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Prevalence of hypertension and its associated risk factors among police personnel of a metropolitan city

Arunesh Kumar[1], Praveen B Gautam[2], Prasad Pore[3]

[1]Assistant Professor, Department of Community Medicine, [2]Assistant Professor, Department of Tuberculosis and Chest Diseases, MV Autonomous State Medical College, Basti, Uttar Pradesh, [3]Professor, Department of Community Medicine, Bharati Vidyapeeth (DTU) Medical College, Pune, Maharashtra, India

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ABSTRACT

Background: Hypertension is one of the diseases of occupational origin. It is ranked 5th among the 10 most important categories of occupational illness. Police personnel constitute a special occupational group with exposure to violence at work, which directly and indirectly affects their health. Various studies have reported significantly high prevalence of stress-related disorders such as hypertension, diabetes, and coronary heart disease among the policemen and found police occupation as a prominent risk factor for coronary heart disease. **Aims and Objectives:** This study aims to estimate the prevalence of hypertension among police personnel of a metropolitan city. **Materials and Methods:** A cross-sectional study was conducted among the police personal of a metropolitan city for a period of 1 year. Three hundred and fifty police personnel were contacted and interviewed using pre-designed, pre-tested, semi-structured pro forma. Police personnel were screened by taking two B.P. readings. Data analysis was done using SPSS 20.0 Statistical software. Chi-square/Fisher's exact test was used to find the association. Statistical significance was considered at $P<0.05$. **Results:** The prevalence of hypertension was 28% in the present study including 6% already detected and 22% newly detected. On multivariate logistic regression analysis, factors which were identified as risk factors for the development of hypertension among policemen were smoking, less physical activity, use of extra salt, mixed diet, and body mass index. **Conclusion:** The prevalence of hypertension was high among police personnel. Effective intervention strategies such as lifestyle modification along with health-care strategies must be planned to keep the police force healthy and vigilant.

Key words: Hypertension; Police personnel; Metropolitan city

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INTRODUCTION

Human being lives in a rapidly changing environment. Throughout the world, human health is being shaped by the same powerful forces: Demographic aging, rapid urbanization, and the globalization of unhealthy lifestyle. One of the most striking examples of this shift is the fact that non-communicable diseases have overtaken infectious diseases as the world's leading cause of mortality.[1] Hypertension is one of the diseases of occupational origin and police personnel job have been proven to be a long-term predictor for adverse cardiovascular events.[2]

Hence, the present study was conducted to estimate the prevalence of hypertension among the policemen and to determine the risk factors associated with hypertension in them.

Aims and objectives

This study aims to estimate the prevalence of hypertension among police personnel of a metropolitan city.

Address for Correspondence:
Dr. Arunesh Kumar, Assistant Professor, Department of Community Medicine, MV Autonomous State Medical College, Basti - 272 124, Uttar Pradesh, India. **Mobile:** +91-7757827655. **E-mail:** aruneshkumar2008@gmail.com

MATERIALS AND METHODS

This study was a cross-sectional study that was undertaken to estimate the prevalence of hypertension among police personnel of a metro city. Metro police working area has been divided into north and south regions with four zones. Further zones have been divided into divisions which consist of 39 police stations. The study was conducted in randomly selected police stations of one division of metro city for a period of 1 year. The selected division had total of eight police stations. The study population comprised police personnel posted in police stations situated in the study area. Ethical approval for the study was obtained from the IEC before start of the study.

Prevalence of hypertension among the policemen revealed 22.5% according to a study conducted in Nagpur.[3] Based on this, a prevalence of hypertension of 22.5% was assumed for the calculation of sample size. The sample size is estimated based on 20% of permissible error at 95% confidence interval. This was estimated by the following formula. $n=4pq/l^2$, where, p (% of prevalence)=22.5%, l (permissible error)=20% of p, that is, (20/100×22.5=4.5), q=(100-p) %, that is, (100-22.5=77.5), therefore, $n=4\times22.5\times77.5/(4.5)^2=344.44=345$.

Hence, 350 police personnel were included for study who were willing to participate. A prior permission from the officer in charge (ACP) was obtained to conduct the study. The list of police stations under ACP was obtained. Out of eight police stations, one police station was selected randomly by chit method. All the police personnel willing to participate from that station were included in the study. Next 2nd police station was selected randomly by chit method. The procedure was repeated till completion of estimated sample size.

