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Cardiovascular Disease Risk Factors Among Truck Drivers in Jaipur, India: A Cross-Sectional Study

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ABSTRACT

Background: Truck drivers are exposed to occupational and lifestyle factors that may increase their susceptibility to cardiovascular and other non-communicable diseases. This study assessed the prevalence of selected cardiovascular and metabolic risk factors and their associated determinants among truck drivers in Jaipur, Rajasthan.

Methods: A community-based cross-sectional observational study was conducted in 2024 among 100 truck drivers attending Transport Nagar, Delhi Road, Jaipur. Eligible participants were aged 23–60 years and had at least five years of heavy vehicle driving experience. Data were collected using a pretested, semi-structured questionnaire based on the World Health Organization STEPwise approach, along with anthropometric measurements, blood pressure assessment and random blood glucose estimation. Descriptive statistics were used to summarise participant characteristics. Associations were assessed using the Chi-square test, and multivariable binary logistic regression was performed to identify factors associated with raised systolic blood pressure (SBP ≥140 mmHg) and raised random blood sugar (RBS ≥140 mg/dL).

Results: The mean age of participants was 37.77 ± 7.95 years, and the mean body mass index (BMI) was 24.62 ± 2.37 kg/m². Raised SBP and raised RBS were observed in 18% and 14% of participants, respectively. Smoking, alcohol consumption and tobacco chewing were reported by 61%, 58% and 51% of drivers, respectively. Only 5% reported daily fruit consumption. In bivariate analysis, raised RBS was significantly associated with BMI (p=0.013) and weekly driving hours (p<0.001), whereas raised SBP was significantly associated with smoking (p=0.019) and weekly driving hours (p=0.001). In multivariable logistic regression, higher BMI and longer weekly driving hours were independently associated with both raised SBP and raised RBS. Alcohol consumption was independently associated with raised SBP (OR 19.907; 95% CI 1.953–202.949; p=0.012), but not with raised RBS.

Conclusion: Truck drivers in this study demonstrated a considerable burden of behavioural and metabolic cardiovascular risk factors. Higher BMI and longer weekly driving hours were important correlates of raised blood pressure and blood glucose. Occupational health programmes focusing on regular screening, weight management and healthier lifestyle practices may help address these risk factors.

Keywords: Truck Drivers; Cardiovascular Diseases; Risk Factors; Hypertension; Blood Glucose; Occupational Health.

INTRODUCTION

Non-communicable diseases (NCDs) pose a significant global health challenge, accounting for the majority of morbidity and mortality worldwide. The World Health Organization (WHO) reported that NCDs were responsible for nearly 43 million deaths in 2021, constituting around 75% of non-pandemic-related deaths, with cardiovascular diseases (CVDs) being the leading cause. [1] These conditions, which include coronary artery disease, cerebrovascular disease, and hypertensive heart disease, are largely influenced by behavioral, metabolic, and environmental risk factors. India, like other low- and middle-income countries, is experiencing a rapid epidemiological transition marked by an increasing prevalence of lifestyle-related diseases such as diabetes, hypertension, and obesity. Cardiovascular diseases alone contribute to a significant proportion of deaths, leading to considerable loss of productive years and economic burden. [2]

Truck drivers represent a high-risk occupational group for developing CVDs due to their sedentary lifestyle, irregular work hours, stress, and poor dietary habits. Their profession demands long driving hours, inadequate sleep, and limited access to healthy food, all of which heighten the risk of hypertension, diabetes, and obesity. [3] Studies among Indian truck drivers have documented a substantial burden of cardiometabolic risk factors, including overweight and obesity, tobacco use, and alcohol consumption, which may increase their vulnerability to cardiovascular and other non-communicable diseases. [4,5] The lack of regular health check-ups and limited accessibility to healthcare services further compounds their vulnerability to undiagnosed and unmanaged chronic conditions. [6]

