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THE EFFECT OF SUPPORTIVE EDUCATION NURSING INTERVENTION ON SELF-EFFICACY OF FAMILY CAREGIVERS CARING FOR DEPENDENT ELDERLY: RANDOMIZED CONTROLLED TRIAL

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Abstract

Objectives: This study aimed to examine the effect of supportive education nursing intervention (SENI) on the self-efficacy of family caregivers caring for dependent elderly.

Materials and Methods: This is a parallel and two-armed randomized control trial. The research was conducted in the work area of primary health facilities in Puskesmas Pasar Ikan with 8 sub-districts in Bengkulu. We recruited 52 family caregivers divided into intervention and control. The supportive educational nursing intervention included audio visual, module book, and worksheet that covered relevant parts of dependent elderly and family caregivers' self-efficacy. The study data were analyzed using chi-square, and independent t-test as well as analysis of variance.

Results: Before the intervention, the total score of family caregivers' self-efficacy was 90.19 and 94.58 in the intervention and control groups, respectively. After the intervention, it increased to 114.23 and 101.58 in the intervention and control groups, respectively, which was statistically significant in both groups ($p<0.001$). Moreover, the mean increase of 24.04 in the experimental group and the mean increase of 7.00 in the control group showed a significant difference between the two groups ($p<0.001$).

Conclusion: The SENI model is an effective way to increase the self-efficacy of family caregivers with dependent elderly. The SENI program can be effectively integrated into primary health services through tailored modifications that account for local contexts and specific healthcare needs.

Keywords: Caregivers, frail elderly, self-efficacy, education, home health nursing, randomized controlled trial.

Introduction

Family caregivers are partners, friends, relatives, or neighbors who help someone with physical, mental, or cognitive disabilities, and these services are usually provided unpaid.[1] In Indonesian culture, family members have an intimate bond with one another called "Ngabdi Wong Tuwo".[2] This cultural preference for independent patient care at home rather than at a hospital leads family caregivers to view this as self-dedication to parents.[3] Indonesian family caregivers require assistance with a range of duties. This entails giving direct care, controlling symptoms, giving emotional support, and handling money. Not only that, but family caregivers must also be able to act as patient advocates, interact with other members of the family, make decisions, navigate the healthcare system, and be ready for an uncertain future.[3,4] Consequently, long-term caregiving for dependents elderly may place a significant burden on other family members.[5]

The prevalence of family caregiver burden globally ranges from 25% to 54%, with evidence indicating that family caregivers in Indonesia typically experience a moderate level of burden in their caregiving roles.[5–7] Family caregiver burden can arise because of the caregiver's duties, negative consequences such as a role in providing care to patients, which causes high pressure felt by the family.[8] The caregiving burden diminishes caregivers' well-being and sleep quality due to the emotional and physical demands they experience.[9] In addition, the caregiving burden affects the quality of life and increases symptoms of depression among family caregivers.[10]

Self-efficacy is known to be able to have a positive influence on family caregivers in increasing confidence and ability to care for the elderly and can directly reduce psychological distress when dealing with various challenges in caring for the elderly.[11,12] Self-efficacy is a psychological factor that greatly influences stress tolerance and family caregiver skills in caring for sick family members.[13]

Self-efficacy is an important phenomenon in understanding the impact of the care tasks undertaken by family caregivers. The characteristics that define self-efficacy in family caregivers include their sense of assurance, competence, and confidence in their capacity to care for adult family members, friends, or members of the community.[7] Self-efficacy will influence motivation to act, levels of depression, anxiety, and feelings of disappointment experienced by the family.[11,12]

Family caregiver self-efficacy, particularly confidence in managing caregiving demands and self-care, is significantly associated with lower stress levels, emphasizing the need for healthcare practitioners to support family caregivers' self-care to prevent health issues.[12,14] Research results show that effective adaptation skills can help family caregivers survive, avoid mental health disorders, and improve quality of life.[9,15] A self-management program can lessen the burden and improve the self-efficacy of family caregivers.[16,17]

Supportive educational nursing interventions based on Orem's nursing theory can promote better nursing care through education, support, and guidance.[18–20] Supportive education nursing intervention is a simple, affordable, and useful program that can decrease the burden and improve the self-efficacy of family caregivers.[19] There is a lack of formal training and home visitation services in Indonesia that would empower family caregivers to offer patient care at home.[4]To reduce the burden on family caregivers, it is recommended to improve home healthcare quality, provide support and education, and promote patient independence. [21]

The use of supportive education nursing intervention for enhancing the self-efficacy of family caregivers providing care for dependent elderly individuals in Indonesia remains relatively unknown, despite the known obstacles. In summary, we aimed to investigate the effect of supportive educational nursing intervention on family caregivers who care for dependent elderly. It was expected that family caregivers' self-efficacy would rise following the use of supportive educational nursing intervention.

Materials and Methods

Research design

This study was designed as a parallel and two-armed randomized control trial. Before the intervention, the pretest was conducted at baseline, and the post-test was completed five weeks later. This study adheres to the CONSORT guidelines.[22] Eligible participants were allocated (1:1) after completion of the enrollment and baseline measures using simple random (block size of 2,4) assigned to the intervention group or the control group by university IT staff. The university IT staff was not involved in any part of this study and used a computer-generated random sequence to randomize participants.

Setting and samples

The research was conducted in the work area of primary health facilities in Puskesmas Pasar Ikan with 8 sub-districts in Bengkulu. Researchers purposefully chose all participants who met the requirements by reviewing medical record data at the primary health facilities. To reflect on the diversity of the participants, investigators assessed the patient's level of dependency with the Barthel index. The total number of family caregivers living with the elderly who are dependent and need long-term care across the 8 sub-districts in Puskesmas Pasar Ikan in this study is approximately 167. All participants who carried out this study agreed to informed consent.

The sample size was calculated using G*Power 3.1.9.7 software. To compare the means between the two groups with a one-tailed test at a level of significance (α) = 0.05, power of the test (1-β) = 0.80, a large effect size (d) of 0.7, and an allocation ratio N2/N1 = 1.[20] The minimum sample size per group was calculated as 26. A total of

167 potential eligible family caregivers were evaluated, of which 52 eligible family caregivers were randomized until reached 26 participants in each group (Figure 1).

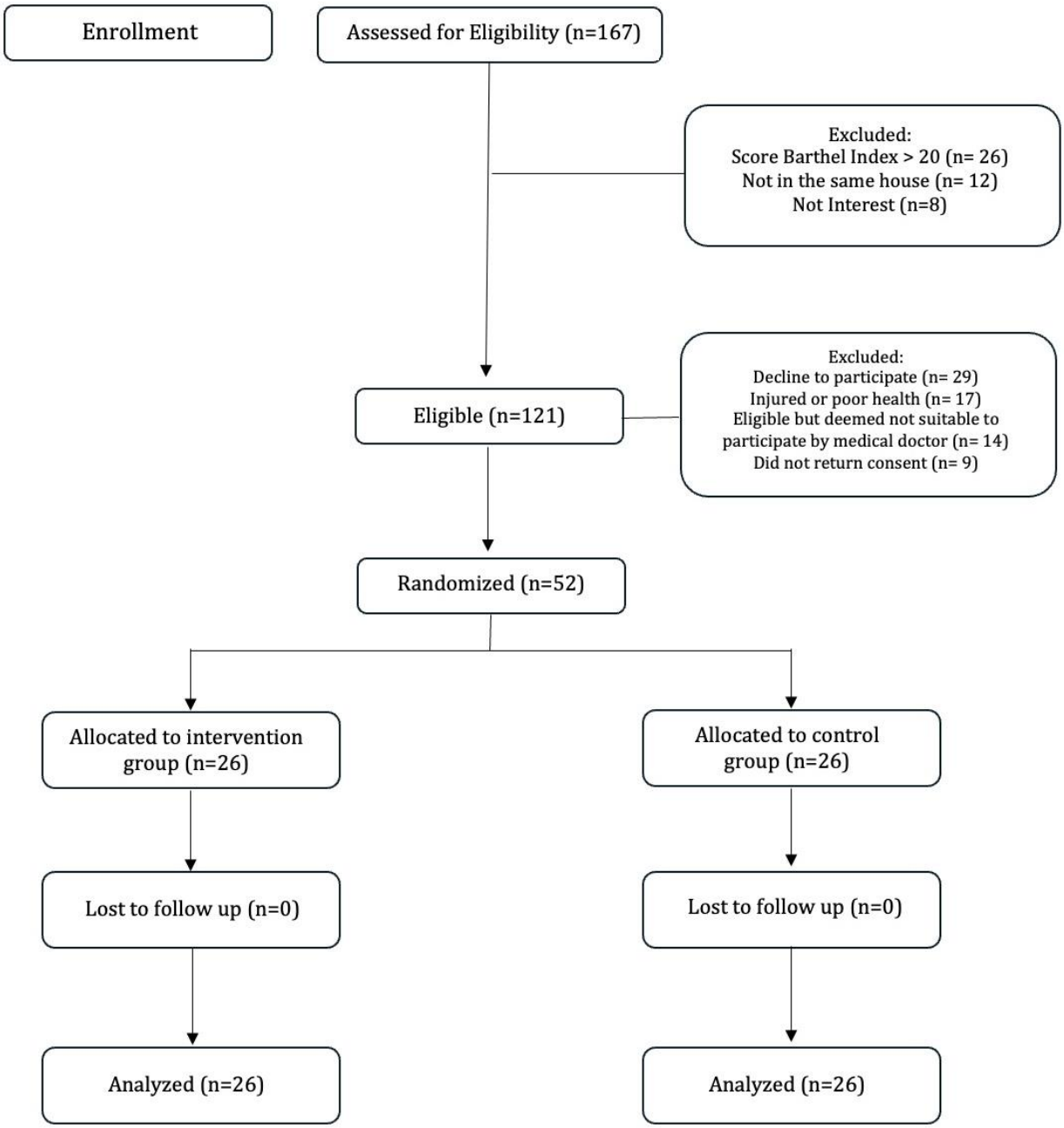

Figure 1. The flow diagram of the study

The following eligible family caregivers included those who were the patient's primary family caregiver and shared a home; were 18 years or older; caring for patients with total dependence based on the Barthel index and willing to spend time for the process of the research. Family caregivers who were already receiving therapeutic intervention to decrease their burden or caring for nursing home-dependent elderly during the recruitment period were excluded. Approaches to potential participants who met the eligibility criteria were carried out to explain the aims, benefits, and procedures of the research. After potential participants signed the consent form, the researcher then conducted a pretest.

Intervention

The researchers developed a supportive educational nursing intervention after reviewing the relevant literature. The supportive educational nursing intervention included audio visual, module book, and worksheet that covered relevant parts of dependent elderly and caregivers' self-efficacy, as well as an overview of how to be a good family caregiver and strategies needed to care for dependent elderly, such as stressors and obstacles to being a family caregiver, the need of topical care, self-care, activity daily living and emergencies of the dependent elderly. Two researchers (TA, NY) conducted all the instructional sessions to guarantee consistency in the implementation of the intervention. Every participant in the intervention group was visited door to door by researchers for 45 minutes as part of supportive educational nursing intervention sessions. The role and self-efficacy of family caregivers are enhanced using audiovisual and educational video-based module books, which facilitate discussions, presentations, and further explanations. The content of educational videos, which are made to meet specific objectives, includes details about the responsibilities, capacities, and self-efficacy of family caregivers in providing care for dependent elderly people as well as the characteristics of such individuals. A worksheet and module were created to pinpoint the work, appropriate, and useful skills for its application to support the researcher's explanation of the instructions.

Measurement and data collection

To investigate the effects of supportive educational nursing interventions on family caregivers, several outcomes were assessed. The study instruments were twofold: (i) a questionnaire for demographic data; and (ii) a self-efficacy questionnaire for family caregivers. The purpose of the demographic information questionnaire was to gather data about participant characteristics, including age, gender, education level, length of caregiving experience, and type of employment. We also created questions about illnesses, such as a specific type of disease.

We evaluated the self-efficacy of family caregivers using the Caregiving Inventory (CGI) developed by Merluzzi, et al. [23] The 21-item Caregiver Inventory is divided into four subscales: managing medical information, caring for the care recipient, taking care of oneself, and handling challenging interactions and emotions associated with tasks performed when taking care of ill family members. The instrument uses a Likert scale, with the number 1 indicating not at all confident in carrying out the treatment, and the value 9 indicating very confident in completing the action. The reliability score of the Caregiver Inventory translated into Bahasa Indonesia was 0.85.[24] We received permission to use the CGI from Merluzzi, et al also the CGI Bahasa version from Rochmawati & Prawitasari.[23,24]

The procedures outlined below were followed in conducting this study. Following official approval from the director of Puskesmas Pasar Ikan and an explanation of the study's objectives to the head nurses, the researchers started gathering data with a preparatory phase in which all family caregivers who were eligible and cared for dependent elderly people during the time frame set were asked to participate in the study and signed a written informed consent form. The patients who fulfilled the inclusion requirements and gave their consent to participate were then divided into two groups: the intervention group and the control group.

The study was conducted over five weeks, two days a week (Wednesday and Saturday) from 8:00 a.m. to 5:00 p.m. at the Puskesmas Pasar Ikan primary health facilities work area. It took a lot of hard work for the researchers to determine the schedule to set for the intervention group. Every Sunday, participants were contacted to schedule weekly meetings in the intervention group. Each session lasts 45 minutes with details of 15 minutes for material sessions and 30 minutes for discussion sessions with family caregivers.

Based on four of Orem's theories, the intervention group got routine home visits and SENI: "teaching" through PowerPoint and audiovisual education, "guiding" through weekly worksheets, "supporting" through weekly phone calls, and "developmental environment" with the provision of a module book. Based on Orem's "teaching" and "guiding" theories, the control group was only given routine home visits. The family caregiver's worksheet must be completed, and it will be updated each time the researcher visits.

In the control group, family caregivers' health problems were addressed in a nursing consultation following the usual home visit of health monitoring dependent elderly in primary care, without considering the factors associated with family caregivers' care that cause burden. During the design and development of the trial, there was no specific protocol in the primary care service for family caregivers.

Following the presentation in the orientation session, the family caregivers were given a written educational program outlining the learning objectives and subject matter for each session. Next, a questionnaire was used to evaluate self-efficacy and the traits of family caregivers. Family caregivers received information about diseases, the significance of providing care for the elderly who are dependent, and how to oversee their self-

care throughout sessions one through four. The SENI program covered a wide range of topics and methods, including worksheets, instructional videos, PowerPoint slideshows, and modules. Table 1 provides a summary of the SENI program's goals and contents.

Table 1. The content of the Supportive Educative Nursing Intervention program

Session	Content	Goals	Methods
Orientation	Introducing the instructors and family caregivers to each other and overview of the program Discussion of the importance of the program both for patients and caregivers and completion of a questionnaire by family caregivers	To introduce family caregivers to the program and establish a rapport of trust between family caregivers and instructors	Question–Answer
Week 1	Emphasis on the importance of caregiver's roles Discussion about how to care-dependent elderly	To identify the role of caregivers To understand the disease and its symptoms	Lecture, question–answer discussion, delivering PowerPoint and audio-visual education
Week 2	Teaching about self-care, managing the patient's symptoms, and referring the patient to an emergency	To recognize the emergencies of dependent elderly	Lecture, question–answer discussion, audio-visual education.
Week 3	Discussion about adaptation to caregiving roles by promoting coping strategies and self-efficacy Orientation toward problem-solving methods and time management in the caregiving situation	To promote family caregivers' self-efficacy To promote the capability of caregiving	Lecture, question–answer consultation, PowerPoint
Week 4	Explanation of the importance of self-care in caregiving and completion of a post-test questionnaire by family caregivers	To maintain and promote caregivers' physical and mental health	Lecture, question–answer, delivering PowerPoint and audio-visual education

Each session included a lecture from the researcher in the first half and a conversation between the researcher and the family caregiver in the second half. The caregivers talked about alternate approaches to their caring roles and related and shared their experiences in caring for dependent elderly.

Data analysis

Using SPSS 24 software, the collected data were arranged, tabulated, and statistically examined (IBM Corp, 2021). Descriptive statistics (Mean ± SD and percentage) were utilized to analyze the demographic data. Using the chi-square and t-test, the homogeneity of the intervention and control groups with considering demographic data was evaluated. In addition, we compared the baseline characteristics of the participants who completed the follow-up assessments (completers) and those who were lost to follow-up (drop-out). The two groups' data were normally distributed according to the Kolmogorov-Smirnov test, so the independent sample t-test was used to compare the data between the groups, and the paired sample t-test was used to compare the data within the groups before and after the intervention. A fixed significance level of $p < 0.05$ was used to interpret the significance test results.

Ethical considerations

The study was approved by the Faculty of Public Health Sriwijaya University with number Institutional Review Board is 288/UN9.FKM/TU.KKE/2023. Following an explanation of the study's goal, each participant gave written consent to take part in the research and was given the assurance that all information collected would be kept completely confidential and used only for that purpose. The researchers stated that participation in this study was completely voluntary and anonymous. It was also explained to participants that declining to take part in the study would not have any negative effects on their health.

Results

Data was available for 52 participants who took part in this study. Their demographic characteristics are described in Table 2. The mean age of participants is 51.44±6.37 years. The homogeneity of variables such as sex, education, employment, patient's medical diagnoses, and income was assessed using a chi-square test, and then age and length of caregiving were assessed using an independent t-test, which divided the different levels of variables into two intervention and control groups. The mean±SD age (years) and length of caregiving (years) were 51.15±7.15 and 3.80±2.48 in the intervention group, respectively, and 51.73±5.62 and 3.42±1.94 in the control group (Table 2).

Table 2. Demographic Characteristics of Family Caregivers

Characteristic		Intervention Group n (%)	Control Group n (%)	X^2/t	p-value
Age (years)	Mean (SD)	51.15 (7.15)	51.73 (5.62)	-0.323[a]	0.187
Length of Caregiving (years)	Mean (SD)	3.80 (2.48)	3.42 (1.94)	0.622[a]	0.234
Sex	Male	20 (76,1)	20 (76.9)	0.332[b]	0.565
	Female	6 (23.1)	6 (23.1)		
Education	Literate	13 (50)	17 (65.4)	0.709[b]	0.400
	Not Literate	13 (50)	9 (34.6)		
Employment	Employee	10 (38.5)	13 (50)	0.312[b]	0.577
	Not employee	16 (61.5)	13 (50)		
Patient's medical diagnose	Stroke	10 (38.5)	11 (42.3)	0.876[b]	0.645
	Diabetes	4 (15.4)	6 (23.1)		
	Osteoporosis	12 (46.2)	9 (34.6)		
Income	< minimum wage	10 (38.5)	13 (50)	0.312[b]	0.577
	≥ minimum wage	16 (61.5)	13 (50)		

[a] Independent t-test [b] Chi-square, minimum wage = IDR 2.494.915

The mean score of family caregiver's self-efficacy was 20.19±17.88 in the intervention group and 94.58±22.38 in the control group before the intervention and changed to 114.23±18.35 in the intervention group and 101.58±22.03 in the control group after the intervention (Table 3). Based on the results of the paired t-test, the mean score of family caregiver self-efficacy had a statistically significant change in the intervention and control group ($p<0.001$). Based on the independent t-test, the mean score of family caregiver's self-efficacy before intervention had no significant difference between the two groups ($p>0.05$). However, after intervention, the mean score of family caregiver self-efficacy had a statistically significant difference between the two groups ($p<0.05$). In addition, the mean increase of 24.04 in the experimental group and a mean increase of 7.00 in the control group showed a significant difference between the two groups ($p<0.001$).

Table 3. The comparison of the mean and standard deviation of the family caregivers' self-efficacy before and after the intervention

Family caregivers' self-efficacy	Pre-Intervention		Post-Intervention			Pre-Post Differences		
	M	SD	M	SD	P-value**	Effect size	M	SD
Intervention Group (n=26)	90.19	17.88	114.23	18.35	<0.001	0.623	-24.04	5.64
Control Group (n=26)	94.58	22.38	101.58	22.03	<0.001		-7.00	4.11
p-value*	0.439		0.029				<0.001	

* Independent t-test
** Paired t-test

Discussion

The results of this study indicate that the intervention using Supportive Education Nursing Intervention (SENI) is significantly different from other interventions and can increase the self-efficacy of the patient's family to reduce the burden on family caregivers. The same results were also shown by previous research regarding the self-efficacy of hemodialysis patients by Wasalamah, et al, that Supportive Education Nursing Intervention (SENI) Orem's theory can increase self-efficacy. Other research explains the significant influence of the application of SENI in increasing the knowledge and attitudes of participants who are breast cancer patients.[20,25]

Some mentioned a variety of interventions such as direct education, showing motivational videos, arm stretching, using booklets, monitoring, and closing with a final evaluation.[25] Apart from that, intervention activities are also mentioned in 3 categories, namely teaching, guiding, and supporting which are carried out in a hybrid manner (online and offline) for participants.[20,26] Different media are mentioned in other studies, specifically the usage of media in the form of animated films and early childhood logbooks with light games.[27]

Orem nursing theory is a comprehensive self-nursing theory that provides the most appropriate clinical guidelines for planning and implementing self-nursing principles. In his philosophy, the main thing in Orem's theory is to prepare individuals to be able to take care of themselves. Self-efficacy is a factor related to self-care behavior.[28] Self-efficacy is the belief a person has in their ability to adopt a behavior and achieve the expected results.[29] The results of this research show that there is a connection between self-efficacy and Orem theory. Supportive Nursing Education Intervention (SENI) based on the Orem theory, can increase caregivers' self-efficacy. Good self-efficacy enables family caregivers to manage caregiving burdens and psychological distress

more effectively, utilize positive coping strategies, reduce depression, and enhance their overall psychological well-being. [13,14,17]

Future research could explore integrating community engagement into Supportive Education Nursing Interventions (SENI) to enhance family caregivers' self-efficacy within Orem's framework. This includes investigating the role of local organizations and community support systems in strengthening caregivers' skills and confidence, as well as examining how regular community meetings and collaborative dialogues can address challenges and refine caregiving practices.[30] Additionally, research could assess the impact of community-driven initiatives on caregivers' quality of life and their ability to manage caregiving demands.

Conclusion

We have shown a positive rise in the self-efficacy of caregiving with the supportive educational nursing intervention that was specifically designed for family caregivers of elderly dependents in Bengkulu. Thus, by taking into consideration and putting this program into practice, healthcare professionals, especially nurses, can play a significant role in assisting family caregivers.

The findings of the current study must be considered within its limitations. Because of their personal and financial circumstances, family caregivers' opinions about providing care may have varied between the interventional and control groups. Researchers attempted to control this issue by random allocation of the family caregivers to the groups. The purpose of using modules as a "developmental environment" tool was for participants to read the module, but researchers were unable to verify that this was the case. Researchers confirmed directly to participants when weekly phone calls and meetings. In addition to providing interventions for respondents in the intervention and control groups, researchers participated in the data collection process. This may cause bias in the study's findings.

Family caregiver burden can arise because of the caregiver's duties and role in providing care to patients. Self-efficacy can be something important to prevent a burden on family caregivers. With self-efficacy, family caregivers can directly reduce psychological distress when dealing with challenges in caring. The SENI nursing care model represents an innovative and evidence-based approach to enhancing family caregivers' self-efficacy while simultaneously mitigating and preventing caregiver burden. By empowering caregivers with the knowledge, skills, and support necessary to navigate the complexities of caregiving, the SENI model addresses both the practical and emotional dimensions of care.

Integrating the SENI program into primary health services holds significant potential to improve health outcomes for both caregivers and care recipients. This integration can be optimized through context-specific adaptations that consider local cultural, social, and healthcare system dynamics. Tailored modifications might

include alignment with local healthcare policies, and incorporation of community resources to enhance accessibility and relevance.

Ethical Considerations: The study was approved by the Faculty of Public Health Sriwijaya University with number Institutional Review Board is 288/UN9.FKM/TU.KKE/2023.

Conflict of Interest: The authors declare no conflict of interest.

Acknowledgment: The authors wish to acknowledge the developers of the scales who provided permission to use and modify them to suit the study. The nursing staff at Puskesmas Pasar Ikan are thanked for their support during the recruitment of the participants.

References

1. Schulz R, Beach SR, Czaja SJ, Martire LM, Monin JK. Family caregiving for older adults. Vol. 71, Annual Review of Psychology. Annual Reviews Inc.; 2020. p. 635–59.
2. Ningsih W. Empowerment of family the "Ngabdi Wong Tuwo" with caregiver training for elderly stroke suffering in Jabung Village Plupuh Sragen. Jurnal Pengabdian Masyarakat Kesehatan. 2022;8(3):231–40.
3. Yustisia N, Aprilatutini T, Utama TA, Masdar M. The burden experience of family caregiver of older adults with chronic illness. Research in Community and Public Health Nursing. 2023 Jun 1;34(2):85–95.
4. Purba CIH, Johnston B, Kotronoulas G. An exploration of family caregivers' health care needs when caring for patients with cancer in the resource-challenged context of West Java, Indonesia. Semin Oncol Nurs. 2023 Jun 1;39(3).
5. Putri YSE, Putra IGNE, Falahaini A, Wardani IY. Factors associated with caregiver burden in caregivers of older patients with dementia in Indonesia. Int J Environ Res Public Health. 2022 Sep 29;19(19):12437.
6. Salsabila N, Pratiwi H, Emaliyawati E. The overview of caregiver burden in families with hemodialysis patient. 2024; Available from: https://doi.org/10.37287/ijghr.v6i3.3199.
7. Khan TS, Hirschman KB, McHugh MD, Naylor MD. Self-efficacy of family caregivers of older adults with cognitive impairment: A concept analysis. Nurs Forum (Auckl). 2021;56(1):112–26.
8. Effendy C, Uligraff DK, Sari SH, Angraini F, Chandra L. Experiences of family caregivers of children with cancer while receiving home-based pediatric palliative care in Indonesia: A qualitative study. BMC Palliat Care. 2022;21(1):1–10.
9. Yang Z, Sun F, Zhao L, Hu T, Lin X, Guo Y. Self-efficacy and well-being in the association between caregiver burden and sleep quality among caregivers of elderly patients having multiple chronic conditions in rural China: a serial multiple mediation analysis. BMC Nurs. 2023 Nov 13;22(1):424.
10. Loo YX, Yan S, Low LL. Caregiver burden and its prevalence, measurement scales, predictive factors and impact: A review with an Asian perspective. Singapore Med J. 2022 Oct;63(10):593–603.
11. Arenella K, Steffen AM. Self-reassurance and self-efficacy for controlling upsetting thoughts predict depression, anxiety, and perceived stress in help-seeking female family caregivers. Int Psychogeriatr. 2020;32(2):229–40.
12. Samia LW, O'Sullivan A, Fallon KC, Aboueissa AM, Hepburn KW. Building on self-efficacy for experienced family caregivers: The savvy advanced program. Gerontologist. 2019;59(5):973–82.

13. Mohamed Mahmoud A, Helmy Osman L, Mohamed El- Sayed Gaafar M, Ibrahim Hassan gomaa N. Depression, burden, and self-efficacy among caregiving parents of children with cancer. Egyptian Journal of Health Care. 2022 Jun 1;13(2):385–401.
14. Wang Y xin, Cai C, Zhu Y xin, Shi W li, Cheng B, Li C yang, et al. Family burden and psychological distress among Chinese caregivers of elderly people with dementia: A moderated mediation model. BMC Nurs. 2024 Oct 8;23(1):723.
15. Leung DYP, Chan HYL, Chiu PKC, Lo RSK, Lee LLY. Source of social support and caregiving self-efficacy on caregiver burden and patient's quality of life: A path analysis on patients with palliative care needs and their caregivers. Int J Environ Res Public Health. 2020;17(15):1–13.
16. Banitalebi S, Etemadifar S, Kheiri S, Masoudi R. The effect of a self-management program on care burden and self-efficacy in family caregivers of people with multiple sclerosis. Journal of Nursing Research. 2022;30(5):E234.
17. Khouban-Shargh R, Mirhosseini S, Ghasempour S, Basirinezhad MH, Abbasi A. Stress management training program to address caregiver burden and perceived stress among family caregivers of patients undergoing hemodialysis: A randomized controlled trial study. BMC Nephrol. 2024 Oct 14;25(1):350.
18. Martínez N, Connelly CD, Pérez A, Calero P. Self-care: A concept analysis. Int J Nurs Sci. 2021 Oct;8(4):418–25.
19. Khademian Z, Ara FK, Gholamzadeh S. The effect of self care education based on Orem ' s nursing theory on quality of life and self-efficacy in patients with hypertension. International Jurnal Community Based Nurs Midwifery. 2019;8(2):140–9.
20. Wasalamah B, Alim S, Widyandana D. Supportive educative nursing intervention (SENI) as intervention in enhancing self-efficacy among hemodialysis patients. Journal of Health Sciences and Medical Development. 2022;1(01):1–11.
21. Gürsoy E, Eren S. Care Burden and Influencing Factors of Elderly Patients Receiving Home Health Care: Perspectives of Patients and Caregivers. Ankara Medical Journal. 2023;23(4):389–99.
22. Schulz KF, Altman DG, Moher D, Group the C. CONSORT 2010 Statement: Updated guidelines for reporting parallel group randomised trials. BMC Med. 2010;8(1):18.
23. Merluzzi T V., Philip EJ, Vachon DO, Heitzmann CA. Assessment of self-efficacy for caregiving: The critical role of self-care in caregiver stress and burden. Palliat Support Care. 2011;9(1):15–24.
24. Rochmawati E, Prawitasari Y. Perceived caregiving preparedness and quality of life among Indonesian family caregivers of patients with life-limiting illness. Int J Palliat Nurs. 2021;27(6):293–301.
25. Waluya JG, Rahayuwati L, Lukman M. Pengaruh supportive educative nursing intervention (SENI) terhadap pengetahuan dan sikap penyintas kanker payudara. Media Karya Kesehatan. 2019;2(2):128–44.

26. Anggraini D, Antika T, Kusuma R, Sudrajat DA, Komariyah NA. Pemberian supportive educative nursing intervention (SENI) dalam upaya peningkatan aktivitas fisik penyintas kanker payudara. Jurnal Penabdian Masyarakat Al Irsyad (JPMA). 2022;4(2):54–67.
27. Hasanah PN, Aprilianti R, Sri Hikmayani A. Pengembangan metode supportive educative nursing intervention for stunting (SENI-S) sebagai media edukasi gemar makan ikan pada anak usia dini. Early Childhood: Jurnal Pendidikan. 2022;6(2):100–15.
28. Alligood MR. Nursing theorists and their work. 10th edition. St. Louis, Missouri: Elsevier; 2022.
29. Fereidooni GJ, Ghofranipour F, Zarei F. Interplay of self-care, self-efficacy, and health deviation self-care requisites: A study on type 2 diabetes patients through the lens of Orem's self-care theory. BMC primary care. 2024;25(1):48.
30. Sacks E, Schleiff M, Were M, Chowdhury AM, Perry HB. Communities, universal health coverage and primary health care. Bull World Health Organ. 2020 Nov 1;98(11):773–80.

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Research Article

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THE RELATIONSHIP BETWEEN DOCTORS' PERSONALITY TYPES ACCORDING TO ENNEAGRAM TYPOLOGY AND THEIR CHOICE OF MEDICAL SPECIALTY

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Abstract

Objectives: An individual's personality affects many choices in their life, as well as their choice of profession and specialty. The aim of this study is to examine the effect of physicians' personality type on their preference for specialization in medicine.

Materials and Methods: This research was designed as a cross-sectional study. In this study, sample selection was made from all the residents undergoing specialty training at Ankara City Hospital by stratified sampling method, based on the number of residents in internal medicine, surgery, and basic sciences. A personal data collection form was used as a data collection tool and the "Taştan Personality Type Inventory" was used to determine personality type.

Results: According to the personality type scale, most of the participants were identified as the 'helper' personality type. While there was no significant relationship in the comparison of the three major branches according to personality type, a significant difference was found in the double comparison of internal and surgical sciences. According to this result, it was determined that most of the "achiever" and "challenger" type physicians were in surgical departments.

Conclusion: Personality models can be used as a tool for specialty selection by medical students and physicians. Therefore, personality-type education could be incorporated into the medical curriculum. This would allow medical students to recognize their traits during their education and make more informed choices regarding their specialty.

Keywords: Medical specialities, personality, medical education.

