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Research Article

Risk Indicators of Heart Diseases

Prevalence of Risk Indicators of Heart Diseases Among Professional Male Bus Drivers

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Abstract: The study aims to determine the prevalence of heart disease risk indicators among male professional bus drivers. A quarter of all mortality is attributable toheart disease. The risk of heart disease is now more common among male professional bus drivers due to irregular diet, lifestyle and shift of work. This observational study included 100 male professional drivers selected by convenience sampling from an MTC bus stand (Chennai bus depot) and ACS medical college and hospital drivers. Face-to-face questioning strategies were administered to obtain information about their lifestyle conditions and shift of work from all participants. The Anthropometric measurement such as body mass index, blood pressure, and fasting blood glucose level is measured by a hand-held BMI machine, sphygmomanometer and glucometer. The risk score for the indicators of cardiovascular diseases (CVD)is estimated using a gender-specific Framingham risk score. The data analysis shows nearly 55% of subjects are in the low-risk category, 35% of issues are in the intermediate-risk category, and 10% are subjects in the high-risk category of developing a cardiovascular disease based on the estimation of 10 years of cardiovascular disease risk. The study concluded that bus drivers are at intermediate and high risk of developing CVD.Cardiovascular diseases have now become the leading cause of mortality in India. The risk of heart disease is more common among male professional bus drivers. The drivers are exposed to several possible risk indicators of cardiovascular diseases. Low physical activity levels were associated with higher CVD among male professional bus drivers.

Keywords: Cardiovascular disease; Risk factor; Blood Pressure; Framingham risk score; Body mass index; total cholesterol and hypertension.

