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Impact of lifestyle on obesity among rural adults in Kancheepuram District of Tamil Nadu, India

Karthik R C[1], Gopalakrishnan S[2*]

Affiliation:1- Assistant Professor, Department of Community Medicine, Tagore Medical College & Hospital, Chennai, 2- Professor and H.O.D, Department of Community Medicine, Sree Balaji Medical College & Hospital, Chrompet, Chennai.

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***Author for correspondence**:1- Assistant Professor, Department of Community Medicine, Tagore Medical College & Hospital, Chennai, 2- Professor and H.O.D, Department of Community Medicine, Sree Balaji Medical College & Hospital, Chrompet, Chennai.

ABSTRACT

In developing countries like India, non-communicable diseases are emerging to become major causes of morbidity, mortality and disability, in both urban and rural areas alike. One of the key risk factors for many of these non-communicable diseases is obesity, which is detrimental to the health. In the changing times of modernization, lifestyle plays a major role in predetermining the risk of obesity. This study was done to evaluate the impact of obesity among rural adults in Tamil Nadu. **Methods**: Cross sectional study was carried out among 600 adults living in rural field practice area of our medical college, using systematic random sampling technique. Using a pre-tested structured questionnaire, data regarding the lifestyle factors was collected. Height, weight, waist circumference and waist hip ratio were measured. Body Mass Index was calculated and classified as per World Health Organization classification for Asian population. Using SPSS Version 17 did the data analysis and the results were presented as tables and graph. **Results**: The prevalence of obesity (BMI ≥ 25kg/m²) in this study was 25.5% while that of overweight (BMI ≥ 23kg/m²) was 25.3%. In this study, 48.8% of the participants had high waist circumference and 58.8% of the participants had a high waist hip ratio. Consumption of junk food and lack of physical activity were strongly associated with obesity. **Conclusion**: This study showed that risk factors like increased frequency of consumption of junk food, television viewing and sedentary lifestyle, had a strong and significant association with overweight/obesity. This elucidates the need for providing awareness at the primordial level to promote a healthy lifestyle and prevent risk factors from developing among the population.

Key-words: Body Mass Index, Overweight, Risk factors, Physical Activity

INTRODUCTION

India as a country in economic transition faces several health challenges, of which non-communicable diseases are on the top. Some of these diseases like cardiovascular diseases, cancers and renal failure are the leading causes of death every year. The resulting complications not only increase the morbidity, but also cause substantial disability, placing a severe socioeconomic and psychological burden to the patients and their families. [1]The risk factors of non-communicable diseases are manifold, ranging from obesity, smoking, diabetes mellitus, hypertension, stress, etc. In a broader perspective, non-communicable diseases are also known as lifestyle diseases, implying that lifestyle plays a key role as a potent risk factor. [1, 2]

In India, Industrialization and urbanization brought out many changes in the lifestyle of individuals.[3]In addition, the work culture changed from being an agricultural labor-intensive work to clerical and deskwork, thereby minimizing the need for physical activity. These changes also resulted in increased stress levels, increasing the risk for psychological and psychiatric problems, which have been the causes of substance abuse and other personal habits like smoking, alcoholism, etc. However, all the above lifestyle changes are responsible for the development of a single strong risk factor, obesity, which is the precursor risk factor for most of the non-communicable diseases.

Obesity is a multi-factorial disorder. Overweight or obesity is the leading cause of hypertension, diabetes, osteoarthritis, and various types of cancers in women like breast cancer and uterus cancer, menstrual disorder and infertility and many more diseases. [2] Obesity is emerging as a serious problem throughout the world not only among adults, but also children, teenagers, and young adults. Of the factors contributing to obesity, stress seems to be particularly important as stress is a precursor for irregularity in diet, lack of exercise and addiction, each being considered independent factors leading to obesity. [3]

The problem of obesity is pertinent in both developing and developed nations alike. When a country achieves economic development, the diet and physical activity patterns of its citizens change greatly. This phenomenon, observed in developing countries, is known as “nutrition

transition". [4] More than 1.1 billion individuals meet current definitions for overweight or obesity which puts them at increased risk for a number of chronic diseases. [5] The prevalence of overweight and obesity have been radically increasing among Indian youth [6] This has been attributed to nutritional transition in India, characterized by a shift in the diet content towards a high fat and high sugar diet. [7] Among developing countries; obesity is now fast growing problem especially in higher socioeconomic status. [8]

It has been estimated that obesity accounts for 2% to 7% of total healthcare costs. [9-11] There are also other costs to consider such as reduced quality of life and productivity loss attributed to medical leave. [4]

There are several studies that have been done in Tamil Nadu to assess the magnitude of obesity. However, there are few studies, which explore the impact of lifestyle problems on the measures of body fat. Establishment of associated factors will be potentially useful in the holistic approach to the prevention of the rising prevalence of obesity and other non-communicable cardiovascular diseases.