Introduction

The concept of personality is one of the most important parts of efforts to understand others. Personality is a structure of human emotions, behavioral patterns, thoughts, and psychological structure and determines a person's unique adaptation to life. Many theories about personality were put forward and personality was examined from many different aspects. One of these methods is the Enneagram methodology.[1–3]

There are 9 basic personality types in the Enneagram model, and each has its own positive and negative characteristics. The types do not have superiority over one another; rather, they have their differences. This model examines healthy, average, and unhealthy behaviors of 9 personality types through their connections with one another.[4]

Enneagram is a model that examines personality from a very broad perspective and offers suggestions for change and development. It is a model used to help people in many other areas of life such as to make the right choice according to their tendencies and to recognize their improvable and negative behaviors.[4]

We can define profession as all the activities that individuals acquire as a result of education, which meet certain conditions and provide financial gain. A profession provides not only financial gain but also spiritual satisfaction accompanied by the feeling of being useful. Professional life constitutes a large part of life and has an important place in terms of a person's satisfaction and happiness in life.[2]

For physicians, choosing a specialty is like a new career choice, and the choices affect their whole life. The decision to receive training in a particular area for the rest of their lives is of critical importance, and the wrong choice may have negative effects on their lives. Choosing a profession or specialty that suits the characteristics of their personality is very important both in terms of the person's professional satisfaction and happiness and in terms of the benefit they will provide to their community. While there are many external factors to affect the choice of specialty such as financial gain, working conditions, and workload, the most important internal factor is personality type. The physician's choice will affect their functionality, satisfaction, and happiness in life. Previous studies also revealed that differences in people's professional interests are largely affected by their personality.[2,5,6]

Although there are studies conducted with different personality inventories on physicians and medical students, not many studies were found using the enneagram methodology.

This study aims to examine whether the enneagram types of physicians in different specialties are effective in their specialty preferences and to increase awareness of personality theories among physicians.

Materials and Methods

This research was designed as an observational, cross-sectional study.

Data collection forms

A survey consisting of a personal data collection form and Taştan Personality Type Inventory (TPTI)[7] was conducted on resident physicians who agreed to participate in the study, through e-mail and the survey application method under observation between 15.08.22 and 15.10.22. All participants included in the study have given written consent. The personal data collection form included information on age, gender, marital status, and specialty. In this study, personality types were determined according to TPTI. TPTI consists of 44 questions. It is a Likert-type scale and graded from 0 (definitely no) to 6 (definitely yes). The scale contains 44 items and has nine subtypes, each consisting of a personality type. The scale was developed by Taştan et al. Certain questions on the scale indicate the characteristics of a certain personality type. Personality type number one is defined as "*reformer*", personality type number two is "*helper*", personality type number three is "*achiever*", personality type number four is *"individualist",* personality type number five is "*investigator*", personality type number six is "*loyalist*", personality type number seven is "*enthusiast*", personality type number eight is "*challenger*", and personality type number nine is "*peacemaker*".[7]

The population of this research consists of approximately 2000 residents undergoing specialty training at Ankara City Hospital, and the sample consists of residents who were selected according to the distribution of internal, surgical, and basic departments among the residents working at Ankara City Hospital and volunteered to participate in the study. A stratified sampling method was used in sample selection, and the sample size was calculated according to a 95% confidence interval and a 5% margin of error. Accordingly, it was aimed to reach 197 and 113 physicians from internal departments and surgical departments, respectively. Since the number of resident physicians in basic departments was insufficient to represent the population, it was aimed to reach all 54 residents in this field. A total of 365 people, 207 of them in internal departments, 113 of them in surgical departments, and 45 of them in basic departments, who received medical specialty training at Ankara City Hospital and volunteered to participate, were included in the study. This survey was administered to 367 residents, but since 2 participants gave the same answers to all the questions in the TPTI and received equal scores from all personality types, these participants were not included in the statistical analysis.

The data was obtained from 365 participants in this research and the analysis was evaluated with appropriate statistical methods in the IBM SPSS Statistics 22 (SPSS Inc., Chicago, IL) program. The survey method was used in this research. Moreover, in the research reliability analyses were conducted for the scales and Cronbach Alpha coefficients were calculated. The Cronbach Alpha coefficient for TPTI was calculated as 0.820, and that

indicates the scale to be highly reliable. In the analysis of the data, descriptive categorical data are shown as number (n) and percentage (%), and quantitative data are shown as mean and standard deviation values, skewness, kurtosis, and minimum and maximum values. It was determined that there was no missing value in the data. Independent Sample T Test was used to compare the means of two independent groups, and the One-Way ANOVA test was used to compare the means of more than two groups. Pearson Correlation test was used to examine the relationship between quantitative variables, and Pearson Chi-Square analysis was used to determine the relationship between categorical data. Additionally, the significance value for all the results was taken as $p<0.05$.

Results

The results of a total of 365 participants, 207 from internal departments, 113 from surgical departments, and 45 from basic departments, were analyzed. It was observed that the age of the participants in this study was mean±SD= 28.29±2.72 years *(*Min.= 24, Max.= 49). When the gender variable was examined, it was determined that 111 (30.2%) of the participants were male and 254 (69.6%) were female. When the marital status variable was examined, it was seen that 200 (54.8%) of the participants were single, 5 (1.4%) were divorced/widowed, and 160 (43.8%) were married. Of the participants, 207 (56.7%) were from internal departments, 113 (31.0%) were from surgical departments, and 45 (12.3%) were from basic departments.

In this study, we found that there are physicians of every personality type in almost every branch.

There was no significant relationship between the major branch in which the physician specializes and their personality types ($p>0.05$) (Table 1).

Since there was no significant relationship in the comparison of the three major branches, a pairwise comparison was made between internal and surgical departments by excluding basic departments because of the low number of residents. This comparison is given in detail in Table 2. Accordingly, a significant relationship was found between the major branch in which physicians specialize and their personality types ($p=0.03$).

The most common personality types among physicians specializing in Family Medicine were the "*reformer*", "*helper"* and "*peacemaker*" respectively (Table 3).

Table 1. Examining the Relationship Between the Major Branch of Physicians' Specialization and Personality Types

	Variables	Major Branches						Total
		Internal Departments		Surgical Departments		Basic Departments		
		n	%	n	%	n	%	
Personality Types	Reformer	56	61.5	24	26.4	11	12.1	91
	Helper	57	58.2	31	31.6	10	10.2	98
	Achiever	18	39.1	21	45.7	7	15.2	46
	Individualist	5	55.6	3	33.3	1	11.1	9
	Investigator	5	71.4	2	28.6	0	0	7
	Loyalist	5	38.5	5	38.5	3	23.1	13
	Enthusiast	21	65.6	6	18.8	5	15.6	32
	Challenger	9	39.1	12	52.2	2	8.7	23
	Peacemaker	31	67.4	9	19.6	6	13.0	46
χ^2 =20.810		p=0.186						365

Table 2. Comparison of Personality Types of Physicians in Internal Medicine and Surgical Branches

Variables		Major Branches				Total n (%)
		Internal		Surgical		
		n	%	n	%	
Personality Types	Reformer	56	70	24	30	80 (100)
	χ^2=1.318 p=0.251					
	Helper	57	64.8	31	35.2	88 (100)
	χ 2=0.001 p=0.984					
	Achiever	18	46.2	21	53.8	39(100)
	χ 2=6.679 p=**0.010**					
	Individualist	5	62.5	3	37.5	8(100)
	χ 2=0.017 p=0.896					
	Investigator	5	71.4	2	28.6	7 (100)
	χ^2=0.142 p=0.706					
	Loyalist	5	50	5	50	10 (100)
	χ 2=0.975 p=0.323					
	Enthusiast	21	77.8	6	22.2	27 (100)
	χ 2=2.212 p=0.137					
	Challenger	9	42,9	12	57.1	21 (100)
	χ 2=4.689 p=**0.030**					
	Peacemaker	31	77.5	9	22.5	40 (100)
	χ^2=3.285 p=0.070					
χ^2=17.235	p=**0.028**					**320**

Table 3. Examination of Personality Distribution of Physicians Working in the Department of Family Medicine

Variables		Family medicine	
		n	%
Personality Types	Reformer	22	26.8
	Helper	20	24.4
	Achiever	5	6.1
	Individualist	2	2.4
	Investigator	3	3.7
	Loyalist	2	2.4
	Enthusiast	9	11
	Challenger	3	3.7
	Peacemaker	16	19.5

While the majority of the male physicians were in the "*reformer*" personality type, the majority of female physicians were in the "*helper*" personality type. A significant relationship was found between the physician's personality type and their gender (p=0.01). In the detailed analysis conducted to find out at what personality level there is a significant difference between gender and personality type, the "*helper*" personality type was found to be significant in favor of female physicians (p=0.002), while the "*challenger*" personality type was found to be significant in favor of male physicians (p=0.001).

There was no significant relationship between personality type and marital status of the participating physicians (p>0.05).

Discussion

As far as the research goes, there was no study in the literature examining the relationship between the enneagram model personality type and medical specialty branch preference. There was no statistically significant difference between the personality type and medical specialty branch preferences of the residents who received specialty training at Ankara City Hospital, considering all the major branches. Another comparison was made between internal and surgical departments and a significant difference was observed between the two branches. While that was the case in this study, a study conducted by Akış et al. using five-factor personality traits in residents found that there was no significant difference between personality traits and specialty branch preferences.[5]

It was determined that the most common personality types among the resident physicians who participated in our study were *"helper"* and *"reformer"*. The most common personality type in internal departments and surgical departments was "*helper"*, while the most common personality type in basic departments was

"*reformer*". In a study conducted by Erçin, the most common personality type in healthcare professionals was the *"reformer"* type.[8] In another study conducted by Taştan and Aktürk on university employees and students, the most common personality type in the Türkiye sample was found to be the *"helper"* type, however, it was found that as the level of education increased, the *"reformer*" type of personality increased.[9] Another study conducted in Korea found that the most common personality types among medical students were *"peacemaker"* and "*reformer*".[10] It can be said that the prevalence of personality types varies from society to society. Thus, this sample group is compatible with the Türkiye sample average. It can be predicted that type 2 (*helper type*), who care about the needs of those around them and like to help, are self-sacrificing and compassionate, will choose medicine, which is a profession that requires a lot of sacrifice and sensitivity to people's needs, and this situation is parallel to the results of the study. On the other hand, it is expected that the "*reformer*" personality type, which is an idealistic, principled, and sensitive type in their responsibilities, will turn to medicine, a profession that requires idealism and responsibility. Moreover, it is expected that the "*helper*" type will be more commonly found in internal and surgical branches. Those branches have one-on-one communication with the patients, and they require more dedication. In a study conducted by Subaş et al. on school administrators, the most common personality types were found to be "*peacemaker*" and "*challenger*". This result suggests that the distribution of personality types varies from profession to profession.[11]

In this study, a significant difference was found between internal and surgical departments on personality type, and this difference was in the "*achiever*" and "*challenger*" types. "*Achiever"* and "challenger" types were more likely to choose a surgical branch. In a study conducted by Sievert et al. using a temperament and character inventory, the most common cluster in general surgery residents was the "commanding" cluster.[6] This cluster has temperamental characteristics such as independence, autonomy, and assertiveness and shows similar characteristics to the type 8 "*challenger*" type in the Enneagram. On the other hand, type 3 (*achiever type*), who are ambitious, competitive, do not like to be idle, care about their image, are goal-oriented and self-motivated, can be expected to turn to surgical branches that require high motivation and long hours of work, and this case shows similarity to the results of this study. It is expected that type 8 (*challenger type*), who likes to take risks, and is a challenging and strong type, will turn to surgical branches that require risk-taking, quick decision-making, and being strong. Therefore, it may show that physicians with this personality type make a more appropriate choice if they choose the surgical branch.

In this study, family medicine residents within internal departments were evaluated and a sufficient number of residents for analysis was reached, therefore personality type distribution for them was examined. The most common personality types in the family medicine field were identified as "*reformer"*, "*helper"* and "*peacemaker"* respectively. These results show that family medicine, which adopts a holistic approach, fits the Ankara City Hospital resident physician profile and the general Türkiye sample profile. Person-centered care, community orientation, original problem-solving skills, comprehensive approach, primary care management, and holistic

modeling are the core competencies of family medicine, and they overlap with the characteristics of the "*reformer*" personality type. A review study conducted by Borges and Savickas revealed that family physicians have a high awareness of rules, they care more about ideas and imagination than practices, they are more thought-oriented than general surgery and anesthesia, and their conscientious aspects are more dominant. Family physicians were observed to be more organized and persistent. In other studies, examined, family physicians were found to be emotion-oriented.[12] Having a high awareness of rules, being organized, and being persistent can be reconciled with the characteristics of the "*reformer*" type in the enneagram, who are rule-oriented, principled, have a high sense of responsibility, are meticulous and organized. Their predominance of conscientiousness and emotional focus can be reconciled with the characteristics of the "*helper*" type in the emotional center triad, who are selfless, attach importance to emotional sharing, and are very sensitive to the needs of those around them. All these results support that people who choose Family Medicine are more prone to "*reformer*" and *"helper*" personality types.

In this study, a significant relationship was found between physicians' personality type and gender. Most of the men were "*reformer"* type, while most of the women were "*helper"* type. In a study by Taştan and Aktürk investigating the personality type distribution in a Türkiye sample of 1646 people, consisting of university students and employees, the "*helper"* personality type was found equally in women and men, while the rate of "*reformer"* was found higher in men.[9] It can be said that the results of this study are parallel to these results. In this study, the "*helper"* type was found to be significantly higher in favor of women, while the "*challenger"* type was found to be significantly higher in favor of men. In a study conducted by Yüksel on university students, the "*individualist"* type was found to be significant in favor of women, while the "*investigator"* type was found to be significant in favor of men[13]. In a study conducted by Erçin on people admitted to the hospital, the "*achiever"* type was found to be significant in favor of men. Moreover, in this study, the most common type in both men and women is the "*reformer"* type.[8] With these results, it can be inferred that the distribution of personality types according to gender varies according to the population. It can also be concluded that one cannot say that any enneagram type is gender-specific.

In this study, the relationship between personality type and medical specialty branch preference was examined. Medicine is a discipline where all personality types can find a suitable field in terms of branch diversity. Although physicians seem to represent a homogeneous group in terms of personality traits and abilities, differences may emerge during the specialty selection. The branch choice can be considered as a new career choice, and personality type can be taken into consideration for such an important choice.

Physicians constitute a heterogeneous group; however, it can be said that different personality types can adapt to different branches. By becoming aware of their personalities and abilities, physicians can focus on how they

can more efficiently utilize the skills resulting from these personalities in their branches. It would also be useful to conduct studies on the success strategies of different personality types in the same branch.

It would be beneficial to conduct more comprehensive studies on the subject in basic departments that can reach a sufficient number of people. Moreover, expanding the scope of the research and comparing all major and minor branches within internal, surgical, and basic departments according to personality type may provide more meaningful results in terms of reaching more homogeneous groups. The relationship between personality type and branch selection can be examined by using different personality inventories.

Limitations of the Study: Although the sample was conducted with several resident physicians that can be generalized to the educational institution where it is located, the limitations of this study are that it is limited to only residents, that it does not represent all physicians, as the number of residents in basic departments is insufficient, resident doctors were not grouped according to their seniority years, they were not grouped according to sociodemographic characteristics, and that we must use two different methods as a survey application method.

Ethical Considerations: Our study was conducted following the Helsinki Declaration Principles. The study was conducted with the approval of Ankara City Hospital No. 2 Clinical Research Ethics Committee. (Decision No: E2-22-2234, Date: 03/08/2022).

Conflict of Interest: The authors declare no conflict of interest.

References

1. Triandis HC, Suh EM. Cultural influences on personality. *Annu Rev Psychol*. 2002;53:133-60 (doi:10.1146/annurev.psych.53.100901.135200).
2. Yıldız S. Kişilik ve Meslek Seçimi Arasındaki İlişki ve Bir Uygulama. Yüksek Lisans Tezi, Uludağ Üniversitesi Sosyal Bilimler Enstitüsü, Çalışma Ekonomisi ve Endüstri İlişkileri Anabilim Dalı, Bursa; 2001:4-48.
3. Bozik FB. Evli Bireylerin Enneagram Kişilik Tipleriyle Evlilik Uyumları Arasındaki İlişkinin İncelenmesi. Yüksek Lisans Tezi, İstanbul Sabahattin Zaim Üniversitesi Lisansüstü Eğitim Enstitüsü, Aile Danışmanlığı Anabilim Dalı, İstanbul; 2021:5-9.
4. Acarkan İ. *Enneagram ile Kendini Keşfet*. 5. Baskı. İstanbul: Timaş Yayınları; 2022:6-22.
5. Akis N, Taneri PE, Avsar Baldan G, Aydin A. The effects of personality traits and other variables on the specialty choices of resident doctors. *Turkish Journal of Public Health* 2018;16(2):157-66 (doi:10.20518/TJPH.458355).
6. Sievert M, Zwir I, Cloninger KM, Lester N, Rozsa S, Cloninger CR. The influence of temperament and character profiles on specialty choice and well-being in medical residents. *PeerJ*. 2016;4:e2319 (doi:10.7717/PEERJ.2319/SUPP-2).
7. Taştan K. Development and Validation of a Personality Type Inventory Based on Enneagram. *Konuralp Medical Journal*. 2019;11(1):112-8 (doi:10.18521/KTD.462049).
8. Erçin HŞ. Sağlıklı Yaşam Biçimi Davranışları ile Enneagram Kişilik Tipleri Arasındaki İlişkinin Değerlendirilmesi. Tıpta Uzmanlık Tezi, Yıldırım Beyazıt Üniversitesi Tıp Fakültesi, Aile Hekimliği Anabilim Dalı, Ankara; 2018:50.
9. Aktürk Z, Taştan K. Frequency of personality types based on enneagram in a Turkish sample: A web-based cross-sectional study. *Ortadoğu Medical Journal*. 2020;12(2):211-8 (doi:10.21601/ORTADOGUTIPDERGISI.722751).
10. Hur Y, Lee K ho, Hur Y, Lee K ho. Analysis of Medical Students' Enneagram Personality Types, Stress, and Developmental Level. *Korean J Med Educ*. 2011;23(3):175-84 (doi:10.3946/KJME.2011.23.3.175).
11. Subaş A. Okul Yöneticilerinin Liderlik Stilleri ile Enneagram Kişilik Tipleri Arasındaki İlişkinin İncelenmesi. Doktora Tezi, Marmara Üniversitesi Eğitim Bilimleri Enstitüsü, Eğitim Bilimleri Anabilim Dalı, İstanbul; 2017:156-7.
12. Borges NJ, Savickas ML. Personality and Medical Specialty Choice: A Literature Review and Integration. *Journal of Career Assessment*, 2002;*10*(3),362-80 (doi.org/10.1177/10672702010003006).
13. Yüksel A, Kızılgeçit M. Enneagram Kişilik Modeli Bağlamında İlahiyat Fakültesi Öğrencilerinin Kişilik Özelliklerinin Bazı Değişkenler Açısından İncelenmesi. *Türk Din Psikolojisi Dergisi*. 2021;(3):9-38.

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Research Article

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MEDICATION ADHERENCE AND SELF-EFFICACY IN PATIENTS ON POLYPHARMACY

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Abstract

Objectives: Polypharmacy is defined as the use of multiple medications or the use of more medications than medically necessary, though there is no consensus on a precise definition. This study aimed to identify self-efficacy, treatment adherence, and the most influential factors affecting treatment adherence in patients with polypharmacy.

Materials and Methods: Patients using at least two medications were included in the study. A questionnaire, prepared based on a literature review, and the Medication Adherence Self-Efficacy Scale Short Form (MASES-SF) were administered to determine the patient's sociodemographic characteristics, disease status, types of medications used, and self-efficacy.

Results: The mean age of the 414 patients participating in the study was 59.9±11.8 years. Of the patients, 58.5% (n: 242) were female and 41.5% were male. There were significant differences in the mean scores of the Medication Adherence Self-Efficacy Scale based on the number of medications used and the number of chronic diseases. Patients using 2 medications had higher self-efficacy levels in medication adherence compared to those using 4 or more medications, and patients with 1 chronic disease had higher self-efficacy levels compared to those with 3 or more chronic diseases. Additionally, treatment adherence and self-efficacy were higher in males, patients with primary education, and those who visited doctors more frequently.

Conclusion: Identifying the factors that complicate treatment adherence in patients with multiple chronic diseases and high medication use, developing solutions to these problems, and increasing awareness among physicians can slow the progression of the disease and reduce the economic costs of adverse outcomes in our country.

Keywords: Chronic disease, polypharmacy, treatment adherence, self-efficacy.

Introduction

Polypharmacy, or the use of multiple medications, affects both the health and economic aspects of our country as it does globally. Polypharmacy is defined, though not universally agreed upon, as the use of multiple medications or the use of more medications than medically necessary.[1] The prevalence of polypharmacy reported in the literature varies between 10% and 90%, depending on age group, diagnostic criteria, healthcare services, and the geographic location of the study.[2] A study by Midao et al. across 17 European countries and Israel reported a polypharmacy rate of 39.9%.[3]

In academic literature, "chronic diseases" encompasses many different definitions. According to the World Health Organization (WHO), chronic diseases are non-communicable, slow, and long-lasting conditions generally categorized into four main groups: cardiovascular diseases, cancers, chronic obstructive pulmonary disease (COPD), and respiratory diseases like asthma, and diabetes.[4]

Factors such as sedentary lifestyles, fast food consumption, stress, and radiation exposure have become more prevalent compared to the past. This increase in chronic diseases consequently leads to greater medication use.[5]

Treatment adherence is one of the most crucial factors determining the success of chronic disease management. Treatment adherence encompasses whether patients take their medications at the correct dose, at the correct time, and with the appropriate frequency. It also includes adherence to lifestyle changes and recommendations from healthcare professionals. Studies have shown that treatment adherence can vary based on the form of treatment, specific characteristics of the disease, and the patient's socio-demographic characteristics. Polypharmacy has become an increasingly significant issue worldwide.[6] Studies indicate that adherence rates for patients with chronic diseases are around 40-50% in developed countries, while in developing countries, these rates are much lower. Numerous factors contribute to poor treatment adherence, including low socioeconomic status, lack of awareness of the disease, and inadequate communication between patient and physician. Medication-related factors such as dosage regimen, administration method, side effects, and cost also complicate adherence.[7]

The requirement for multiple medications can complicate medication adherence and lead to inappropriate medication use. Inappropriate medication use can prevent patients from deriving sufficient benefits from their medications and may even cause harm.[8]

Various methods, including self-reports and counting medications from prescriptions, are used to evaluate treatment adherence. Self-reporting is considered an easy and suitable method for assessing adherence. Several questionnaires and scales have been developed to determine adherence.[9]

Self-efficacy is the individual's confidence in their abilities, knowledge, and skills. It is the belief in one's capability to complete a specific task or manage a particular situation. Individuals with strong self-efficacy are more likely to adhere to prescribed treatments and follow recommendations.[10]

This study aims to identify the self-efficacy of patients on polypharmacy, their medication adherence, and the factors most affecting their treatment adherence. Consequently, identifying and addressing these issues will be more feasible. Increased awareness of these problems among all physicians, starting from primary care providers, and implementing preventive measures will enhance medication adherence and self-efficacy among patients.

Materials and Methods

This descriptive, cross-sectional study was conducted with individuals who visited the Internal Medicine Clinic of Karabük University Training and Research Hospital between December 1, 2023, and December 30, 2023, who were using at least two medications and agreed to participate (n = 414). Once the participants had been made aware of the subject matter and scope of the study, the questionnaire was administered to those who had consented to participate in the study utilizing a face-to-face interview. A consent form was then completed. It should be noted that patients were at liberty to withdraw from the study at any time. A questionnaire prepared by the researchers, based on a review of the literature, and the Medication Adherence Self-Efficacy Scale Short Form (MASES-SF) were used to determine the sociodemographic characteristics of the patients, their disease status, the types of medications they used, and their self-efficacy. Individuals who were not mentally capable of understanding and answering the questionnaire, those who refused to participate, and patients using fewer than two medications during the study period were excluded from the study. The study commenced after obtaining approval from the Karabük University Training and Research Hospital Ethics Committee with approval number 2023/ 1577.

The Medication Adherence Self-Efficacy Scale Short Form (MASES-SF) is a straightforward questionnaire designed to assess patients' self-efficacy levels regarding adherence to medication regimens and provides detailed information about the patient. The reliability coefficient of the scale is 0.94. It was developed by Ogedegbe et al. in 2003 and revised by Fernandez et al. in 2008. The Turkish version was adapted by Hacıhasanoğlu et al. in 2012, and its validity and reliability were established. This scale evaluates patients' medication adherence, factors affecting adherence and the individual's self-efficacy (confidence) level. Scores

on this scale range from a minimum of 13 to a maximum of 52, with higher scores indicating better medication adherence.

Statistical analysis was performed using the SPSS (Statistical Package for Social Sciences) for Windows 20.0 program. Mean, median, standard deviation, minimum, and maximum values were calculated. The Chi-Square test was used for comparing qualitative data. Results were presented as frequencies, percentages, and mean±standard deviation. The non-parametric Mann-Whitney U test was used for comparing data. Statistical significance was accepted at $p<0.05$ with a 95% confidence interval.

Results

The mean age of the 414 patients participating in the study was 59.9±11.8 years. Of the patients, 58.5% (n=242) were female and 41.5% were male. Sixty-five percent of the patients had completed primary education, and more than half of them (58.5%) had an income equal to their expenses. Sixty-four point seven percent of the patients lived in urban centers. It was found that 38.4% of the patients visited a doctor every three months, 41.8% had three or more chronic diseases, and 49.0% used four or more medications. Thirty-seven percent of the patients reported that they had not received education about their disease, while 56.5% indicated that they had received education from healthcare professionals. 69% of the patients (n=286) were diagnosed with Diabetes Mellitus, 63.5% (n=263) with Hypertension, and 25.8% (n=107) with Coronary Artery Disease. 22.8% of the patients had one chronic disease, 35.5% had two chronic diseases, and 41.8% had three or more chronic diseases. The distribution of chronic diseases among the patients and the sociodemographic characteristics of the patients are presented in Table 1a, Table 1b, and Table 2.

Table 1a. Demographic Characteristics of Patients (n=414)

	Number (n)	Percentage (%)
Gender		
Female	242	58.5
Male	172	41.5
Educational Background		
Illiterate	46	11.1
Primary School	269	65.0
High School and Above	99	23.9
Income Level		
Income Less Than Expenses	148	35.7
Income Equal to Expenses	242	58.5
Income Greater Than Expenses	24	5.8
Place of Residence		
City Center	268	64.7
District	77	18.6
Village	69	16.7

Table 1b. Demographic Characteristics of Patients (n=414)

	Number (n)	Percentage (%)
Frequency of Doctor Visits		
Frequently	92	22.2
Every 3 months	159	38.4
Every 6 months	110	26.6
Annually	53	12.8
Status of Receiving Education About Your Disease		
Did not receive education	153	37.0
Received from a healthcare professional	234	56.5
Heard from a neighbor	11	2.7
Heard from social media	16	3.8
Number of Medications Used		
2	111	26.8
3	100	24.2
4 or More	203	49.0
Number of Chronic Diseases		
1	94	22.7
2	147	35.5
3 or More	173	41.8
Total	**414**	**100**

When examining the Medication Adherence Self-Efficacy Scale scores based on the types of medications used by the patients, the mean total score of all patients on the Medication Adherence Self-Efficacy Scale was found to be 38.5±8.8. The mean scores on the Medication Adherence Self-Efficacy Scale according to chronic diseases and types of medications used are shown in Table 2. The mean score for patients with diabetes was 38.3±8.9, whereas the mean score for patients with chronic respiratory diseases such as asthma-COPD was 39.4±8.4. The lowest mean score on the Medication Adherence Self-Efficacy Scale was for vitamin medications (34.7±8.9), while the highest mean score was for inhaler medications (39.6±8.6).

Table 2. Mean Scores on the Medication Adherence Self-Efficacy Scale for Patients and Types of Medications Used

Diseases	Mean	Standard deviation	Medications	Mean	Standard deviation
Diabetes Mellitus (n=286)	38.3	8.9	Vitamin (n=80)	34.7	8.9
Heart disease (n=107)	39.3	8.7	Analgesics (n=152)	38.4	8.3
Thyroid Disorders (n=96)	38.4	8.5	Diabetic Medications (n=280)	38.3	8.7
Psychiatric Disorders (n=46)	37.0	8.4	Anticoagulants (n=186)	39.4	8.5
Chronic respiratory	39.4	8.4	Thyroid Medications (n=96)	38.5	8.5
			Psychiatric Medications (n=49)	37.1	8.5
			Inhaler Medications (n=174)	39.6	8.6
Total	**38.5**	**8.8**			

The mean scores on the Medication Adherence Self-Efficacy Scale were significantly higher for male patients compared to female patients (t=25.95; p=0.01). A significant difference in the mean scores on the Medication Adherence Self-Efficacy Scale was found based on educational level; patients with primary education had higher medication adherence self-efficacy compared to patients with secondary or higher education (p=0.04). There was a significant difference in the mean scores on the Medication Adherence Self-Efficacy Scale based on the frequency of doctor visits; patients who visited the doctor every three months had higher medication adherence self-efficacy compared to those who visited every six months (p=0.07). A significant difference in the mean scores on the Medication Adherence Self-Efficacy Scale was found based on the number of medications used; patients using two medications had higher medication adherence self-efficacy compared to those using four or more medications (p=0.036). A significant difference in the mean scores on Medication Adherence

Self-Efficacy Scale was observed based on the number of chronic diseases; patients with one chronic disease had higher medication adherence self-efficacy compared to those with three or more chronic diseases (p=0.039). The comparison of the average scores of patients on the medication adherence/self-efficacy scale according to different variables is detailed in Table 3.

Table 3. Comparison of Mean Scores on the Medication Adherence Self-Efficacy Scale by Various Variables

Variables	Mean±sd	Test Statistics	P value
Gender			
Female	37.5±8.6	t=25.96	0.010
Male	39.8±8.9		
Educational Background			
Illiterate	36.7±7.5	F=4.169	0.016
Primary School	39.4±9.1*		
High School and Above	36.8±8.1*		
Frequency of Doctor Visits			
Frequently	37.5±9.5	F=4.151	0.006
Every 3 months	40.2±8.1*		
Every 6 months	36.6±8.4*		
Annually	39.0±9.3		
Number of Medications Used			
2 units	36.8±9.0*	F=3.181	0.43
3 units	38.4±9.4		
4 and above	39.4±8.2*		
Number of Chronic Diseases			
1 unit	36.6±8.8*	F=3.127	0.45
2 units	38.6±8.9		
3 and above	**39.4±8.6***		

*Indicates a statistically significant difference between groups.

Discussion

Chronic diseases are typically slow-progressing, long-term health issues that often persist for a lifetime and lack definitive cures. These conditions impact the quality of life and require ongoing medical intervention. If untreated, they can lead to more severe health problems. Chronic diseases do not appear suddenly; they develop over time, which is why the prevalence of many chronic conditions increases with age. Consequently, a significant proportion of the elderly population suffers from one or more chronic diseases. Multiple chronic conditions affect not only adults but also adolescents and children. For instance, 13% of young individuals and 95% of older adults have at least two chronic conditions.[11,12]

Factors such as sedentary lifestyle, fast food consumption, stress, and radiation exposure have become more prevalent compared to the past. This has led to an increase in chronic diseases and, consequently, greater medication use. The need for multiple medications can complicate treatment adherence. Therefore, for patients with multiple chronic conditions who use many medications, it is crucial to be very careful when adding extra medications to their regimen. In a study conducted by Kara et al. in 2017, an increase in the number of medications used daily was associated with decreased medication adherence. Dezii et al. compared patients with hypertension on a single medication regimen to those on a combination of molecules using two separate medications and found higher adherence with fewer medications.[13] Our study also observed that medication adherence decreased with an increase in the number of medications and the number of chronic conditions. Although many studies in the literature show a decrease in adherence with an increasing number of medications, some studies suggest that medication adherence is not necessarily related to the number of medications used.[14-16]

In our study, the mean total score on the Medication Adherence Self-Efficacy Scale for all participants was found to be 38.5±8.8. Hacıhasanoğlu et al. found a mean score of 37.38±11.06 in their Turkish adaptation study of the scale in 2012, while Kankaya et al. reported a score of 38.99±1.17 in their study.[17,18] Factors such as age, gender, marital status, education level, income level, daily medication use, and frequency of doctor visits significantly affect treatment adherence. In a study by Mollaoğlu et al., medication adherence and self-efficacy scores were lower in men.[19] Kankaya et al. also reported lower adherence in men.[18] In another study by Demirbas et al., patients with education beyond primary school and those with an income greater than their expenses had higher adherence scores.[20] Turhan et al. (2014) showed that gender, marital status, and education level influenced medication adherence in geriatric patients, noting higher adherence in those with higher education levels, married individuals, and men.[14] However, Özdemir et al. found that age, marital status, and education level did not affect medication adherence self-efficacy scores.[21] Contrary to most literature, our study found higher adherence self-efficacy scores in men, patients with primary education, and those who visited the doctor more frequently. This might be due to women performing more household duties and visiting doctors less

frequently. Since a significant portion of our study participants had only primary education, it is suggested that individuals with lower education levels have higher medication adherence self-efficacy due to more frequent doctor visits.