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1. INTRODUCTION

Transport or transposition is the movement of people and goods from one place to another. The occupation of driving is also associated with an increased risk of cardiovascular diseases. [1] The health hazards of bus drivers are well known.[2] Several investigations have indicated that cardiovascular diseases affect professional drivers more often than other occupational groups.[4] Professional bus drivers are exposed to occupational risk factors such as shift work, long working hours, and loud noise.[5] The drivers are more likely to be obese as theyburn fewer calories due to the intensity of their work activities, have a poor and irregular diet and have to work in a sitting position for a long period every day.[6] Studies in recent decades have demonstrated that workers in the transportation industry are at greater risk of an incorrect diet and sedentary behaviour.[7] The world health organization (WHO) stated in 2022 that India reports more than 10.5 million deaths annually due to CVD.[8] Globally, heart attacks (MI) and strokes are responsible for 7.3 and 6.2 million deaths, respectively.[9] The global burden of cardiovascular disease today is responsible for approximately one-third of deaths worldwide.[10] Recent data highlight that cardiovascular disease accounts for approximately 16.7 million global deaths of 57 million. 11 A substantial portion of the increasing global impact of cardiovascular disease is attributable to economic, social and cultural changes that have led to an increase in risk factors for cardiovascular disease.[12] To reduce the global mortality burden from cardiovascular disease, we must refine our strategic goals and intervention programs.[13] Cardiovascular diseases is predicted to become the major cause of morbidity and mortality by 2022.[14]. It is recognized as the leading cause of death and disability worldwide.[15] The prevalence of cardiovascular diseases is increasing in developing countries like India.[16] Driving buses expose the drivers to many stressors that increase their cardiovascular risk.[17] Studies have also shown that physical activity is a predictor of cardiovascular disease mortality and morbidity, directly or via its effect on other risk factors. Low levels of physical activity have been associated with higher levels of CVD.[18]Hypertension is one of the main risk factors of CVD and is common among professional drivers. Nineteen bus drivers are likelier to develop CVD due to stressors like inadequate violence from passengers, traffic congestion, inflexible-running-time schedule, and rotating shift patterns.[20] These occupational factors can worsen BP, total cholesterol, Low-density lipoprotein-Cholesterol(LDL), High-density lipoprotein-Cholesterol(HDL), triglyceride, and diabetes resulting in a higher risk of experiencing CV events among professional drivers.[21] CV risk is attributed to lifestyle changes and metabolic activity.[22] The genetic predisposition factors such as cardio metabolic, hypertension, dyslipidemia, hyperglycemia, overweight and obesity and sociocultural factors such as lifestyle, alcohol, smoking, physical activity, and nutrition can all lead to CVD.[23,24]The risk factors fall into the category of either modifiable/non-modifiable risk factors. Non-modifiable risk factors consist of conditions a person cannot alter, whereas modifiable risk factors are conditions that can alter by making certain lifestyle changes.[25] Modifiable risk factors include hypertension, smoking habits, concentrations of LDL, and HDL, blood glucose level, alcohol use, low socioeconomic status, mental ill health, and psychosocial stress. Non-modifiable risk factors include age, genetic predisposition, gender, ethnicity or race.[26] According to the large international INTERHEART study (1990-2010), the so-called conventional risk factors such as hypertension, abnormal serum cholesterol, diabetes mellitus, smoking and obesity contributed to approximately 90% of CVDs[27]. Modifiable risk factors include hypertension, smoking habits, LDL and HDL concentrations, blood glucose level, alcohol use, low socioeconomic status, mental ill health, and psychosocial stress. Non-modifiable risk factors include age, genetic predisposition, gender, ethnicity or race. Hypertension is a systolic BP >=140mmhg and a diastolic BP >=90mmhg.Dyslipidemia is defined as total cholesterol >=6.22mmol/l or LDL-C >=4.14mmol/l, HDL-C =<1.04mmol/l or triglyceride >=2.26mmol/l. Obesity is defined as a BMI >=28.0(kg/m2). Diabetes mellitus is defined as fasting blood glucose concentration >=7.0mmol/l.[28] High BP was the leading risk factor for the global disease burden in 2010. In recent years, intensive lowering of LDL-C using statins has been established as an effective therapy to lower CV risk.[29]Prevention of CVD requires timely identification of people at increased risk to target effective dietary, lifestyle/drug interventions. Therefore, it is necessary to understand the other risk factors involved in this progression as well as to establish reasonable prevention strategies to attenuate this rapid rise in morbidity related to CVD. The prevention of risk factors of CVD and its control is directly linked to access to health care and the promotion of the general health of these workers [30]. The Framingham risk score outcome has been validated against outcome data on CV risk; the results of one British study suggested that the FRS performs well in predicting CHD mortality [31]. The Framingham function adapted to local population characteristics accurately and reliably predicted the 10-year CHD risk for patients aged 35-74. While several studies have claimed to improve the FRS, there is little evidence for any improved prediction beyond the Framingham risk score (FRS) [32].

2. MATERIALS AND METHODS

2.1. Population Samples

The institutional review board approved the study of ACS medical college and hospital with the reference C-20/PHYSIO/IRB/2019-2020. The Population used for the study includes male bus drivers from the Metropolitan transport corporation bus stand and ACS medical college and hospital. The sampling method used was a non-probability convenient sampling method which selected the most accessible set of drivers based on inclusion criteria like age above 45-56 years, smokers who use 4-5 cigarettes packets per day, working experience for more than five years, male, Patient willing to participate in the study, a patient who have diabetes and excluded those with age below 45 years, female, non-professional drivers, not ready to give informed consent and patient under statin therapy. The 100 drivers were grouped from the Population of age group above 45-56 years and working experience of more than five years. The informed consent was obtained from all the participants after a detailed explanation of the procedure.

2.2. Health Examination Survey

The drivers selected for the study were subjected to a health examination survey during their resting period between work hours. Before the anthropometric and physical examination, the information about the working hours, shift pattern, lifestyle habits were gathered through a face-to-face questioning method. The drivers usually had long working

hours and rotational shifts of work. They had a sedentary lifestyle, improper diet, lack of exercise, smoking and alcohol consumption. Firstly, their BMI was measured using an SGP weighing machine, and their BP was measured using medical health care pvt. mercury sphygmomanometer and their range were taken as well. Next, the blood glucose was measured using Accu-Chek. Then the total cholesterol, HDL, LDL and TG was clinically diagnosed by taking blood samples from the participants.

