

Nutritional Status and Physical Activity Pattern as Risk Factors for Non-Communicable Diseases among Occupational Bus Drivers

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ABSTRACT

It is anticipated that occupational bus drivers are at risk of non-communicable diseases. Present study aims at assessing the nutritional status and analyzing the risk factors associated, which could increase the probability of non-communicable diseases among bus drivers and conductors working for Karnataka State Road Transport Corporation. 120 professional drivers and conductors who attended annual health checkup were included. A pre designed questionnaire elicited information about anthropometry, dietary, physical activity and sleep pattern of the subjects. Lipid profile and blood glucose levels were recorded from annual health check up reports. Mean age of the subjects was 44 years with BMI ranging between 25- 29.9Kg/m². 73.3% had mixed diet pattern, 40% skip their meals sometime and majority eat their meals outside home most of the days in a week. 74.2% didn't indulge in physical activity. 56.7% subjects slept six to seven hours per day. 17.5% were diabetic, 52.5%, 80.8% and 17.5% had higher serum triglycerides, Low Density Lipoprotein and total cholesterol respectively. 57.5% had lower High Density Lipoprotein levels. 8.3%, 21.7% and 15% were smokers, alcoholic and tobacco chewers respectively. 't' test analysis showed significant difference between energy, protein and visible fat intake with that of Recommended Dietary Allowance and Estimated Average Requirement. Total cholesterol, Low Density Lipoprotein and serum triglycerides had positive correlation with energy, protein and visible fat intake and BMI. Considerable risk factors for non-communicable diseases were observed among the subjects; effective diet counseling with regular follow up and monitoring is necessary to prevent the same.

Key Words: Occupational drivers, nutritional status, risk factors, dietary pattern, physical activity, Non Communicable Diseases, effective counseling.

INTRODUCTION

Balanced diet plays a key role in attaining a healthy life; it refers to having right nutrients in right proportions to achieve proper bodily function. Also regular physical activity with good sleep pattern aids an individual to lead a healthy life and Non-Communicable diseases like diabetes mellitus, hypertension, cardiovascular diseases, etc. can be prevented.

Workers of transport department especially drivers and conductors showed to have improper lifestyle in terms of diet, physical activity, sleep pattern, habits, etc. The pre-eminent reason could be lack of education and time accompanied by shift timings. Bus or truck drivers are at higher risk of various chronic diseases especially cardiovascular diseases [1]. They can easily get into unfavorable risk factors such as obesity,

poor dietary habits, sedentary lifestyle, etc which accompanied with job stress leads to hypertension, dyslipidemia and diabetes in turn resulting in higher probability of cardiovascular events [2, 3]. Common risk factors of drivers and conductors include prolonged sitting/ standing, decreased rest, disturbed sleep pattern, irregular food habits, stress and pressure for safety of the passengers [4].

Professional drivers munch on unhealthy, handy snacks and choose for more salt and saturated fat, with fewer intakes of fruits and vegetables [5-7]. Intake of junk foods may increase their risk for non-communicable diseases mainly CVD. Also it is quite common that drivers and conductors have to work in both day and night shifts, which apparently affect their diet, physical activity and sleep pattern. There was a significant difference in night shift workers when compared with day shift ones with respect to prevalence of being overweight increased meat consumption and lower fruits and vegetable intake[8].

One of the previous studies reveals that the night shift workers derived higher energy from saturated fats and had lesser vegetables and fruits compared to day workers [9]. Also it was found that night workers had poor snacking choices with possible reasons could be time constraints and lack of education.

This study aims at understanding and assessing the impact of lifestyle modifications on the nutritional status of employees working in Karnataka State Road Transport Corporation. Primary objective was to conduct the anthropometric assessment, investigate the dietary, physical activity and sleep pattern and correlate it with lipid profile of the subjects. Data was collected using standard tools, appropriate statistical tests were applied and inferences were drawn.

Also subjects were given simple advice on choosing healthy food, regular physical activity, stress management, practicing good lifestyle, etc. Emphasizing on these parameters could prevent the

subjects from various Non-Communicable Diseases.