In our study, the lowest mean score on the Medication Adherence Self-Efficacy Scale was found for vitamin medications, while the highest adherence was associated with inhaler medications. In a study by Sönmez et al. in 2014, the highest adherence was reported for thyroid medications, osteoporosis medications, and cardiovascular medications.[22] The higher adherence to inhaler medications in our study is thought to be due to the rapid onset of disease symptoms if the medication is not used. The lower scores for vitamin medications are believed to be due to the slower resolution of symptoms and the less severe symptoms upon discontinuation compared to other medications.

In conclusion, It is essential to assess medication adherence in patients using multiple medications and with multiple comorbidities and to increase awareness of this assessment among physicians. If physicians can identify the reasons for poor adherence in patients with multiple chronic diseases and multiple medications, and find solutions to these problems, this will both slow the progression of disease and reduce the economic cost of ill health to our country.

Ethical Considerations: The study was approved by Karabük University, Health Sciences Ethics Committee with the date and approval number 07.12.2023-1577.

Conflict of Interest: The authors declare no conflict of interest.

References

1. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in the elderly. Expert Opinion on Drug Safety. 2014;13(1):57-65.
2. Khezrian M, McNeil CJ, Murray AD, Myint PK. An overview of prevalence, determinants, and health outcomes of polypharmacy. Therapeutic Advances in Drug Safety. 2020;11:2042098620933741.
3. Midão L, Giardini A, Menditto E, Kardas P, Costa E. Polypharmacy prevalence among older adults based on the survey of health, ageing and retirement in Europe. Archives of Gerontology and Geriatrics. 2018;78:213-20.
4. Williams A, Manias E, Walker R. Interventions to improve medication adherence in people with multiple chronic conditions: a systematic review. Journal of Advanced Nursing. 2008;63(2):132-43.
5. Azad N, Tierney M, Victor G, Kumar P. Adverse drug events in the elderly population admitted to a tertiary care hospital. Journal of Healthcare Management. 2002;47(5):295-305.
6. Costa E, Giardini A, Savin M, Menditto E, Lehane E, Laosa O, et al. Interventional tools to improve medication adherence: review of literature. Patient Preference and Adherence. 2015:1303-14.
7. Stewart RB, Caranasos GJ. Medication compliance in the elderly. The Medical Clinics of North America. 1989;73(6):1551-63.
8. Blaschke TF, Osterberg L, Vrijens B, Urquhart J. Adherence to medications: insights arising from studies on the unreliable link between prescribed and actual drug dosing histories. Annual Review of Pharmacology and Toxicology. 2012;52:275-301.
9. Ruddy K, Mayer E, Partridge A. Patient adherence and persistence with oral anticancer treatment. CA: A Cancer Journal for Clinicians. 2009;59(1):56-66.
10. Gözüm S, Aksayan S. Reliability and validity of the Turkish version of the Self-Efficacy Scale. Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi. 1999;2(1).
11. Anderson E, Durstine JL. Physical activity, exercise, and chronic diseases: A brief review. Sports Medicine and Health Science. 2019;1(1):3-10.
12. Dogra S, Copeland JL, Altenburg TM, Heyland DK, Owen N, Dunstan DW. Start with reducing sedentary behavior: a stepwise approach to physical activity counseling in clinical practice. Patient Education and Counseling. 2022;105(6):1353-61.
13. Dezii C. A retrospective study of persistence with single-pill combination therapy vs. concurrent two-pill therapy in patients with hypertension. Managed Care (Langhorne, Pa). 2000;9(9 Suppl):2-6.
14. Turhan Ö, Kibar E, Ekren E, Engin O, Ercan D, Erdal AI, et al. Medication adherence in the elderly: A university hospital-based descriptive study. Nobel Medicus Journal. 2014;10(2).
15. Grant RW, Devita NG, Singer DE, Meigs JB. Polypharmacy and medication adherence in patients with type 2 diabetes. Diabetes Care. 2003;26(5):1408-12.

16. Chapman RH, Petrilla AA, Benner JS, Schwartz JS, Tang SS. Predictors of adherence to concomitant antihypertensive and lipid-lowering medications in older adults: a retrospective, cohort study. Drugs & Aging. 2008;25:885-92.
17. Hacıhasanoğlu R, Gözüm S, Çapık C. Validity of the Turkish version of the medication adherence self-efficacy scale-short form in hypertensive patients. *Anadolu Kardiyol Derg.* 2012;12(3):241-8.
18. Kankaya H, Özer S, Korkmaz M, Karabulut Ö, Kurt E. Medication adherence and self-efficacy in elderly hypertensive patients. Ege University Journal of Nursing Faculty. 2017;33(3):1-10.
19. Mollaoğlu M, Solmaz G, Mollaoğlu M. Adherence to therapy and quality of life in hypertensive patients. Acta Clin Croat. 2015;54(4):438-44.
20. Demirbas N, Kutlu R. Medication adherence and self-efficacy levels in adults using multiple medications. Ankara Medical Journal. 2020;20(2).
21. Özdemir Ö, Akyüz A, Doruk H. Medication adherence in geriatric hypertensive patients. Medical Journal of Bakirkoy. 2016;12(4).
22. Sönmez Y, Aşcı H, Olgun İzmirli G, Gündoğar D, Cankara FN, Yeşilot Ş. Evaluation of potentially inappropriate drug use and medical non-adherence in a community-dwelling elderly population: a cross-sectional study. Turkish Journal of Geriatrics/Türk Geriatri Dergisi. 2014;17(2).

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FACTORS AFFECTING PREGNANCY STRESS AND ITS RELATIONSHIP WITH ADVERSE BIRTH OUTCOMES

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Abstract

Objectives: This study aimed to investigate the association of some sociodemographic characteristics and pregnancy stress levels of pregnant women with adverse birth outcomes.

Materials and Methods: This study was conducted on pregnant women who applied to Hacı Nimet Köseoğlu Family Health Center (FHC) in 2022. A questionnaire was administered twice, prenatally and postnatally. Pregnancy Stress Rating Scale (PSRS) was applied in the first stage. In the second stage of the study, those who completed the first part of the questionnaire were administered the continuation of the questionnaire after delivery. Pearson's test and Fisher's Chi-Square test were used to compare categorical data, and Student's t-test was used to compare the means of two independent groups.

Results: The mean PSRS score of the participants was 97.0 ± 23.7. Those with chronic disease had a higher PSRS score than those without chronic disease ($p=0.011$). Those who experienced numbness in the hands and feet had a significantly higher PSRS score ($p<0.001$). The mean PSRS score of mothers whose babies were given formula after birth was higher than those whose babies were not given formula ($p=0.039$).

Conclusion: Pregnant women with chronic diseases and symptoms such as hand-foot numbness had significantly higher stress levels. A significant relationship was observed between postpartum formula feeding and pregnancy stress levels. Managing factors that may cause pregnancy stress may be beneficial in terms of some adverse birth outcomes, such as postpartum formula feeding.

Keywords: Pregnancy, adverse birth outcomes, pregnant women.

Introduction

Pregnancy is a vital process characterized by biological, physiological, and psychosocial changes and may be accompanied by psychiatric disorders such as stress, anxiety, and depression.[1,2] Although this process usually results in maternal adaptation, this is not always the case. There are studies in the literature showing that stress during pregnancy is associated not only with pregnancy complications such as pre-eclampsia but also with adverse birth outcomes such as miscarriage, preterm birth, and low birth weight. [3-5] There is a strong belief that stress increases adverse birth outcomes, especially in women. [6] However, it is not clear how stress during pregnancy causes these adverse birth outcomes. One leading hypothesis is that stress-induced increased cortisol levels activate corticotropin-releasing hormone to induce preterm labor. [7] Determining the stress level of pregnant individuals and making preventive and therapeutic interventions to reduce the stress level is important in reducing complications and adverse medical conditions during pregnancy, birth, and postpartum. [8,9] In our study, some sociodemographic characteristics and pregnancy stress levels of pregnant women about adverse birth outcomes were investigated.

Materials and Methods

Our study was conducted with pregnant women who were registered in Hacı Nimet Köseoğlu Family Health Center (FHC) in Melikgazi district of Kayseri province between January 1 and December 31, 2022, who applied to the FHC during and after pregnancy for reasons such as pregnancy follow-up, examination and vaccination and who agreed to participate in the study. Our study was designed in two stages. A questionnaire was administered to the participants twice under the supervision of the researchers as a data collection method before and after delivery. In the first stage, sociodemographic characteristics were questioned, and the Pregnancy Stress Rating Scale was applied. The Turkish validity and reliability study of the Pregnancy Stress Rating Scale was conducted, and it was shown to be suitable for further research in the Turkish language. The scale consists of 36 questions and five sub-dimensions. The answers to the questions in the scale are in 5-point Likert type as "absolutely no", "mild", "moderate", "serious", or "very serious", and the answers are scored as 0,1,2,3,4 respectively. The maximum score that can be obtained from the scale is 144, and there is no cut-off score. [10] In the second stage of the study, the people who completed the first part of the questionnaire were administered the continuation of the questionnaire after delivery. The birth history, health status of the baby and mother, and the experience of complications related to childbirth were questioned. Approval for our study was obtained from the Clinical Research Ethics Committee of Kayseri Training and Research Hospital (Date: 30.12.2021, Decision No: 569), and the study was conducted following the principles of the Declaration of Helsinki.

Statistical Analysis

Descriptive statistics for continuous variables were expressed as mean and standard deviation, while categorical variables were expressed as frequency and percentage. The compatibility of the continuous data of the variables with normal distribution was determined by one sample Kolmogorov Smirnov test. Pearson's test and Fisher's Chi-Square test were used to compare categorical data. Student's t-test was used to compare the averages of two independent groups that conformed to the normal distribution in continuous data. In calculations, $p<0.05$ was considered statistically significant at a 95% confidence interval, and statistical data analysis was performed using the IBM SPSS v 21.0 (IBM Corp, Armonk, NY, USA) program.

Results

Our study was completed with a total of 102 people who applied to the FHC in twelve months and agreed to participate in the study. The mean age of the participants was 25.9±4.57 years. The first part of the questionnaire was administered to 17.6% of the participants in the first trimester, 38.2% in the second trimester, and 44.1% in the third trimester. 2.0% of the participants were illiterate, 11.8% were primary school graduates, 21.6% were middle school graduates, 40.2% were high school graduates and 24.5% were university graduates. 55.9% of the participants stated that their income was close to their expenses. 89.2% of the participants did not have any chronic disease. The distribution of variables related to the prenatal, intrapartum, and postnatal histories of the participants is given in detail in Table 1.

Table 1: Distribution of variables related to prenatal, perinatal, and postnatal stories of the participants

Variables		n	%
History of miscarriage	Yes	18	17.6
	No	84	82.4
Preferred mode of delivery	Vaginal delivery	65	63.7
	C/S for medical reasons	30	29.4
	Optional C/S	7	6.9
Presence of any health problem during pregnancy	Yes	49	48.0
	No	53	52.0
Pregnancy outcome	Live birth	99	97.1
	Abortus	3	2.9
Prematurity	Yes	12	12.1
	No	87	87.9
Mode of delivery	Vaginal	39	38.2
	C/S	63	61.8
Infant feeding pattern*	Breast milk	65	65.7
	Breast milk and formula	27	27.3
	Formula	7	7.1
Use of formula	Yes	34	34.3
	No	65	65.7
Incubator status of the baby*	Yes	17	17.2
	No	82	82.8
Any problems in the baby during/after birth*	Yes	8	8.1
	No	91	91.9
Separation of mother and baby*	Yes	14	14.1
	No	85	85.9
Presence of abnormal maternal bleeding	Yes	38	37.3
	No	64	62.7
Any infection in the mother	Yes	5	4.9
	No	97	95.1
Development of any problem in the breast	Yes	31	30.4
	No	71	69.6
Presence of another birth complication	Yes	1	1.0
	No	101	99.0

C/S: Cesarean section.

Frequency analysis was performed.

*: Since the pregnancy process of 3 participants resulted in "miscarriage", they were not included in the analysis.

The most common factors causing the baby to stay in the incubator after birth were jaundice (38.5 %) and respiratory distress (23.1 %). Respiratory distress (33.3 %) and jaundice (22.2 %) were the most common reasons for separating mother and baby after birth. Among the problems seen in the breast at the end of labor, cracking was the most common (50.0 %) (Table 2).

Table 2: Problems occurring in infants and mothers and investigation of causing factors

Variables		n	%
Factors that cause the baby to stay in the incubator	Jaundice	5	38.5
	Respiratory distress	3	23.1
	Prematurity	2	15.4
	Malnutrition	1	7.7
	Spina bifida	1	7.7
Problems detected in the baby	Jaundice	3	37.5
	Meconium	1	12.5
	Spina bifida	1	12.5
	Respiratory distress	1	12.5
	Urinary tract infection	1	12.5
	Renal disease	1	12.5
Factors that cause the baby to be separated from the mother	Respiratory distress	3	33.3
	Jaundice	2	22.2
	Hospitalization of the baby	1	11.1
	Incubator needs	1	11.1
	Suture infection	1	11.1
	Prematurity	1	11.1
Problems occurring in the breast	Crack	8	57.2
	Pain	5	35.7
	Infection	1	7.1

Frequency analysis was performed.

The mean PSRS total score of the participants was 97.0 ± 23.7. The PSRS score of people with chronic diseases was higher than those without chronic diseases (p=0.011). Those who experienced numbness in the hands and feet also had a significantly higher PSRS score (p<0.001) (Table 3).

Table 3: Factors affecting the level of stress in pregnancy

		n	Mean	SD	*P*
History of miscarriage	Yes	18	98.5	20.9	0.763
	No	84	96.6	24.4	
Education	≤High school	36	96.5	26.6	0.893
	>High school	66	97.2	22.2	
Household income	Medium-Good	70	96.4	25.1	0.719
	Bad	32	98.2	20.7	
Chronic disease	Yes	11	114.0	17.9	**0.011**
	No	91	94.9	23.6	
Vaginal discharge bleeding	Yes	10	97.2	16.7	0.973
	No	92	96.9	24.4	
Low back pain	Yes	30	103.0	22.0	0.078
	No	72	94.3	24.1	
Hand-foot numbness	Yes	6	128.0	21.5	**<0,001**
	No	96	95.1	22.6	
Depression	Yes	5	119.0	13.5	0.029
	No	97	95.8	23.6	

Student's t-test was applied.

The mean PSRS scores of mothers whose babies were given postnatal formula were higher than those of mothers whose babies were not given formula (p=0.039). Although the mean PSRS scores of mothers who gave birth to premature babies were higher than those who did not, there was no statistically significant difference between the two groups (p=0.162) (Table 4).

Participants were divided into two groups: those under and over 30 years of age. The groups were compared in terms of pregnancy outcome, prematurity, mode of delivery, birth weight of the baby, postnatal formula use, postnatal incubator stay, presence of abnormal maternal bleeding, and development of infection. Those under 30 years of age had a significantly higher rate of abnormal bleeding than those over 30 years of age (p=0.029). (Table 5)

Table 4: The effect of stress level during pregnancy on adverse birth outcomes

Variables		**n**	**Mean**	**SD**	***P****
Pregnancy outcome	Live birth	99	96.7	23.9	0.506
	Abortus	3	106.0	19.1	
Birth of a premature baby*	Yes	12	106.0	10.7	0.162
	No	87	95.4	25.0	
Mode of delivery	Vaginal	39	99.1	27.2	0.471
	C/S	63	95.6	21.4	
Low birth weight*	Yes	8	98.9	15.8	0.789
	No	91	96.5	24.5	
Feeding status*	Yes	34	104.0	23.4	**0.039**
	No	65	93.1	23.6	
Postpartum incubator needs*	Yes	17	94.8	18.9	0.726
	No	82	97.1	24.9	
Separation of mother and baby*	Yes	14	94.5	19.8	0.714
	No	85	97.0	24.6	
Presence of abnormal bleeding in the mother	Yes	38	101.0	27.8	0.211
	No	64	94.7	20.9	
Development of any infection in the mother	Yes	5	98.0	16.7	0.921
	No	97	96.9	24.1	
Development of any problem in the breast	Yes	31	99.2	24.5	0.539
	No	71	96.0	23.5	

Student's t-test was applied.***:** Since the pregnancy process of 3 participants resulted in "miscarriage", they were not included in the analysis.

Table 5: Comparison of participants above and below 30 years of age according to various variables

Variables		**People under 30 years of age**		**People aged 30 years and older**		***P***
		n	%	n	%	
Pregnancy outcome	Live birth	79	79.8	20	20.2	0.503*
	Abortus	2	66.7	1	32.3	
Giving birth to a premature baby	Yes	11	91.7	1	8.3	0.450*
	No	68	78.2	19	21.8	
Mode of delivery	Vaginal	34	87.2	5	22.8	0.202**
	C/S	47	74.6	16	25.4	
Low birth weight	Yes	6	75.0	2	25.0	0.661*
	No	73	80.2	18	19.8	
Feeding status* **	Yes	26	76.5	8	23.5	0.739**
	No	53	81.5	12	18.5	
The need for a postpartum incubator	Yes	13	76.5	4	23.5	0.743*
	No	66	80.5	16	19.5	
Presence of abnormal maternal bleeding	Yes	35	92.1	3	7.9	**0.029****
	No	46	71.9	18	28.1	
Development of any infection in the mother	Yes	5	100.0	0	0.0	0.581*
	No	76	78.4	21	21.6	

***:** Fisher's exact chi-square test

****:** Chi-squared test with Yates correction

*****:** Since the pregnancy process of 3 participants resulted in "miscarriage", they were not included in the analysis.

Discussion

Pregnancy stress refers to concerns directly related to the pregnancy itself, such as fetal and maternal scans, infant health and development, changes in lifestyle due to motherhood, and fear of childbirth.[11] In a study of pregnant women attending the obstetrics and gynecology outpatient clinic at a public hospital in the Mediterranean region, the mean PSRS score of pregnant women was 94.9±7.2 (min:69-max:113). [12] Similarly, the mean score of the participants in our study was found to be 97.0±23.7.

In a study conducted on pregnant women, it was observed that there was a significant negative relationship between pregnancy stress and breastfeeding success. [13] On the other hand, a study of 594 participants suggested that inadequate management of pregnancy stress may lead to the development of postpartum depression. [14] A study by Dunn et al. showed that women with postpartum depression had higher rates of breastfeeding discontinuation. [15] Karahan et al. also found that women who exclusively breastfed their babies had lower rates of postpartum depression than those who fed their babies with formula. [16] In our study, it was observed that those with high pregnancy stress levels were more likely to give formula to their babies. Considering that breastfeeding has positive effects on both infant and maternal health according to the World Health Organization (WHO) and that WHO recommends exclusive breastfeeding for the first six months, it seems that combating prenatal stress will indirectly affect both maternal and infant health. [17]

An Australian study found that women with a history of miscarriage were more likely to experience sadness or depressed mood, anxiety, and stress during subsequent pregnancies. [18] However, in our study, there was no statistically significant difference between pregnant women with a history of miscarriage and those without a history of miscarriage in terms of the mean score of PSRS. It has been shown in the literature that stress during pregnancy may also be caused by a lack of social support. [19] The difference may be because social support elements such as family or relatives are relatively developed in our country. [20]

As the pregnancy process becomes risky, pregnant women are more affected psychologically and physiologically, and their stress levels increase. [21] Pregnant women with certain chronic diseases are known to be at higher risk of adverse pregnancy outcomes. [22] In the literature, it has been observed in some studies that pregnant women with chronic diseases have higher stress levels. [21] Our study supports this finding, and stress levels were significantly higher in pregnant women with at least one chronic disease.

Studies have found different results for the relationship between the educational level of individuals and pregnancy stress. In a study conducted by Sis and Atasever in 2020, it was observed that the educational level of individuals was a factor affecting the level of stress they had. [23] In a study conducted with pregnant women enrolled in family health centers located in the center of a province in eastern Turkey, it was observed that

women with low educational levels had higher pregnancy stress.[21] However, no significant relationship was found between educational level and pregnancy stress in our study. There are also studies in the literature that support our findings.[11,12] This difference may be due to the variability in the methods of expression or measurement of the stress level of individuals.

It is known that musculoskeletal and nervous system symptoms of negative emotions such as anxiety and worry include symptoms such as numbness and tingling. [24] In support of this, our study found that levels of pregnancy stress were significantly higher in those who experienced numbness in their hands and feet. Monitoring physical symptoms such as numbness and tingling in pregnant women may help assess pregnancy stress management and the course of the process.

In a study conducted by Zhang et al. on pregnant women, no statistically significant relationship was found between the stress level of pregnant women and C/S delivery, preterm labor, and low birth weight. [25] However, there are also publications showing that stress during pregnancy may be associated with preterm labor. [26] In a case-control study conducted by Lilliecreutz et al. in 2016, 54% of women who experienced stress during pregnancy had preterm labor. [27] In our study, although the rate of preterm labor was higher in women with higher levels of pregnancy stress, no significant relationship was found between preterm labor and pregnancy stress. The difference may be due to confounding factors that may affect preterm labor.

Although there are studies in the literature showing that excessive exposure to glucocorticoids in the mother due to dysregulation in the hypothalamic-pituitary-adrenal axis due to stress during pregnancy is associated with low birth weight, there are also studies to the contrary. [28] A Polish study showed that stress during pregnancy was not associated with low birth weight. [29] In our study, no difference was observed in terms of infant birth weight between pregnant women with and without high PSRS scores.

Although advanced age is considered a risk factor for postpartum hemorrhage, in our study, the proportion of women with abnormal postpartum hemorrhage was higher in women below 30 years of age compared to women above 30 years of age. [30] Since it is known that various external factors, such as prolonged trauma and intervention delivery, may also affect postpartum hemorrhage, the difference may be due to the confounding effect of these external factors.

As a result, pregnant women with chronic diseases and symptoms such as hand-foot numbness had significantly higher stress levels. A significant relationship was observed between giving formula to the baby after birth and pregnancy stress level. In women under 30 years of age, the rate of abnormal bleeding was significantly higher than in women over 30 years of age. Managing the factors that may cause pregnancy stress by regular follow-up of pregnant women by providing preventive health care services, especially in primary care, may be beneficial in terms of some adverse birth outcomes such as postpartum formula feeding.

Limitations

Since the population of the study consisted of pregnant women who applied to FHC, our study has limitations in representing the general population.

Ethical Considerations: Approval for our study was obtained from the Clinical Research Ethics Committee of Kayseri Training and Research Hospital (Date: 30.12.2021, Decision No: 569), and the study was conducted following the principles of the Declaration of Helsinki.

Conflict of Interest: The authors declare no conflict of interest.

References

1. Russell JA, Douglas AJ, Ingram CD. Brain preparations for maternity—adaptive changes in behavioral and neuroendocrine systems during pregnancy and lactation. An overview. Prog Brain Res. 2001;133:1-38. (doi:10.1016/s0079-6123(01)33002-9).
2. Becker M, Weinberger T, Chandy A, Schmukler S. Depression during pregnancy and postpartum. Curr Psychiatry Rep. 2016;18(3):32. (doi:10.1007/s11920-016-0664-7).
3. Lawrence BC, Kheyfets A, Carvalho K, et al. The impact of psychosocial stress on maternal health outcomes: a multi-state PRAMS 8 (2016-2018) analysis. Journal of Health Disparities Research and Practice. 2022;15(2): 7.
4. Lima SAM, El Dib RP, Rodrigues MRK, et al. Is the risk of low birth weight or preterm labor greater when maternal stress is experienced during pregnancy? A systematic review and meta-analysis of cohort studies. PloS One. 2018; 13(7): e0200594. (doi:10.1371/journal.pone.0200594).
5. Beijers R, Buitelaar JK, de Weerth C. Mechanisms underlying the effects of prenatal psychosocial stress on child outcomes: beyond the HPA axis. Eur Child Adolesc Psychiatry. 2014;23(10):943-56. (doi:10.1007/s00787-014-0566-3).
6. Qu F, Wu Y, Zhu Y-H, et al. The association between psychological stress and miscarriage: a systematic review and meta-analysis. Sci Rep. 2017;7(1):1731. (doi:10.1038/s41598-017-01792-3).
7. Thomson M. The physiological roles of placental corticotropin releasing hormone in pregnancy and childbirth. J Physiol Biochem. 2013;69(3):559-73. (doi:10.1007/s13105-012-0227-2).
8. Talge NM, Neal C, Glover V, et al. Antenatal maternal stress and long-term effects on child neurodevelopment: how and why?. J Child Psychol Psychiatry. 2007;48(3-4):245-61. (doi:10.1111/j.1469-7610.2006.01714.x).
9. Tollenaar M, Beijers R, Jansen J, Riksen-Walraven J, De Weerth C. Maternal prenatal stress and cortisol reactivity to stressors in human infants. Stress. 2011;14(1):53-65. (doi:10.3109/10253890.2010.499485).
10. Aksoy SD, Dutucu N, Özdilek R, Bektaş HA, Keçeci A. Gebelik Stresi Değerlendirme Ölçeği'nin Türkçe'ye uyarlanması ve faktör analizi. KOU Sag Bil Derg. 2019;5(1):10-4. (doi: 10.30934/kusbed.467716).
11. Zehra Ü, Pasinlioğlu T. Primipar ve multipar gebelerde doğum ve postpartum döneme ilişkin endişelerin belirlenmesi. HSP. 2015;2(3):306-17. (doi: 10.17681/hsp.96963).
12. Bakır N, Demir C, Şener N. Gebelerin yaşadiği stres ve gebelik semptomlari arasindaki ilişki. Karya J Health Sci. 2021;2(3):71-6. (doi: 10.52831/kjhs.974791).
13. Tristão RM, Barbosa MP, Araújo T, et al. Breastfeeding success and its relation to maternal pain, behaviour, mental health, and social support. J Reprod Infant Psychol. 2023;41(3):346-61. (doi:10.1080/02646838.2021.2004300).

14. Dennis CL, McQueen K. Does maternal postpartum depressive symptomatology influence infant feeding outcomes?. Acta Paediatr. 2007;96(4):590-4. (doi:10.1111/j.1651-2227.2007.00184.x).
15. Dunn S, Davies B, McCleary L, Edwards N, Gaboury I. The relationship between vulnerability factors and breastfeeding outcome. J Obstet Gynecol Neonatal Nurs. 2006;35(1):87-97. (doi:10.1111/j.1552-6909.2006.00005.x).
16. Karahan N, Gençalp NS, Bingöl F, Aydın R, Benli AR. Postpartum depresyonun bebekle ilişkili risk faktörleri. Kırıkkale Uni Med J. 2017;19(3):204-13. (doi: 10.24938/kutfd.331954).
17. World Health Organisation: Breastfeeding. (İnternet). https://www.who.int/health-topics/breastfeeding#tab=tab_1 (Accessed: 30.01.2024)
18. Chojenta C, Harris S, Reilly N, Forder P, Austin M-P, Loxton D. History of pregnancy loss increases the risk of mental health problems in subsequent pregnancies but not in the postpartum. PLoS One. 2014;9(4):e95038. (doi: doi:10.1371/journal.pone.0095038).
19. Talley L. Stress management in pregnancy. International Journal of Childbirth Education. 2013;28(1):43-5.
20. Senturk V, Abas M, Berksun O, et al. Social support and antenatal depression in extended and nuclear family environments in Turkey: a cross-sectional survey. BMC Psychiatry. 2011;11(48). (doi: 10.1186/1471-244X-11-48).
21. Ünver H, Özşahin Z, Tekdal AG. Gebelerde COVID-19 korkusunun gebelik stresi ve travmatik doğum algısına etkisi. Journal of Midwifery and Health Sciences. 2022;5(2):71-8. (doi: 10.5152/JMHS.2022.222327).
22. Ralston ER, Smith P, Chilcot J, Silverio SA, Bramham K. Perceptions of risk in pregnancy with chronic disease: A systematic review and thematic synthesis. PLoS One. 2021;16(7):e0254956. (doi: 10.1371/journal.pone.0254956).
23. Çelik AS, Atasever İ. Gebelerde algılanan stres düzeylerinin ve etkileyen faktörlerin belirlenmesi. Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi. 2020;23(2):267-76. (doi: 10.17049/ataunihem.622304).
24. Kaytan D. Kırsal kesimde yaşayan gebelerin kaygı düzeylerinin belirlenmesi. MS thesis, Hasan Kalyoncu Üniversitesi Lisansüstü Eğitim Enstitüsü, Gaziantep; 2021:11.
25. Zhang L, Zhu S, Wu Y, Chen D, Liang Z. Association between maternal second-trimester stress and adverse pregnancy outcomes according to pre-pregnancy body mass index and gestational weight gain. Front Psychiatry. 2023;14:1129014. (doi:10.3389/fpsyt.2023.1129014).
26. Ortiz Martínez RA, Castillo A. Relation between stress during pregnancy and spontaneous preterm birth. Rev Colomb Psiquiatr. 2016;45(2):75-83. (doi:10.1016/j.rcp.2015.07.006).
27. Lilliecreutz C, Larén J, Sydsjö G, Josefsson A. Effect of maternal stress during pregnancy on the risk for preterm birth. BMC Pregnancy Childbirth. 2016;16:5. (doi:10.1186/s12884-015-0775-x).

28. Sheng JA, Bales NJ, Myers SA, et al. The hypothalamic-pituitary-adrenal axis: development, programming actions of hormones, and maternal-fetal interactions. Frontiers in Behavioral Neuroscience. 2021;14:601939. (doi:10.3389/fnbeh.2020.601939).
29. Steplewski Z, Buczyńska G, Rogoszewski M, et al. Level of stress during pregnancy estimated by mothers and average weight of newborns and frequency of low birth weight. Ginekol Pol. 1998;69(2):76-81.
30. Pubu ZM, Bianba ZM, Yang G, CyRen LM, Pubu DJ, Suo Lang KZ, et al. Factors Affecting the Risk of Postpartum Hemorrhage in Pregnant Women in Tibet Health Facilities. Med Sci Monit. 2021;27:e928568. (doi:10.12659/MSM.928568).

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MORTALITY RATES AND CAUSES BETWEEN 2018 AND 2023 IN TÜRKİYE ACCORDING TO TURKISH STATISTICAL INSTITUTE DATA

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Abstract

Objectives: Mortality statistics are essential for understanding community trends and shaping preventive health services. This study aimed to identify mortality rates and common causes of death in Türkiye, providing a valuable resource for planning health service delivery.

Materials and Methods: This cross-sectional descriptive study analyzed death statistics from 2018 to 2023, sourced from the Turkish Statistical Institute's website between July 10 and August 5, 2024. The study population included all data from Türkiye, encompassing all age groups.

Results: Between 2018 and 2023, Türkiye saw increased mortality rates in both sexes in 2021, linked to COVID-19. The primary causes of death were circulatory diseases (35.48%) and tumors (16.10%). In men, tumors accounted for 18.81% and respiratory diseases for 14.08%; in women, circulatory diseases comprised 38.72% and respiratory diseases 13.02%. Ischemic heart disease was the most common cause of death, with women showing higher rates of hypertensive diseases. Respiratory malignancies led for men (38.98%), while malignant breast tumors were second for women (15.06%). Deaths from Alzheimer's and epilepsy were noted, with 12.29% of men linked to alcohol and drug abuse, which was not reported for women.

Conclusion: This study examined death statistics in Türkiye from 2018 to 2023, emphasizing regional rates and causes. These mortality statistics are crucial for planning health services. The findings will aid health managers and policymakers in enhancing health outcomes. The study concluded that increasing public awareness of common diseases, improving health literacy, implementing preventive measures, and reducing risk factors are vital steps.

Keywords: Mortality rate, causes of death, statistics.

Introduction

Statistical data collected in health-related areas and the objective indicators derived from these data play a critical role in achieving various health goals. These data help to determine the overall health levels of populations and allow for the identification of health priorities. They also provide the basis for effective planning and implementation of health services. These indicators are used to assess health services' success and compare regions or periods. In this context, the focus is usually on fertility, mortality, and disease prevalence indicators. These indicators provide important data for shaping health policies and improving health services.[1,2] Mortality indicates the effectiveness of health services and the level of need for these services. Mortality studies address the relationships between mortality rates the size, structure, and distribution of the population, and the who, how, why, and when of deaths.[3] Mortality statistics are useful in determining trends and differences in mortality in the population, priorities for biomedical research, public health programs, decisions on the allocation of funding, and directions for epidemiological studies.[4]

The disease or injury that directly initiates the process that results in death is defined as the main cause of death.[5] This study examines common causes of death, their rates, and demographics in Türkiye from 2018 to 2023, providing valuable resources for health policymakers and professionals.

