PREVALENCE OF HYPERTENSION AND ITS ASSOCIATED RISK FACTORS AMONG POLICE PERSONNEL OF VIJAYAPURA.

By

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Dissertation submitted to

B.L.D.E (DEEMED TO BE UNIVERSITY) VIJAYAPURA, KARNATAKA

In partial fulfillment of the requirements for the degree of

DOCTOR OF MEDICINE

In

COMMUNITY MEDICINE

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Date: **Dr. LAXMI TELLUR**

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LIST OF ABBREVIATIONS USED

WHO	:	World Health Organization
HTN	:	Hypertension
JNC	:	Joint National Committee
ESH	:	European Society of Hypertension
SBP	:	Systolic Blood Pressure
DBP	:	Diastolic Blood Pressure
SES	:	Socioeconomic Status
BMI	:	Body Mass Index
PR	:	Pulse Rate
NCDs	:	Non-communicable Diseases
H/O	:	History of
SD	:	Standard Deviation
ANOVA	:	Analysis of variance
KW Test	:	Kruskal Wallis Test
CVD	:	Cardio Vascular Disease
CAD	:	Coronary Artery Disease
DALY	:	Disability Adjusted Life Years Lost
NPCDCS	:	National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke

ABSTRACT:

Introduction: Hypertension is a chronic condition which is a major public health challenge due to associated morbidity, mortality and financial burden on the society in both developed and developing countries. According to World Health Organisation, hypertension accounts for one in every third deaths worldwide.

Hypertension has been linked to ischemic heart disease, peripheral vascular diseases, stroke, myocardial infarction, and renal failure. There is a two fold higher risk of developing coronary artery disease (CAD) and four times higher risk of congestive heart failure among hypertensives when compared to normotensives. In India, prevalence of hypertension is approximately 13-37% in general population. Non communicable diseases (NCDs) are responsible for 53% of deaths and 44% of disability adjusted life years lost (DALY) in India.

Police personnel are backbone for maintaining law and order within their jurisdiction. Police work has been regarded as one of the stressful occupation, who have long duty hours, irregular diet, limited choice of food while on duty, suffer from disrupted sleep patterns and high rates of addiction which are all the risk factors for hypertension. Growing unemployment, increasing violence and rising expectations of the people have caused serious challenges for the police. Several studies done across India have shown prevalence of hypertension ranging from 16-42% among police personnel.

Vijayapura is one of the district headquarters in North Karnataka which is undergoing rapid socioeconomic transition & lifestyle modifications. As data regarding NCDs among police personnel is very sparse, hence the present study is undertaken to know the

prevalence of hypertension and associated risk factors among police personnel of Vijayapura.

Objectives:

1. To study the prevalence of hypertension among police personnel of Vijayapura district.
2. To find out the socio-demographic and other risk factors influencing hypertension.
3. To create awareness about the disease, risk factors, complications and preventive measures among the respondents.

Material and methods:

After obtaining ethical clearance from the Institutional Ethical Committee of Shri. B. M. Patil Medical College, Hospital & Research Centre,Vijayapura and permission from the Superintendent of Police, Vijayapura, the study was carried out in all 24 police stations of Vijayapura district. After informing all the participants about the nature and purpose of the study, informed consent was obtained. A total of 1210 participants were interviewed and examined, others were either on leave or on election duty. Participants were then interviewed using a predesigned, pre-structured questionnaire and examined. Height was measured by using a measuring tape. Weight was recorded using a standardised weighing machine. Body mass index was then calculated. Participants were seated quietly for at least 5 mins on chair, with feet on the floor, and arm supported at heart level. Two readings of blood pressure(BP) were taken 5 minutes apart using mercury sphygmomanometer on right arm in the sitting posture. All the instruments used for the study were calibrated before using them each time.

Results: The overall prevalence of hypertension among the police personnel was 32.5%. Among hypertensives the prevalence was highest among males (96.9%), 51-60 years of age (57.9%), graduates (69.4%), socioeconomic class I & II (60.5% & 60.1%), police constables (49.5%), 21-30 years of service (44.7%), shift duty(16.6%), alcoholics (76.3%), tobacco users (60.5%) and this was statistically significant($p<0.05$). Also, a positive association was found between body mass index(BMI) and hypertension ($p<0.05$).

Conclusion: Hypertension is more prevalent among police personnel in their fifth decade of life. This has been found to be influence by some of the modifiable and non-modifiable risk factors due to lifestyle changes and their profession. Therefore, it is necessary to create awareness about hypertension and its complications by health education programmes.

Keywords: Hypertension, police personnel, prevalence, risk factors.

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"Hypertension: Silent killer, global public health crisis"

- World Health Day Theme - 2013

Hypertension is a chronic condition which is a major public health challenge due to associated morbidity, mortality and financial burden on the society in both developing as well as developed countries.[1] According to World Health Organisation, hypertension accounts for one in every third deaths worldwide.[2]

Hypertension is responsible for 57% of all stroke deaths, 24% of all cardio-vascular deaths in East Asia.[3] The current definition of hypertension is a level of systolic blood pressure of 140 mmHg or above, or a level of diastolic blood pressure of 90 mmHg or above which is followed by Joint National Committee (JNC) and European Society of Hypertension (ESH). According to seventh JNC, detection, evaluation and treatment of hypertension (JNC VII and VIII) criteria, hypertension is classified as follows;

Sl. No.	Category	SBP in mmHg	DBP in mmHg
1	Normal blood pressure	<120	<80
2	Pre-hypertension	121-139	80-89
3	Stage 1 hypertension	140-159	90-99
4	Stage 2 hypertension	>160	>100

Hypertension has been linked to ischemic heart disease, peripheral vascular diseases, myocardial infarction, stroke and renal failure. There is a two fold higher risk of developing coronary artery disease (CAD) and four times higher risk of con-

gestive heart failure among hypertensives when compared to normotensives.[3] In India, prevalence of hypertension is approximately 13-37% in general population. Non communicable diseases (NCDs) are responsible for 53% of deaths and 44% of disability adjusted life years lost (DALY) in India.[4] World health report 2002, stated cardiovascular diseases (CVD) will be the largest cause of death and disability by 2020 in India.

The world Health Day theme for the year 2013 was hypertension which is 'a silent killer being the cause of global public health crisis'. "Healthy heart beat healthy blood pressure" was the slogan for the campaign. This highlighted an important priority area of public health concern all over the world.

In all countries, police personnel are backbone for maintaining law and order within their jurisdiction ensuring security and stability. Police work has been regarded as one of the stressful occupation, who have long duty hours, irregular diet, limited choice of food while on duty, exposure to violence, suffer from disrupted sleep patterns and high rates of addiction which are all the risk factors for hypertension.[4] Police personnel work twelve hours every day on an average and most often put in long hours at a stretch during VIP visits and festivals. The antisocial and influencing people are regularly trying to interfere in the routine work of police and bringing pressure on them, to obey their commands. They only get negative feedback in terms of how many murders, robberies, rapes, etc had taken in a day and they start the day with bad news unlike other jobs.

Currently police personnel have a high prevalence of hypertension, obesity, hyperlipidemia, metabolic syndrome, cigarette smoking and sedentary lifestyle conditions that contribute to a higher prevalence of cardiovascular disease.[2]

Considering the physical and psychological job stress related to law enforcement, hypertension poses a number of clinical and public health challenges.[6] Growing unemployment, increasing violence and rising expectations of the people have caused serious challenges for the police. Several studies done across India have shown prevalence of hypertension ranging from 16-42% among police personnel.[2-11]

Study conducted by Yadavannavar MC *et al* at Vijayapura, revealed that the prevalence of hypertension among doctors, teachers and bank employees was 23.52%, 26.11% & 28.35% respectively, and the overall prevalence was found to be 25.95%.[5]

Vijayapura is one of the district headquarters in North Karnataka which is undergoing rapid socioeconomic transition & lifestyle modifications. As data regarding NCDs among police personnel is very sparse, hence the present study intends to find the prevalence of hypertension and associated risk factors among police personnel of Vijayapura.

OBJECTIVES:

1. To study the prevalence of hypertension among police personnel of Vijayapura district.

2. To find out the socio-demographic and other risk factors influencing hypertension.

3. To create awareness about the disease, risk factors, complications and preventive measures among the respondents.

REVIEW OF LITERATURE:

HISTORY OF HYPERTENSION:

The vascular diseases and aetiopathogenesis came from ancient medical Indian text Sushruta Samhita. Ebers Papyrus, an Egyptian compilation of all medical texts dating back to 1550 B.C, has writings on blood pressure. This is one of the oldest known medical works. The father of Medicine, Hippocrates, and the great physician of Ancient Greek Medicine, Galen mentioned high blood pressure in their teachings. Stephen Hales, English man measured blood pressure in horses and other animals by direct intra arterial method during 1720 to 1730.[12]

In 1827, a British Clinician Richard Bright, brought to our attention the existence of hypertension in man which was linked to disease. In 1828, Pouiseuille a French medical student measured blood pressure in man by intra arterial method using U shaped mercury manometer. Then in 1854, Karl Von Vierordt created a device called 'Sphygmograph' for indirect measurement of blood pressure. He also constructed a 'hemotachometer' which is an apparatus used to monitor the velocity of blood flow. Following this Samuel Siegfried Von Basch developed the first non-invasive sphygmomanometer in 1881. In 1896, the first clinically acceptable sphygmomanometer was introduced by Scipione Riva Rocci.[13] In 1896 Sir Clifford Allbutt in his fundamental observation recognised the distinction between hypertension due to renal disease. Tigerstedt and Bergman in 1898 isolated a pressure substance from the renal cortex and named it 'renin'.[13]

Amber and Beaujard in 1904 studied hypertensive patients and observed that positive chloride balance was associated with a rise in blood pressure and vice versa. In 1905, Nicholai Korotkoff, a Russian surgeon, discovered auscultatory sounds in

relation to systolic and diastolic blood pressure called Korotkoff sounds while taking blood pressure using a non-invasive procedure. Also, in 1911, Eberhard Frank coined the term 'essential hypertension' so as to describe higher blood pressure for which no cause could be found. In 1928, physicians from Mayo clinic coined the term 'malignant hypertension' describing a syndrome of elevated blood pressure, severe retinopathy and inadequate renal function which resulted in death within a year as a result of stroke, cardiac failure or renal failure. Franklin D. Roosevelt was a predominant individual with severe hypertension.[14] Laragh in 1963 emphasised importance of classifying hypertension according to peripheral renin activity into low, normal and high renin group. In 1968 Sir. George Pickering advocated the concept that hypertension was only a quantitative deviation from the normal. De. Wanderer and Mcgregor in 1980 postulated a causal role for sodium in the genesis of hypertension, where higher concentration of sodium is present in the vascular tissue and blood cells of most hypertensives. In 1950's, there was development of potent drug treatment, beginning with ganglion blocking agent came into clinical use which was a revolution. The diagnosis of secondary hypertension made easy with advent of newer investigational modalities like CT scan in 1970's. Zither and Grunting in 1978 performed ballon angioplasty of renal artery successfully.[12] The changing concepts of hypertension have led the scientists to advocate programmes to control hypertension at the community level.

PROBLEM STATEMENT:

World-wide: Hypertension prevalence estimates rely on the cut-off point by which it is defined. The literature available around the world needs to be handled with utmost caution as standardisation may not have been exercised with regard to definition of hypertension, measurement methods used, observers, and age structures of

populations. The lower the threshold value, the higher the prevalence estimated would be.[15]

According to WHO, in Africa the prevalence of raised blood pressure was highest, where it was 46% for both sexes combined and was lowest in the WHO region of Americas at 35% for both sexes. In the countries of income group, the prevalence of raised blood pressure was consistently high with low, lower middle and upper middle countries where all having rates of around 40%. The prevalence in high income countries was lower at 35%.[16]

In the United States, hypertension affects approximately 50 million individuals and approximately 1 billion worldwide. As the population ages, if broad and effective preventive measures are not implemented the prevalence of hypertension will increase. The data from the Framingham Heart Study suggest that individuals with 90% lifetime risk for developing hypertension who are normotensives at age of 55.[17]

Indian Situation :

In our country, prevalence of hypertension has been estimated to be between 20% to 40% in urban adults and 12% to 17% (even upto 20%) in rural adults. The estimated number of Indians with hypertension was 120 million in year 2000, which is likely to expand to 200 million by 2025, with equal numbers among men and women.[6,10]

CLASSIFICATION OF HYPERTENSION:

Occupational blood pressure guidelines for firefighters and police officers given by Massachusetts Human Resources Division[11], 1998 is as follows,

Sl. No.	Category	SBP (in mmHg)	BDP (in mmHg)
1	Acceptable blood pressure	<160	<100
2	Uncontrolled hypertension	≥160	≥100

California Peace Officer Standards and Training[11] (2004), given blood pressure guidelines for police officers, which is as follows,

Sl. No.	Category	SBP (in mmHg)	BDP (in mmHg)
1	"Group I" Normal	<160	<90
2	"Group II" mild hypertension	>160	90 - 104
3	"Group III" moderate hypertension	>160	105 - 114
4	"Group IV" severe hypertension	>160	>115

Williams B et al (2010) classified hypertension based on etiology[18];

Primary (Essential) hypertension	**Secondary hypertension**
- Sympathetic nervous system hyperactivity	- Renal disease
- Abnormal cardiovascular development	- Genetic causes
- Renin-angiotensin system activity	- Renal vascular hypertension
- Defect in natriuresis	- Primary hyperaldosteronism
- Intracellular sodium and calcium	- Cushing's syndrome
- Exacerbating factors	- Pheochromocytoma
	- Pregnancy induced hypertension
	- Estrogen use and Others

European Society of Hypertension and European Society of Cardiology (2013) classified hypertension as[19];

Sl. No.	Category	SBP (in mmHg)	BDP (in mmHg)
1	Optimal	<120	<80
2	Normal	120-129	80-84
3	High normal	130-139	85-89
4	Grade 1 hypertension	140-159	90-99
5	Grade 2 hypertension	160-179	100-109
6	Grade 3 hypertension	≥180	≥110
7	Isolated systolic hypertension	≥480	<90

The seventh report of the JNC on prevention, detection, evaluation and treatment of hypertension proposed for police officers is as follows[11],

Blood pressure	**Fitness determination**	**Recommended intervention(s)**	**Occupational follow-up**
Normal	Unrestricted duty	• Population-based wellness programs	• 12-24 months based on overall CVD risk factor profile.
Pre-hypertension	Unrestricted duty	• Population-based wellness programs	• 6-12 months based on overall CVD risk factor profile.
Stage 1 hypertension	Time-limited clearance for duty	• Population-based wellness programs • Individual education • Hypertension treatment and evaluation	• Time-limited clearance(6-12 months) based on overall CVD risk factor profile • Expect controlled blood pressure at follow-up • If blood pressure control improves, revert to annual follow-up.
Stage 2 hypertension	Restricted to modified duty (excluding physical exertion related duties) until blood pressure reaches stage 1 or lower	• Population-based wellness programs • Individual education • Clinical management of Hypertension	• Time-limited clearance after adequate blood pressure control • Time-limited clearance(6-12 months) based on overall CVD risk factor profile • Expect controlled blood pressure at follow-up • If blood pressure control improves, revert to annual follow-up.