MATERIALS AND METHODS/ METHODOLOGY

Sample selection: The study was conducted in a Tertiary care hospital (Sri Jayadeva Institute of Cardiovascular Sciences and Research) in Bangalore. The study population included 120 male bus drivers and conductors employed by Karnataka State Road Transport Corporation (KSRTC) selected using simple random sampling technique, who had visited the hospital for annual health checkup between January 2020 to May 2020. Only male subjects were included as females were less in number. Among 120 subjects selected in the study 55 were driver cum conductors, 48 were drivers and 17 were conductors.

Study design: It was a cross-sectional study conducted using a pre-requisite questionnaire to elicit information on basic data, anthropometry, biochemical parameters, diet, physical activity and sleep pattern of the subjects.

Data collection: Data was collected using personal interview technique; it included basic information like age, education qualification, occupation, monthly income, family type, family size, habit of smoking, tobacco chewing or alcoholism, etc. Anthropometric measurements for weight and height were collected using calibrated weighing machine and height scale. BMI was calculated. Obtained values were compared with Asian BMI standards and subjects whose BMI was between 18.5-22.9 were categorized as normal, 23-24.9 as overweight, 25-29.9 as pre obese and those > 30 as obese.

Blood samples collected during medical camp to test for Fasting Blood Sugar, Post Prandial Blood Sugar and lipid profile using GOD-POD method for blood sugar, CHOD-PAP, direct method and GPO-PAP for lipid profile were recorded. These values were compared with reference

range given by Centre for Disease Control (CDC), May 2019.

Eliciting information on dietary pattern of the subject was done by collecting data regarding food pattern (Vegetarian or Non vegetarian), number of meals taken per day, habit of skipping meals, oil used for cooking medium, quantity of oil used per month, etc. 24hrs dietary recall method was used, through this average intake of energy, protein and visible fat was calculated and compared with Estimated Average requirement (EAR) 2020 and Recommended Dietary Allowance (RDA) 2010. Food Frequency Questionnaire including 30 items was framed and frequency of consumption of those foods was assessed.

Physical activity level of the subjects was assessed based on the time spent on various activities such as walking, jogging, yoga, exercise etc. Sleep pattern was evaluated by collecting data on sleep and wake up time.

Statistical analysis and Interpretation:

The collected data was coded and entered using MS excel 2007 and analyzed using SPSS software. Basic statistical methods like percentage were used to analyze the basic data, anthropometry, food habit, physical activity and sleep pattern, etc. Mean and standard deviation were used to analyze the intake and adequacy of nutrients. Student 't' test was performed to assess for association between mean intake and EAR and RDA of the nutrients. Pearson Chi square test was performed to check the association of BMI with age group. Spearman Correlation test was used to evaluate the correlation between nutrient intake, BMI and sleep pattern of the subjects with glucose and lipid profile. All statistical tests were performed at 0.05 level of significance and confidence interval of 95%.

RESULT

TABLE – 1. Classification of Respondents by Personal characteristics, N=120

Characteristics	Category	Respondents	
		Number	Percent
Age group (years)	30-39	24	20.0
	40-49	54	45.0
	50-59	42	35.0
Educational level	SSLC	52	43.3
	PUC	47	39.2
	Graduation	21	17.5
Occupation	Driver	43	35.8
	Conductor	11	9.2
	Driver cum conductor	50	41.7
	Mechanic	16	13.3
Total		120	100.0

Table 1 depicts the age group, educational level and occupation of the respondents.

TABLE – 2. Classification of Respondents by Food habit, N=120

Characteristics	Category	Respondents	
		Number	Percent
Food habit	Vegetarian	24	20.0
	Mixed diet	88	73.3
	Ovo vegetarian	8	6.7
Frequency usage of non-vegetarian	Weekly	45	37.5
	Fortnightly	31	25.8
	Monthly	12	10.0
	No	32	26.7
Total		120	100.0

Table 2 gives the food habit and frequency of non-veg consumption of the subjects,

TABLE – 3. Response on Meal pattern and Skipping of meals, N=120

Characteristics	Category	Respondents	
		Number	Percent
Number of meals consumed /day	Two	25	20.8
	Three	95	79.2
Skipping of meals	Yes	24	20.0
	No	48	40.0
	Sometimes	48	40.0
Type of meal skipped	Breakfast	22	18.3
	Lunch	47	39.2
	Dinner	3	2.5
Type of oil used	Sunflower	88	73.3
	Groundnut	24	20.0
	Others	8	6.7
	Total		120

Table 3 depicts the meal pattern of the respondents, it includes number of meals consumed per day, skipping of meals, if yes which meal is skipped and also the type of oil used for cooking at home.

