



# A Study on Prevalence and Socio Demographic Risk Factors for Hypertension Among Bus Drivers and Conductors of Southern India

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## ABSTRACT

**Background:** Hypertension is one of the diseases of occupational origin. The percentage of hypertensive increases when selected occupational groups are screened. Transport personnel are one such group who are at risk of developing hypertension due to the nature of their profession.

**Objective:** To study the prevalence of hypertension and socio demographic risk factors for hypertension among bus drivers and conductors of NEKRTC, Raichur division.

**Methods:** A cross sectional study comprising of 360 bus drivers and 338 bus conductors was undertaken in two NEKRTC depots of Raichur division, Raichur. Data was collected by interviewing study subjects and by physical examination and analyzed using percentages and Chi square test.

**Results:** Prevalence of hypertension among bus drivers and conductors was found to be 25.3% and 19.8% respectively. Socio demographic factors like age, marital status, type of family, socioeconomic status was significantly associated with hypertension in bus drivers while in conductors only age and marital status were significantly associated with hypertension.

**Conclusion and recommendations:** Prevalence of hypertension is higher in bus drivers and conductors, thus periodic screening and monitoring of blood pressure in these transport personnel along with provision of preventive and curative services to them at the earliest will be an effective strategy.

**Key words:** Hypertension, Bus drivers, Conductors

## INTRODUCTION

Currently Non-Communicable Diseases (NCD) has replaced the communicable diseases as the most common cause of morbidity and premature mortality worldwide. Of 56 million global deaths in 2012, 38 million (68%) were due to Non-Communicable Diseases, of which around 17.5 million deaths (46.2%) were due to cardiovascular diseases.<sup>1</sup> Hypertension is one of the most common cardiovascular diseases with the global prevalence in adults aged 18 years and over around 22%.<sup>2</sup>

The World Health Organization and the seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure (JNC-7) defines Hypertension as systolic blood pressure more than or equal to 140 mmHg and/or diastolic blood pressure more than or equal to 90 mmHg.<sup>3,4</sup> Hypertension has concomitant risks of coronary artery disease, congestive heart failure, stroke, end stage renal disease, dementia, and blindness.<sup>5,6</sup>

According to the report of survey conducted by ICMR in 2007-08, the prevalence varied from 17% to 21%

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in all the states of India included in the survey with marginal rural-urban differences.<sup>7</sup>

It has long been acknowledged that certain occupation will exacerbate or even cause cardiovascular disease. Hypertension is one of the diseases of occupational origin. The percentage of hypertensive increases more when selected occupational groups are screened. Analysis of data from the 1999–2004 National Health and Nutrition Examination Survey (NHANES) of 6,928 adult U.S. workers showed that prevalence of hypertension varied among the 13 occupational groups in the study ranging from 10.5% to 28%.

Transport personnel are one such group who are at risk of developing hypertension due to the nature of their profession. There are many studies conducted in western countries in drivers but these studies were not conducted specifically on hypertension but were on their wellbeing, work disability and cardiovascular disease risk factors in general and covering hypertension as a part thereof.<sup>9-11</sup> Also very few studies have been conducted in bus drivers and conductors in Indian context. Hence this study was undertaken to estimate the prevalence and socio demographic determinants of hypertension among bus drivers and conductors.

## METHODOLOGY

A Cross-sectional study was carried out in the bus depots of Raichur Division for a period of one year from January 2016 to December 2016. Raichur Division of NEKRTC consists of two bus depots which are located in Raichur district, Karnataka. All the bus drivers and conductors working during the period of data collection in two NEKRTC bus depots of Raichur division were included in the study. We also included those who were previously diagnosed with hypertension in the study. Individuals who were not willing to participate in the study were excluded. Thus, total of 698 transport personals, 360 drivers and 338 conductors were included in the study sample.

