

Original Research Article

MAGNITUDE OF SELECTED CARDIOVASCULAR RISK FACTORS AMONG POLICEMEN IN TAMILNADU, A CROSS SECTIONAL STUDY

Arjun Loganathan¹, Perumal Kandasami Govindarajan², Sathish kumar Selvaraju³

¹Senior Assistant Professor, Government Medical College, The Nilgiris, Tamil Nadu, India.

²Professor Community Medicine, Vinayaka Mission's Medical College Hospital, VMRF-DU, Karikal, India

³Assistant Professor Cum Statistician Department of Community Medicine, Vinayaka Mission's Medical College Hospital, VMRF-DU, Karikal, India

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Corresponding Author:

Dr. Arjun Lognathan

Senior Assistant Professor, Government Medical College, The Nilgiris, Tamil Nadu, India.

Email: drarjun1314@gmail.com

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ABSTRACT

Background: Cardiovascular disease (CVD) is the single largest cause for mortality and morbidity in the world. Police services have always been one of the most challenging and stressful services in India. The aim of the study to assess the prevalence of selected cardiovascular risk factors among Policemen working in Tamilnadu, India.

Materials and Methods: The study was a cross sectional observational conducted among the policemen in three subdivisions of Villupuram district in Tamilnadu. A multistage sampling technique was employed to select 171 policemen. 8 study tools were used to assess the selected cardiovascular risk factors.

Results: Total of 171 policemen participated in this study and the mean age of study participants was 39 ± 9.4 years. This study found that the alcohol habits among the policemen was 36.3% and the prevalence of smoking tobacco was 8.2% In the present study, the prevalence of hypertension among police personnel was 31.5% and the prevalence of diabetes mellitus among policemen was 14.7%. The prevalence of hypercholesterolemia was 33.3%. Results of this study revealed high frequency of certain cardiovascular risk factors among the study participants.

Conclusion: This cross-sectional study concludes that the prevalence of certain cardiovascular risk factors was high among the policemen which should be taken care.

Keywords: Cardiovascular risk factors, Policemen, Hypertension, Diabetes mellitus, alcohol, smoking, Physical activity.

INTRODUCTION

Cardiovascular disease is the single largest cause for morbidity and mortality in the world. In 2005, CVDs were estimated to be the leading cause of death (30% of all deaths) and much of these deaths occurred prematurely, under the age of 70 years.^[1]

The incidence of coronary artery diseases has been increasing in a rapid rate over the past two decades. In India it is estimated that 46.9 million people do have coronary diseases. There has been an increase from 4% to 11% in the cases reported in the last five decades. Nearly half of these deaths are likely to occur in young and middle aged individuals in between 30-69 years.^[2] The largest share in non-

communicable disease cardio vascular disease is 31% when compare to mental health disorder(26%), cancers(10%), diabetes(2%), COPD and asthma(5%), blindness (4%),oral disease(1%) and other disease(21%).^[3]

With the epidemiologic transition, the CVD burden continues to rise in developing countries including India. In India, non communicable diseases (NCDs) were responsible for 53% of deaths and 44% of disability adjusted life years lost.^[4] Appropriate assessment and management of cardiovascular risk is vital to prevent fatal and non-fatal heart attacks and strokes and to improve health outcomes in individuals at high risk of cardiovascular events. There are several risk factors for developing coronary

artery diseases. They include hypertension, diabetes mellitus, smoking, high blood lipids, family history of coronary artery diseases, obesity, physical inactivity, hormonal factors and occupational stress. Of the several risk groups for these NCD, police personnel are certainly one, who work are considered to be in one of the stressful occupations, who have long duty hours and experience several other stress and strain. Policemen have irregular diet and limited choice of food while on duty, suffer from disrupted sleep patterns, stress, and have high rates of tobacco and alcohol consumption than the general population.^[5]

Police services have always been one of the most challenging and stressful services in India and with changing times it is becoming even more so. The major brunt of this job is borne by constables as they are the foot soldiers of police in India. They have to deal with angry mobs, counter insurgency operations, traffic control, VIP security, political rallies, religious festival crowd control, and various other law and order duties without losing their composure and sensitivity.

The aim of the study to assess the prevalence of selected cardiovascular risk factors like hypertension, diabetes, lipid profile, Physical inactivity, BMI, stress, smoking and alcohol among Policemen which are adding up factors for CVD along with their routine job related factors working in Tamilnadu, India.