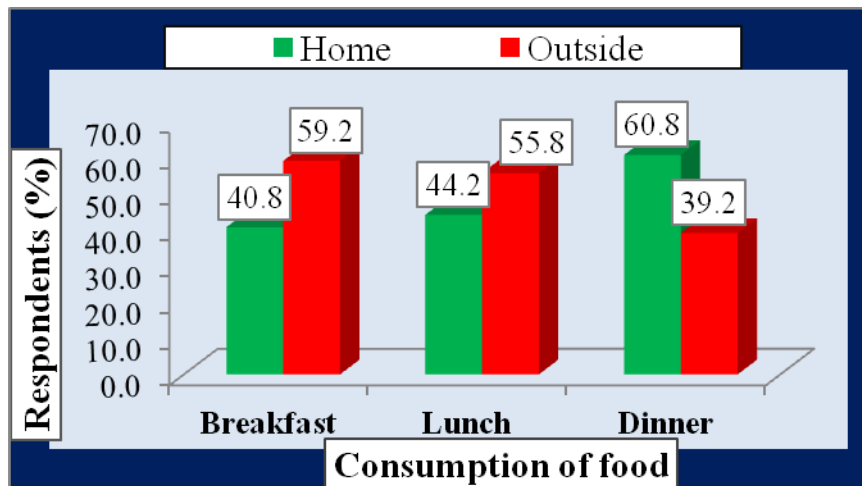


Figure 1: Classification of Respondents by Consumption of food

Fig 1 depicts the consumption of food outside home by the respondents.

TABLE – 4. Classification of Respondents by Anthropometric measurements, N=120

Characteristics	Category	Respondents	
		Number	Percent
Height (cm)	155-165	42	35.0
	166-170	44	36.7
	171-180	34	28.3
Weight (kg)	51-70	38	31.7
	71-80	51	42.5
	81+	31	25.8
Total		120	100.0

Table 4 depicts the anthropometric measurements; it includes average height and weight of the respondents.

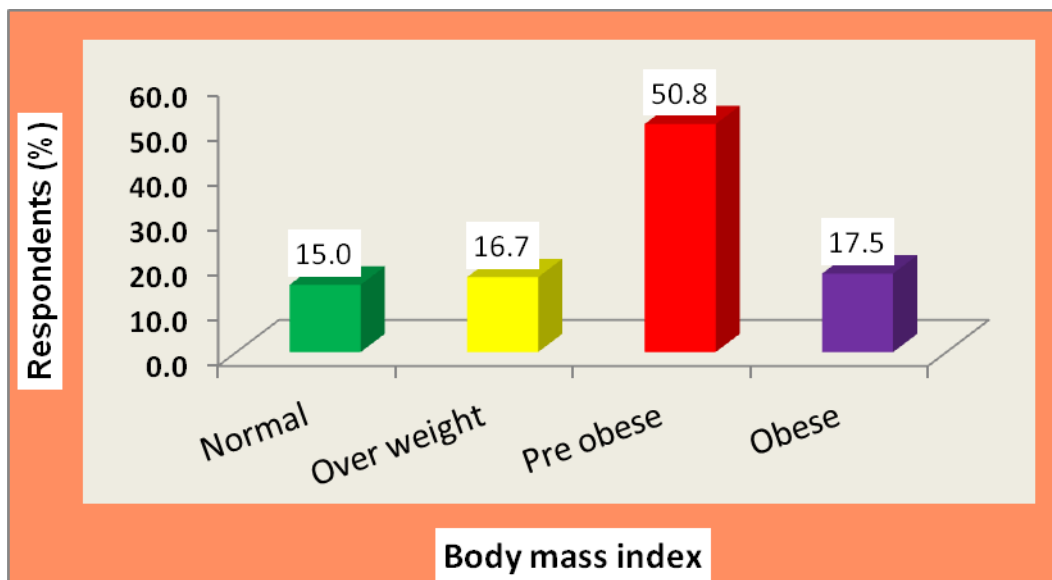


Figure 2 Classification of Respondents by Body mass index

Fig 2 states the BMI of the respondents in comparison with Asian BMI Standards.

