



Prevalence of hypertension and its concomitants: An exploratory study among a group of bus drivers in Kolkata, West Bengal

Monojit Das¹, Akash Mallick², Subir Biswas³

1 Research Assistant Cultural research Institute, Kolkata, India ; 2 Senior Research Fellow Biological Anthropology Unit, Indian Statistical Institute, Kolkata, India; 3 Professor Department of Anthropology West Bengal State University, West Bengal, India. Corresponding author: akashmallick123@gmail.com

KEYWORDS

Alcohol intake, Bus drivers, Hypertension, India, Pre-hypertension, Smoking
Introduction

ABSTRACT

The present study was carried out in Kolkata to find out the prevalence of hypertension among bus drivers and if any concomitant factor(s) is/are responsible for it. Bus drivers, a vulnerable occupational group, are exposed to adverse workplace environmental conditions which play major role in developing hypertension among them. This study indicates that a prolonged exposure to smoking, alcohol, street food intake and overtime working may augment the chance of developing hypertension. Prevalence of pre-hypertension is a matter of concern for the safety of bus drivers as well as of community.

Introduction

Bus drivers represent a particular working group within the transport industry who habitually deals with adverse workplace conditions like long driving hours, shifting work, prolonged sitting while driving, traffic congestions, vehicular noise, air pollution, irregular diet as well as passenger demands and complaints etc. (Richter *et al.* 1998; Hirata *et al.* 2012; Joshi *et al.* 2013; Balaji *et al.* 2016). This complex workplace environment augments job stress among bus drivers (Albright *et al.* 1992) and compels them to develop several behavioural habits like smoking, tobacco chewing, alcohol intake, drug use (Tse *et al.* 2006) etc. It is well established in studies that bus drivers are frequently engaged in smoking (Bovenzi *et al.* 1992; Maciulyte 2000), alcohol intake (Ragland *et al.* 1995; Cunradi *et al.* 2003) and drug use (Anderson 1992) to cope with occupational stress when other forms of coping are unattainable. However, these coping mechanisms along with their workplace conditions play a major role of developing hypertension among bus drivers (Evans 1996; Tüchsen *et al.* 2006; Siu *et al.* 2012).

Worldwide, hypertension has become a major health burden among bus drivers in recent decades. A study found that bus drivers are susceptible to develop high blood pressure compared to other occupations due to many occupational and behavioural stressors (Netterstrom 1981). On one hand, occupational stressors include several conditions like shifting work, increased work pace (Alfredsson *et al.* 1993; Gustavsson *et al.* 1996), prolonged driving hours (Johansson *et al.* 2012), exposure

to noise (Pushpa *et al.* 2013; Janghorbani *et al.* 2009) and so on. Similarly, inappropriate dietary habits (Bigert *et al.* 3003; Erhiano *et al.* 2015) frequent smoking (Odeyinka *et al.* 2017), alcohol consumption (Miller *et al.* 2005) were also found as some of the responsible behavioural stressors of hypertension among bus drivers.

Also in India, several studies found significant association between hypertension and age, traffic congestion, rotating shift work (Joshi *et al.* 2013), longer duration of job (Lakshman *et al.* 2014), smoking, alcohol intake (Udayar *et al.* 2015), tobacco chewing (Satheesh & Veena 2013) among bus drivers. However, India is a nation with a large transport network within and around states. Metropolitan cities like Kolkata, Delhi, Mumbai and Chennai offer a vast network of transport services in and around the cities, mostly covered by bus services (both public and governmental services). Therefore, the health issues of bus drivers is always a concern for the safety of community.

Nevertheless, to the best of our knowledge, not much emphasis has been given on the issues of hypertension and its concomitants among bus drivers of Kolkata, a metropolitan city in India. Therefore, the present study was carried out in Kolkata to find out the prevalence of hypertension among bus drivers and whether any concomitant factor(s) is/are responsible for it.

