

EVALUATION OF CARDIO-VASCULAR RISK FACTOR IN POLICE OFFICERS**ATANU SAHA, SUBHASHIS SAHU* AND GOUTAM PAUL**

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* *Corresponding Author* skcsahu@yahoo.co.in**ABSTRACT**

Police work is one of the most stressful occupations in the world due to their enormous stresses, uncertainty in work, lack of support from the superior, etc. They were suffering from different types of physical and mental disorders. But only a few studies were carried out in India.

The present study was conducted to evaluate the cardiovascular status of police officers working in different police stations under the jurisdiction of the superintendent of police, Hooghly district in West Bengal. Apart from questionnaire study, biochemical and physiological study was carried out on police officers and similar number of non-police personnel of same age group to evaluate the cardiovascular risk factors of the police officers.

After analyzing the data it was found that the police officers suffer from more cardiovascular risk factors than the general population. Body mass index, blood pressure, cholesterol, triglyceride, High-density lipoprotein were higher than the non-police personnel.

KEY WORDS

Ergonomics, Police Officers, Cardiovascular Disorder, Occupational Stress, Lipid Profile, Physiological Parameters.

INTRODUCTION

Police force provides continuous service to the civilians. They have to serve round the clock for proper investigation, safety and justice. All police officers have to prepare themselves for responding efficiently and properly even for the unforeseen and unpredictable incidents.

Police work has been regarded by some researchers as one of the stressful occupation in the world¹. However, previous studies have found that police work is not only a stressful occupation, but may be a factor of psychological stress^{2, 3, 4, 5, 6}.

Some researchers also indicate that police officers were exposed to different stressful situations which affect their health and performance^{7, 8, 9, 10, 11}. They showed that police officers complained about physical health due

to job stress. It has been reported by different researchers that due to enormous stress, police officers suffer from different physiological disorders, such as gastrointestinal, chronic insomnia, psychological disorders, and family dysfunction^{7, 8, 9, 10, 11, 12, 13}.

It has also been reported by some researchers that police officers suffer increased rates of cardiovascular and metabolic disorders, divorce rates and suicide than the general population^{14, 15}. These work stresses lead to heart attacks, headaches, and high blood pressure in police officers. Some study showed that police officers were suffering from abdominal pain, lack of appetite, and

backache. Moreover psychosomatic symptoms¹⁶ are more acute on them.

Apart from the job stress, police officers suffer different health problems¹⁷ due to improper scheduling of shift.

Police officers face many stressors like chronic exposure to critical incident stressors as well as routine occupational and organizational stressors, such as high responsibility, contact with criminals, heavy work load, irregular duty hours and others that may adversely affect sleep quality and health^{11, 18}.

A few studies have focused specifically on the sleep complaints in police officers. They focussed on the adverse effects of rotating shifts on mood and health complaints. The sleep-wake cycle, under the circadian control of endogenous regulators or oscillators, is disrupted by a misalignment between the external demands of police work and biological rhythms^{19,20}. This produces mood disturbances, decreased work performance, general physical malaise; sleep-wake complaints²¹ and increased intake and addiction to alcohol and drugs²².

Study⁵ has found that police officers suffer from different types of psychological stressors. Lack of force, killing someone in the line duty, shooting incident and shift work were most stressful stressors of the police officers. They remain exposed to traumatic stressors, including physical injury, witnessing death or injuries to other officers and civilians in duty hours. The impact of this high rate of exposure on health has long been a significant public health concern¹¹.

Researchers¹¹ have shown that the police officers are also exposed to chronic non-traumatic stress arising from the demands of their work environment. For example, police officers face pressures from supervisors, court, media, and the public that can increase the stress-related problem such as insomnia.

It was found that police work tends to be regarded as inherently stressful because of the personal risk of exposure to confrontation and violence and the day-to-day involvement in a variety of traumatic incidents²³. As a result, high levels of stress-related symptoms might be expected in this population.