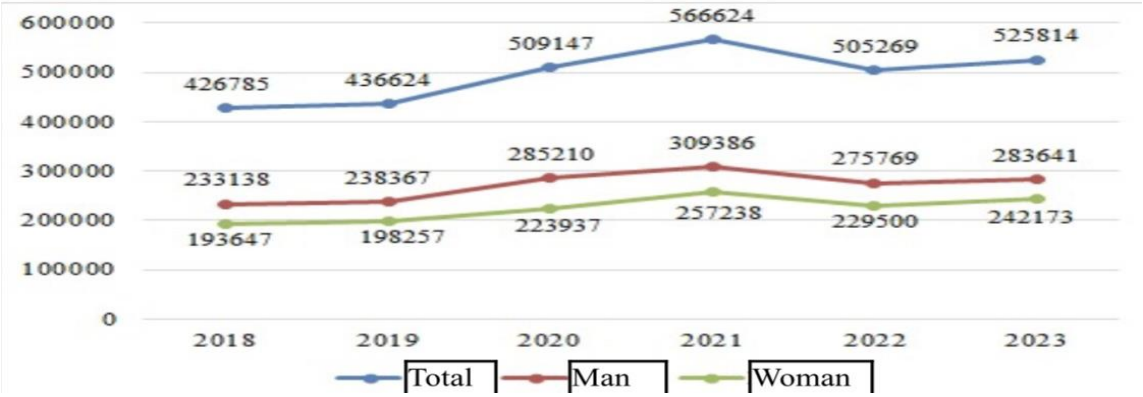
Materials and Methods

Our cross-sectional descriptive study was carried out by examining the statistics of deaths between 2018 and 2023, which were available on the website of TurkStat between 10.07.2024-05.08.2024.[6] Since public data and related literature were analyzed in our study, there was no ethical violation. The population of our study includes all Türkiye data, and the sample includes all age groups. The data used were transferred to the computer environment and evaluated in the Microsoft Office Excel program and IBM SPSS (Version 22.0) statistical package program and $p<0.05$ was accepted as a statistical significance value.

Results

In 2023, Türkiye recorded 525,814 deaths, a 4.1% increase from 505,269 in 2022. Of these, 53.9% were men and 46.1% were women, with a crude death rate of 6.2 per thousand, up from 5.9 in 2022. Between 2018 and 2023, mortality rates increased for both genders in 2021, likely due to the COVID-19 pandemic. (Table 1)

Table 1. Distribution of deaths by year and gender



Between 2018 and 2023, the leading cause of death in Türkiye was circulatory system diseases (35.48%), followed by benign and malignant tumors (16.10%). For men, the most common causes were benign and malignant tumors (18.81%) and respiratory system diseases (14.08%). In women, circulatory system diseases (38.72%) and respiratory system diseases (13.02%) were the top causes. Deaths from external causes, including earthquake-related incidents, accounted for 12.3%, with 45,784 deaths reported from the earthquakes in Kahramanmaraş on February 6. (Table 2)

Table 2. Comparison of genders according to common causes of death

	Total	Men	Women
Mortality-Related Diseases by Gender Between 2018 and 2023	%	%	%
Circulatory system diseases	35.48	32.80	38.72
Benign and malignant tumors (malignant and benign tumors)	16.10	18.81	12.83
Respiratory system diseases	13.60	14.08	13.02
Diseases related to endocrine glands, nutrition, and metabolism	4.42	3.57	5.44
Nervous system and sensory organs diseases	3.89	3.09	4.86
External causes of injuries and poisoning	5.33	6.40	4.02
COVID-19	3.75	3.87	3.61
Others	17.43	17.37	17.50
Total	100	100	100

When we compare mortality rates regionally, the Aegean region ranks first in terms of circulatory system diseases at 38.31% and respiratory system diseases at 15.18%. When we evaluate the mortality rates due to tumors and cancer, Istanbul East West Marmara region has the highest mortality rate with 13.85%. The region with the highest mortality rate due to COVID-19 was the West-Eastern Black Sea region, with a rate of 4.83% (Table 3).

Table 3. Regional distribution of diseases leading to death

	İstanbul East West Marmara	Central Western Anatolia	West East Black Sea	North Eastern and Central Eastern Anatolia	Aegean	Mediterranean	Southeast Anatolia
Circulatory System	34.62	34.83	37.89	33.64	38.31	34.54	33.47
Tumor Cancer	18.47	16.97	15.21	17.15	15.47	13.42	11.1
Respiratory System	13.85	13.34	14.24	13.56	15.18	11.97	11.46
Nervous System	4.31	4.22	3,83	3.98	3.58	3.33	3.18
Endocrine System	4.17	5.50	4.26	4.56	4.24	4.35	3.96
Trauma Poisoning	3.23	4.10	3.24	4.97	4.20	12.62	9.81
COVID-19	4.58	2.52	4.83	3.45	2.57	4.02	3.18
Other	12.72	13.85	12.18	13.58	11.95	11.6	16.46
Unknown	4.03	4.67	4.32	5.11	4.51	4.15	7.38

Ischemic heart disease is the leading cause of death for both men and women, while hypertensive diseases have a higher mortality rate in women. Among malignancies, respiratory system cancers are the most common cause of death in men (38.98%), with a mortality rate 2.9 times higher than in women. In women, malignant breast tumors rank second (15.06%). Alzheimer's disease is the leading cause of death in both genders, but rates are higher in women. Deaths from epilepsy and psychiatric disorders show similar trends, with alcohol and drug use accounting for 12.29% of male deaths, with no reported cases in women. Suicide rates are higher in men (16.87%) compared to women (10.06%), and COVID-19 mortality rates are 1.29 times higher in men than in women. (Table 4)

Table 4. Distribution of diseases by gender

	Total	Man	Total	Woman	Total
2018-2023	**n**	**n**	**%**	**n**	**%**
Infectious and parasitic diseases	**90907**	**46608**	**100.00**	**44299**	**100.00**
Diarrhea and gastroenteritis	1131	500	**1.07**	631	**1.42**
Tuberculosis	2059	1355	**2.91**	704	**1.59**
Meningococcal infections	61	30	**0.06**	31	**0.07**
Septicemia	80209	40419	**86.72**	39790	**89.82**
HIV disease	728	616	**1.32**	112	**0.25**
Viral hepatitis	1797	1073	**2.30**	724	**1.63**
Others	4922	2615	**5.61**	2307	**5.21**
Benign and malignant tumors	**478219**	**305745**	**100.00**	**172474**	**100.00**
Malignant tumors of the lips, oral cavity, pharynx	4962	3321	**1.09**	1641	**0.95**
Malignant tumor of the esophagus	4649	2753	**0.90**	1896	**1.10**
Malignant tumor of the stomach	37189	24655	**8.06**	12534	**7.27**
Malignant tumor of the colon	36365	21400	**7.00**	14965	**8.68**
Malignant tumor of the rectum and anus	8512	5229	**1.71**	3283	**1.90**
Malignant tumors of the liver, intrahepatic, and bile ducts	16405	10637	**3.48**	5768	**3.34**
Malignant tumor of the pancreas	30509	17586	**5.75**	12923	**7.49**
Malignant tumor of the larynx and trachea/bronchus/lung	142335	119191	**38.98**	23144	**13.42**
Malignant tumor of the skin	3070	1807	**0.59**	1263	**0.73**
Malignant tumor of the breast	26337	356	**0.12**	25981	**15.06**
Malignant tumor of the cervix, uterus	3043	0	**0.00**	3043	**1.76**
Other malignant tumors of the uterus	6334	0	**0.00**	6334	**3.67**
Malignant tumor of the ovaries	9876	0	**0.00**	9876	**5.73**
Malignant tumor of the prostate	20528	20528	**6.71**	0	**0.00**
Malignant tumor of the kidney	5872	4085	**1.34**	1787	**1.04**
Malignant tumor of the bladder	14098	11831	**3.87**	2267	**1.31**
Lymphoid and hematopoietic malignant tumor	37211	21762	**7.12**	15449	**8.96**
Others	70924	40604	**13.28**	30320	**17.58**
Diseases of the blood and blood-forming organs and	**6700**	**3263**	**100.00**	**3437**	**100.00**
Diseases related to endocrine glands, nutrition, and	**131253**	**58085**	**100.00**	**73168**	**100.00**
Diabetes mellitus	97488	42901	**73.86**	54587	**74.61**
Others	33765	15184	**26.14**	18581	**25.39**
Mental and behavioral disorders	**2399**	**1147**	**100.00**	**1252**	**100.00**
Dementia	924	367	**32.00**	557	**44.49**
Due to alcohol use (including alcoholic psychosis)	118	113	**9.85**	0	**0.00**
Drug addiction, toxicomania	33	28	**2.44**	0	**0.00**
Schizophrenia, schizotypal and delusional disorders	301	167	**14.56**	134	**10.70**
Mental (emotional) disorders	107	47	**4.10**	60	**4.79**
Others	916	425	**37.05**	501	**40.02**
Diseases of the nervous system and sensory organs	**115633**	**50262**	**100.00**	**65371**	**100.00**
Meningitis	799	450	**0.90**	349	**0.53**
Alzheimer's disease	77977	29294	**58.28**	48683	**74.47**
Multiple sclerosis	690	305	**0.61**	385	**0.59**
Epilepsy	7824	4278	**8.51**	3546	**5.42**
Others	28343	15935	**31.70**	12408	**18.98**
Circulatory system diseases	**1053924**	**533206**	**100.00**	**520718**	**100.00**
Hypertension	101613	39605	**7.43**	62008	**11.91**
Ischemic heart disease	435627	247048	**46.33**	188579	**36.22**
Other heart disease	253705	122852	**23.04**	130853	**25.13**
Cerebrovascular disease	210757	97817	**18.35**	112940	**21.69**
Others	52222	25884	**4.85**	26338	**5.06**

Respiratory system diseases	**403892**	**228871**	**100.00**	**175021**	**100.00**
Acute upper respiratory infections and influenza	608	330	**0.14**	278	**0.16**
Pneumonia	211184	111600	**48.76**	99584	**56.90**
Chronic lower respiratory diseases	146466	92496	**40.41**	53970	**30.84**
Others	45634	24445	**10.68**	21189	**12.11**
Digestive system diseases	**63531**	**33225**	**100.00**	**30306**	**100.00**
Stomach, duodenal, and small intestine ulcers	3527	1981	**5.96**	1546	**5.10**
Crohn's disease and ulcerative colitis	523	309	**0.93**	214	**0.71**
Paralytic ileus and intestinal obstruction (without hernia)	6587	3307	**9.95**	3280	**10.82**
Chronic liver disease	14551	8751	**26.34**	5800	**19.14**
Pancreatic diseases	4125	1924	**5.79**	2201	**7.26**
Others	34218	16953	**51.02**	17265	**56.97**
Diseases of the skin and subcutaneous tissue	**2055**	**820**	**100.00**	**1235**	**100.00**
Diseases of the musculoskeletal system and connective	**6594**	**2575**	**100.00**	**4019**	**100.00**
Rheumatoid arthritis and osteoarthrosis	1230	397	**15.42**	833	**20.73**
Others	5364	2178	**84.58**	3186	**79.27**
Genitourinary system diseases	**110749**	**54849**	**100.00**	**55900**	**100.00**
Kidney and ureter diseases	99230	49197	**89.70**	50033	**89.50**
Prostate hyperplasia	1225	1225	**2.23**	0	**0.00**
Inflammatory diseases of the female pelvic organs	78	0	**0.00**	78	**0.14**
Others	10216	4427	**8.07**	5789	**10.36**
Complications of pregnancy, delivery, and puerperium	**855**	**0**	**0.00**	**855**	**100.00**
Pregnancy complications that occur predominantly in the	126	0	**0.00**	126	**14.74**
Pregnancy complications, mainly during labor and delivery	104	0	**0.00**	104	**12.16**
Others	625	0	**0.00**	625	**73.10**
Specific conditions arising from the perinatal period	**32341**	**18235**	**100.00**	**14106**	**100.00**
Disorders associated with short gestation and low birth	3445	1938	**10.63**	1507	**10.68**
Others	28896	16297	**89.37**	12599	**89.32**
Congenital disorders and chromosome-related	**20737**	**11036**	**100.00**	**9701**	**68.77**
Congenital disorders of the nervous system	3143	1426	**12.92**	1717	**12.17**
Congenital disorders of the circulatory system	9488	5240	**47.48**	4248	**30.11**
Others	8106	4370	**39.60**	3736	**26.49**
Symptoms, signs, and abnormal findings, ill-defined	**45515**	**25808**	**100.00**	**19707**	**100.00**
Sudden infant death syndrome	1016	544	**2.11**	472	**2.40**
Unknown and unspecified causes	20105	13135	**50.90**	6970	**35.37**
Others	24394	12129	**47.00**	12265	**62.24**
COVID-19	**111411**	**62884**	**100.00**	**48527**	**100.00**
External causes of injury and poisoning	**158180**	**104062**	**100.00**	**54118**	**100.00**
Accidents (Transportation Accidents, Accidental Falls,	128482	81351	**78.18**	47131	**87.09**
Suicide and intentional self-harm	23001	17556	**16.87**	5445	**10.06**
Homicide, assault	5796	4691	**4.51**	1105	**2.04**
Others	901	464	**0.45**	437	**0.81**
Unknown	**135366**	**84828**	**100.00**	**50538**	**100.00**

Discussion

Improving living conditions and health services worldwide increases the average life expectancy. The aging of the world population is the most important sociological change of the 20th century. In the early 1900s, deaths due to infectious diseases decreased after practices to improve public health, and deaths due to non-communicable, chronic diseases increased with the prolongation of human life.[7] When the worldwide data are analyzed, it is determined that the number of elderly people aged 65 years and over was 258 million in 1980, 703 million in 1990, and 771 million in 2022.[8]

Ischemic heart diseases are the most common cause of death in both men and women in Türkiye, as in the whole world. Between 2009 and 2016, the rate of circulatory system-related deaths was 35.84% in men and 43.97% in women.[9] In our data, this rate decreased to 32.80% in men and 38.72% in women between 2018 and 2023. In countries with a high sociodemographic index, there has been a significant decrease in mortality rates related to cardiovascular disease in the last 25 years, and chronic diseases associated with the continuous aging of the population have caused a plateau in the decrease in mortality rates in the last 5 years.[10] Approximately 20.5 million people worldwide die each year due to cardiovascular disease.[11] The most common causes of cardiovascular diseases are atherosclerotic heart disease, heart failure, and atrial fibrillation.[12] Cardiovascular diseases account for 23% of deaths in high-income countries and 42% of deaths in low- and middle-income countries.[13,14] Studies show that cardiovascular-related deaths in many countries have increased after the COVID-19 pandemic.[15] While there was a rapid increase in cardiovascular mortality in the first two years of the COVID-19 pandemic, mortality rates decreased between 2021 and 2023. The groups with the fastest increase in mortality rates are young people and male patients, while the fastest decrease is seen in this group. While there was a rapid increase in cardiovascular mortality in the first two years of the COVID-19 pandemic, mortality rates decreased between 2021 and 2023. The groups with the fastest increase in mortality rates are young people and male patients, while the fastest decrease is seen in this group.[16]

Cancer was the second most common cause of death in men at 18.81%, while it ranked third for women at 12.83%. Between 2009 and 2016, cancer rates were 24.71% for men and 16.11% for women. The leading cause of cancer-related deaths in men was respiratory system cancers, accounting for 40.20%.[9] Lung cancer represents 12.4% of all cancers diagnosed globally and accounts for 18.7% of cancer deaths. The highest incidence rates in men are found in East Asia, followed by Micronesia/Polynesia and Eastern Europe, with Turkey having the highest national rate. For women, the highest incidence rates are seen in North America, East Asia, and Northern Europe, with Hungary having the highest national rate.[17] China has a disproportionate cancer burden for its population size. China accounts for 30.2% of cancer-related deaths worldwide. As in our study, the most common cancer types in China are lung cancer, colorectal cancer, and breast cancer.[18] According to the GLOBOCAN analysis, the most common cancers causing death worldwide are lung cancer

(18.2%), colorectal cancer (9.5%), liver cancer (8.4%), stomach cancer (7.8%), and breast cancer (6.9%). In the USA, the leading causes of cancer-related deaths are lung cancer (22.6%), colorectal cancer (8.9%), pancreatic cancer (7.8%), breast cancer (7%), and prostate cancer (5.3%).[19]

Sepsis is a significant public health issue, particularly among the elderly in developed countries. The Centers for Disease Control and Prevention estimates that around 1.7 million people in the USA develop sepsis each year, leading to about 270,000 deaths. [20] In Turkey, our data shows that 80,209 patients died from sepsis between 2018 and 2023, accounting for 86.72% of infectious disease-related deaths in men and 89.82% in women.

SARS-CoV-2 is the cause of the COVID-19 pandemic, which has affected millions worldwide since it began in December 2019. Declared a pandemic by the World Health Organization (WHO) in March 2020, COVID-19 presents symptoms ranging from asymptomatic cases to acute respiratory distress syndrome. Over 702 million infections and more than 6.97 million deaths have been reported globally. In the USA, there have been over 110 million infections and 1.19 million deaths.[21] In our country, 111,411 deaths due to COVID-19 were reported between 2018 and 2023. The mortality rate is 1.1% for those under 50, while it increases exponentially for those 50 and older, with the highest rates observed in patients aged 80 and above. The risk of mortality significantly increases in those aged 60 to 69.[22] Among 3714 articles and 87 studies reviewed, Diabetes Mellitus was identified as the most common determinant of COVID-19 mortality, followed by Chronic Obstructive Pulmonary Disease and malignancies.[23]

The number of reported suicide deaths was 23,001, with men being 1.6 times more likely to die by suicide than women. Suicide poses a significant global public health issue, leading to over 700,000 deaths annually. While more common in older age groups, it is the fourth leading cause of death among young adults.[24,25] The WHO mortality database indicates that, over the last 30 years, suicide rates in men have been 2 to 5 times higher than in women.[26] Alzheimer's is an irreversible neurological disorder characterized by cognitive decline, memory loss, and impaired daily functioning. Although the global prevalence of dementia and Alzheimer's disease is estimated to be 55 million people, 60% are known to be in low and middle-level countries. Approximately 10 million newly diagnosed patients are reported each year.[27] Data show that while the number of Alzheimer's patients was 19.79 million in 1990, this number increased by 161% in 2019, reaching 51.62 million. In 2050, this number is projected to reach 152.8 million. As the elderly population increases, age-related Alzheimer's disease and related deaths also increase.[28] In our study, deaths due to dementia between 2018 and 2023 were 924, and deaths due to Alzheimer's disease were 77,977.

In conclusion, advancements in health and science technologies are increasing life expectancy and the elderly population, leading to a diversification of diseases and causes of death associated with aging. In Türkiye,

cardiovascular diseases, cancers, and respiratory diseases are the most common causes of death, presenting significant public health challenges. Family medicine plays a crucial role in addressing these issues. Primary health care services facilitate early diagnosis and intervention by continuously monitoring individual health. Chronic disease management, including hypertension and diabetes, allows family physicians to reduce complication risks. Regular cancer screenings (e.g., breast, cervical, and colon) enable early detection and treatment.

This analysis is crucial for understanding the prevalence of causes of death and the potential for prevention. By evaluating lifestyles and health histories, family physicians can identify risk factors and promote healthy living. They play a vital role in managing cardiovascular diseases and cancers. In Türkiye, the effectiveness of these services is essential for sustaining the health system and improving public health.

Ethical Considerations: Since public data and related literature were analyzed in our study, there was no ethical violation.

Conflict of Interest: The authors declare no conflict of interest.

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References

1. Sümbüloğlu V, Gören A, Sümbüloğlu K.Ölüm Raporu Yazım Kılavuzu, TC Sağlık Bakanlığı Sağlık Projesi Genel Koordinatörlüğü Sağlık Enformasyon Sistemleri Eğitim Dizisi. Değiştirilmiş 2. Basım. No:3. Ankara: Aydoğdu Ofset; 1995. 3.
2. Civil Registration: Why counting births and deaths is important? World Health Organization. [Internet]. http://www.who.int/mediacentre/factsheets/fs324/en/ (Accessed: 15.08.2024).
3. WHO. Civil registration: Why counting births and deaths is important: World Health Organization. [Internet]. https://www.who.int/news-room/factsheets/detail/civil-registration-why-countingbirths-and-deaths-is-important. (Accessed: 01.09.2024).
4. Hernandez JBR, Kim PY. Epidemiology Morbidity and Mortality. [Internet]. https://www.ncbi.nlm.nih.gov/books/NBK547668/ (Accessed: 01.09.2024).
5. Türkiye İstatistik Kurumu. [Internet]. www.tuik.gov.tr (Accessed: 01.09.2024).
6. TÜİK. Ölüm ve Ölüm Nedeni İstatistikleri, 2023 [Internet] https://data.tuik.gov.tr/Bulten/Index?p=Olum-ve-Olum-Nedeni-Istatistikleri-2023-53709 (Accessed: 01.09.2024).
7. Hacker, K. (2024). The burden of chronic disease. Mayo Clinic Proceedings: Innovations, Quality & Outcomes, 8(1), 112-9.
8. Keskin, M., & Koçak, H. (2023). Türkiye'de Nüfusun Yaşlanması Üzerine Bir Swot Analizi. Sosyolojik Düşün, 8(2), 275-303. https://doi.org/10.37991/sosdus.1267376
9. Akturan, S., Gümüş, B., Özer, Ö., Balandız, H., & Erenler, A. K. (2019). TÜİK verilerine göre Türkiye'de 2009 ve 2016 yılları arasındaki ölüm oranları ve nedenleri. Konuralp MedicalJournal, 11(1), 9-16.
10. Sterpetti AV, Gabriele R, Iannone I, Sapienza P, Marzo LD. The role of education and information to prevent trends towards increase of cardiovascular mortality rates in Europe from 2015 to 2019. Curr Probl Cardiol. 2024 Mar;49(3), 102415. https://doi.org/10.1016/j.cpcardiol.2024.102415.
11. World Heart Federation. World Heart Report 2023: Confronting the World's Number One Killer. Geneva, Switzerland; 2023.
12. Lindstrom M, DeCleene N, Dorsey H, et al. Global Burden of Cardiovascular Diseases and Risks Collaboration, 1990–2021. J Am Coll Cardiol. 2022; 80(25): 2372–2425. DOI: 10.1016/j.jacc.2022.11.001

13. Ponte-Negretti CI, Wyss FS, Piskorz D, et al. Considerations and Guidance for the Structure, Organisation, and Operation of Cardiometabolic Prevention Units: A Consensus Statement of the Inter-American Society of Cardiology. Glob Heart. 2021; 16(1): 27. DOI: 10.5334/gh.960

14. Blumenthal JA, Sherwood A, Smith PJ, Watkins L, Mabe S, Kraus WE, Ingle K, Miller P, Hinderliter A. Enhancing cardiac rehabilitation with stress management training: a randomized, clinical efficacy trial. Circulation. 2016;133:1341–1350. doi: 10.1161/CIRCULATIONAHA.115.018926

15. Alicandro, G., La Vecchia, C., Islam, N., & Pizzato, M. (2023). A comprehensive analysis of all-cause and cause-specific excess deaths in 30 countries during 2020. European Journal of Epidemiology, 38(11), 1153-64.

16. Song, S., Guo, C., Wu, R., Zhao, H., Li, Q., Dou, J. H., ... & Wei, J. (2024). Impact of the COVID-19 pandemic on cardiovascular mortality and contrast analysis within subgroups. Frontiers in Cardiovascular Medicine, 11, 1279890.

17. Bray, F., Laversanne, M., Sung, H., Ferlay, J., Siegel, R. L., Soerjomataram, I., & Jemal, A. (2024). Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: a cancer journal for clinicians, 74(3), 229-63.

18. Cancerprofiles in Chinaandcomparisonswiththe USA: a comprehensiveanalysis in theincidence, mortality, survival, staging, andattributionto risk factorsResearchPaperPublished: 21 September 2023 Volume 67, pages 122–31,

19. Desai, K., Baralo, B., Kulkarni, A., Keshava, V. E., Iqbal, S., Ali, H., ... & Thirumaran, R. (2024). Cancer statistics: The United States vs. worldwide.

20. Ibarz, M., Haas, L. E., Ceccato, A., & Artigas, A. (2024). The critically ill older patient with sepsis: a narrative review. Annals of Intensive Care, 14(1), 6.

21. Raja, A., Khan, O., Sagar, R. S., Kumar, R., Bhimani, P. D., Bhimani, R. K., ... & Mustafa, M. S. (2024). Insights into Covid-19 Mortality: A Comprehensive Study of Cardiovascular Sensitivity, Gender, Race, and Geography Trends in the United States (2020-2023). Current Problems in Cardiology, 102435.

22. Bonanad, C., García-Blas, S., Tarazona-Santabalbina, F., Sanchis, J., Bertomeu-González, V., Fácila, L., ... & Cordero, A. (2020). The effect of age on mortality in patients with COVID-19: a meta-analysis with 611,583 subjects. Journal of the American Medical Directors Association, 21(7), 915-8.

23. Corona, G., Pizzocaro, A., Vena, W., Rastrelli, G., Semeraro, F., Isidori, A. M., ... & Maggi, M. (2021). Diabetes is most important cause for mortality in COVID-19 hospitalized patients: Systematic review and meta-analysis. Reviews in Endocrine and Metabolic Disorders, 22, 275-96.

24. Värnik, A., Kõlves, K., Allik, J., Arensman, E., Aromaa, E., Van Audenhove, C., ... & Hegerl, U. (2009). Gender issues in suicide rates, trends and methods among youths aged 15–24 in 15 European countries. Journal of affective disorders, 113(3), 216-26.

25. World Health Organization. Suicide worldwide in 2019: Global Health Estimates. Geneva: World Health Organization (2021).

26. Bertuccio, P., Amerio, A., Grande, E., La Vecchia, C., Costanza, A., Aguglia, A., ... & Odone, A. (2024). Global trends in youth suicide from 1990 to 2020: an analysis of data from the WHO mortality database. EClinicalMedicine, 70.

27. Faisal, M., Alharbi, A., Alhamadi, A., Almutairi, S., Alenezi, S., Alsulaili, A., ... & Khan, F. (2024). Robot-based solution for helping Alzheimer patients. SLAS technology, 29(3), 100140.

28. Mobaderi, T., Kazemnejad, A., & Salehi, M. (2024). Exploring the impacts of risk factors on mortality patterns of global Alzheimer's disease and related dementias from 1990 to 2021. Scientific Reports, 14(1), 15583.

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PERIODIC EXAMINATION OF ADOLESCENT STUDENTS IN PRIMARY CARE

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Abstract

Objectives: Adolescence is an important transition period and The World Health Organization (WHO) defines adolescence as the age between 10-19. Today, there are approximately 1.3 billion adolescents, 16% of the world's population. It is important for individuals in adolescence, a group that is difficult to reach in a society consisting of healthy individuals, to have their diseases or deficiencies detected early and to be examined at least once a year.

Materials and Methods: The research was conducted cross-sectionally at Konya Karatay No: 09 Family Health Center. Sample selection was made in the study and it was conducted with 143 adolescents who applied to the family health unit.

Results: 143 adolescents were examined within the scope of the research, 53.1% were male, and 58.0% were early adolescents. 14.0% of the adolescents do not have a good home situation, 25.9% do not have a good education, and 36.4% do not do any activity. 21.7% of those examined stated that their eating situation was poor. 3.9% of adolescents are obese and all of them are boys. 67.1% had tooth decay and 3.5% had eye refraction problems. Of those examined, hemoglobin was found to be low in 35.7%, hematocrit in 28.7%, vitamin D in 14.0%, and vitamin B12 in 2.1%.

Conclusion: School health services and periodic monitoring of adolescents are important in helping individuals acquire positive health behaviors, thus improving the health of society. The role of parents, teachers, and school administrators is important, as well as health professionals multidisciplinary and multisectoral.

Keywords: Adolescence, periodic examination, student health.

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Introduction

Adolescence is an important transition period in terms of physical and psychological development, where childhood ends. In this period; new characteristics are acquired as we step into adulthood, we cannot separate the beginning and ending of adolescence. The World Health Organization (WHO) defines adolescence as the age between 10-19.[1] Today, there are approximately 1.3 billion adolescents, 16% of the world's population, and 85% of them are in developing countries.[2] According to the 2018 data from the Türkiye Demographic Health Survey (TNSA), adolescents in Türkiye constitute 16% of the entire population.[3] The adolescence is grouped is younger adolescence as younger adolescents (10-14 years old), and older adolescents (15-19 years old).[4]

To protect and improve the health of adolescents, who constitute a significant part of our country's population, the "School Health Services Cooperation Protocol" was signed between the Ministry of National Education (MEB) and the Ministry of Health (SB) on 17.05.2016. Following the preparatory work, the “Protection and Development of Health in Schools Program” was launched with the agreement reached between both Ministries. The Implementation Guide has been published within the scope of the Health Protection and Development Program at the School. In this regard, annual periodic follow-ups of all school-age children are carried out by family physicians following protocols.[5] Students who are in their adolescence period, accompanied by their families, apply to the Family Health Centers where they are registered once a year using a standard form. What will be done at each stage is explained. A complete systemic examination is performed. Arterial femoral pulses are palpated. Blood pressure, body weight, height, and hemoglobin/hematocrit (Hb/Htc) measurements are made. Respiration, heart, and hyperlipidemia risks are evaluated. In the genitourinary system examination, Tanner staging is used to determine the level of physical development of the adolescent. The Tanner staging card is given to the adolescent and he/she is asked at which stage he/she sees himself/herself. The adolescent is also examined by the family physician and evaluated in terms of early or late puberty. During the musculoskeletal examination, scoliosis is particularly checked. Their vaccinations are checked according to the national vaccination program, and if there is a missing vaccine, it is completed. The acronym HEEADSSS (Home, Education/Employment, Eating, Activities, Drugs, Sexuality, Suicide/Depression and Safety) is used to determine psychosocial status.[6]

The World Family Physicians Association (WONCA) has picked up the core competencies that family physicians should have under 6 headings in 2005, and the 6th of these items is to approach the person as a biopsychosocial whole. According to this model, health and disease are shaped by complex interactions of biological, psychological, and social variables, and none of them can be categorized separately from the other.[7]

Following the Family Medicine Practice Regulation and School Health Services Cooperation Protocol, periodic examinations/monitors of adolescents are carried out every year by family physicians in line with the Infant Child Adolescent Follow-up Protocols published by the Ministry, they are entered into the Family Medicine Information System, and the printout of the form is given to the family and forwarded to the school. The basic prediction is to prevent the conditions that predispose to the disease by detecting them in advance. This is both a healthier and more economical approach. Family physicians play a key role in the adoption and implementation of this approach.[5-6] Family physicians periodically provide many health services, from examination to health education and consultancy, to ensure the primary care management of common health problems for adolescents, thus protecting and improving adolescent health[4-5-6-7]. It is important for individuals in adolescence, a group that is difficult to reach in a society consisting of healthy individuals, to have their diseases or deficiencies detected early and to be examined at least once a year.[6]

This study aimed to evaluate the results of the health services received by adolescents registered to a family medicine unit in a city center within the scope of the 'School Health Protection and Promotion Programme'.

Materials and Methods

The study was conducted cross-sectionally at Karatay Family Health Center No. 09, after receiving approval from the KTO Karatay University Faculty of Medicine Non-Drug and Medical Device Research Ethics Committee with the decision number E-2020/038 dated 15.12.2020. The universe of the study consists of 164 adolescents registered in a family health unit 42.22.055 in Konya city center. Of the 164 adolescents attending the family health unit, the recommended sample size for this study was 162 adolescents with a 95% confidence level and 5% sampling error using G*Power 3.1. 13 Adolescents enrolled in the family medicine unit were excluded from the study because they applied outside the study schedule, 6 adolescents could not be reached, and 2 adolescents' blood samples were reported as clotted. The study was conducted with 143 adolescents who applied to the family medicine unit with their parents, and the participation rate was 88.3%.

Before starting the research, adolescents and their parents were interviewed, information about the health screenings to be applied to the adolescents was given, consent forms were obtained and screenings were carried out. Height (centimeter (cm)), weight (kilogram (kg)), systolic and diastolic blood pressure (mm Hg), Hb (g/dL)/Htc (%), vitamin D (ng/mL), vitamin B12 (pg/mL) levels of each adolescent were measured. A cardiac examination was performed. Dental caries were also checked. The vision was examined separately for each eye with a Snellen chart. Hearing tests were performed with a tuning fork(diapason). Each heading in the HEEADSSS acronym was asked as an open-ended question. It was assessed whether they were vaccinated according to the national vaccination program. All data were recorded in the family medicine information system. For the study, socio-demographic characteristics, physical examination findings, and laboratory results

were recorded in the database created for retrospective research. Detection of abnormal findings in at least one of the physical examination findings and laboratory results was accepted as a health problem.

