Assessment of Cardiovascular risk factors among Autorickshaw drivers: A cross-sectional study from Central Karnataka, India.

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Abstract

Background: Cardiovascular diseases (CVDs) are a major public health concern in India, with autorickshaw drivers being a high-risk group due to their sedentary lifestyle and exposure to various risk factors. This study aimed to assess the determinants of cardiovascular risk factors among autorickshaw drivers in Davangere, Karnataka, India.

Objectives: To assess Cardiovascular risk factors and its determinants among auto-rikshawdrivers.

Methodology: A cross-sectional study was conducted among 100 randomly selected autorickshaw drivers in Davangere city for a period of 3months. Data on sociodemographic characteristics, lifestyle factors, and anthropometric measurements were collected by using a structured questionnaire for the study population and chi square test was used to analyse the data.

Results: The study encompassed a total of 100 auto-rickshaw drivers. The majority of the drivers fell within the age group of 40 to 49 years (37%), followed by the 30 to 39-year age group (28%). Among the study population, the prevalence of major cardiovascular risk factors was as follows: 31% were current smokers, 48% reported alcohol consumption, 63% were classified as obese, 35% exhibited central obesity, and 44% had hypertension.

Conclusion and Recommendations: The study revealed a high prevalence of behavioural risk factors, hypertension, and obesity among autorickshaw drivers, putting them at an elevated risk of developing cardiovascular diseases. It is advised to implement health education and targeted interventions to encourage healthy lifestyles, as well as to conduct regular health check-ups to identify and manage risk factors in this particular group.

Keywords: Cardiovascular Diseases, Risk Factors, Auto-rickshaw Drivers, Hypertension.

Introduction

The global burden of cardiovascular diseases (CVDs) is substantial, leading to high rates of morbidity and mortality[1]. In India, the prevalence of CVDs has been increasing due to urbanization, lifestyle modifications, and associated risk factors[2]. This trend is also evident in the state of Karnataka, located in southern India, particularly among certain occupational groups such as auto-rickshaw drivers in urban areas, including central Karnataka[3].

Auto-rickshaw drivers play a pivotal role in the Indian public transport system, offering last-mile connectivity. However, their occupation subjects them to various health risks, including prolonged sitting, irregular meal patterns, high-stress levels, exposure to vehicular pollution, and lack of physical activity, all of which contribute to an elevated risk of developing cardiovascular diseases. Previous research emphasizes the association between sedentary occupations and higher incidences of CVDs, underscoring the need to comprehend and address the cardiovascular risk factors prevalent among auto-rickshaw drivers for the development of effective public health interventions[4].

Numerous well-documented cardiovascular risk factors encompass hypertension, obesity, dyslipidaemia, diabetes mellitus, smoking, and alcohol consumption[5,6,7]. Hypertension, characterized by persistently elevated blood pressure, is a significant predictor of cardiovascular events like heart attack and stroke[3]. Obesity, particularly central obesity, is linked to an increased risk of hypertension, dyslipidaemia,

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and insulin resistance, while dyslipidaemia, defined by abnormal lipid levels in the blood, can lead to atherosclerosis and subsequent cardiovascular events [5,6]. Additionally, diabetes mellitus significantly heightens the risk of cardiovascular diseases, and smoking and excessive alcohol consumption contribute to endothelial dysfunction and increased oxidative stress[7,8].

In the case of auto-rickshaw drivers, these risk factors may be exacerbated due to their occupational environment and lifestyle, including occupational stress, irregular working hours, and exposure to air pollution, which can notably affect cardiovascular health[4,9,10]. Furthermore, limited access to healthcare services and health education among this group can potentially delay the diagnosis and management of cardiovascular risk factors[3].

The main objective of this study is to evaluate the prevalence of cardiovascular risk factors among auto-rickshaw drivers in central Karnataka, specifically focusing on hypertension, obesity, dyslipidaemia, diabetes mellitus, smoking, and alcohol consumption. Additionally, the study seeks to identify any associations between these risk factors and demographic variables such as age, duration of driving, and socio-economic status[3].

To accomplish these objectives, a cross-sectional study design will be utilized, involving a representative sample of auto-rickshaw drivers from central Karnataka. Data will be collected through structured questionnaires, physical examinations, and laboratory investigations. The findings from this study are anticipated to provide valuable insights into the cardiovascular health status of auto-rickshaw drivers, guiding targeted interventions to reduce their cardiovascular risk[3].

