

Original Research Article

Prevalence of hypertension and its risk factors among transport workers in South India

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ABSTRACT

Background: Cardiovascular disease accounts for approximately 17 million deaths a year and complications of hypertension accounts for 9.4 million deaths worldwide every year. High blood pressure is a major public health problem in India and its prevalence is rapidly increasing. Cardiovascular disease including hypertension was most common among transport workers. Bus drivers have higher rates of mortality, morbidity and absence due to illness when compared to employees from a wide range of other occupational groups.

Methods: This cross sectional study was done in south India, during June to December 2018. A total of 450 participants were selected. A self-administered questionnaire was used to collect data and summarized using descriptive statistics. A p value of <0.05 was considered significant.

Results: Out of the total 450 participants, 125 (27.8%) were hypertensives. Among the hypertensives, 98 (78.4%) participants were smokers, 103 participants (82.4%) had consumed alcohol which was significantly associated with the outcome of hypertension. Lack of physical activity 108 (86.4%), excess salt 108 (86.4%) and fat intake 89 (79.2%) had statistically significant association with hypertension. A higher body mass index and waist to hip ratio more than WHO recommended range was also found to be prone to hypertension.

Conclusions: The study revealed higher prevalence of hypertension was found among the drivers group compared to conductors and desk workers. Regular periodic examinations with alleviation of the above lifestyle and occupational risk factors among the three groups with special attention to drivers would help achieve apt ergonomics.

Keywords: Hypertension, Transport workers, Modifiable risk factors, South India

INTRODUCTION

Cardiovascular disease accounts for approximately 17 million deaths a year, nearly one third of the total deaths.¹ Of these, complications of hypertension accounts for 9.4 million deaths worldwide every year.² Hypertension is responsible for at least 45% of deaths due to heart disease, and 51% of deaths due to stroke.¹

Global prevalence: The prevalence of hypertension is highest in the African region at 46% of adults aged 25

and above, while the lowest prevalence at 35% is found in the Americans. Overall, high-income countries have a lower prevalence of hypertension (35%), than other groups at 40%.^{3,4}

Indian prevalence: High blood pressure (BP) is a major public health problem in India and its prevalence is rapidly increasing among both urban and rural populations. In fact, hypertension is the most prevalent chronic disease in India.⁵

The prevalence of hypertension ranges from 20-40% in urban adults and 12 to 17% among rural adults. The number of people with hypertension is projected to increase from 118 million in 2000 to 214 million in 2025, with nearly equal numbers of men and women.⁶

According to some epidemiological studies, following diseases are most common among transport workers: cardiovascular disease including hypertension, gastrointestinal illnesses including peptic ulcer and digestive problems, and musculoskeletal problems including back and neck pain.

Bus drivers have higher rates of mortality, morbidity, and absence due to illness when compared to employees from a wide range of other occupational groups. Increased disease rates have been found for drivers.⁷ So this study was conducted to determine the prevalence of hypertension among transport workers and its risk factors.

Objectives

The objectives of the study were to determine the prevalence of hypertension among transport workers; to assess the socio demographic and modifiable risk factors associated with the condition among transport workers.

METHODS

A cross-sectional study was conducted over a period of 7 months from June 2018 to December 2018.

Study setting

In two bus depots selected by purposive sampling in Salem, the study population consisted of three groups, namely; drivers, conductors and desk workers.

Sample size calculation

The prevalence of hypertension among road transport corporation (RTC) employees was observed to be 56% in a study by Wang et al.⁸

Sample size was calculated using the formula,

$$n = \frac{t \times p \times q}{d^2},$$

Where, n=required sample size,

t=confidence level at 95% (standard value of 1.96),

p=estimated prevalence of hypertension,

d=precision value (value is 0.05).

15% was added to this sample size to account for incomplete response and non-responses bringing the sample size to 435 which were rounded off to 450.

Sampling technique

The total employee workforce among the two depots was 1213, comprising of 591 (48.7%) drivers, 437 (36%) conductors and other employees (including clerks, supervisors, cleaners, traffic guides, welders, mechanics, security guards) were 185 (15.3%). There were 200 drivers, 200 conductors and 50 desk workers were recruited for the study in a 4:4:1 ratio to obtain the required sample of 450 by simple random sampling from the three groups of employees respectively.

Sampling

Prior to the study, permission for conducting the study was sought from the depot manager. A semi-structured questionnaire was used to gather data. The questionnaire was initially translated into the local language and re-translated from Telugu to English to ensure backwards compatibility. The questionnaire was pre-tested in a pilot study and the final version was used.