The research data was evaluated with the IBM Statistics 22.0 SPSS package program. As statistical analysis, variables were evaluated with normal distribution test (Kolmogorov Smirnov/Shapiro-Wilk Tests). In descriptive findings, categorical variables were presented with numbers and percentages, and continuous variables were presented with median (maximum, minimum value). The Chi-Square Test was used in the examination of nominal variables. In multivariate analysis, independent predictors of health problems were examined using logistic regression analysis. Age, gender, education, eating, and activity status were included in the model. The Hosmer Lemeshow Test was used for model compliance. A p-value of <0.05 was accepted for statistical significance.

Results

143 adolescents were examined within the scope of the research, 53.1% were male, and 58,0% were early adolescents. The median age was 14 (min; 10-max; 19). 14.0% of adolescents' home situation is not good, 25.9% of them have a bad educational status and 36.4% of them do not do any activity. Of those examined, 21.7% stated that their eating situation was bad. 23.9% of girls and 19.7% of boys stated that their eating situation was bad. No statistically significant difference was found between the distribution of adolescence, home situation, education status, activity, and eating situations according to the gender of those examined (p>0.05). All of those examined stated that they were safe, did not use addictive substances, and did not have suicidal thoughts. (Table 1)

All those examined had normal blood pressure. Median systolic blood pressure is 97.0 (min; 86.0-max; 106.0) for girls, and the median for boys is 98.0 (min; 88.0-max; 106.0). Median diastolic blood pressure is 63.0 (min; 60.0-max; 74.0) for girls, and the median for boys is 67.0 (min; 60.0-max; 72.0). The median height for girls is 157.0 (min; 134.0-max; 168.0), median height for boys is 161.5 (min; 138.0-max; 178.0). The median weight for girls is 48.0 (min; 30.0-max; 62.0), and the median for boys is 57.0 (min; 35.0-max; 72.0). According to the BMI percentile, 2.1% of those examined are obese. All of the obese are male, 3.9% of the males are obese. 1.4% of those examined have a heart murmur, 67.1% have tooth decay, and 3.5% have refraction problems. 1.5% of the girls and 1.3% of the boys have a heart murmur, 67.2% of the girls and 67.1% of the boys have tooth decay, and 4.5% of the girls and 2.6% of the boys have refraction problems. All of the examined adolescents are fully vaccinated and none of them have hearing loss.

The median of hemoglobin values is 12.6 (min;11.3-max;14.5) for girls and 12.6 (min;11.3-max;15.2) for boys. The median of hematocrit values is 37.0 (min;32.4-max;39.4) for girls and 36.7 (min;32.4-max;40.1) for boys.

The median of vitamin D values is 16.0 (min;6.0-max;29.0) for girls and 17.0 (min;5.0-max;28.0) for boys. The median of vitamin B12 values is 220.0 (min;152.0-max;295.0) for girls and 222.0 (min;202.0-max;295.0) for boys. Of those examined, 35.7% had low hemoglobin, 28.7% had low hematocrit, 14.0% had low vitamin D, and 2.1% had low vitamin B12. When hemoglobin, hematocrit, vitamin D, and B12 levels were examined according to age and gender; hemoglobin was found to be low in 13.4% of girls and 55.3% of boys, hematocrit was found to be low in 13.4% of girls and 42.1% of boys, vitamin D was found to be low in 86.6% of girls and 85.5% of boys, and vitamin B12 was found to be low in 4.5% of girls. No statistically significant difference was found between the distribution of BMI percentile values, presence of heart murmur, presence of tooth decay, presence of refraction problems, and vitamin D levels according to the gender of those examined ($p>0.05$). There was a statistically significant difference between hemoglobin and hematocrit levels ($p<0.05$). The frequency of low hemoglobin and hematocrit levels is higher in boys. (Table 2)

Table 1: Distribution of Some Descriptive Characteristics of Those Examined According to Gender, Konya, 2021.

Feature	Total (n=143)		Girl (n=67)		Boy (n=76)	
	Number	%*	Number	%*	Number	%*
Adolescence Periods						
Early Adolescence	83	58,0	37	55,2	46	60,5
Older adolescence	60	42,0	30	44,8	30	39,5
			χ^2=0,411	p=0,521		
Situation at Home						
Bad	20	14,0	6	9,0	14	18,4
Good	123	86,0	61	91,0	62	81,6
			χ^2=***	p=0,165		
Educational Status						
Bad	37	25,9	16	23,9	21	27,6
Good	106	74,1	51	76,1	55	72,4
			χ^2=***	p=0,749		
Activity Status						
Bad	52	36,4	19	28,4	33	43,4
Good	91	63,6	48	71,6	43	56,6
			χ^2=***	p=0,090		
Eating Status						
Bad	31	21,7	16	23,9	15	19,7
Good	112	78,3	51	76,1	61	80,3
			χ^2=***	p=0,692		

%*: Column percentage **: Fisher's Exact Test ***: Chi-square with Yates Correction

According to the results of the physical examination and laboratory tests, at least one health problem was found in 83.2% of those examined, 80.6% of the girls, 85.5% of the boys, 94.0% of those in early adolescence, 93.3% of those in late adolescence, 78.4% of those who said their educational status as not good, 84. 9% of those said their educational status was good, 83.5% of those who said they did activities, 82.7% of those said they did not do activities, 93.5% of those who said their nutritional status was poor and 80.4% of those who said their nutritional status was good. No statistically significant difference was found between the status of having a health problem according to age (p: 0.213), gender (p: 0.574), adolescence (p: 1.000), educational status (p: 0.510), activity status (p: 1.000), and eating status (p: 0.142).

One unit increase in age creates a 1.1-fold risk of having a health problem, male gender 1.6 times, good education status 2.1 times, lack of activity 1.1 times, poor eating habits 1.2 times. However, these risk increases are not statistically significant (p>0.05) (Table 3).

Table 2: Distribution of Some Health-Related Characteristics of Those Examined According to Gender, Konya, 2021.

Feature	Total (n=143)		Girl (n=67)		Boy (n=76)	
	Number	**%***	**Number**	**%***	**Number**	**%***
According to BMI						
Obese	3	2,1	0	0,0	3	3,9
Normal	140	97,9	67	100,0	73	96,1
Presence of Heart Murmur						
There is	2	1,4	1	1,5	1	1,3
None	141	98,6	66	98,5	75	98,7
			χ^2=**	p=1,000		
Presence of Tooth Decay						
There is	96	67,1	45	67,2	51	67,1
None	47	32,9	22	32,8	25	32,9
			χ^2=**	p=1,000		
Presence of Refraction Problems of Eye						
There is	5	3,5	3	4,5	2	2,6
None	138	96,5	64	95,5	74	97,4
			χ^2=**	p=0,665		
Haemoglobin Level						
Low	51	35,7	6	9,0	31	40,8
Normal	92	64,3	61	91,0	45	59,2
			χ^2=***	**p<0,001**		
Haematocrit Level						
Low	41	28,7	10	14,9	31	40,8
Normal	102	71,3	57	85,1	45	59,2
			χ^2=***	**p=0,001**		
Vitamin D Level						
Low	16	11,2	9	13,4	7	9,2
Normal	127	88,8	58	86,6	65	90,8
			χ^2=***	p=0,594		
VitaminB12 Level						
Low	3	2,1	3	4,5	0	0,0
Normal	140	97,9	64	95,5	76	100,0

%*: Column percentage **: Fisher's Exact Test ***: Chi-square with Yates Correction

Table 3: Logistic Regression Analysis Results of Factors Affecting the Health Problem Status of Those Examined, Konya, 2021.

Risk Factor	RR (%95 GA)*	p
Age	1,1 (0,934-1,380)	0,204
Gender (Boy)	1,6 (0,627-3,861)	0,340
Educational Status (Good)	2,1 (0,747-6,117)	0,157
Activities Status (Bad)	1,1 (0,398-2,796)	0,914
Eating Status (Bad)	1,2 (0,805-17,719)	0,092

Discussion

Adolescence is a transformative period of growth and development that has profound consequences for both the individual's health in later life and the health of potential children. Common problems during this period include iron deficiency anemia, eating disorders, obesity, and growth and developmental delays.[8,9] In this study, which was conducted within the scope of a school-based adolescent health screening program, it was determined that those examined had health risks such as poor eating habits, tooth decay, and low hemoglobin and hematocrit levels, as stated in a publication by Norris et al.[8] Nutrition has a formative role in the timing and patterning of puberty. Nutritional effects on adolescent development extend to adult height, muscle, and fat mass gain, as well as cardiorespiratory fitness, neurodevelopment, and immunity. It also has implications for the risk of noncommunicable diseases in later life. In the study of Norris et al., which showed the effects of changing nutrition and lifestyle on 54 million children and adolescents (5-19 years of age), it was reported that linear growth in children and adolescents in many countries was below the WHO reference, malnutrition and overweight continued, and there was very little growth in height. It was also reported that height increased in all populations for decades, that this situation was moderate in high-income countries and varied in low- and middle-income countries.[8] According to the WHO European Region Obesity Report 2022, published recently by WHO, it was stated that approximately one in three children in the European region (29% in boys, 27% in girls) is overweight or obese.[10] According to the results of the Türkiye Statistical Institute (TÜİK) Health Survey, the prevalence of obesity in the 15-year-old and older age group is 21.1%. According to the Türkiye Nutrition and Health Survey 1.2% of those aged 15 and under are underweight, 39.9% are overweight, 23.3% are obese, and 1.3% are morbidly obese. In the 15-19 age group, 1.1% are underweight, 43.4% are overweight, 24.9% are obese, and 1.4% are morbidly obese.[3,11] In a study conducted by Digrak E. et al., it was determined that 3.0% of those examined were underweight, 13.7% were overweight and 15.4% were obese.[12] In this study, obesity was found as 2.1%. The prevalence of obesity is very low.

One of the WHO's global nutrition targets is to reduce the prevalence of anemia, which is a widespread health problem worldwide. According to WHO, if the prevalence of anemia is below 5% in a country, there is no problem. If the prevalence is between 5-19%, it is considered mild, if between 20-39%, it is considered moderate, and if it is ≥40%, it is considered a serious health problem. The global prevalence of anemia at all ages is 24.3%. While the prevalence of anemia is 17.5% in men, it is 31.2% in women. Differences by gender are especially high among adolescents and adults.[13] Although iron deficiency anemia has been reported to be between 15.2% and 62.5% in studies conducted in different age groups and regions between the ages of 10-19 in our country, there is no study representing the entire country.[14]

When we research the literature, it is understood that there is no current study reflecting the B12 and vitamin D levels in adolescents as in anemia in the country, and there are studies conducted in different regions in

different age groups. In a study conducted with adolescents living in the central region of Diyarbakır province; B12 vitamin levels were found to be insufficient in 2.2%.[15] Wetherilt et al. determined the frequency of B12 vitamin deficiency as 5.9% in a study they conducted in the 7-17 age group in Turkey.[16] In a study conducted by Uçar et al. in Ankara, vitamin D insufficiency was found as 20.7%, and in a study conducted by Türe et al. in Samsun, vitamin D insufficiency was found as 65%.[17,18] Of those examined, 11.2% had low Vitamin D levels, 2.1% had low Vitamin B12 levels, 35.7% had low hemoglobin levels, and 28.7% had low hematocrit levels. According to WHO, anemia is a mild-to-serious problem in our country, but when the hemoglobin and hematocrit levels detected in this study are considered, it is a mild health problem. Vitamin D and B12 levels detected in this study are also less frequent compared to the studies mentioned. 21.7% of those examined stated that they were malnourished. Although one in every five people examined in the study stated that they were malnourished, examination findings and laboratory results show that malnutrition is less frequent than in previous studies.

It is reported that disorders in oral and dental health can cause toothache, early tooth loss, systematic diseases, speech development disorders, school absences, learning problems, and loss of attention and self-confidence.[19] Tooth decay affects 60-90% of school children even in developed countries.[20] The prevalence of decay is 46.6% for the 12-year-old age group in Europe. It decreased from 61.2% to 58.3% in 15-year-olds between 2004 and 2018.[21] According to the 2019 Turkey Health Survey data; oral and dental health problems are in third place with a frequency of 14.2% in the distribution of health problems/diseases seen in the 7-14 age group.[11] Different prevalences are known in studies conducted in different regions of our country, with different socioeconomic levels, different oral and dental health habits, and different numbers of children. The prevalence of tooth decay was reported as 81.1% in the 8-12 age group in a study conducted by Egemen and Tüloğlu, 56.7% in the 12 age group in a study conducted by Karatepe and Güner, 82% in a study conducted by Eğri et al., and 85.2% in the 15 age group in a study conducted by Öztürk and Sönmez.[19,22] The 67.1% tooth decay prevalence found in this study is consistent with the literature. The results of this study and literature reports show that the frequency of tooth decay is quite high in our country, and despite the developments in preventive and therapeutic practices, the targeted rates have not yet been achieved.

In conclusion, although this study conducted with adolescents is evaluated within the scope of public health and school health services in terms of its follow-up results, it is specific to the family medicine unit. Considering the density of the adolescent population, the importance of preventive and therapeutic services for school age and the role of the family medicine unit in the provision of these services are emphasized.

Although school health services are standardized throughout our country, the priority of targets and preventive methods may differ among societies due to socioeconomic, demographic, cultural, etc. characteristics. Public health needs to conduct and publish studies that comparatively evaluate the results in different regions and at

the national level, considering different periods, different age groups, and sociodemographic and socioeconomic variables regarding school health services.

School health services and periodic monitoring of adolescents are important in helping individuals acquire positive health behaviors, thus improving the health of society. The role of parents, teachers, school administrators, as well as health workers, and the need for a multidisciplinary and multisectoral approach in increasing the quantity and quality of these important services is an undeniable fact.

Limitations

The findings in the study are limited to adolescents registered in a family health unit, and the study findings cannot be generalized to the adolescent group in Turkey. The presence of family members when asking questions to adolescents may have influenced their answers. In addition, it provides an idea about the important health problems of adolescents and reveals the importance of health screening.

Ethical Considerations: The study was approved by KTO Karatay University Faculty of Medicine Non-Drug and Medical Device Research Ethics Committee with the decision number E-2020/038 dated 15.12.2020.

Conflict of Interest: The authors declare no conflict of interest.

References

1. L World Health Organization. Adolescent health [Internet]. https://www.who.int/health-topics/adolescent-health#tab=tab_3 (Accessed: 10.07.2024).
2. United Nations International Children's Emergency Fund, (UNİCEF). Monitoring the situation of children and women. Investing in a safe, healthy and productive transition from childhood to adulthood is critical. [Internet]. https://data.unicef.org/topic/adolescents/overview/ (Accessed:10.07.2024).
3. Türkiye Nüfus ve Sağlık Araştırması Raporu 2018. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü Ankara, Türkiye. [Internet]. https://hips.hacettepe.edu.tr/tr/nufus_ve_saglik_arastirmalari_serisi-59 (Accessed: 15.06.2024).
4. The adolescent health indicators recommended by the Global Action for Measurement of Adolescent health: guidance for monitoring adolescent health at country, regional and global levels. Geneva: World Health Organization; 2024. [Internet]. https://www.who.int/groups/the-global-action-formeasurement-of-adolescent-health (Accessed 03.11.2024)
5. T.C. Millî Eğitim Bakanlığı ve T.C. Sağlık Bakanlığı Arasında Okul Sağlığı Hizmetleri İşbirliği Protokolü. T.C. Sağlık Bakanlığı, Halk Sağlığı Genel Müdürlüğü, Çocuk ve Ergen Sağlığı Dairesi Başkanlığı, Ankara, 2018. [Internet]. https://okulsagligi.meb.gov.tr/www/Okul Sağlığı Hizmetleri İşbirliği Protokolü / Okulda Sağlığın Korunması ve Geliştirilmesi Programı Uygulama Kılavuzu (meb.gov.tr) (Accessed 01.07.2024).
6. Bebek, Çocuk, Ergen İzlem Protokolleri, T.C. Sağlık Bakanlığı, Halk Sağlığı Genel Müdürlüğü, Çocuk ve Ergen Sağlığı Dairesi Başkanlığı. Ankara. (Genelge)2018; Yayın No:1112.
7. Aile Hekimliği Avrupa Tanımı, WONCA AVRUPA 2005 Basımı Türkçe Çevirisi Türkiye Aile Hekimleri Uzmanlık Derneği Yayınları. 2011;13-5.
8. Norris SA, Frongillo EA, Black MM, Dong Y, Fall C, Lampl M, et al. Nutrition in adolescent growth and development. Lancet. 2022;399(10320):172-84.
9. Sachdev, H. S., Porwal, A., Acharya, R., Ashraf, S., Ramesh, S., Khan, N., et al. Haemoglobin thresholds to define anaemia in a national sample of healthy children and adolescents aged 1–19 years in India: a population-based study. Lancet Glob Health. 2021;9(6): 822-31.
10. World Health Organization. WHO European Regional Obesity Report 2022, Geneva. [Internet]. https://iris.who.int/bitstream/handle/10665/353747/9789289057738-eng.pdf (Accessed 15.06.2024).
11. Türkiye İstatistik Kurumu (TÜİK) Sağlık Araştırması. Ankara. 2019. [Internet]. https://data.tuik.gov.tr/Bulten/Index?p=Turkey-Health-Survey-2019-33661(Accessed 15.06.2024).

12. Dığrak E., Eyimaya Öztürk A., Zengin H., Tezel A. İki Devlet İlkokulundaki Öğrencilerin Sağlık Tarama Sonuçlarının Değerlendirilmesi. TJFMPC, 2020;14 (2): 289-98.
13. Gardner, William M et al. Prevalence, years lived with disability, and trends in anaemia burden by severity and cause, 1990–2021: findings from the Global Burden of Disease Study 2021. The Lancet Haematology, 2023;10(9):713-34.
14. Demir Gibi Türkiye Programı Uygulama Rehberi. T.C. Sağlık Bakanlığı, Halk Sağlığı Genel Müdürlüğü, Çocuk ve Ergen Sağlığı Dairesi Başkanlığı, Ankara. [Internet]. https://hsgm.saglik.gov.tr/depo/birimler/cocuk-ergen-sagligi-db/Programlar/DEMR_GB_TRKYE_PROGRAMI_UYGULAMA_REHBER.pdf (Accessed: 15.06.2024).
15. Öncel K, Özbek M.N., Onur H., Söker M., Ceylan A. Diyarbakır İlindeki Çocuklarda ve Adölesanlarda B12 Vitamin ve Folik Asit Düzeyleri, Dicle Tıp Dergisi 2006;33(3):163-9.
16. Wetherilt H, Ackurt F, Brubacher G, Okan B, Aktas S, Turdu S. Blood vitamin and mineral levels in 7-17 years old Turkish children. Int J Vitam Nutr Res 1992; 62(1): 21-9.
17. Uçar F., Taşlıpınar M.Y, Soydaş A.Ö., Özcan N. Ankara Etlik İhtisas Eğitim ve Araştırma Hastanesi'ne Başvuran Hastalarda 25-OH Vitamin D Düzeyleri. Eur J Basic Med Sci 2012;2(1):12-5.
18. Çubukçu, M., Acı, R., & Müderrisoğlu, S., Samsun İlinde D Vitamini Düzeylerinin Yaş, Cinsiyet ve Mevsimsel Özelliklere Göre Değerlendirilmesi. Ankara Medical Journal, 2019;19(4): 769-75.
19. Şişko, E., & Dağhan, Ş., Türkiye'de Okul Çağı Çocuklarında Ağız ve Diş Sağlığı Araştırmalarının Sonuçları Bize Ne Söylüyor? Sürekli Tıp Eğitimi Dergisi, 2022;31(1): 67-80.
20. Şeker Özden M. C. Diyarbakır İli Pediatrist ve Aile Hekimlerinin Çocuk Ağız-Diş Sağlığı Hakkındaki Bilgi Düzeyi ve Yaklaşımlarının Değerlendirilmesi. Uzmanlık Tezi. Çocuk Diş Hekimliği Anabilim Dalı. Diyarbakır. 2022;79.
21. Sağlık Bakanlığı Türkiye Ağız Ve Diş Sağlığı Profili Araştırma Raporu, 2018 [Internet]. https://dosyamerkez.saglik.gov.tr/Eklenti/42552/0/turkiye-agiz-ve-dis-sagligi-profili-arastirma-raporu.pdf. (Accessed: 15.06.2024).
22. Egemen E., Tüloğlu N., Eskişehir İlindeki Çocuklarda Diş Çürüğü ve Florozis Görülme Sıklığının Değerlendirilmesi. Selcuk Dent J., 2019;6(3):297-308.

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EVALUATING PATIENTS REFERRED TO FAMILY MEDICINE OUTPATIENT CLINIC AT A TERTIARY CARE HOSPITAL

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Abstract

Objectives: This study aims to analyze the patients transferred from the emergency triage clinic to the family medicine outpatient clinics and the patients returning to the emergency department with the same or similar complaints within 10 days.

Materials and Methods: An analytical cross-sectional study was conducted with 370 patients who applied to family medicine outpatient clinics. Patients who agreed to participate in the survey were asked about their complaints, whether their complaints had been resolved, the status and reasons for return visits to the emergency department, and their attendance at the relevant clinics. The approval of the University of Health Sciences Ankara Bilkent City Hospital Ethics Committee (approval number E2-22-1719) was obtained before conducting a study involving 370 volunteers admitted as patients to the Family Medicine Outpatient Clinic at a tertiary care center in Ankara.

Results: The average age of 370 patients who participated in the study was 38.8 ± 14.3. These patients consulted the family physicians with the complaints which can be split as 18.4% sore throat and nasal discharge, 14.6% musculoskeletal pain, and 31.6% of the patients revisited the emergency service. 21.4% of the patients who revisited the emergency service requested IV (intravenous) therapy, and 17.9% requested an injection. The most frequent symptoms observed in return visits to the emergency service were fever with a 50% rate and urinary disorders with a 48.1% rate.

Conclusion: It is a public health issue to have overcrowded emergency rooms. Improving health literacy, better informing the patients, and optimizing the appointment systems can reduce the number of people overcrowding the emergency rooms.

Keywords: Emergency department, family medicine, visit.

Introduction

Emergency departments are facilities that patients visit when health issues unexpectedly occur or when accidents happen.[1] The percentage of admission to the emergency departments is 30% in Turkey while this number decreases to 5 to 8% in developed countries.[2] This may lead to increased mortality and morbidity in emergency departments or cause delays in cases requiring urgent intervention. Recently, there has been ongoing study and several implementations to ease overcrowding and enhance patient treatment quality.[3-4]

The consensus when patients return shortly after they are treated and discharged from the emergency department with the same or similar conditions is that their first diagnosis was either incomplete or insufficient. The studies on this subject cannot fully determine why these patients return, but it is believed that there might be various reasons nonetheless.[5]

Patients who frequently use emergency services for non-urgent and non-relevant reasons comprise a significant proportion of admissions to the emergency department.[6] These patients cause hospitals to become overcrowded and busy.[7]

Primary care units are vital in organizing and coordinating health care services. The most important part of healthcare services provided worldwide is the concept of family medicine, known by different names in various countries. Family medicine should fulfill the primary level of healthcare services. It is expected more than 90% of patients admitted to family medicine services can have their issues resolved.

The Republic of Turkey Ministry of Health published a circular numbered 54567092, titled 2018/2 "Shift Adjustment or Shift Specialty Clinic Application" on January 31, 2018, in which the clinics in the non-urgent care are separated into Area 1 and Area 2. Through the non-urgent care area 2, has been attempted to prevent overcrowding and excessive wait times.[8]

This study aims to analyze the patients who arrive at the emergency department without urgent causes and are transferred to the non-urgent care area 2 by the triage clinic, the number and reasons for readmission to the emergency departments for treatment as well as to analyze the outcome of whether these patients went to the relevant clinics which they were transferred.

Materials and Methods

This study was carried out as an analytical cross-sectional study using the patients admitted to the family medicine outpatient clinic non-urgent care area 2 at the tertiary care center in Ankara between the 1st of January 2022 and the 31st of March 2022. The population sample was calculated with a minimum of 370 individuals with a 95% confidence level and a 5% margin of error, based on approximately 12,000 adult patients visiting the family medicine outpatient clinic at the tertiary care center in Ankara over three months. The volunteers were included in the study in case of their own volition and had the right to withdraw from the study at any time they chose. Forgotten applications, minors, and patients who applied intending to receive an examination or prescription were excluded from the study. The approval of the University of Health Sciences Ankara City Hospital Ethics Committee (approval number E2-22-1719) was obtained before conducting a study involving 370 volunteers admitted as patients to the Family Medicine Outpatient Clinic at a tertiary care center in Ankara.

Examining the family medicine outpatient clinic records for the 3 months constituting the research population, it was found that around 12,000 registered patients visited the clinic. Nearly 10,000 of these patients were transferred to the non-urgent care area 2 from the emergency department. Using the sample size formula for a known population to estimate an unknown prevalence, the minimum sample size was determined to be 370 for a 95% confidence level and a 5% margin of error. To identify the patients for sampling, one in every 27 individuals was systematically selected from the 10,000 patients, resulting in a total of 370 participants. However, some of the resulting 370 patients were not non-urgent care area patients, thus, an additional reserve list of 130 individuals was created by selecting one in every 70 individuals from the same list. In cases where a patient could not be reached by phone or the patient terminated the interview, a backup list was used. Initially, those on the main list were contacted, and after excluding the patients who were not from the non-urgent care area or unwilling to participate in the study, 253 individuals agreed to participate. Subsequently, patients from the reserve list were selected and 117 individuals were added to achieve a total of 370 participants. The selection process was terminated once the target number of participants was achieved.

Initially, verbal consent was obtained from all participants. The study proceeded with those who gave their consent. Demographic data was collected, including age, gender, marital status, and insurance coverage, along with the presenting complaints, by examining the patient records.

The participants were asked questions in the data collection created by the researcher. It was inquired via phone whether the presenting complaints had been resolved if the patient had returned to the emergency department within 10 days of their initial visit, if they had attended the referred clinic, whether they had scheduled an appointment with the referred clinic, and if so, which specialty they had an appointment with.

Additionally, it was asked if they had returned to the emergency department and, if applicable, the reason for their return, as well as whether they had consulted their family physician.

Data analysis was performed using SPSS version 26.0. Descriptive statistics were reported as frequencies and percentages for categorical variables and as means, standard deviations, medians, minimum, and maximum values for numerical variables. The Chi-square test and Fisher-Freeman-Halton tests were used to compare categorical variables. The normality of numerical data was assessed with the Kolmogorov-Smirnov test. Due to the data not following a normal distribution, the Kruskal-Wallis and Mann-Whitney U tests were applied for comparisons. Post-hoc analyses were corrected using the Bonferroni method. The results were evaluated with a 95% confidence interval and p-values less than 0.05 were considered to be statistically significant.

Results

Sociodemographic characteristics of the participants during the study period were as follows; median age was 37, 53.6% were female, 46.2% were male, and 58.4% were married (Table 1).

Table 1: Socio-demographic Characteristics of the Patients

Age (year)	Mean±sd	38.82±14.35
	Median	37
	Min-max	18-84
Sex n (%)	Female	199(53.8)
	Male	171(46.2)
Marital Status n (%)	Married	216(58.4)
	Single	106(28.6)
	Divorced/deceased spouse	48(13.0)
Total		370(100)

Examining the distribution of initial patient complaints revealed that the most common reasons were sore throat and nasal discharge at 18.4%, followed by musculoskeletal pain at 14.6%, ear pain at 11.1%, and cough at 11.1%. The analysis of the reasons for revisiting the emergency department among 116 patients shows that

21.4% of these patients requested an IV therapy, 17.9% requested an injection, 16.2% wanted immediate resolution to their complaints, and 11.9% went for a consultation (Table 2).

Table 2: The Distribution of Initial Patient Complaints and The distribution of reasons for patients revisiting the emergency department

Initial Complaint	n	%	Reason for revisiting ED*	n	%
Sore throat, nasal discharge	68	18.4	Request for an IV therapy	25	21.4
Musculoskeletal pain	54	14.6	Request for an injection	21	17.9
Ear pain	41	11.1	Request for an immediate solution	19	16.2
Cough	41	11.1	Visiting ED for a consultation	14	11.9
Symptoms related to the GI(gastrointestinal) System	39	10.5	Persistent complaints despite treatment	11	9.4
Itch/Rash	35	9.4	Increasing complaints	10	8.5
Symptoms related to urinary system	27	7.3	Dissatisfaction with the treatment	7	6.0
Exhaustion, fatigue	23	6.2	Dissatisfaction with the doctor	2	1.7
Burning and stinging sensation in the eye	17	4.6	Unable to attend the clinic during work hours	2	1.7
Fever, chills	10	2.7	Unable to secure an appointment	2	1.7
Headache	7	1.9	Other	4	3.6
Other	8	2.2			
Total	370	100.0	Total	117	100.0

*In patients who stated more than one reason, the first reason was taken into consideration.

74.9% of the patients noticed their complaints disappeared, 31.6% revisited the emergency department, 31.9% scheduled an appointment and 19.2% attended related clinics. The patients transferred to urgent care comprised 2.7% of the total patients. 2.4% of the patients came for a follow-up with a family physician, while 2.2% preferred a private hospital. 60.2% out of 118 patients who made an appointment visited related clinics within 10 days (Table 3).

Among the 29 patients who did not schedule an appointment despite continuing symptoms, 58.6% were unable to secure an appointment, 17.3% could not attend the clinic during work hours, and 13.8% did not know how to schedule an appointment.

Table 3: The distribution of patient complaints regarding the resolution of the complaints, return visits, clinic attendance, appointment scheduling, follow-up visits, and preferring private hospitals

Characteristics		n	%
Resolving Complaints	Yes	277	74.9
	No	83	22.4
	Transferred to urgent care	10	2.7
Return visits to the ED(emergency department)	Yes	117	31.6
	No	243	65.7
	Transferred to urgent care	10	2.7
Related clinic attendance	Yes	71	19.2
	No	289	78.1
	Transferred to urgent care	10	2.7
Scheduling appointments	Yes	118	31.9
	No	242	65.4
	Transferred to urgent care	10	2.7
Follow-up visits	Yes	9	2.4
	No	361	97.6
Preferring private hospitals	Yes	8	2.2
	No	362	97.8
Total		370	100.0

Upon examining the return visits to the emergency department based on initial patient complaints, it was observed that the most frequent reasons for return visits were for fever and chills with a 50% rate, and urinary system symptoms with a 48.1% rate. The least frequent return visits were for ear pain at 17.1%, headache at 20%, and itching/rash at 22.9%. The differences in return visits to the emergency department based on the initial complaint were not statistically significant (p=0.270)(Table 4).

Comparing the mean age of patients among the reasons for being unable to schedule an appointment, it was observed that those who did not know how to schedule an appointment were older (75.25±5.97), and this difference was found to be on the threshold of statistical significance (p=0.054).

Table 4: The comparison of return visits to the emergency department based on initial patient complaints

Initial complaint	Returning to ED n(%)		Total n(%)	P*
	Yes	No		
Sore throat, nasal discharge	23 (34.8)	43 (65.2)	66 (18.3)	
Musculoskeletal pain	16 (29.6)	38 (70.4)	54 (15.0)	
Ear pain	7 (17.1)	34 (82.9)	41 (11.4)	
Cough	16 (40.0)	24 (60.0)	40 (11.1)	
Symptoms related to the GI system	11 (31.4)	24 (68.6)	35 (9.7)	*0.270[a]
Itch/Rash	8 (22.9)	27 (77.1)	35 (9.7)	
Symptoms related to urinary system	13 (48.1)	14 (51.9)	27 (7.5)	
Exhaustion, fatigue	9 (39.1)	14 (60.9)	23 (6.4)	
Burning and stinging sensation in the eye	5 (29.4)	12 (70.6)	17 (4.7)	
Fever, chills	5 (50.0)	5 (50.0)	10 (2.8)	
Headache	1 (20.0)	4 (80.0)	5 (1.4)	
Other	3 (42.9)	4 (57.1)	7 (1.9)	
Total	117 (32.5)	243 (67.5)	360 (100.0)	

[a]Chi-Square Test

Discussion

This study aims to address the escalating overcrowding in emergency departments and the surge in repeated visits driven by similar complaints, both of which are adversely affecting the efficiency of our country's healthcare system. Identifying the underlying causes of these issues, seeks to guide the implementation of preventive measures and serve as a foundation for future research.

