

IDENTIFICATION OF RISK FACTORS FOR SELECTED NON COMMUNICABLE DISEASES AMONG PUBLIC SECTOR OFFICE EMPLOYEES, SRI LANKA.

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Abstract— The increasing prevalence of Non communicable diseases has been observed in many low income countries during the last decades. Occupational health plays a major role as it is the stem of the country. Documented scientific proven quantity and quality based descriptive evidence on the nutritional, physical activity and other risk factors among office employees are lacking in Sri Lanka.

A descriptive cross sectional study was conducted with 380 public sector office employees in Sri Lanka. Socio demographic and behavioral risk factor data (smoking, alcoholism)- using self administered questionnaire, anthropometry data (*weight, height, waist and hip circumference*), blood pressure, dietary data using semi quantitative Food Frequency Questionnaire, Physical activity data using International Physical Activity Questionnaire - long form and fasting blood glucose level were assessed. Data was analyzed using SPSS version 16.

Mean age of the study population was 38 years (± 9.22). There 38.7% were obese and 20.6% were overweight. Mean waist circumference was 86.75 (± 9.83) cm. 55.2% of them were centrally obese, average waist to hip ration was 0.92 (± 0.07) and 62.1% of them were having higher waist to hip ratio according to the WHO (Asian) cut off. 39.9% population was under the pre-hypertensive stage. There 4.8% were diabetes and 7.7% were pre-diabetes. 17.2% of male were currently smoking and 52.6% of male were using alcohol. There 31% were inactive while majority of them (61.7%) were moderately physically active. Median Total PA score was 963 MET-min/week. Highest PA score was at Domestic and garden domain (420 MET-min/week), and lowest PA score was at work domain (33 MET-min/week). Daily intake of fruit, vegetable and dairy foods were well below national recommendations.

Overweight, obesity, central obesity and pre-hypertension, unhealthy eating habits and sedentary during working were identified as risk factors.

Key words: Non communicable disease, risk factors, office employees

I. INTRODUCTION

Nutritional, demographic, epidemiological, and socioeconomic transitions are occurring in many developing countries. Continuing under nutrition and escalating over nutrition has created double jeopardy of communicable and non communicable diseases (NCDs) [1,2]. This double burden poses apparently insurmountable health and economic challenges in resource-constrained populations. Obesity is a natural consequence of over nutrition and sedentary lifestyle. Obesity dysregulates metabolic processes including action of insulin on glucose, lipid and free fatty acid metabolism and severely affects processes controlling blood glucose, blood pressure, and lipids. Thus begins a cluster of conditions; dysglycaemia, dyslipidaemia, hypertension, and procoagulant state, known as the metabolic syndrome [3].

The demographic and epidemiological transition in Sri Lanka (SL) is well underway and the country faces escalating health care costs with rising rates of NCDs. In Sri Lanka, Metabolic syndrome among Sri Lankan adults: prevalence, patterns and correlates study was lead by Prasad Katulanda, Diabetes Research Unit, Department of Clinical Medicine, Faculty of Medicine, and University of Colombo. This population-based cross-sectional study was conducted in seven of the nine provinces (excluding war affected Northern and Eastern provinces) in Sri Lanka using nationally representative sample of 5000 non-institutionalized adults over 18 years of age. This study found that MS is common among Sri Lankan adults affecting nearly one-fourth of the population. The crude prevalence of MS was 27.1% and age-adjusted prevalence was 24.3%. Prevalence in males and females were 18.4% and 28.3% respectively. Urban adults (34.8%) had a significantly higher prevalence than rural adults (21.6%). Among ethnic groups, the highest prevalence of MS was observed in Sri Lankan Moors (43.0%). Prevalence of MS in the different

physical activity categories of the IPAQ were; 'inactive'– 38.8%, 'moderately active'– 33.5% and 'active'– 21.1% [4].

Studies such as assessing the risk level for NCDs among employees aren't a common case in Sri Lanka. Occupational health plays a major role as it is the stem of a country as well as people who are in most productive age are involved with the working group in a country. Therefore health among employees should be concerned and also surveillance must be done on evaluating job relating factors and the health of workers.