MATERIALS AND METHODS

Study design: Descriptive observational cross-sectional study

Study setting and population: Tamil Nadu has a police-population ratio of 1:632 with 100986 policemen serving under the department.

For administrative purposes, the state has been divided into four police zones – North, South, West and Central each headed by an Inspector General of Police. North Zone having jurisdiction over 8 Districts (excluding Chennai City) viz., Kanchipuram, Thiruvallur, Villupuram, Cuddalore, Vellore, Tiruvannamalai, Kallakurichi and Chengalpattu.

Tamilnadu police has various units under it like armed force, law and order, intelligence, crime, cybercrime, railways, traffic etc. The policemen of interest in this study belong to three units namely law and order, crime and traffic in Villupuram subdivision, which is headed by superintend of police.

Study area: Nine police stations in Villupuram subdivision under Tamilnadu police department.

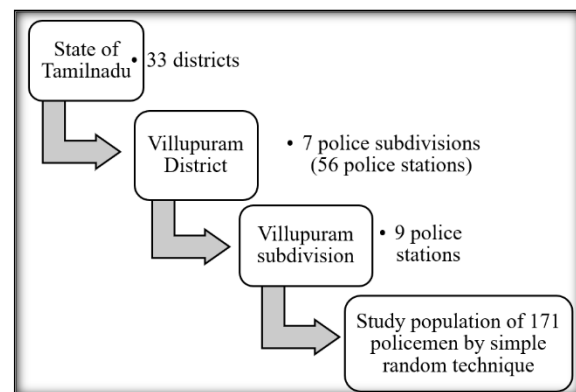
Study period January 2018 to December 2018

Sample size: As per the article “High prevalence of cardiovascular risk factors among policemen in Pondicherry, South India” by Ramakrishna, Jayalakshmy et al., published in Journal of Cardiovascular Disease Research the prevalence of

hypertension is 31%, with absolute precision as 10%, cluster design effect 2, level of confidence as 95% the required sample size is 164 calculated using N-master sample size software.

Sampling procedure

A multistage sampling technique was employed to select the representative sample. The state of Tamilnadu had 33 districts among which Villupuram district was selected randomly. Villupuram police department had seven subdivisions with 56 police stations. One Subdivision (Villupuram) which had 9 stations was selected randomly. Study population of 171 policemen working in these stations was selected by simple random technique.



Study tools

1. A Pretested Semi-structured questionnaire.
2. Well calibrated adult weighing scale. [KURUPS, Dr Belli& Sons, India]
3. 1.5 mts length Inch tape with minimum calibration to 1mm.
4. Standardized Mercury sphygmomanometer. [Diamond, India]
5. Standardized Glucometer. [OneTouch]
6. Serum Cholesterol by CHOD POD method.
7. Serum Triglyceride by Enzymatic Colorimetric method (GPO).
8. Stress was assessed using Operational police stress questionnaire (PSQ-Op) which is a 7-point Scale uses 20 statements with 1 as ‘no stress at all’ to 7 being ‘a lot of stress’. The overall stress levels are categorized into middle, moderate and severe stress by total score obtained from 20 statements. Mild is a score of <60, moderate is 61-100, severe is 100-140.

Inclusion criteria

Policemen working in the selected 9 police stations.
Policemen aged more than 25 years.

Exclusion criteria

1. Policemen who are seriously ill.
2. Policemen with service less than 1 year.
3. Policemen who are not willing to participate in the study
4. Hypertension or diabetes mellitus is taken as positive family history.

Study Procedure: Ethical approval was obtained from Institutional Ethics Committee before commencement of the study. Participants were well

informed about the study to enhance maximum participation. After obtaining the informed written consent subjects were interviewed with pre tested semi structured questionnaire for select socio-demographic variables, years of job experience, diet habits, personal habits, family history and other selected cardiovascular risk factors. Occupational stress was assessed using Operational police stress questionnaire (PSQ-Op) a 7-point scale with 20 statements. Height of the subjects was measured with inch tape after making the subject to stand erect on a height scale. Weight of the subjects in kgs was measured by making them to stand erect with their head straight on the mechanical adult weighing scale calibrated to '0' point.