Written informed consent was obtained before interviewing the subjects, after explaining the study procedure to them. A pre-designed, pre-tested, semi-structured pro forma was used for interviewing the subjects. Pro forma consists of two parts, Part I having general information (age, gender, education, duration of service, type of diet, family type, and socioeconomic status) and Part II consists of information about risk factors regarding hypertension. Police personnel were screened by taking two B.P. readings according to JNC VII at an interval of 5 min. Average of two readings was calculated. Those who found to have hypertension were examined in detail. The following standardized instruments were used during the study: Mercury sphygmomanometer, stethoscope, weighing machine, measuring tape, and stadiometer. All these instruments were validated before initiation of measurement.

Anthropometric measurements[4] such as weight, height, waist circumference, and hip circumference were measured with standardized instruments. The data so collected were compiled in MS Excel. Data analysis was done using SPSS 20.0 Statistical software. For statistical significance, Chi-square test was used to find the association. Statistical significance (i.e., rejection of null hypothesis and acceptance of research hypothesis) was considered at $P<0.05$.

RESULTS

As shown in Table 1, the mean age of study participants was 34.65 years with SD of 7.90, among which majority were male. The average length of duration in service was 11.374 with S.D of 8.4 years.

Table 2 describes that in our study, when asked in detail about past smoking habit among non-smoker group, 4 (1.1%) revealed that they were ex-smoker and rest 332 (94.9%) were non-smoker. Average number of cigarettes smoked per day was 4.56 with SD of 1.50 and average duration of smoking was 9.50 years with SD of 7.86 years. When asked in detail about past tobacco chewing habit among non-tobacco chewer group, 5 (1.4%) revealed that they were ex-tobacco chewer and rest 320 (91.4%) were non-tobacco chewer. At the time of study, average duration of chewable tobacco use was 12.24 years with

Table 1: Distribution of the study participants according to sociodemographic variables

Socio-demographic variables	Frequency (%)
Age in years	
≤30	149 (42.6)
31–40	126 (36)
41–50	65 (18.6)
51–60	10 (2.9)
Gender	
Male	322 (92)
Female	28 (8)
Service in years	
≤5	118 (33.7)
06–10	95 (27.1)
11–15	38 (10.9)
16–20	34 (9.7)
21–25	32 (9.1)
>25	33 (9.4)
Education group	
Secondary/matriculation	102 (29.1)
Higher secondary/diploma	54 (15.4)
Graduate/postgraduate	194 (55.4)
Diet	
Veg	27 (7.7)
Mixed	323 (92.3)
Socioeconomic status (Modified Prasad's classification)	
I (upper class)	167 (47.7)
II (upper-middle)	183 (52.3)

SD of 7.36 years. Out of the total 350 study participants, majority were not consuming alcohol during the period of study. When asked in detail from non-drinker about past drinking habit, only 1 (0.3%) had positive history of drinking in past and rest 332 (94.9%) were in non-drinker category. When asked specifically about any physical activity in past, 3 (0.9%) was ex-exerciser who had now left doing any type of physical activity. Rest 117 (33.4%) were non-exerciser. Average amount of salt intake per day was 8.14 g with SD of 0.56 g.

Figure 1 shows that out of total 350 study participants, 98 (28.0%) were found to be hypertensive and rest 252 (72.0%) were non-hypertensive. Hence, the prevalence of hypertension in our study among police personnel was found out to be 28%, out of which 21 (21.43%) were old and 77 (78.57%) were newly diagnosed in the present study.

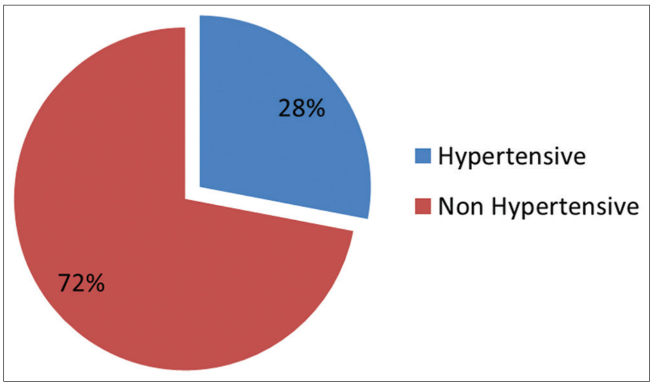

Figure 1: Prevalence of hypertension among police personnel

It can be inferred from Table 3 that the prevalence of hypertension increases with advancing age. This association was found to be highly significant (P<0.001). In the present study, males had a higher prevalence of hypertension compared to females. The prevalence of hypertension was 29.6% in males and 10.8% in females, and this difference was found to be statistically significant (P<0.05). The prevalence of hypertension increases with advancing time of service in years. This association was found to be highly significant (P<0.001). Furthermore, in our study, we found out that policemen of >10 years of police service had higher risk of hypertension than those with ≤10 years of police service. The association for >10 years versus ≤10 years of police service was also found to be significant (P<0.001). In the present study, the prevalence of hypertension was