Lack of understanding of the beneficial effects of dietary choices and exercise in the regulation of NCDs, may lead to inappropriate treatment methods. Documented scientific proven quantity and quality based descriptive evidence on the nutritional and physical exercise risk factors among office employees are lacking in Sri Lanka. Based on that evidence gap the aim of this research was to determine nutritional and physical exercise risk factors associated with office employees with metabolic syndrome and obesity. The beneficiaries of this research are the office community, vulnerable to metabolic syndrome and obesity, who are already having risk factors and for targeting for further assessment and reduction of risk. This study was assessed the prevalence of modifiable risk factors for metabolic syndrome and obesity among office employees.

II. METHOD

The cross sectional descriptive study was carried out at the selected public sector (Ministry of Development) Sri Lanka. Convenience sampling technique was done and sample size was determined using the equation with the particular characteristic prevalence rate (obesity prevalence in SL), with 95% power, at 5% CI, design effect of 2 and 10% dropouts. The study population consisted of volunteer office employees age between 20-60 years. Pregnant or breast –feeding women were excluded. Data was collected from April to December 2013.

A. Data assessment

1) Socio- demographic lifestyle information

A Self administrated questionnaire was used to obtain socio- demographic details such as age, gender, educational level, ethnicity, marital status, Number of family members, occupation, total monthly household income, allocation for food and medicine from total income, type of residency, smoking and alcoholic habits, past medical history and family history.

B. Dietary assessment

Dietary assessment was performed by means of self administered semi qualitative food frequency questionnaire (FFQ) [5].Quantity of food items was estimated by using common household utensils (eg. tea cup, table spoon, tea

C. Physical activity assessment

Physical activity was assessed using the long version of validated International Physical Activity Questionnaire (IPAQ) by self- administered format. Questions were asked regarding the preceding week, the frequency and duration of physical activity (PA) including walking and moderate PA and vigorous physical exercise.

Participants were categorized in to three groups (low, moderate and high physically active) by calculating MET/minutes [6].

D. Anthropometric assessment

Weight, height, waist and hip circumference were measured to calculate BMI, waist to hip ratio (WHR). WHO (Asian) cut-off points were used to categorize BMI, WHR and central obesity. WHO cut off values were used for categorizing Asian population in to underweight, normal weight, overweight and obese [7].

E. Blood Pressure

Two Blood Pressure (BP) values were collected and average was considered. BP was classified according to the American Heart Association [8].

F. Biochemical assessment

Overnight fasting blood was obtained to measure Fasting Blood Glucose (FBG) level. WHO cut-off points were used for classification of blood glucose level of participants [9].

G. Data management and analysis

Collected data was coded and entered into Microsoft excel database and exported to SPSS 16.0 (SPSS Inc., Chicago, IL, USA) for analysis. Descriptive statistics was performed to summarize the socio demographic information, anthropometric data and behavioral data and the results were presented using the percentages. Data was described using mean (S.D) for continuous variables.

The daily food intake was divided into seven food groups: (i) cereal or equivalents (starchy foods); (ii) vegetables; (iii) fruits; (iv) meat or alternatives; (v) pulses; (vi) dairy; and (vii) added sugars. Average daily portion sizes were calculated as the total portion size divided by the number of participants. We analyzed the mean daily consumption of each food group according to gender using the two-sample t test, to determine whether the mean values differed between genders. Data were analysed using the SPSS statistical software package version

16 (SPSS Inc.). In all analyses a P value, 0.05 was considered statistically significant.

Physical activity data was collected with the IPAQ long form reported in WS Excel as both categorical continuous measures and reported as median MET- minutes. Physical activity data undertaken across four set of domains ,(1. Work domain 2. Active transportation domain 3. Domestic and garden domain 4. Leisure time domain) were entered by dividing each domains into three specific types of activities that were assessed walking, moderate intensity activities and vigorous- intensity activities. Total scores were computed with summation of the duration (in minutes) and frequency (days) for all the types of activities in all domains. Domain specific scores and activity specific sub scores were calculated by summation of the scores for walking, moderate-intensity and vigours intensity activities within the specific domains and summation of the scores for the specific type of activity across domains. Data were analyzed in MS Excel.