PREVALENCE OF HYPERTENSION IN THE WORLD-

Various studies from abroad have shown the prevalence of hypertension as,

AUTHORS	PLACE	YEAR	SAMPLE SIZE	PREVALENCE (%)
Gu JK *et al*[20]	United States	**2018**	242	**31.8**
Gibson R *et al*[21]	Britain	**2017**	5527	**Men- 68.7** **Women- 33.5**
Schiozaki M *et al*[22]	Japan	**2017**	1081	**36.8**
Tariku T *et al*[23]	Ethiopia	**2017**	584	**17.8**
Janczura M *et al*[24]	Poland	**2015**	235	**44.2**
Garbarino S*et al*[25]	Italy	**2015**	234	**40.6**
Chang JH *et al*[26]	Taiwan	**2015**	824	**32.9**
Filho RTB *et al*[27]	Brazil	**2014**	452	**55.6**
Violanti JM *et al*[28]	Newyork	**2013**	412	**26.2**
Vin Molea *et al*[29]	Finland	**2011**	613	**27.3**
Ramey SL *et al*[30]	Iowa	**2011**	335	**24**
Yoo H *et al*[31]	United States	**2011**	65	**9.2**
Ramey SL *et al*[32]	Milwaukee	**2009**	165	**51.5**
Violanti JM *et al*[33]	United States	**2009**	98	**15.3**
Kanam RN *et al*[34]	Indonesia	**2008**	190	**47.6**
Ramey SL *et al*[35]	Iowa	**2008**	672	**27.4**
Aisha HA *et al*[2]	Sudan	**2008**	426	**27**

PREVALENCE OF HYPERTENSION IN INDIA-

Several Studies done across India have shown prevalence of hypertension as,

AUTHORS	PLACE	YEAR	SAMPLE SIZE	PREVALENCE (%)
Rathi K *et al*[36]	New Delhi	**2018**	85	**63.6**
Kumar N *et al*[37]	Darbhanga	**2017**	199	**21.0**
Lokapur VR *et al*[38]	Maharashtra	**2017**	98	**40.2**
Almale BD *et al*[7]	Mumbai	**2015**	276	**42.4**
Sen A *et al*[3]	Kolkata	**2015**	916	**32.5**
Mallik D *et al*[6]	West Bengal	**2014**	1817	**41.9**
Ganesh KS *et al*[39]	Puducherry	**2014**	296	**34.5**
Ramakrishnan *et al*[4]	Puducherry	**2013**	256	**30.5**
Thayyil J *et al*[40]	Calicut	**2012**	900	**37.7**
Tambe NN *et al*[10]	Navi Mumbai	**2012**	443	**20.0**
Satapathy *et al*[41]	Berhampur	**2009**	48	**25.0**
Tharkar S *et al*[42]	Chennai	**2008**	318	**58.5**
Mesharam FA *et al*[43]	Nagpur	**2005**	520	**22.5**

PREVALENCE OF HYPERTENSION IN KARNATAKA-

The prevalence of hypertension from studies done in Karnataka as,

AUTHORS	PLACE	YEAR	SAMPLE SIZE	PREVALENCE(%)
George CE *et al*[44]	Bengaluru	**2017**	60	**8.3**
Kavya CN *et al*[45]	Hassan	**2016**	50	**72.0**
Parsekar *et al*[46]	Udupi	**2015**	76	**10.5**

PREVALENCE OF HYPERTENSION IN OCCUPATIONAL GROUPS-

The prevalence of hypertension in some occupational groups are as follows,

AUTHORS	PLACE	YEAR	SAMPLE SIZE	PREVALENCE(%)
Dubey M *et al*[47]	Bhopal	**2018**	Employees of BSNL and LIC.	**53.3**
Shakeel S *et al*[48]	Jammu Kashmir	**2017**	Teachers	**31**
Girish B *et al*[49]	Tumkur	**2017**	Teachers	**28.5**
Manjula D *et al*[50]	Bengaluru	**2016**	Teachers	**24**
Nagammanavar R *et al*[51]	Bellary	**2015**	Bank employees	**48**
Ghosh A *et al*[52]	West Bengal	**2015**	Doctors	**14.8**
Yadavannavar MC *et al*[5]	Vijayapura	**2011**	Doctors	**23.5**
			Teachers	**26.1**
			Bank employees	**28.3**

EPIDEMIOLOGY OF HYPERTENSION:

Hypertension is a worldwide health problem and is a major public health problem in many developed as well as developing countries.

1. AGE: Almost all studies have demonstrated a positive association between age and blood pressure.[53] SBP increases consistently till almost in the seventh or eighth decade, while DBP increases till fifth decade, which becomes stationary later, leading to an increase of pulse pressure and increased incidence of systolic hypertension in the elderly. However, the age related rise in blood pressure is not an inevitable phenomenon of nature since the blood pressure does not increase with age, in some isolated populations with very low habitual salt intake, indicating that with controlled salt intake and active lifestyle, the rise of blood pressure can be checked, despite ageing.[54]

Aisha HA *et al* (2008), in his study among police forces showed that prevalence of hypertension was significantly higher in older individuals (>50 years of age).[2]

Also a study by **George CE *et al* (2017),** showed that greater age (> 50 years) and presence of hypertension was significantly associated with high CVD risk. Age and systolic blood pressure showed a significant positive correlation with CVD risk.[44]

2. **GENDER:** In childhood there is no difference between sexes but from adolescence onwards, the average BP is higher in males. However, this difference narrows down when women attain the age of 50 years, and then after, it may even get reversed.[53]

Mallik D *et al* (2014), conducted study to assess the prevalence of hypertension, prehypertension, normotension among police personnel in Bankura, West Ben-

gal, India which showed positive association with hypertension/ pre-hypertension with the male gender.[6]

3. HEREDITY: Family history of increased blood pressure is a strong risk factor for future development of hypertension in individuals. Sex dependent genetic effects in hypertension have also been noted by many.[54]

4. GENETIC FACTORS : The genetic basis of high blood pressure has been well supported by experimental research, and while some monogenic hypertensive disorders in humans have been described (eg. ACE-II and angiotensinogen gene polymorphism), for the most part, hypertension is currently regarded to be a "polygenic" condition.[54]

5. ETHNICITY: According to several population based studies, Black races have higher risk of hypertension; whether this is due to socio-cultural differences between Black and White races or due to racial factors is not clear. More recent research indicates that South Asian populations including Indians, may be more predisposed to developing hypertension and metabolic syndrome.[54]

6. DIET: The role of saturated fats, dietary cholesterol, fibre (protective), antioxidant vitamins (protective), dietary calcium (increased intakes are protective) have been postulated, still there is no convincing evidence. However, keeping in view the fact that these nutrients have been shown to have a roleiin Ischemic heart disease and diabetes, it would be desirable to adhere to the healthy lifestyle recommendations, in totality. Several epidemiological studies and clinical trials have showed that dietary intake of sodium is directly related to blood pressure, while dietary calcium intake was inversely associated with blood pressure.[54]

Gibson R *et al* (2017), conducted a cross-sectional investigation on the occupational and socio-demographic characteristics of British police force employees, who were reporting a dietary pattern associated with cardiometabolic risk, revealed that employees recording a poor diet quality had greater odds (odds ratio in men 1.50; 95% CI 1.12–2.00, odds ratio in women 1.84; 95% CI 1.19–2.97) of increased cardiometabolic risk which is independent of established demographic, life-style and occupational risk factors when compared to the healthiest diet group.[21]

7. ALCOHOL INTAKE: In different epidemiological studies, alcohol consumption has been consistently related to blood pressure. The risk effects are independent of obesity, central obesity, physical inactivity, age, sex and smoking. The RR(relative risk) of alcohol for causing hypertension has been estimated to be 1.4 to as high as 4.1, depending on the quantity and regularity of alcohol consumption (WHO global estimates). When 2 or more drinks are consumed daily, 1 mm increase in SBP and 0.5 mm increase in DBP on an average; daily drinkers have SBP and DBP levels which are higher by 6.6 mm and 4.7 mm respectively, compared to those who drink only once a week.[55,56]

A Study done by **Dubey M *et al* (2018),** found positive association between hypertension and alcohol intake, cigarette smoking, adding extra salt to food.[47]

Ramakrishnan J *et al* (2013), conducted a study on cardiovascular risk factors among policemen in Puducherry which showed high prevalence of alcohol and smoking habits which was 45.7% and 23% respectively.[4]

8. USE OF TOBACCO: Tobacco use and hypertension, when present together, interact and greatly increase the cardiovascular risk compared to when either of them would have been alone. The direct risk of tobacco in causing high blood pressure is

not very clear (some smokers may in fact have lower BP levels, since the habit of chronic tobacco use may induce decrease in appetite with decrease in body weight and thus in turn slight lowering of BP). However, the WHO global risk estimates indicate that the RR of hypertension due to tobacco use is 1.17 times higher.[54]

Singh A *et al* (2016), conducted a study to assess the frequency of adverse addictive habits and its association with the frequency of oral mucosal lesions and periodontal diseases among police personnel of Bhopal City, Central India which showed that high usage of tobacco (55%) leads to detrimental effect on oral health.[57]

9. PHYSICAL ACTIVITY: Physical inactivity is an important risk factor for hypertension which has been convincingly demonstrated by epidemiological and clinical data. In sedentary and unfit normotensive individuals there is 20% to 50% increased risk of developing hypertension in the next few years as compared to their fit and more active peers[58]. WHO estimates indicate that the relative risk for developing hypertension due to physical inactivity is between 1.2 to 2.9, in different research studies.[54]

Ahmed AO *et al* (2018), conducted a study on effect of confinement training of police force on some cardiopulmonary and haematological parameters in Sudan which revealed that improvement in the pulmonary and cardiovascular reserve function by decreasing blood pressure and weight, following training among police force.[59]

10. OBESITY: There is strong and consistent evidence that overweight / obesity is associated with hypertension, with the relative risk being 2 to as much as 6 times. The proportion of hypertension attributable to obesity has been estimated to be 30% to 65% in western countries. It is also estimated that for 10kg increase in weight, the

SBP would increases by 2 to 3 mm and DBP by 1 to 3 mm.[60] Besides obesity, central obesity due to excessive intra- abdominal (visceral) fat, as measured by waist circumference or waist-hip ratio has been clearly shown to be a risk factor for hypertension, independent of whether generalized obesity is present or not. Hypertension and obesity/ central obesity, in addition, are factors which cluster together in metabolic syndrome.[54]

Alghamdi AS *et al* (2017), observed that overweight and obese individuals with high levels of biochemical indicators were susceptible to heart disease and diabetes, where 66.9% were overweight or obese and the average body mass index was 27.5 ± 5.1.[61]

Silva FCD *et al* (2014), conducted a systematic review of the anthropometric indicators of obesity which showed that most of the policemen were overweight (BMI: 25.2–29.3kg/m^2), obese (body fat $\geq$ 25%), abdominal perimeters (18.9–90.5 cm) and increased waist (90.4–102 cm) had a higher risk of chronic disease, which is associated with depression and stress development.[62]

11. SALT INTAKE: There is substantial and convincing evidence that salt intake over and above the physiological requirements, is a strong risk factor for hypertension. It has been estimated that a 100 mmol per day lower intake of sodium over the lifetime would result in 9 mm smaller rise in SBP between 25 to 55 years of age; this would translate to a reduction in mortality by 16% in ischemic heart disease, 23% for stroke and 13% deaths from all causes. Well established public health recommendations indicate that dietary salt consumption, from all sources should not exceed 5 to 6 grams a day for an adult.[63,64]

12. ENVIRONMENTAL FACTORS: Exposure to noise, air pollution and water pollution have all been implicated as a risk factor for hypertension, but no epidemiological evidence is still available. Protection of public against environmental hazards is, in any case, a worthwhile public health measure.[54]

13. SOCIOECONOMIC STATUS: In a number of populations in developed countries, it has been observed that higher levels of BP and higher prevalence of hypertension noted in lower socio-economic groups. Contrarily, in those countries whose economies are improving, higher prevalence is seen in higher socio-economic groups. Thus, in developing countries, the higher prevalence in higher socioeconomic strata probably representing the initial stages of the epidemic of cardiovascular diseases; as the epidemic advances in these countries, there is likely to be a reversal of the social groups affected.[54]

14. PSYCHOLOGICAL FACTORS: There is evidence that acute mental stress can cause an increase in blood pressure. However, there is no evidence to prove that long term stress causes chronic increase in blood pressure. Overall, the available evidence is insufficient to allow for definite conclusions of causality; methodologically sound research is required in this area. Nonetheless, stress management techniques would be of help in controlling acute stress.[54]

In a study done by **Arnetz BB *et al* (2013)**, among urban police officers in Sweden it was observed that stress prevention training program for work-related stress found to have good psychological and physical health improving the general health and also demonstrated lower levels of stomach problems, exhaustion and sleep difficulties.[65]

Collins PA *et al* (2003), conducted a study to detect origin and severity of stress in police officers in United Kingdom. It was found that 41% of population had high levels of stress and the reason being organizational issues like work demand impinging upon home life, lack of control over workload, lack of consultation and communication, inadequate support and excess workload.[66]

Kara HB *et al* (2015). did a comparison study between US and Turkish police force, which revealed that stress is more in a developing country when compared to developed country due to geographical condition causing international policing problems like drug and gun smuggling, human trafficking and terrorist activities.[67]

Yoo H *et al* (2011), conducted a study on stress and cardiovascular disease risk factors in female law enforcement officers in Iowa city revealed that female law enforcement officers had more stress, more job-related stress (job strain, vital exhaustion and effort–reward imbalance, $p< 0.01$ for all), when compared to male officers.[31]

Schiozaki M *et al* (2017), conducted a study on police officers in Japan, on job stress and behavioural characteristics in relation to coronary heart disease risk, revealed that coronary-prone behaviour may contribute to the higher prevalence of coronary heart disease risk factors thus leading the long working hours and the work-related unfavourable lifestyles like alcohol drinking and physical inactivity and finally leading to stress.[22]

Anshel MH *et al* (2013), conducted an exploratory study to determine the effectiveness of a coping and wellness program on changes in perceived stress, job satisfaction, and physical energy among emergency dispatchers (EDs) in the southeastern U.S. Participants were given 2-hour seminar on coping skills and received strength training for 10-week period. The results showed significant greater use of

avoidance of coping strategies and marked improvement of perceived physical energy.[68]

Janczura M *et al* (2015), conducted a study in Poland to know the relationship of metabolic syndrome with stress, coronary heart disease and pulmonary function in police officers which showed that exposure to job-specific stress among police officers increased the prevalence of metabolic syndrome and coronary heart disease.[24]

Varvarigou V *et al* (2014), conducted study in United States which showed that stressful duties were associated with large increase in the risk of sudden cardiac death compared with routine, non-emergency duties.[69]

Ragesh G *et al* (2017), conducted study on occupational stress among police personnel in India, which showed 68% of moderate level and 14% of high level organisational stress and operational stress scores were in the moderate range among police personnel 67% and 16.5% of them were in high range. The younger age group (21-35 years) and lower level rank police personnel had higher stress. Also showed that stress was higher among female police personnel compared to males.[70]

MATERIALS AND METHODS

STUDY AREA: The present study was conducted in all the 24 police stations of Vijayapura district.