TABLE – 5. Response on Body mass index by Age group, N=120

Body mass index	Respondents by Age (years)						χ^2 Test
	30-39		40-49		50-59		
	N	%	N	%	N	%	
Normal	5	20.8	8	14.8	5	11.9	2.50 NS
Over weight	2	8.3	11	20.4	7	16.7	
Pre obese	13	54.2	26	48.1	22	52.4	
Obese	4	16.7	9	16.7	8	19.0	
Total	24	100.0	54	100.0	42	100.0	

NS: Non-significant, $\chi^2 (0.05, 6df) = 12.592$

Table 5 depicts the response of Body Mass Index (BMI) by age group, Chi Square test shows no significant difference in BMI

among the respondents of different age group at 5% level of significance.

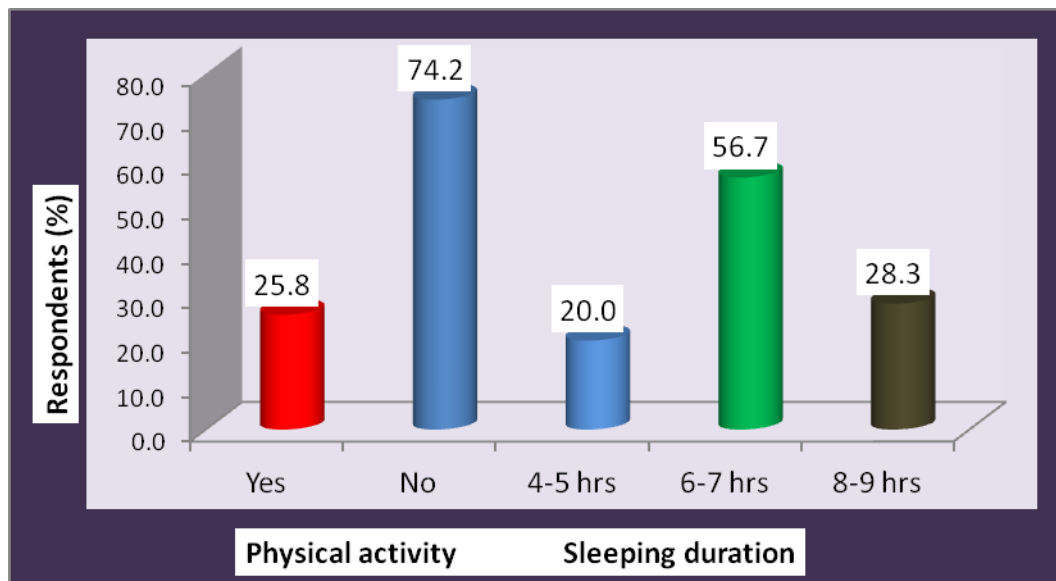


Figure 3 Response on Physical activity and sleeping duration

Fig 3 depicts the Physical activity level and sleep duration of the subjects.

TABLE – 6. Response on Co morbidity and Personal habits, N=120

Aspects @	Category	Respondents	
		Number	Percent
Comorbidity @	None	64	53.3
	HTN	7	5.8
	Diabetics	21	17.5
	Others	22	18.3
Personal habit @	None	74	61.7
	Smoking	10	8.3
	Alcohol	26	21.7
	Tobacco	18	15.0
Total		120	100.0

@ Multiple Response

Table 6 shows the co morbidity status and personal habits of the subjects.