H. Ethical Approval

The study was approved by the Ethical Review Committee (ERC), Faculty of Medicine, and University of Colombo, Sri Lanka. Informed consent was obtained from each participant.

III. Results

Findings of this study indicates that the health status in terms of determining the status of anthropometric, biochemical measures and behaviors related to healthy lifestyle among office workers in a particular government institute in western province in Sri Lanka. Present study basically focused on determining prevalence of overweight, obesity, hypertension and blood glucose level and physical activity level among public sector office workers who were employed in western province in Sri Lanka

Sample size was 380, of whom 46.8% (n 178) were males and 53.2% (n 202) were females. The socio demographic profile of the study population is shown in TABLE I. Mean age of the study population was 37 years. Majority of study population was from 31-40 years of age (41.1%). Majority of the study population were married (72.2%). As for the education qualifications, most respondents completed up to the G.C.EA/L) (47.6%) and 36.3 % of participants have completed tertiary education. Majority of study population earned > 50,000 (Sri Lankan rupees) as their monthly household income (44.4%). Majority of them had permanent residencies.

TABLE I. Socio demographic details of study populations (n=380)

Variables	Value (%)
Mean age (yr)	37.66 (± 9.22)
Age Category	
20- 30 years	90 (23.8%)
31- 40 years	156 (41.1%)
41- 50 years	97 (25.4%)

51- 60 years	37 (09.7%)
Gender	
Male	178 (46.8%)
Female	202 (53.2%)
Ethnicity	
Sinhala	364 (96%)
Tamil	8 (2%)
Muslims	8 (2%)
Religion	
Buddhist	340 (89.5%)
Christian	26 (6.9%)
Islam	8 (1.6%)
Hindu	6 (1.2%)
Marital status	
Married	275 (72.2%)
Unmarried	101 (27%)
Separated	4 (0.8%)
Education level	
Secondary (O level)	61 (16.1%)
A level	181 (47.6%)
Tertiary (university/college)	138 (36.3%)
Monthly household income	
< LKR 20,000	18 (4.8%)
LKR 20,000- 25,000	29 (7.7%)
LKR 25,000- 30,000	32 (8.9%)
LKR 30,000- 35,000	36 (9.7%)
LKR 35,000- 40,000	27 (7.3%)
LKR 40,000- 45,000	18 (4.8%)
LKR 45,000- 50,000	48 (12.5%)
LKR >50,000	172 (44.4%)
Number of family members	
1-4 members	288 (75.8%)
5-8 members	82 (21.8%)
>8 members	10 (2.4%)
Type of Residency	
Permanent (own home)	308(81%)
Rent (Temporary)	43 (11.3%)
Flat	4 (2.4%)
Quarters/Hotels	25 (15.2%)

Smoking Prevalence	31(17.2%)
Frequency of smoking	
1-2 per day Users	9 (30.0%)
3-4 per day Users	5 (15.0%)
>4 per day Users	2 (05.0%)
1 per week Users	7 (25.0%)
2-4 per week Users	6 (15.0%)
>4 per week Users	2 (05.0%)
Alcohol Prevalence	94 (52.6%)
Frequency of alcohol consumption	
Daily Users	2 (01.6%)
4-5 times per week Users	6 (03.2%)
2-3 times per week Users	2 (01.6%)
Once a week Users	16 (17.5%)
2-3 times per month Users	18 (19.0%)

TABLE II. Data on smoking and alcohol consumption among male population (n= 178)

Only males were having use of tobacco smoke and alcohol from study population. Smoking and alcohol consumption prevalence and frequency of use is shown in TABLE II. Very few from male population was smokers (the prevalence of smoking in male is 17.2%) while half of the male population was having alcohol, it was found that 52.6% of male consumed alcohol. Among the smokers 30% of them consumed 1-2 cigarettes per day and majority from alcohol users were having alcohol during once a month (54.0%).