Approval of Ethical committee of Raichur Institute of Medical Sciences, Raichur and permission from the Division Controller of Raichur District and from concerned Depot Manager was taken before the start of the study. Before starting the study, the Divisional Controller and the depot managers were approached and informed about the details of the study. Two general meetings with bus drivers and conductors, one in each bus depot, were conducted to explain them in detail the rationale behind carrying out this study and were encouraged to participate in the study. Those already diagnosed with hypertension or diabetes were asked to bring their previous health records for the interview. In order to interview all the bus drivers and conductors within the study period, weekly two visits were done to the depots. 10-15 staff members (bus drivers and conductors) were interviewed during each visit.

Data was collected using a pre-tested semi structured questionnaire after obtaining the verbal consent of the study subjects. Physical examination was undertaken after the interview.

A detailed questionnaire was prepared and was pre-tested and validated during the pilot study. It included information on socio demographic variables, Section II - contained information on risk factors for hypertension and Section III - a record of the parameters obtained during physical examination. Section II and III are not part of this paper.

Pilot study conducted included 30 bus drivers. Based on the pilot study appropriate changes were made in the initial questionnaire and a final questionnaire was prepared and used for the study. Blood Pressure (BP) was recorded using a mercury sphygmomanometer by Palpatory and Auscultatory method. Two BP readings were recorded 5 minutes apart in the sitting position and the mean of two BP measurements was taken for analysis. Prehypertension defined as SBP between 120 to 139 mmHg and/or DBP between 80 to 89 mmHg. Hypertension is defined as SBP more than or equal to 140 mmHg or DBP more than or equal to 90 mmHg. Those individuals already diagnosed as hypertensive were also labelled as hypertensive.<sup>4</sup>

Data was analyzed and presented in frequency tables and graphs using Microsoft word and Excel. Chi-square test was applied to test statistical significance wherever necessary. Significance is assessed at 5% level of significance and p-value of <0.05 was considered as statistically significant. Odds Ratio and confidence interval was also calculated. SPSS 16.0 statistical software was used for analysis.

## RESULTS

Among the study participants, majority were in the age group of 31 to 40 years. All drivers were males and only 15 of the 338 conductors were females. Nearly 50% had completed secondary school education. Hindus were in majority. Two third of study participants were married and nearly half of them belonged to nuclear family. 48.3% of bus drivers belonged to class III and 47% of conductors belonged to class II.

Hypertension was found in 91(25.3%) out of 360 drivers and 67 (19.8%) out of 338 conductors (Figure 1). Prehypertension was found in 56.7% bus drivers and 58.6% conductors. Out of total hypertensives, 70.3% subjects had Grade I hypertension, 18.7% subjects had Grade II hypertension while only 11% had BP under control. Out of 91 bus drivers with hypertension, 30.8% had known history of hypertension while 69.2% were newly diagnosed during the study.

Among conductors, out of total hypertensives, 71.6% subjects had Grade I hypertension, 22.4% subjects had Grade II hypertension and while only 6% subjects had BP under control. (Table 1)

**Table 1: Distribution of study subjects based on their blood pressure level as per JNC 7**

Category	Drivers (%)	Conductors (%)
<b>Total Participants</b>	<b>n=360</b>	<b>n=338</b>
Normotensive	65 (18)	73 (21.6)
Prehypertensive	204 (56.7)	198 (58.6)
Hypertensives	91 (25.3)	67 (19.8)
<b>Sub-groups among hypertensives</b>	<b>n=91</b>	<b>n=67</b>
Hypertensives with raised BP on examination*		
Grade I	64 (70.3)	48 (71.6)
Grade II	17 (18.7)	15 (22.4)
Known hypertension cases with controlled BP	10 (11)	4 (6)

\*Hypertensives with raised blood pressure includes both newly diagnosed cases and known hypertension cases having high BP.

