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Pre Hypertension and Hypertension in Iranian Military Personnel: Prevalence According to Some Related Factors

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Abstract: This Cross-sectional study was carried out to determining the association between some risk factors with prevalence of systolic and diastolic pre and hypertension (HTN) in male members of the Iranian military personnel. Of total participants, 235(58.0 %) have systolic and 200 (49.4%) have diastolic pre hypertension. The prevalence of systolic HTN was 9.4% and for diastolic HTN was 22.2% respectively. Logistic regression showed less than 35 years, high body mass index (BMI) and medium physical active person to be independently associated with odds of having systolic pre hypertension whereas less than 25 years age group and medium physical active person to be independentlyassociated with odds of having diastolic pre hypertension. Our findings highlight the seriousness of the problemand the importance of promoting appropriate lifestyle modifications in especially reducing body weight, no adding salt on the table and increasing physical activity, fruit and vegetable intake.

Key words: Epidemiology · Hypertension · Risk factors · Military

INTRODUCTION

Cardiovascular diseases remain the most common cause of death worldwide. Hypertension (HTN) is the most frequent treatable risk factors for these diseases[1] Hypertension is called the "silent killer" because about one-third of the people with it do not know that they have it. Hypertension is a major risk factor for all stroke subtypes, infarction as well as hemorrhage [2]. Evidence from clinicaltrials shows that control of blood pressure (BP) leads to asubstantially lower risk of stroke. HTN exerts detrimentalactions on the cerebral circulation that play a critical rolein its ability to promote cerebrovascular diseases [3]. In 15 countries of Asian pacific region with available data, the prevalence of hypertension ranged from 5-47% in men and from 7-38% in women. Overall, the fraction of IHD attributable to HTN ranged from 4-28% in men and from 8-39% in women. Corresponding ranges for hemorrhagic stroke were 18-66% and 15-49% and for ischemic stroke were 8-44% and 12-45% [4]. The prevalence of HTN varies widely among different populations,with rates as low as 3.4% in rural Indian men and as high as72.5% in Polish women [1]. Worldwide prevalence estimates for HTN may be as much as 1 billionindividuals and ~7.1 million deaths per year may be attributableto it [5]. Differences in genetic background, environmentalfactors especially diet and physical activity and variationsin study protocols all influence the prevalence of HTN in adults [6-8]. In economically developed countries, the prevalence of HTN rangedbetween 20% and 50% [1]. The worldwide prevalence and total number of adults with hypertensionin 2025 will be 29% and 1.56 billion, respectively [9]. Annual indirect expenditure result from inappropriate treatment of hypertension is high. For example, in USA, the per-person annual cost was $234.60 and the total national cost was approximately $13 billion in 2006 [10]. Recently, the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High BP(JNC-7) defined a new set of guidelines for the prevention andmanagement of HTN. Pre HTN is not a disease category; however, pre hypertensive subjectsare known to be at high risk for developing HTN and even slightlyelevated BP increases cardiovascular risk [11]. HTN is a common condition, but little is known about its prevalence in the Armed Forces. In military personnel around the world, there have been only a few studies regarding theepidemiology of HTN.

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The aim of this study is to assess the prevalence of pre HTN andHTN according to the new Seventh Joint National Committee (JNC-7) guidelines in the Iranian military personnel and to examine HTN associations with a number of related risk factorsin this group.

MATERIALS AND METHODS

This Cross-sectional study was conducted to determining the association between age groups, BMI, WC/HC ratio, educational levels, physical activity, adding salt on the table and smoking status with prevalence of systolic and diastolic HTN in male members of the Iranian military personnel. The sample in which a simple random sampling design was used consisted of 405 men aged between 19 and 54 years in 2009.

The mercury sphygmomanometer was used for BP measurements by well-trained personnel in this study. Systolic BP and diastolic BP were measured after the subjects had rested in quiet area for 5minutes. The subject's arm was placed at heart level in a sitting position.