TABLE III shows that prevalence of anthropometric and biochemical data among study population. According to the average BMI of the study population (24.11 (± 3.65) kg/m²), this population can be consider as overweight population. But majority of the study population were obese (38.7%) according to the WHO BMI classification and more than half of the study population (55.2%) were centrally obese and females (65.9%) were more centrally obese than male (43.1%) according to the WHO (Asian) cut-off points. Prevalence of higher waist to hip ration (WHR) among the population was 62.1% and females (72.0%) were having higher WHR than male (50.9%). No one was having hypotension. This population was having 37.1% of desired blood pressure and 39.9% of them were pre-hypertension. Majority of female population was having desired blood pressure. Prevalence of stage 1 hypertension was 17.7% among the population. Prevalence of stage 2 and stage 3 hypertension were low and it was 4.4% and 0.8% respectively. Most of the study population (39.9%) were under the pre-hypertensive stage. Mean fasting blood glucose level among the population was 98.54 mg/dL with the 31.44 of SD. Majority of study population (87.5%) had normal FBG level, only 4.8% were diabetes and 7.7% were pre-diabetes.

TABLE III. ANTHROPOMETRIC AND SELECTED BIOCHEMICAL RISK FACTORS AMONG POPULATION (N=380)

	Populatio n	Male	Female
Average BMI (kg/m ²)	24.11 (± 3.65)	24.06(± 3.72)	24.15 (± 3.59)
Prevalence of Body Mass Index (BMI) categories			
Under weight	6.5%	5.2%	7.6%
Normal weight	32.3%	37.1%	28.0%
Over weight	20.6%	16.4%	24.2%
Obese	38.7%	38.8%	38.6%
Mean waist circumference (cm)	86.75 (± 9.83)	89.65 (± 9.50)	84.19 (± 9.43)
Central Obesity	55.2%	43.1%	65.9%
Average Waist to hip ratio	0.92 (± 0.07)	0.95 (± 0.05)	0.89 (± 0.07)
Higher waist to hip ratio	62.1%	50.9%	72.0%
Prevalence of each blood pressure classification			
Hypotension	0	0	0
Desired	37.1%	22.4%	50.0%
Pre-hypertension	39.9%	46.6%	34.1%
Stage 1 hypertension	17.7%	22.4%	13.6%
Stage 2 hypertension	4.4%	7.8%	1.5%
Stage 3 hypertension	0.8%	0.9%	0.8%
Mean Fasting Blood Glucose (mg/dL)	98.54 (± 31.44)	99.58 (± 34.40)	97.63 (± 28.68)
Prevalence of each Fasting Blood Glucose classification			
Normal	87.5%	86.2%	88.6%
IFG (pre diabetes)	7.7%	8.6%	6.8%
Diabetes	4.8%	5.2%	4.5%

TABLE IV shows that prevalence of each physical activity (PA) level named as ‘low, moderate and high physical activity’, median total PA score and median PA score at each domain in population, male and female. Majority of the study population (61.7%) were moderately physically active. Prevalence of inactivity and high physical activity were 31% and 7.3% respectively. Median total PA score in both male (963.00 MET-min/week) and female (964.50 MET-min/week) were more similar. Highest median PA scores were at Domestic and garden domain in both male and female and those were 405.00 MET-min/week and 427.50 MET-min/week respectively. Lowest median PA score was at work domain in both male and female and those were 41.25.00 MET-min/week and 0.00 MET-min/week respectively.

The estimated mean daily servings of the seven food groups, according to the gender, are shown in TABLE V. Mean daily

intake of fruit (0.45) and vegetable (1.75) portions were well below minimum recommendations (fruits >2 portions/d; vegetables >3 portions/d). The total fruit and vegetable intake was 2.2 portions/ d. Daily consumption of meat or alternatives was 1.75 portions/d. On average, this population consumed over 15 portions of starch/d; moreover, males consumed 6 more portions of cereal than females. This population consumed on average 4.01 portions of added sugars/d.