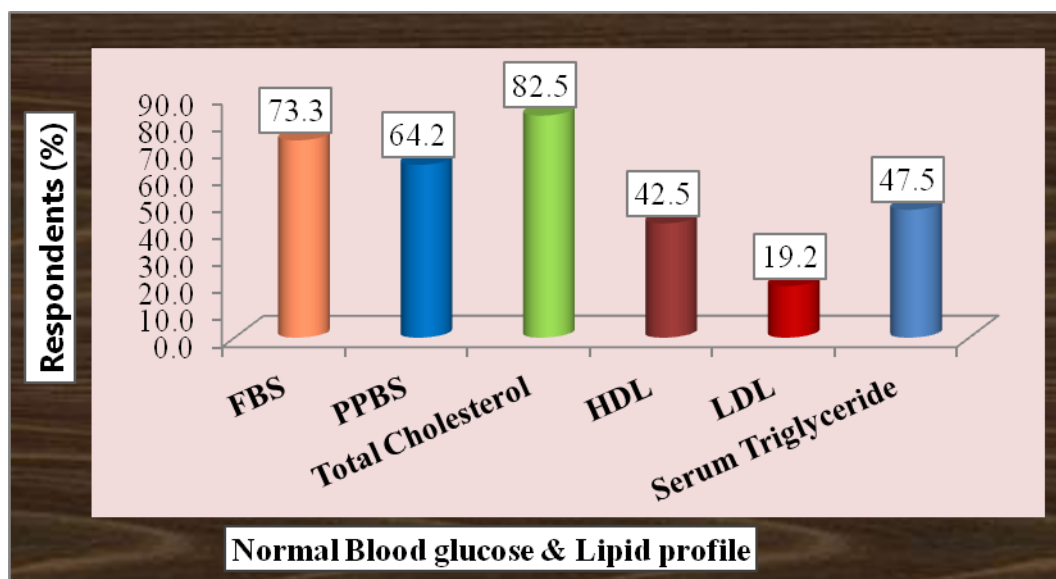


Figure 4: Response on Blood glucose & Lipid profile values

Fig 4 states the Blood glucose parameters and lipid profile of the subjects.

TABLE – 7. Mean consumption of Nutrients in comparison with Recommended Dietary Allowance (RDA), N=120

No.	Nutrients	RDA	Consumption		Adequacy (%)	‘t’ Test
			Mean	SD		
1	Energy (Kcal)	2320	1631	228	77.3	25.30**
2	Protein (g)	42.9	53.3	9.0	124.2	12.66**
3	Fat (g)	25	35.2	9.2	140.8	12.15**

*Significant at 5% level. $t(0.05,119df) = 2.58$

Table 7 gives the Mean consumption of Nutrients in comparison with Recommended Dietary Allowance (RDA), it showed significant difference at 5% level of significance.

TABLE – 8. Mean consumption of Nutrients in comparison with Estimated Average Requirement (EAR), N=120

No.	Nutrients	EAR	Consumption		Adequacy (%)	‘t’ Test
			Mean	SD		
1	Energy (Kcal)	2110	1631	228	77.3	23.01**
2	Protein (g)	60	53.3	9.0	123.9	8.15**
3	Fat (g)	25	35.2	9.2	140.8	12.15**

*Significant at 5% level. $t(0.05,119df) = 2.58$

Table 8 gives the Mean consumption of Nutrients in comparison with estimated average requirement (EAR), it showed significant difference at 5% level of significance.

TABLE – 9. Correlation coefficient between Nutrients and Lipid profile and Blood glucose parameters, N=120

No.	Parameters	Correlation (r) with Nutrients		
		Energy	Protein	Fat
I	Blood Profile			
1	FBS	+0.034	+0.065	+0.028
2	PPBS	+0.048	+0.064	+0.086
II	Lipid Profile			
1	Total Cholesterol	+0.068	+0.106	+0.042
2	LDL	-0.004	+0.023	+0.046
3	HDL	+0.017	-0.081	-0.053
4	Serum Triglyceride	+0.135	+0.108	-0.167

Table 9 depicts the correlation between intake of energy, protein and fat with blood glucose level and lipid profile.