Research²⁴ has reported that police officers suffer from mental health problems. The

organizational culture and workload are the key issues in officers' stress. As a result, they suffer from mental illness²³, unsatisfactory marriage and family life²⁵.

Riediker et al²⁶ have shown that heart rate of the police officers varies after getting some unavoidable or crucial news. Cardiovascular and haematological stresses are very acute in officers engaged in highway patrolling.

It has been found from some researches that police officers leads a physically inactive life, have irregular and hotel made diet and taking spicy and limited choice of food while on duty, take overtime and shift work, suffer from sleeplessness, high rate of alcohols and tobacco consumption and stresses than the general people. They have been found to have an increased prevalence of cardiovascular risk factors than the general population²⁷.

A study done by Vila²⁸ has reported that police officers often are overly fatigued because of shift work, insufficient sleep and long and erratic work hours. Long work hours and shift work severely stresses on the health and performance of police officers. These factors likely contribute to the elevated levels of morbidity and mortality, psychological distress and family disharmony observed among police²⁹.

Unfortunately, there is dearth of data on the job stress of the police officers in the Indian contexts^{6,18}. The present study aimed at evaluating the job stresses on cardiovascular profile of the police officers working in different police stations of West Bengal, India.

MATERIALS & METHODS

1. Subject: Questionnaire study was conducted on one hundred and five police officers working in different police stations in Hooghly district, West Bengal. Physiological and biochemical Studies were conducted after randomly taken thirty one officers who were non smokers, non alcoholic and working only in police stations in Hooghly district in West Bengal and similar number of non-police officers of same age group and same district. Police officers are broadly classified

into two groups: unarmed and armed. Armed police officers means those were maintain mainly law and order and other administrative duties and they were not investigative officers, where as unarmed officers were investigative officers. So they maintained public grievance in police stations, law and order, patrolling, investigation and other such types of stressful work. Unarmed officers also faced shooting incident against criminal. Both groups were serving their duties with arms. In this study, only unarmed police officers were taken because from the questionnaire study it was revealed that duty of unarmed police officer i.e., those are working in police station are more stressful. Permission to study was obtained from the superintendent of police of Hooghly district and police stations of Hooghly district were taken for the study. From the subject, who took part in questionnaire study and consented for physiological study, thirty one personnel were randomly chosen.

2. Questionnaire study: A detailed ergonomic questionnaire was developed and applied on one hundred and five police officers.

3. Biochemical Estimation: Venous blood samples were collected after a minimum of 10 to 12 hours of overnight fasting. Fasting serum samples were used for estimation of lipid profile. All the biochemical estimations were done in university laboratory by using standard KIT (Erba Mannheim) within 5 hours and auto analyzer was used for all assays.

4. Physiological variables studied

a) Heart Rate:

Pre working and working heart rates were taken on police officers with the help of polar heart rate monitor (S810i) through out the duty hours.

b) Blood Pressure:

Blood pressures were taken in resting condition before starting the duty as police officers with the help of properly calibrated sphygmomanometer and stethoscope.

c) Body Mass Index (B.M.I):

Physical parameters such as stature and body weight were measured with an

anthropometric rod and a properly calibrated weighing machine respectively. Body Mass Index (BMI) was calculated from the anthropometric data³⁰.

5. Psychological variables studied:

Subjective feelings were measured on a five-point scale. When very frequent in the scale means eight and never means zero. Rating was calculated and mean were taken.

6. Data analysis:

Sigma stat version 3.5 was used for statistical analysis. The data were analysed as percentage, mean and \pm standard error. Comparisons of the means of different parameters of police officers were prepared by student's t test, $P < 0.05$ as a limit of significance and correlation of different parameters of health status of police officers were prepared by Pearson correlation test.

RESULTS AND DISCUSSIONS

The ages of the police officers and non-police personnel (NP) were between 35-45 years. Persons of both groups were physically fit. Graduation was the compulsory educational qualification of police officers at the entry level of their service. After joining police service, officers were exposed to physical training and service related theoretical classes for the building of capacity appropriate to the job for one year to one and half years duration. It was also studied that the unarmed police officers didn't exposed to regular physical training schedule during entire period of service after completion of mandatory entry level training courses.