STUDY POPULATION: All the Civil Police Personnel of Vijayapura district.

STUDY DESIGN: Cross-sectional Study.

STUDY TECHNIQUE : Interview technique accompanied by anthropometric measurements and blood pressure measurement.

STUDY PERIOD: June 2017 – May 2018.

SAMPLE SIZE: With average prevalence of hypertension among police personnel i.e 25% (ranges from 16-42%)[2-11] at 95% confidence level and 10% relative error, calculated sample size was 1152, by using the statistical formulae,

$$n = \frac{Z^2 p(100 - p)}{e^2}$$

where,

Z = level of significance i.e, 95%

p = prevalence rate (from previous studies)

e = relative error i.e 10% of prevalence.

5% drop out rate = 57, Therefore n = 1152+57 = 1209.

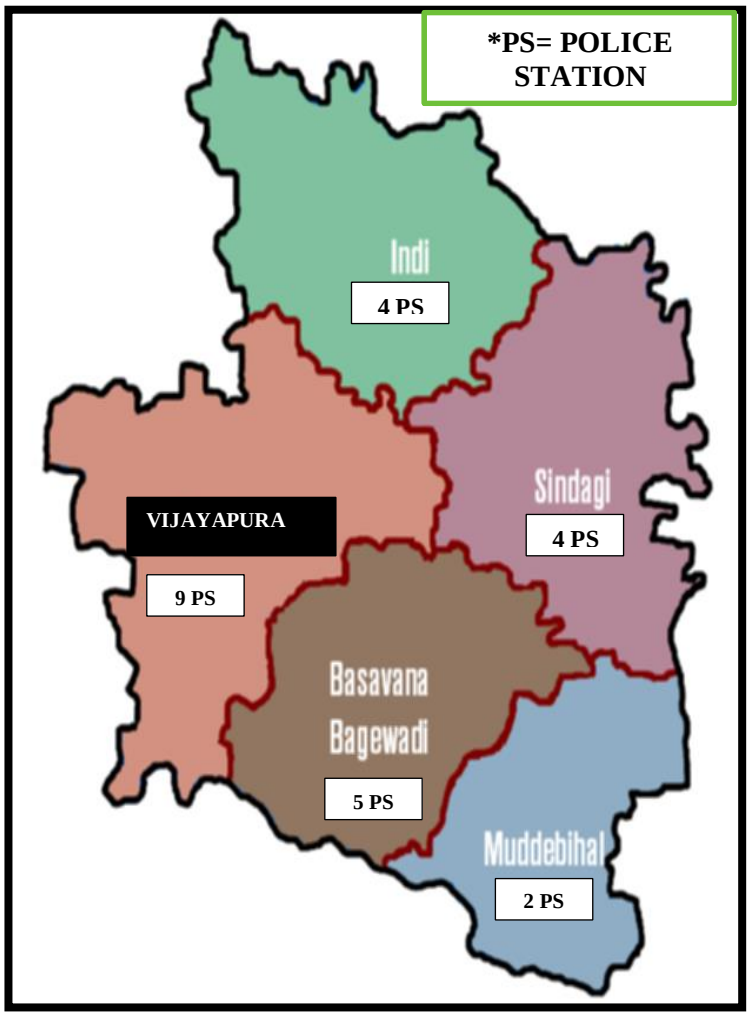
There were 1308 police personnel working in Vijayapura district, calculated sample size was 1209, so all the 1308 police personnel were included in the study. At the rime of data collection, 98 were either not willing to participate in study,were on long

leave or were having chronic diseases. So data of 1210 police personnels was collected.

METHODOLOGY:

After obtaining ethical clearance from the Institutional Ethical Committee of Shri. B. M. Patil Medical College, Hospital & Research Centre, Vijayapura and permission from the Superintendent of Police, Vijayapura, the study was carried out in all 24 police stations of Vijayapura district.

MAP OF VIJAYAPURA DISTRICT WITH POLICE STATIONS:



COLLECTION OF DATA:

After informing all the participants about the nature and purpose of the study, informed consent was obtained. Participants were then interviewed using a prede-signed, pre-tested, semi-structured questionnaire and examined. Prior appointment was taken from head of each police station and informed about the schedule of sur-vey and also sometimes routine roll-call timing was selected for interviewing and ex-amining in each police station as many participants were present during this time. There are 5 talukas in Vijayapura district. A total of 1210 participants were inter-viewed and examined, in which 569 were from Vijayapura taluk (9 stations), 221 from Basavana Bagewadi taluk (5 stations), 165 from Sindagi taluk (4 stations), 163 from Indi taluk (4 stations) and 92 from Muddebihal taluk (2 stations).

INCLUSION CRITERIA:

1. Police personnel willing to participate in the study.

EXCLUSION CRITERIA:

1. Those who were not willing to participate in the study.

2. Persons with known chronic illness like hypertension associated with renal paren-chymal diseases, polycystic kidney diseases, pheochromocytoma, Cushing's syn-drome, hypothyroidism, hyperparathyroidism individuals on steroids and pregnant women were excluded from the study.

STUDY VARIABLES:

- **Age:** Age was recorded in completed years as on the date of interview, re-vealed by the subjects.

❖ **Gender:** Male/ Female

❖ **Education**[71]**:**

- High school: Studied from 8th standard to 10th std (SSLC).
- PUC/Diploma : Studied up to 12th std (PUC) or any diploma.
- Graduation: Studied up to graduation.
- Postgraduate: Studied up to post graduation and above.

❖ **Type of family**[71]**:**

- Nuclear family: It consists of a married couple and their children while they are still regarded as dependents.
- Joint family: It consists of number of married couple and their children who live together in the same household. All men are related by blood and women of household are their wives, unmarried sisters and their family kinsmen.
- Three Generation family: It is a family where representatives of three generation are living together. Young married couple continue to stay with their parents and have their own children as well.

❖ **Designation**[4]**:**

- Circle Inspector of Police (CPI)- is a head of 2-3 police station who will supervise smooth functioning.
- Police Sub-Inspector (PSI) and Woman Police Sub-Inspector (WPSI)- is a head of 1 police station who will supervise the work of ASI, CHC

and CPC. He/ She supervise smooth functioning by maintaining law and order.

- Assistant Police Sub-Inspector (ASI) and Woman Assistant Police Sub-Inspector (WASI)- He/ She is below to the rank of PSI, who will supervise the work of head constable and police constable by giving proper directions and instructions. He/ She can be incharge of police station in the absence of PSI.

- Civil Head Constable (CHC) and Woman Civil Head Constable (WHC)- He/ She will have the works like case registration and also direct constables for maintaining law and order. And they have to obey all legal instructions given by superior officers.

- Civil Police Constable (CPC) and Woman Civil Police Constable (WPC)- He/ She will have legal works like Sentry, escort duty, hospital duty, etc and have to obey the instructions given by superior officers.

❖ **Work place and total service:** The place of work and total service (urban and rural) was recorded as revealed by the subjects.

❖ **Nature of work:** As revealed by subjects on the date of interview.

- Combined and field work- The work mainly in a group by police personnel like arresting the prisoners, investigation of case, bandobast duties to maintain law and order, pre and post crime bandobast duties.

- Table and Computer work- Sentry, security, record maintaining, maintaining registers, filing FIR, writing panchanamas and maintaining digitalised records in computer.

- Driving- Driving duty during escorting the superior officers, visiting to the crime place, etc.
- Intelligence- Collecting the advanced information about crime, communal tension, etc which is required for smooth functioning of law.
- Crime- Duty only related to the crimes like dacoit, robbery, murder, quarrels, etc.

❖ **Duty hours and shift duty:** Number of duty hours per day and shift duty of day, afternoon, night and how frequently they have change in the shift duty was recorded.

❖ **Socio-Economic status[72,73]:**

- Self- reported per capita monthly income was recorded. Modified BG Prasad's classification was used to assess the social class of the study subjects.
- Correction factor = $\frac{\text{Current Index value}}{\text{Base Index value (100)}}$

  = 274 /100 =2.74
- Multiplication factor (MF) = Correction factor X 4.63 X 4.93

  = 2.74 X 4.63 X 4.93 = 62.54
- This MF obtained is multiplied with the income limits of B G Prasad's classification 1961. Socio-economic classes obtained were as follows:

Socio-economic class	B.G.Prasad classification(1961)	Modified B. G. Prasad classification(Jan 2017)
Upper (I)	Rs 100 & above X Multiplication factor	6254 & above
Upper middle (II)	Rs 50-99 X Multiplication factor	3127-6253
Lower middle (III)	Rs 30-49 X Multiplication factor	1876-3126
Upper lower (IV)	Rs 15-29 X Multiplication factor	938-1875
Lower (V)	Rs <15 X Multiplication factor	Below 938

❖ **Habits:**

- Alcohol consumption: Yes/No
  - Yes: Subjects who at the time of the data collection gave history of consumption of any alcoholic beverage daily or occasionally for the past one year.
  - No: Person who at the time of the data collection did not consume any alcoholic beverage for the past one year.
  - Duration of consumption and form of alcohol used.
- Tobacco consumption: Yes/No

- Yes: Subjects who at the time of the data collection gave history of smoking/ tobacco use in any form either daily or occasionally for the past one year. (Smoke form – cigarettes, beedis, etc. Smokeless form – plug, loose leaf, pellets, snuff, tambak, gutka, etc)

- No: Person who at the time of the data collection does not use tobacco in any form either daily or occasionally for the past one year.

- Duration of consumption and form of tobacco used.

❖ **Physical exercise:** Present/ Absent

- Regular recreational physical activity other than occupational, carried out for greater than 30 min on at least 5 days a week is called 'Regular physical exercise' excluding the daily/ weekly parade by the subjects.[3]

- The subjects were categorized whether they were exercising regularly in the form of walking, running, swimming, cycling, etc.

❖ **Dietary habits:** Consumption of vegetarian or mixed diet (veg + non-veg).

❖ **Extra salt intake:** Yes/No

- Regular use of items containing high salt in their daily diet (Eg: pickle, papad, cheese, sauce, groundnut chutney, etc) and adding extra table salt to their meals on dining table.

❖ **Extra fat intake:** Yes/No

- Regular use of items with high fat content in their daily diet (Eg: oil, butter, cheese, vanaspati, ghee, etc) and adding extra ghee, oil or butter to their meals on dining table.

❖ **Professional Life Stress Scale[74]:**

Presence of stress was measured using the professional life stress scale questionnaire. In this scale, there are 24 questions, the scale was translated into Kannada language. Instructions were given to police personnels before filling questionnaire. Stress was classified into categories based on scores as, stress is not a problem in your life(0-15), moderate range of stress(16-30), stress is clearly a problem(31-45) and stress is a major problem(45-60).

The questionnaires were mainly regarding common features of life pertaining to health and work, like unsettled conflicts with colleagues, work overload, lack of family time, hindrance or help by superiors in work, lack of organization in work, professionally fulfilling expectations, achieved rewards in terms of status and promotions for their ability and commitment in the work, achieved major objectives of their life, whether they discuss/share their problems with colleagues, family, interest in watching sports, bored at work and so on.

Measurement of height[75]:

Height measurement was taken in erect standing position using calibrated measuring tape marked in centimeters. A flat, smooth wall with no skirting at the bottom, as close to a reference vertical line as possible, like the corner of a wall was chosen for measurement. Subjects were explained regarding the procedure and assent was confirmed. Subjects were made to remove their footwear and stand with heels touching each other and toes apart and head positioned so that the line of vision was perpendicular to the body (Frankfurt line) against the wall. The arms were hung freely by the sides, with the head, back, buttock and heels in contact with the wall. A wooden

scale was brought down to the topmost point on the head and marking was made on the wall. Height was recorded to nearest 0.5 cm.

Measurement of weight[75]:

The weight was measured in kilograms (kg) using standardized bathroom weighing machine with the study subject standing erect on centre of platform, with the body weight evenly distributed between both the feet together and toes apart bare-feet with accepted clothing and looking straight ahead with the arms held loosely by the side. The weight was recorded to nearest 0.5 kg. The instrument was calibrated before using it each time.

Body Mass Index (BMI)[75]:

In this study, BMI classification proposed by the WHO Western Pacific Regional Office in collaboration with IOTF (International Obesity Task Force) steering committee (2000) for Asian people was used. It is also called as Quetlet Index and was used to assess obesity and is computed by, BMI=Weight (in kg) / Height (in metre)^2.It is classified as BMI <18.5 (Underweight), 18.5-22.9 (Normal), 23.0-24.9(At risk obesity), 25.0-29.9 (Obese I) and > 30 (Obese II).

Blood Pressure measurement[76]:

Blood pressure was recorded using a mercury sphygmomanometer following auscultatory method. Participant was informed to relax for at least 5 minutes in a chair (rather than on an exam table), with feet on the floor, and arm supported at heart level and caffeine, exercise and smoking were avoided for at least 30 minutes prior to measurement. Measurement of BP in the standing position was indicated for those at risk for postural hypotension and in those who reported symptoms consistent with reduced BP upon standing. An appropriately sized cuff (cuff bladder encircling at least 80% of the arm) was used to ensure accuracy. For manual determinations, palpated

radial pulse obliteration pressure was used to estimate SBP—the cuff was then inflated to 20–30 mmHg above this level for the auscultatory determinations. The cuff deflation rate for auscultatory readings was 2 mmHg per second. SBP is the point at which the first of two or more Korotkoff sounds is heard (onset of phase 1), and DBP is the point at which there is disappearance of Korotkoff sound (onset of phase 5). Two measurements were taken and the average was recorded and considered for analysis.

Diagnostic criteria was based on JNC VII & VIII guidelines, Systolic blood pressure ≥ 140mmHg and/or Diastolic blood pressure ≥ 90mmHg.The instrument was calibrated before using it each time.

Education regarding Disease:

Education about disease, its risk factors, complications and preventive measures among the respondents was given during the interview, so as to create awareness among them regarding its occurrence, complications and preventive measures like dietary changes, importance of exercise and avoiding stress, regular blood pressure check up and treatment.

Statistical Analysis:

The data was presented in the form of tables and graphs. All characters were summarised descriptively. For categorical data, the number and percentage were used in the data summaries, Chi-square(X^2) test was applied to know the association between the categorical variable and for continuous variables, the summary statistics of mean, standard deviation (SD) were used. Comparison of continuous variables using ANOVA/ Kruskal Wallis Test. The data was compiled in Microsoft Excel work sheet and analysed using Statistical Package for Social Sciences (SPSS) v.17.0 software.

