Predicting the 10-year Risk of Cardiovascular Diseases and Its Relation to Healthy Diet Indicator in Iranian Military Personnel

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Abstract

Background: epidemiological studies indicate increased prevalence of cardiovascular disease (CVD) among military personnel. Accordingly, identifying at-risk individuals and modifying lifestyle such as increasing the dietary quality can have inhibitory effects against this trend. The aim of the study was predicting the 10-year risk of CVD and its association with healthy diet indicator (HDI) among military personnel.

Methods: the participants in this cross-sectional study included 400 male military personnel within the age range of 30-75 years. HDI score was calculated based on food frequency questionnaire, and the 10-year risk of CVD was evaluated using Framingham risk score (FRS). The FRS items include age, gender, total cholesterol, HDL-C, systolic blood pressure, status of diabetes and status of smoking. Partial correlation test was employed to investigate the relationship between Framingham risk score and HDI score.

Results: the participants had the mean age and BMI of 38.67±5.3 year and 25.28±3.22 kg/m^2, respectively. Prediction of Framingham risk was as follows: 96.5% were low risk, 2% were moderate risk, and 1.5% were high risk. The mean score of HDI index for the participants in this study was 5.98±1.36. Although HDI score did not show a significant relationship with FRS (r:0.028, p:0.575), increased dietary sodium intake led to a significant rise in Framingham risk score (r: 0.110, p:0.030).

Conclusion: a wide range of participants (96.5%) had low risk of developing CVD in the next 10 years. Meanwhile, the FRS showed no significant relationship with HDI score. Further research is required to confirm the results of the present study.

Introduction

Cardiovascular disease (CVD) constitutes an important cause of mortality in both developed and developing countries (1, 2). This disease led to 17 million deaths in 2013 (3). It has been estimated that the mortality resulting from CVD would reach 23.6 million worldwide by the end of 2030 (4). Also, previous evidence suggests ascending trend of prevalence of CVD in Iran; epidemiological studies indicate that the total mortality caused by CVD would reach 44.8% by 2030 in Iran (5). The most important risk factors of this disease include unhealthy diet, hypertension, tobacco smoking, dyslipidemia, obesity, glucose disorders, and stress (6, 7). Stress resulting from occupations can significantly affect the prevalence of this disease (8). For example, military-related stressors have a relationship with acute cardiac disorders (9). In this regard, increased CVD prevalence as well as its risk factors can be observed in this population (10–12). Previous studies have found that the prevalence of hypertension and hypertriglyceridemia is 8.8 and 30.5% across the military personnel in Iran (9).

Previous findings also suggest an inverse relationship between quality of diet and CVD prevalence (13); intake of some foods such as fish, fruits and vegetables can reduce the risk of developing CVD (14). Based on the diet-diseases reaction theory, different dietary compounds can have various effects on progression or prevention of diseases. Accordingly, investigating the quality of general dietary intake is preferable over examining individual intake of every single food (15). Based on the WHO guidelines, the dietary quality measurement indicators are also considered as a tool for investigating the quality of diet in different societies. Healthy dietary index (HDI) was also introduced in the 1990s as one of these indicators and to prevent chronic diseases (16). Previous reports suggest an inverse relationship between HDI and all-cause mortality in adults. In this regard, the results of a study showed 18% reduction in the risk of mortality caused by CVD in groups with higher HDI score (17). On the other hand, very limited studies have been performed to predict the CVD risk and its association with HDI among military personnel. One of the systems utilized to estimate the risk of CVD across the world is Framingham risk score (FRS). This system predicts the risk of developing CVD in future based on the data related to age, gender, total cholesterol, status of diabetes, systolic blood pressure, HDL-C, and tobacco smoking (18).

Considering the limited studies performed on 10-year risk assessment of CVD and its association with dietary quality among the military personnel as well as the increasing prevalence of this disease in Iran, the aim of the present study was to predict the 10-year risk of CVD using FRS and its relationship with HDI. The results of the present study can be used to prevent CVD among the military personnel.

Materials And Methods

Study design and participants

The present cross-sectional study was performed on male military personnel in September 2020. The number of participants considering 50% frequency and error of 0.05% was considered 400. Sample selection was random cluster sampling from among four groups of the population of military forces living in Tehran province. The inclusion criteria were as follows: willingness to participate in study, age range 30-75 years, no CVD disease, and no food allergy. The exclusion criteria included following a certain diet and lack of cooperation for obtaining the information required in the research.