Body Mass Index of police officers and non-police personnel

In the present study, it was observed that 48% percent of the police officers working in police stations have attained over weight than non-police personnel (Figure 1 and 2). It was also seen that BMI of the police officers working in the police stations are gradually increasing proportionately with the age of the subject.

Figure 1
Body Mass Index

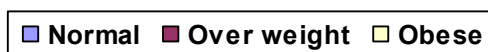
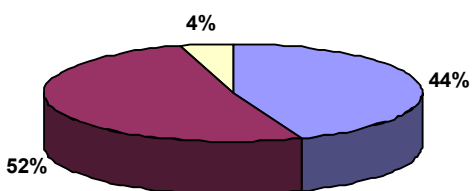


Figure 2
Body Mass Index

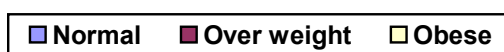
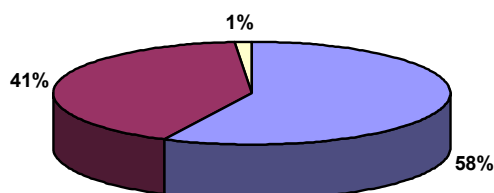


Figure 1
Body Mass Index of Police officers

Figure 2
Body Mass Index of Non Police Personnel

Health problems of police officers

In order to study the relationship between the physiological stresses with the job of police officers working in police stations, questionnaire study was conducted to acquire data about their physiological stresses and its effect on health. It was found from questionnaire studies that health complains as mentioned in the table 1 were significantly increased after joining the service. Among these complains cardiovascular,

gastrointestinal and sleep deprivation problems were increased during the service period. So, to investigate the causes of cardiovascular complain detail physiological investigation was carried. The police officers have to work outside the police station sometimes in dusty and hot environment. Many times they do not get proper hygienic food during outside duty hours. They have to face arrogant mob. All these factors affect their health status³².

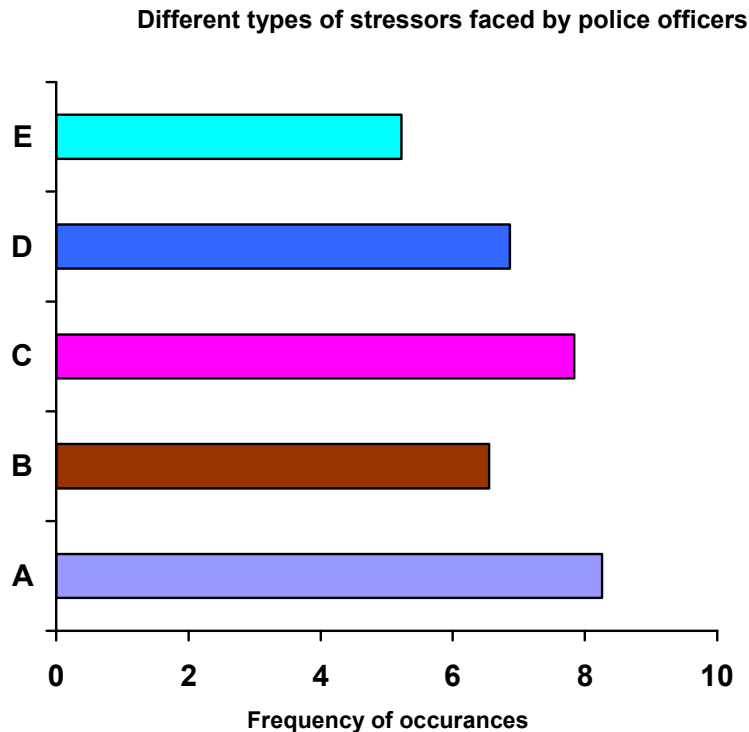
Table 1
Complaints of police officers (in percentage) about health problems Occurrence in percentage (%)