Participants were advised to avoid exercise for atleast 30 min before their BP measurement. The Korotkoff phaseI (appearance) and phase V (disappearance) were recorded forthe SBP and DBP, respectively (least of 3 readings taken on 1 occasion).

Subjects were considered pre hypertensive and hypertensive according to Joint National Committee 7 criteria, normal BP is definedas a systolic BP less than 120 mmHg and a diastolic BP less than 80 mmHg; a systolic BP of 120-139 mmHg or a diastolic BPof 80-90 mmHg is defined as pre HTN [12]. When presenting systolic BP/ diastolic BP equal or above 140/90 mmHg is defined as HTN.

A questionnaire that included age, educational levels, physical activity in week, adding salt on the table and smoking status was completed by observer for all participants.

All analyses were carried out using SPSS version 15.0 software [13].

Continuous variables are presented as mean and standard deviation.

Categorical variables are presented as absolute and relative frequencies. Independent samples t-test are used for equality of means of systolic BP/ diastolic BP in people who adding salt on the table vs. not. Spearman rank correlation coefficient was used to evaluate linear relationships between systolic BP and diastolic BP with age, hours physical activity in week, BMI and waist WC/HC ratio. Bivariatelogistic regression models were used to calculate odds ratios (Ors) and 95% confidence intervals (CIs) for all independent variables [14]. All reported P-values are based on two-sided hypotheses.

RESULTS

In this survey, total 405 participants were randomly selected.

The main Participants'characteristics are presented in Table 1. Mean age of participants was 30.4 year (STD=8.8 year), the mean blood pressure was 119/80mm Hg, the mean physical activity per week was 7.8 hour, the mean WC/ HC was 0.92 and the mean body mass index was 25.5 (kg/m^2). From the investigated person, 320 (79.0%) were normal weight (BMI < 25.0 kg/m^2) and approximatelyone fifth of them were overweight (BMI =25.0 kg/m^2) respectively. The majority of participants were not smoker (91.6%).

Table 1: Characteristics of participants in the study of pre hypertension & hypertension in Iranian military personnel. City of Tehran, I.R. of Iran, 2009

Related factors	Number	Percent
Age groups (year)		
<25	131	32.3
25-34	163	40.2
35-44	67	16.5
> 45	44	10.2
Total	405	100.0
Level of schooling		
Primary & Diploma	196	48.4
Technical & higher education	209	61.6
Total	405	100.0
Adding salt on the table		
Yes	164	40.6
No	240	59.4
Missing	1	-
Total	405	100.0
Smoking		
Non smoker	348	91.6
Smoker	32	8.4
Missing	25	-
Total	405	100.0
BMI		
< 25	320	79.0
= 25	85	21.0
Total	405	100.0
Physical activity		
Low	85	21.0
Medium	68	16.8
High	252	62.2
Total	405	100.0

Table 2: Prevalence of systolic, diastolic pre hypertension & hypertension in Iranian military personnel according to related factors. City of Tehran, I.R. of Iran, 2009

Related factors	Syst.	Diast. prehypertension.	Syst.	Diast. hypertension
Age groups (year)				
<25	61.6	61.0	4.6	9.9
25-34	61.5	63.0	4.3	15.3
35-44	66.7	65.9	14.9	38.8
> 45	82.8	77.8	34.1	59.1
Level of schooling				
Primary & Diploma	59.1	58.5	7.7	16.3
Technical & higher education	68.8	68.9	11.0	27.8
Adding salt on the table				
Yes	64.3	64.5	12.8	30.5
No	63.7	61.4	7.1	16.7
Smoking				
Non smoker	64.5	63.8	8.6	20.7
Smoker	70.4	68.2	15.6	31.3
BMI				
< 25	59.0	61.7	4.1	11.9
= 25	90.0	78.8	29.4	61.2
Physical activity				
Low	68.1	69.4	18.8	42.4
Medium	57.1	51.1	14.7	30.9
High	65.8	64.8	4.8	13.1

Of total participants, 235(58.0 %) have systolic and 200 (49.4%) have diastolic pre hypertension. The prevalence of SHTN was 9.4% and for DHTN was 22.2% respectively (Table 2).