IV. DISCUSSION

There are two research studies on physical activity from Sri Lanka. From those, study of ‘physical activity pattern and correlates among adults in Sri Lanka’ which was done with nationally representative sample showed majority of Sri Lankan adult was ‘highly active’ physically [10]. Other study conducted in selected one province Sri Lanka showed that majority of the study population was “Moderately active” [11]. Prevalence of “Inactivity” in population, male, female in current study is more similar with the results of that provincial based study. Participants were more active in the domestic and garden domain when compared with other domains. Lowest median physical activity in work domain reveals that participants were sedentary during office time. Our results showed a low mean daily intake of fruits and vegetables among this population (2.2 portions) compared with five servings of fruits and vegetables considered the minimum daily intake by national dietary guidelines [12]. Smoking habit was not common in this population according to the current study results compared to data from other studies done in Sri Lanka and to many Asian countries. The prevalence of alcohol consumption was more similar with other studies done in Sri Lanka.

TABLE IV. PHYSICAL ACTIVITY DATA OF STUDY POPULATION (n=380)

	Population	Male	Female
Prevalence of each physical Activity (PA) level			
Low PA (inactive)	31%	33.6%	28.8%
Moderate PA	61.7%	59.5%	63.6%
High PA	7.3%	6.9%	7.6%
Median Total PA score (MET-min/week)	963.00	963.00	964.50
Domain specific median PA scores (MET-min/week)			
At Work	33.00	41.25	0.0000
At Transportation	198.00	181.50	198.00
At Domestic & garden	420.00	405.00	427.50
At Leisure time	99.00	140.25	80.00

TABLE V. AVERAGE DIETARY INTAKE OF DIFFERENT FOOD GROUPS (PORTIONS/D) AMONG THE POPULATION (n=380)

Food Group	Population		Male		Female	
	Mean	SD	Mean	SD	Mean	SD
Starch	15.04	4.57	18.16	5.17	11.48	4.67
Fruits	0.45	0.68	0.46	0.79	0.54	0.65
Vegetables	1.75	1.25	1.98	1.42	1.56	1.14
Meat or alternatives	1.75	1.64	1.92	1.98	1.65	1.48
Pulses	1.54	1.01	1.29	1.24	0.80	0.84
Dairy	0.50	0.47	0.4	0.48	0.51	0.45
Added sugars	4.01	3.19	4.12	3.42	3.51	2.97
Fruits and vegetables	2.2	1.46	2.44	1.26	2.10	1.89

This study has some limitations; first there are some difficulties to generalize the results to all the office employees

in Sri Lanka as this was done using the convenient sampling method with the use of selected public sector in western province in Sri Lanka. We could not estimate the level of variables as the overall sample is low. The sample size of the study was relatively small. It is recommended to use larger sample with a proper sampling method would result in a more conclusive description of prevalence of risk factors and identified risk factors for future studies. Since present study was done based on a self-administered questionnaire, it is therefore possible that the respondents might have over or under-reported their food frequencies, food quantities, level of physical activity and respondents might hide some behavioral characteristics such as smoking and alcoholism.

To overcome some limitations during filling of the questionnaires, all participants were given a detailed explanation of the purpose of the study and Subjects was given an opportunity to questions regarding the project information and other relative information during filling of the questionnaires.

Studies such as assessing the risk level for Non Communicable Diseases among employees were not a common in Sri Lanka. This study data contribution of lifestyle, diet, physical activity and other behavioral practices and their risk factors among office employees can be used to develop effective intervention program targeting main issues among this population.

V. CONCLUSION

Overweight and obesity (according to the BMI), central obesity and pre-hypertension, unhealthy eating habits and sedentary during working time are identified as major risk factors.

It is evident that this population does not consume adequate proportions of variety of food groups such as fruits, vegetables, dairy, fish and meat and pulses, which is suggestive of a close factor for developing nutrition related NCDs in the population and unhealthy eating habits.

This population was moderately physically active but sedentary during work domain suggest that physical activity during office time have to be concerned as they were inactive during working hours.

We suggest that appropriate intervention program specifically addressing issues with regard to diet, physical activity and their solutions have to be prepared.

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