Type of Complaints	Occurrences increase after joining the job	
	Police officers	Non police personnel
Gastro intestinal problems	45.8	16.3
Cardio vascular problems	38.2	21.2
Nervousness/ Anxiety problems	52.8	15.3
Pain in different body parts	24.8	11.2
Sleep disturbance	50.5	2.2
Others problems	30.3	25.3

Psycho-physiological stressors faced by police officers:

The frequencies of occurrence of different psycho-physiological stressors were given in figure 3. From the figure it was

observed that heavy workload, injury during duty and irregular duty hours were stressors that were more frequent. Other common stressors were high responsibility contact with criminals etc.



Heavy work load (A), Injury during duty (B), Irregular duty hours(C),
High responsibility (D), Contact with criminals (E)

Fig 3

Different types of stressors faced by police officers during their duties.

Biochemical study of police officers:

In the present study, it was observed that there were marked differences in physiological profile in table 2 between police officers and NP. The police group had a higher mean of biochemical parameters and anthropometric measurement. Although differences in age, heart rate (HR), low density lipoprotein (LDL) and very low density lipoprotein (VLDL) were not statistically significant between police group and NP. Mean age of police officers and NP was statistically

insignificant. Mean body mass index (BMI) was higher than NP and the difference was statistically significant. Mean differences of two variables, systolic blood pressure (SBP) and diastolic blood pressure (DBP) of police officers and NP were statistically significant. Mean difference of HR of two populations were statistically insignificant. Differences of mean variables total cholesterol (Chol), Triglyceride (TG) and High density lipoprotein (HDL) were statistically significant. Mean differences of LDL and VLDL were statistically insignificant.

Table 2
Physiological profile of Police officers and non Police Personnel

Variables	Police (n=31)	NP (n=31)	P Value
Age (years)	41.61 ± 5.2 (35-45)	39.87 ± 3.93 (35-45)	NS
Body Mass Index (Kg/m ²)	25.90 ± 2.93 (18.66-31.22)	23.83 ± 4.32 (18.1-37.1)	<0.01
Systolic Blood Pressure (SBP-mm/Hg)	129.48 ± 9.02 (110-152)	125.87 ± 8.09(110-140)	<0.05
Diastolic Blood Pressure (DBP-mm/Hg)	86.71 ± 8.62 (75-115)	82.80 ± 7.41 (70-11)	<0.05
Pre Working Heart Rate (HR-in minute)	78.80 ± 8.33 (62-102)	76.58 ± 6.17 (68-90)	NS
Mean Working Heart Rate	102 ± 9.23 (88-120)	101 ± 8.98 (87-118)	NS
Total Cholesterol (TC-mg/dl)	189.58 ± 19.08 (140-212)	182.41 ± 11.23 (155-245)	<0.05
Triglyceride(TG- mm/dl)	175.32 ± 52.76 (96-220)	155.67 ± 20.87 (105-200)	<0.01
Low Density Lipoprotein (LDL- mm/dl)	112.34 ± 21.53 (83.6-139)	109.56 ± 5.93 (85-135)	NS
High density Lipoprotein (HDL-mm/dl)	41.57 ± 5.93 (30-50)	42.88 ± 4.66 (35-47)	<0.05

Values are Mean ±S.D; P<0.05, <0.01 denotes statistical significance; NS means statistically not significance. Figures in parentheses indicate the range.

Figure 4
Health status abnormalities among police in comparison with non police population.

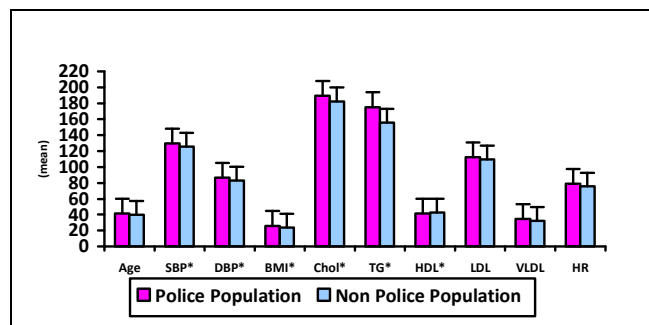


Fig. 4

Shows the prevalence of health status abnormalities among police in comparison with non-police population. * denotes statistically significant.