Materials and Methods

Area and population: Present cross-sectional study was carried out in the suburban Kolkata involving bus drivers engaged as employee under Calcutta State Transport Corporation under the district of North 24 Parganas, West Bengal, India. Two bus depots (Route 201 and L238) were chosen for the convenience of fieldwork due to

- prior rapport with the depot authorities and
- time and funding limitation. Prior to data collection, bus drivers were informed about the purpose of the study.

Data collection: All the bus drivers of the selected two bus depots, were involved: in fact, statistical sampling was not attempted because of

- absence of adequate literatures providing prevalence of hypertension among Kolkata bus drivers and
- to avoid growing suspicion upon selective choice of participants.

Bus drivers who were engaged in the driving for at least one year and had a full-time job were included in the study. However, due to absence of some bus drivers during the survey (approx. 25 bus drivers) or refusal (approx. 39 bus drivers), it was not possible to collect data from all of them and therefore they were excluded from the dataset. Initially, 138 adult bus drivers voluntarily agreed to participate in the study with a written consent. Bus drivers, who either reported medication for maintaining blood pressure or stated vigorous physical exercise, smoking, tobacco use or drinking alcohol/tea/coffee within thirty minutes prior to blood pressure measurements (approx. 18 bus drivers) were excluded from the study. Finally, data were collected from 120 adult bus drivers by a single investigator/measurer (MD).

Data types: Data were divided into two sections. The first section included the general characteristics of the bus drivers, collected using a self-administered questionnaire. The second section included data on blood pressure measurements of all the participants following standard protocols.

Data on general characteristics

The participants were asked to provide information on their age, educational status, marital status, driving hours per day, sleep duration per day and habit of smoking, tobacco chewing, alcohol intake and meal intake. Age records of the bus drivers were obtained from existing governmental records like the Voter card or Aadhar card.

Blood pressure measurement

The standard protocol was maintained for taking blood pressure measurement from the study participants. The auscultatory method was used for blood pressure measurement with a mercury sphygmomanometer and a stethoscope. Instruments were standardized before conducting the survey and regularly standardized afterwards during the survey. All the measurements were taken from the bus drivers before they joined their daily work. The participants were asked to sit comfortably on a chair for at least fifteen minutes. Two readings of the systolic blood pressure (SBP) and the diastolic blood pressure (DBP) were taken at an interval of 30 minutes for the accuracy of the reading. All the records were written by the investigator/measurer himself to avoid error.

Data classification: Firstly, the general characteristics of the bus drivers were grouped into categories for appropriate use in statistical analysis. The bus driver's present age was classified into 2 categories viz. '<35 years' and '≥35 years'. Educational status was grouped into 2 categories viz. 'Primary' (attended from Class I to IV) and 'Secondary' (attended from Class V and above). Marital status was grouped as 'Unmarried' and 'Married'. Secondly, the smoking status was grouped into 2 categories viz. 'Smoker' and 'Non-smoker'. The habit of tobacco chewing among bus drivers was grouped into 'Present' and 'Absent'. Alcohol consumption was also grouped into 'Present' and 'Absent'. Subsequently, sleep duration per day was grouped into two categories using median value as '<6 hours' and '≥6 hours'. Lastly, the habit of meal intake was grouped into two categories i.e. 'Homemade' and 'Street food'.

Categories of blood pressure were made following the classification cut-off point of JNC-7 (Chobanian *et al.* 2003). Individuals with SBP <120 mmHg and DBP <80 mmHg were considered as 'Normotensive'. Individuals with SBP 120-139 mmHg or DBP 80-89 mmHg or with both were considered as 'Pre-hypertensive'. Subsequently, Individuals having SBP of 140-159 mmHg and DBP 90-99 mmHg were considered as 'Stage 1 Hypertensive' and those who had SBP ≥160 mmHg or DBP ≥100 mmHg or both were considered as 'Stage 2 Hypertensive'.