Pre hypertension and hypertension was more common in older age groups, technical and higher education level, person who adding salt on the table, smoker and those in the low physical activity and high body mass index (Table 2).

Logistic regression showed less than 35 years, high body mass index and medium physical active person to be independentlyassociated with odds of having systolic pre hypertension whereas less than 25 years age group and medium physical active person to be independentlyassociated with odds of having diastolic pre hypertension (Table 3).

Also, logistic regression showed over than 45 years and high body mass index to be independentlyassociated with increased odds of having systolic hypertension. In addition person who was adding salt on the table to be independentlyassociated with odds of having diastolic hypertension (Table 4).

Spearman's rank coefficient showed age(r= 0.26, 0.32), body mass index (r= 0.51, 0.53), physical activity (r= -0.13, -0.21) and WC/ HC ratio (r= 0.29, 0.26) were noted to be correlated withsystolic and diastolic blood pressure (P< 0.001).

Table 3: Prevalence Odds Ratio (OR) of systolic, diastolic pre hypertension in Iranian military personnel according to related factors. City of Tehran, I.R. of Iran, 2009

Related factors	OR (95% CI) systolic,	OR (95% CI) diastolic pre hypertension
Age groups (year)		
<25	0.23 (0.06- 0.89)	0.48 (0.12- 1.98)
25-34	0.20 (0.05- 0.76)	0.44 (0.11- 1.73)
35-44	0.25 (0.06- 1.03)	0.54 (0.12- 2.36)
> 45 baseline		
Level of schooling		
Primary & Diploma	0.67 (0.40- 1.13)	0.59 (0.34- 1.02)
Technical & higher education	Baseline	
Adding salt on the table		
Yes	0.99 (0.60- 1.61)	0.89 (0.53- 1.48)
No	Baseline	
Smoking		
Smoker	1.473 (0.60- 3.62)	1.37 (0.52- 3.56)
Non smoker	Baseline	
BMI		
= 25	6.71 (2.53- 17.80)	2.27 (0.88- 5.88)
< 25	Baseline	
Physical activity		
Low	0.61 (0.31- 1.23)	0.91 (0.44- 1.90)
Medium	0.37 (0.19- 0.73)	0.45 (0.22- 0.93)
High	Baseline	

Table 4: Prevalence Odds Ratio (OR) of systolic, diastolic hypertension in Iranian military personnel according to related factors. City of Tehran, I.R. of Iran, 2009

Related factors	OR (95% CI) systolic,	OR (95% CI) diastolic hypertension
Age groups (year)		
<25	0.11 (0.03- 0.45)	0.09 (0.03- 0.30)
25-34	0.13 (0.04- 0.42)	0.19 (0.07- 0.49)
35-44	0.30 (0.10- 0.91)	0.35 (0.13- 0.96)
> 45	Baseline	
Level of schooling		
Primary & Diploma	1.62 (0.64- 4.12)	1.05 (0.53- 2.10)
Technical & higher education	Baseline	
Adding salt on the table		
Yes	1.63 (0.73- 3.64)	2.78 (1.48- 5.22)
No	Baseline	
Smoking		
Smoker	1.73 (0.49- 6.10)	1.86 (0.66- 5.23)
Non smoker	Baseline	
BMI		
= 25	6.91 (3.04- 15.70)	10.91 (5.67- 20.97)
< 25	Baseline	
Physical activity		
Low	1.19 (0.41- 3.44)	1.41 (0.62- 3.19)
Medium	1.81 (0.63- 5.21)	1.84 (0.81- 4.16)
High	Baseline	