2.3. Variables

The independent variable such as age, height, weight, and BMI were taken. The dependent variables, such as systolic and diastolic BP, are classified as hypertensive, prehypertensive and normal based on WHO criteria. The blood glucose is classified as diabetic, pre-diabetic based on WHO criteria[33].The blood glucose and cholesterol are converted by the conversion formula provided by disabled world[34]. The categorical variable of smokers and non-smokers was based on the number of cigarette packets used daily. The FRS is used to estimate the patient risk for CV diseases, and it is a gender-specific algorithm used to assess an individual's 10-year CVD risk.

STEP-1. According to the risk factor such as patient age, HDL, TC, systolic BP and if they smoke or have diabetic depending on appropriate values, the risk points are calculated.
STEP-2 Using the total points from the risk factor element(Step-1), the 10-year CVD risk in % is determined.
STEP-3 Using the total points from (Step-1), the heart age (in years) is determined. STEP-4 Using the 10-year CVD risk from (Step-2), the high, low, and intermediate risk categories are selected. FRS >= 20%-high risk, FRS 10-19% intermediate risk, FRS < 10%-low risk.

3. DATA ANALYSIS

The collected data were tabulated and analyzed using both descriptive and Inferential statistics. All the parameters were assessed using the statistical package for social science (SPSS) version 24. t - Statistics.

Table 1: Descriptive Statistics for Demographic Data

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
						Statistic	Std. Error
Age	100	45.00	58.00	50.3700	3.49503	.286	.241
Height	100	162.00	180.00	169.93	5.39	-.630	.241
Weight	100	56.00	78.00	66.51	6.48	.092	.241
Bmi	100	15.40	37.00	23.3230	3.91477	1.172	.241

Table 1 reveals the mean value, standard deviation and standard error of the variables such as age, height, weight and BMI of the 100 individuals.

Table 2: Frequency Percentage of Categorical Variable

Variables	Percentage
Smoker	**29%**
Non Smoker	**71%**

Table 2 reveals the percentage for the variables such as smokers at 29% and non-smokers at 71%

Table 3: Descriptive Statistics for Dependent Variables

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
						Statistic	Std. Error
Systolic Blood Pressure	100	87.00	146.00	111.76	13.320	.060	.241
Diastolic Blood Pressure	100	60.00	95.00	74.22	6.6720	.484	.241

Table 3 shows the mean value, standard deviation, and standard error of the systolic and diastolic blood pressure.

Table 4: Comparison of Framingham Risk Score (FRS) Among Individuals

	FRS
MEAN	11.75
S.D	5.60
t-test	20.97
df	99
Significance	000***

(-P ≤ 0.001), CVD - Cardiovascular Disease,***
Table 4 reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom (df) and p-value of subjects and shows that statistically significant difference within subjects. (P ≤ 0.001)***

4. RESULTS

4.1. General Characteristics of Bus Driver

Among 100 bus drivers, 37 were above 45-50 years, and 63 were above 51-56 years, respectively. 75% were average, and 15% were overweight. 4% were obese, and 6% were underweight (table 1 & figure 1). Working experience of 5 years was about 30% and more than five years was about 70%.