Data analysis: Binary logistic regression was performed to calculate odds ratio (OR) to find out the effects of selected bus drivers' characteristics on hypertension. The presence of hypertension was considered as a binary dependent variable (i.e. 'Hypertensive' and 'Non-hypertensive'). It is worth mentioning that the categories 'Normotensive' and 'Pre-hypertensive' were considered together as 'Non-hypertensive' and the other categories 'Stage 1 Hypertensive' and 'Stage 2 Hypertensive' together were considered as 'Hypertensive'. Age group, Educational status, Marital status, Smoking status, Tobacco chewing, Alcohol consumption, Driving time per day, Sleep duration per day, meal intake were independent variables. All the statistical analysis was done using statistical package PASW (Predictive Analytics Software) version 18.0.

Results

Table 1 depicts the socio-economic and occupational characteristics of private bus drivers in Kolkata. Mean age of bus drivers was 39.79±6.17 years. Around 72.5% of them completed education

up to primary level. Most of the participants were married (86.7%). Almost 80.0% of the study participants were smokers compared to only 20.0% who were non-smokers. Prevalence of tobacco chewing was as low as 20.0% among them while 80.0% of them reported that they never chewed tobacco. Approximately 85.0% of the study participants were alcohol consumers. Around 50 study participants (41.7%) reported on ≥ 14 hours driving time per day. A large number of participants (73.3%) slept less than 6 hours per day. Almost all of them (93.3%) took meal outside during their working hours. Only 6.7% of them took homemade food (Cfr. Table 1).

Table 1. Socio-economic and occupational characteristics of private bus drivers in Kolkata

Variable		Bus drivers (n=120)
Age - years (Mean \pm SD)		39.79 \pm 6.17
Educational status	Primary	87 (72.5%)
	Secondary and above	33 (27.5%)
Marital status	Unmarried	16 (13.3%)
	Married	104 (86.7%)
Smoking status	Smoker	96 (80.0%)
	Non-smoker	24 (20.0%)
Tobacco chewing	Present	24 (20.0%)
	Absent	96 (80.0%)
Alcohol consumption	Present	102 (85.0%)
	Absent	18 (15.0%)
Driving time/day (h)	<14	70 (58.3%)
	14	50 (41.7%)
Sleep time/day (h)	<6	88 (73.3%)
	6	32 (26.7%)
Meal intake	Homemade	8 (6.7%)
	Street food	112 (93.3%)

Table 2 shows the frequency distribution of private bus drivers in categories of hypertension based on the classification of JNC-7. Only 9.2% of the study participants were considered as 'Normotensive' with SBP<120 mmHg and DBP<80 mmHg. Most of the participants were categorised into 'Pre-hypertensive' group with SBP 120-139 mmHg and/or DBP 80-89 mmHg. Around 14.1% of the participants were considered as 'Stage 1 hypertensive' group with SBP 140-159 mmHg and/or DBP 90-99 mmHg. A few of them (2.5%) belonged to 'Stage 2 hypertensive' group with SBP ≥ 160 mmHg and/or DBP ≥ 100 mmHg. (Cfr. Table 2).

Table 2. Categories of the bus drivers on the basis of JNC-7 (blood pressure) classification

Categories of Blood pressure (Cut-off point)	Bus drivers (n = 120)	
	n	%
Normotensive (SBP<120; DBP <80)	11	9.2
Pre-hypertensive (SBP 120-139 and/or DBP 80-89)	89	74.2
Stage 1 hypertensive (SBP 140-159; DBP 90-99)	17	14.1
Stage 2 hypertensive (SBP ≥ 160 ; DBP ≥ 100)	3	2.5

Table 3 shows the results of binary logistic regression analysis on hypertension in respect of selected socio-economic and occupational characteristics. Reference categories were 'Age group <35 years', '≥Secondary educational status', 'Married', 'Non-smoker', 'Absence of tobacco chewing', 'Absence of alcohol consumption', '<14 hours driving time/day', '<6 hours sleep duration/day' and 'Homemade meal intake'. Results show that none of the predictor variables predicted the risk of developing hypertension among bus drivers. However, results indicate that bus drivers aged ≥35 years (OR = 6.036), smokers (OR = 1.924) and alcohol consumers (OR = 1.315) were more likely to show hypertension compared to their counterpart groups. Driving time more than 14 hours a day (OR = 1.593) and meal intake from street (OR = 1.715) also show indication of developing hypertension compared to the counterpart groups (cfr. Table 3).

