Black Sea Journal of Health Science
doi: 10.19127/bshealthscience.1208858

Open Access Journal
e-ISSN: 2619 - 9041

Research Article
Volume 6 - Issue 2: 274-278/ April 2023

PREVALENCE OF HYPERTENSION IN MILITARY PERSONNEL: A STUDY CONDUCTED IN TÜRKİYE

Serhat GÜNLÜ[1]*, Mehmet Zülkif KARAHAN[1]

[1]*Mardin Artuklu University, Faculty of Medicine, Department of Cardiology, 47200, Mardin, Türkiye*

Abstract: Hypertension is a major global public health concern. There is a paucity of studies describing military populations with hypertension. We aimed to demonstrate Turkish military personnel with hypertension and review associated factors in a garrison of Diyarbakır City. This retrospective cross-sectional study comprised 22,141 individuals referred to an outpatient cardiology clinic between August 2016 and June 2022 with complaints of early morning headaches, abnormal heart rhythms, nosebleeds, visual problems, and buzzing in the ears. Sociodemographic characteristics were collected. Analyses of laboratory test findings and blood pressure measurements were conducted. The study comprised a total of 174 patients with an average age of 32.68±6.51 years. 94.8 percent of the patients were not drug users, and 68.3 percent had no strong family history. The prevalence of hydration habits (29.4%) and sleep disturbances (22.5%) were lower. According to body mass index (BMI), the rate of overweight was higher (56.8%). Most patients' educational status was bachelor's degrees (46.5%). The smoking rate was high (73%). Body mass index was a statistically significant predictive factor of hypertension (OR [95% CI], 2.69 [1.0-7.17], p= 0.048). Physical exercise rate in the past three months was a statistically significant predictive factor for hypertension (OR [95%CI], 2.98 [1.42-6.23], P= 0.021). Hypertension was detected in 0.78 percent of all participants and was associated with being overweight and a lower frequency of physical exercise.

Keywords: Military personnel, Hypertension, Addictive substance use, Physical exercise, Mental stress, Body mass index

***Corresponding author:** Mardin Artuklu University, Faculty of Medicine, Department of Cardiology, 47200, Mardin, Türkiye
E mail: serhat8086@hotmail.com (S. GÜNLÜ)
Serhat GÜNLÜ https://orcid.org/0000-0001-6985-6112
Mehmet Zülkif KARAHAN https://orcid.org/0000-0001-8145-9574

Received: November 23, 2022
Accepted: February 23, 2023
Published: April 01, 2023

Cite as: Günlü S, Karahan MZ. 2023. Prevalence of hypertension in military personnel: a study conducted in Türkiye. BSJ Health Sci, 6(2): 274-278.

1. Introduction

Hypertension (HTN) is presently accepted as a global concern for public health owing to its prevalence and related complications (Günlü and Demir, 2022). Over a quarter of the global population (26.4%) is hypertensive; this percentage is anticipated to increase to 27.3% by 2025, representing roughly two billion hypertensive individuals (Brant et al., 2022). Hypertension is an unfavorable prognostic indicator and a leading cause of sudden cardiac death (Sarıdas et al., 2021). It is vital to be cautious in avoiding essential disease and detecting and treating it when it does occur (Keithler et al., 2020).

Military service is linked with severe disciplinary procedures, lengthy work hours, inadequate climatic and topographical conditions, and apprehension of enemy activity, which are stressful conditions at the risk of hypertension (Whelton et al., 2017).

Symptomatic hypertension may impair the ability of military members to perform important responsibilities in a variety of army occupations, hence affecting military preparedness, mobilization ability, and retention capability (Robert et al., 2022). Furthermore, these patients should not be assigned tasks until their blood pressure is under control.

In this study, we aimed to observe the prevalence of hypertension in a garrison of Diyarbakır city, characterize patients with hypertension, and review the associated factors.

2. Materials and Methods

This study included 179 patients with abnormal blood pressure values between 2016 and 2022. Five patients were excluded due to insufficient data. All data were kept in an encrypted, password-protected file. The data gathering spreadsheet was stored independently of any personally identifiable information.