TABLE – 10. Correlation coefficient between Sleeping duration and Body mass index with Lipid profile and Blood glucose parameters, N=120

No.	Parameters	Correlation (r) with	
		Sleep duration	Body mass index
I	Blood Profile		
1	FBS	-0.055	-0.142
2	PPBS	-0.041	-0.047
II	Lipid Profile		
1	Total Cholesterol	-0.084	+0.126
2	LDL	-0.061	+0.129
3	HDL	+0.068	-0.201
4	Serum Triglyceride	-0.023	+0.128

Table 10 shows the correlation of lipid profile with sleep duration and BMI of the subjects.

TABLE – 11. Association between Age group with Lipid profile and Blood glucose parameters, N=120

No.	Parameters	Association with Age group (years)						χ^2 Test
		30-39 (n=24)		40-49 (n=54)		50-59 (n=42)		
		N	%	N	%	N	%	
I	Blood Profile							
1	FBS	23	95.8	39	72.2	26	61.9	9.05*
2	PPBS	22	91.7	33	61.1	22	52.4	10.65*
II	Lipid Profile							
1	Total Cholesterol	20	83.3	43	79.6	36	85.7	0.62 ^{NS}
2	LDL	6	25.0	8	14.8	9	21.4	1.33 ^{NS}
3	HDL	10	41.7	23	42.6	18	42.9	0.01 ^{NS}
4	Serum Triglyceride	11	45.8	27	50.0	21	50.0	0.13 ^{NS}

*Significant at 5% level, NS : Non-significant, $\chi^2(0.05,2df) = 5.991$

Table 11 shows that there was a significant difference among different age group in Blood glucose parameters, whereas

no significant difference for the same in lipid profile at 5 % level of significance.

TABLE – 12. Response on Frequency consumption of Foods, N=120

No.	Food groups	Respondents (%)						
		Never	Daily	Weekly twice	Weekly once	Fort nightly	Monthly	Occasionally
I	Cereals							
1	Rice	0.0	95.8	4.2	0.0	0.0	0.0	0.0
2	Wheat	5.0	17.5	44.2	23.3	9.2	0.8	0.0
3	Ragi	8.3	55.0	17.5	9.2	5.8	3.3	0.8
4	Jowar	49.2	27.5	5.8	9.2	4.2	2.5	1.7
5	Navane	88.3	1.7	1.7	2.5	3.3	2.5	0.0
6	Arka	95.8	0.8	1.7	0.0	0.0	0.8	0.8
7	Baragu	94.2	0.8	1.7	0.0	0.8	1.7	0.8
8	Saame	95.0	0.8	1.7	0.0	0.0	1.7	0.8
9	Sajje	90.8	1.7	3.3	0.0	0.8	0.8	2.5
II	Pulses							
1	Turdal	0.0	84.2	10.0	5.0	0.8	0.0	0.0
2	Moong dal	0.8	25.8	21.7	38.3	10.0	3.3	0.0
3	BengalGram dal	1.7	13.3	27.5	35.8	10.8	8.3	2.5
4	Soya	85.0	2.5	0.0	4.2	0.8	4.2	3.3
5	Urad dal	1.7	27.5	35.0	30.0	5.0	0.8	0.0
III	Milk & Products							
1	Milk	9.2	82.5	4.2	1.7	1.7	0.0	0.8
2	M.Products	0.0	70.0	20.8	4.2	4.2	0.0	0.8
3	Ghee	21.7	12.5	16.7	20.8	15.0	5.0	8.3
4	Butter	68.3	2.5	3.3	10.8	2.5	5.8	6.7
5	Dalda	93.3	0.8	0.8	0.8	0.0	0.8	3.3
IV	Vegetable							
1	Roots& Tubers	0.0	34.2	30.8	27.5	3.3	2.5	1.7
2	Green leafy veg.	0.0	40.0	44.2	15.0	0.8	0.0	0.0
3	Other Veg	0.0	55.0	27.5	14.2	2.5	0.8	0.0
V	Fruits							
1	Fruits	2.5	20.0	25.8	29.2	17.5	4.2	0.8
2	Nuts	7.5	8.3	7.5	18.3	13.3	14.2	30.8
VI	Beverages							
1	Alcoholic	61.7	3.3	6.7	13.3	5.0	5.0	5.0
2	Non Alcoholic	0.8	22.5	33.3	25.8	12.5	2.5	2.5
VII	Others							
1	Bakery	23.3	7.5	14.2	26.7	15.0	6.7	6.7
2	Fast foods	30.0	3.3	6.7	20.0	19.2	7.5	13.3
3	Fried foods	15.0	6.7	19.2	26.7	22.5	6.7	3.3
4	Sweets	14.2	7.5	11.7	26.7	16.7	11.7	11.7