The presence of cardiovascular risk factors among truck drivers not only affects their health but also poses a potential threat to road safety. Research from Western countries suggests that undiagnosed or poorly controlled cardiovascular conditions have been linked to sudden incapacitation and road accidents among drivers. Implementing standardized cardiovascular risk assessment tools, such as the Framingham Risk Score, could help identify high-risk individuals and enable timely preventive interventions. [7] In India, strengthening the National Programme for Non-Communicable Diseases (NP-NCD) to include occupation-specific health initiatives for truck drivers can play a vital role in reducing both disease burden and road safety risks. [8,9]

Despite their indispensable contribution to the economy, there remains limited research on the cardiovascular health of truck drivers in India. This study aims to identify factors associated with the risk of cardiovascular diseases among truck drivers, thereby facilitating the formulation of effective promotive and preventive measures. Specifically, it seeks to estimate the proportion of various CVD risk factors using the WHO STEP questionnaire and to determine their association with socio-demographic variables among truck drivers halting at Delhi Road Transport Nagar, Jaipur.

MATERIALS & METHODS

The present community-based cross-sectional observational study was conducted in the Transport Nagar area, Delhi Road, Jaipur, during the year 2024. The study aimed to assess the cardiovascular disease risk factors among truck drivers operating in this region. The study population included truck drivers halting at Transport Nagar, with the inclusion criteria specifying individuals aged 23–60 years, having at least five years of heavy vehicle driving experience, holding a valid driving license, and providing written informed consent. Those with known congenital heart disease

or genetic disorders were excluded from the study.

The sample size was calculated at a 95% confidence interval, assuming that 50% of truck drivers had one or more cardiovascular risk factors, with an absolute allowable error of 10%. Based on these parameters, a sample size of 100 participants was determined. The sampling technique involved random selection using a random number table. Considering that approximately 50 trucks passed daily through Transport Nagar, two visits per week were planned, collecting data from about eight participants per week. The desired sample size was achieved within a period of around three months.

Prior to the commencement of data collection, ethical approval was obtained from the Institutional Research Review Board and the Ethics Committee of SMS Medical College, Jaipur. All participants were informed about the objectives, benefits, and potential implications of the study, and written informed consent was obtained to ensure voluntary participation.

Data collection was carried out using a pre-tested and pre-validated semi-structured proforma based on the WHO STEPwise approach to NCD risk factor surveillance. The questionnaire included sections on demographic details, behavioral measurements (such as tobacco and alcohol use, diet, and physical activity), physical measurements (including height, weight, and blood pressure), and biochemical parameters relevant to cardiovascular risk assessment. The outcome variables included the socio-demographic characteristics of truck drivers such as age, education, marital status, and family type, along with the proportion exhibiting cardiovascular risk factors like high blood pressure, abnormal blood sugar, increased BMI, defective vision, smoking, and alcohol use. These indicators helped assess the overall risk profile of the study population.

Statistical Analysis

Data were entered, coded, and analysed using Statistical Package for the Social Sciences (SPSS), version 25.0 (IBM Corp., Armonk, NY, USA). Categorical variables were summarised as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation. Bivariate associations between selected sociodemographic, occupational, and lifestyle characteristics and the study outcomes were assessed using the Chi-square test. The two primary outcome variables were raised systolic blood pressure (SBP ≥140 mmHg) and raised random blood sugar (RBS ≥140 mg/dL).

Multivariable binary logistic regression analysis was performed to identify factors independently associated with raised SBP and raised RBS. Age, weekly driving hours, smoking habits, alcohol consumption, body mass index (BMI), and waist–hip ratio (WHR) were included as explanatory variables in the regression models. The results were expressed as odds ratios (ORs) with 95% confidence intervals (CIs). A two-sided *p*-value of <0.05 was considered statistically significant.