Emergency departments appeal to patients for various reasons. The increasing presence of experienced emergency physicians will further enhance the attractiveness of emergency departments by providing faster

diagnoses and more accurate treatments. Additionally, the perception that outpatient clinics are busier during the day, that emergency departments offer faster examination and laboratory procedures, and that overall waiting times in the hospital are shorter contributes to the overcrowding of emergency departments. As emergency departments that are already busy become even more crowded over time, the time allocated to patient care will decrease, and the quality of patient care will deteriorate. In response, initiatives and measures should be implemented to reduce the overcrowding in emergency departments.[5,9]

In this study, the average age of the 370 patients who first visited the family medicine non-urgent care area 2 clinics was 38.8 ± 14.3 years, with a median age of 37, a minimum of 18, and a maximum of 84. The average age of patients who returned to the emergency department was 37.9 ± 13.0 years. Various studies have reported age ranges for revisits, including 17-65 years, 30-49 years, and 35-54 years.[10-12] The most common patient complaints were sore throat and nasal discharge, followed by musculoskeletal pain, ear pain, and cough. The examination of return visits to the emergency department based on initial patient complaints showed that the highest return rates were for fever chills and urinary system symptoms. The least frequent return visits were for ear pain, headache, and itching/rash.

Studies by Hocagil et al. and Cheng et al. reported gastrointestinal complaints, infections, and respiratory system issues as the most frequent reasons for return visits. Similarly, Wu et al. identified abdominal pain, high fever, vertigo, and upper respiratory tract infections as common reasons. In Odehcouvertier et al.'s study, 32% of return visits within 30 days were attributed to abdominal pain. Differences in findings among these studies may stem from variations in the classification of complaints and the timeframes analyzed for return visits.[13-16]

It was considered that the differences between the results of this study and other studies were due to the treatment of complaints such as acute abdominal pain, severe diarrhea-vomiting, shortness of breath, and renal colic pain in different areas of the emergency department. Abdominal pain treated in the non-urgent care area of our clinic was included among gastrointestinal system complaints. Return visits within 10 days were assessed in this study, whereas other studies assessed return visits within 72 hours and 30 days[13-16]. Proportionally, the results were found to be similar.

In this study, musculoskeletal pain was present in 14.6% of initial visits, with a return visit rate of 15%. In the study by Megalla et al., it was observed that more than 10% of patients with back pain visited the emergency department multiple times with the same complaint within 2 years.[17] The percentage of initial visits with symptoms suggestive of upper respiratory tract infection was 29.5%, while the return visit rate was 40%. In the study by Akyol et al., infection-related complaints (particularly upper respiratory infections) were found to be the most frequent reason for return visits .[18]

It was noticed in this study that 31.6% of patients who made their initial visit to the family medicine non-urgent care area 2 clinics returned to the emergency department. In the United States, return visits to emergency departments constitute approximately 4.5% of all visits.[19] It is suggested that our country is the only country with emergency department visits close to 1.5 times its population.[20] According to the 2020 Health Statistics Yearbook, the population of the Republic of Türkiye is almost 83 million, while the number of primary care visits is about 253 million.[21]

Bıçakçı et al. reported a 2.4% return visit rate within 72 hours, while Verelst et al. found it to be 1.9%.[8,22] The differences may be attributed to this study's focus on return visits to non-urgent care-2 clinics.

The top four reasons for return visits to the emergency department in this study were found to be:

1. Request for IV therapy,

2. Request for an injection,

3. Request for an immediate solution,

4. Visiting ED for a consultation.

The literature search for this study showed that significant differences are observed among studies regarding the inappropriate use of emergency departments. This can be attributed to the lack of a standard criterion to measure and define the urgency with clear boundaries, differences in sociocultural levels, and public distrust in the healthcare system. It is believed in this study that frequent visits for reasons such as requesting an injection or IV therapy and seeking consultations are due to sociocultural differences between countries. There are very few studies in the literature regarding the rate of return visits to the emergency department within 10 days with the same or similar complaints. Given the diverse causes associated with revisits, the use of revisit rate as an indicator of quality has been debated. While some studies argue that revisit rates are a valid measure at the hospital level, others contend that they are insufficient as a standalone indicator of quality.[23-24]

This study was conducted during the COVID-19 pandemic, and patients with negative PCR test results were directed to non-urgent care clinics. The follow-up visit rate to the family medicine outpatient clinic was only 2.4%.

This study was conducted retrospectively, and the patients were contacted on the phone. As a result, factors such as patients' income and education levels, whether they had ongoing medical needs, their medical history, and the ease or difficulty of accessing the hospital were not fully assessed.

Remarkably, patients who did not know how to schedule an appointment had an average age of 75.25 ± 5.97, and those whose complaints had been resolved visited the emergency department slightly more often than those whose complaints had not been resolved. Return visits to the emergency department were approximately twice as high among those who had not made an appointment compared to those who had, and this situation was found to be unclear.

In conclusion, it is recommended to improve appointment systems for elderly patients, encourage visits to family medicine outpatient clinics, and educate the public that injections or IV therapies do not provide immediate cures. Initiatives to enhance health literacy and reduce unnecessary emergency department visits should be prioritized, and emergency departments should not be portrayed as easily accessible or overly attractive options. Implementing green zone practices or integrating family medicine into these areas should be viewed as complementary, not definitive, solutions.

Additionally, patients should be informed that symptoms may not resolve immediately after treatment begins and should be advised on when to return to the emergency department. Efforts should also focus on improving the time doctors spend with patients, streamlining appointment systems, enabling employees to visit clinics during work hours, and directing patients requiring non-urgent care to appropriate clinics. Promoting workplace healthcare services can further alleviate the burden on emergency departments.

Ethical Considerations: The study was approved by Ankara City Hospital, Health Sciences Ethics Committee with the approval number E2-22-1719

Conflict of Interest: The authors declare no conflict of interest.

References

1. Yataklı Sağlık Tesislerinde Acil Servis Hizmetlerinin Uygulama Usul ve Esasları. 31952 Sayılı Resmi Gazete'de yayımlanan yataklı sağlık tesislerinde acil servis hizmetlerinin uygulama usul ve esasları hakkında tebliğ. 13 Eylül 2022. Erişim adresi: https://www.resmigazete.gov.tr/eskiler/2022/09/20220913-5.htm
2. Zeytin AT, Cevik AA, Acar N, Kaya S, Ozcelik H. Characteristics of Patients Presenting to the Academic Emergency Department in Central Anatolia. Turk J Emerg Med. 2014;14(2):075-81.
3. Sartini M, Carbone A, Demartini A, et al. Overcrowding in Emergency Department: Causes, Consequences, and Solutions-A Narrative Review. Healthcare (Basel). 2022;10(9):1625. Published 2022 Aug 25. doi:10.3390/healthcare10091625
4. Kılıçaslan İ, Bozan H, Oktay C, Göksu E. Türkiye'de Acil Servise Başvuran Hastaların Demografik Özellikleri | 2005, Volume 5, Issue 1 | Turkish Journal of Emergency Medicine. Turk J Emerg Med. 2005;5(1):5-13.
5. Bicakci S, Bicakci N, Duman A, Atilla R. Characteristics of recurrent emergency department visits within 72 hours of visits for the same or related complaints. Med Sci. 01 Aralık 2016;5(4):937-40.
6. Pines JM, Asplin BR, Kaji AH, Lowe RA, Magid DJ, Raven M, vd. Frequent users of emergency department services: gaps in knowledge and a proposed research agenda. Acad Emerg Med Off J Soc Acad Emerg Med. Haziran 2011;18(6):e64-69.
7. Ej L, Ej R, Ng G. High-frequency users of emergency department care. J Emerg Med [Internet]. Haziran 2013 [a.yer 22 Kasım 2022];44(6). Erişim adresi: https://pubmed.ncbi.nlm.nih.gov/23473816/
8. 2018-2 Acil Sağlık Hizmetlerine Yönelik Düzenleme Hakkında Genelge [İnternet]. [a.yer 23 Kasım 2022]. Erişim adresi: https://shgm.saglik.gov.tr/TR,32181/2018-2-acil-saglik-hizmetlerine-yonelik-duzenleme-hakkinda-genelge.html
9. Gevrek, Orhan & Sari, Oktay & Aydogan, Umit & Akbulut, Halil & Saglam, Kenan & Özcan, Okan. (2015). Perceptions of Parents of Children Admitted to the Emergency Room and of Doctors Regarding the Urgency of Situation and the Factors Affecting Perceptions. Eurasian Journal of Emergency Medicine. 14. 183-188. 10.5152/eajem.2015.35682
10. Kent R, Bonnie L. Early emergency department representations. Emerg Med Australas EMA [Internet]. Nisan 2013 [a.yer 21 Kasım 2022];25(2). Erişim adresi: https://pubmed.ncbi.nlm.nih.gov/23560964/
11. Al Ali M, Alfalasi MR, Taimour HA, Ahmed AM, Muhammed Noori OQ. ED Revisits Within 72 Hours to a Tertiary Health Care Facility in Dubai: A Descriptive Study. *Cureus*. 2023;15(3):e36807. Published 2023 Mar 28. doi:10.7759/cureus.36807

12. Abualenain J, Frohna WJ, Smith M, Pipkin M, Webb C, Milzman D, vd. The prevalence of quality issues and adverse outcomes among 72-hour return admissions in the emergency department. J Emerg Med. Ağustos 2013;45(2):281-8.
13. Hocagil AC, Bildik F, Kılıçaslan İ, Hocagil H, Karabulut H, Keleş A, vd. Evaluating Unscheduled Readmission to Emergency Department in the Early Period. Balk Med J. Ocak 2016;33(1):72-9.
14. Cheng SY, Wang HT, Lee CW, Tsai TC, Hung CW, Wu KH. The characteristics and prognostic predictors of unplanned hospital admission within 72 hours after ED discharge. Am J Emerg Med. Ekim 2013;31(10):1490-4.
15. Wu CL, Wang FT, Chiang YC, Chiu YF, Lin TG, Fu LF, vd. Unplanned emergency department revisits within 72 hours to a secondary teaching referral hospital in Taiwan. J Emerg Med. Mayıs 2010;38(4):512-7.
16. Odeh Couvertier V, Patterson BW, Zayas-Cabán G. Association between advanced image ordered in the emergency department on subsequent imaging for abdominal pain patients. Acad Emerg Med Off J Soc Acad Emerg Med. Eylül 2022;29(9):1078-83.
17. Megalla M, Ogedegbe C, Sanders AM, Cox N, DiSanto T, Johnson H, vd. Factors Associated With Repeat Emergency Department Visits for Low Back Pain. Cureus. Şubat 2022;14(2):e21906.
18. Akyol C, Hakbilir O, Akyol JA, Tür ÇF, Oktay C. Acil servise aynı şikayet ile tekrar başvuran hastaların değerlendirilmesi. Türkiye Acil Tıp Dergisi. 2006;6(3):108-16.
19. Ling DA, Sung CW, Fang CC, et al. High-risk Return Visits to United States Emergency Departments, 2010-2018. West J Emerg Med. 2022;23(6):832-840. Published 2022 Oct 18. doi:10.5811/westjem.2022.7.57028
20. Karacay P. Emergency department crowding and possible solutions/Acil servis kalabaligi ve cozum onerileri. J Educ Res Nurs. 01 Mayıs 2010;7(2):20-5.
21. Bakanligi TCS. Sağlık İstatistikleri Yıllığı 2020 Yayınlanmıştır [İnternet]. T.C. Saglik Bakanligi. [a.yer 23 Kasım 2022]. Erişim adresi: https://www.saglik.gov.tr/TR,89801/saglik-istatistikleri-yilligi-2020-yayinlanmistir.html
22. Verelst S, Pierloot S, Desruelles D, Gillet JB, Bergs J. Short-term unscheduled return visits of adult patients to the emergency department. J Emerg Med. Ağustos 2014;47(2):131-9.
23. Pham JC, Kirsch TD, Hill PM, DeRuggerio K, Hoffmann B. Seventy-two-hour returns may not be a good indicator of safety in the emergency department: a national study. Acad Emerg Med. 2011;18(4):390-397. doi:10.1111/j.1553-2712.2011.01042.x
24. Hiti EA, Tamim H, Makki M, Geha M, Kaddoura R, Obermeyer Z. Characteristics and determinants of high-risk unscheduled return visits to the emergency department. Emerg Med J. 2020;37(2):79-84. doi:10.1136/emermed-2018-208343

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HYPERTENSION INCIDENCE, AWARENESS, TREATMENT AND CONTROL STATUS IN ADULT PATIENTS

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Abstract

Objectives: The aim of this study was to examine the relationship between the incidence, awareness, treatment, and control of hypertension and the factors affecting them.

Materials and Methods: The Recep Tayyip Erdogan University Rize Training and Research Hospital Family Medicine outpatient clinic conducted this descriptive study with 339 participants aged 30 years and older. Blood pressure was measured and other anthropometric measurements were recorded during the outpatient clinic visit and a questionnaire prepared by the researcher was applied.

Results: In the study, the incidence of hypertension was 41%, awareness status was 88.5% and control status was 79.7% in individuals aged 30 years and older who applied to our Family Medicine clinic. It was found that the rate of hypertension in the parents of individuals with a diagnosis of hypertension was statistically significantly higher than in individuals without hypertension (p=0.011).). The study inquired about the status of blood pressure measurement during prior visits to any healthcare facility among normotensive individuals, revealing that 16.5% of participants had not undergone blood pressure measurement during such visits.

Conclusion: Family medicine specialists, who deal with their patients with a community-oriented, holistic, and comprehensive approach, are the most prominent people who can ensure optimal blood pressure management within the scope of primary and secondary prevention by recognizing, treating, and controlling hypertension both before it occurs at elevated BP levels and in the early stages, and by providing continuous counseling.

Keywords: Hypertension, blood pressure monitoring, family practice.

Introduction

Hypertension, a systemic disease characterized by persistently elevated blood pressure (BP), is an important health problem because it causes serious complications and is widely prevalent in the population.[1] It is associated with many events, including hemorrhagic and thrombotic stroke, heart attack, sudden death, heart failure, peripheral arterial disease, aortic dissection, and renal failure. It is quantitatively the most important modifiable risk factor for early cardiovascular disease.[2] The best evidence for a causal role of increased blood pressure in cardiovascular complications is the reduction of blood pressure with antihypertensive treatment and improvement in outcome.[3] According to analyses, it has been reported that by 2030, 23 million cardiovascular deaths worldwide will be associated with hypertension (HT) and 85% of these deaths will occur in low- and middle-income countries.[4] The Turkish Hypertension Prevalence Study 2 or PatenT 2 (Prevalence, awareness, and treatment of hypertension in Turkey 2) study was conducted in 2012 to access the most up-to-date and comprehensive information on the prevalence, distribution, awareness, treatment, and control rates of hypertension in Turkey. The PatenT 2 study revealed a prevalence of hypertension in Turkey of 30.3% in 2012.[5] The TEKHARF study, which employed the real sample method, reported a 33.7% prevalence of hypertension in Turkey in 2017.[6] Due to the absence of a hypertension prevalence study conducted in Turkey following these studies, we aimed to address the data gap on this subject. If the prevalence of hypertension in Turkey remains constant until 2030, it is estimated that 17.4 million people will have hypertension, taking into account population growth.[7] The prevalence of hypertension increases with age, and in every age group from 40 to 80, women have a higher age-specific hypertension rate than men.[5]

This study aimed to evaluate the relationship between the awareness, prevalence, treatment, and control of hypertension and the factors affecting these factors in individuals aged 30 years and older who applied to the Family Medicine clinic of Recep Tayyip Erdogan University Training and Research Hospital and to present data that have not been investigated for hypertension in Turkey for a long time.

Materials and Methods

Participants and sampling

The Recep Tayyip Erdogan University Training and Research Hospital, Department of Family Medicine, conducted a descriptive study between 01.11.2022 and 31.01.2023. The Recep Tayyip Erdogan University Medical Faculty Non-Interventional Clinical Research Ethics Committee reviewed the study following the committee's directive during the meeting and determined it to be scientifically and ethically appropriate, issuing decision number 2023/18. The study included male and female patients over 30 years of age who applied to the Recep Tayyip Erdogan University Training and Research Hospital Family Medicine Outpatient

Clinic. The study excluded pregnant women, individuals who were bed or wheelchair-bound and could not be measured standing up, individuals with cognitive dysfunction who were unable to answer the questionnaire questions, and individuals who refused to participate in the study when informed before the survey. The G power analysis, which determined the sample size, estimated the population of Rize in 2022 to be 347,582 people. The Patent 2 study reports a prevalence of hypertension in our country at 30.3%.

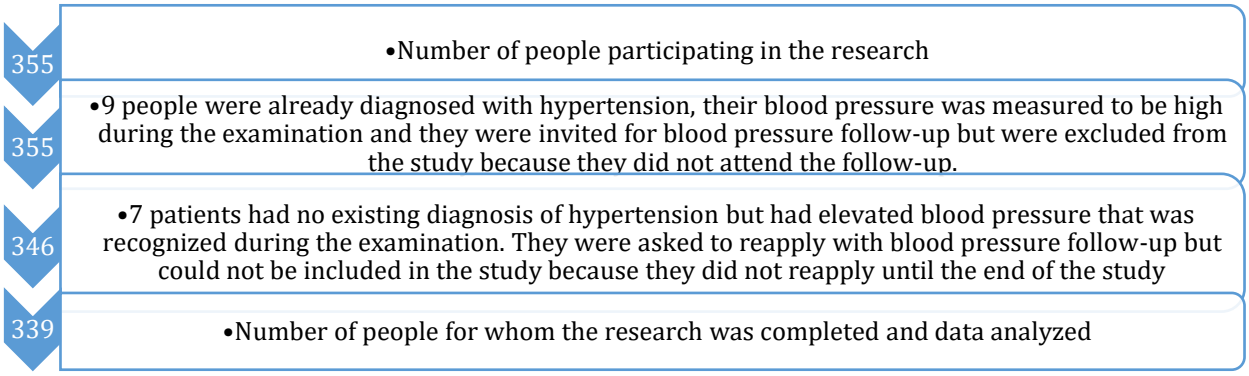

Figure 1. Flow Diagram

Tools

The researchers, after reviewing the literature, prepared a questionnaire form to gather sociodemographic and medical history data from the patients. The questionnaire asked about the participant's age, gender, place of residence, education level, regular physical activity, salt-restricted diet, presence of stress, diagnosis of hypertension, chronic diseases, alcohol use, smoking, number of packs/years of smoking, and parental history of hypertension, among other details. The study also collected data on anthropometric measurements, blood pressure measurements taken during the outpatient clinic visit, and LDL cholesterol levels analyzed within the last 6 months. For people who have been diagnosed with high blood pressure, the questionnaire asked about their use of antihypertensive drugs, the types of drugs they took (angiotensin-converting enzyme inhibitor (ACE-I), angiotensin receptor blockers (ARB), calcium channel blockers (CCB), beta-blockers, diuretics), their blood pressure at target, what they did to get their blood pressure there, how they got treatment for their newfound hypertension, what antihypertensive drug groups they started on, and how well they were doing with their treatment. The researcher administered the questionnaire face-to-face during the participant's outpatient clinic visit. The researcher used an automatic (digital display) sphygmomanometer (OMRON M2 Basic HEM-7121 J-E Intellisense, Tokyo, Japan) with a suitable cuff on both arms to measure and record blood pressure. Blood pressure was measured when the patient was not talking, leaning back, sitting on a chair with feet on the floor, with the arm supported at the level of the heart, and resting for at least five minutes. The

researcher ensured that the patient had not consumed tea, coffee, or smoked within the last 30 minutes. The researcher also measured the patient's height, weight, body mass index (BMI), and waist circumference. The researcher obtained information on the antihypertensive medication or medications used by the patients from the MEDULLA pharmacy system and/or e-NABIZ system.

Statistical Analysis

We performed statistical analyses using SPSS 22.0 for Windows. We presented descriptive measures as mean, standard deviation, and percentage distribution. The Kolmogorov-Smirnov test checked the data's conformity to the normal distribution. We used a chi-square test (Fisher's exact test when necessary) to compare the distributions of categorical variables and a student t-test to compare the averages between two groups that met parametric conditions. The statistical significance level was taken as $p<0.05$.

Results

A total of 339 individuals participated in the study; 58.9% were normotensive, 36.3% were hypertensive, and 4.8% were first diagnosed with hypertension. In the study, 44.6% of participants diagnosed with hypertension were male, whereas 40% of participants without such a diagnosis were male. 23.7% of individuals diagnosed with hypertension resided in rural areas, whereas 15.5% of participants without such a diagnosis lived in rural regions.

The analysis of hypertension prevalence across age groups indicated that men exhibited a higher likelihood of having hypertension than women in the 30-39 and 50-59 age brackets, whereas women demonstrated a greater likelihood than men in the remaining age groups (Figure 2).

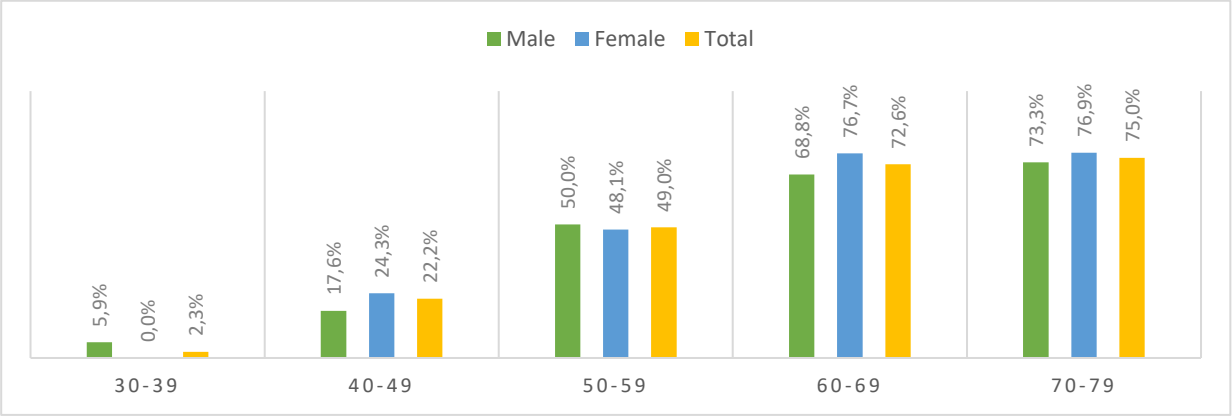

Figure 2. Distribution of the prevalence of hypertension according the gender in age groups

The prevalence of hypertension in male participants was 43.7%, while the prevalence of hypertension in female participants was 39.1% (Table 1). There was no statistically significant relationship between male and female gender in the distribution of the prevalence of hypertension (p:0.398).

While 83.9% of the male participants were aware of hypertension, this rate was 92.2% among the female participants. The overall awareness rate for hypertension was 88.5% (p:0.126) (Table 1). In the study, hypertension under control was defined as systolic blood pressure (SBP) <130 mmHg and diastolic blood pressure (DBP) <80 mmHg.[1] We evaluated managed hypertension with office blood pressure measures after patient self-reporting. Table 1 illustrates the control status of hypertension in patients having an active diagnosis of the condition. Hypertension was managed in 72.5% of males and 85.9% of women (p = 0.067) (Table 1).

Table 1. Distribution of the prevalence, awareness, and under-control status of hypertension in the participants

	Male (n:142)		Female (n:197)		Total (n:339)		
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI	*p*
Prevalence (n:339)	62(43.7)	35.7-51.9	77(39.1)	32.5-46.0	139(41.0)	35.9-46.3	0.398
Awareness (n:139)	52(83.9)	73.3-91.4	71(92.2)	84.4-96.7	123(88.5)	82.4-93.0	0.126
Under Control Status (n:123)	37(72.5)	58.5-82.9	61(85.9)	76.4-92.5	98(79.7)	72.6-86.6	0.067

Analysis of the relationship between study participants' hypertension and parental hypertension revealed that 75.5% of individuals with hypertension had a parental diagnosis of hypertension, compared to 62.5% of those without hypertension (p = 0.011) (Table 2)

Table 2. Examination of the relationship between the presence of hypertension in individuals and parental diagnosis of hypertension

		Hypertension				
		No		Yes		
		n	Percent (%)	n	Percent (%)	*p*
Do the parents have a diagnosis of hypertension?	**No**	75	37,5	34	24,5	
	Yes	125	62,5	105	75,5	0,011

*Chi-square test

The study compared the average body mass index and waist circumference between groups with and without blood pressure at the target value, focusing on individuals with hypertension across both genders. No statistically significant difference was observed between the groups (Table 3).

Table 3. Comparison of body mass index and waist circumference averages between those with and without blood pressure at target value in individuals with hypertension

	Is blood pressure at target value in individuals with hypertension?									
	Male					Female				
	Yes		No			Yes		No		
	Average	SD	Average	SD	*p*	Average	SD	Average	SD	*p*
BMI (kg/m^2)	31.1	8.9	31.6	5.8	0.861	33.6	6.0	36.7	4.7	0.119
Waist circumference (cm)	105.5	9.6	107.9	14.9	0.484	105.1	16.3	108.5	11.0	0.531

*Student t test

The normotensive participants in the study were queried regarding prior blood pressure measurements taken during visits to health institutions. Results indicated that 16.3% of men and 16.7% of women reported having never received such measurements (Figure 3).

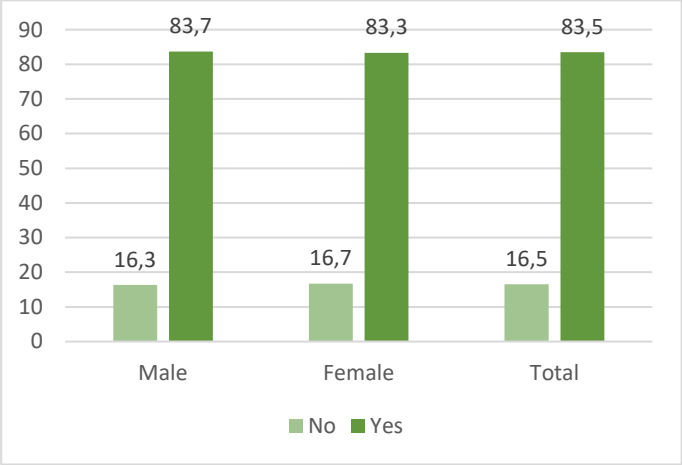

Figure 3. Status of blood pressure measurement in previous visits to any health institution in normotensive individuals

Figure 4 illustrates the distribution of treatment status and characteristics among hypertensive participants in the study. Among those receiving antihypertensive treatment, 4.1% were on monotherapy, with 43.7% of these individuals employing calcium channel blockers (CCB). Among the patients getting treatment, 26.2% were prescribed a triple combination therapy, with 29.7% giving the ACE-I-CCB-Diuretic combination and 29.6% receiving the ARB-CCB-Diuretic combination. It was noted that 22.2% of patients undergoing antihypertensive treatment were administered quadruple combination therapy, with 40% receiving ARB-CCB-Beta blocker-diuretic and 40% receiving ACE-I-CCB-Beta blocker-diuretic.

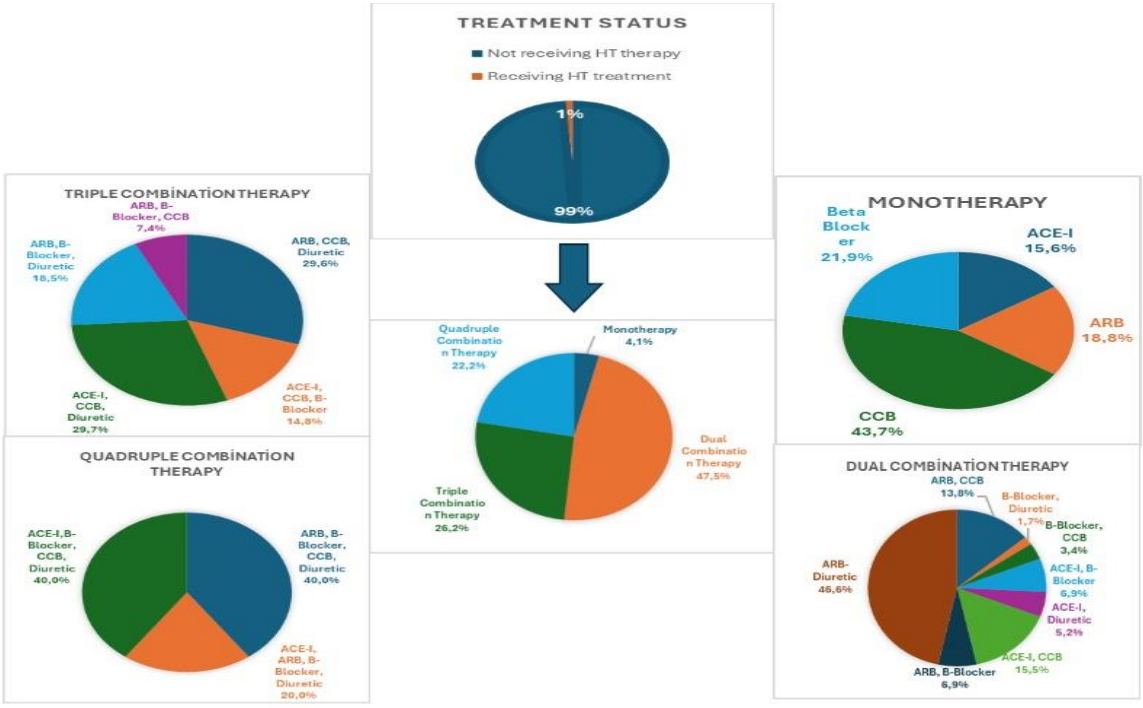

Figure 4. Distribution of treatment status of hypertensive individuals and characteristics of treatment received by individuals receiving treatment

(ACE-I: Angiotensin-converting enzyme inhibitor, ARB: Angiotensin receptor blockers, CCB: Calcium channel blocker HT: Hypertension)

Discussion

The study found that the prevalence of hypertension among participants was 41%. In 2012, the PatenT 2 study, encompassing a representative adult population in Turkey, indicated a hypertension prevalence of 30.3%.[5] The TEKHARF study, published in 2017, indicated a prevalence of 33.7% in Turkey and 36.5% in TEMD data.[1,6] Our research and the existing literature indicate a recent rise in the prevalence of hypertension. The aging population, urbanization, alterations in food habits, and heightened social stress may contribute to this trend.

The awareness level among participants with hypertension was 88.5%, whereas the control group had a level of 79.7%. The PatenT 2 study indicated that 40.7% of hypertension patients were cognizant of their diagnosis in 2003, increasing to 54.7% in 2012, while control rates escalated from 8.1% in 2003 to 28.7% in 2012.[5] According to WHO data, only 14% of the estimated 1.4 billion people with hypertension worldwide have their blood pressure under control.[8] Recent enhancements in Turkey's healthcare system, including improved access

to medical facilities, easier availability of medications, heightened expertise among physicians and healthcare personnel, and implemented educational initiatives, may have contributed to increased awareness and management of hypertension.[9]

The study involved participants aged 30 years and older who visited our family medicine clinic, revealing that 47.5% of individuals with hypertension belonged to the 60-79 age group. A study conducted in Germany indicated that 71% of individuals aged 65 to 79 were diagnosed with hypertension.[10] The PatenT 2 study, consistent with global data, indicated that the prevalence of hypertension rises with age, reaching 60–70% after the age of 60.[5] In light of these results, it can be considered that the prevalence of hypertension may increase in the coming years with the aging of the population in our country.

A cohort research tracking individuals over 54 years revealed a significant independent correlation between parental hypertension diagnosis and elevated blood pressure levels, as well as the onset of hypertension in adulthood.[11] A separate study indicated that a familial history of hypertension in both mothers and fathers increased the probability of hypertension in both genders.[12] The study revealed that the prevalence of hypertension among the parents of individuals diagnosed with hypertension was statistically substantially greater than that of individuals without hypertension (p=0.011). The findings of our investigation align with the existing literature. The concordance of blood pressure within families may be ascribed to both common environmental factors and genetic predisposition. Shared genetic susceptibility is probably due to the cumulative effect of multiple genetic variations that elevate blood pressure.[11]

In the study, researchers inquired about the blood pressure measurement history of normotensive individuals during prior visits to healthcare facilities, and unexpectedly, discovered that 16.5% of the participants had never undergone a blood pressure measurement. The PatenT study revealed that 32.2% of participants had never undergone blood pressure measurement, while the PatenT 2 study indicated that 15.5% of individuals in Turkey had not had their blood pressure measured despite searching for care at a health institution for various reasons.[5,13] In our country, it may be important to increase blood pressure measurement to increase awareness of hypertension, to recognize and intervene in hypertension at an early stage, to identify patients in the stage of increased BP before hypertension occurs to provide primary prevention, and to address pharmacological and non-pharmacological treatments within the scope of guidelines. The higher the BMI, the higher the risk of morbidity and mortality.[13] In the PatenT study, it was found that body mass index was high in hypertensives and there was a linear relationship between hypertension and body mass index.[14] In the Balcova Heart Project, it was reported that 61.1% of individuals with high waist circumference were hypertensive.[15] Another study showed that both overweight and obesity were highly associated with hypertension risk in men and women.[16] In our study, the average BMI and waist circumference of hypertensive adults, both with and without blood pressure at the target value, were compared across genders, revealing no

statistically significant differences between the groups. However, it is significant that the average BMI and waist circumference were markedly elevated in both men and women, irrespective of whether blood pressure met the target range Interventions to reduce adiposity and avoid overweight can have major impacts on risk factors and the development of cardiovascular diseases at the individual and community level. The main approach in the treatment of metabolic diseases such as HT and obesity; providing weight control, increasing physical activity, and abandoning a sedentary lifestyle.[17] For this reason, it is known that family physicians in primary care have a major role in the prevention of obesity and then in the recognition and treatment of obesity.