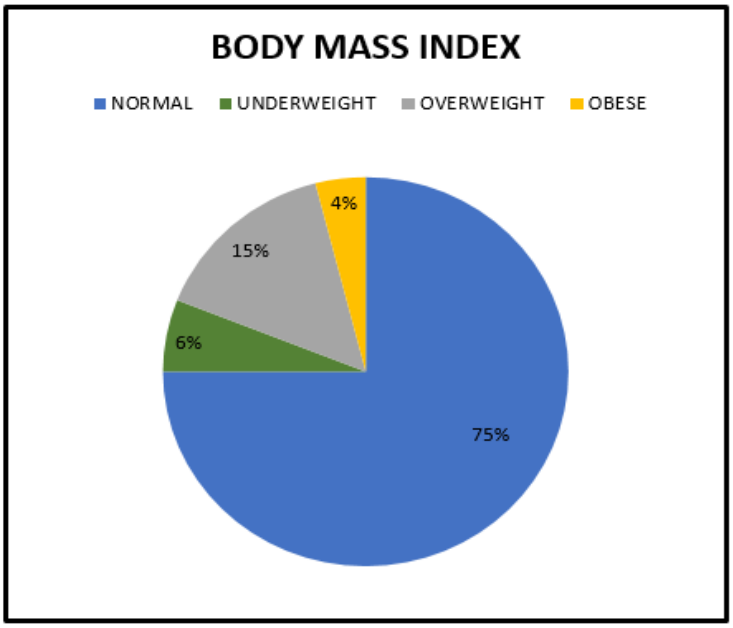

Fig 1: Frequency Percentage of BMI Distribution

Figure 1 illustrates the BMI distribution of 100 individuals as usual, underweight, overweight and obese.

4.2. CV Event Risk & Professional Driving

Among 100 bus drivers, the risk indicators for developing CV event risk, such as systolic and diastolic BP were 93% normal, 7% were hypertensive (figure 2), and 3% were diabetes (figure 3). Then the lipid profile showed 5% borderline high risk (figure 4). When the values were compared with FRS, they showed statistically significant differences within the subject (P>=0.001) (table 4, figure 5).

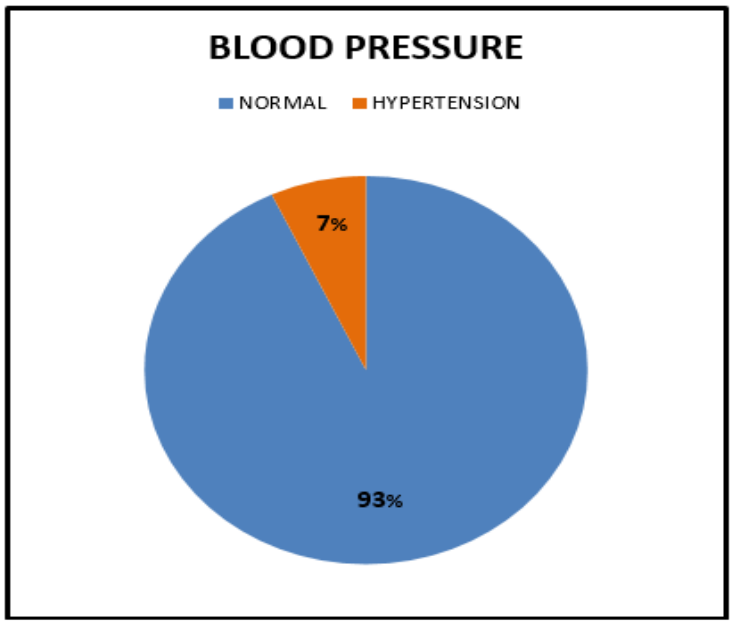

Fig 2: Frequency Percentage of Blood Pressure Distribution

Figure 2 shows the frequency percentage of blood pressure distribution among 100 individuals as 93% normal and 7% hypertensive.

Table 5: Descriptive Statistics for Dependent Variables

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
						Statistic	Std. Error
HDL	100	31.00	95.00	49.2400	13.636	.037	.241
LDL	100	44.00	145.00	83.6300	22.277	.649	.241
Triglyceride (TG)	100	110.00	381.00	149.04	38.208	3.320	.241
Total Cholesterol	100	134.00	255.00	179.75	21.154	.996	.241

Table 5 reveals the mean value, standard deviation, and standard error of the HDL, LDL, Triglyceride and total cholesterol.