Right arm blood pressure was measured with mercury sphygmomanometer in sitting posture.

Random blood sugar was measured using standardized glucometer by making finer prick after adopting aseptic precautions. Also, 5ml of venous blood is taken on the next day morning in fasting for assessment of serum total cholesterol and triglyceride levels.

BMI was calculated with the following standard formula

$BMI = \text{Weight in Kgs} / \text{Height in meter}^2$. BMI values >25 was categorized to the class of overweight and obesity and is considered as risk.

Statistical Analysis: Collected data were compiled and analyzed by Statistical Package for Social Sciences (SPSS) software version 23. The continuous variables were analysed with mean, standard deviations and proportion. Normality tested with Kolmogorov-Smirnov test. Association between variables analysed with chi-square test and Mann-Whitney U test Z. Statistical significance was fixed as p value < 0.05

RESULTS

The study was conducted among 171 policemen to assess the magnitude of cardiovascular risk factors. The response rate was 100%. Results of this study revealed high frequency of certain cardiovascular risk factors among the study participants. The mean age of study participants was 39 ± 9.4 years. [Table 1] shows certain demographic characters of study participants.

Among the study participants 31.5% were hypertensive, 6.4% were already diagnosed as

hypertensive and on treatment and 25.1% of the participants were newly diagnosed with systemic hypertension during the survey. [Table 2]

Among the study participants 14.7% of the participants were diabetes mellitus and 13.5% were diagnosed before the study and 1.2% of the participants were newly diagnosed with Diabetes during the survey. [Table 2]

The present study identified the mean Body Mass Index was 25.8 ± 3.4 and more than half of the participants (54.5%) were belonging to overweight category. and 5.3 % of the subjects were Obese class I and 1.8% were Obese class II. [Table 2]

Regarding Lipid profile the mean total cholesterol is 188.3 ± 39.7 mg/dl and mean Triglyceride level is 134.4 ± 65.4 mg/dl. Majority of the study participants had serum total cholesterol level below 200 mg/dl (66.7%) and serum triglyceride level below 150 mg/dl (77.8%). 57 Policemen had hypercholesterolemia contributing 33.3% and 38 Policemen had hypertriglyceridemia contributing 22.2 %. [Table 2]

Nearly 63.7% have not the habit of alcohol consumption and 36.3% were current consumers. Also, 17.9 % of the subjects consuming alcohol for more than 5 years. Among the study participants majority were nonsmokers (91.8%). 8.2% of the policemen had smoked in some point of their life. Among them, 7% were current smokers with 4.6 % of the subjects smoking for more than 5 years.

About 90.1% have working hours of more than 8 hours per day and mean working hours 13.6 with standard deviation of 3.5 [Table 1]

In the present study majority of the study participants (86.5%) had physical activity of less than 150 minutes per week.

The study found out moderate stress among policemen as 60.2% and severe stress as 6.4%

The working hours more than 12 hours of the police men was 52.7%.

The occurrence of Hypertension and Diabetes mellitus were high and statistically significant with 0.0001 among constables than Head constables and Sub inspectors. [Table 3]

There was association established age and year of experience with Diabetes mellitus and the same time the hypertension was associated with age, year of experience and pattern of working hours. [Table 4 and 5].

Table 1: Distribution certain demographic characters of study participants

Variable	Category	Frequency	Percentage
Age	≤ 30 years	37	21.6
	31-40 years	73	42.7
	41-50 years	32	18.8
	>50 years	29	16.9
Sex	Male	151	88.3
	female	20	11.7
Marital status	Married	144	84.2
	Unmarried	20	15.8
Education	Secondary	62	36.3
	Graduate	87	50.8

	Post Graduate	22	12.9
Family type	Extended	2	1.2
	Joint	77	45.0
	Nuclear	92	43.8
Designation	Constable	97	56.7
	Head Constable	41	24.0
	Sub - Inspector	33	19.3
Years of service	<10 years	84	49.1
	10-20 years	34	20.0
	>20 years	33	30.9
Working hours	<8 hours	17	9.9
	8-12 hours	64	37.4
	>12 hours	90	52.7

