SIGNIFICANCE OF INTERARM PRESSURE DIFFERENCE AND STRESS- A CROSS SECTIONAL STUDY IN POLICE WORKER

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Abstract

Background: Interarm pressure difference more than 10 mm of Hg is predictor of cardiovascular and metabolic risk. There is high prevalence of obesity and stress in police personnel because of stressful working environment. With this background the present study conducted to access the relation of interarm blood pressure difference with stress in police personnel.

Aims and Objective: To assess the prevalence of stress among police personnel and to see its association with interarm pressure difference.

Material and Method: This cross-sectional observational study done on 245 police worker in PAC, Sitapur, India. Subjects having more than ten years of working experience were included in study. Anthropometric measurements of subject recorded by following standard protocol. Measurement of systolic pressure in both arm recorded simultaneously by mercury sphygmomanometer. Occupation related stress was measured by using preformed police stress questionnaire, each having 20 items. Result expressed as mild, moderate or severe stress. Available data analyse and expressed in percentage, mean with SD and chi square test to see the significance of association.

Results: Study result showed that 34.29 percent of subjects have abnormally high (≥ 10 mmHg) interarm systolic blood pressure difference and showed high significant association with duration of service and with stress of police personnel.

Conclusion: Interarm blood pressure difference is greater in individual having stress or prolong duration of service. Such subjects are more susceptible to develop cardiovascular or metabolic disorder in future. Early screening can help to detect the vascular events likely to occur in the future

Keywords: Body mass index, Interarm pressure difference, Stress, shift worker

Introduction:

Globally, police work is considered to be one of the stressful occupations. Police are at high risk of developing work related stress.¹ The police are trained in policing, but not about how to maintain their mental and physical wellbeing. Working throughout the day in such an atmosphere produces adverse psychological effects. Police personnel mostly engaged in field duties and perform rotating shift duty. Shift work may be directly related to increased risk for cardiovascular disorder due to circadian disturbance or misalignment between work time and an individual's internal circadian system, or indirectly related to CVD through several pathways such as work-related psychological and behavioural disorders.^{2,3} Moreover long working hours, irregular eating habits, sleepless nights, shift duties and disturbed personal life produces stress in the police officer's life and they become vulnerable to obesity and other metabolic disorders.⁴ Studies confirmed that depression and anxiety also correlated with significant difference in blood pressure between the arms.⁵ Several prospective studies have also reported interarm difference (IAD) in blood pressure as a risk factor for future cardiovascular events and cardiovascular death.⁶⁻⁸ As IAD

is simple to detect/measure in clinical practice, it will be of clinical benefit for primary prevention of CVD, whether IAD can be established as a useful parameter for cardiovascular risk assessment.⁹ For these reasons, this study conducted to determine changes in blood pressure and the associations with stress of working police personnel in PAC Sitapur. Comparisons were also made between their duration and nature of duty.

Aims and Objective

To assess the prevalence of stress among police personnel and to see its association with of interarm pressure difference.

Methodology

This cross-sectional observational study conducted on 245 police personnel working at provincial armed constabulary, Sitapur, Uttar Pradesh from October 2016 to April 2017. This study was approved by institutional ethical committee. After getting written informed permission from higher authority to conduct the study, subjects selected randomly after getting their verbal consent to participate in study and only those subjects included who have completed 10 years of services. Subjects were explained in detail the nature of

study and assure the confidentiality of recorded data. Demographic data of subjects such as age, duration of service, nature of duty and food habits were recorded. Anthropometric parameters of subject were measured using standardized techniques.¹⁰ Height (in centimeters) of subject measured using a measuring scale and weight (in kilograms) was measured with a calibrated electronic weighing scale that was kept on a firm and flat surface. Body mass index (BMI) was calculated using the formula weight (kg)/height²(m). Waist circumference (WC) (in centimeters) measured by non-stretchable measuring tape at the smallest horizontal girth between the costal margins and the iliac crest at the end of expiration. Blood pressure of both the arm is recorded in supine position by auscultatory method of BP measurement by mercury sphygmomanometer under standardized protocol after taking 10 min rest to the subject. Measurement has taken in the arm first presented without prompting, and the cuff was then wrapped to the other arm and another measurement taken. Differences in systolic blood pressure were recoded for analysis. Work related stress was measured by using preformed operational police stress questionnaire and organizational police stress questionnaire, each having 20 items. Questions are related to their administrative and professional pressure, attitude of individuals to handle the pressure and about their personal life. Each subject was asked to rate how stressful each item has been for him and how they handle the situation, on a seven-point Likert scale ranging from “not at all stressful” (Score: 1-3), “moderately stressful” (Score: 4-6), and “very stressful” (Score: 7).²⁴ Stress of police personnel classified into categories namely mild, moderate and severe.¹¹