**Table 2: Distribution of study subjects based on Socio-demographic details and its association with Hypertension**

Study group	Drivers			Conductors		
	HTN (n=91)(%)	Non-HTN (n=269)(%)	OR (95% CI)	HTN (n=67)(%)	Non-HTN (n=271)(%)	OR (95% CI)
<b>Age group (In years)</b>						
21-30	3(3.8)	75(96.2)	Ref	2(2.6)	75(97.4)	Ref
31-40	30(23.3)	99(76.7)	7.58 (2.23-25.77)	23(18.9)	99(81.1)	8.71 (1.99-38.11)
41-50	34(30.9)	76(69.1)	11.18 (3.29-37.99)	23(24.7)	70(75.3)	12.32 (2.8-54.19)
51-60	24(55.8)	19(44.2)	31.58 (8.59 -116.05)	19(41.3)	27(58.7)	26.39 (5.76- 120.89)
Test of significance	$\chi^2=42.322$ ; DF=3; P<0.001			$\chi^2=29.213$ ; DF=3; P<0.001		
<b>Education</b>						
Primary school	5(50)	5(50)	Ref	0(0)	0(0)	-
Middle school	19(44.2)	24(55.8)	0.79 (0.2-3.14)	5(41.7)	7(58.3)	Ref
Secondary school	48(23.6)	155(76.4)	0.31 (0.09 -1.12)	29(20.1)	115(79.9)	0.35 (0.1-1.19)
PUC/Diploma	17(19.5)	70(80.5)	0.24 (0.06-0.94)	25(18.9)	107(81.1)	0.33 (0.1-1.12)
Graduation/Postgrad	2(11.8)	15(88.2)	0.13 (0.02-0.92)	8(16)	42(84)	0.27 (0.07-1.05)
Test of significance	$\chi^2=14.821$ ; DF=4; P=0.005			$\chi^2=4.136$ ; DF=4; P=0.247		
<b>Religion</b>						
Hindu	60(24.3)	187(75.7)	Ref	55(19.4)	229(80.6)	Ref
Muslim	31(27.7)	81(72.3)	1.19 (0.72-1.98)	12(24)	38(76)	1.31(0.64-2.68)
Christian	0(0)	1(100)	-	0(0)	4(100)	-
Test of significance	$\chi^2=0.807$ ; DF=2; P=0.668			$\chi^2=1.575$ ; DF=2; P=0.455		
<b>Current marital status</b>						
Married	85(27)	230(73)	2.4 (0.98-5.88)	61(21.8)	219(78.2)	2.41(0.99-5.89)
Unmarried/ widowed	6(13.3)	39(88.6)	Ref	6(10.3)	52(91.2)	Ref
Test of significance	$\chi^2= 3.884$ ; DF=1; P=0.0487			$\chi^2=3.957$ ; DF=1; P=0.046		
<b>Type of family</b>						
Nuclear	61(36.3)	107(63.7)	3.32 (1.91-5.75)	44(23.7)	142(76.3)	1.76 (0.97-3.19)
Three generation	8(19)	34(81)	1.37 (0.56-3.34)	4(16)	21(84)	1.08 (0.33-3.51)
Joint	22(14.7)	128(85.3)	Ref	19(15)	108(85)	Ref
Test of significance	$\chi^2=20.629$ ; DF=2; P<0.001			$\chi^2=3.838$ ; DF=2; P=0.147		
<b>Socioeconomic class</b>						
Class I	9(34.6)	17(65.4)	2.44(1-5.99)	10(22.7)	34(77.3)	1.18 (0.12-11.76)
Class II	51(33.3)	102(66.7)	2.31(1.38-3.85)	35(22)	124(78)	1.13 (0.12-10.43)
Class III	31(17.8)	143(82.2)	Ref	21(16.4)	107(83.6)	0.79 (0.08-7.38)
Class IV	0(0)	6(100)	-	1(20)	4(80)	Ref
Class V	0(0)	1(100)	-	0(0)	2(100)	-
Test of significance	$\chi^2=13.954$ ; DF=4; P=0.007			$\chi^2=2.148$ ; DF=4; P=0.709		

Ref - Reference category, OR - Odds Ratio, CI - Confidence interval

A statistically significant upward trend in prevalence of hypertension was observed with increase in age and currently married bus drivers and conductors. While lower education, nuclear family and higher socioeconomic status showed higher prevalence of hypertension among bus drivers but not in conductors (Table 2).