RESULTS

Table 1: Socio-Demographic characteristics of police personnel (N = 1210)

Characteristics		N	%
Age	less than 30	204	16.9
	31-40	582	**48.1**
	41-50	195	16.1
	51-60	229	18.9
Gender	Male	1104	**91.2**
	Female	106	8.8
Religion	Hindu	1095	**90.5**
	Muslim	111	9.2
	Others	4	0.3
Marital Status	Married	1098	**90.7**
	Unmarried	112	9.3
Education	SSLC	129	10.7
	PUC	273	22.6
	Graduate	801	**66.2**
	Postgraduate	7	0.6
Type of family	Nuclear	495	40.9
	Joint	681	**56.3**
	Others	34	2.8
Socioeconomic status	Class I	519	42.9
	Class II	678	**56.0**
	Class III	8	0.7
	Class IV	5	0.4

Table 1 depicts the sociodemographic characteristics.

48.1% of the police personnel belonged to 31-40 year age group and 91.2% were males. 90.5% were Hindus, 90.7% were married, 66.2% of police personnel had graduation level of education, 56.3% belong to joint family and majority (56%) belonged to Class II SES.

Figure 1: Distribution of subjects according to gender

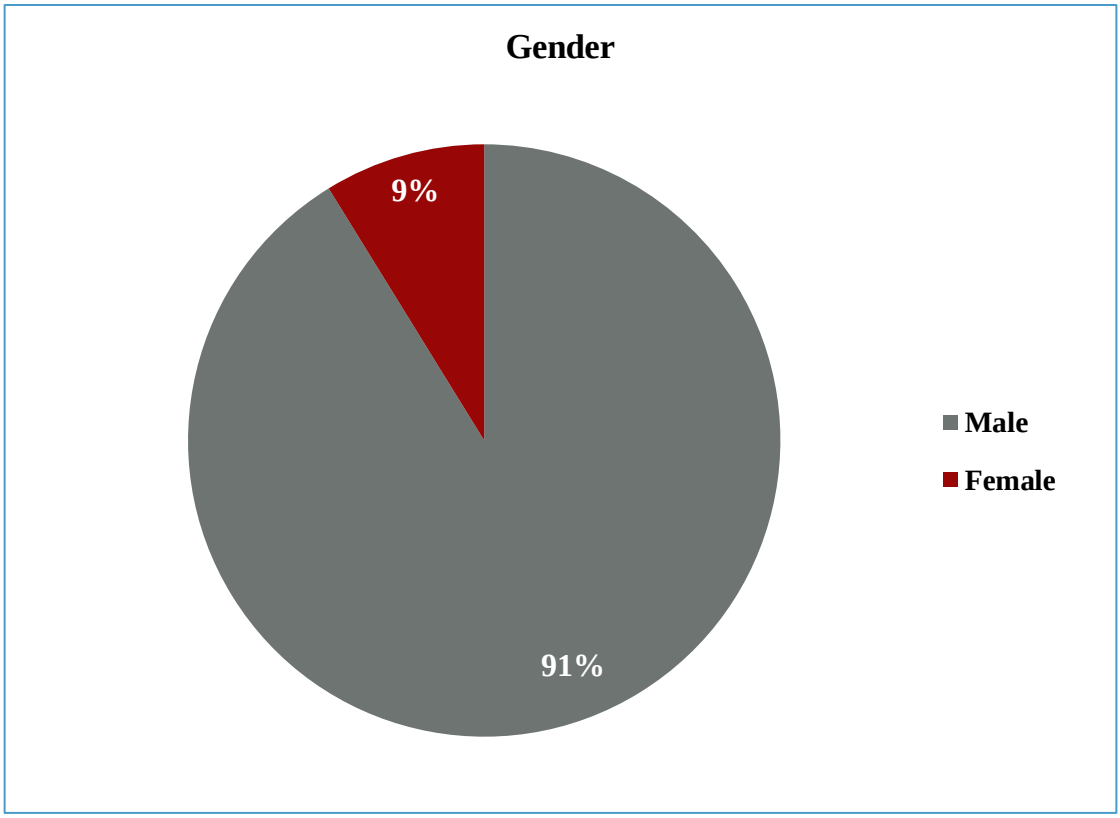


Figure 2 – Among the study subjects, 91% were males and 9% were females

Table 2: Distribution of participants according to blood pressure category

Blood Pressure Categories	N	%
Normal	225	18.6
Pre-hypertension	591	48.8
Hypertension stage 1	355	29.3
Hypertension stage 2	39	3.2
Total	1210	100

Figure 2: Distribution of participants according to blood pressure category

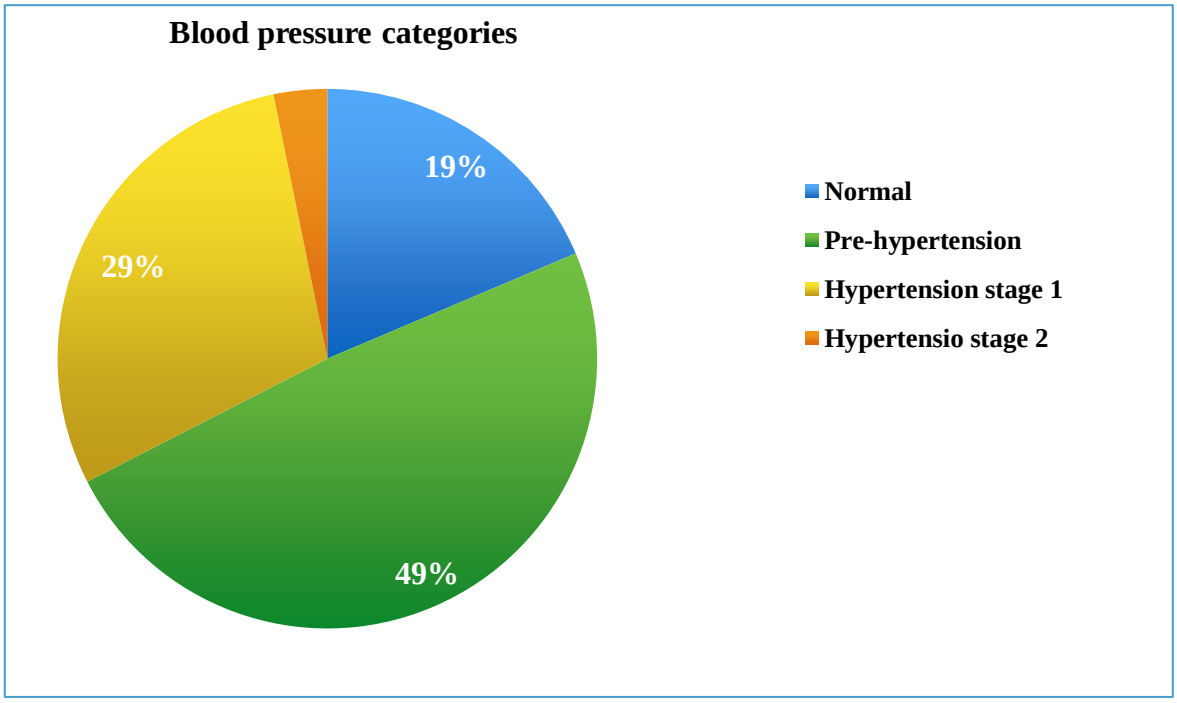


Table 2 and figure 2 - Among hypertensives, 7.8% were known cases of hypertension while 92.2% were newly diagnosed with hypertension. This was statistically significant.

Table 3: Distribution of blood pressure categories according to sociodemographic and occupational characteristics of police personnel.

Sociodemographic and Occupational Characteristics		Normal	Pre-hypertension	Hypertension stage 1	Hypertension stage 2	Total	p value
		N (%)	N (%)	N (%)	N (%)	N (%)	
Age	**<= 30**	42 (18.7)	94 (15.9)	68 (19.1)	0 (0)	204 (16.9)	**<0.001***
	31-40	117 (52.0)	334 (56.5)	**123 (34.6)**	8 (21.1)	582 (48.1)	
	41-50	28 (10.4)	100 (16.9)	59 (16.6)	8 (21.1)	195 (16.1)	
	51-60	38 (16.9)	63 (10.7)	106 (29.8)	**22 (57.9)**	229 (18.9)	
Gender	**Male**	176 (78.2)	545 (92.2)	**345 (96.9)**	**38 (100)**	1104 (91.2)	**<0.001***
	Female	49 (21.8)	46 (7.8)	11 (3.1)	0 (0)	106 (8.8)	
Education	**SSLC**	27 (12.0)	58 (9.8)	27 (7.6)	17 (44.7)	129 (10.7)	**<0.001***
	PUC	52 (23.1)	132 (22.3)	82 (23.0)	7 (18.4)	273 (22.6)	
	Graduation	146 (64.9)	397 (67.2)	**247 (69.4)**	11 (28.9)	**801 (66.2)**	
	Post-graduation	0 (0)	4 (0.7)	0 (0)	3 (7.9)	7 (0.6)	
Designation	**CPI**	0 (0)	4 (0.7)	2(0.6)	0 (0)	6(0.5)	**<0.001***
	PSI & WPSI	5(2.2)	13 (2.2)	8 (2.2)	5 (13.2)	31 (2.6)	
	ASI & WASI	12 (5.4)	28 (4.8)	56 (15.7)	5 (13.2)	101 (8.3)	
	CHC & WHC	72 (32.9)	169 (28.6)	114 (32.0)	14 (36.8)	**371 (30.7)**	
	CPC & WPC	134 (59.6)	377 (63.8)	**176 (49.5)**	14 (36.8)	701 (58.0)	
Total service	**less than 10**	88 (39.1)	258 (43.7)	142 (39.9)	2 (5.3)	490 (40.5)	**<0.001***
	11-20	79 (35.1)	248 (42.0)	100 (28.1)	12 (31.6)	439 (36.3)	
	21-30	55 (24.4)	69 (11.7)	77 (21.6)	**17 (44.7)**	218 (18.0)	
	31-40	3 (1.3)	16 (2.7)	26 (7.3)	7 (18.4)	52 (4.3)	
	more than 41	0 (0)	0 (0)	11 (3.1)	0 (0)	11 (0.9)	

Note: * significant at 5% level of significance ($p<0.05$)

Figure 3: Distribution of blood pressure categories according to age

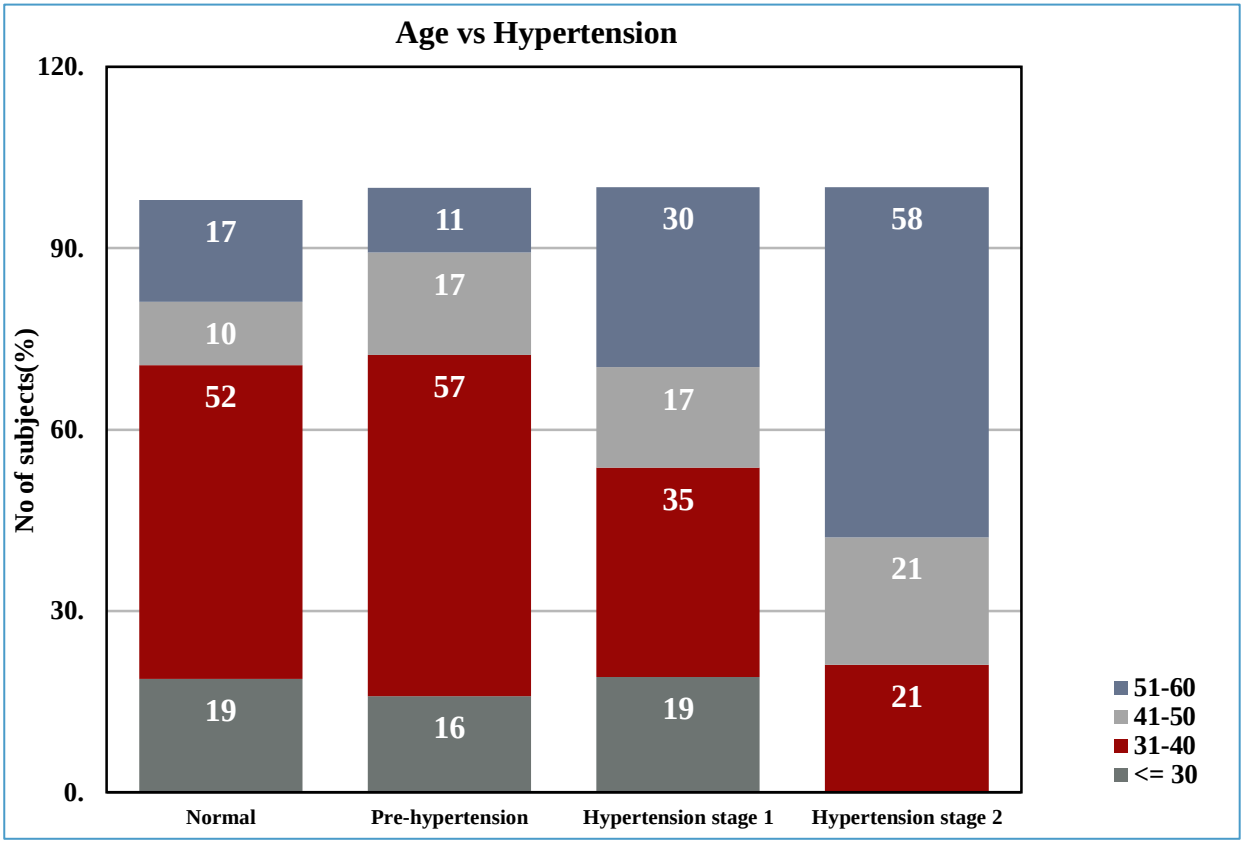
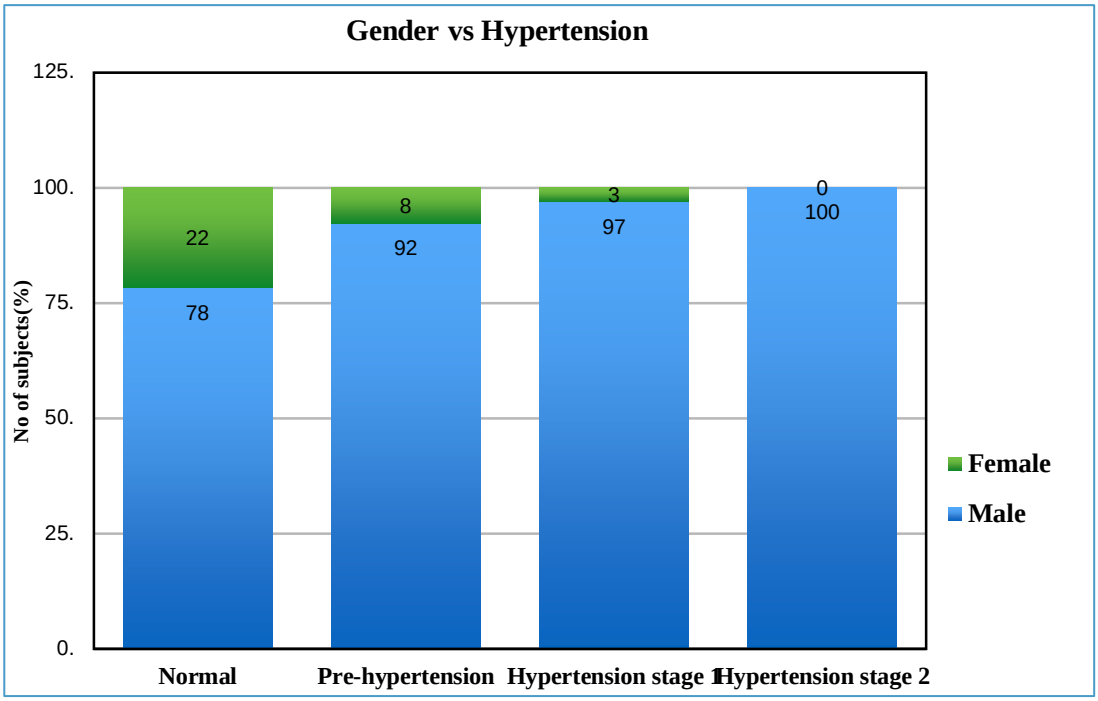


Table 3 and figure 3 shows that prevalence of stage 1 hypertension is higher in 31-40 year of age group (34.6%), followed by 51-60 year age group (29.8%). Prevalence of stage 2 hypertension is 21.1% in both 31-40 and 41-50 years age group followed by 57.9% in 51-60 year age group. This steep rise in the prevalence of hypertension in 5th decade was statistically significant ($p<0.05$).