In conclusion, the assessment of cardiovascular risk factors among auto-rickshaw drivers is essential for devising tailored public health strategies. Addressing these risk factors can significantly alleviate the burden of cardiovascular diseases in this occupational group, ultimately enhancing their quality of life and overall health outcomes[3].

Aim: To assess Cardiovascular risk factors and its determinants among auto-rikshaw drivers.

Materials and methods: Study setting: Davanagere is situated in central part of Karnataka. **Study design and target population:** This study was a community-based cross-sectional analytical study carried out in Central Karnataka, Davanagere. **Study Subjects:** Autorickshaw drivers in Davangere City Inclusion Criteria: Full time auto rickshaw drivers. Persons who are driving auto for more than 6 months. Exclusion Criteria: Drivers who were not willing to participate in the Study. **Sample size determination:** Sample size calculated on the basis of 35.45 percent prevalence of smoking among autorickshaw drivers in a study done by Girish H O[11], with 10 percent allowable error using the formula 4PQ/D[2]. The sample size calculated is 88. With non-response rate of 10 percent, the minimum sample size will be 97 which will be rounded off to 100 for convenience. **Study period:** The study duration was for a period of 3 Months (September to November 2023). **Study tool:** After receiving approval from the institutional ethical committee (Ref No: JJMMC/IEC-47-2023), we used a multi-stage random sampling method to select autorickshaw drivers. We randomly selected drivers from five different auto stands, with 20 drivers chosen from each stand, for a total of 100 autorickshaw drivers. We employed the World Health Organization (WHO)[12] step-wise approach to assess the magnitude of cardiovascular risk factors in the study population. The study comprised two components: (1) a questionnaire-based survey for behavioural risk factors, and (2) anthropometric measurements. We collected primary data using a semi-structured pre-tested questionnaire after obtaining informed consent from the autorickshaw drivers. Data on socio-economic status, tobacco consumption, smoking, alcohol consumption, physical activity, anthropometric measurements, and blood pressure was gathered from all study subjects. Standard instruments and procedures were employed for anthropometric measurements. STEP 1: Information on socio-demographic variables and behavioural NCD risk factors including smoking, tobacco consumption, alcohol consumption, physical activity (Job, Leisure time and Travel related physical activities). STEP 2: Physical measurements- Height, Weight, waist circumference and blood pressure were measured using standardized instruments and protocols. Parameters used: Height: Height was measured with a standard tape to the nearest 0.1cm. Subjects were requested to stand without shoes and stand upright with the back against the wall, heels together and eyes directed forward[13]. Weight: Weight was measured using a standard balance to the nearest 0.5kg[14]. Waist Circumference (WC): A non-stretchable fiber measuring tape was used to measure WC. This measurement was made at the midway in the mid-axillary plane between the crest of the ileum and the inferior border of the last rib. The landmarks were felt for, noted, and a tape measure was used to determine the midpoint. With the arms relaxed at the sides, the measurement was obtained at the conclusion of a typical expiration12. Blood Pressure: The BP was measured by using a standard mercury

sphygmomanometer (appropriately calibrated and maintained). Blood pressure was measured in a quiet room, on the right arm in sitting position. Measurement was done three times over a period of minutes interval, lowest among the readings was recorded13.Body Mass Index (BMI15): The formula used to determine BMI is

BMI = weight in kgs / (height in meters) 2.

BMI scale:

< 18.5 Kg/ m2 : Under Weight	18.5 to 22.9 kg / m2 : Normal	23 to 24.9 kg / m2 : Overweight	≥ 25 kg / m2 : Obese

SES Classification: Based on B G Prasad's Classification updated in February 2023. The socioeconomic status of the drivers has been classified into five classes. Definitions employed in the study[12]: The WHO STEPS standards were followed for defining the different parameters.

Present smokers and users of smokeless tobacco:

Individuals who currently smoke or use smokeless tobacco on a daily basis were classified as current daily smokers or users.

Current/Present alcoholic: Those who have consumed alcohol within the past year are considered current alcoholics.

Elevated Blood Pressure: The definition of blood pressure is classified as follows:

Classification	Systolic BP (mmHg)		Diastolic BP (mmHg)
Normal	< 140	and	< 90
Hypertension Stage	>140	or	>90

Waist circumference: abdominal obesity was diagnosed when waist circumference (WC)was >90cm in men and >80 cm in women in accordance with the recommendations of World Health Organization for Asian adults.