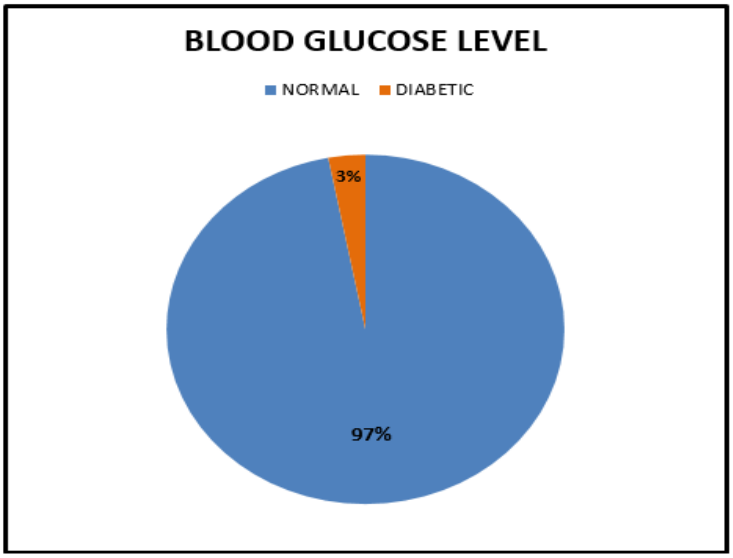

Fig 3: Frequency Percentage of Blood Glucose Level Distribution

Figure 3 reveals the frequency percentage of blood glucose level distribution among 100 male bus drivers as 97% normal and 3% diabetic.

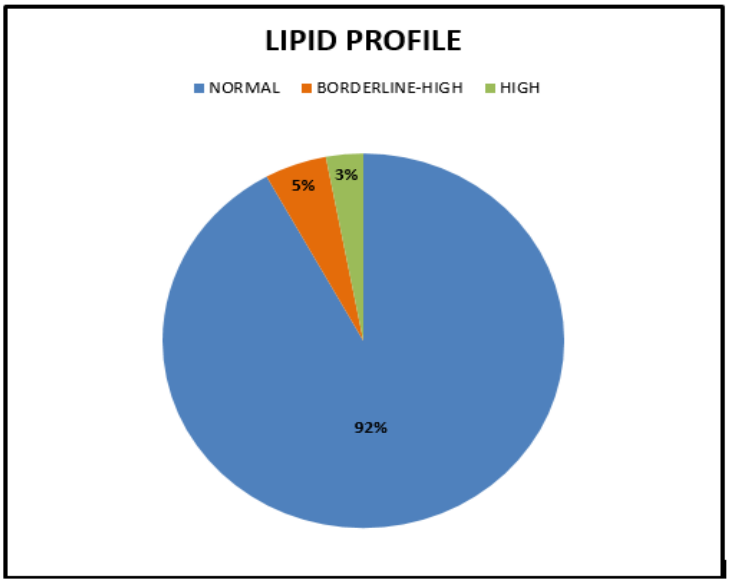

Fig4: Frequency Percentage of Lipid Profile Distribution

Figure-4 shows the frequency distribution of lipid profile as standard, high and borderline-high

Almost all the study participants who were diabetic, smokers, hypertensive and obese subjects were at risk of developing cardiovascular diseases. The data analysis shows nearly 55% of subjects are in the low-Risk Category based on the estimation of 10 years of cardiovascular disease risk, 35% of subjects are in the intermediate-risk category, and 10% are in the high-Risk Category of developing cardiovascular disease.

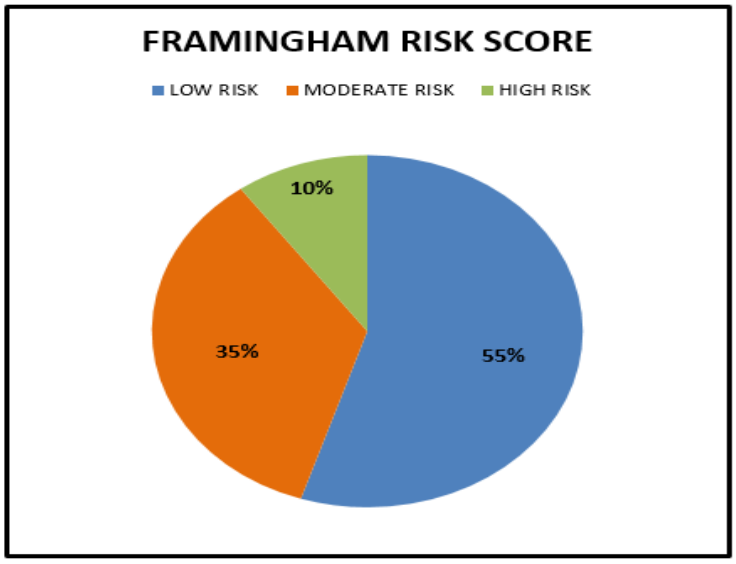

Fig 5: Frequency Percentage of Framingham Risk Score Distribution

Figure-5reveals the frequency percentage of Framingham risk score distribution as low risk, intermediate risk and high risk.