Table 2: Distribution of the study participants according to associated risk factors

Risk factors	Frequency (%)
Smoking status	
Current smoker	14 (4)
Ex-smoker	4 (1.1)
Non-smoker	332 (94.9)
Tobacco chewing status	
Current tobacco chewer	25 (7.1)
Ex-tobacco chewer	5 (1.4)
Non-tobacco chewer	320 (91.4)
Alcohol consumption status	
Current drinker	17 (4.9)
Ex-drinker	1 (0.3)
Non-drinker	332 (94.9)
Physical activity status	
Current exerciser	230 (65.7)
Ex-exerciser	3 (0.9)
Non-exerciser	117 (33.4)
Consumption of high salt content food	
Yes	31 (8.9)
No	319 (91.1)
BMI (wt./ht^2)	
Normal	50 (14.29)
Overweight	269 (76.86)
Obese	31 (8.86)
WHR	
Low risk	317 (90.57)
Moderate risk	10 (2.86)
High risk	23 (6.57)

Table 3: Association between sociodemographic variables and HTN

Sociodemographic variables	HTN (%)	Statistical significance
Age group (in years)		χ^2-value=47.93; df=3; P<0.001
≤30	16 (10.7)	
31–40	42 (33.3)	
41–50	34 (52.3)	
51–60	06 (60.0)	
Total	98 (28)	
Gender		χ^2-value=4.51; df=1; P=0.034 OR-3.49 (1.03–11.83)
Male	95 (29.6)	
Female	3 (10.8)	
Total	98 (28)	
Service (in years)		χ^2-value=50.43; df=5; P<0.001
≤5	12 (10.1)	
06–10	21 (22.1)	
11–15	14 (36.8)	
16–20	15 (44.1)	
21–25	17 (53.1)	
>25	19 (57.6)	
Total	98 (28)	
Education group		χ^2-value=22.51; df=2, P<0.001
Secondary/matriculation	44 (43.1)	
Higher secondary/diploma	19 (35.1)	
Graduate/postgrad.	35 (18.0)	
Total	98 (28)	
Diet		χ^2-value=6.154; df=1, P=0.013 OR-5.29 (1.23–22.76)
Mixed	96 (29.8)	
Veg.	2 (7.4)	
Total	98 (28)	
Socioeconomic status (as per modified Prasad classification)		χ^2-value=1.56; df=1, P=0.151
Upper class (I)	52 (31.1)	
Upper-middle class (II)	46 (25.1)	
Total	98 (28)	

HTN: Hypertension

found to be highly significant with respect to education (P<0.001). The prevalence of hypertension was more among police personnel who were having mixed diet and it was less in those who were vegetarian. The results were statistically significant. Hypertension was found to be more common in the upper socioeconomic class. The prevalence of hypertension was high in the upper socioeconomic class followed by upper-middle class. In the present study, though there is difference in prevalence of hypertension in Class I and II, it is not statistically significant (P>0.05).

In our study, as shown in Table 4, tobacco smoking was found to be a significant risk factor for the development of hypertension (P<0.05). Although the prevalence was high among current and ex-tobacco chewer compared to non-tobacco chewers, no significant association was found between tobacco chewing and hypertension (P>0.05). Alcohol consumption was found to be a significant risk factor for the development of hypertension (P<0.05). The present study found that people who were engaged in regular physical activity had less probability of developing hypertension compared to those who rarely do any physical activity. The association was highly significant (P<0.05). In the present study, 8.9% of the participants were consuming salt in excess (>6 g/day). Extra salt intake was found to be a significant risk factor for the development of hypertension. The current study shows that body mass index (BMI) association was found to be highly significant. In our study, waist–hip ratio (WHR) association was not found to be statistically significant.