All patients had routine blood testing conducted. Mental stress was evaluated by measuring the cortisol level in saliva, which is one of the autonomic measurement methods. Blood pressure was measured with a manual sphygmomanometer twice on the right arm with at least a 5-minute interval between measures in a sitting position. Hypertension was classified According to the WHO Classification (Whitworth et al., 2003). It was classified as systolic blood pressure (SBP) greater than or equal to 140 mm Hg and/or diastolic blood pressure (DBP) greater than or equal to 90 mm Hg, or the use of an antihypertensive effect medicine in a patient with SBP 140 mmHg and DBP 90 mmHg who has been previously classified as hypertensive. Legal highs are substances designed to produce similar effects to illegal drugs. The body mass index (BMI) was determined using weight and

height measurements. The definition of obesity was a BMI of 30 kg/m^2 or over. A 24-hour tension Holter monitoring (Northeast Monitoring, Maynard, MA) and echocardiogram (Philips ultrasonography Model HD7 XE) was performed if necessary. All analyses were conducted utilizing SPSS program version 26.0, Chicago, IL, USA.

According to the dispersion of the data, the initial continuous variables were expressed as mean ± standard deviation or median (interquartile range). Categorical variables were expressed using frequency and proportion. The Chi-square test or Fisher's exact test was utilized for categorical variables. We ran univariate and multivariate regression analyses to identify hypertension risk variables. A significance threshold of $P<0.05$ was set.

3. Results

The study comprised a total of 174 patients with an average age of 32.68 ± 6.51 years. Figure 1 illustrates the study's flowchart. Among the patients, 94.8% were not drug users, and 68.3% did not have a positive family history. The prevalence of sleep disturbances (22.5%) and hydration habits (29.4%) was lower. The average BMI values (56.8%) were within the overweight range (Table 1). In the last three months, the rate of physical exercise was lower (86.8%). Most patients' educational statuses were bachelor's degrees (46.5%). The smoking rate was high (73%). The rates of unmarried status and mental stress were 71.2% and 47.7%. Mean echo measurement values were normal.

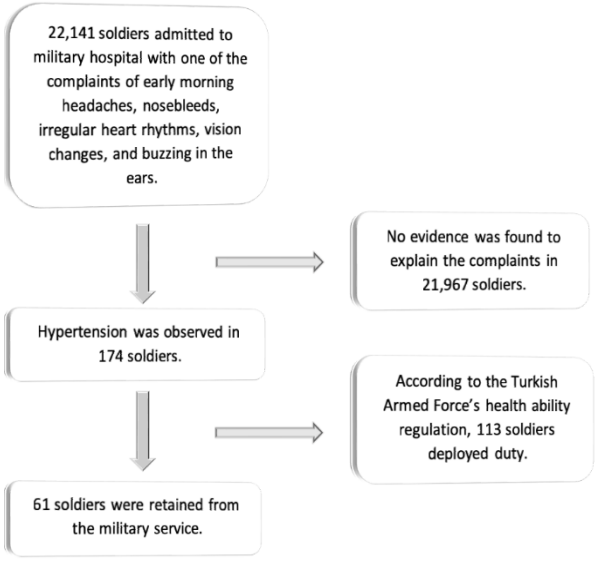

Figure 1. Study flow diagram

Univariate regression analysis was performed for all factors that may contribute to the development of hypertension. Multivariate regression analysis was performed. Body mass index was a statistically significant predictive factor of hypertension (OR [95% CI], 2.69 [1.0-7.17], P= 0.048). Physical exercise rate in the past three months was a statically significant predictive factor of hypertension (OR [95%CI], 2.98 [1.42-6.23], P=0.021) (Table 2).

4. Discussion

This study's goal was to provide a profile of hypertensive Turkish soldiers. Significantly more alarming was the body mass index, which was overweight in more than half of the patients.