Figure 4: Distribution of blood pressure categories according to gender



Gender: As per the table 3 and figure 4, gender wise 3.1% females were hypertensives, whereas 100% and 96.9% of male were in stage 2 and stage 1 hypertension respectively.

Figure 5: Distribution of blood pressure categories according to education

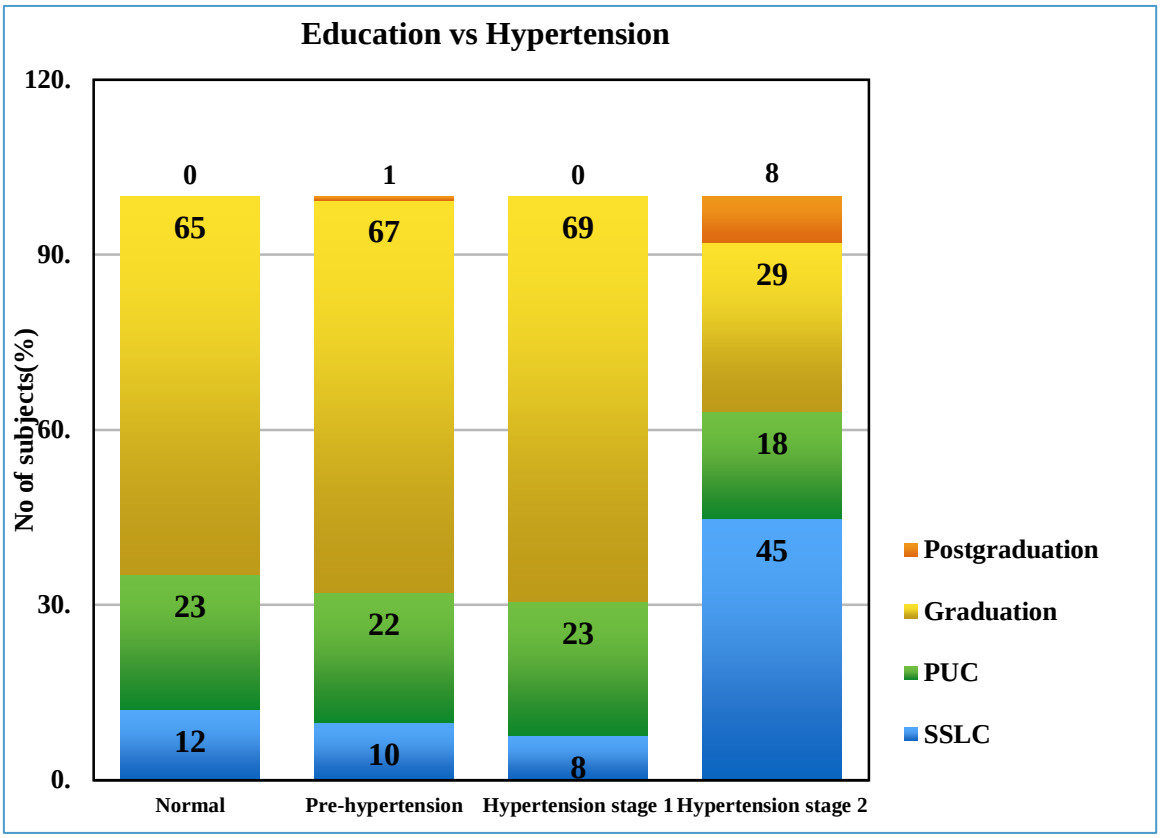
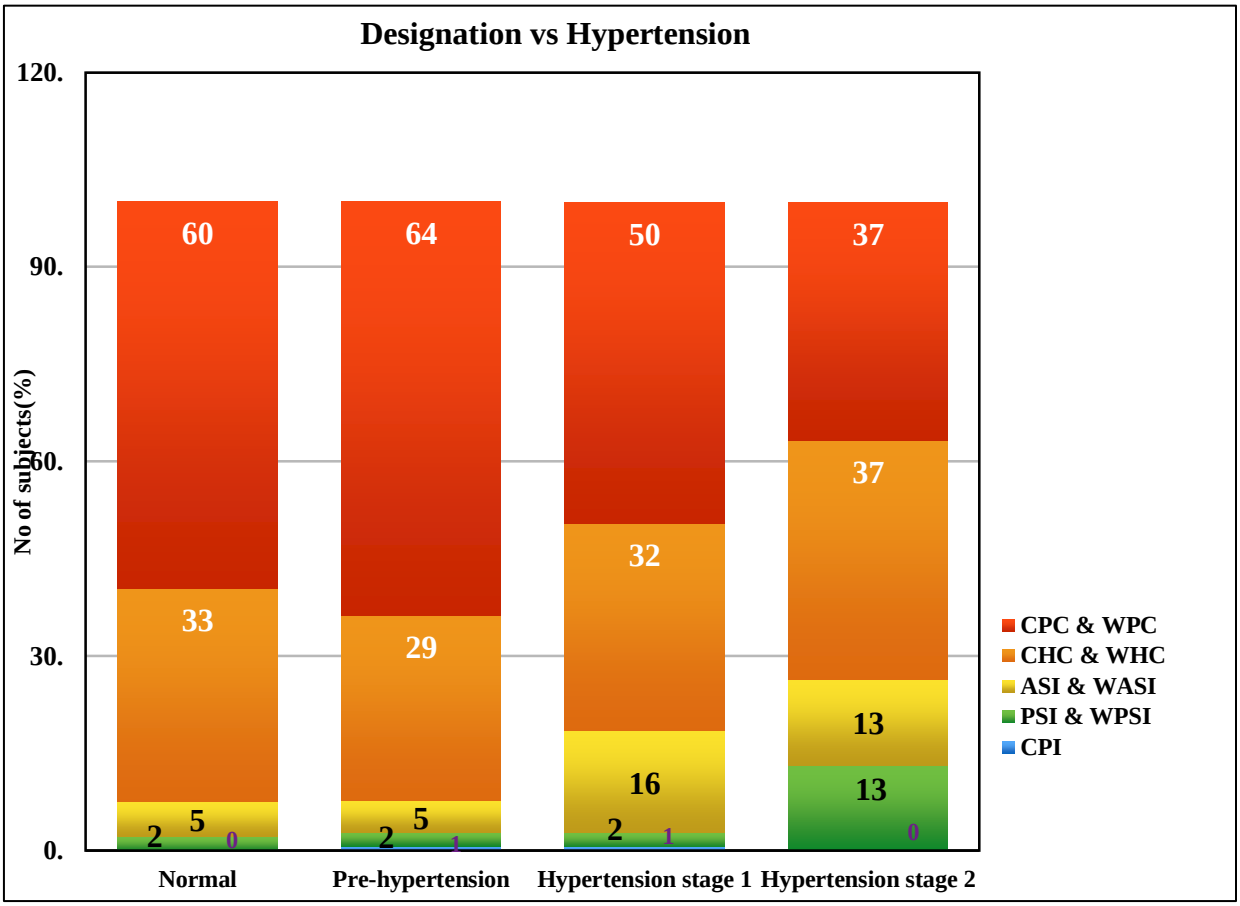


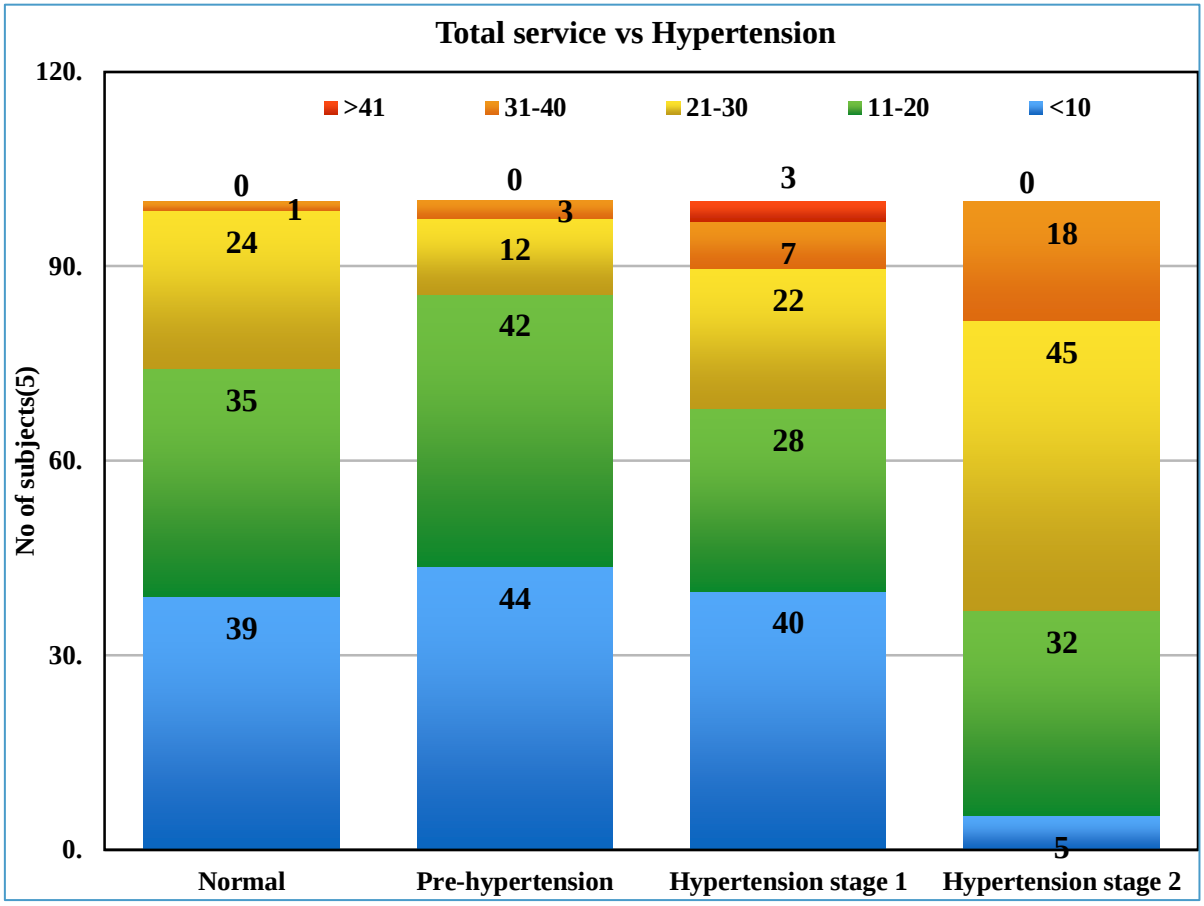
Table 3 and figure 5- Majority of police personnel had graduation level of education (66.2%) followed by PUC (22.6%) and SSLC (10.7%). The prevalence of stage 1 hypertension was highest among graduates (69.4%) as compared to others and this was statistically significant ($p<0.05$).

Figure 6: Distribution of blood pressure categories according to designation



As per table 3 and figure 6- Most of the police personnel were police constables- CPC & WPC (58%) followed by head constables- CHC & WHC (30.7%). The prevalence of stage 1 hypertension was highest among police constables- CPC & WPC (49.5%) as compared to head constables-CHC & WHC (32%) and this was statistically significant ($p<0.05$). On the other hand Stage 2 hypertension prevalence was 36.8% in both head constables- CHC & WHC and police constables- CPC & WPC.

Figure 7: Distribution of blood pressure categories according to total service



As per table 3 and figure 7- The prevalence of stage 2 hypertension was highest (44.7%) in police personnel whose duration of service was 21-30 years and this was statistically significant ($p<0.05$).

Table 4: Distribution of blood pressure categories according to Nature of Work

Nature of Work	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Combined and Field work	155	68.9	367	62.1	208	**58.4**	20	**52.6**	750	**62.0**	**<0.001***
Table and Computer work	64	28.3	132	22.3	138	**38.8**	18	**47.4**	352	29.1	
Driving	4	1.8	60	10.2	6	1.7	0	0	70	5.8	
Intelligence and Crime	2	0.9	32	5.4	4	11	0	0	38	3.1	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance ($p<0.05$)

Table 4 implies that majority of the police personnel were having combined and field work (62%), followed by table and computer work (29.1%), driving(5.8%) and intelligence and crime(3.1). The prevalence of stage 1 and 2 hypertension was 58.4% and 52.6% respectively, which were highest in combined and field work personnel. Whereas prevalence of stage 2 hypertension was 47.4% and stage 1 hypertension was 38.8% in personnel with table and computer work and this difference was statistically significant ($p<0.05$).

Table 5: Distribution of blood pressure categories according to Duty Hours

Duty Hours	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
>12 hours	52	23.1	146	24.7	74	20.8	11	28.9	283	23.4	**<0.001 ***
12-16 hours	140	62.2	312	52.8	160	**44.9**	22	**57.9**	634	52.4	
<16 hours	33	14.7	133	22.5	122	34.3	5	13.2	293	24.2	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 5 reveals that most of the police personnel (52.4%) were doing 12-16 hours of duty. The prevalence of stage 1 and stage 2 hypertension was 44.9% and 57.9% respectively, which were highest as compared to police personnel with less than 12 hours and more than 16 hours of duty and they were statistically significant (p<0.05).

Table 6: Distribution of blood pressure categories according to Shift Duty

Shift Duty	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Yes	63	28.0	86	14.6	59	**16.6**	22	**5.3**	210	17.4	**<0.001 ***
No	162	72	505	85.4	297	83.4	36	94.7	1000	82.6	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 6 - Among the police personnel only 17.4% had shift duty. Prevalence of stage 1 hypertension and stage 2 hypertension was 16.6% and 5.3% respectively in personnel who had shift duty.