Multivariate logistic regression analysis was performed to assess the independent impact of different variables on the probability of hypertension adjusted for the influence of other variables. As shown in Table 5, variables such as high BMI, mixed diet, smoking, use of extra salt, and less physical activity were found to be potential risk factors exerting significant positive independent impact on prevalence of hypertension among the policemen.

Table 4: Association between risk factors and HTN

Risk factors	HTN (%)	Statistical significance
Smoking status		Fisher's exact test used P=0.033
Current smoker	8 (57.1)	
Ex-smoker	0 (0)	
Non-smoker	90 (27.1)	
Total	98 (28)	
Tobacco chewing status		Fisher's exact test used P=0.225
Current tobacco chewer	10 (40)	
Ex-tobacco chewer	2 (40)	
Non-tobacco chewer	86 (26.9)	
Total	98 (28)	
Alcohol consumption status		Fisher's exact test used P=0.009
Current drinker	10 (58.9)	
Ex-drinker	0 (0)	
Non-drinker	88 (26.6)	
Total	98 (28)	
Physical activity status		Fisher's exact test used P<0.001
Current exerciser	43 (18.7)	
Ex-exerciser	0 (0)	
Non-exerciser	55 (47.0)	
Total	98 (28)	
Extra salt intake		χ^2-value=12.15; df=1; P=0.003 OR-3.57 (1.68–7.56)
Yes	17 (54.9)	
No	81 (25.3)	
Total	98 (28)	
BMI		χ^2-value=49.90; df=2; P<0.001
Normal (≥18.9–24.9 kg/m^2)	3 (6.0)	
Overweight (≥25–29.9 kg/m^2)	71 (26.4)	
Obese (≥30 kg/m^2)	24 (77.4)	
Total	98 (28)	
Waist–hip ratio		Fisher's exact test used P=0.170
Low risk	91 (28.7)	
Moderate risk	4 (40.0)	
High risk	3 (13.0)	
Total	98 (28)	

HTN: Hypertension

DISCUSSION

In our Study, mean age of study participants was 34.65 years with SD of 7.90. Similarly, as per Kales et al.,[5] reported mean age of study participants to be 37 years in their study.

Similar to our study, Mallik et al.,[6] and Ramakrishnan et al.,[7] revealed in their study that study population was male dominated. The study conducted by Commonwealth Human Rights Initiative[8] has also found that women make up only 6.11% of India's 2.3 million police force. One of the main reasons is that women faced a deep-seated gender bias across the police force which started at recruitment and carried on throughout their career. Hence, overall proportion of male policemen is more than female policemen, which is also reflected in the present study.

The average length of duration in service was 11.374 with S.D of 8.4 years in our study. Garbarino and Magnavita[9] found, in their study, the average length of duration in service of study participants to be 14 years, which is almost nearby to our study. In contrast to our study, where only 39.1 % of study participants had length of police service more than 10 years.

Meshram et al.,[3] in her study, found majority of participant's, that is, 428 (82.3%) out of 520 have education higher than secondary level which is almost similar to our present study which has 71% of participants having education higher than secondary level.

Similar to our study, Meshram et al.,[3] in her study, mentioned that out of the total study participant's, majority, that is, 96.2% belong to upper-middle and rest 3.8% to lower-middle.

Table 5: Multivariate analyses using binary logistic regression with outcome variable hypertensive/ non-hypertensive

Risk factors	B	SE	df	P-value	Odds ratio	95% CI for odds	
						Lower	Upper
Age (years)	−0.133	0.075	1	0.076	0.875	0.756	1.014
Gender	1.259	0.853	1	0.140	3.522	0.661	18.758
BMI							
Normal			2	<0.001			
Overweight	3.347	0.834	1	<0.001	28.413	5.542	145.663
Obese	1.317	0.494	1	0.008	3.731	1.416	9.831
Years in service	0.019	0.072	1	0.796	1.019	0.885	1.173
Education							
SSC			2	0.690			
HSC	−0.081	0.458	1	0.860	0.922	0.376	2.263
Graduate	−0.379	0.447	1	0.397	0.685	0.285	1.645
Diet	−1.924	0.825	1	0.020	0.146	0.029	0.736
Smoking consumption							
Current smoker			2	0.075			
Ex-smoker	−1.623	0.739	1	0.028	0.197	0.046	0.839
Non-smoker	−0.880	1.186	1	0.458	0.415	0.041	4.239
Alcohol consumption	0.245	0.321	1	0.445	1.278	0.681	2.397
Use of extra salt	1.304	0.501	1	0.009	3.685	1.381	9.834
Physical exercise	−0.551	0.177	1	0.002	0.577	0.408	0.815
Constant	3.394	3.194	1	0.288	29.790		

In contrast to our study, Almale et al.,[10] in his study, found that only 14% were from upper class, 33% from upper-middle, and 53% from lower-middle class. This difference may be due to different scale which was used to categorized study participants.