RESULT

Socio-demographic characteristics

A total of 100 truck drivers participated in the study. Nearly half (46%) belonged to the 26–35 years age group, followed by 36–45 years (34%) and 46–55 years (19%), while only 1% were aged below 25 years (figure 1). The majority were from rural areas (72%) and Rajasthan (80%) (figure 2). Most participants had completed secondary (30%) or senior secondary education (30%), whereas 24% had primary education, 12% were illiterate, and 4% were graduates. Most truck drivers were married (91%) and belonged to the Hindu religion (87%). More than half (54%) had 11–20 years of driving experience, while 44% had been driving for 5–10 years.

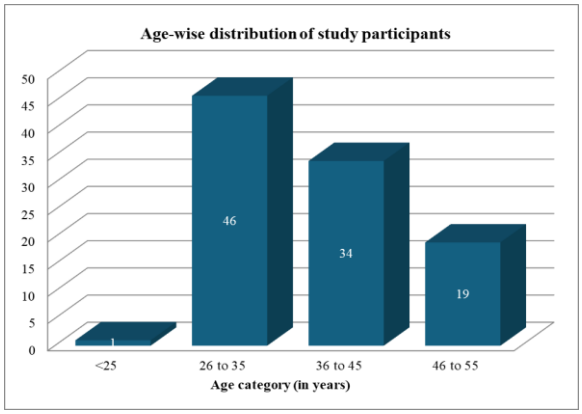


Figure 1: Age-wise distribution of participants.

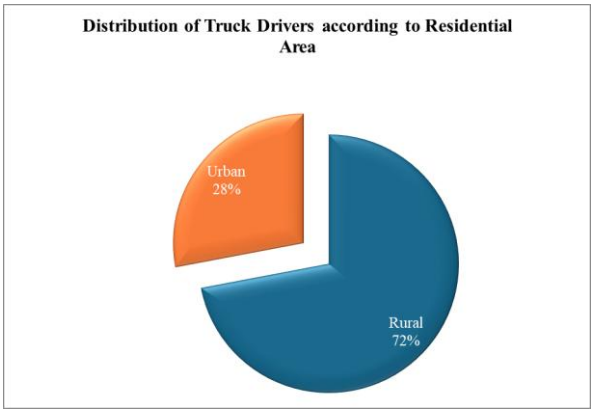


Figure 2: Distribution of truck drivers according to residential area.

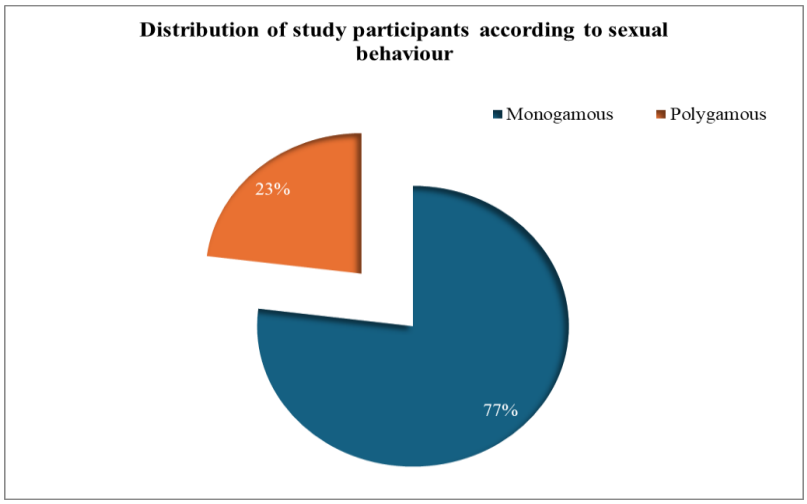


Figure 3: Distribution of study participants according to sexual behaviour.