Table 3. Results of binary logistic regression analysis of hypertension in respect of bus drivers characteristics.

Independent variables		Binary logistic regression method	
		OR (95% CI)	p
Age group (in years)	<35	Reference group	
	35	6.036 (0.752-48.469)	0.091
Educational status	Primary	0.864 (0.284-2.632)	0.798
	Secondary	Reference group	
Marital Status	Unmarried	0.673 (0.156-2.910)	0.596
	Married	Reference group	
Smoking Status	Smoker	1.924 (0.372-9.943)	0.435
	Non-smoker	Reference group	
Tobacco.chewing	Present	0.469 (0.088-2.496)	0.375
	Absent	Reference group	
Acohol Consumption	Present	1.315 (0.244-7.083)	0.750
	Absent	Reference group	
Driving time/day (h)	<14	Reference group	
	14	1.593 (0.458-5.538)	0.464
Sleep duration/day (h)	<6	0.940 (0.245-3.611)	0.928
	6	Reference group	
Meal intake	Homemade	Reference group	
	Street food	1.715 (0.295-9.987)	0.548
Nagelkerke R ²		0.11	
Model correctly predicted		83.3	

Discussion

Prevalence of hypertension is escalating all over the world including India due to unfavourable modification of lifestyle and dietary habits (Zulkifle *et al.* 2012) Among various occupational groups, bus drivers exhibit comparatively higher prevalence of hypertension. In international context, many empirical studies demonstrated that hypertension is not an independent health outcome among bus drivers but mostly depends on their occupational and behavioural characteristics. In a national context, the number of researches on this issue are scanty. It is understandable that India consists of many metropolitan cities like Kolkata, Mumbai, Chennai and Delhi etc. where bus service represents a major public transport system. However, studies regarding hypertension and its possible concomitants are insufficient. Therefore, the present study was carried out among the bus drivers of Kolkata, one

of the metropolitan cities in India to find out the prevalence of hypertension and its concomitants in the backdrop of inadequate literatures on hypertension. The study protocol was uniformly followed for each and every participants.

The present study found that the mean age of the bus drivers in Kolkata was 39.79 ± 6.17 years ranging from 28 years to 50 years. It is supported by several studies where the mean age of bus drivers was found to be similar (Udayar *et al.* 2015; Saberi *et al.* 2011; Tobin *et al.* 2013). Contrastingly, few other studies showed a higher mean age of the bus drivers (Erhiano *et al.* 2015; Pop *et al.* 2015; Borle & Jadhao 2015).

A large proportion of the bus drivers in present study reported that they smoked (80.0%) and consumed alcohol (85.0%). Alcohol consumption in the present study group was relatively high compared to the some earlier findings where around 40-50% of the bus drivers were found as alcohol consumers (Udayar *et al.* 2015; Tobin *et al.* 2013; Borle *et al.* 2015; Makanjuola *et al.* 2007) In contrast to the present study, Tobin (2013) and Odeyinka and Ajayi (2017) found low responses of smoking. However, only 20% of the bus drivers in Kolkata reported on chewing tobacco compared to the bus drivers of Andhra Pradesh (Udayar *et al.* 2015).