Table 12 depicts the frequency of consumption of different food group among the subjects.

DISCUSSION

The present study was conducted in a tertiary care hospital in Bangalore. 120 subjects included were employees of Karnataka State Road Transport Corporation (KSRTC). The main aim of the study was to assess the nutritional status of the subject with respect to anthropometry, physical activity, sleep and dietary pattern of the subjects. The data obtained was correlated with Lipid profile and blood glucose level to study the risk of Non Communicable Diseases.

The mean age of the subjects was found to be 44 years with majority of them (45%) in the age group of 40-49 years. Similar results were shown in a study done by Sr. Kanikkai Parvin. et al. where 61% of the subjects were in the age group of 40-50 years [10]. Present study reported that 43.3% had completed Secondary School Leaving Certificate (SSLC) exam and majority were driver cum conductor by profession (Table 1). This will create a lot of occupational stress on the subjects. A study done by Takilkar C S revealed that 57.8% exhibits moderate level of stress score and significantly associated with hypertension [11]. It was reported that 73.3% of the subjects had mixed diet pattern

in the present study among which 37.5% consumed non veg weekly (Table 2). However in a study a higher percentage of the study population (99.4%) reported mixed diet pattern, among which 55.8% consumed non veg on most of the days in a week reports Arjun Lakshman et al. [12]. 20% skip their meals everyday whereas 40% skip it sometimes due to work pressure and time constraints, majority (39.2%) usually skip the lunch because of long travelling period and lack of break time (Table 3). On contrary as per Sasikala devi S, 61.4% skip their breakfast and only 15.3% skip their lunch [13]. Interestingly present study reports that 59.2%, 55.8% and 39.2% of the subjects eat breakfast, lunch and dinner from outside source every day respectively (Fig 1). Supporting this Arjun Lakshman et al. states that 62.6% eat their meals from restaurants [13]. This could be one of the cardiovascular risk factors among the subjects.

Anthropometric data reports that majority (36.7%) of the subject's height falls in the range of 166 to 170cm and 42.5% of the subject's weight ranges between 71-80Kg. BMI of the subjects categorizes 50.8% to be Pre-obese with BMI of 25 to 29.9Kg/m² (Table 4, Fig 2). Similar result was reported by Sr. Kanikkai Parvin et al. with 49% of the study population to have BMI range of 25 to 29.9Kg/m² [10]. A study done by Chankaramangalam Mathew Anil reported 50% of the subject's BMI to be >25Kg/m² [14]. Conversely Saimak Pourabdin et al. reports 39.1% of the study population to have BMI ranging between 25-29.9Kg/m² [15], which is lower compared to the present study. Besides previous study also reports significant association of Age with BMI [15] whereas present study reports no significant difference in BMI among different age group; 30-39 years, 40-49 years, 50-59 years respectively (Table 5).

Assessing Physical activity pattern revealed that majority (74.2%) were not indulged in any kind of physical activity, although Sr. Kanikkai et al. reports only

11% of the subjects were doing physical activity [10]. Sleep duration reported that 56.7% of the subjects sleep for 6-7 hours yet subjects self-reported that the sleep was disturbed; it was either in the break time or day time combined with fatigue (Fig 3). Alexander M Crizzle et al. states that sleep apnea in association with stress and underlying medical condition can increase the crash risk [16]. Co morbidity status revealed that an overall of 46.7% of the subjects had Hypertension, Diabetes, etc. among which 17.5% were diabetic (Table 6), whereas Lakshman et al. reports 13% of the subjects to be diabetic in his study [12], which is lesser than the present study.