The incidence of hypertension in soldiers is lower than that in the community. The majority of the military personnel is comprised of youths. Mental stress is widespread among soldiers. It has been shown to raise the risk of hypertension. Furthermore, substance abuse, environmental and climate circumstances, intense physical activity, and obesity all contribute to the onset of hypertension. These were identified as physiological mechanisms. Sleep is frequently underestimated by military people (Wang and Jin, 2022). According to Luxton et al. (2011) recruits who slept fewer than five hours sustained greater injuries during physical exertion and during the war due to elevated blood pressure. Early-onset hypertension is associated with diastolic dysfunction in later life (Ede et al., 2015). This process can have catastrophic consequences later on. In order to prevent the harmful effects of hypertension that may develop after retirement, the predisposing factors mentioned above should be avoided.

Body mass index (BMI) is a highly accurate predictor of hypertension. An increased BMI increases the likelihood of hypertension, whereas regular physical activity protects against hypertension. In Spain, the incidence of overweight and obesity was determined in 6,124 individuals, and hypertension was diagnosed in 14% of them (Ajejas et al., 2021). The prevalence of hypertension in the American population was 34% (Flegal et al., 2009). These results were similar to those of the British Army, where 44.7% of active personnel were overweight and 12.0% had hypertension (Hruby et al., 2021). For instance, 40.4% of Nigerian military personnel, 36% of Brazilian military personnel, and 53.3% of the United States Navy population were overweight (Hosseini et al., 2021). Similarly, the prevalence of obesity was 18% in the Republic of Benin, 13.6% in Ghana, and 19.2% in Tanzania (Ambikapathi et al., 2021; Azandjeme et al., 2020). The frequency of hypertension was 11% among male Iranian military personnel (Payab et al., 2017). Hypertension is significantly linked to being overweight and insufficient physical activity. The Turkish military population appears to be in better physical condition than any other Western military population (Günlü and Aktan, 2022).

Youth alcohol and cigarette consumption are growing daily. Recruits from New Zealand have reportedly experienced hypertensive crises during training (Hall et al., 2022). It also increases medical costs since it causes major arrhythmias and wounds (Burak et al., 2019).

doi: 10.19127/bshealthscience.1208858

Table 1. General characteristics of the study participants (n=174) *

Parameters		x̄±SD, or [IQR]	Min-Max
Age (years)		32.68±6.51	22-52
Total cholesterol (mg/dl)		198 (180-227)	143-309
LDL (mg/dl)		108 (92.5-132.8)	45.2-199
HDL (mg/dl)		41.1 (34-49.2)	16.9-79.9
Fasting glucose (mg/dl)		89 (81-95)	71-106
Alt (U/L)		21 (15-32)	10-97
Ast (U/L)		18.4 (12-25)	4-56
Ca (mmol/L)		9.83±0.56	8.4-10.9
K (mmol/L)		4.1 (3.8-4.4)	3.2-6.2
Na (mmol/L)		140 (137-142)	128-147
Wbc		8.67 (7.1-10.5)	3.4-13.4
Hgb (g/dL)		14 (13.1-15.2)	9.3-16.1
Fe^{+2}(ug/dL)		93 (88-96)	34-108
SBP (mmHg)		117 (112-121)	83-157
DBP (mmHg)		75 (71.7-79.1)	48-97
LVSD (mm)		28 (26-29)	20-39
LVDD (mm)		46 (45.3-48)	36-56
IVSD (mm)		9 (8-11)	7-12
LAD (mm)		34 (32-36)	29-40
EF %		67 (64-69)	37-73
Characteristics		Number	Percentage
Body mass index	Normal	49	28.3
	Overweight	99	56.8
	Obese	26	14.9
Physical exercise in the past three months	< once a week	66	37.9
	> once a week	48	27.6
	< once a month	37	21.3
	> once a month	23	13.2
Positive family history	No	119	68.3
	Yes	55	31.7
Marital status	Unmarried	124	71.2
	Married	50	28.8
Mental stress	No	91	52.3
	Yes	83	47.7
Addictive substance use	Smoking	127	73
	Alcohol use	65	37.3
	Legal high use	22	12.6
Hydration habit	No	123	70.6
	Yes	51	29.4
Educational status	Associate degree	65	37.3
	Bachelor's degree	81	46.5
	Post-graduate	18	10.3
	Doctorate	10	5.7
Sleep disturbance	No	135	77.5
	Yes	39	22.5
Drug use	None	165	94.8
	Anti-histamines	4	2.3
	Anti-psycohotics	5	2.9