Physical Inactivity: A person was labelled as inactive if he /she was inactive in all the three domains of work, transport, and leisure.

Statistical analysis:

The responses were coded and the data tabulated on a Microsoft Excel sheet and analysis was done by using IBM SPSS Version 25. The chi-square test was used to analyse the association between the cardiovascular risk and various factors. P value less than 0.05 was considered statistically significant.

Results:

**Table 1- Sociodemographic details of the auto drivers**

Variables	N (100)	Percentage
EDUCATION		
Illiterate	6	6
Till 10th	38	38
Till 12th/diploma	46	46
Till degree and above	10	10
MARITAL STATUS		
Married	85	85
unmarried	15	15

Many of the drivers had studied till 12th grade/ diploma (46%), followed by 38% who had studied till 10th grade. The percentage of drivers with a degree and above was only 10%, and 6% of the drivers had no formal education. It was observed that the majority of the drivers were married (85%), with only 15% of the respondents being unmarried (Table 1).
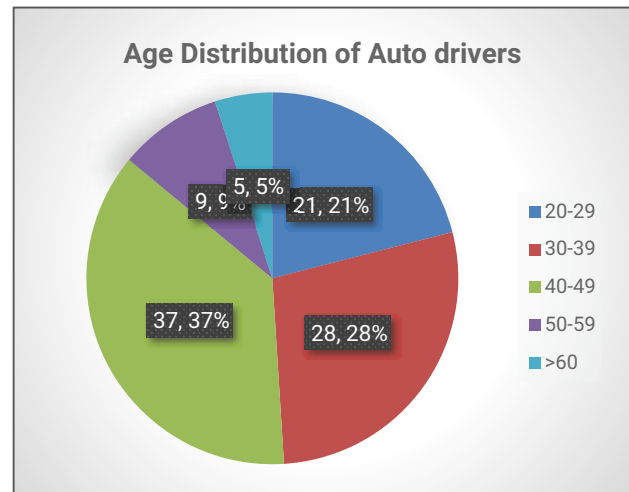
Figure 1: Age distribution of auto drivers.

The majority of the drivers were in the age group of 40 to 49 years (37%), followed by the age group of 30 to 39 (28%). The percentage of drivers in the older age group (>60) was very low (5%), and there were 9% of drivers in the age group of 50 to 59 (Fig 1).
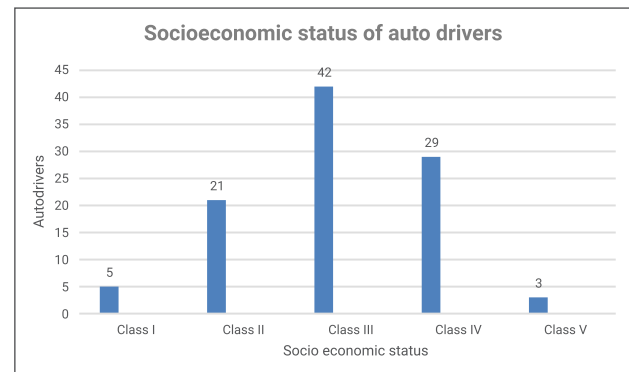
Figure 2: Socioeconomic status distribution of auto drivers

Most auto drivers belonged to class III and IV and the least belonged to class I and V socioeconomic status based on B G Prasad's Classification updated in February 2023.

Table 2: Cardio-vascular-risk factor profile of the auto-rickshaw drivers

Variables	N (100)	Percentage
Hours of Driving		
<8	30	30
>8	70	70
Years of Experience in Driving		
<10	43	43
>10	57	57
Diet		
vegetarian	18	18
Mixed	82	82
Years of Smoking		
No Smoking	69	69
<10	17	17
>10	14	14
Years of Drinking Habit		
No drinking	52	52
<5	19	19
>5	29	29
Tobacco/gutka chewing		
yes	29	29
no	71	71
Physical Activity		
yes	36	36
no	64	64
Body Mass Index		
Normal	24	24
overweight	13	13
obesity	63	63
Waist circumference		
<90cm	65	65
>90cm	35	35