Informed verbal consent was obtained from the participants after explaining the purpose of the study. During the entire process, confidentiality was maintained.

Inclusion criteria

All participants employed in their respective occupation for a period of at least 1 year.

Exclusion criteria

Participants with language barriers and unable to respond.

Responses were obtained to the oral questionnaire regarding socio-demographic information, modifiable, non-modifiable risk factors, job characteristics and psychosocial risk factors among road transport employees. Anthropometric measurements and blood pressure recordings were also obtained as per American Heart Association (AHA) guidelines.

Blood pressure was measured using AHA guidelines, using a mercury sphygmomanometer by the palpatory method followed by the auscultatory method. The participant was asked to sit quietly and comfortably in a chair with back support in a quiet room for a period of about five minutes prior to measurement. With an appropriate adult sized cuff of 13×30 cms, using a well maintained instrument, with the subject in an appropriate position, (participants seated comfortably, with back supported, legs uncrossed, persons arm at heart level), blood pressure was measured in the non-dominant hand with the upper arm bared. Two separate readings were obtained at an interval of one minute. The mean of the two measurements was recorded as the blood pressure of the participant as per the guidelines.

Participants who were known hypertensives on treatment and newly diagnosed participants with a systolic blood pressure of more than 140 or diastolic blood pressure of more than 90 were classified as hypertensives.

Statistical analysis

Statistical analysis was done using SPSS version 20. Categorical variables were appropriately coded for data entry. Numerical data and BP recording were entered as such. Descriptive statistical measures obtained were frequencies, percentages, proportions, means and standard deviation. Data were analyzed using test of proportion, Chi square test and Fischer’s exact test.

RESULTS

From Figure 1, among the participants 125 (27.8%) were hypertensive, whereas 325 (72.2%) did not have hypertension. A majority of the participants, 154 (34.2%) were in the age group of 31 to 40 years among RTC workers. Majority 414 (92%) of the RTC workers were males. Based on modified Kuppuswamy classification of

socio economic status, 423 (94%) belong to upper middle class, 27 (6%) belong to lower middle class. The drivers and conductors were mostly educated up to high school or intermediate, whereas 12 (2.7%) of the desk workers were graduates (Table 1).

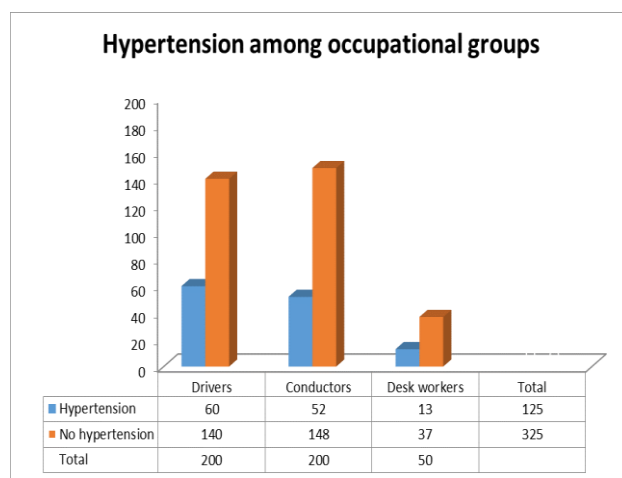


Figure 1: Hypertension among occupational groups.

Table 1: Socio demographic characteristics among RTC workers

Socio demographic factors		Drivers	Conductors	Desk workers	Total
		N (%)	N (%)	N (%)	N (%)
Age (in years)	21-30	40 (8.9)	44 (9.8)	10 (2.2)	94 (20.9)
	31-40	65 (14.4)	71 (15.8)	18 (4.0)	154 (34.2)
	41-50	62 (13.8)	57 (12.7)	14 (3.1)	133 (29.6)
	51-60	33 (7.3)	28 (6.2)	8 (1.8)	69 (15.3)
Gender	Male	200 (44.4)	177 (39.3)	37 (8.2)	414 (92)
	Female	0 (0)	23 (5.1)	13 (2.9)	36 (8)
Education	High school certificate	47 (10.4)	48 (10.7)	4 (0.9)	99 (22)
	Intermediate or post high school diploma	153 (24)	152 (33.8)	34 (7.6)	339 (75.3)
	Graduate or post graduate	0 (0)	0 (0)	12 (2.7)	12 (2.7)

Table 2: Association of modifiable risk factors with hypertension among RTC workers.