Basic data on biochemical analysis

The basic information of participants included anthropometric measurements (height, weight, BMI), age, level of physical activity, smoking habit, diabetes, systolic blood pressure, total cholesterol, and HDL-C. The weight was measured with minimum clothing and with bare feet using a standard digital balance with 100 g accuracy. The height was measured using a band tape with no shoes with 0.5 cm accuracy. Finally, BMI, was measured based on the formula (wt/ht^2). The information related to the level of physical activity (more than 30 min/day or less than 30 min/day), cigarette smoking (yes/no), and diabetes (yes/no) were collected as in-person interview. Blood pressure measurement was performed using a standard sphygmomanometer (Microlife BP AGI-20/Switzerland) in sitting state from the right arm of participants by an experienced physician. Blood samples were taken as much as 5 cc after 12 hours of fasting to determine the laboratory data. Next, their blood samples were centrifuged at 2500 rpm for 15 min. The total cholesterol was measured using enzymatic method based on cholesterol esterase and cholesterol oxidase. Also, HDL-C was measured specifically using the antibodies functioning against human lipoproteins, with the same enzymatic method used for the total cholesterol.

Dietary assessment and HDI score

The semi-quantitative item food frequency questionnaire-168 was employed to investigate the normal dietary intake of the participants. The reliability and validity of this questionnaire had already been validated in previous studies (19). Through in-person interview by experienced experts, each of the participants was asked to report the frequency of consuming each food item based on standard sizes in the form of per day, week, month, or year. Next, the obtained values of consumption were converted to gram per day using household measures. Eventually, the daily consumption values of each food item were determined for every participant. The serving consumed by each food group was determined by USDA pyramid, and then the serving consumed by each group was calculated for every participant based on the gram of every food item consumed. Determination of the daily energy expenditure and nutrient intake was performed by N4 software. Dietary recommendations published by WHO have been expressed for prevention of chronic disease by HDI. In this regard, we used its updated version (HDI-20) in order to cover the current and up-to-date recommendations of WHO. Note that investigation of the dietary quality has already been performed by HDI-2020 in previous studies (20). This index has an 11 items list with the score range of 0-11. Zero represents minimum adherence of the participants diet to HDI, while 11 indicates the maximum adherence to HDI. Individual components have a specific range and can vary between 0 and 1. The intake level of fruits and vegetables, beans and legumes, nuts and seeds, dietary fiber, whole grains, sodium, total fat, free sugars, SFA, processed meat, and unprocessed red meat would be scored by the index of interest. Generally, the recommendations suggest increasing consumption of five primary elements and limiting the consumption of the six other elements in the daily diet. The details of scoring of HDI-2020 components are shown in Table 1.

Table 1

Healthy diet indicator elements (HDI-2020)

Dietary component	Criteria for scoring	Scoring *
Whole grains	>0 g/day	0/1
Beans and other legumes	>0 g/day	0/1
Fruits, vegetables	≥400 g/day	0/1
Nuts and seeds	>0 g/day	0/1
Dietary fiber	>25 g/day	0/1
Total fat	<30% total energy/day	0/1
Saturated fat	<10% total energy/day	0/1
Free sugars	<10% total energy/day	0/1
Dietary sodium	<2g /day	0/1
Unprocessed red meat	≤71 g/day	0/1
Processed meat	0 g/day	0/1
* Total index score; minimum: 0, maximum: 11. If % or quantities are not in the ranges, score = 0.		

CVD risk assessment

The 10-year risk prediction of CVD was performed by Framingham scoring system. The Framingham scoring table includes age, gender, high-density lipoprotein-cholesterol (HDL-C), systolic hypertension (treated/untreated), total cholesterol, smoking habits, and status of diabetes. FRS elements have a specific range (Table 2). Those with diabetes received score 3, while the subjects without diabetes were assigned 0. Score 4 was assigned to smoking, while 0 was dedicated to those with no smoking habit. After calculating the score of each of the mentioned elements, the sum of scores of each of them would also determine the total score. The 10-year risk percentage of CVD would also be calculated according to the total score obtained (Table 2). The range of the total score obtained can be ≥-3 up to ≤ 21. Accordingly, the 10-year CVD risk percentage can be less than 1 (<1) up to more than 30 (>30). The 10-year CVD risk level can be as follows: low: FRS<10%, moderate: FRS: 10-19%, and high: FRS≥20% (21).