Prevalence of hypertension among the study participants was 16.6%. This finding was consistent with many earlier literatures which showed less than 25% prevalence of hypertension among bus drivers (Joshi *et al.* 2013; Udayar *et al.* 2015; Sathesh *et al.* 2013; Tobin *et al.* 2013; Abdelmoneim 2003; Backman 1983; Katti *et al.* 2009). Nevertheless, many others reported high prevalence of hypertension among bus drivers (Erhiano *et al.* 2015; Saberi *et al.* 2011; Borle & Jadhao 2015; Wang & Lin 2001; Rao *et al.* 2015). The differences in the prevalence may have occurred due to lifestyle differences of bus drivers from different regions. However, pre-hypertensive individuals in the present study were around 74.2%. The proportion is much greater than that of the bus drivers in Londrina, Brazil (Hirata *et al.* 2012), Andhra Pradesh (23.05%) (Udayar *et al.* 2015) and Kerala (41.9%) (Lakshman *et al.* 2014) as well. This could be an important issues to address as Ishikawa *et al.* mentioned that progression of pre-hypertension to hypertension increases cardio-vascular disease risk among individuals (Ishikawa *et al.* 2017).

The present study further revealed that the occurrence of hypertension among the bus drivers was age-independent and was not influenced by the participants' marital status. However, Lakshman *et al.* and Borle and Jadhao reported in their study that the age of the bus drivers correlates with hypertension (Lakshman *et al.* 2014; Borle & Jadhao 2015). They also reported that married individuals were more likely to develop hypertension compared to unmarried individuals. It may be due to the additional stress of earning money for the fundamental needs of the family members.

The study findings indicated that the smoking behaviours of the bus drivers were associated with hypertension. Although not significant, smokers were more likely to develop hypertension (OR = 1.924) compared to non-smokers. This finding agrees with Lakshman *et al.* (2014). In contrast, two other studies found a significant association between smoking and hypertension (Nasri *et al.* 2006; Viridis *et al.* 2010). The present study also found no significant association between alcohol consumption and hypertension similar to the findings by Malhotra (1971), Erhiano *et al.* (2015) and Jayarajah *et al.* (2017). The findings pointed out that alcohol consumers were more likely to develop hypertension (OR = 1.315) than their counterparts. However, the data was inconsistent with those of few studies (Udayar *et al.* 2015; Ahn *et al.* 2015). The habit of tobacco chewing was not significantly

associated with hypertension among the present study group unlike in the findings by Satheesh and Veena (2013).

Findings further indicated that working hours were not associated with developing hypertension. This finding validated the study by Tobin and colleagues (2013). In comparison, Greiner *et al.* (2004) and Johansson *et al.* (2012) showed that the duration of work per day and/or per week predicts high blood pressure among bus drivers. It is obvious that a prolonged exposure to driving enhances a sedentary lifestyle, noise exposure, stress and so on that further results into hypertension. Taking street food during work is a common phenomenon among bus drivers. The bus drivers' inappropriate dietary habits are established as one of the significant factors of developing hypertension (Odeyinka & Ajayi 2017). However, the present study found no such association.

In summary, the present study found that none of the selected characteristics (occupational and behavioural) of the bus drivers were responsible for developing hypertension. Further, the study indicates that smoking, alcohol consumption, inappropriate diet outside home may lead to hypertension among the study population. It is not apparent in the present findings though. However, the pre-hypertensive individuals are at risk of developing hypertension in near future.

Conclusion

People who are employed in the transport industry form a vital workforce of a nation. Professional bus drivers, engaged as a full time employee, are one of those major groups who are frequently exposed to many stressors without any awareness or protection. Most of them serve in the nation to make transport service more reliable to community and people. Therefore, the health of bus drivers are of concern not only for the sake of themselves but for the safety of people in community. The present study did not found any significant concomitants but pointed out some major concerns. The bus drivers' behavioural habits seemed to be responsible for blood pressure elevation among them. Hence, it is important to further the study of the bus drivers' behavioural habits to get a better insight into the problem. It would have been better to incorporate several other concomitants which were not possible to include in such a small study. Besides, the small sample size is a deterrent to draw any conclusion of the findings. Future studies in this area should fill the lacuna and design their study problem considering various environmental traits in order to get a better insight on the present issue.