Our study investigated hypertension as well as chronic renal disease, diabetes mellitus, coronary artery disease, and hyperlipidemia. Our study did not identify a significant association between hypertension and the chronic diseases examined.

The WHO published guidelines on the pharmacological treatment of hypertension in 2021; recommends the initiation of pharmacological antihypertensive treatment in individuals with a confirmed diagnosis of hypertension and systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg, single-pill combination therapy as initial treatment, and the selection of antihypertensive drugs to be used in combination from three drug classes including diuretics (thiazide or thiazide-like), ACE-I/ARBs and dihydropyridine group CCBs.[8] We evaluated the treatment status of the hypertensive individuals who participated in our study and the distribution of the characteristics of the treatment received by the individuals who received treatment. The results of the study showed that the antihypertensive treatments initiated in hypertensive individuals in recent years were largely following the WHO recommendations. The accessibility of online environments for both physicians and patients, enhanced communication among healthcare providers, the presence of updated guidelines in conjunction with ongoing technological advancements, and the global accumulation of knowledge regarding hypertension may have impacted these findings.

When the studies in the literature were examined, it was observed that Patent 2 and TEKHARF studies were conducted in 2012 and 2017, respectively, to assess the prevalence of hypertension in Turkey, but studies on this subject in recent years have been quite limited. To fill this gap in the literature, the incidence, awareness, treatment, and control status of hypertension, risk groups were determined and the effectiveness of family physicians working in primary care in the diagnosis, treatment, and follow-up of hypertension was demonstrated in this study.

Limitations and Alternatives

The study's strength is its application of suitable interventions for participants, grounded in established guidelines for hypertension and associated risk factors. The study's execution at a single center represents a

limitation. The results obtained do not reflect the entire population. Multicenter studies are essential for this purpose.

Conclusion

In the study, we found that the prevalence of hypertension in individuals aged 30 years and older who applied to our family medicine clinic was higher than the current data in Turkey, hypertension awareness was at the level of developed countries, and the status of hypertension under control was well above the data in Turkey. The treatment approach for hypertensive individuals with uncontrolled blood pressure was reorganized, lifestyle change recommendations were reiterated, new hypertension was diagnosed in several patients, and pharmacological treatment was initiated alongside lifestyle change recommendations. In line with these results, family medicine specialists, who address their patients with a community-oriented, holistic, and comprehensive approach, are the most prominent people who can ensure optimal blood pressure management within the scope of primary and secondary prevention by recognizing, treating and controlling hypertension both before it occurs at elevated BP levels and in the early stages, and by providing continuous counseling. Therefore, family physicians should carefully consider the management of blood pressure at each stage and explain this to patients, promoting health and well-being at every stage and involving them in managing their health.

Ethical Considerations: The study was approved by the Recep Tayyip Erdogan University Medical Faculty Non-Interventional Clinical Research Ethics Committee board (Number: E-40465587-050.01.04-589).

Conflict of Interest: The authors declare no conflict of interest.

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References

1. Hypertension Diagnosis and Treatment Guideline: The Society of Endocrinology and Metabolism of Turkey. Identifying Risks in Hypertension. 6th ed. Baltimore: Turkish Endocrinology and Metabolism Society; 2022:11-22.
2. Collaborators GBDRF. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2018;392(10159):1923-94.
3. Ninomiya T, Perkovic V, Turnbull F, et al. Blood pressure lowering and major cardiovascular events in people with and without chronic kidney disease: meta-analysis of randomised controlled trials. Bmj. 2013;347:f5680.
4. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. Plos Med. 2006;3(11):e442.
5. Sengul S, Akpolat T, Erdem Y, et al. Changes in hypertension prevalence, awareness, treatment, and control rates in Turkey from 2003 to 2012. J Hypertens. 2016;34(6):1208-17.
6. Onat A, Can G, Yuksel H, et al. TEKHARF 2017. In: Onat A, ed. Blood Pressure and Hypertension in Our Societ. 1st ed. Baltimore: Logos Publishing; 2017:104-119.
7. Yurekli AA, Bilir N, Husain MJ. Projecting burden of hypertension and its management in Turkey, 2015-2030. Plos One. 2019;14(9):e0221556.
8. WHO. Guideline for the pharmacological treatment of hypertension in adults 2021. Available from: https://iris.who.int/bitstream/handle/10665/344424/9789240033986-eng.pdf (Accessed: 09.04.2023)
9. Saglıkta-Donusum-Programı. 2007 Available from: https://www.saglik.gov.tr/TR,11415/saglikta-donusum-programi.html. (Accessed: 10.04.2023)
10. Neuhauser HK, Adler C, Rosario AS, Diederichs C, Ellert U. Hypertension prevalence, awareness, treatment and control in Germany 1998 and 2008–11. Journal of Human Hypertension. 2015;29(4):247-53.
11. Wang NY, Young JH, Meoni LA, Ford DE, Erlinger TP, Klag MJ. Blood pressure change and risk of hypertension associated with parental hypertension: the Johns Hopkins Precursors Study. Arch Intern Med. 2008;168(6):643-8.
12. Rebbeck TR, Turner ST, Sing CF. Probability of having hypertension: Effects of sex, history of hypertension in parents, and other risk factors. Journal of Clinical Epidemiology. 1996;49(7):727-34.

13. Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Hypertension. 2018;71(6):e13-e115.
14. Altun B, Arici M, Nergizoglu G, et al. Prevalence, awareness, treatment and control of hypertension in Turkey (the PatenT study) in 2003. Journal of Hypertension. 2005;23:1817-23.
15. Sozmen K, Ergor G, Unal B. Factors affecting hypertension prevalence, awareness, treatment uptake and blood pressure control. Dicle Medical Journal. 2015;42(2).
16. Wilson PW, D'Agostino RB, Sullivan L, Parise H, Kannel WB. Overweight and obesity as determinants of cardiovascular risk: the Framingham experience. Arch Intern Med. 2002;162(16):1867-72.
17. Ozkan Pehlivanoglu EF, Saglan Y, Balcioglu H, Yildiz P, Bilge U, Unluoglu I. Evaluation of Mediterranean Type Nutrition Habits with Blood Pressure Regulation and Metabolic Syndrome Parameters in Patients with Hypertension. Anatol J Family Med 2019;2(3):103–7.

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THE RELATIONSHIP BETWEEN ANTICHOLINERGIC LOAD AND FRAILTY STATUS: A CROSS-SECTIONAL STUDY IN ELDERLY INDIVIDUALS

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Abstract

Objectives: Frailty is a significant concern in elderly individuals, and the anticholinergic effects of medications are commonly encountered in geriatric patients. This study aims to explore the relationship between anticholinergic drug burden and frailty status in people aged 65 and older.

Materials and Methods: The study included 1,058 individuals identified as "pre-frail" and "frail" according to the Fried frailty index, who visited a geriatric outpatient clinic at a tertiary reference center. All participants underwent a comprehensive geriatric assessment along with socio-demographic data. The anticholinergic load of the medications used by the participants was measured using the Anticholinergic Cognitive Burden Scale (ACB), with ACB scores of ≥2 considered indicative of a high anticholinergic load. The relationship between frailty status and high ACB burden was analyzed using multivariate analysis.

Results: The study consisted of 672 (56.8%) participants classified as "pre-frail" and 386 (32.6%) classified as "frail". Frailty was more prevalent among older individuals, females, those with lower education levels, and unmarried individuals. Additionally, frail individuals exhibited high ACB scores, multi-morbidity, cognitive impairments, and undernutrition. Multivariate analysis revealed that an ACB score of ≥2 was 2.07 times more likely to be associated with frailty (OR: 1.63, 95% CI: 1.43-2.98, $p < 0.001$).

Conclusion: A high ACB score is significantly associated with frailty compared to pre-frailty. Assessing anticholinergic drug load, a modifiable factor, should be considered as it may positively influence the management of frail patients.

Keywords: Anticholinergic load, frailty, pre-frailty, older adults.

Introduction

The elderly population is rapidly increasing, drawing attention to geriatric syndromes characterized by multifactorial causes and complex clinical symptoms.[1]Frailty," recognized as a decrease in physiological reserves and functions and an impaired ability to cope with stressors, is a geriatric syndrome that tends to increase with age. This condition represents a dynamic process marked by a series of physical, cognitive, and psychosocial changes. According to a meta-analysis by Collard et al., the incidence of frailty in individuals aged 65 and over varies widely, ranging from 4% to 59% depending on the screening tools used.[2]In Turkey, a 2020 study by Naharci et al. found this rate to be 33.1% among community-dwelling individuals.[3]

Commonly used scales to comprehensively assess the multifaceted nature of frailty include the FRAIL Scale, Fried Frailty Index, Clinical Frailty Scale, Edmonton Frail Scale, and Rockwood Frailty Index (FI). The Fried Frailty Index evaluates individuals in five areas: weight loss, decreased physical activity, exhaustion, walking speed, and hand grip strength. Based on these criteria, individuals are classified as "robust," "pre-frail," and "frail".[4]Those in the "pre-frail" stage may show early signs of physical and cognitive decline, decreased stamina, and difficulty maintaining daily activities. In the "frail" stage, these issues are more pronounced, leading to significant functional decline, serious deterioration in quality of life, increased risk of hospitalization, and even death. However, the progression to "frail" can be prevented or delayed with positive interventions for those identified in the "pre-frail" stage.[5]

Medication use is also high among elderly individuals, with almost every individual taking an average of 3 to 8 medications.[6]Anticholinergic drugs, frequently prescribed for conditions such as depression, insomnia, overactive bladder, and chronic obstructive pulmonary disease, exert their effects by inhibiting cholinergic neurotransmission in the peripheral and central nervous systems.[7]These medications can cause numerous undesirable effects, including dry mouth, constipation, blurred vision, urinary retention, cognitive impairment, and an increased risk of falls, particularly in older individuals. Drug-drug interactions and side effects tend to increase due to reduced physiological reserves with advanced age, changes in pharmacokinetic and pharmacodynamic properties, and a decline in cholinergic neurons and receptors.[8]

Many scales have been developed to measure the anticholinergic load, including the Drug Burden Index (DBI), the Anticholinergic Cognitive Burden Scale (ACB), and the Anticholinergic Risk Scale (ARS). [9,10]The ACB is a frequently used, highly practical rating system designed to measure the cumulative anticholinergic potential of a drug regimen.[9]Drugs are evaluated with a categorical scoring system ranging from 0 to 3, where a total score of 1 indicates a “low” anticholinergic effect, and a score of ≥2 indicates a “high” anticholinergic effect.[10]The higher the total score, the greater the anticholinergic effects, especially in older adults who may be more sensitive to these medications.[11]

The potential adverse effects of anticholinergic medications on the health of older adults have raised concerns, particularly regarding their association with frailty. These widely prescribed medications can disrupt the delicate balance of physiological processes in aging individuals. Various studies have investigated the potential relationship between anticholinergic load and frailty in elderly individuals.[3,12,13]Although the tools used to evaluate anticholinergic load and frailty vary, most evaluations compare "robust" and "frail" patients.[14]In 2021, a cross-sectional study by Ruiz et al. using the ACB and FI scales showed a high correlation between the presence of an ACB score of ≥1 and frailty.[12]However, there is limited data on the relationship between anticholinergic load and the "frail" and "pre-frail" groups, and no studies have been conducted directly with the ACB. A 2016 study by Jamsen et al. using the DBI and the Modified Fried Frailty Index found that each unit increase in the DBI score increased the transition from the "robust" group to the "pre-frail" group by 73%, with no significant difference between the pre-frail and frail groups.[13]

Understanding the nuances of the relationship between frailty and anticholinergic medications, which are widely used among older adults, can inform specific interventions and optimize drug therapy management. This can lead to strategies aimed at protecting the health and well-being of individuals, particularly in the transition from the "pre-frail" period to frailty. Our study aims to reveal the subtle relationship between the anticholinergic load measured by ACB and the "pre-frail" and "frail" status in elderly individuals.

Materials and Methods

Study Design and Population

This study is based on a cross-sectional cohort of adults aged 65 years and older enrolled at a tertiary care geriatric clinic. A total of 3,178 different elderly individuals visited the relevant polyclinic between August 2020 and August 2023. Of these, 1,194 patients were excluded due to acute or severe systemic disease, visual or sensorial disability, mood disorders other than depression, delirium, receiving home care services, and having no frail assessment, leaving 1,184 patients for further evaluation (Figure 1). All participants gave written informed consent for the research, and the study was approved by the Health Sciences University Ethics Committee (date and approval number: 2020/03-58).

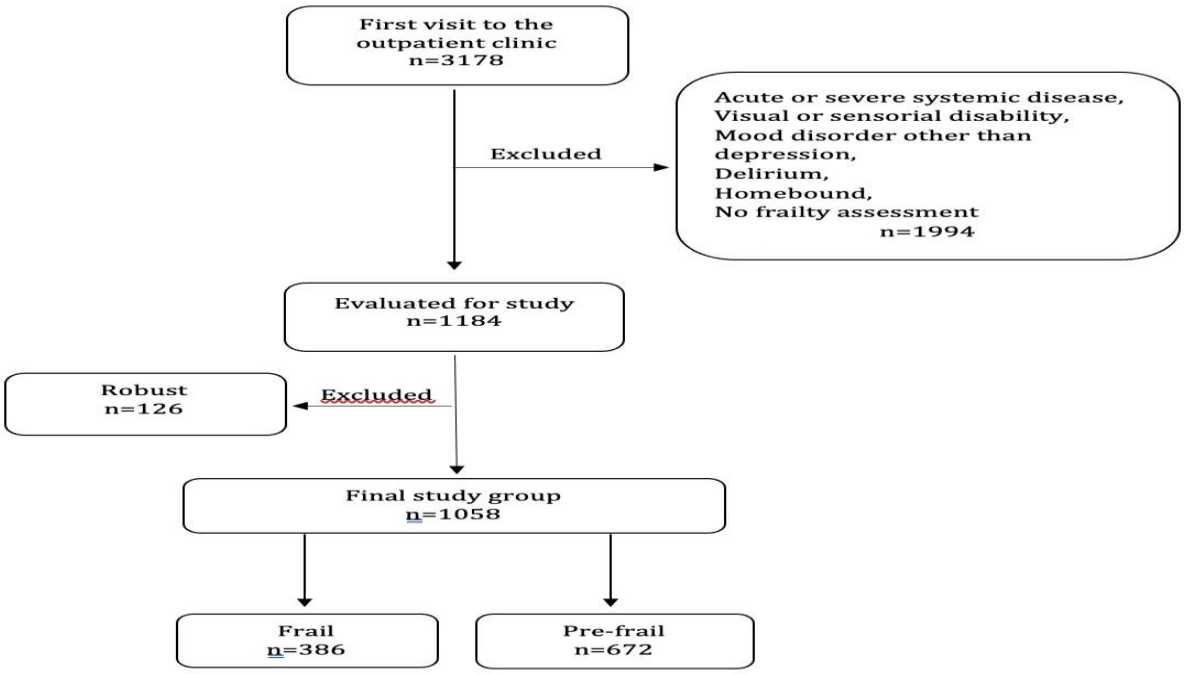

Figure 1. Flow chart of the patient selection process

Measurements

All participants underwent a comprehensive geriatric evaluation. Frailty status was determined according to the Fried Frailty Index.[4] Based on the parameters of weight loss, low handgrip strength, low walking speed, weakness, and decreased physical activity, individuals with a total score of 0 were categorized as “robust,” those with scores of 1-2 as “pre-frail,” and those with scores of ≥3 as “frail.” Of the total applications, 1,058 (89.4%) were evaluated as pre-frail and frail, and 126 individuals categorized as "robust" were excluded from the study (Figure 1). The Anticholinergic Cognitive Burden Scale (ACB) was used to assess patients' anticholinergic burden.[15] Each drug used by the participants was scored between 0 and 3 according to the scale, and the total score of all drugs was recorded.[10] Participants were further categorized into two groups: those with ACB scores of 0-1 (low) and those with ACB ≥2 (high). Nutritional status was assessed using the Mini Nutrition Assessment-Short Form (MNA-SF), with a score ≤11 defined as “malnutrition”.[16]Cognitive assessment was performed using the Mini-Mental State Examination (MMSE)with scores ≤26 indicating cognitive impairment.[17]

Socio-demographic and Medical Characteristics

Socio-demographic data collected included age, gender, marital and educational status, smoking, and alcohol use. Data on comorbidities such as diabetes, hypertension, ischemic heart disease, chronic obstructive pulmonary disease, and Parkinson's disease were obtained from patient history, interviews with relatives, and medical records. The medication history of participants was reviewed, and the number of medications was noted. Multimorbidity was defined as having 2 or more chronic diseases. [18]

Statistics

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) (IBM SPSS Inc., IL, Chicago, USA). Numerical variables were presented as absolute numbers and percentages, mean and standard deviation, or median (minimum-maximum). Continuous data were compared using the Student t-test or Mann-Whitney U test. The Kolmogorov-Smirnov test was used to determine the distribution of data. Categorical variables were expressed as percentages and compared using the chi-square test. Frailty status was selected as the dependent variable for all regression analyses. In univariate analysis, statistically significant variables ($p \leq 0.05$) such as age, gender, marital status, cognitive decline, and malnutrition were selected to create a multivariate regression model. The Hosmer-Lemeshow (H-L) test was used to assess model suitability. Odds ratios (OR) and their 95% confidence intervals (CI) were reported from the models. The Phi correlation coefficient test was used to measure the correlation between categorical variables. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 1,058 patients were included in the study, with 672 (63.5%) classified as "pre-frail" and 386 (36.5%) as "frail". The average age of the participants was 78.9 (±6.9) years, and 66.6% were women. More than half of the individuals (57.8%) were married, and 65.4% had received five years of education or less. The median number of medications used was 4, and the rate of patients with any ACB score (≥1) was 37.1%, while 14.8% had a score of 2 or more. The three most common comorbidities were hypertension, diabetes mellitus, and depression. Undernutrition was detected in 21.0% of the patients, functional impairment in 10.0%, and cognitive impairment in 35.1% (Table 1).

Comparing frailty statuses, the "frail" group had a higher average age (80.4 ±6.9 vs. 78.1±6.8), a higher proportion of females (75.1% vs. 61.8%), and a higher rate of individuals with ≤5 years of education ($p<0.001$). The proportion of unmarried individuals was higher in the "frail" group compared to the "pre-frail" group. Those with an ACB score ≥1 were also higher at 45.1% ($p<0.001$). Patients with a "high" anticholinergic load

were 22.5% in the "frail" group and 10.4% in the "pre-frail" group, a significant difference (p<0.001). All evaluated comorbidities were significantly more frequent in the "frail" group, with multi-morbidity present in 76.4% compared to 63.0% in the "pre-frail" group (p<0.001). Under-nutrition and cognitive impairment were also more common in the "frail" individuals (Table 1).

Table 1. Baseline characteristics of participants in terms of frailty states.

Parameters	**Total** (n=1058)	**Frail** (n=386)	**Prefrail** (n=672)	**p**
Age (± SD)	78.9 (±6.9)	80.4 (±6.9)	78.1 (± 6.8)	**<0.001**
Gender, female, n (%)	705 (66.6%)	290 (75.1%)	415 (61.8%)	**<0.001**
Marital status, married, n (%)	611 (57.8%)	181 (46.9%)	430 (64.0%)	**0.001**
Education level, ≤ 5 years, n (%)	692 (65.4%)	299 (77.5%)	393 (58.7%)	**<0.001**
Smoking, n (%)	55 (5.2%)	41 (6.1%)	14 (3.6%)	0.081
Alcohol, n (%)	17 (1.6%)	13 (1.9%)	4 (1.0%)	0.251
Number of drugs, median (range)	4 (3%)	5 (4%)	4 (4%)	**<0.001**
ACB, ≥1, n (%)	393 (37.1%)	174 (45.1%)	219 (32.6%)	**<0.001**
ACB, n (%)				
0-1	801 (85.2%)	299 (77.5%)	602 (89.6%)	**<0.001**
≥2	157 (14.8%)	87 (22.5%)	70 (10.4%)	**<0.001**
Comorbidities, n (%)				
Hipertension	801 (75.7%)	306 (79.3%)	495 (73.7%)	**0.040**
Diabetes mellitus	380 (35.9%)	167 (43.3%)	213 (31.7%)	**<0.001**
Coronary artery disease	284 (26.8%)	118 (30.6%)	166 (24.7%)	**0.039**
Cerebrovasular disease	67 (6.3%)	32 (8.3%)	35 (5.2%)	**0.048**
Chronic obstructive lung disease	109 (10.3%)	55 (14.2%)	54 (8.0%)	**0.02**
Depression	382 (36.1%)	180 (46.8%)	202 (30.1%)	**<0.001**
Multimorbidity, n (%)	717 (67.8%)	294 (76.4%)	423 (63.0%)	**<0.001**
MNA-SF, score, (± SD)	12.4 (1.9%)	11.7(2.1%)	12.8 (1.6%)	**<0.001**
Undernutrition, n (%)	222 (21.0%)	125 (32.8%)	97 (14.5%)	**<0.001**
MMSE, score, (± SD)	26.8 (3.1%)	25.9 (3.4%)	27.3 (2.8%)	**<0.001**
Cognitive impairment, n (%)	371 (35.1%)	198 (51.4%)	487 (72.6%)	**<0.001**

Abbreviation: ACB; anticholinergic cognitive burden, MMSE; mini-mental state examination, MNA-SF; mini nutritional assessment- short form

Multivariate regression analysis, adjusted for age, gender, educational status, marital status, multi-morbidity, under-nutrition, and cognitive impairment, revealed that having a "high" ACB score was 2.07 times associated with being "frail" (OR: 2.07, 95% CI: 1.43-2.98, p < 0.001). The Hosmer-Lemeshow (H-L) test result (Chi-square: 8.506) indicated a high model fit (p=0.386). Other parameters associated with frailty included advanced age, female gender, low education level, multi-morbidity, cognitive impairment, and undernutrition (Figure 2).

The correlation analysis results of Fried subcategories with frailty and ACB≥2 are detailed in Supplementary Table 1.

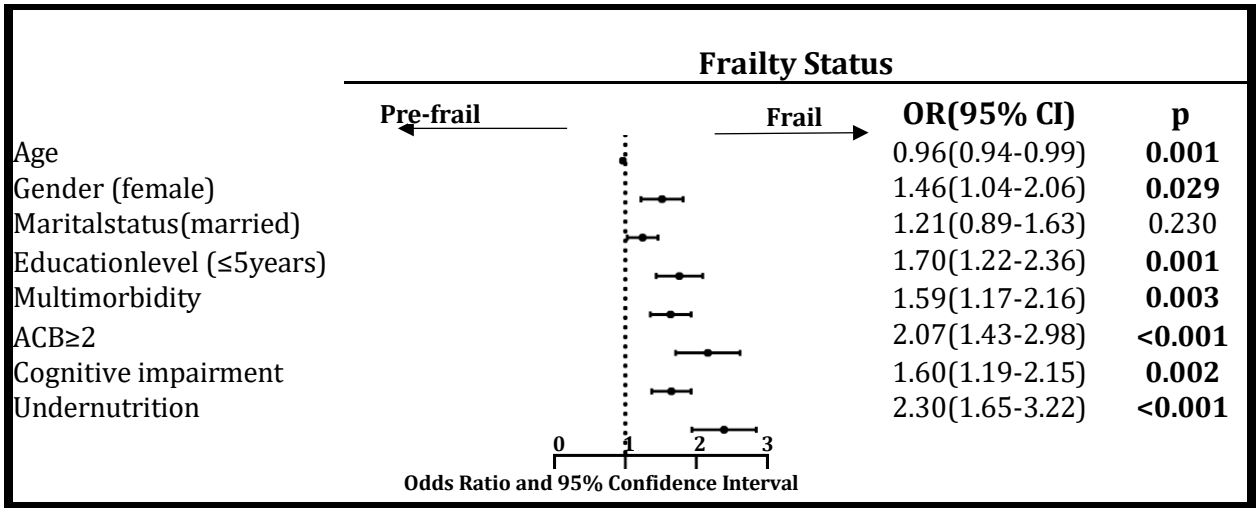

Figure 2. Forest plot of multivariate analysis of parameters related to frailty status.

Abbreviation: ACB; anticholinergic cognitive burden

Discussion

This single-center, cross-sectional study conducted at a tertiary reference center evaluates the parameters affecting frailty compared to pre-frailty. A high ACB score was independently associated with frailty by 2.07 times. Additionally, advanced age, female gender, low education level, multi-morbidity, cognitive impairment, and under-nutrition were other relevant parameters. Notably, 89.4% of the study population was pre-frail or frail, and nearly one in three individuals (37.1%) had any ACB score. This study highlights the relationship between a "high anticholinergic load" and frailty in elderly individuals.

Few studies in the literature separately evaluate the relationship between anticholinergic load and frailty/pre-frailty.[13] To our knowledge, no study compares these two groups using ACB. A study using the Drug Burden Index (DBI) showed that each unit increase in DBI score was 73% higher in the pre-frail group compared to

the healthy group, with no difference between pre-frail and frail groups.[13]This difference may be due to the relatively large number of "healthy" groups in that study and the evaluation of only male patients. Another study assessing 115 inpatients with a higher cut-off point in the ACB score (ACB >3) found that a high anticholinergic load was 2.21 times more associated with frailty compared to the "healthy" group.[19]Ruiz et al. conducted a study among 17,084 male participants, finding that any ACB burden was associated with 4.78 times greater frailty. In our study, an ACB score of 2 or more was 2.07 times more associated with frailty. Our study is significant as it focuses on comparing frail individuals with pre-frail individuals according to ACB score, potentially guiding further studies on this topic.

Other parameters associated with pre-frail and frail states have been evaluated in previous studies, yielding results consistent with our findings. Older age, female gender, and lower education level are more associated with frailty compared to pre-frailty.[20-23]In addition to these immutable factors, modifiable geriatric syndromes such asmalnutrition[20-22,24], and cognitive impairment [20,21,23]are more frequently observed in frail individuals, aligning with our study. While these parameters' association with frailty is expected, identifying the relationship between modifiable factors and frailty can help prevent frailty by improving these conditions, particularly in pre-frail individuals.

The prevalence of frailty and pre-frailty varies depending on the group studied and evaluation methods. In our study, pre-frail or frail individuals constituted 89.4% of the total patients applying to the outpatient clinic. Studies using similar frailty tools support our findings. [21,23] Population screening studies report lower rates, but frail and pre-frail individuals still make up more than half of the population.[20,22] It is important to remember that frailty is a dynamic process. A systematic review and meta-analysis by Kojima et al. showed that 25% of pre-frail patients and only 3% of frail patients returned to 'healthy'.[25]Comparing pre-frail and frail individuals, as we did in our study, can contribute to understanding this dynamic process. Furthermore, nearly one in three patients in our study population had an ACB score, supported by similar studies.[26,27] Both frailty and ACB presence are common problems in the elderly population, making their assessment crucial in geriatric patient evaluations.

Our study has several strengths and limitations. A key strength is the detailed examination of pre-frail and frail groups, which are common in the geriatric population but have different prognoses. Most previous studies found that the parameters distinguishing these two conditions are immutable factors. However, anticholinergic load is particularly important as it is easily modifiable, allowing quick intervention and results. Another advantage is the easy application of the ACB measurement method, facilitating the study's practical application in daily practice. The study's limitations include being single-center and cross-sectional, which limits generalizability. Despite a comprehensive evaluation, there may be variables not examined in this study.

In conclusion, this study showed that a high anticholinergic drug burden in elderly individuals is significantly associated with frailty compared to pre-frail. Understanding the nuances of the relationship between anticholinergic load and frailty levels can optimize drug therapy management and contribute to early strategies in the progression from pre-frail to frail. A larger sample and prospective studies are needed to strengthen our findings on this subject.

Ethical Considerations: The study was approved by the Health Sciences University Ethics Committee (date and approval number: 2020/03-58).

Conflict of Interest: The authors declare no conflict of interest.

References

1. Bulut EA, Soysal P, Isik AT. Frequency and coincidence of geriatric syndromes according to age groups: single-center experience in Turkey between 2013 and 2017. *Clinical Interventions in Aging.* 2018:1899-905.
2. Collard RM, Boter H, Schoevers RA, Oude Voshaar RC. Prevalence of frailty in community-dwelling older persons: a systematic review. *Journal of The American Geriatrics Society.* 2012;60(8):1487-92.
3. Naharci MI, Tasci I. Frailty status and increased risk for falls: the role of anticholinergic burden. *Archives of Gerontology.* 2020;90:104136.
4. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences.* 2001;56(3):M146-M57.
5. Cano-Escalera G, Graña M, Irazusta J, Labayen I, Gonzalez-Pinto A, Besga A. Mortality Risks after Two Years in Frail and Pre-Frail Older Adults Admitted to Hospital. *Journal of Clinical Medicine.* 2023;12(9):3103.
6. Charlesworth CJ, Smit E, Lee DS, Alramadhan F, Odden MC. Polypharmacy among adults aged 65 years and older in the United States: 1988–2010. *Journals of Gerontology Series A: Biomedical Sciences Medical Sciences.* 2015;70(8):989-95.
7. Sura SD, Carnahan RM, Chen H, Aparasu RR. Prevalence and determinants of anticholinergic medication use in elderly dementia patients. *Drugs Aging* 2013;30:837-44.
8. Mintzer J, Burns A. Anticholinergic side-effects of drugs in elderly people. *Journal of the Royal Society of Medicine.* 2000;93(9):457-62.
9. Campbell N, Maidment I, Fox C, Khan B, Boustani M. The 2012 update to the anticholinergic cognitive burden scale. *Journal of the American Geriatrics Society.* 2013;61(S1):S142-S3.
10. Boustani M, Campbell N, Munger S, Maidment I, Fox C. Impact of anticholinergics on the aging brain: a review and practical application. *Aging Health.* 2008.
11. Naseri A, Sadigh-Eteghad S, Seyedi-Sahebari S, Hosseini M-S, Hajebrahimi S, Salehi-Pourmehr H. Cognitive effects of individual anticholinergic drugs: a systematic review and meta-analysis. *Dementia Neuropsychologia.* 2023;17:e20220053.
12. Ruiz SJ, Cevallos V, Baskaran D, Mintzer MJ, Ruiz JG. The cross-sectional association of frailty with past and current exposure to strong anticholinergic drugs. *Aging* 2021;33:2283-9.
13. Jamsen KM, Bell JS, Hilmer SN, et al. Effects of changes in number of medications and drug burden index exposure on transitions between frailty states and death: the concord health and ageing in men project cohort study. *Journal of the American Geriatrics Society.* 2016;64(1):89-95.