Variables		Presence of Hypertension		P value
		Yes	No	
		N (%)	N (%)	
Smoking	Yes	98 (78.4)	128 (39.3)	<0.001
	No	27 (21.6)	197 (60.6)	
Alcohol	Yes	103 (82.4)	45 (13.8)	<0.001
	No	22 (17.6)	280 (86.1)	
Exercise	Yes	17 (13.6)	129 (39.6)	<0.001
	No	108 (86.4)	196 (60.3)	
Salt intake	Excess	108 (86.4)	72 (22.1)	<0.001
	Normal	17 (13.6)	253 (77.8)	
Fat intake	Excess	89 (71.2)	142 (43.6)	<0.001
	Normal	36 (28.8)	183 (56.3)	
Fibre intake	≥3 times a week	17(13.6)	147 (45.2)	<0.001
	<3 times a week	108 (86.4)	178 (54.7)	

From Table 2 majority 98 (78.4%) were smokers among the hypertensives and was significantly associated with the outcome. More than 3/4th 103 (82.4%) had consumed alcohol which was significantly associated with the outcome of hypertension. Workers who did not indulge in any physical activity 108 (86.4%) were hypertensives and

was significantly associated. Workers 108 (86.4%) who consumed excess intake of salt >15 g/day and fat >40 ml/day/person 89 (79.2%) had statistically significant association ($p < 0.001$). Lack of regular consumption of dietary fibre was significant for hypertension on a chi square test.

Table 3: Association of modifiable risk factors with hypertension among RTC workers.

		Presence of hypertension		P value
		Yes (%)	No (%)	
BMI	<25	19 (15.2)	199 (61.2)	<0.001
	>25	106 (84.8)	126 (38.7)	
Waist hip ratio (males)	< 0.9	0 (0)	98 (30.1)	<0.001
	> 0.9	121 (96.8)	195 (60.9)	

Among the total hypertensives, 106 (84.8%) had a body mass index more than 25, and the p value was significant. Similarly, among the male hypertensives, 121 (96.8%), had a waist to hip ratio more than 0.9, which is more than normal as per WHO guidelines for male participants and the association was statistically significant.

DISCUSSION

Hypertension is a chronic condition of concern due to its role in the causation of coronary heart disease, stroke and other vascular complications. WHO has announced “control your blood pressure” as theme of world health day of the year 2013. Hypertension is a silent, invisible killer that rarely causes symptoms. Certain occupations are at a higher risk for developing hypertension by virtue of their physical, psychological and lifestyle habits. Bus drivers are at a particularly high risk due to the long hours of work, strenuous, sedentary positions adopted, exposure to noise and chemicals and psychosocial occupational factors which leads to a greater prevalence amongst this occupation than the general population.⁸ Raised blood pressure is a serious warning sign that significant lifestyle changes are urgently needed. To raise awareness and prevention needs to support healthy lifestyles: eating a balanced diet, reducing salt intake, avoiding harmful use of alcohol, getting regular exercise and shunning tobacco. Access to good quality medicines, which are effective and inexpensive, is also vital, particularly at the primary care level. As with other non-communicable diseases, awareness aids early detection while self-care helps ensure regular intake of medication, healthy behaviour and better control of the condition.⁹

In the current study, the prevalence of hypertension among the RTC employees was 27.8% (n=125). Among the sample, 70 (15.6%) of the study participants were previously known hypertensives on treatment and had their blood pressure within normal limits, and 55 (12.2%) were classed as Stage I hypertensives. The mean systolic blood pressure and diastolic blood pressure among the hypertensives were 139.26 ± 5.48 and 88.96 ± 4.25 mm of Hg respectively. A similar prevalence of hypertension

(26%) was obtained by Reddy et al, who studied hypertension among industrial workers in various cities of India.¹⁰ This is also in concordance with the general urban prevalence of hypertension which ranges from 20 to 40%.⁶

The prevalence of hypertension among the bus drivers was about 13.3% (n=60), and among the conductors and desk workers it was 11.5% (n=52) and 2.8% (n=13) respectively in the current study. Sathesh et al, who studied the prevalence of hypertension among bus drivers in Bangalore city, found the prevalence to be 16% similar to the current study.¹¹ However, Wang et al, who studied the prevalence of hypertension among road traffic corporation employees in Taiwan, obtained a prevalence of 56%.⁸ The differences can be attributed to regional variations and differences in defining hypertension and the sample denominator.

Socio-demographic characteristics

Socio-demographic characteristics evaluated included age, gender, literacy, income, socioeconomic status, marital status, past history of medical and surgical illness.