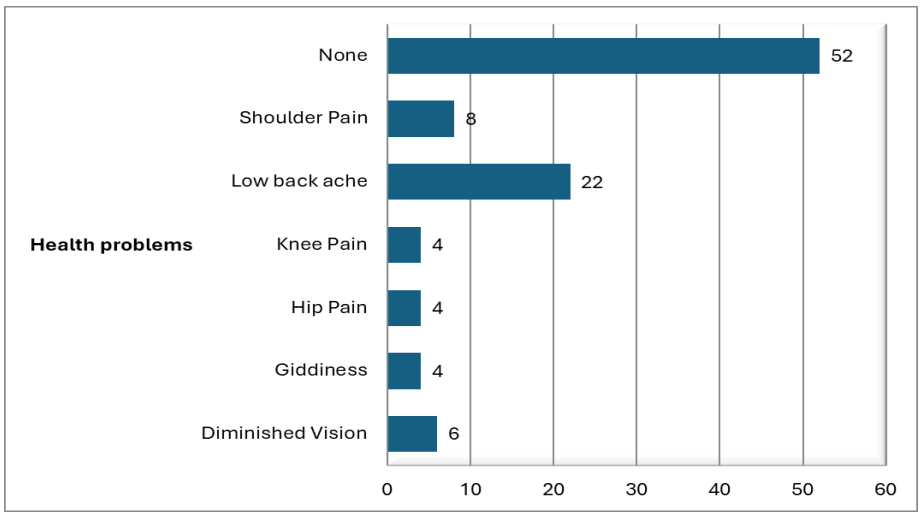


Figure 4: Health problems of study participants.

Lifestyle characteristics and health complaints

Most truck drivers reported monogamous relationships (77%) (figure 3). Smoking was reported by 61% of participants, alcohol consumption by 58%, and tobacco chewing by 51%. Nearly half (49%) consumed fruits only once a month, whereas 46% consumed fruits weekly and only 5% reported daily fruit intake.

More than half of the participants (52%) reported no health complaints. Among those

reporting health problems, low backache was the most common complaint (22%), followed by shoulder pain (8%), diminished vision (6%), and hip pain, knee pain, and giddiness (4% each). Table 1.

Table 1: Health problems of study participants.

Complaints	Number	Percentage
Diminished Vision	6	6.0
Giddiness	4	4.0
Hip Pain	4	4.0
Knee Pain	4	4.0
Low back ache	22	22.0
None	52	52.0
Shoulder Pain	8	8.0
Total	100	100.0

Descriptive Statistics

Anthropometric and clinical characteristics

The mean age of the participants was 37.77 ± 7.95 years. The mean body mass index (BMI) was 24.62 ± 2.37 kg/m², with a mean body weight of 73.24 ± 7.06 kg and mean height of 172.51 ± 3.69 cm. The mean random blood sugar level was 119.60 ± 16.64 mg/dL. The average systolic and diastolic blood pressures were 131.16 ± 8.25 mmHg and 83.23 ± 7.50 mmHg, respectively; Table 2.

Table 2: Descriptive Statistics of Anthropometric and Health Parameters Among Truck Drivers

	N	Minimum	Maximum	Mean	Std. Deviation
Age	100	25	53	37.77	7.947
Body Mass Index (BMI)	100	20.2	29.4	24.621	2.3725
Height (in cm)	100	166	180	172.51	3.691
Body weight (in Kg)	100	60	88	73.24	7.060
Random Blood Sugar	100	78	152	119.60	16.636
Systolic Blood Pressure	100	116	150	131.16	8.245
Diastolic Blood Pressure	100	67	98	83.23	7.495

Overall, 18% of the truck drivers had raised systolic blood pressure (≥140 mmHg), and 14% had raised random blood sugar levels (≥140 mg/dL). These findings suggest a substantial burden of cardiovascular and metabolic risk factors in truck drivers.