Acknowledgements

The authors are grateful to the study participants and CSTC bus depot authorities for their contribution. Authors are thankful to the West Bengal State University for financial and logistic support. Authors acknowledge the voluntary participation of Ms. Arpita Santra for her valuable comments during the preparation of manuscript.

Conflict of Interests

Authors declare no conflict of interest regarding authorship and/or publication of the manuscript.

Source of funding

The present research is a part of the dissertation project conducted under the supervision of faculties of Department of Anthropology of West Bengal State University in relation to the fulfilment of post-graduate degree in Anthropology. Financial and logistic support was provided by the University.

Ethical clearance

Ethical clearance was obtained from the Institutional Ethical Committee prior to conduct the survey. Written consent was obtained from the study participants prior to the survey.

References

- Abdelmoneim, I. (2003) "Hearing impairment and hypertension among long distance bus drivers". *Journal of Family and Community Medicine* 10(3):25-29.
- Ahn, Y., Jang, Y., Ju, J., Cho, S., Han, S. (2015) "Relationship between prevalence of hypertension and lifestyle in male bus drivers in some areas in Seoul [Abstract]". *Korean Journal of Family Practice* 5(4):461-463.
- Albright, C. L., Winkleby, M. A., Ragland, D. R., Fisher, J., Syme, S. L. (1992) "Job strain and prevalence of hypertension in a biracial population of urban bus drivers". *American Journal of Public Health* 82(7):984-989.
- Alfredsson, L., Hammar, N., Hogstedt, C. (1993) "Incidence of myocardial infarction and mortality from specific causes among bus drivers in Sweden". *International Journal of Epidemiology* 22(1):57-61.
- Anderson, R. (1992) "The back pain of bus drivers: Prevalence in an urban area of California". *Spine* 17(12):1481-1488.
- Backman, A. L. (1983) "Health survey of professional drivers". *Scandinavian Journal of Work, Environment & Health* 9(1):30-35.
- Balaji, R., Rajasegaran, R., John, N. A., Venkatappa, U. S. (2016) "Hearing Impairment and High Blood Pressure among Bus Drivers in Puducherry". *Journal of Clinical and Diagnostic Research*. 10(2):8-10. doi:10.7860/JCDR/2016/17361.7199
- Bigert, C., Gustavsson, P., Hallqvist, J., Hogstedt, C., Lewné, M., Plato, N., et al. (2003) "Myocardial infarction among professional drivers". *Epidemiology* 14(3):333-339. doi:10.1097/01.EDE.0000057141.91012.80
- Borle, A.L., Jadhao, A. (2015) "Prevalence and associated factors of hypertension among occupational bus drivers in Nagpur city, Central India - A cross sectional study". *National Journal of Community Medicine*. 6(2):423-428.
- Bovenzi, M., Zadini, A. (1992) "Self-reported low back symptoms in urban bus drivers exposed to whole-body vibration". *Spine* 17(9):1048-1059.
- Chobanian, A. V., Bakris, G. L., Black, H. R., Cushman, W.C., Green, L. A., Izzo, Jr. J. L., et al. (2003) "Seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure". *Hypertension* 42(6):1206-1252.