Table 2: Distribution of hypertension and, diabetes mellitus and BMI

Variables	Frequency	Percentage
1.Hypertension	54	31.5
2. Diabetes mellitus	25	14.7
3.BMI		
Over weight	93	54.5
Obese class I	09	05.3
Obese class II	03	01.8
4.Hypercholesterolemia	57	33.3
5.Hypertriglyceridemia	38	22.2

Table 3: Association between Designation with DM and HT

Variables			Designation			Total	Chi Square Test Value	P value
			Constable	Head Constable	Sub Inspector			
DM	No	Count	93	32	23	148	24.811	0.0001
		% of Total	54.4%	18.7%	13.5%			
	Yes	Count	2	10	11			
		% of Total	1.2%	5.8%	6.4%			
Total		Count	95	42	34	171		
		% of Total	55.6%	24.6%	19.9%	100.0%		
HT	No	Count	95	42	23	160	47.371	0.0001
		% of Total	55.6%	24.6%	13.5%			
	Yes	Count	0	0	11			
		% of Total	0.0%	0.0%	6.4%			
Total		Count	95	42	34	171		
		% of Total	55.6%	24.6%	19.9%	100.0%		

Table 4: Association between DM with selected variables

Selected Variables			DM		Total	Chi Square test value	P value
			No	Yes			
Age	≤ 30 years	Count	37	0	37	47.923	0.0001
		% of Total	21.6%	0.0%			
	31-40 years	Count	73	0			
		% of Total	42.7%	0.0%			
	41-50 years	Count	20	12			
		% of Total	11.7%	7.0%			
	>50 years	Count	18	11			
		% of Total	10.5%	6.4%			
Total		Count	148	23	171		
		% of Total	86.5%	13.5%	100.0%		
Years of Service	≤10 years	Count	84	0	84	40.531	0.0001
		% of Total	49.1%	0.0%			
	11 - 20 years	Count	31	3			
		% of Total	18.1%	1.8%			
	>20 years	Count	33	20			
		% of Total	19.3%	11.7%			
Total		Count	148	23	171		
		% of Total	86.5%	13.5%	100.0%		
Working hrs	≤8 hours	Count	14	3	17	4.555	0.103
		% of Total	8.2%	1.8%			
	8-12 hours	Count	60	4			
		% of Total	35.1%	2.3%			
	>12 hours	Count	74	16			
		% of Total	43.3%	9.4%			
Total		Count	148	23	171		
		% of Total	86.5%	13.5%	100.0%		

Table 5: Association between HT with selected variables

Selected Variables		HT		Total	Chi Square test value	P value			
		No	Yes						
Age	≤ 30 years	Count	37	0	36.726	0.0001			
		% of Total	21.6%	0.0%			21.6%		
	31-40 years	Count	73	0			73		
		% of Total	42.7%	0.0%			42.7%		
	41-50 years	Count	30	2			32		
		% of Total	17.5%	1.2%			18.7%		
	>50 years	Count	20	9			29		
		% of Total	11.7%	5.3%			17.0%		
Total		Count	160	11	171				
		% of Total	93.6%	6.4%	100.0%				
Years of Service	≤10 years	Count	84	0	20.080	0.0001			
		% of Total	49.1%	0.0%			49.1%		
	11 - 20 years	Count	33	1			34		
		% of Total	19.3%	.6%			19.9%		
	>20 years	Count	43	10			53		
		% of Total	25.1%	5.8%			31.0%		
	Total		Count	160			11	171	
			% of Total	93.6%			6.4%	100.0%	
Working hrs	≤8 hours	Count	17	0	6.519	0.038			
		% of Total	9.9%	0.0%			9.9%		
	8-12 hours	Count	56	8			64		
		% of Total	32.7%	4.7%			37.4%		
	>12 hours	Count	87	3			90		
		% of Total	50.9%	1.8%			52.6%		
	Total		Count	160			11	171	
			% of Total	93.6%			6.4%	100.0%	

DISCUSSION

The present cross-sectional study attempted to estimate the magnitude of cardiovascular risk factors like personal habits, lack of physical activity; long working hours, BMI, etc and also, prevalence of Diabetes, Hypertension, Dyslipidemia and occupational stress were measured among policemen.