Table 2

Estimation of 10-year CVD risk using Framingham risk factors in men

Age (year)	HDL	Total Cholesterol	SBP Not Treated	SBP Treated	Smoker	Diabetic	Risk score
	+60		<120				-2
	50–59						-1
30–34	45–49	<160	120–129	<120	No	No	0
	35–44	160–199	130–139				1
35–39	<35	200–239	140–159	120–129			2
		240–279	+160	130–139		Yes	3
		+280		140–159	Yes		4
40–44				+160			5
45–49							6
							7
50–54							8
							9
55–59							10
60–64							11
65–69							12
							13
70–74							14
+75							15

Statistical analysis

Comparison of categorical variables across the Framingham risk subgroups was performed by chi-square test. This comparison was done by Kruskal-Wallis and one-way ANOVA test for continuous variables. Normality and variance of data (homogeneity of variances) were examined by Shapiro Wilk test as well as Leven's statistics respectively. The relationship between HDI score as well as the elements of this index and FRS was checked using partial correlation test. Note that the age, daily energy intake, smoking habit, physical activity, BMI, waist circumference, hip circumference, waist hip ratio, and history of diabetes were also controlled in order to examine the mentioned relationship. The obtained results have been reported in Tables 2 and 4 as number, percentage, mean ± SD, median, and interquartile range (IQR). The analyses in this study were done in SPSS 22, with the significance level considered p-value<0.05.

Results

The mean age and BMI of the participants were 38.76±5.3 and 25.28±3.22, respectively. Also, 52% of the participants had BMI>25, with 48% having BMI≤25. The mean WC, HC, and WHR were 46.34±4.19, 49.54±4.21, and 0.93±0.05 respectively. Further, 4.2% of the participants smoked, while 95.8% had no smoking habit. The level of physical activity was assessed suitable in most participants; 79.7% of them had moderate and high physical activity, while only 20.3% of them reported low physical activity (less than 30 min /day). Generally, the mean daily caloric intake of the participants was 2285.11±1028.68. Further, alcohol consumption across the studied population was reported 0%. For the 10-year CVD risk assessment based on Framingham model here, 96.5% had low risk, 2% had moderate risk, and 1.5% showed high-risk. Also, the mean HDI score for the participants here was 5.98±1.36.

The information related to the anthropometric indicators, lifestyle, biochemical analysis, dietary intake, systolic blood pressure, and mean HDI score based on Framingham risk level is reported in Table 2. Table 2 indicates that more senior individuals have a higher 10-year CVD risk level (p<0.001). Also, the participants without diabetes and with no smoking habit fell in the low-risk population group (p<0.001). The systolic blood pressure was significantly higher in those with moderate risk that in the two other groups (p:0.033). On the other hand, 95% of the participants had untreated systolic blood pressure (hypertension), while 5% of them reported treated SBP. Meanwhile, HDI was not statistically significant across the groups with low, moderate, and high-risk (p:0.940). Another notable point is that those with low risk of FRS had a higher rate of processed meat consumption (p=0.002). On the other hand, the level of caloric intake and other nutrients including whole grains, beans and other legumes, fruits and vegetables, nuts and seeds, dietary fiber, total fat, SFA, free sugars, dietary sodium, and unprocessed meat did not differ significantly across the three groups (low, moderate, and high-risk) (P>0.05) (Table 3).