With this background, this study was planned with the objectives to estimate the prevalence of various markers of obesity in the study area and to evaluate the impact of lifestyle factors in obesity in the study area.

METHODOLOGY

Study setting and study population: This study was carried out as a community based cross sectional study among rural adults, in the field practice area of our medical college, Rural Health Training Centre (RHTC) located at Sripuram, Kancheepuram district of Tamil Nadu. The duration of the study was for six months, between November 2015 and April 2016. The study population identified was all adults in the age group 20-60 years in the Sripuram area.

Sample size and sampling technique: The Sample Size was calculated based on the prevalence of obesity in an earlier study done in Chennai among the general population, which was found to be 28.5%. [12] Based on this prevalence, using the formula $4PQ/L^2$, with 95% confidence limits and 13.5% relative precision, the sample size was calculated to be 542. Allowing 10% for refusals and attritions, the final sample size was calculated as 596, which were rounded off to 600.

Systematic random sampling method was used to identify the sample population. The list of people in the village aged >20 years was obtained from the field staff of the RHTC. There were a total of 24498 adults in the area living in approximately 7329 households during the study period. The households were arranged in sequential order and sampling frame was prepared. The sampling interval was calculated by dividing the total number of households (7329) by the required sample size (600). The sampling interval obtained was 12. The first number was selected at random by lottery method as 4. From this number, every 12^{th} household was visited for data collection. All eligible adult residents from each house were taken for the study to get the required sample size of 600. If a house was found locked or eligible subject not available, the next house was visited.

Inclusion and Exclusion criteria: All the adults belonging to age group 20-60 years living in Sripuram area of Kancheepuram district and willing to participate in the study by giving informed consent were included in the study. The residents of Sripuram who were unavailable during the period when study or those who were not willing to give consent for the study and pregnant and lactating women were excluded from the study.

Ethical approval and informed consent: Ethical approval and permission was obtained from the Institutional ethical committee of our medical college prior to the commencement of the study. All participants were explained about the purpose of the study and an informed consent was taken from each of them prior to data collection.

Data collection: The Interns posted to the department collected the data under the supervision of the authors. The interns were thoroughly briefed on the accurate data collection technique and also to do the accurate anthropometric measurements using the standard and regularly validated equipment. Data collection was carried out after pre-testing on 30 adults from a different geographic area to test the feasibility and viability of the interview schedule. The data was collected using a structured pre-tested questionnaire. The questions consisted of demographic characteristics and questions related to their lifestyle. Data was elicited on dietary habits, frequency of junk food consumption and physical activity. Particulars regarding personal habits like smoking and alcohol were also elicited. Physical activity was measured using International Physical Activity Questionnaire (IPAQ).

Metabolic Equivalents (METs) are commonly used to express the intensity of physical activities, and are also used for the analysis of IPAQ data. MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1 kcal/kg/hour. For the analysis of IPAQ data, existing guidelines have been adopted: It is estimated that, compared to sitting quietly, a person's caloric consumption is four times as high when being moderately active, and eight times as high when being vigorously active. [13]

In International Physical Activities Questionnaire, the definitions [14, 15] involved are

i. Inactive category:

a) No activity is reported OR some activity is reported but not enough to meet Categories ii or iii mentioned below.

ii. Minimally Active category

Any one of the following 3 criteria:

a) 3 or more days of vigorous activity of at least 20 minutes per day OR
b) 5 or more days of moderate -intensity activity or walking of at least 30 minutes per day OR
c) 5 or more days of any combination of walking, moderate -intensity or vigorous intensity activities achieving a minimum of at least 600 MET (resting metabolic rate) -min/week.

iii. HEPA active (Health enhancing physical activity; a high active) category

Any one of the following 2 criteria

a) Vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week OR
b) 7 or more days of any combination of walking, moderate -intensity or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes/week.

Vigorous physical activities refer to activities that take hard physical effort and make him/her breathe much harder than normal.

Those physical activities that are done for at least 10 minutes at a time only are considered.

Physical examination was carried out to measure height, weight, waist circumference, and hip circumference.