Analysis of the data reveals that the majority of the drivers are engaged in driving for over 8 hours per day (70%), while the remaining 30% drive for less than 8 hours a day. Additionally, it was found that 57% of the drivers have more than 10 years of driving experience, while 43% have less than 10 years of experience. The study also indicates that the majority of the drivers (82%) follow a mixed diet pattern, whereas only 18% follow a pure vegetarian diet. Furthermore, 69% of the drivers are non-smokers, while 17% have been smoking for less than 10 years, and 14% have been smoking for more than 10 years. Regarding alcohol consumption, 52% of the drivers do not have the habit of consuming alcohol, whereas 29% have been drinking for more than 5 years, and 19% have been drinking for less than 5 years. Moreover, 71% of the drivers do not engage in tobacco or gutka chewing, while 29% are addicted to this habit. In terms of physical activity, 64% of the drivers are not involved in any form of physical activity, while 36% are engaged in activities such as walking, jogging, or cycling. The data also reveals that 63% of the drivers are classified as obese, 13% are overweight, and only 24% have a normal BMI. When considering waist circumference, it was found that 65% of the drivers have a waist circumference of less than 90, whereas 35% have a waist circumference of over 90. Additionally, 72% of the drivers experience stress, while the remaining 28% do not report feeling stressed (Table 2).

Table 3 - Association of Cardio-vascular-risk factors of the auto-rickshaw drivers

Variables	Normal	Hypertension	total	Chi square	P -value
Age					
20-29	14	7	21	5.531	0.237
30-39	19	9	28		
40-49	16	21	37		
50-59	4	5	9		
>60	3	2	5		
Total	56	44	100		
Education					
Illiterate	2	4	6	1.376	0.711
Till 10th	22	16	38		
Till 12th/diploma	26	20	46		
Degree and above	6	4	10		
Total	56	44	100		
Marital status					

married	49	36	85	0.623	0.429
unmarried	7	8	15		
Total	56	44	100		
Socio- economic status					
Class I	3	2	5	2.058	0.724
Class II	10	11	21		
Class III	22	20	42		
Class IV	19	10	29		
Class V	2	1	3		
Total	56	44	100		
Hours of Driving					
<8	20	10	30	1.979	0.159
>8	36	34	70		
Total	56	44	100		
Years of Experience in Driving					
<10	28	15	43	2.544	0.111
>10	28	29	57		
Total	56	44	100		
Diet					
vegetarian	7	11	18	2.608	0.106
Mixed	49	33	82		
Total	56	44	100		
Years of Smoking					
No Smoking	42	27	69	0.023	0.877
<10	10	7	17		
>10	4	10	14		
Total	56	44	100		
Years of Alcohol Drinking Habit					
No drinking	25	27	52	5.393	0.067
<5	15	4	19		
>5	16	13	29		
Total	56	44	100		
Tobacco/gutka chewing					
yes	12	17	29	3.543	0.059
no	44	27	71		
Total	56	44	100		
Physical Activity					
yes	22	14	36	0.596	0.439
no	34	30	64		
Total	56	44	100		
Body Mass Index					
Normal	16	8	24	3.211	0.201
overweight	9	4	13		
obesity	31	32	63		
Total	56	44	100		
Waist circumference					
<90cm	52	13	65	43.413	0.0001*
>90cm	4	31	35		
Total	56	44	100		

*p<0.05 statistically significant

In our study, the proportion of hypertension was found to be 44%, with the majority of cases occurring in the 40-49 age group (47.7%). Analysis of the data revealed that 34% and 36% of auto drivers who worked more than 8 hours were hypertensive and normotensive, respectively, while among those who worked less than 8 hours, the figures were 10% and 20%, respectively. Furthermore, 29% and 28% of auto drivers with over 10 years of experience were found to be hypertensive and normotensive, and the corresponding values for those with less than 10 years of experience were 15% and 28%, respectively. Moreover, 33% and 49% of auto drivers with a mixed type of diet were hypertensive and normotensive, while 11% and 7% of those with a vegetarian diet fell into these respective categories. In addition, 27% and 42% of non-smoking drivers were found to be hypertensive and normotensive, with 7% and 10% of those with less than 10 years of smoking experience falling into these categories. Furthermore, 27% and 25% of non-drinking drivers were hypertensive and normotensive, while 13% and 16% of those who had been drinking alcohol for more than 5 years fell into these categories. Additionally, among drivers with the habit of tobacco/gutka chewing, 17% and 12% were found to be hypertensive and normotensive, while 27% and 44% of those without this habit were found in these categories, respectively. Furthermore, 14% and 22% of physically active drivers were hypertensive and normotensive, whereas 32% and 31% of obese drivers fell into these respective categories. Finally, 13% and 52% of drivers with a waist circumference less than 90cm were hypertensive and normotensive, whereas 31% and 4% of those with a waist circumference greater than 90cm were found in these categories, respectively, with the difference being statistically significant (p<0.05). Moreover, 33% and 39% of drivers experiencing stress were found to be hypertensive and normotensive, respectively (Table 3).