Demographic data distribution: The mean age of study participants was 39 ± 9.4 years. Distribution of study population by family type in this was joint (45%) and nuclear (43.8%) which is not coinciding with the study done by Selokar D et al where it was 27.5% and 72.5% and also another study by Parsekar S et al where it was 31.6% and 68.4% respectively.^[6,7] This may be because of the difference in social and cultural practice prevailing among these different study settings. By educational qualification 63.7% of the policemen were graduate and post graduate in this study which is considerably higher than the study done by Tharkar S et al and Selokar D et al where it was 24.5% and 49% respectively.^[7,8]

Distribution by occupational characteristics: Distribution of policemen by the designation in this study was that majority of them were police constables (56.7%) and head constables (24%) which was similar to a study done by Saya GK et al where it was 56% and 27.7% respectively.^[9]

Also, work hours of more than 8 hours per day is a major factor for developing stress which in turn is a risk factor for developing cardiovascular diseases. The prevalence of long working hours here was 90.1% which is very high. Various other studies also show similar pattern of prolonged working

hours(82.4%) among policemen due to work demands.^[7,10]

Modifiable risk factors

Distribution by personal habits: Lifestyle studies of policemen showed moderately high rate of alcohol consumption.^[11] They work under tremendous pressure and stress which may make them alcohol and smoking dependent.^[11] This combination can have a synergistic and detrimental effect on the deterioration of their health status. This study shows that the alcohol habits among the policemen was high (36.3%), which is similar when compared to other policemen studies like Tharkar S et al (31.1%) and Ramakrishnan J et al(45.5%).^[5,12] But the results are lower, when compared to study done by Tesfaye T et al where the prevalence of alcoholism was 70.9%.^[13] The prevalence of smoking tobacco in this study was 8.2% which is considerably low when compared to other policemen studies like Tharkar S et al (22.6%) and Ramakrishnan J et al (23%). Also the prevalence is low when compared to smoking prevalence in general population as reported by Mohan P et al (28.6%) and Rani M et al (30%).^[14,15] This can be attributed to that in this study population the educational status of the policemen was higher when compared to other studies in similar setting.^[7,12]

Anthropometric measurements: The distribution of participating police officers into four Body mass index (BMI) groups is as follows: underweight - 1.2%; normal - 37.4%; overweight - 54.5% and obese - 7.1%. In other words, more than 64.6% of the study subjects were either overweight or obese. These findings are similar to a study done by Alghamdi A et al who observed prevalence rates of overweight, 42.5%; and obese, 24.4%.^[16] Also, the results are

similar to another study done by Al-Qahtani DA et al who reported 81.4% of obesity.^[17]

Ramakrishnan J et al in his study found out the prevalence of cardiovascular risk factors among policemen in Puducherry was overweight and obesity was 25.3% and 51.6% respectively.^[5]

Many studies have demonstrated that BMI has significant relationship with cardiovascular events. The increased risk of CVD (cardio vascular disease) and cancer mortality associated with an elevated BMI was significant at levels above 30 kg/m². However overweight individuals (BMI 25-29.9 kg/m²) also had an approximately 60% higher risk of CVD mortality.^[18,19]

Hypertension: In the present study, the prevalence of hypertension (HT) among police personnel was 31.5% which was almost similar to a prevalence of 30.5% among policemen in a study done by Ramakrishnan J et al.^[5] But was less compared to another study in police personnel conducted by Shabana et al with a prevalence of 58.5%.^[7] In another study done by Shiozaki et al, who reported 36.6% of prevalence is higher than this study. However, the study used the BP cutoff as 130/85 mmHg.

In India, the prevalence of HT among adults more than 20 years old was estimated to be 15.9%^[20]. Prevalence of HT among police personnel in the present study was found to be higher than that of the general population (31.5%), which is surprising as police personnel are involved in regular physical activity.

One of the cornerstones of the primary prevention of CVD has been screening for high blood pressure and antihypertensive drug treatment.^[21]

Diabetes Mellitus: Diabetes is one of the most pervasive and worsening health problems facing the world today and it doesn't spare police occupation also. In a study based on "Helsinki Policemen Study", men in the upper 20% of the 2-h glucose distributions and those in the upper 2.5% for fasting glucose had a significantly higher risk of all-cause mortality in comparison with men in the lower 80% of these distributions. For death from cardiovascular and CHD, men in the upper 2.5% of the 2-h and fasting glucose distributions were at higher risk.^[22]