Table 7: Distribution of blood pressure categories according to Alcohol Intake

H/o Alcohol Intake	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Yes	29	12.9	181	30.6	98	**27.5**	29	**76.3**	337	27.9	**<0.001 ***
No	196	87.2	410	69.4	258	72.5	9	23.7	223	72.2	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 7- Among the alcohol consumers, 76.3% had stage 2 hypertension and 27.5% had stage 1 hypertension which was statistically significant (p<0.05).

Table 8: Distribution of blood pressure categories according to Use of Tobacco in any form.

H/o Tobacco Use	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Yes	58	25.8	140	23.7	96	**26.9**	23	**60.5**	317	26.2	<0.001 *
No	167	74.2	451	76.3	260	**73.1**	15	**39.5**	893	73.8	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 8 - Statistically significant association was found between hypertension and tobacco use (p<0.05). Stage 2 hypertension was 60.5% in tobacco users and 39.5% in non-users. Stage 1 hypertension was present among 26.9% tobacco users and 73.1% in non-users.

Table 9: Distribution of blood pressure categories according to Physical Activity

Physical Activity	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Yes	94	41.8	223	37.7	191	**53.7**	16	**42.1**	524	43.3	**<0.001***
No	131	58.2	368	62.3	165	46.3	22	57.9	686	56.7	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 9- Stage 1 and stage 2 hypertension prevalence was 53.7% and 42.1% respectively, in police personnel who were doing physical activity which was statistically significant (p<0.05).

Table 10: Distribution of blood pressure categories according to family history of (F/H/0) Hypertension

F/H/0 Hypertension	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Yes	47	20.9	110	18.6	77	**26.1**	16	**42.1**	250	20.7	**0.006***
No	178	79.1	481	81.4	279	78.4	22	57.9	960	79.3	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 10- Statistically significant association was found between hypertension and family history of hypertension (p<0.05). 42.1% of stage 2 hypertensives and 26.1% of stage 1 hypertensives gave family history of hypertension.

Table 11: Distribution of blood pressure categories according to Food Habits

Food Habits	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Veg	80	35.6	125	21.2	80	22.5	7	18.4	292	24.1	**<0.001 ***
Mixed	145	64.6	466	78.8	276	**77.5**	31	**81.6**	918	75.9	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 11- Majority of stage 1 (77.5%) and stage 2 (81.6%) hypertensive subjects were having mixed food habit as compared to vegetarians and it was statistically significant (p<0.05).

Table 12: Distribution of blood pressure categories according to Extra Salt Intake

Extra salt intake	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Yes	39	17.3	153	25.9	117	**32.9**	14	**36.8**	323	26.7	**0.003***
No	186	82.7	438	74.1	239	67.1	24	63.2	887	73.3	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 12- The prevalence of stage 2 (36.8%) and stage 1 (32.9%) hypertension was found to be more among those who consumed extra salt in the form of pickle, papad or adding extra table salt in their diet and which was statistically significant (p<0.05).

Table 13: Distribution of blood pressure categories according to Extra Fat Intake

Extra Fat Intake	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Yes	27	12.0	166	28.1	108	**30.3**	14	**36.8**	315	26.0	**<0.001 ***
No	198	88.0	425	71.9	248	69.7	24	63.2	895	74.0	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 13- 36.8% and 30.3% of stage 2 and stage 1 hypertensive participants consumed extra fat in the form of ghee, oil, butter which was found statistically significant (p<0.05).

Table 14: Distribution of blood pressure categories according to H/o of Frequently Eating Food Outside.

H/o of Frequently eating food outside	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Yes	22	9.8	82	13.9	27	**7.6**	2	**5.3**	133	11.0	**0.013***
No	203	90.2	509	86.1	329	92.4	36	94.7	1077	89.0	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 14- Stage 2 and stage 1 hypertension in 7.6% and 5.3% respectively,was found in participants who were having the habit of frequently eating outside food and this was statistically significant (p<0.05).

Table 15: Distribution of blood pressure categories versus Known Case of Hypertension

Known case Hypertension	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Yes	4	1.8	25	4.2	55	**15.4**	10	**26.3**	94	7.8	**<0.001 ***
No	229	98.2	566	95.8	301	**84.6**	28	**73.7**	1116	92.2	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Figure 8: Distribution of blood pressure categories according to known case of hypertension

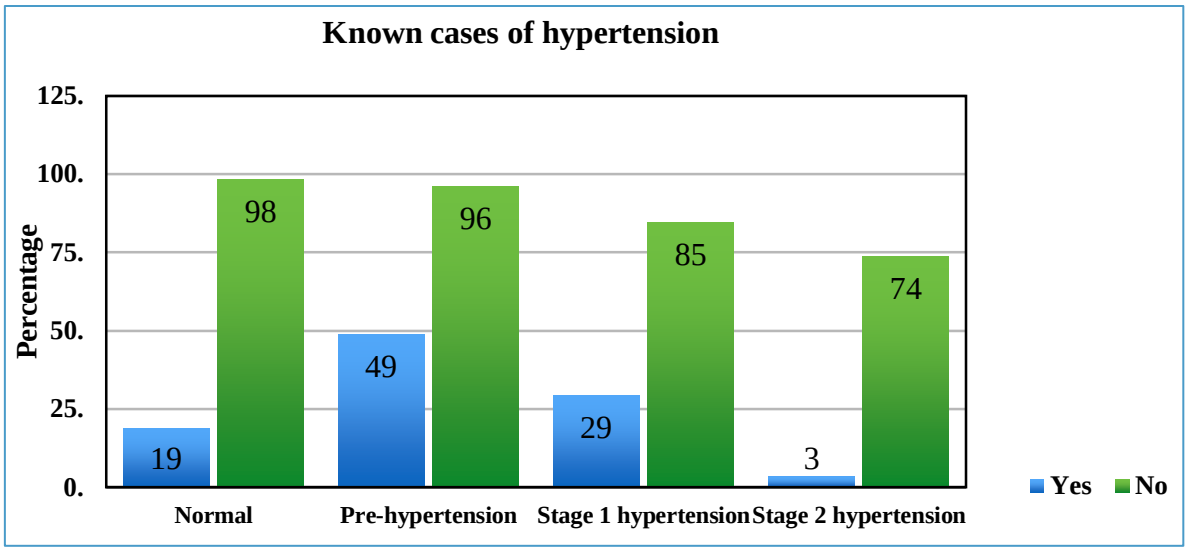


Table 15 and figure 8- Among hypertensives, 15.4% and 26.3% were known cases of stage 1 and stage 2 hypertension respectively, while 84.6% and 73.7% of stage 1 and stage 2 hypertensives respectively, were newly diagnosed with hypertension. This was statistically significant (p<0.05).

Table 16: Distribution of blood pressure categories according to BMI

BMI	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
Underweight	4	1.8	3	0.5	0	0	0	0	7	0.6	
Normal	75	33.3	109	18.4	73	20.5	2	5.3	259	21.4	
At risk Obesity	33	14.7	126	21.3	105	29.3	6	15.8	270	22.3	**<0.001 ***
Obese I	92	40.9	328	55.5	162	**45.5**	25	**65.8**	607	50.2	
Obese II	21	9.3	25	4.2	16	4.5	5	13.2	67	5.5	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 16 implies that hypertension was significantly associated with BMI (p<0.05). 65.8% of stage 1 and 45.5% of stage 2 hypertensives respectively, were found to be obese.

Table 17: Distribution of blood pressure categories according to Stress Scale

Stress Scale Scores	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		Total		p value
	N	%	N	%	N	%	N	%	N	%	
less than 15	63	28.0	190	32.1	112	31.5	5	13.2	370	30.6	
16-30	158	70.2	385	65.1	228	**64.0**	31	**81.6**	802	66.3	**0.077***
31-45	4	1.8	16	2.7	16	4.5	2	**5.3**	38	3.1	
Total	225	100	591	100	356	100	38	100	1210	100	

Note: * significant at 5% level of significance (p<0.05)

Table 17 show that 81.6% and 64% of stage 2 and stage 1 hypertensives respectively, had moderate range of stress, while 5.3% of stage 2 hypertensives had stress which is clearly a problem due to their profession and they were not statistically significant (p<0.05).

Table 18: Comparison of mean BMI according to blood pressure categories

Variable	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		K W Test
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	0.150*
BMI	25.3	3.6	25.4	2.8	25.3	2.7	26.5	3.5	

Note: * significant at 5% level of significance (p<0.05)

Figure 9: A comparison of mean BMI according to blood pressure categories.

Table 18 and figure 10- The mean BMI among normotensive was 25.3 ± 3.6. Those with pre-hypertension had mean BMI of 25.4 ± 2.8, stage 1 hypertensives had a mean BMI of 25.3 ± 2.7 and stage 2 hypertensives had a mean BMI of 26.5 ± 3.5. This difference in the mean BMI according to blood pressure category was not statistically significant (p<0.05).

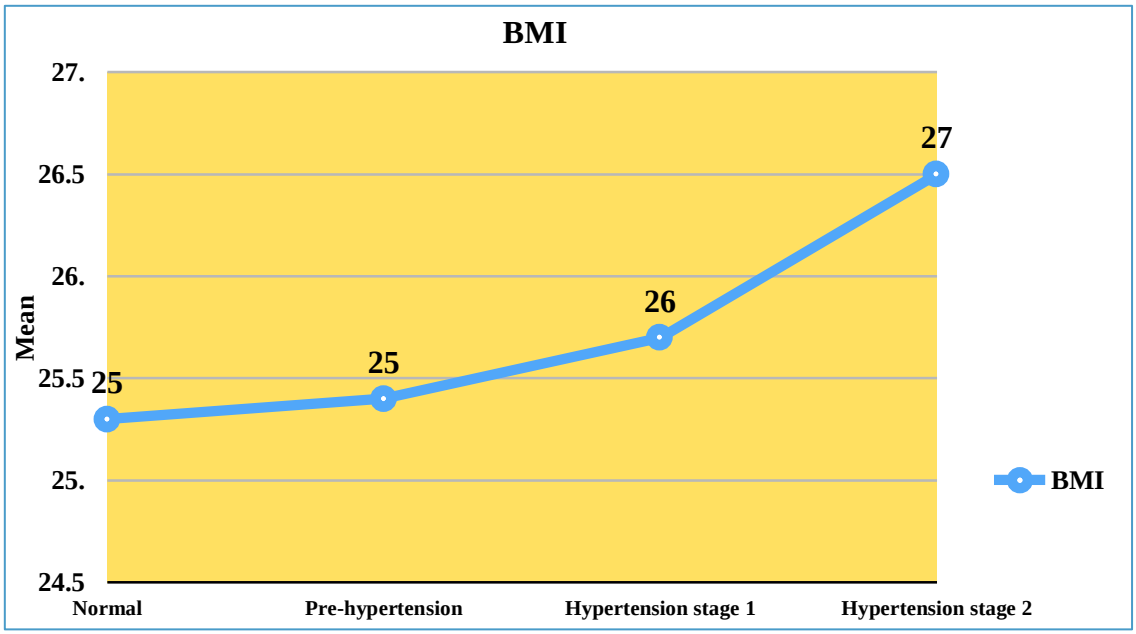


Table 19: Comparison of mean Pulse rate according to blood pressure categories

Variable	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		ANOVA p value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
PR	80.3	10.3	79.2	10.0	81.3	9.5	87.1	11.6	<0.001*

Note: * significant at 5% level of significance (p<0.05)

Figure 10: A comparison of mean Pulse rate according to blood pressure categories.

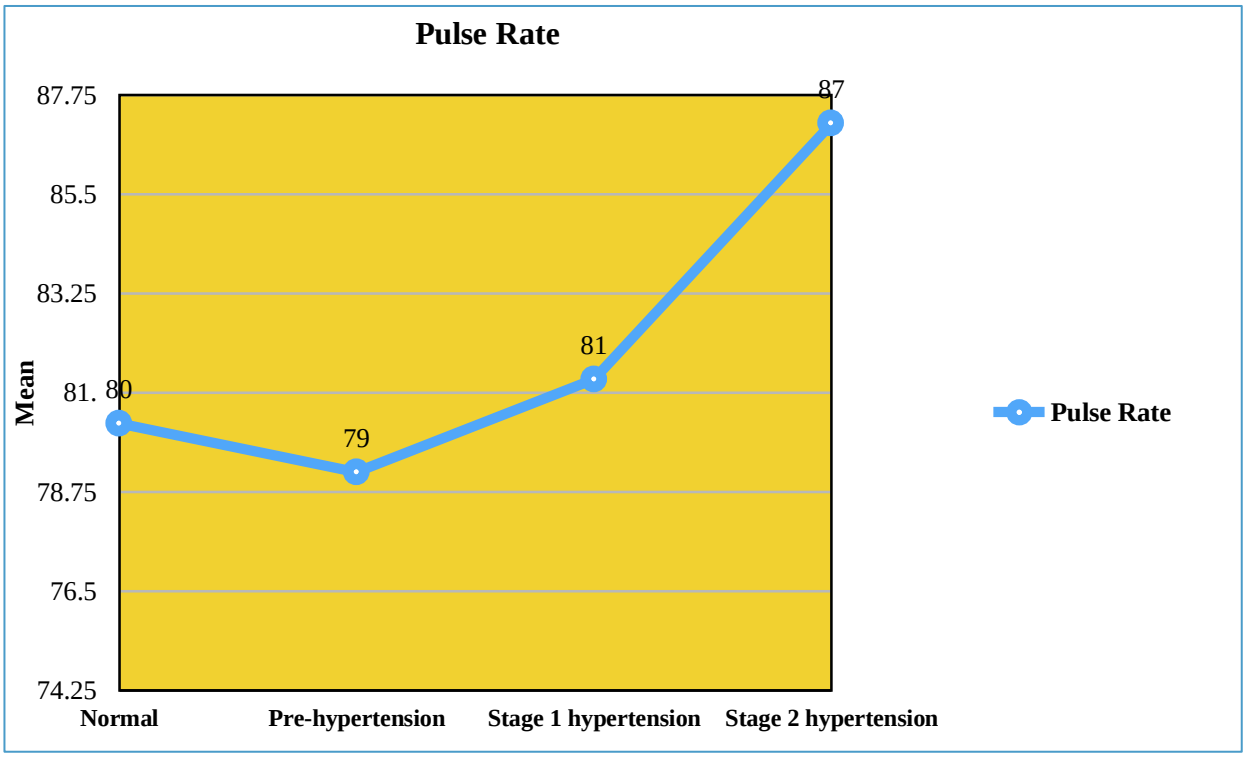


Table 19 and figure 11- The mean PR among pre-hypertensives was 79.2 ± 10.0, stage 1 hypertensives had a mean PR of 81.3 ± 9.5 and stage 2 hypertensives had a mean PR of 87.1 ± 11.6. This difference was statistically significant (p<0.05).