Discussion

Our research encompasses various dimensions of cardiovascular diseases, particularly focusing on the association between conventional risk factors and the increased prevalence of coronary artery disease (CAD) in the Indian population. Our study, specifically conducted among auto-rickshaw drivers in Davanagere city, sheds light on the significant proportion of risk factors associated with the development of cardiovascular diseases within this occupational group.

The findings of our study reveal that hypertension prevails among 44% of the participants, with the majority falling in the age group of 40-49 years (47.7%) followed by 30-39 years (20.4%). This proportion notably differs from the prevalence reported by Girish

H. O[11] et al, which stood at 21.8% and other community-based studies conducted in urban settings in other parts of India[16] whereas the study done by Mehan et al[17] the habit of oral tobacco and cigarettes/rolled tobacco was the highest 44.6% in males and oral tobacco usage alone was 16.1%. Moreover, the study highlights the substantial prevalence of smoking, with 38.63% of hypertensive individuals being smokers which is comparable to the study done by Koppad et al[18],

Proportion of alcohol consumption among hypertension in our study is 38.63% which is low compared to the observations made by Shah B et al[19] among urban men, a multi centric study and studies done by Girish H.O et al[11] where the prevalence is 43.6%. Our study shows that 68.1% of our study population are sedentary in nature which is high when compared to study conducted by Koppad et al[18]. The reason for this could be that driving is a sedentary activity that requires little physical exertion, and all drivers were full-time drivers.

Proportion of obesity among hypertensives in our study was 72.7% which is very high when compared with the observations made by other studies conducted in the urban areas of India which could be due to the sedentary life style[17,20]. And waist circumference was found to be 70.45% among hypertensives which is very high. This could be due to more sedentary during working hours and lack of awareness of obesity and its hazards, as most of the drivers studied up to 10th or 12th standard. The proportion of physical inactivity among hypertensives was 68.1% which is low compared to the study done by Mehan et al[17] majority of the subjects 86.8% were sedentary in nature.

Notably, a high prevalence of sedentary behavior (68.1%) and obesity (72.7%) was observed among the hypertensive population of auto-rickshaw drivers. The sedentary nature of their work, combined with low educational attainment and lack of awareness of obesity-related health hazards, may contribute to these concerning figures.

Conclusions

According to the study, there are major cardiovascular risks among autorickshaw drivers, and many of them have hypertension. Most drivers are married, between the ages of 40and 49, and are driving for more than 10 years. Majority of the drivers lead unhealthy lives that include stress, obesity, a mixed diet and lack of physical activity. Interestingly drivers with more than eight hours of labor each day, ten or more years of driving experience, a diverse diet and high truncal obesity are more likely to have hypertension. Even while drinking and smoking are more common among

this population, the cumulative impact of other risk factors points to the urgent need for focused health initiative.

Recommendations

To reduce the cardiovascular risks faced by autorickshaw drivers, it is imperative to introduce comprehensive health programs. Regular health screenings, especially for hypertension and obesity, should be implemented. Educational campaigns that promote physical activity, a balanced diet, and stress management techniques are essential. Regulation of work schedules to limit prolonged driving hours is also necessary. Furthermore, the provision of support groups and counseling services to address stress and mental health issues would be advantageous. Effective communication and adoption of these recommendations can be ensured through collaboration between health authorities and transport associations, thereby enhancing the overall health and well-being of the drivers.

Limitations

The study faces certain limitations that warrant attention. The sample size is relatively small, comprising only 100 drivers, which may not accurately represent the broader population of autorickshaw drivers. Relying on self-reported data for habits such as smoking, alcohol consumption, and physical activity introduces the potential for bias or inaccuracies. Moreover, the study is cross-sectional, thereby restricting the ability to deduce causation from the observed relationships. Conducting further research with larger, more diverse samples and longitudinal designs would yield more substantial insights into the cardiovascular health risks among autorickshaw drivers.

References:

1. World Health Organization. (2021). Cardiovascular diseases (CVDs). Retrieved from https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds) cited on 10/6/2024.