In the present study, the prevalence of diabetes mellitus (DM) among policemen was 14.7% which is very much lower than the study done by Ramakrishna J et al who reported 33.6%.^[5]

Alghamdi AS et al in a study done among police officers in Riyadh city reported a prevalence of Diabetes mellitus as 12% which is near to the results obtained in this study.^[16]

A study done by Madhusudhana MV et al shows that the overall prevalence of diabetes mellitus among serving army personnel in Belgaum Cantonment, India was 6.67% which is lower than the prevalence in this study.^[23]

However, from report in an India Diabetes (ICMR-INDIAB) study done by Indian Council of Medical Research (ICMR) the prevalence of diabetes among

general population of state of Tamilnadu, India was 10.4%.^[24] This shows that DM prevalence among policemen in this study is similar to that of the overall general population of the state.

Total cholesterol and Triglyceride levels: Combining data from various prospective studies, triglyceride is found as a risk factor for cardiovascular disease for both men and women, independent of HDL cholesterol. Triglyceride levels show 30% more risk of developing CVD by univariate analysis and after adjusting to HDL cholesterol and other risk factors the risk attenuated to 22.2%.^[25]

In this study 22.2% of the study population had serum triglyceride levels more than 149 mg/dl with a mean level of 134.4±65.4 mg/dl. It is less than the study done by Thayyil J et al done in Kerala where the prevalence of hypertriglyceridemia was 36.9% and also a higher mean triglyceride level of 143±56.9 mg/dl.^[26] Another study done by Shiozaki M et al among Japanese police officers reported a prevalence of triglyceride level ≥150mg/dl as 32.1%.^[27]

Similarly, regarding total cholesterol one of the major risk factors for CVD is dyslipidemia, which precipitates atherosclerotic change in vessels. Studies indicate that increased cholesterol levels were associated with high CVD risk in young adults.^[28] In accordance with this, in this study the prevalence of total cholesterol ≥200 mg/dl was 33.3% with mean cholesterol level of 188.3±39.7 mg/dl.

Ramakrishna et al in his study mentioned that total cholesterol level ≥150 mg/dl was among 27.3% of the policemen.^[5] This is marginally lower than the results of this study. Prevalence of hypercholesterolemia among general population in India varies from 17.5% to 22.5% which is also lower than the prevalence in this study (33.3%).^[29]

In the present study majority of the study participants (86.5%) had physical activity of less than 150 minutes per week.

The study found out moderate stress among policemen as 60.2% and severe stress as 6.4% which little low to compare a study conducted by Vincy et al and found out 89.3 % participants were moderately stressed and 6.9 % study participants were highly stressed and only 8 (3.7%) participants had low stress levels.^[30]

The working hours more than 12 hours among police men was 52.7% which shows more burden than other jobs where only 8 hours duty allotted.

Present study explored that the occurrence of Hypertension and Diabetes mellitus are high and statistically significant among constables than Head constables and Sub inspectors

The association established age and year of experience with Diabetes mellitus and the same time the hypertension was associated with age, year of experience and pattern of working hours.

Limitations

The present study is a cross sectional study which could only find out the prevalence of risk factors.

Follow up studies is needed to strengthen the cause-and-effect relationship.

Since this study was performed with the aim of providing the baseline information on prevalence rates for the intervention programs, complete lifestyle patterns were not assessed. Multivariate Logistic Regression not performed.

Recommendations

This scenario suggests that effective health care approaches at individual and occupational level as well as regular screening for non-communicable diseases need to be set to achieve an optimal control and management of various cardiovascular risk factors.

Lifestyle modification like reducing tobacco, high alcohol intake and sedentary lifestyle need to be advised and regular counselling schedules for reducing stress levels can be organized at occupational level for a healthy body and mind which will positively influence the performance of the policemen in their workplace.

Early and correct treatment by choosing the appropriate drugs as well as the promotion of patient adherence to the therapy is considered essential strategies to control hypertension, diabetes and dyslipidemia which are important CVD risk factors. Hence, joint efforts to prevent, diagnose, treat and control various cardiovascular risk factors can have a positive impact on cardiovascular health.

CONCLUSION

The job of policing is strenuous and there is greater need to conduct more research on police stressors since the rate and nature of police work changes so fast compared to other jobs. This cross-sectional study concludes that the prevalence of certain cardiovascular risk factors was high among the policemen than the general population.

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