Body weight was measured with the subject standing still on weighing scale and weight equally distributed on each leg. Subjects were instructed to not wear footwear, while their weight was being measured. Height was measured using a non-stretchable tape with the subject in an erect position against a vertical surface.

Waist circumference (WC) was measured midway between the inferior margin of the last rib and the crest of the ileum and hip circumference (HC) around the pelvis at the point of maximum protrusion of the buttocks, both in a horizontal plane, without compressing the soft tissues. WC and HC were recorded to the nearest cm and WHR was defined as a ratio of WC to HC.

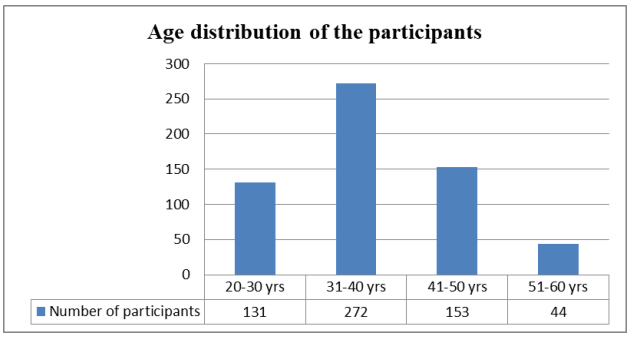
Operational Definitions: Body mass index was calculated by dividing the weight (in kilograms) with the square of height (in meters). For Asians population the values of BMI have been reset as their body composition is different from that of the western world. [16, 17] Proposed classification of weight by BMI in adult Asians: Underweight < 18.5; Normal range: 18.5 - 22.9; Overweight >23; Obese I: 25 - 29.9; Obese II > 30. Overweight was defined as a BMI ≥23 kg/m^2 but <25 kg/m^2 for both genders (based on the World Health Organization Asia Pacific Guidelines) with or without abdominal obesity. [17] Generalized obesity was defined as a BMI ≥ 25 kg/m^2 for both genders (based on the World Health Organization Asia Pacific Guidelines) with or without abdominal obesity. [17]

Statistical analysis: Data analysis was done using descriptive and analytical statistics. The descriptive statistics like frequency distribution and percentage is used to assess the various variables. The analytical statistics like P-value, Chi- square, Odds ratio and Confidence interval were used to determine the association of obesity with selected variables. Data was analyzed using SPSS version 17. P value < 0.05 was considered as statistically significant value.

RESULTS

This study was carried out among 600 adults residing in the rural field practice area of our medical college. The demographic characteristics of the study participants are given in Figure 1. Among the 600 total study subjects, 317 subjects (52.8%) were males and 283 subjects (47.2 %) were females. The age distribution among the study population ranged between 20-60 years. As shown in the table, majority of the subjects i.e. 67.2% belonged to less than 40 years age group and 32.8% subjects belonged to 40-60 years age group.

Figure-1: Age distribution of the study participants



The prevalence of obesity among the study participants is given in Table 1. The prevalence of obesity (BMI > 25) in this study was 25.5% while that of overweight (BMI >23) was 25.3%. In this study, 48.8% of the participants has high waist circumference and 58.8% of the participants had a high waist hip ratio.

The prevalence of lifestyle risk factors among the study participants is given in Table 2. It was observed that a majority of the participants were non-vegetarian (92.8%) and 87.3% of them consumed non-vegetarian food once a week. Most of the participants (71.3%) watched television for less than 2 hours in a day while 58.5% were found to be minimally active.

Table-1: Prevalence of obesity among the study participants:

Parameters	Frequency N =600	Percentage (%)	95% CI for prevalence
Body Mass Index			
Underweight	69	11.5	9.0-14.0
Normal	226	37.7	33.8 – 41.6
Overweight	152	25.3	21.8 – 28.8
Obesity	122	20.3	17.1 – 23.5
Very Obese	31	5.2	3.4 – 7.0
Waist circumference			
Normal	307	51.2	47.2 – 55.2
High	293	48.8	44.8 – 52.8
Waist hip ratio			
Normal	247	41.2	37.3 – 45.1
High	353	58.8	54.9 – 62.7

Table -2: Prevalence of lifestyle risk factors among the study participants

Factors	Frequency N=600	Percentage (%)
Dietary habits		
Vegetarian	43	7.2
Mixed	557	92.8
Consumption of non-vegetarian food / week		
Nil	43	7.2
Once	524	87.3
Twice	25	4.2
More	8	1.3
Hours spent watching Television/ computer daily		
< 2 hours	428	71.33
>2 hours	172	28.67
Physical activity		
Inactive	216	36
Minimally active	351	58.5
HEPA	33	5.5