Table 3 summarizes the chi-square test results examining the associations between random blood sugar (RBS), systolic blood pressure (SBP), and selected occupational and lifestyle variables among truck drivers. A statistically significant association was observed between RBS and BMI (χ^2 = 6.231, df = 1, p = 0.013), indicating that overweight drivers were more likely to have elevated blood sugar levels. RBS was also significantly associated with weekly driving hours (χ^2 = 26.508, df = 4, p <0.001), suggesting that drivers who worked longer hours were at greater risk of abnormal blood sugar levels. Similarly, SBP showed a significant association with smoking status (χ^2 = 10.002, df = 3, p = 0.019) and with weekly driving hours (χ^2 = 33.281, df = 12, p = 0.001), but not with alcohol consumption (χ^2 = 1.922, df = 3, p = 0.589). Weekly driving hours were further found to be significantly associated with distant vision status (χ^2 = 12.862, df = 4, p = 0.012). Overall, these findings suggest that prolonged driving hours, smoking, and higher BMI are important factors linked to elevated blood sugar and blood pressure levels among truck drivers, while alcohol consumption did not show a significant relationship with blood pressure in this study population.

Table 3: Summary of Bivariate Associations Between Random Blood Sugar/Blood Pressure and Selected Variables Among Truck Drivers

S. No.	Variable 1	Variable 2	df	Chi-Square Value	P-Value	Association
1	RBS	BMI	1	6.231	0.013	Significant
2	RBS	Driving Hours/Week	4	26.508	<0.001	Significant
3	SBP	Alcohol Consumption	3	1.922	0.589	Not Significant
4	SBP	Smoking	3	10.002	0.019	Significant
5	SBP	Driving Hours/Week	12	33.281	0.001	Significant
6	Driving Hours per Week	Distant Vision	4	12.862	0.012	Significant

RBS – Random Blood Sugar, BMI – Body Mass Index, SBP – Systolic Blood Pressure, df- Degree of Freedom

Logistic regression analysis was performed to identify independent predictors of raised systolic blood pressure (SBP ≥140 mmHg) and raised random blood sugar (RBS ≥140 mg/dL) among truck drivers. Longer weekly driving hours and higher BMI were independently associated with both raised SBP and raised RBS. Each additional hour of driving per week increased the odds of raised SBP by 22% (OR = 1.22, 95% CI: 1.110–1.341; p < 0.001) and raised RBS by 8.8% (OR = 1.088, 95% CI: 1.033–1.145; p = 0.001). Similarly, higher BMI significantly increased the odds of raised SBP (OR = 2.446, 95% CI: 1.549–3.860; p < 0.001) and raised RBS (OR = 1.621, 95% CI: 1.208–2.175; p = 0.001). Alcohol consumption was independently associated with raised SBP (OR = 19.907, 95% CI: 1.953–202.949; p = 0.012), whereas no significant association was observed with raised RBS. Age, smoking habits, and waist–hip ratio were not significantly associated with either outcome after adjustment for other variables (p > 0.05); Table 4.

Table 4: Multivariable logistic regression analysis of factors associated with raised systolic blood pressure and random blood sugar among truck drivers

Variable	Raised Systolic Blood Pressure (≥140 mmHg) OR (95% CI)	p-value	Raised Random Blood Sugar (≥140 mg/dL) OR (95% CI)	p-value
Age	0.898 (0.781–1.034)	0.134	1.075 (0.996–1.161)	0.064
Hours of driving per week	1.220 (1.110–1.341)	<0.001	1.088 (1.033–1.145)	0.001
Smoking habits	7.534 (0.968–58.639)	0.054	1.550 (0.459–5.235)	0.48
Alcohol consumption	19.907 (1.953–202.949)	0.012	0.834 (0.278–2.506)	0.747
BMI	2.446 (1.549–3.860)	<0.001	1.621 (1.208–2.175)	0.001
Waist–hip ratio (WHR)	1.002 (0.911–1.132)	0.068	1.033 (0.956–1.168)	0.053

DISCUSSION

Our study assessed the burden of cardiovascular and metabolic risk factors among truck drivers, a high-risk occupational group characterized by prolonged sedentary work and unhealthy lifestyle practices. The prevalence of raised systolic blood pressure (≥140 mmHg) and raised random blood sugar (≥140 mg/dL) was 18% and 14%, respectively. It indicates a substantial burden of non-communicable disease (NCD) risk factors in this population. The mean age of the participants was 37.77±7.95 years, which is comparable to previous studies conducted by Jaiswal et al. [3] and Sharma et al. [10] Similar to earlier reports, most participants had secondary-level education or below, suggesting relatively low health literacy that may influence awareness and management of chronic diseases.