## DISCUSSION

In present study, the prevalence of hypertension in bus drivers and conductors was found to be 25.3% and 19.8% respectively. This finding in bus drivers is high compared to prevalence in general population as reported by survey conducted by ICMR, wherein the prevalence varied from 17% to 21% in all the

states of India included in the survey with marginal rural-urban differences.<sup>7</sup> The observed difference could be due to their occupation, which needs to be explored further.

These findings are more or less comparable with the findings of other studies conducted by Dabrh et al<sup>12</sup> 23%, Joshi et al<sup>13</sup> 23.8% and Smolarek et al<sup>14</sup> 24%. However, higher prevalence was reported in studies conducted by Rao et al<sup>15</sup> 36%, Priya et al<sup>16</sup> 35%, Lakshman et al<sup>17</sup> 41.3% and Nayak et al<sup>18</sup> 46%. Higher prevalence reported in above mentioned studies compared to our study was probably due to including more number of elderly study subjects in their study, while most of the study subjects in our study belonged to younger age groups and it is known fact that as age increases, prevalence of hypertension also increases. Few other studies also reported lower prevalence of hypertension in bus drivers namely Udayar et al<sup>19</sup> 14.21% and Satheesh B.C and Veena R.M<sup>20</sup> 16%.

One significant observation done during this study was that nearly two thirds of the hypertension cases among drivers and conductors were newly diagnosed during the study. This explains the burden of the disease among such occupations and the need for having a regular screening program for the employees for the early detection and prompt treatment.

Steady increase in prevalence of hypertension with increasing age was observed, consistent with findings of study conducted by Rao et al<sup>15</sup> which showed that 50% of drivers over 50 years of age had hypertension. Educational status and hypertension prevalence were inversely proportional in our study. These findings are comparable to the results of other studies carried out by Borle and Jadhao<sup>21</sup> and Lakshman et al<sup>17</sup>.

Distribution of hypertension cases varied with the religion; being more prevalent in Muslims compared to other religions. Joshi et al<sup>13</sup> reported similar findings of 32.3% of Muslims having hypertension compared to 21.6% in Hindus (P=0.04). However, commenting on prevalence of hypertension in Christians in both the studies will be inaccurate due to smaller number of individuals belonging to this religion among study participants.

The observed association of hypertension and marital status was also similarly stated by Lakshman et al<sup>17</sup> in their study with higher proportion of hypertensive found among married/divorced drivers (45.6%) compared to 21.9% in unmarried drivers (P=0.01).

Participants belonging to nuclear family contributed to more cases than those from joint family. Odds of having hypertension among drivers and conductors belonging to nuclear family are 3.32 and 1.76 times than those from joint family respectively. Recent trend of shifting of joint families to nuclear type has increased the financial and social burden on earning members of such families thus adding to the stress

and this probably might be a risk factor for hypertension in drivers. These findings were comparable to the study conducted by Joshi et al<sup>13</sup>.

Socioeconomic status is found to be directly proportional to prevalence of hypertension in present study as reported by Joshi et al<sup>13,22</sup>, Tobin et al (2013)<sup>23</sup> in which higher the socioeconomic status, more was the prevalence of hypertension. However, Borle and Jadhao et al<sup>21</sup> reported negative association in their study. This could be due to recent change in the life-style of people from lower socioeconomic strata.

## LIMITATIONS

Estimated prevalence was based on a single occasion measurement of blood pressure. As very few studies are carried out among bus conductors, hence only a single study was used for discussion and making inferences. Other behavioural and work-related risk factors which could have contributed to the high prevalence of hypertension in the study population were not studied.

## CONCLUSION AND RECOMMENDATIONS

There is higher prevalence of hypertension among transport personal compared to general population. Thus, there warrants the need for regular high risk screening program for early diagnosis and treatment of diseases like hypertension and diabetes mellitus. Out of total known hypertensives in present study, very few study subjects were found to have their blood pressure under control. This emphasizes the need to educate them about the necessity of taking treatment with good compliance and periodic follow up to prevent complications. All the participants are acknowledged for their contribution made to the study.

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