Tambe et al., (2012)[11] in their study, mentioned that 7.9% of study participants were smoker. Similar to our study, Aishwarya et al., (2013)[12] mentioned in their study that out of total 781 study participants, 64 (8.7%) reported smoking. In contrast to our study, *Jahanvi* et al., *(2012)*[13] in her study, revealed 22% of police personnel as smoker. The reason for such high percentage of smoker would be due to larger study population and also 50% or more of study participants were aged over 43 years. These factors may be one of the reasons of larger percentage of study participants smoking. As with increasing age and experiences, responsibility increases, which may lead to increase of stress and, in turn, leads to addictive habits.

In contrast to our study, where only 7.1% of policemen had addiction of tobacco chewing, Sen et al.,[14] mentioned in their study that 30.5% of study participants had addictive habits of smokeless tobacco consumption. Similar to our study, Aishwarya et al., (2013)[12] revealed in their study, that among 781 police personnel, 10 (1.3%) consumed alcohol whereas higher percentage was found in Sen et al.,[14] study which mentioned that results for addictive habits showed that alcohol consumption was significantly higher, that is, 33% in the policemen.

Meshram et al.,[3] in her study, found out that 59.81% of subjects were not doing any type of leisure time physical activity. The number is high in comparison to our study for non-exerciser. One of the reasons may be that question in other study was time specific, that is, leisure time physical activity. Ganesh et al.,[15] in their study, mentioned that around 186 (62%) of police personnel consume high salt content food. The percentage was very high as compared to ours but the detailed dietary history was not assessed in Ganesh et al.,[15] study to explain the high percentage.

Almost similar to our study, Thayyil et al., (2012)[16] in their study, found that BMI was in the overweight-obesity range for 65.6% of the police officers. Almale et al.,[10] mentioned in his study that 31.5% of policemen were in normal range, 48.2% in overweight range, and 20.3% in obese range. In our study, we had used WHO classification of BMI to categorize police personnel. Variation in result with other studies may be due to Indian classification used for BMI categorization in their studies.

In contrast to our study, where 90.57% of police personnel were in low-risk group according to WHR, Ramakrishnan et al.,[7] in his study among policemen in Puducherry, found that around 91.4% of police personnel had WHR higher than the gender-specific normal values.

Almost similar to our study, Ramey et al.,[17] in their study, found prevalence among police personnel to be 28%, whereas much lesser prevalence was found in Selokar et al.,[18] study which revealed a prevalence of 17.6% and Garbarino and Magnavita[9] revealed a prevalence of 12.4%.

Many studies done to identify the risk factors of hypertension have inferred that age is a significant risk factor for the development of hypertension. Similar to our study, Meshram et al.,[3] in her study, found that younger policemen of 18–27 years of age were free from hypertension. The prevalence of hypertension was significantly higher in policemen of 48–58 years of age. One of the many reasons may be that newly appointed policemen have to pass through various physical (athletic) tests and medical examination and only absolutely fit candidates are appointed as policemen.

A large number of epidemiological studies have inferred that prevalence of hypertension is more in males as compared to females. This is because; during adolescent and middle-aged males have a higher blood pressure compared to females. The female hormones estrogen and progesterone have a protective effect on blood pressure. Later in life, this difference diminishes mainly because of the postmenopausal changes. Similar to our study, Mallik et al.,[6] also in their study, mentioned that male gender was positively associated with hypertension.

The present study found increasing years in service among police personnel to be an important risk factor for the development of hypertension. The main reason for increase in blood pressure with increase years in service might be the seniority of policemen increases more and more responsibilities are posed on them. Burden of these job responsibilities in addition to increased family responsibilities perhaps increases the level of stress resulting in higher risk of hypertension among the policemen of longer years of service as compared to their other counterparts. In addition to above reason, increasing age has also impact as years of service increases. Similar to our study, Meshram et al.,[3] in her study, found that variables like length of police service (>10 years vs. ≤10 years) were found to be potential risk factors exerting significant positive independent impact on prevalence hypertension among the policemen.