5. DISCUSSION

The present study investigated the prevalence of risk indicators of CVD among male professional bus drivers.100 male subject who fulfilled the inclusion criteria participated in this study. The incidence of CVD reminds the debilitating condition throughout the world. Professional drivers, those carrying passengers, were found to be at an increased risk of developing CVD, attributed to HTN and stress [24,25]. Eleni Rapsomaniki et al. (2014) stated that smoking, being overweight or obese, hypertensive, dyslipidemic[35] and hyperglycemic are the traditional CVD risk factors for developing CVD[28]. However, these are all controllable by diet and exercise[14]. Seung Yong Shin et al. (2013) mentioned that following adjustments for age, smoking, obesity, blood pressure, blood sugar, blood lipids and other factors, the above results remain intact[3].Zhao and Jie (2012) concluded that driving a bus differs from other occupations along a variety of dimensions, including the level of physical activity, the potential for disruption in diet and sleep habits and exposure to various elements of the physical environment such as carbon monoxide, lead and noise [14]. Over commitment also leads to job stress which is associated with CVD risk factors[26]. These factors may also contribute to the increased health risk experienced by bus drivers [9]. There are many preventable and unpreventable factors related to CVD progression, although we only investigated defined major risk factors[1]. With the rapid lifestyle changes, morbidity[36] related to various CV risk factors has increased rapidly among professional drivers with multiple risk factors clustered in the same individual, and the progression of CVD reminds grim [3]. G S Tell et al. (1998) used a diversity of clinical types and complexities of diagnosis for CHD and stroke, which is different from hypertension, diabetes and other epidemics; it is difficult to perform a large-scale survey on the prevalence of CVD among male professional drivers [21]. Another study conducted with 102 drivers who were followed up 24 weeks with a program of health profile assessment and health examination reported that it affected the levels of some risk indicators of heart disease and the revelatory communication value to evaluate the clinical outcome [38]. This study used the Framingham risk score (10 years for developing CVD). The other literature has also reported that the risk factors for CVD were due to lack of physical activity, proper diet, etc[29,10]. Our data showed that the prevalence of risk factors such as obesity was 4%, followed by hypertension at about 7%, diabetes at about 3%, lipid profile at about 3% and smokers at about 29% among male professional drivers of age above 45 years, respectively. The results of this study indicate that male professional drivers bear a burden of intermediate and high risk for developing CVDs[22].To conclude, the prevalence of risk indicators of heart disease among male professional drivers is at intermediate and high risk. Therefore, it should rehabilitate those at risk to protect their health and ensure passengers' safety. In addition, the study underscores the pressing demand for targeted educational interventions, regular check-ups, and appropriate lifestyle modifications among bus drivers.

6. CONCLUSION

The present study concluded that bus drivers are at intermediate and high risk of developing CVD. Early diagnosis and awareness of the risk factors in the development of CVD should be clearly defined for working bus drivers. A proper prevention exercise, awareness program and health education regarding their lifestyle and dietary modifications.

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8. AUTHORS CONTRIBUTION STATEMENT

This study was designed, directed and coordinated by V.Rajalaxmi as principal investigator and provided conceptual and technical guidance for all the aspects of the study. Kirthika. R and G. Mohan Kumar performed and analyzed the collected data and gave inputs. N.Muthukumaran, K.Balathandayutham and E.Kavitha contributed to discussing the methodology and result and contributed to the research work.

9. CONFLICT OF INTEREST

There is no conflict of interest.

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