- Cunradi, C. B., Greiner, B. A., Ragland, D. R., Fisher, J. M. (2003) "Burnout and alcohol problems among urban transit operators in San Francisco". *Addictive Behaviors* 28(1):91-109.
- Erhiano, E. E., Igbokwe, V. U., El-Khashab, M. M., Okolo, R. U., Awosan, K. J. (2015) "Prevalence of hypertension among commercial bus drivers in Sokoto, Sokoto State Nigeria". *International Journal of Medical Science and Public Health* 2(3):34-39.
- Evans, L. (1996) "The dominant role of driver behaviour in traffic safety". *American Journal of Public Health* 86(6):784-786.
- Greiner, B. A., Krause, N., Ragland, D., Fisher, J. M. (2004) "Occupational stressors and hypertension: A multi-method study using observer-based job analysis and self-reports in urban transit operators". *Social Science & Medicine* 59(5):1081-1094.
- Gustavsson, P., Alfredsson, L., Brunnberg, H., Hammar, N., Jakobsson, R., Reuterwall, C. et al. (1996) "Myocardial infarction among male bus, taxi, and lorry drivers in middle Sweden". *Occupational and Environmental Medicine* 53(4):235-240.
- Hirata, R. P., Sampaio, L. M., Filho, F. S., Braghiroli, A., Balbi, B., Romano, S. et al. (2012) "General characteristics and risk factors of cardiovascular disease among interstate bus drivers". *The Scientific World Journal* 1:1-7. doi:10.1100/2012/216702
- Ishikawa, Y., Ishikawa, J., Ishikawa, S., Kario K., Kajii, E. (2017) "Progression from prehypertension to hypertension and risk of cardiovascular disease". *Journal of Epidemiology* 27(1):8-13.
- Janghorbani, M., Sheikhi, A., Pourabdian, S. (2009) "The prevalence and correlates of hearing loss in drivers in Isfahan, Iran". *Archives of Iranian Medicine* 12(2):128-134.
- Jayarajah, U., Jayakody, A. J., Jayaneth, J. M., Wijeratne, S. (2017) "Prevalence of hypertension and its associated factors among a group of bus drivers in Colombo, Sri Lanka". *International Journal of Occupational and Environmental Medicine* 8(1):58-59. doi:10.15171/ijoem.2017.986
- Johansson, G., Evans, G. W., Cederstrom, C., Rydstedt, L. W., Fuller-Rowell, T., Ong, A. D. (2012) "The effects of urban bus driving on blood pressure and musculoskeletal Problems: A Quasi-Experimental Study". *Psychosomatic Medicine* 74(1):89-92.
- Joshi, A. V., Hungund, B. R., Katti, S. M., Mallapur, M. D., Viveki, R. G. (2013) "Prevalence of hypertension and its socio demographic and occupational determinants among bus drivers in North Karnataka—A Cross sectional study". *Medica Innovatica* 2(2):3-7.
- Katti, S., Joshi, A., Mallapur, M., Wantamutte, A. (2009) "Prevalence of Hypertension among Bus Drivers of Belgaum Division". Lecture presented at 36th National conference IAPSM in Aurangabad, Maharashtra.
- Lakshman, A., Manikath, N., Rahim, A., Anilakumari, V.P. (2014) "Prevalence and risk factors of hypertension among male occupational bus drivers in North Kerala, South India: A Cross-sectional study". *ISRN Preventive Medicine* 2:1-9.