Table 3

Characteristics of study participants according to Framingham risk level

Variables †		Total	FRS			P-value
			Low (≤10 %)	Intermediate (10-19 %)	High (>20 %)	
No. of participants, n (%)		400 (100)	386 (96.5)	8 (2)	6 (1.5)	
Age (year)		38.67 ± 5.3	38.29 ± 4.7	45.87 ± 9.29	54 ± 6.29	< 0.001 a
Body mass index (kg/m^2)		25.28 ± 3.22	25.19 ± 3.13	28.22 ± 6.14	26.95 ± 1.98	0.158 a
Waist circumference (cm)		46.34 ± 4.19	46.33 ± 4.17	45.75 ± 5.31	48.16 ± 4.4	0.484 a
Hip circumference (cm)		49.54 ± 4.21	49.52 ± 4.20	48.37 ± 5.15	52.16 ± 3.12	0.109 a
Waist−hip ratio		0.93 ± 0.05	0.93 ± 0.05	0.94 ± 0.02	0.92 ± 0.03	0.563 a
Physical activity level, n (%)	Low	81 (20.3)	78 (96.3)	2 (2.5)	1 (1.2)	0.923 b
	Moderate/High	319 (79.7)	308 (96.6)	6 (1.9)	5 (1.6)	
Smoking status, n (%)	No	383 (95.8)	377 (98.4)	5 (1.3)	1 (0.3)	< 0.001 b
	Yes	17 (4.2)	9 (52.9)	3 (17.6)	5 (29.4)	
Having diabetes, n (%)	No	384 (96)	377 (98.2)	3 (0.8)	4 (1)	< 0.001 b
	Yes	16 (4)	9 (56.3)	5 (31.3)	2 (12.5)	
SBP (mmHg)		121.25 ± 9.38	121.02 ± 9.35	128.75 ± 6.4	125.83 ± 10.2	0.033 c
HDL (mg/dl)		43 ± 7.01	43.09 ± 6.98	41.76 ± 9.01	38.84 ± 4.87	0.299 c
TC (mg/dl)		150.83 ± 21.56	150.48 ± 21.18	163.16 ± 38.36	156.70 ± 13.81	0.206 c
HDI score		5.98 ± 1.36	5.99 ± 1.37	5.87 ± 1.12	5.83 ± 1.47	0.940 c
Dietary Intake, median (IQR)						
Energy intake (kcal/day)		2027.4 (1303.35)	2024.04 (1324.43)	2130.04 (1722.31)	2400.72 (924.50)	0.641 a

Whole grains (g/day)	208.37 (146.86)	206.64 (142.23)	325.55 (196.43)	299.01 (166.75)	0.158 a
Beans and other legumes (g/day)	28.12 (23.37)	27.79 (23.06)	27.90 (30.18)	31.67 (33.76)	0.947 c
Fruits, vegetables (g/day)	842.85 (845.64)	832.49 (857.11)	922.21 (797.44)	1094.94 (730.66)	0.957 c
Nuts and seeds (g/day)	19.23 (24.39)	19.33 (27.58)	17.69 (12.5)	19.24 (4.93)	0.791 c
Dietary fiber (g/day)	28.7 (21.03)	28.7 (21.30)	29.08 (23.26)	38.96 (21.91)	0.967 c
Total fat (% total energy)	32.45 (7.36)	32.3 (7.64)	33.73 (8.84)	32.96 (6.99)	0.936 a
Saturated fat (% total energy)	10.3 (3.73)	10.36 (3.69)	10.13 (4.49)	10.35 (6.20)	0.982 a
Free sugars (% total energy)	43.49 (15.97)	43.52 (16.24)	43.78 (21.18)	44.5 (19.92)	0.790 a
Dietary sodium (g/day)	3.44 (2.84)	3.42 (2.76)	6.48 (6.27)	8.06 (3.94)	0.927 a
Unprocessed red meat (g/day)	73.19 (54.64)	73.19 (55.14)	85.92 (67.93)	81.52 (34.34)	0.448 a
Processed meat (g/day)	13.12 (15)	13.75 (15.54)	8.04 (8.44)	9.01 (12.54)	0.002 a

Abbreviations: FRS; Framingham risk score, SBP; Systolic blood pressure, TC; Total cholesterol; HDL-c; High-density lipoprotein-cholesterol, HDI; Healthy diet indicator. [a] Kruskall-Wallis test. [b] Chi-square test. [c] One-way ANOVA test. †All values are expressed as mean ± standard deviation (SD), median (interquartile range) and number (percent). * P-value <0.05 considered as significant level.

The results of investigating the relationship between HDI as well as the score obtained from each of the elements of this index and the total Framingham risk score are outlined in Table 4. Although HDI score showed an inverse relationship with FRS, this relationship was not significant (r: -0.028, p:0.575). Another result obtained from partial correlation test showed that increased sodium intake in the diet would lead to a significant rise in FRS level (r:0.110, p:030), thereby posing more CVD risk in the next 10 years. On the other hand, other HDI elements showed no significant relationship with FRS (p>0.05). These results were obtained after controlling the confounding variables including age, energy intake, smoking habit, physical activity, BMI, waist circumference, hip circumference, waist hip ratio, and history of diabetes (Table 4).