A majority of the participants, 154 (34.2%) were in the age group of 31 to 40 years followed by 69 (15.3%) participants in the age group of 51 to 60 years. The frequency of hypertension was more among participants of higher age groups. Age was also a risk factor among the studies by Anderson et al.^{12,13} Age is an essential factor in the occurrence of hypertension due to the association with age related degeneration and atherosclerosis and age is also a covariate in the exposure of occupational factors related to the duration of the job.

The drivers group consisted exclusively of males, among conductors and desk workers, relatively few of the workers were females, viz. 23 (5.1%) and 13 (2.9%) respectively. In the sample, the drivers group consisted entirely of men, and only fewer females were present in other two groups, hence tests of significance were not obtained for gender.

Socioeconomic status was calculated using modified Kuppuswamy scale, which is a composite index of education, occupation and total family monthly income. Among the total sample 423 (94%) belonged to the upper middle class, 27 (6%) belong to lower middle class. Participants from the upper socio economic classes were more likely to develop hypertension. In a study conducted by Gilberts et al, in a rural south Indian community, they observed that the prevalence of hypertension in the highest socioeconomic group was more than twice that in the lowest socioeconomic group.¹⁴

Risk factors

Relationship between smoking and hypertension was evaluated in the present study and among the hypertensives, 98 (78.4%) were smokers and 27 (21.6%) were not smokers. Among the non hypertensives, 128 (39.3%) were smokers whereas 197 (60.7%) were not smokers, which proved a strong association between smoking and hypertension. Liu et al studied the association between cigarette consumption and hypertension, and demonstrated that smoking quantity was positively associated with hypertension.¹⁵

Consumption of alcohol was evaluated as an independent risk factor for development of hypertension, among the total hypertensive participants, 103 (82.4%) had consumed alcohol in the previous month and 22 (17.6%) had not. A significant association between consumption of alcohol and the outcome of hypertension was found in the current study. Puddey et al also studied the relationship between alcohol and blood pressure.¹⁶ Consumption of alcohol elevates blood pressure and the increase in blood pressure occurs irrespective of the type of alcoholic beverage. Similar finding were also obtained by Klatsky et al who studied the prevalence of systemic hypertension among moderate alcohol drinkers. They also observed that alcohol drinking is associated with an increased prevalence of systemic hypertension.¹⁷

Lack of physical activity was found to be a significant risk factor for the development of hypertension among the participants in the present study. 17 (13.6%) of the hypertensives indulged in regular physical activity or exercise whereas 108 (86.4%) did not involve in any such activity. Fagard et al studied the effect of physical activity on blood pressure control in hypertensive patients.¹⁸ The study was a meta-analysis of nine randomized controlled trials (12 study groups) on aerobic exercise and the results revealed a weighted net reduction in blood pressure of 3.2 (p=0.10) in systolic blood pressure and 3.5 (p<0.01) mmHg in diastolic blood pressure associated with exercise. Lesniak et al also studied the relationship between exercise and hypertension, found incorporation of physical activity with other lifestyle interventions provides multiple benefits to hypertensive patients that extend beyond a reduction in blood pressure.¹⁹

In the current study, 409 (90.9%) participants were on mixed diet. Among the hypertensives 112 (89.6%) were on mixed diet, and type of diet was not a significant risk factor for the development of hypertension. In contrast to present study, Appleby et al compared the prevalence of self-reported hypertension and mean systolic and diastolic blood pressures in four diet groups (meat eaters, fish eaters, vegetarians and vegans) to investigate dietary factors that might account for any differences observed between the groups.²⁰ Non-meat eaters, especially vegans, had a lower prevalence of hypertension and lower systolic and diastolic blood pressures than meat eaters. The differences between the current study and literature may be accounted for by the low number of vegetarians in the current study.

Excess intake of salt, more than 15 g per day was measured in the present study and among the participants, 108 (86.44%) participants had hypertension, and prevalence of hypertension was more among those who consumed excess salt.

Radhika et al studied the dietary salt intake and hypertension in an urban south Indian population and obtained similar results.²¹ Participants in the highest quintile of salt intake had a significantly higher prevalence of hypertension than did those in the lowest quintile (48.4% versus 16.6%, p<0.0001). Both systolic and diastolic blood pressure significantly increased with increase in quintiles of total dietary salt both among hypertensive and normotensive participants (p<0.0001) in their study. Mir et al studied the relationship of salt intake and arterial blood pressure in salted-tea drinking Kashmiris.²² Both the systolic and diastolic blood pressures showed a significant increase with the salt intake and multiple regression analysis suggested an independent effect of salt intake on blood pressure after adjusting for age.