*Values are reported as median (interquartile range), and n (%) for categorical variables. LDL= low-density lipoprotein, HDL= high-density lipoprotein, ALT= alanine aminotransferase, AST= aspartate aminotransferase, WBC= white blood cell, HGB= hemoglobin, SBP= Systolic blood pressure, DBP= diastolic blood pressure, LVSD= left ventricular systolic dysfunction, LVDD= left ventricular diastolic dysfunction, IVSD= interventricular septum diameter, LAD= left atrium diameter, EF= ejection fraction.

Table 2. Independent predictors for hypertension by multivariate logistic regression analysis

Parameters	Univariate analysis		Multivariate analysis	
	OR (95% CI)	P value	OR (95% CI)	P value
Addictive substance use	1.03 (1.0-1.07)	0.020	1.03 (0.99-1.06)	0.059
Drug use	0.78 (0.35-1.73)	0.547	*	
Mental stress	2.68 (1.16-6.18)	0.021	2.10 (0.87-5.06)	0.095
Hydration habit	1.83 (0.83-4.04)	0.130	*	
Sleep disturbance	1.44 (0.64-3.21)	0.374	*	
Educational status	0.45 (0.20-1.02)	0.056	*	
Body mass index	2.97 (1.13-7.76)	0.026	2.69 (1.0-7.17)	0.048
Mental stress	1.13 (0.99-1.29)	0.068	*	
Positive family history	0.90 (0.71-1.15)	0.426	*	
Physical exercise in the past three months	3.19 (1.97-6.82)	0.018	2.98 (1.42-6.23)	0.021

According to Quednow et al., 69% of the Swiss population consumed alcohol and smoked cigarettes (Quednow et al., 2022). More than 10% of legal highs were synthetic, and 49% of those over the age of 20 utilized legal highs (Santangelo et al., 2022). This may damage the future health of veterans. A study found that ex-smokers developed hypertension at a rate of 52% more than non-smokers, and smokers developed hypertension at 26% more than non-smokers (Yun et al., 2022). On the contrary, some studies stated that smoking alone is a risk factor for the development of hypertension (Suzuki et al., 2022). Medical officers around the country should provide presentations to enhance the health of service personnel and the military's battle preparedness (Clary et al., 2021).

Hypertension can be caused by the negative effects of drugs and endocrine disorders. Antipsychotics are the drug that elevates blood pressure and is acknowledged by neuropsychiatrists (Bellone et al., 2021).

Hypertension can be caused by metabolic syndrome. 24.3% of the population of the Saudi army was diagnosed with metabolic syndrome, and 578 of them had high blood pressure (Al-Shehri et al., 2021). A positive family history, a recognized risk factor for hypertension, was observed in 35.9% of newly diagnosed cases compared to 23.6% of all hypertensive patients in previous research. In contrast to our study and Gan et al., who showed that parental hypertension history did not demonstrate a significant association in the regression model, this conclusion validates earlier research findings (Zaidi et al., 2022; Gan et al., 2003).

5. Conclusion

Hypertension was detected in 0.78 percent of all participants and was associated with overweight and less frequency of physical exercise. Our research promotes lifestyle modifications. In this population, there is a serious need for preventive interventions that identify and reduce HT risk at an early stage. More multicenter studies should be conducted to better characterize hypertensive patients in the military population.

Limitations

Women in Türkiye are not required to serve in the military because of this policy due to gender inequality, this could generate some discussion. This study did not investigate dietary habits. Our sample does not represent the Turkish army as a whole.