Correlation with different health status parameters of police personnel:

(i) **Age and systolic blood pressure (SBP):**
There was a strong correlation between the age of police officers and SBP. The higher SBP level in police officers may reflect the positive correlation with age. In this study HR, DBP, TG, LDL, HDL and VLDL were not influenced by age.

(ii) **Body mass index (BMI) and heart rate (HR):**

From table 2, it was showed that there was a significant relationship between BMI and HR of the police officers. The higher BMI level in police reflects positive correlation with HR. According to Wing et al.³¹ obese subjects have lower HDL level and higher level of

blood pressure (BP); as in our subject BP, total cholesterol, LDL, TG, HDL and VLDL cholesterol was not related to BMI.

(iii) Blood pressure (SBP and DBP) and triglyceride (TG):

From the study it was found that there was a relationship between SBP and DBP and statistically significant correlation was found in between SBP and TG (Table 2). The higher SBP level in police reflects positive correlation with DBP and TG. No significant relations were found between BP and parameters of lipid profile.

(iv) Triglyceride (TG) and low density lipoprotein (LDL), high density lipoprotein (HDL) and very low density lipoprotein (VLDL):

From the study it was found that there was a significant correlation between TG and LDL, TG and HDL and TG and VLDL. The higher TG levels in police officers reflect

positive correlation with LDL and VLDL. The higher TG levels in police officers reflect negative correlation with HDL. HR and BP did not reflect any relation with TG.

(v) Low density lipoprotein (LDL) and very low density lipoprotein (VLDL):

From the study it was found that there was a significant correlation between LDL and VLDL. The higher LDL levels in police officers reflect positive correlation with VLDL. HR, BP, TG and HDL did not reflect any relation with LDL.

(vi) High density lipoprotein (HDL) and very low density lipoprotein (VLDL):

In order to study that there was a good correlation found in between HDL and VLDL. The higher HDL levels in police officers reflect negative correlation with VLDL. HR, BP, TG and LDL did not reflect any relation with HDL.

Table 3
Correlation with different health status parameter of police officers.

	Age	BMI	SBP	DBP	HR	Chol.	TG	LDL	HDL	VLDL
Age	-	0.103	0.388*	0.237	-0.198	0.0863	0.143	-0.033	-0.135	0.203
BMI			-0.050	0.212	0.429*	0.129	-0.472	-0.275	-0.0783	-0.464
SBP				0.628*	-0.14	-0.267	0.337*	0.03	-0.133	0.242
DBP					0.22	0.0416	0.208	0.242	-0.157	0.0254
HR						0.0098	-0.189	0.05	0.0372	-0.351
Chol.							-0.35	-0.153	-0.0249	-0.411
TG								0.354*	-0.455*	0.898*
LDL									-0.164	0.349*
HDL										-0.531*
VLDL										-

*denotes statistically significant in <0.05 level.

CONCLUSION

From the study it was observed that police officers suffered from different health problems. The cardiovascular risk factors are also higher in them than the non police population. Metabolic syndrome diagnosis was done by IDF definition and metabolic syndrome was confirmed in police group when BMI ≥ 25 kg/m², triglyceride ≥ 150 mg/dl and blood pressure found 130/85 mm/Hg. It was seen that, there was a correlation between blood pressure and triglyceride. It was also found that after the completion of the training period, the police officers had no any training schedule or daily physical activity. Due to enormous stress and high pressure they could not taken healthy diet and regular basic exercise. So BMI of the police population is significantly (<0.01) higher

than the non police population. Therefore, they have higher risk of cardiovascular diseases. The age group of police officers were 35-45 years. Due to the low age group of the police officers, their physical problems were low but in the long run process they will suffer more physical problems than now.

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