The impact of lifestyle factors on obesity is given in Table 3. In our study, it was observed that junk food consumption was a significant risk factor for obesity (p=0.0001). Similarly, lack of activity was also a significant risk factor for obesity (p=0.0001) with an odds ratio of 5.6. Watching television for over 2 hours was also an important risk factor for obesity. (p<0.05)

DISCUSSION

The present study was conducted in the rural field practice area of the medical college and has made an attempt to determine the impact of lifestyle factors on obesity. In our study population the prevalence of overweight (BMI > 23) was 25.3%, the prevalence of obesity (BMI > 25) was 25.5%.The prevalence of overweight/ obesity observed in our study was comparable to a study done by Mohan et al - The Chennai urban rural epidemiology study (CURES-52), [12], Prabakaran et al [18] and Venkatachalam J et al. [19]

Table -3: Impact of lifestyle factors on obesity:

Risk Factors	N= 600	Overweight / Obesity N	%	Chi square	P value	OR	95% CI
Dietary habits							
Mixed	557	282	50.6				0.5-1.6
Vegetarian	43	23	53.5	0.1	0.718	0.9	
Junk food consumption							
Present	521	287	55.1				2.4-7.2
Absent	79	18	22.8	28.6	**0.001***	4.2	
Hours spent watching television/ computer daily							
>2 hours	172	105	61.1				1.2-2.6
< 2 hours	428	200	46.7	10.1	0.002*	1.8	
Physical activity							
Inactive	216	165	76.4				
Minimally active & HEPA	384	140	36.5	88.2	**0.001***	5.6	3.9- 8.2

In our study the association between frequency of consumption of junk food and overweight/obesity is statistically significant. (p-value=0.0001). There is 4 times more chance of becoming overweight/obese on consumption of junk food. Similar association was reported in a study done by Kokila et al among medical college students in Kanchipuram district, Tamil Nadu, it was found that the frequency of eating fatty food is high among obese & overweight individuals when compared to normal and underweight students. [20] A study carried out by Tiwari R et al reported that there was a statistically significant difference noted in the likening of fried food and junk food by obese and overweight persons when compared with persons who have normal body mass index. [21]

Moreover, in our study the association between television viewing and overweight/obesity is statistically significant. (p- value= 0.002). Similar results have been reported in other studies. Goyal *et al*. [22] Bishwalata *et al.*[23] and Laxmaiah *et al.*,[24] also concluded that watching TV or playing computer games for more than 2 h/day significantly increased the risk of being overweight or obese. The association between TV viewing and overweight could be due to snacking and physical inactivity during viewing time.

The association between physical activity and overweight/obesity is statistically significant. (p- value= 0.0001).Similar results have been reported in other studies like the study carried out by Coll JL in the Balearic Islands, a Mediterranean Region it was found that no leisure-time physical activity (LTPA) was one of the main

risk factors associated with overweight/Obesity. [25] Another study carried out by Zhang X et al in a Chinese Rural Population also reported that physical activity was associated with overweight/obesity. [26]

A study carried out by Baalwa J et al in young adults in Uganda, found that physical activity was significantly associated (P<0.05) with overweight/obesity.[27] In a similar study carried out by Uthakalla VK et al in Hyderabad, low physical activity was significantly associated with overweight/obesity. [28]

The shift from traditional diets to high-fat and high-energy diets has contributed to the changes seen in people's nutritional status and in the mortality and morbidity patterns in India [29,30] From a large body of evidence, the global epidemic of obesity has resulted mainly from societal factors that promote sedentary lifestyles and the consumption of high-fat, energy-dense diets.[31]

Conclusion: This study showed that risk factors like increased frequency of consumption of junk food, television viewing and sedentary lifestyle, had a strong and significant association with overweight/obesity.

The problem of obesity/overweight is on the rise, and there is a definite need to inculcate good habits of healthy eating and regular physical exercise. Changing dietary habits, using of junk food and limited physical activity pattern due to rapid urbanization, modernization can be reasons for the increase in BMI of Sripuram adults. There is a further need to establish programmes for promoting awareness and lifestyle modifications among the population of the health hazards and means of control for obesity in the study area.

Combating the global epidemic of obesity requires action at the community and national levels. At the national level, framing appropriate policies for promotion of a good diet and adequate physical activity is needed. At the community level, we need to create an environment that promotes the adoption of healthy lifestyle behaviors.

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