Author Contributions

Percentages of the author(s) contributions is present below. All authors reviewed and approved final version of the manuscript.

%	S.G.	M.Z.K.
C	50	50
D	50	50
S	50	50
DCP	100	
DAI	50	50
L	50	50
W	50	50
CR	50	50
SR	50	50
PM	50	50

C= concept, D= design, S= supervision, DCP= data collection and/or processing, DAI= data analysis and/or interpretation, L= literature search, W= writing, CR= critical review, SR= submission and revision, PM= project management.

Conflict of Interest

The authors declared that there is no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

Ethical Approval/Informed Consent

The participants were informed that their information would be kept confidential and used only for scientific purposes. For the study, the Ethics committee approval was obtained from Health Sciences University Gazi Yaşargil Training and Research Hospital Clinical Research Ethics Committee (protocol code: 2022-159 and date of approval: September 9, 2022). The study was conducted in accordance with the principles of the

Declaration of Helsinki. Informed consent forms were obtained from all individuals included in the study.

References

Ajejas Bazán M, Fuentes Mora C, Ballester Orcal LE, Puerro Vicente M, Herrero Pérez L, Wärnberg J, Pérez Rivas FJ, Pérez Farinós N. 2021. A questionnaire survey of personal and occupational variables associated with Sars-Cov-2 infection in health care personnel of the Spanish central military hospital. Mil Med, 188(1-2): 166-173.

Al-Shehri HA, Al-Asmari AK, Khan HA, Horaib GB, Al-Buraidi A, Al-Sharif AA, Kadasah SG, Al-Omani S, Mohammed FS, Abbasmanthiri R, Osman NM. 2021. Recent trends of metabolic syndrome and its components in military recruits from Saudi Arabia. Medicines, 8(11): 65.

Ambikapathi R, Shively G, Leyna G, Mosha D, Mangara A, Patil CL, Boncyk M, Froese SL, Verissimo CK, Kazonda P, Mwanyika-Sando M, Killewo J, Gunaratna NS. 2021. Informal food environment is associated with household vegetable purchase patterns and dietary intake in the DECIDE study: Empirical evidence from food vendor mapping in peri-urban Dar es Salaam, Tanzania. Glob Food Sec, 28: 100474.

Azandjeme CS, Alihonou F, Sossa CJ, Gbatcho U, Gounongbe F. 2020. Factors associated with the nutritional status of schoolchildren in the main city of Benin Republic, sub-Saharan Africa. Int Arch Public Health Community Med, 4: 036.

Bellone J, Van Patten R. 2021. What is neuropsychology? In: Bellone J, Van Patten R. editors. Becoming a neuropsychologist. Springer, Bern, Switzerland, 1st ed., pp: 3-28.

Brant LCC, Passaglia LG, Pinto-Filho MM, de Castilho FM, Ribeiro ALP, Nascimento BR. 2022. The burden of resistant hypertension across the world. Curr Hypertens Rep, 24: 55-66.

Burak, C, Baysal: E, Altıntaş, B, Kaya İ, Günlü, S, Süleymanoğlu M, Hayme S. 2019. Girişimsel kardiyologlar arasında atriyal fibrilasyon farkındalık anketi değerlendirmesi. Kocaeli Tıp Derg, 8: 54-60.

Clary K, Habbal M, Smith D, Fratila I. 2021. The green sheep: Exploring the perceived risks and benefits of cannabis among young military members and Veterans. Cannabis, 4: 31-46.

Ede H, Derya MA, Ardahanlı İ, Erbay AR, Akgün O. 2015. Hipertansif hastalarda nabız basıncı aralığı ile sol ventrikül diyastolik fonksiyon ilişkisi. Bozok Tıp Derg, 5(1): 1-2.

Flegal KM, Caroll MD, Ogden CL, Curtin LR. 2010. Prevalence and trends in obesity among US adults, 1999-2008. JAMA, 303: 235-241.