Excess fat intake was recorded in the present study among 231 (51.3%) of the participants. Among these, 89 (19.8%) were hypertensive. Excess fat consumption was found significant for the development of hypertension. Consumption of high saturated fat was positively associated with the development of hypertension in the present study. Among the total participants, 74 (16.4%) used high saturated oil for house hold cooking purpose and 35 (7.8%) among them were hypertensives.

Beegom et al also studied the association of higher saturated fat intake with hypertension in an urban population of Trivandrum in South India.²³ Total and saturated fat intake, and the consumption of coconut oil and butter, flesh foods, milk and yogurt as well as sugar and jaggery were significantly associated with hypertension. The odds ratio indicates higher risk of hypertension due to higher intake of saturated fat in both sexes (odds ratio, men, 1.07, 95% confidence interval 1.05-1.09; women, 1.08, 1.06-1.12, p<0.01).

Lack of regular consumption of dietary fibre was significant for development of hypertension in the current study, 286 (63.6%) of the participants consumed dietary fibre less than three times a week and lack of regular consumption of dietary fibre was significant for occurrence of hypertension. Streppel et al performed a meta-analysis of randomized placebo-controlled trials to estimate the effect of fibre supplementation on BP overall and in population subgroups and found fibre supplementation (average dose, 11.5 g/d) reduced systolic BP by 1.13 mm Hg (95% confidence interval: 2.49 to 0.23) and diastolic BP by 1.26 mm Hg (95% confidence interval: 2.04 to 0.48).²⁴ Whelton et al conducted a meta-analysis of 25 randomized controlled trials, to assess the effect of dietary fibre intake on blood pressure.²⁵ The results indicated that increased intake of dietary fibre may reduce BP in patients with hypertension.

A high body mass index was found significantly associated with hypertension in the current study. Among the participants, 232 (51.6%) had a BMI more than 25, and among the hypertensive participants, 106 (84.8%) had a BMI more than 25. Tesfaye et al studied the association between BMI and BP in three populations across Africa and Asia.²⁶ The risk of hypertension was higher among population groups with overweight and obesity. BMI was significantly and positively correlated with both systolic BP and diastolic BP in all the three populations, correlation coefficient (r) ranging between 0.23 and 0.27. The intersect study conducted by Dyer et al to find relation of body mass index to blood pressure also observed that body mass index was related significantly to systolic blood pressure, diastolic pressure and the prevalence of hypertension in both men and women.²⁷

The relation between waist to hip ratio (WHR) and hypertension was assessed in the current study and an increase in WHR was significantly associated with the prevalence of hypertension among the males but not among the females. This can be attributed to the low number of female participants in the current study. Gupta R studied the impact of body-mass index, waist-size, waist-hip ratio and cardiovascular risk factors in urban participants and found a significant positive correlation between BMI, waist-size and WHR with systolic BP ($r=0.46$ to 0.13), diastolic BP (0.42 to 0.16).²⁸ They concluded that there is a continuous positive relationship of all markers of obesity (body-mass index, waist size and waist hip ratio) with hypertension.

CONCLUSION

This cross sectional study was conducted to evaluate socio-demographic characteristics, modifiable, non-modifiable risk factors of hypertension, anthropometry and blood pressure recordings of 450 participants, divided into three group of employees, 200 drivers, 200 conductors and 50 desk workers. Descriptive statistics and inferential statistics were used to test association

between independent variables hypertension. Among the modifiable risk factors, cigarette smoking, consumption of alcohol and excess consumption of salt was significantly associated with hypertension. Adequate intake of fibre and regular physical activity were preventive against hypertension in the study sample. The priori hypothesis indicated that drivers and conductors were more likely to suffer from hypertension when compared to the desk workers. A higher body mass index was significant for developing hypertension and male participants who had a waist to hip ratio more than WHO recommended range were also found to be prone to hypertension in the study results. Higher prevalence of hypertension was found among the occupational work group of drivers when compared to conductors and desk workers.

Recommendations

Regular periodic examinations with alleviation of the above lifestyle and occupational risk factors among the three groups with special attention to drivers would help achieve apt ergonomics and reduce the morbidity and mortality of the burgeoning modern, slow epidemic of hypertension and subsequent co-morbidities including cardiovascular disease.

Health regulations exist with primary health care and facility based medical check-up for the employees along with referral services, which can be further supplanted with a focus on the occupational risk factors which remain largely neglected. Health education for the drivers, conductors and desk workers with regard to regular breaks, avoidance of risk factors and prompt health seeking behaviour can be emphasized.

Establishment of specialized non communicable diseases cells for screening, management, health education, health promotion and encouragement of treatment adherence will help enable primary and primordial prevention and reduce the number of lost work days leading to achievement of positive health and well-being.

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