Statistical analysis

Available data secured in widespread excel data sheet and analysed using SPSS software 16.0 version. Result was expressed as percentage and mean with standard deviation.

Chi-square test was used to see the association between different variables. Association was considered statistically significant at $P < 0.005$.

Result

Socio demographic results of study subjects showed that mean age of subjects is 40.34 (8.23). Most (62.85 percent) of subject completed 10 year service and 25.72 percent of subjects were between 11 to 20 year service duration with mean duration of service is 23.29 (8.49). Majority of subjects were young between 30 to 40 years age group and 15.51 percent of subject were between 51 to 60 years age group. Nature of job result shows that majority (95.92%) of subject were engaged in field or shift duty and only 4.08 percent was performing office duty. Anthropometric results of subject showed that 77.14 percent of subjects were having generalised obesity with mean body mass index of 27.65 (3.99) and 82.04 percent of subjects were having abdominal obesity with mean waist circumference of 99.31 (9.11), (**Table 1**). 34.29 percent of study subjects showed abnormally high (≥ 10 mmHg) inter-arm systolic blood pressure difference with mean IAD 9.11 (7.42), which is indicator of cardiovascular or metabolic risk in future. Stress of subject showed that 31.84 percent of subject having mild stress and 16.73 percent and 0.41 percent were having moderate and severe degree of stress respectively, (**Table 2**). Prevalence of hypertension and other metabolic disorders were very high as duration of service advances but showed no association it may due to that majority of subjects were between 30 to 40 years age group and 15.51 percent of subject between age group 51 to 60 years. Interarm difference of blood pressure also showed highly significant association ($P=0.002$ HS) with stress of subjects, (**Table 3,4**). Obesity of subject showed high significant association with duration of service, (**Table 5**).

Result

Table 1: Socio demographic variables of subjects

Socio demographic variable		N	%	Mean (SD)
Age of subject	30-40 years	135	55.1	40.34 (8.23)
	41-50 years	72	29.39	
	51-60 years	38	15.51	
Duration of service	≤ 10 years	154	62.85	23.29 (8.49)
	11-20 years	63	25.72	
	21-30 years	28	11.43	
Food habit	Veg	78	31.84	
	Non veg	167	68.16	
Nature of job	Office	10	4.08	
	Field	235	95.92	
Body mass index	Normal	32	13.06	27.65 (3.99)
	Pre Obese	24	9.8	
	Obese	189	77.14	
Waist Circumference	Normal (85-90 cm)	44	17.96	99.31 (9.11)
	Obese (> 90 cm)	201	82.04	

Table 2: Results of dependant variables of subjects

Dependent variable		N	%	Mean (SD)
Interarm systolic pressure Difference	Normal (5-10 mmHg)	161	65.71	9.11 (7.42)
	Abnormal (> 10 mmHg)	84	34.29	
Stress level of subjects	Normal	125	51.02	18.56 (4.51)
	Mild	78	31.84	
	Moderate	41	16.73	
	Severe	1	0.41	

Table 3: Association of stress of subjects with nature of job

Nature of Job	Stress level of subjects				Total	Chi square value
	Normal	Mild	Moderate	Severe		
Field	117(49.79%)	76(32.34%)	41(17.45%)	1(0.43%)	235(100%)	3.96 P=0.14
Office	8(80%)	2(20%)	0(0%)	0(0%)	10(100%)	
Total	125(51.02%)	78(31.84%)	41(16.73%)	1(0.41%)	245(100%)	

Table 4: Association of stress with interarm systolic pressure difference of subjects