Present study proclaims that 8.35% of the subjects were smokers, 21.7% were alcoholics and 21.7% were tobacco chewers (Table 6). On contrary, Lakshman et al. reports 46%, 86.3% and 15.6% of the study population to be Smokers, alcoholic and tobacco chewers respectively [12], which is way too higher than the present study. A 38-year follow-up study of UK men showed that baseline differences in tobacco use, High blood pressure and cholesterol were associated with a 10- to 15-year shorter life expectancy [17]. Increased smoking indicates elevated number of tobacco related deaths in developing countries [18]. By the year 2030, WHO (2008) projects that over 80% of tobacco-related deaths are to occur in young people in developing countries [19].

Furthermore, biochemical parameters reports 17.5%, 80.8% and 52.5% of the subjects to have elevated total cholesterol, Low Density Lipoprotein and Serum Triglycerides respectively. Also 57.5% shows lower High Density Lipoprotein. A study done by Farzanch Monlazerifar et al. reveals that 76.7% had higher Triglycerides and 81.4% had lower High Density Lipoprotein [20]. H Nasri M D et al. Reports 67% of study population (n=194) had elevated Low Density Lipoprotein and was significantly associated with Coronary Artery Disease (p=0.0001*) at 5% level of significance [21].

On comparing with Recommended Dietary Allowance (RDA) 2010, adequacy of calories, protein and fat is reported to be 77%, 124.2% and 140.8% respectively. Similar results were reported when compared with Estimated Average Requirement (EAR) 2020 (Table 7, 8). On performing 't' test, a significant difference was seen between intake and RDA 2010 and EAR 2020 for energy, protein and fat. Majority of the subjects derive their protein from animal source, excessive protein intake do have adverse effect on the health of an individual which results in irregularities of bone and calcium homeostasis. Lower fluid intake accompanied with increased protein consumption increases the renal acid excretion and acid load which in turn results in hypercalciuria and calcium kidney stones. Excessive protein intake increases the risk of cancer and cardiovascular diseases [22].

It was observed that fat intake is almost 1.5 times higher than the requirement, which could be detrimental. The intake of saturated fats and Trans fats in the form of deep fried foods, bakery foods, meat, junk etc (Table 12) is encountered. Also majority (73.3%) used sunflower oil for cooking at home. A study done by Sowmya Narasimhan et al. reported that excessive fat intake was significantly associated with risk of abdominal obesity, hypertension and fasting blood glucose, which indeed are the components of metabolic syndrome. Adding to this previous study also states that using sunflower oil for cooking had significant association with above mentioned components ($p < 0.001$) [23]. Sunflower oil due to its higher emission of aldehydes, independent of cooking method is carcinogenic reports Chiung-Yu Peng et al. [24].

Present study reveals a weak positive correlation of total cholesterol, LDL and Serum Triglyceride with BMI whereas a negative correlation with HDL (Table 10). Supporting this Magna Manjareeka et al. also reports a weaker

correlation of lipid profile with BMI, but shows a comparatively stronger correlation with waist circumference [25].

CONCLUSION

The present study gives an overview of nutritional status of the subjects which is alarming and increases their risk for non-communicable diseases. Adding to this is physical inactivity, sleep apnea and tobacco use resulting in abdominal obesity; a precursor of non-communicable diseases. Effective repeated counseling and educating on healthy eating; short duration physical activity in leisure time will improve lifestyle and reduce the risk of many non-communicable diseases such as cardiovascular diseases, diabetes, hypertension, and cancer.

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Abbreviations

RDA: Recommended Dietary Allowances.

EAR: Estimated Average Intake.

BMI: Body Mass Intake.

FBS: Fasting Blood Sugar

PPBS: Post Prandial Blood Sugar

CVD: Cardio Vascular Diseases

HDL: High Density Lipoproteins

LDL: Low Density Lipoproteins

GOD-POD: Glucose Oxidase-Peroxidase.

CHOD-PAP: Cholesterol Oxidase Phenol 4-Aminoantipyrine Peroxidase.

GPO-PAP: Glycerine Phosphate Oxidase Peroxidase.

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