Table 4

Partial correlation of Framingham risk score (FRS) with HDI elements among participants

Variables ©	FRS		
	Median (IQR)	r	P *
Whole grains (g/day)	208.37 (146.86)	- 0.048	0.343
Beans and other legumes (g/day)	28.12 (23.37)	0.048	0.346
Fruits, vegetables (g/day)	842.85 (845.64)	- 0.019	0.706
Nuts and seeds (g/day)	19.23 (24.39)	- 0.059	0.246
Dietary fiber (g/day)	28.7 (21.03)	- 0.024	0.640
Total fat (% total energy)	32.45 (7.36)	- 0.015	0.765
Saturated fat (% total energy)	10.3 (3.73)	- 0.010	0.847
Free sugars (% total energy)	43.49 (15.97)	0.016	0.756
Dietary sodium (g/day)	3.44 (2.84)	0.110	0.030
Unprocessed red meat (g/day)	73.19 (54.64)	- 0.016	0.757
Processed meat (g/day)	13.12 (15)	- 0.010	0.838
Total HDI score	6 (2)	- 0.028	0.575
© Adjusted for total energy intake, body mass index, age, physical activity, waist circumference, hip circumference, waist–hip ratio, history of diabetes disease and smoking status. * P-value <0.05 considered as significant level.			

Discussion

The present study found that 96.5% of the military personnel participating in this study had FRS less than 10%. On the other hand, 2% of these people showed moderate risk (10–19%) and 1.5% of participants had a risk above 20%. Further, the relationships examined in this research suggested that HDI had no significant relationship with FRS, but dietary sodium intake indicated a significant positive relationship with FRS. These results were found after controlling the confounding variables.

Population studies suggests that prevalence of CVD as well as the risk factors of CVD are growing in the military personnel (11). Meanwhile, past evidence suggests that controlling CVD risk factors can significantly reduce the development as well as mortality caused by this disease across the military population (12). In this regard, various prospective studies have been conducted worldwide to predict the risk of developing CVD across the military population. A result found in the present study showed that a wide range (96.5%) of the military personnel participating in this study had a low 10-year risk of CVD. Confirming this finding, the study by Al-Dahi et al. performed on 10500 military personnel in Saudi Arabia also showed that only 9.1% of the participants had a 10-year risk of CVD above 10%, while 90.9% of the participants showed a risk lower than 10%; the mean FRS across the military personnel participating in that study was 4.5 (22).

Elsewhere, prevalence of CVD risk factors and then 10-year risk of CVD among men in the Belgian military was examined by Mullie et al. (2010). Prevalence of obesity across the official officers, unofficial officers, and soldiers was 5.6%, 15%, and 19.5%, respectively. On the other hand, only about 8.5% of the officers had a 10-year risk of CVD above 5%. Also, high-risk participants had age younger than 40, and 12.5% of official officers and 19.7% of unofficial officers had smoking habits (23). However, the results of the study by Grósz et al. also challenge the findings of the studies mentioned above. The research by Grósz et al. was performed to determine the 10-year risk level of CVD among 250 male military pilots. They found that half of the participants had a five-year risk of CVD above 2.5%; this number did not exceed 15–20% even in the high-risk age group. In addition, the level of CVD risk factors among the military pilots participating in that study was as follows: insufficient physical activity: 23.9%, smoking: 31.7%, high blood pressure: 14.7%, obesity: 40.8% (24). The discrepancies across all these findings can be examined from different aspects. Bearing in mind that smoking can significantly increase risk of CVD, the level of smoking in the present study was only 4.2%, and in turn the 10-year risk of CVD was also significantly lower. However, in the study by Grósz et al. the level of smoking was around 31.7%, and hence the five-year risk of CVD was significantly higher. Further, BMI in our study was about 25 kg/m^2, while 48.8% of the military pilots in the study by Grósz et al. had BMI > 25 kg/m2, with 40.8% of the participants considered obese. In addition, investigation of previous studies with discrepant results would suggest that the military personnel participating in the present study had a more desirable status regarding the blood pressure and total cholesterol, and thus showed lower FRS (23, 24). Based on the mentioned scenarios, again it seems that the results obtained in the present research are reasonably acceptable.