Inter arm SBP Difference	Stress level of subjects				Total	Chi square value
	Normal	Mild	Moderate	Severe		
Normal (5-10 mmHg)	88(54.66%)	55(34.16%)	17(10.56%)	1(0.62%)	161(100%)	11.75 P=0.002
Obese (> 10 mmHg)	37(44.05%)	23(27.38%)	24(28.57%)	0(0%)	84(100%)	
Total	125(51.02%)	78(31.84%)	41(16.73%)	1(0.41%)	245(100%)	

Table 5: Association of duration of service with BMI of subject

Body mass index (BMI)	Normal	Pre Obese	Obese	Total	Chi square value / p value
Duration of service	≤10 years	16(17.39%)	16(17.39%)	60(65.22%)	15.06/0.004
	11-20 years	11(11.58%)	7(7.37%)	77(81.05%)	
	21-30 years	5(8.62%)	1(1.72%)	52(89.66%)	
	Total	32(13.06%)	24(9.8%)	189(77.14%)	

Discussion

This is the first study to see relation of interarm pressure difference and stress in police personnel. Most of the study performed in general population and established the fact that abnormally high interarm pressure difference (≥ 10 mmHg) is associated with cardiovascular risk and metabolic disorder in future. As we know that police work is very stressful and stress is one of the important causes of high blood pressure. We performed this study to see change in blood pressure and sought to determine its association with duration of service and existing stress in their life. Our results showed that 34.29 percent of study subjects showed high (≥ 10 mmHg) inter-arm systolic blood pressure difference with mean IAD 9.11 (7.42). Cao et al. (2015)⁷ reported that IAD data obtained by simultaneous BP measurement in both arms is more reliable for cardiovascular risk assessment as compared with IAD data obtained by nonsimultaneous measurements of the BP in both arms. Significant difference in interarm systolic pressure is established as a marker of future cardiovascular

and other metabolic risk. Simultaneous measurement of blood pressure in both arm at a time is easy to perform. Verberk W et al. (2011)¹² also stated in his study that blood pressure measurement in both arms is recommended for each patient as vital determinat of cardiovascular risk. Police personnel have different life style from other occupations. They have to work in the field many times so they used to eat easily accessible street food, having irregular sleep, psychological exhaustion and consumption of high calorie foods due to accessibility and low cost.¹³ Such frequent habits lead to develop obesity and other metabolic disorders as in our study also 17.99% of obese subjects were suffering from moderate degree of stress and association is significant. Schulte et al. confirmed our finding as he revealed that overweight and obesity are related to job stress, shift work and long work hours.¹⁴ Occupational stress among police personnel can lead to impaired psychological well-being and physical health.¹⁵ Police personnel officers have more duty on their head quarter and have office work but non officers have various field duties like bandobast duty, traffic control, VIP duties,

flood duty etc.¹³ Most of the rotation duty performed by constables or head constable. This rotation duty of police worker affects their sleep pattern which leads to irritability, agitation and stress. Different studies confirmed high prevalence of stress in police personnel which is a major cause of obesity and high blood pressure.^{16,17} Jaymen et al. (2016)¹⁸ conducted a study in shift working police worker and stated that while there was a significant increase in SBP after shift work, there was no change in DBP. Interarm systolic pressure difference is more significant than diastolic pressure difference because disturbed circadian rhythm and stress mostly affected systemic blood pressure. Different studies also confirmed that shift work may have the propensity to impede BP regulation and increase the risk of hypertension, potentially through circadian rhythm dysregulation.^{19,20} Continuing activity across a period of habitual rest, which night shift work requires, will disrupt the body's natural diurnal cycle and impact cardiometabolic health, thereby increasing BP.²¹ Duration of service result showed significant association with obesity but no association with stress. This agreement with finding of Datta et al. who stated in his study that although policemen join the police department in good health, they retire with some stress related disorders.²²

Conclusion

Study results showed that the interarm pressure difference is greater in individual having prolonged duration of service or stress. Such subjects are more susceptible to develop cardiovascular disorder in future. Screening for inter-arm BP difference at an initial level will help in detecting the vascular events likely to occur in the future.

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