Table 20: Comparison of mean SBP/DBP according to blood pressure categories

Variable	Normal		Pre-hypertension		Hypertension stage 1		Hypertension stage 2		p value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
SBP	115.7	5.4	129.8	4.5	145.1	5.1	167.9	12.1	**<0.001***
DBP	73.77	7.5	79.3	8.3	87.5	7.8	100.3	12.2	

Note: * significant at 5% level of significance ($p<0.05$)

Table 20 infer that the mean SBP among stage 1 hypertensives was 145.1 ± 5.1 and was 167.9 ± 12.1 among those with stage 2 hypertensives. This difference was statistically significant ($p<0.05$). The mean DBP among stage 1 hypertensives was 87.5 ± 7.8 and was 100.3 ± 12.2 among those with stage 2 hypertensives and this was statistically significant ($p<0.05$).

DISCUSSION:

Based on our observations, the magnitude of hypertension and its distribution according to various risk factors are discussed below.

PREVALENCE OF HYPERTENSION: (Table 2,15 & fig.2,8)

The overall prevalence of hypertension in this study was found to be 32.5% which is comparable to the prevalence rate of 32.9% by Chang JH[26] in Taiwan, 31.8% by Gu JK[20] in Northeast United States, 32.5% by Sen A[3] in Kolkata. Many other studies have reported a higher prevalence of hypertension. Few of these studies include those done by Kanam RN[34] in Indonesia (47.6%), Ramey SL[32] in Milwaukee (51.5%), Filho TR[27] in Brazil (55.6%), Janczura M[24] in Poland (44.2%), Garbarino S[25] in Italy (40.6), Tharkar S[42] in Chennai (58.5%), Thayyil J[40] in Calicut (37.7%), Mallik D[6] in West Bengal(41.9), Almale BD[7] in Mumbai(42.4), Lohakpure VR[38] in Maharashtra (40.2%) and Rathi K[36] in New Delhi (63.6%). In the present study, among the 32.5% hypertensives, 7.8% were known cases while 92.2% were newly diagnosed which was statistically significant ($p<0.05$) and 48.8% were found to be pre-hypertensives.

1. Age: (Table 1,3 & fig.3)

In this study the prevalence of stage 2 hypertension was maximum ≈58% in the fifth decade which is comparable to the results obtained by Aisha HA[2] in Sudan and George CE[44] in Bangalore. There was a steep rise in the prevalence among higher age group.

Several studies have shown significant positive correlation between age and systolic blood pressure with CVD risk. Greater age (> 50 years) was significantly associated with high CVD risk. Studies done by Almale BD[7] in Mumbai (42.4%), Sen A[3] in

Kolkata(32.5) and Mallik D[6] in West Bengal(41.9%) also found that age specific hypertension was maximum in the fifth decade when compared to other age groups. A study by Tesfaye T[23] found no difference in prevalence of hypertension with age.

2. Gender: (Table 1,3 & fig.4)

Among 32% hypertensives, the prevalence of stage 1 and stage 2 hypertension was ≈ 97% and 100% respectively, which was higher among males in our study. Similar results were observed in a study done by Bhatia KM[78] in Gujarat, Satapathy DM[41] in Berhampur. This was probably because the number of males who participated in the study were more than the number of females. Also occupational stress could have posed as risk factor for developing hypertension in them.

3. Education: (Table 1,3 & fig.5)

In the present study, prevalence of stage 1 hypertension was highest among graduates ≈69%. Similar findings in study by Aisha HA[2] in Sudan and Ramey SL[32] in Milwaukee where they found significant association with higher education. Prevalence of stage 2 hypertension was highest among those who completed high school education ≈45%. Higher level of education and hypertension was positively associated in our study.

In contrast to this, study done by Mesharam FA[43] in Nagpur found that no significant role of education as an independent protective factor was found against hypertension in policemen suggesting that the policemen with high as well as low level of education bear equal risk of hypertension.

4. SE- Status: (Table 1)

In this study prevalence of stage 2 and stage 1 hypertension was highest among subjects belonging to SES II ≈61% and SES I ≈60%. This was probably because majority of the study population belonged to SES I and II respectively, since the minimum salary scale of police personnel was ≈15000 Rs and more. Study by Almale BD[7] in Mumbai found higher prevalence of hypertension those belonging to lower SES.

5. Duty Hours & Nature of work: (Table 4 & 5)

The prevalence of stage 1 and stage 2 hypertension was ≈45%, 58% respectively in personnel who were doing 12-16 hours of duty in our study. It was observed that long duty hours, work load is associated with higher prevalence of hypertension which was found in study by Kanam RN[34] in Brimob, Violanti JM[33] in US and Schiozaki M in Japan[22.]

In our study stage 1 and 2 hypertension was ≈58% and ≈53% respectively, which were highest in combined and field work personnel when compared to those who were doing table and computer work, which may be probably due to the more responsible and stressful work like investigation of case, aressting prisoners, pre and post crime bandobast duties.

6. Shift Duty: (Table 6)

In this study prevalence of stage 1 and stage 2 hypertension was ≈17% and ≈5% respectively. A study by Elliot JL[79] in Australia found higher prevalence among policemen with shift duty. Shift work has been strongly associated with occupational stress especially night shifts which is comparable to study by Ma CC[80] in USA.

7. Alcohol Consumption: (Table 7)

Several mechanism have been considered to be responsible for the relationship of alcohol consumption with hypertension. They include direct pressor effect of alcohol on the vessel wall, a sensitisation of resistance vessels to alcohol, stimulation of the sympathetic nervous system, and an increased production of adrenocorticoid-harmones. In the present study ≈77% and ≈28% of those who consumed alcohol regularly had stage 2 and stage 1 hypertension respectively, which was consistent with study observed by Fikenzer S[8] in Germany, Derek RS[80] in Japan, Almale BD[7] and Tambe NN[10] in Mumbai, Tharkar S[42] in Chennai and Ramakrishnan J[4] in Puducherry.

8**. Smoking or Tobacco consumption:** (Table 8)

Several studies have shown a significant correlation of tobacco usage in any form with hypertension prevalence. Studies have shown that tobacco usage in any form acutely increases BP and heart rate. The sympathetic-adrenal activating properties of nicotine and high sodium content of oral tobacco preparations could be the main contributing factors for high BP in tobacco chewers.

In this study ≈ 61% and ≈ 27% of the subjects with a history of tobacco usage had stage 2 and stage 1 hypertension respectively, which is comparable to the rates found by Derek RS[80] in Japan, Singh A[81] in Bhopal, Sen A[3] in Kolkata, Mesharam FA[43] in Nagpur and Almale BD[7] in Mumbai. Bhatia KM[77] and Mallik D[6] in their studies conducted in Gujarat and West Bengal respectively found a higher prevalence of hypertension among tobacco users.

Many studies of policemen have showen high rates of addiction to alcohol and tobacco, due to tremendous pressure and stress. This combination can have a synergistic and detrimental effect on the deterioration of their health status of the people.

9. Physical Activity: (Table 9)

In this study, the prevalence of ≈54% and ≈42% of stage 1 and stage 2 hypertension respectively, was found in personnels who were doing physical activity. Study done by Bhatia KM[77] in Gujarat, Ahmed AO in Sudan[59] have found lower level of prevalence of hypertension which could be due to police personnels who were involved in physical activities like sports activities, exercises and yoga.

10. Family history of Hypertension: (Table 10)

Family history of raised blood pressure is an important risk factor for the future development of hypertension in individuals. There are studies which have suggested that 20% of essential hypertension is inherited and remaining may be acquired or environmental.

In our study ≈42% of stage 1 hypertensives were having family history of hypertension which is comparable to the results obtained by Sen A[3] in Kolkata and ≈ 26% of stage 2 hypertension had a family history of hypertension. Study done by George CE[44] in Bangalore have shown that lesser number of hypertensives had a family history of hypertension. However study by Kanam RN[34] in Brimob found that family history of hypertension was not a significant risk factor for hypertension.

11. Extra salt intake: (Table 12)

Salt plays an important role in the auto-regulation of the water and fluid balance in the body. Excess dietary intake of sodium is a burden on the kidneys as they have to excrete the extra amount of salt. Also, cardiovascular system is one of the most vulnerable to the adverse effects of excessive dietary salt intake. Scientific literature has shown higher CVD morbidity among those with high BP.

In this study, it has been observed that extra salt intake has a significant association with hypertension ($p<0.05$). This study showed 36.8% and 32.9% of stage 2 and stage 1 hypertensive subjects respectively, consumed extra salt in their diet.

12. Extra fat intake: (Table 13)

Our study showed ≈37% of stage 2 and ≈30% of stage 1 hypertension respectively, among the subjects who consumed extra fat in the form extra ghee, oil in their diet, when asked to the subjects.

13. BMI: (Table 16)

In this study, hypertension was significantly associated with BMI ($p<0.05$). 79% of stage 2 hypertensives were obese which is similar to the findings of Alghamdi AS[61] in Riyadh, Aisha HA[2] in Sudan and Kanam RN[34] in Brimob, Silva FCD[62] in Brazil. 50% of stage 1 hypertensives were found to be obese which was consistent with the findings of Rathi K[36] in New Delhi.

Among the studies conducted on hypertension, obesity has been found to increase the risk of hypertension by two-fold rise. In present study, irregular diet and habit of frequently eating food outside with poor choice of food (high fat content) during their working hours, might have predisposed to the development of high BMI which cause

hemodynamic and metabolic changes in the body which contribute to the development of hypertension.

14. Food Habits: (Table 11 & 14)

In this study, ≈78% and ≈82% of subjects were having stage 1 and stage 2 hypertension respectively, which was highest among respondents having mixed diet when compared to vegetarians, which may be due to high salt and fat content. And it was observed that ≈8% and ≈5% of stage 2 and stage 1 hypertensive respondents respectively, were having the habit of frequently eating outside food due to the working pattern like long duty hours, stress during work.

15. Stress: (Table 17)

Acute stressful stimuli are known to elevate blood pressure, lead to an increase in the circulating levels of catecholamines, vasopressin, endorphins, and aldosterone and reduction in the urinary sodium excretion. Therefore it has been speculated that in the long run, stress might have a crucial role in the development and maintenance of hypertension.

In this study, professional life stress scale given by David Fontana[74] has been used. Stress was categorised based on scores as, stress is not a problem (0-15), moderate range of stress (16-30), stress is clearly a problem (31-45) and stress is a major problem (45-60).

Moderate range of stress ≈82% was found in stage 2 hypertension which is similar to findings of study by Almale BD[82] in Mumbai (70%), Ragesh G[70] in Bengaluru (68%), Ramakrishnan J[4] in Puducherry(70%), Also, stress is clearly a problem in ≈5% of subjects which was similar to study by Ramakrishnan J[4] (4%), Ragesh G[70] (14%). A

study by Ganesh KS[83] (≈ 84%) showed higher level of stress. A positive correlation was found between hypertension and stress in studies by Saha A[84] in West Bengal, Mohanraj C[85] in Coimbatore, Ganesh KS[83] in Puducherry, Kaur R[86] in Andhra Pradesh, Naik KD[87] in Vadodara, Karunanidhi S[88] in Chennai, Sekar M[89] in Tamil Nadu, Selokar D[90] in Wardha, Xavier P[91] in Tamil Nadu and Sundaram MS[92] in Tamil Nadu.

SUMMARY:

Hypertension is a global health problem due to its increasing prevalence and association with cardiovascular and overall morbidity and mortality. This study was carried out among 1210 police personnel of Vijayapura to know the prevalence of hypertension among police personnel and its associated risk factors and also to determine the socio-demographic, economic and other factors influencing hypertension among them.

- The overall prevalence of hypertension among the personnel was 32.5%. Of them, 7.8% were known cases and 92.2% newly diagnosed.
- A positive association was found between age and hypertension.
- The prevalence of hypertension was maximum (57.9%) in the fifth decade of life. However, pre-hypertension(56.5%) was highest among subjects in the 31-40 years age group.
- Among hypertensives, the prevalence of stage 1, stage 2 hypertension among males was 96.9%, 100% respectively, as compared to females.
- The prevalence of stage 1 hypertension was highest among graduates (69.4%) and stage 2 hypertension was highest among SSLC (44.7%). The level of education was significantly associated with hypertension
- Maximum percentage of hypertensive subjects (60.5% and 60.1%) belonged to SES class I and II respectively.
- Based on the designation, prevalence of stage 1 and stage 2 hypertension was found to be maximum among police constables.

- The prevalence of hypertension was highest (44.7%) in police personnel who had service of 21-30 years.
- The prevalence of stage 1 hypertension was highest in combined and field work personnel (58.4%) and stage 2 hypertension was 52.6%, whereas prevalence of stage 2 hypertension was 47.4% and stage 1 hypertension was 38.8% in personnel with table and computer work.
- The prevalence of stage 1 and stage 2 hypertension was 44.9%, 57.9% respectively, in personnel who were doing 12-16 hours of duty.
- Stage 1 and stage 2 hypertension was found in 16.6% and 5.3% respectively in police personnel who had shift duty.
- 76.3% of those who consumed alcohol regularly had stage 2 hypertension and 27.5% had stage 1 hypertension.
- 60.5% of the subjects with a history of tobacco usage had stage 2 hypertension and 26.9% had stage 1 hypertension.
- The prevalence of 53.7% and 42.1% of stage 1 and stage 2 hypertension respectively, was found in personnels who were doing physical activity.
- 42.1% of stage 1 and 26.1% of stage 2 hypertensives gave family history of hypertension which was significant ($p<0.05$).
- It was observed that extra salt intake has a significant association with hypertension($p<0.05$).
- 36.8% of stage 2 hypertension and 30.3% of stage 1 hypertension were consuming extra fat in the form of extra ghee, oil, butter, etc in their diet.

- A positive association was found between hypertension and BMI ($p<0.05$). 79% of stage 2 hypertensives were found to be obese. 50% of stage 1 hypertensives were found to be obese.
- In police personnel 81.6% and 64% of stage 2 and stage 1 hypertensives respectively, had moderate range of stress.
- The mean systolic blood pressure among those with stage 1 and stage 2 hypertensives was 145.1 ± 5.1 and 167.9 ± 12.1 respectively. Among pre-hypertensives mean SBP was 129.8 ± 4.5 and this difference was statistically significant.

CONCLUSION:

Based on our study findings, it can be concluded that hypertension is more prevalent in the police personnel in their fifth decade. The non modifiable risk factors like age, gender, family history appear to greatly influence the prevalence of hypertension along with the modifiable ones like dietary practices (irregular diet due to work pattern), habits like alcohol consumption and tobacco use. Occupational factors such as work overload, time pressure, long duty hours, shift duty, lack of physical activity and stress due to their profession, disrupted sleep patterns, irregular diet due to limited choice of food while on duty, inadequate resources, manpower shortage, lack of support and consultation, and communication with the higher authorities, etc are likely to contribute to the increased risk of cardiovascular diseases among policemen. It is necessary to create awareness about hypertension and its complications by health education programmes for lifestyle modification to decrease the risk of hypertension in the police personnel.