DISCUSSION AND CONCLUSION

Hypertension affects from 20% to 30% of the world population [15]. Our findings show a prevalence of systolic, diastolic pre hypertension (58, 49.4%) and systolic, diastolic hypertension (9.4, 22.2%) respectively. With an overall prevalence of 58% and 22.2 % and a combined prevalenceof 77.2%, pre hypertension and hypertension were more common inour study than has been previously described in other Iranian's studies [16]. In the present study mean BP 119/80 mm Hg is lower than in Canada, 6 European countries [2] and Royal Thai army population [17] and higher than in US service members [18]. The prevalence of pre hypertension 58.0% is higher than in Korea (41.9%) [19]and USA (40%) [20], but lower than in national study (59.6%) [16]. The prevalence of hypertension 22.2% is lower than in Germany (55%), Finland (52.1%) [21], Netherlands (48.8%) [22], Spain (47%), England (42%), Sweden, Italy (38%) and Canada (27%) [2], France (37.7%) [23], Mexico (34.2%) [24], Turkey (27.5%) [25], Korea (26.9%) [19], but higher than in rural population of India (22.1%) [26], Brazil (22.0%) [6], USA (19.7%) [10], Jamaica (20%) [27] and national study (19.8%) [16].

The prevalence of hypertension in present study is greater than mean prevalence of 35 countries including developing and developed [28].

Consistent with other studies, our analysis shows that pre hypertension and hypertension was more common in older age groups [18, 24, 29, 30].

Overweightis an important predictor of elevated BP: 90.0% of overweight individualshad pre hypertension and 61.2% had hypertension,whereas these figures were only 61.7% and 11.9% among normal weightindividuals, respectively.

The present study shows the best anthropometric indicator for systolic and diastolic blood pressure is body mass index (Spearman's rank coefficient = 0.51, 0.53).

In the study of Royal Thai Army, overweight and obesity were associated with hypertension [17]. In Turkish cohort study, age and body mass index were predictors of hypertension [25]. In Algerian and Italian teenagers study, current weight was strong associated with systolic BP and diastolic BP [31]. In young Swiss men army conscripts, excess bodyweight were strongly correlated with of elevated blood pressure [32]. As compared to normotensives, hypertensive subjects had greater body mass index (28.1 +/- 4.5 versus 25.8 +/- 3.7 Kg/m^2) in San Marino population [33]. In rural population of India study, the prevalence of HTN was associated with higher age and BMI [26]. The results of present study show the association of cigarette smoking with pre and hypertension were not statistically significant (P>0.05). Cigarette smoking causes systolic BP elevation [34],although some studies have found similar or lower

BPs in smokerscompared with nonsmokers [35]. A Cross-sectional data from 3 years of the annual Health Survey for England was showed that any independent chronic effect of smoking on BP was small [36]. A population-based cross-sectional study in France showed that the prevalence and the relative risk of hypertension associated with smoking status [23]. As compared to normotensives, hypertensive subjects were less frequently smokers (20.1 versus 27.8%) in San Marino population [33]. Halimi, *et al.* showed that the prevalence of hypertension was higher in former smokers than in never smokers and the risk of hypertension was higher in former smokers than in never smokers, independently of age and alcohol intake [37].

Our findings show the pre hypertension and hypertension was more common in technical and higher education level, person who adding salt on the table but not statistically significant (P>0.05). It may be due to large effects of age [18, 24, 29, 30], BMI [17, 25, 31, 32] and physical activity [38] on BP results from entrance in to the logistic model.

Further research based on collection of main other risk factors such as fruit and vegetables intake, use of dairy products data wouldbe required to test these etiologic hypotheses.

In conclusion, this study shows that the Iranian military personnel is facinga serious challenge in the prevention and management of pre hypertensionand hypertension, since according to the new JNC-7 guidelines 77.2% of them is affected by the condition. Our findings highlight the seriousness of the problemand the importance of promoting appropriate lifestyle modifications in especially reducing body weight, no adding salt on the table and increasing physical activity, fruit and vegetable intake.

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