Meshram et al.,[3] in her study, found that policemen with >10 years of education were 59% less likely to be hypertensive as compared to those with low level of education, which was similar to our study.

In the present study, the higher prevalence of hypertension in upper class may be because of their lifestyle which usually involves a sedentary type of job, higher mental stress, and lack of physical activity. Similar to the present study, Ganesh et al.,[15] in their study on police personnel in urban Puducherry, found that the prevalence was more among upper socioeconomic class compared to other lower socioeconomic class.

In our study, tobacco smoking was found to be a significant risk factor for the development of hypertension ($P<0.05$). Meshram et al.,[3] and Sen et al.,[14] in their study, mentioned similar result as our present study.

Similar to our study, Meshram et al.,[3] in her study, found that the prevalence of tobacco use was higher among police personnel and it was found to be a potential risk factor. Mallik et al.,[6] revealed in his study that tobacco chewing is a risk factor for hypertension.

Alcohol consumption was found to be a significant risk factor for the development of hypertension ($P<0.05$). Results similar to the present study were obtained by Meshram et al.,[3] in Nagpur. Similar to our study, where physical inactivity was positively associated with high blood pressure, Mallik et al.,[6] in their study, revealed the same. Extra salt intake was found to be a significant risk factor for the development of hypertension. Similar results were also observed in a study done by Ganesh et al.[15]

Similar to our study, majority of the researchers have found increased BMI to be a risk factor for hypertension. Meshram et al.,[3] in her study, found that variables like overweight/obesity were found to be potential risk factors exerting significant positive independent impact on prevalence hypertension among the policemen.

High WHR indicates central/abdominal obesity which is an important risk factor for hypertension, especially among the Southeast Asian region. However, in our study, association of WHR and hypertension could not be found. Ganesh et al.,[15] in their study, mentioned that waist circumference more than 90 cm was associated with higher prevalence rate of hypertension.

Similar to our study, Meshram et al.,[3] in her study after doing multivariate logistic regression analysis found variables such as tobacco use and overweight/obesity to be potential risk factors exerting significant positive independent impact on prevalence hypertension among the policemen.

In contrast to our study, Mallik et al.,[6] in his study after doing logistic regression, found age, male gender, service length of 10 years or more, abdominal obesity, and diabetes positively associated with hypertension. Although similar to our study, they also found that physical inactivity was positively associated with high blood pressure.

Limitations of the study

1. Prevalence estimates have been based only on a single occasion measurement of blood pressure. Hence, it may lead to misclassification bias
2. Results of the present study cannot be generalized to the all police personnel of different states due to differences in socioeconomic variables, dietary habits, and cultural practices existing in the country
3. Few of the variables analyzed in the present study were based on the information given by the study participants. Hence, an element of unavoidable recall bias could be present in the study.

CONCLUSION

Hence, to conclude, the prevalence of hypertension was high among police personnel. Among all the factors studied, variables such as high BMI, mixed diet, smoking, use of extra salt, and less physical activity were found to be potential risk factors exerting significant positive independent impact on prevalence hypertension among the policemen. Effective intervention strategies such as lifestyle modification along with health-care strategies must be planned to keep the police force healthy and vigilant.