RECOMMENDATIONS:

Health education among police personnel regarding NCDs and their risk factors is needed for successful detection, evaluation and treatment of hypertension.

- Stress among police personnel are multi-faceted, health promotion interventions should focus on stress-reduction at both departmental and individual level.
- Specific interventions such as promoting stress-reduction activities, relaxation techniques like yoga, meditation and other recreational activities which support the integration of body, mind and soul, promoting non drinking and non-smoking, encouraging social events at sports clubs and gymnasiums, streamlining administrative processes, reducing overtime, carefully organising shift duties, and allowing rest breaks for those on the night shift, increased physical activity and weight reduction, counselling and interpersonal support can be suggested.
- NCD screening camps to be conducted regularly so that blood pressure can be checked and detected early.
- Regular health checkup as per NPCDCS should be done.
- Police personnel as a special group need more flexibility in their occupational arena.
- Government need to place a greater emphasis on the occupational health of police officers and law enforcement agencies.

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ANNEXURE – I

INSTITUTIONAL ETHICAL CERTIFICATE

B.L.D.E. UNIVERSITY'S
SHRI.B.M.PATIL MEDICAL COLLEGE, BIJAPUR-586 103
INSTITUTIONAL ETHICAL COMMITTEE

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this college met on 04/10/2016 *at* 3-00pm *to scrutinize the Synopsis of Postgraduate Students of this college from Ethical Clearance point of view. After scrutiny the following original/corrected & revised version synopsis of the Thesis has been accorded Ethical Clearance.*

Title Prevalence of hypertension and its associated risk factors among Police Personnel

Name of P.G. student Laxmi Tellur
Dept of Community Medicine

Name of Guide/Co-investigator Dr M.C. Yadavannavar
Professor in community medicine

DR.TEJASWINI VALLABHA
CHAIRMAN
INSTITUTIONAL ETHICAL COMMITTEE
BLDEU'S, SHRI.B.M.PATIL
MEDICAL COLLEGE, BIJAPUR.

Following documents were placed before E.C. for Scrutinization
1) Copy of Synopsis/Research project.
2) Copy of informed consent form
3) Any other relevant documents.

ANNEXURE - II

PROFORMA:

Serial No: Date:

A. Socio-demographic profile:

1. Name:
2. Age: years
3. Sex: Male / Female
4. Religion:
5. Address:

6. Marital status: Married / Unmarried / Divorced / Widow separated.

7. Education: SSLC / PUC / UG / Diploma / Graduate / Postgraduate.

8. Occupational History:
   a. Designation
   b. Working place
   c. Total service : years
      Urban : years
      Rural : years
   d. Nature of work :
   e. Number of duty hours / day :
   f. Shift duty : Yes / No
      If yes - Mention type of present shift :
      Frequency of shift rotation :
   g. Job satisfaction : Yes / No
9. Type of family: Nuclear Joint Others
10. No. of members in the family:

11. a) Monthly income of respondent:

    b) Total income of family:

    c) Per capita income:

12. Socioeconomic class:

B. Personal History:

13. Present h/o habits: Yes No(Go to Q14)

    If Yes,

Habits	Type	Amount	Frequency	Duration
a) Alcohol				
b) Smoking				
c) Tobacco chewing				
d) Any other (drugs, etc.)				

14. Past h/o habits: Yes No

    If Yes,

Habits	Type	Amount	Frequency	Duration
a) Alcohol				
b) Smoking				
c) Tobacco chewing				
d) Any other (drugs, etc.)				

16. Taking any long term medications: Yes No

If yes, what type of medication :

17. Physical activity:

Doing regular exercises - Yes No

If yes,

Type : Cycling Walking Running Swimming Playing

Duration of exercise/day :

No of days per week :

C. Family history:

18. History of hypertension in the family: Yes No

Sl. No.	Relative	Yes/No	Duration
a.	Father		
b.	Mother		
c.	Others		

19. History of diabetes in the family: Yes No

Sl. No.	Relative	Yes/No	Duration
a.	Father		
b.	Mother		
c.	Others		

D. Dietary history:

20. Food habits: Vegetarian Non-vegetarian

21. Amount of salt intake/day …..grams or monthly salt consumption - …..

22. Extra salt intake-

i. Do you regularly consume pickle/papad/cheese/sauce or any other food preparation containing high salt content? Yes No

ii. Do you regularly add extra table salt to your dishes on dining table?

Yes No

23. Extra fat intake-

i. Do you regularly add visible fat like ghee/butter to chapatti and/or any food preparation on dining table? Yes No

24. Per day consumption of

i) Salt:

ii) Oil: Type: Refined/non refined

iii) Ghee:

E**.** If you get a chance to change the job, will you go for it ? Yes / No

If yes - Give reasons and specify the job.

F.**History of illness**

19. Whether person is a known hypertensive? Yes No

If yes,

Since how many months/years ?

Taking regular treatment? Yes No

Type of treatment being taken?

Allopathic

Ayurvedic

Herbal or traditional remedies

Any other

20.Whether person is a known diabetic? Yes No

If yes,

Since how many months/years ?

Taking regular treatment? Yes No

Type of treatment being taken?

Allopathic

Ayurvedic

Herbal or traditional remedies

Any other

PROFESSIONAL LIFE STRESS TEST

1. Two people who know you well are discussing you. Which of the following statements would they be most likely to use?

a. 'X is very together. Nothing much seems to bother him/her.'
b. 'X is great. But you have to be careful what you say to him/her at times.'
c. 'Something always seems to be going wrong with X's life.'
d. 'I find X very moody and unpredictable.'
e. 'The less I see of X the better!'

2. Are any of the following common features of your life?

   a. Feeling you can seldom do anything right
   b. Feelings of being hounded, trapped, or cornered
   c. Indigestion
   d. Poor appetite
   e. Difficulty in getting to sleep at night
   f. Dizzy spells or palpitations
   g. Sweating without exertion or high air temperature
   h. Panic feelings when in crowds or in confined spaces
   i. Tiredness and lack of energy
   j. Feelings of hopelessness ('what's the use of anything?')
   k. Faintness or nausea sensations without any physical cause
   l. Extreme irritation over small things
   m. Inability to unwind in the evenings
   n. Waking regularly at night or early in the mornings
   o. Difficulty in making decisions
   p. Inability to stop thinking about problems or the day's events
   q. Tearfulness
   r. Convictions that you just can't cope
   s. Lack of enthusiasm even for cherished interests
   t. Reluctance to meet new people and attempt new experiences
   u. Inability to say 'no' when asked to do something

   v. Having more responsibility than you can handle

3. Are you more or less optimistic than you used to be (or about the same)?

a. more b. about the same c. less

4. Do you enjoy watching sports?

a. yes b. no

5. Can you get up late on weekends if you want to without feeling guilty?

a. yes b. no

6. Within reasonable professional and personal limits, can you speak your mind to your boss?

a. yes b. no

7. Can you speak your mind to your colleagues?

a. yes b. no

8. Can you speak your mind to members of your family?

a. yes b. no

9. Who usually seems to be responsible for making the important decisions in your life?

a. yourself b. someone else

10. When criticized by superiors at work, are you usually:

a.very upset? b.moderately upset? c.mildly upset?

11. Do you finish the working day feeling satisfied with what you have achieved?

a. often b. sometimes c. only occasionally

12. Do you feel most of the time that you have unsettled conflicts with colleagues?

a. yes b. no

13. Does the amount of work you have to do exceed the amount of time available?

a. habitually b. sometimes c. only very occasionally

14. Do you have a clear picture of what is expected of you professionally?

a. mostly b. sometimes c. hardly ever

15. Would you say that generally you have enough time to spend on yourself?

a. yes b. no

16. If you want to discuss your problems with someone, can you usually find a sympathetic ear?

a. yes b. no

17. Are you reasonably on course towards achieving your major objectives in life?

a. yes b. no

18. Are you bored at work?

a. often b. sometimes c. very rarely

19. Do you look forward to going into work?

a. most days b. some days c. hardly ever

20. Do you feel adequately valued for your abilities and commitment at work?

a. yes b. no

21. Do you feel adequately rewarded in terms of status and promotion for your abilities and commitment at work?

a. yes b. no

22. Do you feel your superiors actively hinder you in your work? Or do they actively help you in your work?

a. hinder b. help

23. If ten years ago you had been able to see yourself professionally as you are now, how would you have seen yourself?

a. exceeding your expectations b. fulfilling your expectations

c. falling short of your expectations

24. If you had to rate how much you like yourself on a scale from 1 (least like) to 5 (most like), what would your rating be?

a. 1 b. 2 c. 3 d. 4 e. 5

H. General Examination:

a. Height: cm

b. Weight: kg

c. BMI:

d. Pulse rate: /min

e. BP recording:

1st reading: mm of Hg

2nd reading: mm of Hg

3rd reading: mm of Hg

Average: mm of Hg

ANNEXURE - III

INFORMED CONSENT FORM

B. L. D. E (DEEMED TO BE UNIVERSITY) SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE, VIJAYAPURA.

Department of Community Medicine

CONSENT FORM

TITLE OF PROJECT:

PREVALENCE OF HYPERTENSION AND ITS ASSOCIATED RISK FACTORS AMONG POLICE PERSONNEL OFVIJAYAPURA.

GUIDE **:** DR.M. C. YADAVANNAVAR

PG STUDENT **:** DR LAXMI TELLUR.

PURPOSE OF RESEARCH:

I have been informed that this study will help to know the Prevalence of hypertension and its associated risk factors among Police personnel of Vijayapura. The study is intended to interview the police personnel of Vijayapura.

PROCEDURE:

I understand that this is a field based programme. In this procedure I will be asked a series of questions by the researcher regarding the topic.

RISK AND DISCOMFORTS:

I understand that I may experience some discomfort during this procedure. The procedures of this study are not expected to exaggerate those feelings which are associated with the usual course of study.

BENEFITS:

I understand that my participation in the study as one of the study subjects will help the researcher to analyse the presence of hypertension & its associated risk factors among Police personnel of Vijayapura.

CONFIDENTIALITY:

I understand that the information produced by this study will be kept secret. The name and contact information will never be identified to anyone outside the study.

REQUEST FOR MORE INFORMATION:

I understand that I may ask more questions about the study at any time to Dr. Laxmi Tellur at the department of community medicine to answer my questions or concerns. I understand that I will be informed of any significant new findings discovered during the course of the study, which might influence my continued participation. A copy of this consent form will be given to me to keep for careful reading.

REFUSAL OR WITHDRAWAL OF PARTICIPATION:

I understand that my participation is voluntary and that I may refuse to participate or may withdraw consent and discontinue participation in the study at any time without prejudice. I also understand that Dr. Laxmi Tellur may terminate my participation in the study at any time after she has explained the reasons for doing so.

(Guide / Principle Investigator) (Date)

(Investigator) (Date)

STUDY SUBJECT CONSENT STATEMENT:

I confirm that Dr. Laxmi Tellur has explained to me the purpose of research, the study procedure that I will undergo & the possible discomfort as well as benefits that I may experience in my own language. I have been explained all the above in detail in my language and understand the same.

Therefore, I agree to give consent to participate as a subject in this research project.

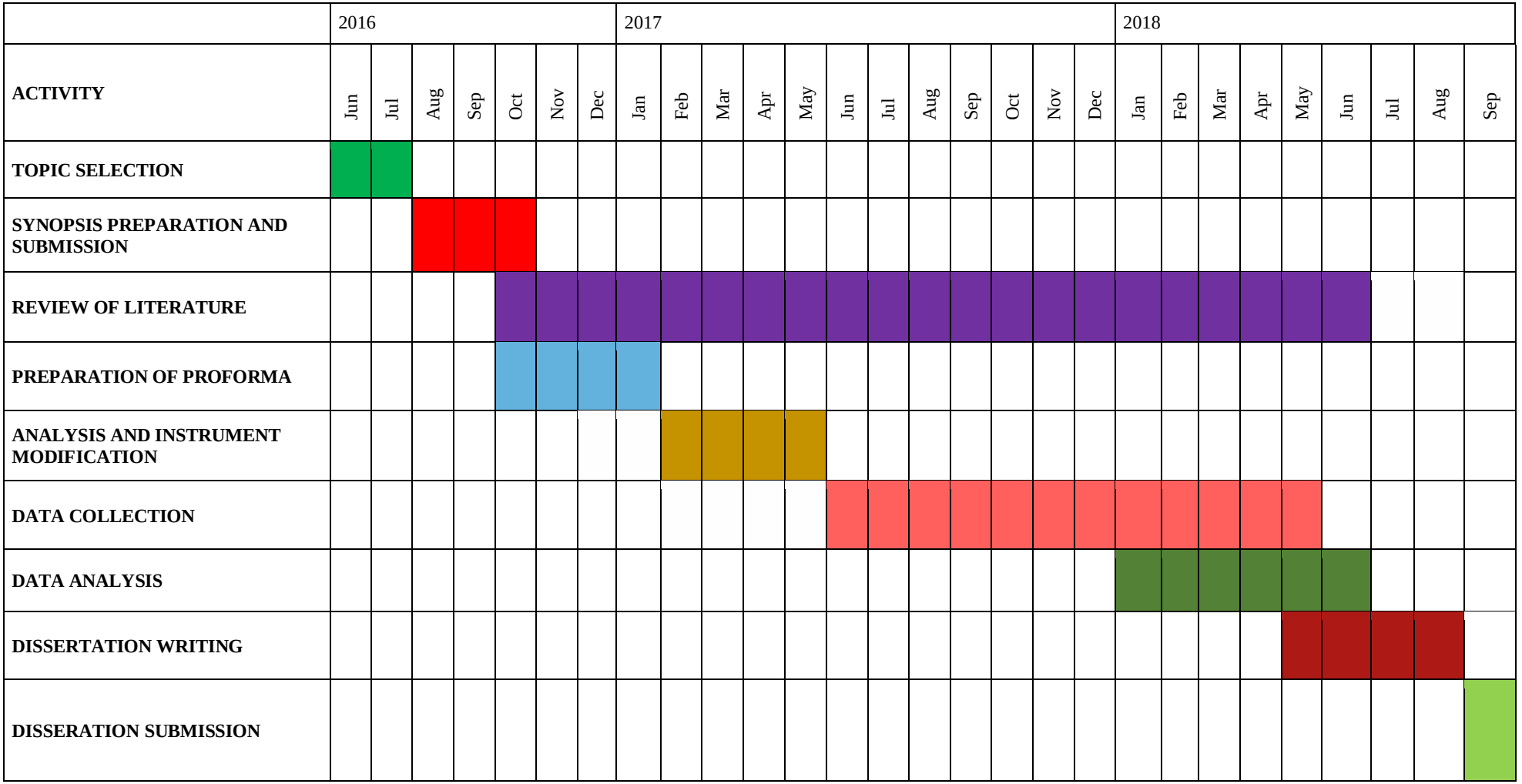
_____ Date:

(Participant signature)

_____ Date:

(Witness signature)

ANNEXURE IV - GANTT CHART



ANNEXURE V

PHOTOGRAPHS