Another finding here showed that the HDI-2020 had no significant relationship with FRS among the military personnel, but increased dietary sodium intake as one of the HDI elements led to a significant rise in FRS. Although studies based on measuring the dietary quality using HDI among the military personnel are very limited, some researchers have conducted notable studies on examining the relationship between HDI and CVD risk as well as CVD induced mortality among other groups of people. Confirming the results of the present study, Mertens et al. who researched 1867 men found no significant relationship between HDI and incidence of CVD either. However, increase in HDI score had an inverse significant relationship with CRP as one of the CVD-risk factors. On the other hand, intake of calories, protein, carbohydrate, sodium, fiber, and fat had no significant difference across the HDI subgroups (25). A cohort study by Struijk et al. on 33671 healthy men and women in Netherlands in the 1990s showed no significant relationship between HDI and CVD risk (26). Further, the results of Atkins et al. on 3325 British 60-79-year-old man suggested that the mortality risk caused by CVD had no significant relationship with HDI score. Further, increased consumption of SFA, PUFA, protein, carbohydrate, sugar, fiber, fruits and vegetables had no significant effect on the incidence of CVD. However, increased dietary cholesterol intake, as one of the HDI elements, significantly augmented the mortality caused by CVD (27). On the other hand, Stefler et al. showed that higher HDI score was associated with a significant reduction in the mortality caused by CVD among 1855 elderly people in the Eastern Europe (14). Further, Knoops et al. reported that higher HDI score had an inverse relationship with all-cause mortality risk including CVD (28). The discrepancies across all of these investigations engender controversial assumptions. One of the assumptions is related to the type of elements examined by HDI-2020 in the present study. Some past research with incongruent results had also dealt with the original HDI assessment, while our study worked with the updated version of this index. One of the differences between these two versions is related to dietary sodium intake, which had not been mentioned in the original HDI, but the present study had considered the daily sodium intake as one of the elements of HDI. Meanwhile, investigation of the results of some other dietary quality indicators shows that increase in the level of some nutrients such as fruits and vegetables, fiber, and whole grains can reduce the risk of CVD, but the results of the present study did not confirm this claim. One of the mentioned assumptions can be due to insufficient consumption of these compounds by Iranian adults. This is because currently there is no comprehensive or exhaustive dietary guidelines for the Iranian population, and it seems some changes have occurred in the Iranian diet (4). Another assumption is related to gender and age of participants. Based on previous studies, women and the elderly have a higher HDI score compared to others (16). Considering the gender and average age of the participants in the present study, there is the assumption that HDI may not be adequately high across the military personnel. Thus, the low range of HDI score has resulted in minor influence of this index on the 10-year risk of CVD.

The main limitation of the present study was its nature, i.e. being cross-sectional, which can complicate extraction of causal relations between HDI and 10-year risk of CVD. Another limitation was gender of participants. Since the female military personnel claims a very minor percentage of the Iranian military community, thus the participants here were chosen from male individuals. Accordingly, the results obtained across the military personnel may be different among women. The strong points of this study were as follows: 1) the results have been obtained based on controlling the most important potential confounders, which has increased the validity of this study; 2) so far no study has been done on assessing the relationship between FRS and HDI score across the military personnel in Iran, and this study can be regarded as the first exploring this relationship in Iran.

Conclusion

The results of this cross-sectional study showed that a wide range of the military personnel participating in this study had a low risk of developing CVD in the next 10 years; 96.5% of them had Framingham risk level of less than 10%, and only 1.5% of them had a risk higher than 20%. Meanwhile, after dietary assessment of the participants, the results showed that the dietary quality measured by HDI had no significant relationship with FRS. However, increased sodium intake significantly increased the risk of developing CVD in the next 10 years; higher sodium intake led to a significant rise in FRS.

Declarations

Acknowledgements

Not applicable.

Funding

Nil.

Conflicts of interest

There are no conflicts of interest.

Ethics approval and consent to participate

Current study was approved by the ethics committee of Baqiyatallah University of Medical Sciences with the code of IR.BMSU.REC.1398.366. All methods were conducted in accordance with the relevant guidelines and regulations. Also, all participants signing a written informed consent form to participate in the study before enrollment.

Consent for publication

Not applicable.

Availability of data

The datasets generated and/or analysed during the current study are not publicly available due to the importance of study population (military personnel), but are available from the corresponding author on reasonable request.

Authors' contributions

1) K. P: Study designing, writing manuscript, and final checking

2) M. S: Outcomes assessing and manuscript editing

3) E. E: Papers reading and collaborating on data collection

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