<http://dx.doi.org/10.1155/2014/318532>

- Maciulyte, N. (2000) "Bus drivers' health and conditions of work". Presentation presented at *Symposium in European Centre for Occupational Health, Safety and the Environment*, Kaunas, Lithuania.
- Makanjuola, B. A., Oyeleke, S. A., Akande, T. M. (2007) "Psychoactive substance use among long distance vehicle driver in Ilorin". *Nigerian Journal of Psychiatry* 5(1):14-18.
- Malhotra, S. L. (1971) "Studies in arterial pressure in the North and South India with special reference to dietary factors in its causation" [Abstract]. *The Journal of the Association of Physicians of India* 19(3):211-224.
- Miller, P. M., Anton, R. F., Egan, B. M., Basile J., Nguyen, S. A. (2005) "Excessive alcohol consumption and hypertension: Clinical implication of current research". *The Journal of Clinical Hypertension* 7(6):346-351.
- Nasri, H., Moazenzadeh, M. (2006) "Coronary artery disease risk factors in driving versus other occupations". *ARYA Journal* 2(2):75-78.
- Netterstrom, B., Laursen, P. (1981) "Incidence and prevalence of ischemic heart disease among Urban bus drivers in Copenhagen". *Scandinavian Journal of Social Medicine* 9:75-79.
- Odeyinka, O. T., Ajayi, I. O. (2017) "Prevalence of hypertension and diabetes and their determinants among commercial drivers in Ibadan metropolis, South-Western Nigeria". *Nigerian Journal of Cardiology* 14(2):75-83. doi:10.4103/njc.njc_11_17
- Pop, C., Manea, V., Matei, C., Trambitasu, R., Mos, L. (2015) "Work stress hypertension and obesity among professional bus drivers: Results of a cross-sectional study conducted in an urban Romanian company of transport". *Journal of Hypertension Research* 1(1):27-32.
- Pushpa, K., Girija, B., Veeraiah, S. (2013) "Effect of traffic noise on hearing in city bus drivers of Bangalore". *Indian Journal of Public Health Research & Development* 4(3):227-230. doi:10.5958/j.0976-5506.4.3.114
- Ragland, D. R., Greiner, B. A., Krause, N., Holman, B. L., Fisher, J. M. (1995) "Occupational and nonoccupational correlates of alcohol consumption in urban transit operators". *Preventive Medicine* 24(6):634-645.
- Rao S.B., Bhavani G.G., Madhavi B.D. (2019) "A study on hypertension and its determinants among male bus drivers in state road transport corporation, Visakhapatnam, Andhra Pradesh". *Journal of Evidence Based Medicine and Healthcare* 2(42):7324-7329. doi:10.18410/jebmh/2015/990
- Richter, P., Wagner, T., Heger, R., Weise, G. (1998) "Psychophysiological analysis of mental load during driving on rural roads- a quasi-experimental field study". *Ergonomics* 41(5):593-609.
- Saberi, H. R., Moravveji, A. R., Fakharian, E., Kashani, M. M., Dehdashti, A. R. (2011) "Prevalence of metabolic syndrome in bus and truck drivers in Kashan, Iran". *Diabetology & Metabolic Syndrome* 3(8):1-5.
- Satheesh, B. C., Veena, R.M. (2013) "A study of prevalence of hypertension among bus drivers in Bangalore city". *International Journal of Current Research and Review* 5(17):90-94.
- Siu, S. C., Wong, K. W., Lee, K. F., Lo, Y. Y., Wong, C. K., Chan, A.K. et al. (2012) "Prevalence of undiagnosed diabetes mellitus and cardiovascular risk factors in Hong Kong professional drivers". *Diabetes Research and Clinical Practice* 96(1):60-67.
- Tobin, E. A., Ofili, A. N., Asogun, D. A., Igbinosun, P. O., Igba, K. O., Idahosa, A. V. (2013) "Prevalence of hypertension and associated factors among inter-city drivers in an urban city in South-South Nigeria". *International Journal of Research in Medicine* 2(3):5-12.
- Tse, J. L., Flin, R., Mearns, K. (2006) "Bus driver well-being review: 50 years of research". *Transportation Research Part F: Traffic Psychology and Behaviour* 9(2):89-114.
- Tüchsen, F., Hannerz, H., Roepstorff, C., Krause, N. (2006) "Stroke among male professional drivers in Denmark". *Occupational and Environmental Medicine* 63(7):456-460.
- Udayar, S.E., Sampath, S., Arun, D., Sravan, S. (2015) "Epidemiological study of cardiovascular risk factors among public transport drivers in rural area of Chittoor district of Andhra Pradesh". *International Journal of Community Medicine and Public Health* 2(4):415-420.
- Virdis, A., Giannarelli, C., Neves, M. F., Taddei, S., Ghiadoni, L. (2010) "Cigarette smoking and hypertension". *Current Pharmaceutical Design* 16(23):2518-2525.
- Wang, P. D., Lin, R. S. (2001) "Coronary heart disease risk factors in urban bus drivers". *Public Health* 115(4):261-264.
- Zulkifle, M., Ansari, A. H., Shakir, M., Akmal, M. (2012) "Hypertension scenario in Bangalore Metropolitan Transport Corporation (BMTTC) employees – A study". *International Journal of Advanced Ayurveda, Yoga, Unani, Siddha and Homeopathy* 1(1):1-5.