Multivariable logistic regression analysis identified longer weekly driving hours and higher BMI as independent predictors of both raised systolic blood pressure and raised random blood sugar. In addition, alcohol consumption was independently associated with raised systolic blood pressure. These findings are consistent with previous studies by Ebrahim et al. [11] and

Mathew et al. [12], which demonstrated that obesity, prolonged occupational exposure, and unhealthy lifestyle behaviours significantly increase the risk of hypertension and other cardiovascular disorders among commercial drivers. Prolonged driving is likely to contribute through physical inactivity, occupational stress, irregular sleep, and unhealthy dietary habits. Previous research has documented a considerable burden of musculoskeletal complaints among professional drivers, with prolonged occupational exposure and the physical demands of driving contributing to work-related discomfort and health problems. [13] Additionally, studies examining bus drivers and conductors have evaluated pulmonary function, aerobic capacity, obesity and perceived stress, highlighting the broader occupational health challenges associated with commercial driving. [14] These findings emphasise the importance of comprehensive occupational health assessments among professional drivers, although they do not directly establish an association between occupational stress and hypertension or metabolic disorders.

Although smoking showed a higher odds ratio for raised systolic blood pressure, the association did not reach statistical significance after adjustment for other variables. Similarly, age, alcohol consumption (for raised blood sugar), and waist–hip ratio were not independently associated with the study outcomes. Similar results were noted in the study by Kumar DS et al. [15] These findings suggest that modifiable occupational and behavioural factors, particularly prolonged driving duration and excess body weight, may have a greater influence on cardiometabolic health than demographic characteristics alone in this population which also reinforces the findings of Yosef T. [16]

This community-based cross-sectional study found a high burden of cardiovascular and metabolic risk factors among truck drivers in Jaipur. Raised systolic blood pressure (≥140 mmHg) and raised random blood sugar (≥140 mg/dL) were observed in 18% and 14% of the drivers, respectively. Many participants also reported unhealthy lifestyle habits, such as smoking, alcohol consumption, tobacco chewing, low fruit intake, and long driving hours. The analysis showed that drivers who spent more hours driving each week and those with a higher body mass index (BMI) were more likely to have raised blood pressure and blood sugar levels. Alcohol consumption was also independently associated with raised systolic blood pressure.

Limitations of the Study

The study was conducted among truck drivers from a single geographical region, limiting the generalizability of the findings. Blood pressure and random blood sugar were measured only once, and lipid profile and inflammatory markers were not assessed. Psychological factors such as stress, anxiety, sleep quality, and mental health were not evaluated, which may have influenced the observed health outcomes.

CONCLUSION

Findings from this study suggest that the demanding nature of truck driving, combined with unhealthy lifestyle practices, places drivers at an increased risk of developing hypertension and metabolic disorders. Regular health check-ups, including routine monitoring of blood pressure and blood glucose, should be encouraged to enable early detection and timely management of these conditions. Workplace health promotion initiatives that encourage healthy eating, regular physical activity, weight management, tobacco and alcohol cessation, improved access to nutritious food during travel, and adequate rest breaks to reduce prolonged uninterrupted driving could play an important role in improving drivers' overall health. Strengthening occupational health services and introducing targeted health programmes for commercial drivers may help reduce the growing burden of non-communicable diseases in this vulnerable population. Further large-scale prospective

studies are needed to better understand the long-term effects of occupational and lifestyle factors and to assess the effectiveness of preventive interventions.

Declaration by Authors

Ethical Approval: Approved. *Reference No.- 11/MC/EC/2023*

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Conflict of Interest: The authors declare no conflict of interest.

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