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REFERENCES

1. World Health Organization. A Global Brief on Hypertension. Available from: https://www.who.int/publications-detail-redirect/a-global-brief-on-hypertension-silent-killer-global-public-health-crisis-world-health-day-2013 [Last accessed on 2022 Dec 05].
2. Wright BR, Barbosa-Leiker C and Hoekstra T. Law enforcement officer versus non-law enforcement officer status as a longitudinal predictor of traditional and emerging cardiovascular risk factors. J Occup Environ Med. 2011;53(7):730-734.
   https://doi.org/10.1097/JOM.0b013e318220c2da
3. Meshram FC, Narlawar U and Durge PM. High prevalence of hypertension among police personnel at Nagpur. S Asian J Prev Cardiol. 2005;9(2):98-106.
4. Dr. Joshi Arun Vishnupant Dissertation on "Prevalence of Hypertension among Drivers and Conductors of North-West Karnataka Road Transport Corporation in Belgaum Division, Belgaum-a Cross Sectional Study". Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka; 2008. Available from: https://www.52.172.27.147:8080/jspui/handle/123456789/4429
5. Kales SN, Tsismenakis AJ, Zhang C and Soteriades ES. Blood pressure in firefighters, police officers, and other emergency responders. Am J Hypertens. 2009;22(1):11-20.
   https://doi.org/10.1038/ajh.2008.296
6. Mallik D, Mukhopadhyay DK, Kumar P and Sinhababu A. Hypertension, prehypertension and normotension among police personnel in a district of West Bengal, India. J Assoc Phys India. 2014;62(11):12-16.
7. Ramakrishnan J, Majgi SM, Premarajan KC, Lakshminarayanan S, Thangaraj S and Chinnakali P. High prevalence of cardiovascular risk factors among policemen in Puducherry, South India. J Cardiovasc Dis Res. 2013;4(2):112-115.
   https://doi.org/10.1016/j.jcdr.2013.05.002
8. Dhar MM, Ewart-James J, Harrison F, Kadri S, Nathan S, Byrne K, et al. Women Police in South Asia; 2015. Available from: https://www.humanrightsinitiative.org/download/1449728344rough-roads-to-equalitywomen-police-in-south-asia-august-2015.pdf [Last accessed on 2022 Nov 23].
9. Garbarino S and Magnavita N. Work stress and metabolic syndrome in police officers. A prospective study. PLoS One. 2015;10(12):e0144318.
   https://doi.org/10.1371/journal.pone.0144318
10. Almale B D, Bansode-gokhe S S, Suryawanshi S R, Vankudre A J, and V, Health profile of mumbai police personnel: A cross sectional study. Indian J Forensic Community Med 2015;2(2):87-90.
    https://www.ijfcm.org/article-details/624
11. Tambe NN, Singh V, Narang K, Tambe V, and Goel RB. A prevalence study of risk factors for chronic diseases among police personnel in a Metropolitan area. Int J Recent Trends Sci Technol. 2012;5(2):61-63.
12. Aishwarya S, Bhambal A, Saxena S, Tiwari V and Tiwari U. Frequency of addictive habits and its association with oral diseases among a cross section of Indian police personnel connotation. J Coll Physicians Surg Pak. 2016;26(5):403-407.
13. Jahanvi G, SatyaRanjanPatra CH Chandrashekhar and Rao BN. Unmasking the health problems faced by the police personnel. Global J Med Public Health. 2012;1(5):64-69.
14. Sen A, Das M, Basu S and Datta G. Prevalence of hypertension and its associated risk factors among Kolkata-based policemen: A socio-physiological study. Int J Med Sci Public Health. 2015;4(2):225-232.
    https://doi.org/10.5455/ijmsph.2015.0610201444
15. Ganesh KS, Naresh AG and Bammigatti C. Prevalence and risk factors of hypertension among male police personnel in urban Puducherry, India. Kathmandu Univ Med J (KUMJ). 2014;12(48):242-246.
    https://doi.org/10.3126/kumj.v12i4.13728
16. Thayyil J, Jayakrishnan TT, Raja M and Cherumanalil JM. Metabolic syndrome and other cardiovascular risk factors among police officers. N Am J Med Sci. 2012;4(12):630-635.
    https://doi.org/10.4103/1947-2714.104313
17. Ramey SL, Perkhounkova Y, Downing NR and Culp KR. Relationship of cardiovascular disease to stress and vital exhaustion in an urban, Midwestern police department. AAOHN

J. 2011;59(5):221-227.
https://doi.org/10.3928/08910162-20110418-02
18. Selokar D, Nimbarte S, Ahana S, Gaidhane A and Wagh V. Occupational stress among police personnel of Wardha city, India. Australas Med J. 2011;4(3):114-117.
https://doi.org/10.4066/AMJ.2011.562

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AK- Concept and design of the study; prepared first draft of manuscript; interpreted the results; reviewed the literature; and manuscript preparation; **PBG-** Coordination and statistically analyzed; and **PP-** Statistically analyzed and interpreted, and revision of the manuscript.

Work attributed to:
Bharti Vidyapeeth Medical College, Pune, Maharashtra, India

Orcid ID:
Dr. Arunesh Kumar - https://orcid.org/0000-0001-8689-7549
Dr. Praveen B Gautam - https://orcid.org/0000-0003-3502-7935
Dr. Prasad Pore - https://orcid.org/0000-0001-7461-6586

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