2. Reddy KS, Yusuf S. Emerging epidemic of cardiovascular disease in developing countries. Circulation. 1998 Feb 17;97(6):596-601. doi: 10.1161/01.CIR.97.6.596

3. Gupta R, Mohan I. Hypertension epidemiology in India: Emerging aspects. Curr Opin Cardiol. 2016 Jul;31(4):354-61. doi: 10.1097/HCO.0000000000000299

4. Sinha AK, Misra P. Occupational health problems of auto-rickshaw drivers. Indian J Occup Environ Med. 2019 Sep-Dec;23(3):144-147. doi: 10.4103/ijoem.IJOEM_167_18

5. Ramachandran A, Snehalatha C. Rising burden of obesity in Asia. J Obes. 2010;2010:868573. doi: 10.1155/2010/868573

6. Vaidya A, Krettek A. Physical activity level and its socio-demographic correlates in a peri-urban Nepali population: A cross-sectional study from the Jhaukhel-Duwakot health demographic surveillance site. Int J Environ Res Public Health. 2014 Jan 16;11(1):928-50. doi: 10.3390/ijerph110100928

7. Thakur JS, Jeet G. Risk factor profile for non-communicable diseases in a state of India: Results of a state-wide STEPS survey. PLoS One. 2015 Jul 2;10(7):e0132159. doi: 10.1371/journal.pone.0132159

8. Patel SA, Narayan KMV. The epidemiology of cardiovascular disease in India: Historical perspectives, current trends, and future directions. Glob Health Action. 2014;7(1):23456. doi: 10.3402/gha.v7.23456

9. Kumar S, Gautam V. Cardiovascular disease risk factors among auto-rickshaw drivers: A cross-sectional study in South India. J Clin Diagn Res. 2021 Apr;15(4):LC01-LC05. doi: 10.7860/JCDR/2021/47087.14610

10. Dholakia HH, Rao KH. Exposure to air pollution and its health effects in auto-rickshaw drivers in Ahmedabad, India. Sci Total Environ. 2018 Nov 1;643:1650-1657. doi: 10.1016/j.scitotenv.2018.06.294

11. Girish HO, Senan P, Koppad R, Venugoplan PP. Risk Factor of Cardiovascular diseases among autorickshaw drivers of Kannur, North Kerala: A Cross-Sectional Study. Int J Community Med Public Health. 2016;3:3395-8

12. Maimoona Aboobakur, Ali Latheef, Ahmed JM, Sheena Moosa, Ravindra MP, Anand Krishnan, Dorairaj Prabhakaran. Surveillance for non-communicable disease risk factors in Maldives: results from the first STEPS survey in Male. Int J Public Health. 2009 Oct; 55(5):489-496.

13. Deepa R, Shantirani CS, Premalatha G, Sastry NG, Mohan V. Prevalence of insulin resistance in a selected south Indian population- The Chennai urban population study-7(CUPS-7).Indian J Med Res.2002;115:118-27.

14. Integrated Disease Surveillance Project. NCD Risk factor surveillance Training manual for field workers and field supervisors. Field manual. [Online].2003-2004 Available from URL:http://www.whoindia.org/LinkFiles/NCD-Survillance- TM02Field- Manual- IDSP-NCD-RF.pdf. available on 10/06/2024.

15. World Health Organization. The Asia pacific perspective: Redefining obesity and its treatment [online]. February 2000[cited] available from URL:http://www.wpro.who.int/internet/resources.ashx/NUT/Redefing+obesity.pdf. Available on 10/06/2024.

16. Thakur JS. Chandigarh: The first smoke-free city in India. Indian J Community Med. 2007;32(3):169-70.

17. Mehan MB,Surabhi S, Gautami J. Solanki. Risk factors profile of Non communicable diseases among middle – income (18-65years) free living urban population of India. Int J Diab Der Crres.2006;26:169-76.

18. Koppad R, Kumar SA, Kotur N, Umakanth AG. A Cross-sectional study on magnitude of risk factors of cardio -vascular diseases among auto -rickshaw drivers of Davangere city of Karnataka, India. Int J Res Rev.2012;4(22):66-73.

19. Shah B, Amthur P. Risk factor Surveillance for Noncommunicable diseases (NCDs): The Multi-site ICMR-WHO Collaborative Intiative. Presentation made at Forum 9; 2005 12-16 September; Mumbai, India.

20. Mohan V ,Shanti Rani CS, Deepa R. Glucose Intolerance (Diabetes and IGT) in a selected South Indian population with special reference to family history, obesity and life style factors- The Chennai Urban Population Study (CUPS 14). J Assoc Physicians India. 2003; 51:771-7.