14. Reallon E, Chavent B, Gervais F, et al. Medication exposure and frailty in older community-dwelling patients: a cross-sectional study. *International Journal of Clinical Pharmacology.* 2020;42(2):508-14 (doi:10.1007/s11096-020-01007-2).
15. Carnahan RM, Lund BC, Perry PJ, Pollock BG, Culp KR. The anticholinergic drug scale as a measure of drug-related anticholinergic burden: associations with serum anticholinergic activity. *The Journal of Clinical Pharmacology.* 2006;46(12):1481-6.
16. Rubenstein LZ, Harker JO, Salvà A, Guigoz Y, Vellas B. Screening for undernutrition in geriatric practice: developing the short-form mini-nutritional assessment (MNA-SF). *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences.* 2001;56(6):M366-M72.
17. Sachdev PS, Blacker D, Blazer DG, et al. Classifying neurocognitive disorders: the DSM-5 approach. *Nature Reviews Neurology.* 2014;10(11):634-42.
18. Johnston MC, Crilly M, Black C, Prescott GJ, Mercer SWJEjoph. Defining and measuring multimorbidity: a systematic review of systematic reviews. 2019;29(1):182-9.
19. Shwe PS, Thein PM, Marwaha P, Taege K, Shankumar R, Junckerstorff R. Anticholinergic burden and poor oral health are associated with frailty in geriatric patients undergoing inpatient rehabilitation: A cross-sectional study. *Gerodontology.* 2023;40(2):213-9.
20. Akın S, Mazıcıoglu MM, Mucuk S, et al. The prevalence of frailty and related factors in community-dwelling Turkish elderly according to modified Fried Frailty Index and FRAIL scales. *Aging Clinical Experimental Research.* 2015;27:703-9.
21. Bollwein J, Volkert D, Diekmann R, et al. Nutritional status according to the mini nutritional assessment (MNA®) and frailty in community dwelling older persons: a close relationship. *The Journal of Nutrition, Health and Aging* 2013;17:351-6.
22. Boulos C, Salameh P, Barberger-Gateau P. Malnutrition and frailty in community dwelling older adults living in a rural setting. *Clinical Nutrition.* 2016;35(1):138-43.
23. Eyigor S, Kutsal Y, Duran E, et al. Frailty prevalence and related factors in the older adult—FrailTURK Project. *Ageing research reviews.* 2015;37:1-13.
24. Verlaan S, Ligthart-Melis GC, Wijers SLJ, Cederholm T, Maier AB, de van der Schueren MAE. High Prevalence of Physical Frailty Among Community-Dwelling Malnourished Older Adults-A Systematic Review and Meta-Analysis. *Journal of American Medical Direrctors Associations.* 2017;18(5):374-82 (doi:10.1016/j.jamda.2016.12.074).
25. Kojima G, Taniguchi Y, Iliffe S, Jivraj S, Walters K. Transitions between frailty states among community-dwelling older people: A systematic review and meta-analysis. *Ageing research reviews.* 2019;50:81-8 (doi:10.1016/j.arr.2019.01.010).
26. Ivchenko A, Bödeker R-H, Neumeister C, Wiedemann A. Anticholinergic burden and comorbidities in patients attending treatment with trospium chloride for overactive bladder in a real-life setting: results of a prospective non-interventional study. *BMC Urology.* 2018;18:1-13.

27. Grossi CM, Richardson K, Savva GM, et al. Increasing prevalence of anticholinergic medication use in older people in England over 20 years: cognitive function and ageing study I and II. *BMC geriatrics.* 2020;20:1-8.

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Research Article

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THE RELATIONSHIP BETWEEN HEPATIC STEATOSIS INDEX (HSI) AND CORTISOL METABOLISM IN OBESE PATIENTS

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Abstract

Objectives: This study aims to investigate the relationship between blood cortisol, 24-hour urinary cortisol, and cortisol levels after overnight administration of 1 mg dexamethasone with liver steatosis in obese subjects.

Materials and Methods: Blood cortisol, 24-hour urinary cortisol, 1 mg Dexamethasone suppression test (DST) cortisol levels, and anthropometric measurements of obese patients were retrospectively recorded. Liver steatosis was assessed using ultrasonography (USG) results and the Hepatic steatosis index (HSI) was calculated from the recorded data.

Results: The mean blood cortisol of the 296 patients included in the study was 13.51±4.74 µg/dL (median=12.9; min= 3.3; max=35.8), the mean 24-hour urinary cortisol was 22.9±27.65 µg/dL (median=16.22; min=3.08; max=350.28), the mean 1 mg DST cortisol was 0.76±0.29 µg/dL (median=0.7; min=0.5; max=2), and the mean HSI was 56.96±8.12. No significant relationship was found between cortisol levels and HSI ($p>0.05$). After adjustment for age, sex, and comorbidities, the correlation between HSI and 1 mg DST cortisol was higher in the group without fatty liver ($rs=0.355$) than in the group with fatty liver ($rs=0.060$) ($p=0.032$).

Conclusion: Further research is needed to better understand the complex relationship between HSI and cortisol in obese individuals.

Keywords: Cortisol, obesity, liver steatosis, hepatic steatosis index.

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Introduction

Non-alcoholic fatty liver disease (NAFLD) is a group of liver diseases ranging from cirrhosis, characterised by varying degrees of liver necrosis and fibrosis, to advanced liver disease and hepatocellular carcinoma.[1] About 2% of people with simple steatosis may progress to end-stage cirrhosis over 20 years. People with steatohepatitis or fibrosis have a 50% chance of developing cirrhosis within two years.[2]

NAFLD is the most common chronic liver disease in the world, with an estimated prevalence of between 25% and 45% in the general population[3], but its prevalence is even higher, affecting up to 70% of people with obesity and type 2 diabetes.[4]

The underlying mechanisms of NAFLD are complex and not fully understood, although insulin resistance is widely recognised as a key factor in its onset and progression.[5] Insulin resistance leads to liver fat accumulation by promoting de novo lipogenesis, reducing fatty acid beta-oxidation and increasing the breakdown of very-low-density lipoprotein (VLDL). It also increases the release of fat from adipose tissue, leading to a greater influx of fatty acids into the liver.[6]

NAFLD is strongly associated with visceral obesity, dyslipidaemia, insulin resistance and type 2 diabetes, suggesting a significant role in the metabolic syndrome.[7] While it is prevalent in up to 80% of obese individuals, it can also be observed in 16% of individuals with a normal body mass index (BMI) who have no metabolic risk factors.[8]

Previous research has linked high levels of both endogenous and exogenous glucocorticoids to central obesity and metabolic syndrome.[9-11] In overweight or obese individuals, plasma cortisol levels may be comparable or even lower than in non-obese individuals, suggesting possible alterations in cortisol metabolism in some cases.[12]

Glucocorticoids and their role in regulating glucocorticoid metabolism are critical in the development of NAFLD. Alterations in hepatic glucocorticoid metabolism may lead to increased cortisol production in individuals with NAFLD.[13] Understanding the relationship between cortisol metabolism, obesity and NAFLD may provide insights into how glucocorticoids influence these conditions and help to develop new approaches for prevention and treatment. This study aims to investigate the relationship between blood cortisol, 24-hour urinary cortisol and 1 mg DST cortisol levels with liver steatosis in obese individuals.

Materials and Methods

Study population

This study was conducted retrospectively between February 2019 and May 2022, with 296 obese patients who presented to the Endocrinology and Metabolic Diseases Outpatient Clinic of Ankara City Hospital for endocrine evaluation prior to bariatric surgery. Patients under 18 years of age, those who had undergone bariatric surgery, those who were pregnant or lactating, those with liver disease due to other causes (autoimmune diseases, Wilson's disease, hemochromatosis, hepatitis B, hepatitis C), those diagnosed with psychiatric diseases, female patients who consumed more than 20 mg of alcohol per day and male patients who consumed more than 30 mg of alcohol per day were excluded from the study. This study was conducted in accordance with the Declaration of Helsinki and ethical approval for the study was obtained from Number 1 Clinical Applications Ethics Committee of the Ankara Bilkent City Hospital with approval number E1-22-2725 and date 29/06/2022.

Descriptive characteristics and anthropometric measurements

Demographic and health-related data were collected from patient records, including comorbidities such as hypertension and type 2 diabetes, and measurements of body weight (kg), height (cm), body fat mass (kg), body fat percentage (%), waist circumference (cm), and hip circumference (cm). Waist to hip ratio was calculated as waist circumference / hip circumference.[14] BMI was calculated as body weight (kg) / (height in meters)^2 with a BMI of 30 kg/m^2 or higher classified as obesity.[15]

Biochemical parameters

Patients' biochemical parameters, including fasting blood glucose (FBG), insulin, blood cortisol, 24 hour urinary cortisol, 1 mg DST cortisol, adrenocorticotropic hormone (ACTH), aspartate aminotransferase (AST), alanine aminotransferase (ALT), platelet count (PLT), and gamma glutamyl transferase (GGT) levels, were recorded from patient records. The Homeostatic Model Assessment for Insulin Resistance (HOMA-IR) was calculated to assess insulin resistance using the formula FBG (mg/dL) x fasting insulin (µIU/mL) / 405, and patients with a HOMA score ≥ 2.7 were considered to have insulin resistance (IR).[16]

1 mg DST cortisol

The results of the standardised low-dose overnight DST were documented after administration of a single oral dose of 1 mg dexamethasone at 23:00 hrs. Serum cortisol levels were then measured between 8:00 and 9:00 the next morning.

Liver Steatosis

The presence of liver steatosis was recorded in patients who underwent liver USG. In addition, the HSI was used to assess NAFLD, calculated using the following equation

HSI = 8 × (ALT/AST ratio) + BMI (+2 if female; +2 if T2DM).

Based on this calculation, an HSI > 36 was considered positive.[17]

Statistical Analyses

In this study, descriptive statistics including mean ± standard deviation, median (minimum; maximum) and frequency (percentage) were presented as appropriate based on the type of variable and distribution characteristics. The Mann-Whitney U test was used to compare two independent groups. Receiver operating characteristic (ROC) curve analysis was performed to evaluate the diagnostic ability of the hepatic steatosis index (HSI) in predicting the reference outcome (USG). An area under the curve (AUC) closer to 1 indicates higher diagnostic accuracy, while values closer to 0.5 indicate no discrimination. The optimal cut-off points were identified using Youden's index, which optimises the balance between sensitivity and specificity. Spearman's rho correlation analysis was used to explore relationships between variables, with correlation strength categorised as follows: 0 (none), <0.30 (weak), 0.30-0.49 (moderate), 0.50-0.69 (fair), 0.70-0.89 (strong), and >0.89 (very strong).[18] The z-test was used to compare differences between correlations in the USG groups. A p-value of <0.05 was considered significant for all statistical tests. Analyses were performed with SPSS version 21.0 (Armonk, NY: IBM Corp.).

Results

A total of 296 patients were included in the study, of whom 240 (81.1%) were female. The mean age of the participants was 38.67±11.97 years (median=39; min=18; max=66). Of the 284 patients for whom USG records were available, 168 (59.2%) had hepatic steatosis and 70 of these individuals (41.7%) had grade 2 steatosis. The mean BMI of the patients was 44.25±6.76 kg/m^2 (median: 43.2; min=30.7; max=79.6). The prevalence of insulin resistance was 78.2% and 16.9% of the patients had diabetes. Among the biochemical parameters, the mean blood cortisol level was 13.51±4.74 µg/dL (median=12.9; min=3.3; max=35.8), and the mean 24-hour urinary cortisol level was 22. 9±27.65 µg/dL (median=16.22; min=3.08; max=350.28), and the mean 1 mg DST cortisol was 0.76±0.29 µg/dL (median: 0.7; min=0.5; max=2). The mean HSI was 56.96±8.12 (Table 1).

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Table 1. The demographic properties and clinical results of patients

Variable	n (%)	Variable	n	mean±SD or %	Median (min; max)
Sex		Age (years)	295	38.67±11.97	39 (18; 66)
Male	56 (18.9)	BMI (kg/m^2)	293	44.25±6.76	43.2 (30.7; 79.6)
Female	240 (81.1)	Body fat (%)	230	45.32±6.04	46.4 (28.8; 60.3)
USG		Body fat mass (kg)	229	53.36±12.89	52.2 (27.9; 102.2)
Without fatty liver	116 (40.8)	Waist circumference (cm)	278	125.16±14.23	125 (94; 170)
With fatty liver	168 (59.2)	Hip circumference (cm)	241	135.55±12.56	135 (111; 192)
Grade 1	48(28.6)	Waist-hip ratio	241	0.92±0.08	0.91 (0.68; 1.21)
Grade 2	70(41.7)	HOMA-IR	239	5.65±5.33	4.27 (0.85; 54.31)
Grade 3	50(29.7)	IR – (<2.7)	52	21.8	
Smoking		IR + (≥2.7)	187	78.2	
No	171 (58.4)	Blood cortisol (µg/dL)	296	13.51±4.74	12.9 (3.3; 35.8)
Yes	90 (30.7)	24 h urinary cortisol(µg/dL)	277	22.9±27.65	16.22 (3.08; 350.28)
Ex-smoker	32 (10.9)	1 mg DST cortisol (µg/dL)	205	0.76±0.29	0.7 (0.5; 2)
Comorbidities*		<1.8	202	98.5	
No	151 (51.0)	>1.8	3	1.5	
Yes	145 (49.0)	ACTH (pg/mL)	296	25.09±17.49	20.75 (4.5; 181)
Diabetes mellitus	50 (16.9)	AST (U/L)	293	23.82±11.83	21 (6; 126)
Prediabetes	17 (11.7)	ALT (U/L)	293	31.21±17.58	26 (7; 104)
Hypertension	81 (55.9)	AST/ALT	293	0.85±0.37	0.79 (0.18; 4.29)
CAD	15 (10.3)	≤0.8	153	52.2	
Hyperlipidemia	26 (17.9)	>0.8	140	47.8	
Medication*		PLT (10^9/L)	292	301.96±71.93	297.5 (135; 590)
Metformin	53 (36.6)	HSI	290	56.96±8.12	55.93 (40.7; 103.5)
Oral antidiabetic	25 (17.2)	>36	290	100.0	
Insulin	14 (9.7)	FBG (mg/dL)	291	100.86±31.24	93.5 (69; 376)
Antihypertensive	51 (35.2)	GGT (U/L)	296	29.83±26.79	24 (7; 288)
Antilipidemic	10 (6.9)				
Oral contraceptive	6 (4.1)				

**Multiple responses were given. USG: Ultrasonography, CAD: Coronary artery disease, BMI: Body mass index, HOMA-IR: Homeostatic Model Assessment- Insulin Resistance, DST: Dexamethasone suppression test, ACTH: Adrenocorticotropic hormone, AST: Aspartate Aminotransferase, ALT: Alanine Aminotransferase, PLT: Platelet count, HSI: Hepatic steatosis index, FBG: Fasting blood glucose, GGT: Gamma-glutamyl transferase*

24-hour urinary cortisol (µg/dL) value was significantly higher in males than in females, blood cortisol and 1 mg DST cortisol levels were similar between sexes (Table 2).

Table 2. Comparison of cortisol levels between males and females

	Male		Female		p-value
	mean±SD	**Median (min; max)**	**mean±SD**	**Median (min; max)**	
Blood cortisol (µg/dL)	14.11±4.26	13.80 (3.30; 25.90)	13.37±4.84	12.50 (3.60; 35.80)	0.090
24 h urinary cortisol (µg/dL)	32.90±51.71	21.51 (7.12; 350.28)	20.69±18.09	15.18 (3.08; 177.46)	**0.005**
1 mg DST cortisol (µg/dL)	0.84±0.33	0.80 (0.50; 1.77)	0.74±0.33	0.70 (0.50; 2.00)	0.137

DST: Dexamethasone suppression test

A small positive correlation was found between the HSI and USG results (rs = 0.168; p = 0.005). The ROC analysis performed on the HSI and USG results showed an AUC of 0.599 (95% CI: 0.532-0.666). Using a cut-off of ≥60.46, the sensitivity and specificity were 33.33% and 82.30%, respectively. When the cut-off was set at ≥52.99, the sensitivity increased to 73.81%, while the specificity decreased to 41.59% (Figure 1).

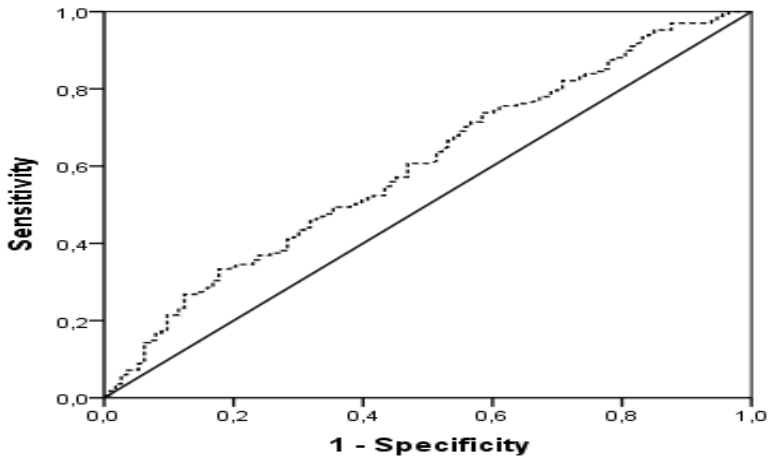

Figure 1. ROC curve for HSI based on USG reference.

USG: Ultrasonography, HSI: Hepatic steatosis index

When analyzing the relationship between HSI and waist circumference and hip circumference for the whole sample and within the USG groups, a moderate positive correlation was observed (p<0.001). No significant relationship was found between cortisol levels and HSI. According to the USG results, the correlation between hip circumference and HSI was significantly lower in subjects with fatty liver (rs = 0.674) than in subjects without fatty liver (rs = 0.804) (p = 0.014). In the whole sample, a significant positive relationship was found between HSI and HOMA-IR in individuals with and without fatty liver based on USG groups (Table 3).

Table 3. Correlation between HSI and some variables

	HSI						
	All sample		**USG**				**Comparison of r_s values**
			Without fatty liver		**With fatty liver**		
	r_s	**p-value**	**r_s**	**p-value**	**r_s**	**p-value**	**p-value**
Waist circumference	0.642	**<0.001**	0.679	**<0.001**	0.617	**<0.001**	0.197
Hip circumference	0.730	**<0.001**	0.804	**<0.001**	0.674	**<0.001**	**0.014**
Waist-hip ratio	0.118	0.069	0.150	0.121	0.052	0.566	0.229
Blood cortisol	0.047	0.428	0.197	**0.036**	0.001	0.994	0.053
24 h urinary cortisol	0.094	0.121	-0,078	0.430	0.107	0.182	0.073
1 mg DST cortisol	0.086	0.223	0.263	**0.040**	0.036	0.681	0.069
ACTH	0.042	0.474	0.089	0.349	0.034	0.660	0.324
HOMA-IR	0.392	**<0.001**	0.433	**<0.001**	0.324	**<0.001**	0.172

r_s: Spearman rho correlation coefficient, HSI: Hepatic steatosis index, USG: Ultrasonography, DST: Dexamethasone suppression test, ACTH: Adrenocorticotropic hormone, HOMA-IR: Homeostatic Model Assessment- Insulin Resistance

After adjustment for age, sex, and comorbidities, a significant correlation was found between HSI and 24-hour urinary cortisol in all subjects (r=0.196, p=0.007). The correlation between HSI and 1 mg DST cortisol in the group without fatty liver (rs=0.355) was higher than that in the group with fatty liver (rs=0.060) (p=0.032) (Table 4).

Table 4. Correlation between HSI and cortisol levels after adjustment for some variables

Adjusted for age, gender, and comorbidities	HSI						
	All sample		USG				Comparison of r_s values
			Without fatty liver		With fatty liver		
	r_s	p-value	r_s	p-value	r_s	p-value	p-value
Blood cortisol	-0.003	0.970	0.127	0.357	-0.027	0.769	0.179
24 h urinary cortisol	0.196	**0.007**	0.303	**0.024**	0.148	0.101	0.166
1 mg DST cortisol	0.123	0.094	0.355	**0.008**	0.060	0.506	**0.032**

r_s: Spearman rho correlation coefficient, HSI: Hepatic steatosis index, USG: Ultrasonography, DST: Dexamethasone suppression test

Discussion

According to the results of this study, cortisol levels were not related to HSI in obese individuals. However, after adjustment for age, sex, and comorbidities, the correlation between HSI and 1 mg DST cortisol was stronger in those without fatty liver.

Glucocorticoids affect key pathways involved in lipid and carbohydrate metabolism and their elevated levels are associated with a higher risk of developing NAFLD.[19] Hypercortisolism contributes to conditions such as insulin resistance, dyslipidemia, hypertension, visceral obesity, and hepatic steatosis, which are common features of metabolic syndrome. Cortisol is known to disrupt insulin sensitivity by directly acting on the insulin receptor pathway and increasing lipolysis and proteolysis, resulting in increased release of free fatty acids and amino acids.[20]

Targher et al.[21] investigated the relationship between cortisol secretion and NAFLD in patients with diet-controlled type 2 diabetes. 24-hour urinary-free cortisol and post-dexamethasone cortisol levels were significantly elevated in patients with NAFLD compared to those without. Regression analysis showed that these cortisol measures were independent predictors of liver steatosis. In a separate study, Targher et al.[7] also investigated the relationship between liver histology and cortisol secretion in NAFLD patients and found that urinary-free cortisol levels and post-dexamethasone cortisol concentrations were higher in NAFLD patients compared to controls. In addition, these cortisol levels significantly correlated with and could independently predict the degree of liver fibrosis. Conversely, another study reported no significant association between

plasma cortisol levels and NAFLD; instead, NAFLD was significantly correlated with age, BMI, waist-hip circumference, ALT, and triglyceride levels.[13]

In obese individuals, clinical studies investigating the relationship between NAFLD and cortisol levels remain limited. Zoppini et al.[22] investigated cortisol levels after overnight low-dose dexamethasone in obese patients with NAFLD and reported an approximately 50% reduction in circulating cortisol levels in those with NAFLD compared to those without steatosis. They also identified cortisol levels after overnight low-dose dexamethasone as an independent risk factor for NAFLD. In contrast to the previous study, our study did not find a significant relationship between cortisol levels and HSI in an obese population. However after adjustment for age, sex, and comorbidities, in individuals without liver steatosis (as determined by USG), the relationship between HSI and 1 mg DST cortisol levels was stronger compared to those with liver steatosis. In obese individuals, cortisol levels may vary; however, chronic stimulation of the hypothalamic-pituitary-adrenal (HPA) axis may lead to processes such as adaptation or desensitization, resulting in a suppressed cortisol response. In this case, low cortisol levels may be observed in obese individuals. In addition, factors such as insulin resistance, leptin levels, and inflammation that affect cortisol metabolism may influence the HPA axis and cortisol metabolism, and these factors may affect cortisol levels independently of fatty liver. Our results suggest that the absence of hepatic fat accumulation might allow for a more pronounced interaction between hepatic steatosis-related factors and cortisol metabolism. However, the severity of liver steatosis in our study population was predominantly in the early stages (grades 1 and 2), which may not be advanced enough to significantly alter cortisol metabolism.

Conditions such as non-alcoholic steatohepatitis (NASH) or advanced fibrosis, which are associated with more severe hepatic inflammation and systemic metabolic disturbances, may have a greater impact on cortisol levels. These findings highlight the need for further research to elucidate the mechanisms underlying these associations and to investigate whether more advanced stages of liver disease show stronger correlations with cortisol metabolism.

The positive correlation of HSI with waist circumference, hip circumference, and HOMA-IR confirms a strong association between liver steatosis, insulin resistance, and body fat distribution. In particular, the more pronounced relationships observed in individuals without USG-assessed liver steatosis may suggest that HSI better reflects metabolic risk in this group. While indicators of visceral fat, such as waist circumference, are more strongly associated with liver steatosis, hip circumference reflects subcutaneous fat and typically shows a weaker relationship with liver steatosis.[23] In this study, the lower correlation between HSI and hip circumference in individuals with liver steatosis compared to those without may indicate that subcutaneous tissue is less affected in those with liver steatosis.

The study has several limitations. Firstly, it is a retrospective and single-center study. Secondly, a non-invasive method was used to diagnose NAFLD. Although imaging techniques and various indices are currently used to diagnose NAFLD, the gold standard for diagnosis and staging of NAFLD is liver biopsy.[24] While liver steatosis was detected in all patients by HSI, only 59.2% of patients were found to have liver steatosis by ultrasound, suggesting that these two methods may have different sensitivities in assessing liver steatosis. The majority of patients with steatosis detected by USG were classified as grade 1 and 2, suggesting that HSI may be less sensitive in the early stages of liver steatosis. Thirdly, dexamethasone may be metabolized differently in individuals with chronic liver disease,[21] and it has been suggested that the pharmacokinetics of dexamethasone may differ in NAFLD.[7] In addition, blood dexamethasone levels were not measured in this study. Lastly, the small number of male participants in our study may limit the generalisability of the results across sexes. This situation is related to the retrospective nature of the data and the lower rates of males seeking bariatric surgery for obesity. However, to minimize this difference, we performed separate analyses for male and female participants.

In conclusion, the results of the study suggest that there is no direct relationship between HSI and cortisol in obese individuals and that cortisol metabolism may be independent of liver steatosis. Further research is needed in people with advanced liver disease or in different subgroups of obesity to better understand the relationship between cortisol metabolism and liver steatosis.

Ethical Considerations: This study was conducted following the Declaration of Helsinki and ethical approval for the study was obtained from the Ankara City Hospital with approval number E1-22-2725 and date 29.06.2022.

Conflict of Interest: The authors declare no conflict of interest.

References

1. Cheung O, Sanyal AJ. Recent advances in nonalcoholic fatty liver disease. *Curr Opin Gastroenterol.* 2010;26:202–8.
2. Ahmed A, Rabbitt E, Brady T, Brown C, Guest P, Bujalska IJ et al. A switch in hepatic cortisol metabolism across the spectrum of non alcoholic fatty liver disease. *PloS one*. 2012;7(2):e29531.
3. Chalasani N, Younossi Z, Lavine JE, Diehl AM, Brunt EM, Cusi K. The diagnosis and management of non-alcoholic fatty liver disease: Practice Guideline by the American Association for the Study of Liver Diseases, American College of Gastroenterology, and the American Gastroenterological Association. *Hepatol*. 2012;55(6):2005-23.
4. Papagianni M, Sofogianni A, Tziomalos K. Non-invasive methods for the diagnosis of nonalcoholic fatty liver disease. *World J Hepatol*. 2015;7(4):638.
5. Candia R, Riquelme A, Baudrand R, Carvajal CA, Morales M, Solís N et al. Overexpression of 11β-hydroxysteroid dehydrogenase type 1 in visceral adipose tissue and portal hypercortisolism in non-alcoholic fatty liver disease. *Liver Int*. 2012;32(3):392-9.
6. Yang M, Ma F, Guan M. Role of steroid hormones in the pathogenesis of nonalcoholic fatty liver disease. *Metabolites.* 2021;11(5):320.
7. Targher G, Bertolini L, Rodella S, Zoppini G, Zenari L, Falezza, G. Associations between liver histology and cortisol secretion in subjects with nonalcoholic fatty liver disease. *Clin Endocrinol.* 2006;64(3):337-41.
8. Milić S, Lulić D, Štimac D. Non-alcoholic fatty liver disease and obesity: biochemical, metabolic and clinical presentations. *World J Gastroenterol.* 2014;20(28):9330.
9. Walker BR. Cortisol–cause and cure for metabolic syndrome? *Diabet Med.* 2006;23:1281–8.
10. Mariniello B, Ronconi V, Rilli S, Bernante P, Boscaro M, Mantero F et al. Adipose tissue 11β-hydroxysteroid dehydrogenase type 1 expression in obesity and Cushing's syndrome. *Eur J Endocrinol*. 2006;155(3):435-41.
11. Aldhahi W, Mun E, Goldfine AB. Portal and peripheral cortisol levels in obese humans. *Diabetologia*. 2004;47:833–6.
12. Holt HB, Wild SH, Postle AD, Zhang J, Koster G, Umpleby M et al. Cortisol clearance and associations with insulin sensitivity, body fat and fatty liver in middle-aged men. *Diabetologia.* 2007;50:1024-32.
13. Hubel JM, Schmidt SA, Mason RA, Haenle MM, Oeztuerk S, Koenig W et al. Influence of plasma cortisol and other laboratory parameters on nonalcoholic Fatty liver disease. *Horm Metab Res*. 2015;47(07):479-84.

14. WHO Waist Circumference and Waist–Hip Ratio. Report of a WHO Expert Consultation. Geneva, 8-11 December 2008. Erişim: http://apps.who.int/iris/bitstream/handle/10665/44583/9789241501491_eng.pdf;jsessionid=367A36E2E05C0A20D2FAE3091CA47C5F?sequence=1 (Accessed: 15.06.2024).
15. WHO Body Mass Index-BMI. [Internet] 2024; https://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthylifestyle/body-mass-index-bmi (Accessed: 10.06.2024).
16. Matthews DR, Hosker JP, Rudenski AS, Naylor BA, Treacher DF, Turner R. Homeostasis model assessment: insulin resistance and β-cell function from fasting plasma glucose and insulin concentrations in man. *Diabetologia.* 1985;28:412-9.
17. Vidal-González D, Uribe M, Montalvo-Javé EE, Nuño-Lámbarri N. Assessment of non-alcoholic fatty liver disease by non-invasive methods: present and future perspectives. *Rev Médica Hosp Gen (Méx).* 2020;83(3):135-43.
18. Hinkle DE, Wiersma W, Jurs SG. Applied Statistics for the Behavioral Sciences. 5th ed. Boston: Houghton Mifflin; 2003.
19. Gariani K, Jornayvaz FR. Pathophysiology of NASH in endocrine diseases. *Endocr Connect*. 2021;*10*(2):R52-R65.
20. Marino L, Jornayvaz FR. Endocrine causes of nonalcoholic fatty liver disease. *World J Gastroenterol.* 2015;21(39):11053.
21. Targher G, Bertolini L, Zoppini G, Zenari L, Falezza G. Relationship of non-alcoholic hepatic steatosis to cortisol secretion in diet-controlled Type 2 diabetic patients. Diabet Med. 2005;22(9):1146-50.
22. Zoppini G, Targher G, Venturi C, Zamboni C, Muggeo M. Relationship of nonalcoholic hepatic steatosis to overnight low-dose dexamethasone suppression test in obese individuals. *Clin Endocrinol*. 2004;*61*(6):711-5.
23. Pafili K, Kahl S, Mastrototaro L, Strassburger K, Pesta D., Herder, C et al. Mitochondrial respiration is decreased in visceral but not subcutaneous adipose tissue in obese individuals with fatty liver disease. *J Hepatol*. 2022;*77*(6):1504-14.
24. Machado MV, Cortez-Pinto H. Non-invasive diagnosis of non-alcoholic fatty liver disease. A critical appraisal. *J Hepatol*. 2013;*58*(5):1007-19.

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Letter to the Editor

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LETTER TO THE EDITOR: ARE DIABETIC PATIENTS AWARE OF THEIR RESPONSIBILITIES IN PREVENTING DIABETIC FOOT DISEASE?

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Dear Editor,

I am writing to commend the authors on their study titled "Are Diabetic Patients Aware of Their Responsibilities in Preventing Diabetic Foot Disease?" published in the Ankara Medical Journal.[1] This research addresses a critical aspect of diabetes management, particularly the prevention of diabetic foot disease, a complication that remains largely preventable despite its prevalence and severity through proper patient education and self-care practices.

The study's methodology, including the use of a semi-structured "Diabetic Foot Disease Awareness Scale" developed by the researchers, provides valuable insights into the specific areas where patients' knowledge and behaviors are lacking. The awareness results were compared to demographic and clinic information of diabetic foot patients. However, some valuable information was missing from this study. First of all, peripheric vascular disease is an important complication in Diabetic foot patients and early detection is important to prevent amputations.[2] Second, dynapenia was found to be associated with diabetic foot disease in both geriatric and nongeriatric diabetic patients in the literature, therefore we think dynapenia should be assessed in sociodemographic evaluations in Diabetic foot studies.[3,4] Third, there is no information about polypharmacy. There is information about drugs but without any explanation of methods therefore, we assume that polypharmacy information is missing. It was demonstrated that polypharmacy was associated with diabetic foot ulcers in type 2 diabetes patients, hence this information should be included in diabetic foot studies.[5] In that study conducted with 512 patients with type 2 diabetes, using five or more medications was defined as polypharmacy, and regression analysis revealed that polypharmacy was independently associated with diabetic foot ulcers.[5]

In conclusion, this study provides important evidence that diabetic foot disease awareness among patients is inadequate and highlights the critical need for enhanced educational programs. As the authors suggest, ongoing education on diabetes and foot care, particularly for those at higher risk, is essential in preventing the occurrence of diabetic foot disease. By addressing these educational gaps, healthcare providers can play a pivotal role in reducing the burden of this debilitating complication and improving the quality of life for diabetic patients.

References

1. Genç B, Koç A, Ersoy R. Are Diabetic Patients Aware of Their Responsibilities in Preventing Diabetic Foot Disease? *Ankara Med J.* 2024;24(2):124-39 (doi:10.5505/amj.2024.30771).
2. Ghirardini F, Martini R. Current Opinion on Diagnosis of Peripheral Artery Disease in Diabetic Patients. *Medicina (Kaunas).* 2024;60(7) (doi:10.3390/medicina60071179).
3. İmre E, Koçakgöl N, İmre E. Low handgrip strength is associated with diabetic foot disease in geriatric patients with type 2 diabetes. *Turk J Med Sci.* 2022;52(6):1854-62 (doi:10.55730/1300-0144.5532).
4. İmre E, İmre E. Unveiling the Link Between Low Handgrip Strength and Diabetic Foot Disease in Non-Geriatric Type 2 Diabetes Patients. *Endocrinology Research & Practice.* 2024;28(1).
5. Imre E, Imre E. Polypharmacy is Associated with Diabetic Foot Ulcers in Type 2 Diabetes mellitus. *Int J Low Extrem Wounds.* 2022:15347346221090756 (doi:10.1177/15347346221090756).