Gan SK, Loh CY, Seet B. 2003. Hypertension in young adults- an under- estimated Problem. Singapore Med J, 44: 448-452.

Günlü S, Aktan A. 2022. Evaluation of military recruits with complaints of palpitations after physical training: A study from Turkey. Cureus, 14: 29284.

Günlü S, Demir M. 2022. Comparison of tenecteplase versus alteplase in STEMI patients treated with ticagrelor: A cross-sectional study. Am J Emerg Med, 58: 52-56.

Hall N, Constantinou M, Brown M, Beck B, Steele M, Rousseau J, Kuys S. 2022. Profiles of recruits entering army basic training in New Zealand. Mil Med, 2022090, 10.1093/milmed/usac090.

Hosseini J, Nematollahi S, Shariatpanahi S, Sadegh-Zadeh Z. 2021. The prevalence of overweight and obesity in Iranian men; a systematic review and meta-analysis study. Men's Health J, 5: 1.

Hruby A, Lieberman HR, Smith TJ. 2021. Symptoms of depression, anxiety, and post-traumatic stress disorder and their relationship to health-related behaviors in over 12,000 US military personnel: Bi-directional associations. J Affect Disord, 283: 84-93.

Keithler AN, Wilson AS, Yuan A, Jose M. Sosa JM, Bush KNV. 2022. Characteristics of US military personnel with atrial fibrillation and associated deployment and retention rates. Cardiovas Disord, 22: 100.

Luxton DD, Greenburg D, Ryan J, Niven A, Wheeler G, Mysliwiec V. 2011. Prevalence and impact of short sleep duration in redeployed OIF soldiers. Sleep, 34: 1189-1195.

Payab MH-RS, Merati Y, Esteghamati A, Qorbani M, Hematabadi M, Rashidian H, Shirzad N. 2017. The prevalence of metabolic syndrome and different obesity phenotype in Iranian male military personnel. Am J Mens Health, 11: 404-413.

Quednow BB, Steinhoff A, Bechtiger L, Ribeaud D, Eisner M, Shanahan L. 2022. High prevalence and early onsets: legal and illegal substance use in an urban cohort of young adults in Switzerland. Eur Addict Res, 28: 186-198.

Robert L, Lloyd J. 2018. Dod instruction 6130.03 medical standards for appointment, Ensistement or induction into the military. Services, 18: 1-18.

Santangelo O, Baldwin JM, Stogner J2022. Does cannabis testing in the military drive synthetic cannabinoid use? Self-reported use motivations among justice-involved veterans. Int J Drug Policy, 106: 103756.

Sarıdas A, Duyan M, Günlü S. 2021. Current approaches to Torsades de Pointes. In: Kaya H. editor. Health & Science. Efe Academi Publishing, İstanbul, Türkiye, 1st ed., pp: 119-128.

Suzuki K, Yamada H, Fujii R. 2022. Circulating microRNA-27a and -133a are negatively associated with incident hypertension: a five-year longitudinal population-based study. Biomarkers, 27: 496-502.

Wang H, Jin Z. 2022. Cardiovascular monitoring in the training of long-distance runners. Revista Brasileira de Med Esporte, 28: 632-634.

Whelton PK, Carey RM, Aronow WS, et al. 2018. 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. Hypertension, 71(6): 1269-1324.

Whitworth JA, World Health Organization, International Society of Hypertension Writing Group. 2003. 2003 World Health Organization (WHO)/International Society of Hypertension (ISH) statement on management of hypertension. J Hypert, 21: 1983-1992.

Yun B, Sim J, Jeong I, Lee S, Kim S, Cho A, Yoon JH. 2022. Does severe subacute noise exposure increase risk of new onset hypertension beyond conventional risk factors? A 30 000 person-years cohort study. J Hypertens, 40: 588-595.

Zaidi STH, Maqsood A, Ali A, Saba A, Ali WS, Afzal W. 2022. Frequency of hypertension in children presenting at combined military hospital Malir Cantt Karachi. Pakistan Armed Forces Med J, 72: 995-998.