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Prevalence of Overweight, Obesity And Its Associated Risk Factors Such as Hypertension And Type 2 Diabetes Among Rural Adults Of Ranga Reddy District in Telangana State

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Abstract: Overweight and obesity in young adults is rising and increases the chances of hypertension, type 2 diabetes and cardiovascular diseases in the later years of life. The widespread data and causes of obesity are required for their primary prevention. The present study was carried out to determine the widespread of overweight, obesity and its associated risk factors such as Hypertension and Type 2 Diabetes among rural adults of Ranga Reddy District in Telangana state. Adults (Total- 210 of which 110 are Males and 100 are Females) in the age group of 20 – 50 years were examined for overweight, obesity, Hypertension and Type 2 Diabetes from their height, weight, waist, hip, BP and GRBS measurements. The observations have shown that the combined overall total widespread rate of overweight and obesity, according to body mass index and waist hip ratio classification, in the present study is 57.61 % and 86.19 % respectively. Moreover, 71.42 % were found to be detected for pre-hypertension and hypertension and almost 19.04 % were found to be to be detected for pre-diabetes and diabetes. The frequency of central obesity and the risk factor such as hypertension was high among adult males when compared to adult females, whereas frequency of general obesity and the risk factor such as diabetes was higher among adult females when compared to adult males.

Introduction

In the beginning of 21st century, one of the greatest challenges in the public health sector is controlling the widespread of overweight and obesity. Because the prevalence of overweight and obesity are rapidly increasing in both the developed and developing countries **(1)**. Overweight and obesity is associated with several chronic conditions such as hypertension, type 2 diabetes and cardiovascular diseases **(2)**. As a result of which, it has led to an increase in morbidity for obesity related conditions which inturn has enforced a heavy burden on the health care related systems and also affected the quality of life **(3, 4)**. Therefore there is a need to prevent and treat overweight and obesity so as to reduce its incidence and its associated metabolic diseases.

In order to prevent obesity the scope and distribution of malnutrition must be clearly understood so that proper and healthy resources can be appropriately supplied to the public. In the past years, India has controlled the severe under nutrition problem in young children to a greater extent. But at present India is facing the rising epidemic of overweight and obesity in young adolescents and adults. Moreover, only limited

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data is available on widespread of overweight and obesity for young adults in India **(5)**. The WHO (1998) has also specified that there is a greatest need to collect the data on obesity especially from countries which are undergoing the nutritional changes **(6)**. India, specially the rural areas population of Ranga Reddy district, in Telangana state are also overcoming through such a nutritional transition. Thus by observing the above mentioned facts, in the present work, an approach has been made to investigate the widespread rate of overweight, obesity and its associated risk factors such as Hypertension and Type 2 Diabetes among rural adults of Ranga Reddy District in Telangana state.

Materials and Methods

The data for the present investigation has been collected at Bhaskar General Hospital, Mionabad, Ranga Reddy District from 110 adult males and 100 adult females (both aged between 20-50 years) of rural areas of Ranga Reddy district of Telangana state. All the study subjects from the population were of Telugu origin and belonged to a lower and middle class with a monthly salary ranging from Rs. 5,000/- to Rs. 20,000/-. The majority of rural data was collected from villages occupied by farmers and daily wage workers of Ranga Reddy district. Female samples in this study because of their cultures and tradition lead a sedentary and comfortable life, whereas the males are very hardworking. The males look after the cattle, work in the farms and also do some part of the labour related works etc. The details of the samples relevant to age, occupation, income etc, was collected through oral interview before pre-testing from each sample of the population. The data of various parameters such as body mass index (BMI), waist/ hip ratio (W/H ratio), blood pressure (BP) and general random blood sugar (GRBS) were collected to know the prevalence of Overweight, Obesity and its associated risk factors such as Hypertension and Type 2 Diabetes among rural adults of Ranga Reddy District in Telangana state.

For assessing the overweight and obesity as per BMI, height and weight measurements were noted from each subject using the standard protocol procedure given by Weiner and Lourie (1981) **(7)**. The clinical and practical definition of obesity is based on BMI and is measured in kilogram per meter square. Moreover, BMI values are strongly correlated with various metabolic and disease outcomes as these are more direct measures of body fatness **(8-13)**. Therefore, the BMI values were calculated for each subject as follows:

BMI= weight (kg) / [height (m)]^2

In this research for assessing the prevalence of overweight and obesity, the suggested critical ranges of BMI as recommended by the Asia-Pacific Task Force was utilized and its classification is shown below in **Table 1 (14)**.

Table 1: Classification for Body mass index (BMI)

Classification	BMI (Kg/m^2)
Normal	18.5 to 22.9
Overweight	23.0 to 24.9
Obese	≥25.0

For assessing the overweight and obesity as per W/H ratio, waist and hip measurements were noted from each subject. W/H ratio is measured in centimeters (cm) and is defined as the circumference ratio of the waist to that of the hips. It is calculated as the waist measurement divided by hip measurement (W/H). In this research for assessing the prevalence of overweight and obesity, the suggested critical ranges of W/H ratio was utilized and its classification is shown below in **Table 2 (15-17)**..

Table 2: Classification for Waist divided by hip (W/H) ratio

Classification	W/H ratio (cm)	
	Male	Female
Normal	≤ 0.84 or 0.84	≤ 0.79 or 0.79
Overweight	0.85-0.89	0.80-0.84
Obese	≥ 0.90 or 0.90	≥ 0.85 or 0.85

BP was measured using an instrument called sphygmomanometer. It was measured in millimeters of mercury (mm Hg) and recorded first with the systolic blood pressure (SBP), followed by the diastolic blood pressure (DBP). For assessing the prevalence of hypertension, the suggested critical ranges of BP was utilized and

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its classification is shown below in **Table 3 (18-22)**.

Table 3: Classification for Blood pressure (BP)

Category	BP (mm Hg)
Normal	SBP 90-119 and DBP 60-79
Pre-hypertension	SBP 120-139 or DBP 80-89
Hypertension	SBP ≥140 or DBP ≥ 90

GRBS was measured by subjecting the consent adult males and adult females to screening by capillary blood prick using electronic glucometer and sensor comfort strips. It was measured in milligrams per deciliter (mg/dl) and for assessing the prevalence of type 2 diabetes, the suggested critical ranges of GRBS was utilized and its classification is shown below in **Table 4 (23-26)**.

Table 4: Classification for General random blood sugar (GRBS)

Result	GRBS (mg/dl)
Normal	≤ 140
Pre-diabetes	140 - 199
Diabetes	≥ 200 or 200

Results

As mentioned above, the objective of this research was to assess the prevalence of overweight, obesity and its associated risk factors such as hypertension and type 2 diabetes in the rural areas of Ranga Reddy district in Telangana state. So, the study was initiated by utilizing the 210 rural adults (i.e. 110 males and 100 females) at Bhaskar General Hospital, Moinabad, R.R.District. The distribution results of all study subjects were presented according to the BMI, W/H ratio, BP and GRBS classifications. First the study was carried out among the 110 adult males and was then continued with the 100 adult females. The observations found during the course of study among individual males, females as a comparative study and also in their combined total form are explained in detail as follows.

The Prevalence results of overweight, obesity and its associated risk factors such as hypertension and type 2 diabetes among rural adult males and females are represented in the form of a comparative bar diagram as shown in **Figure 1**.

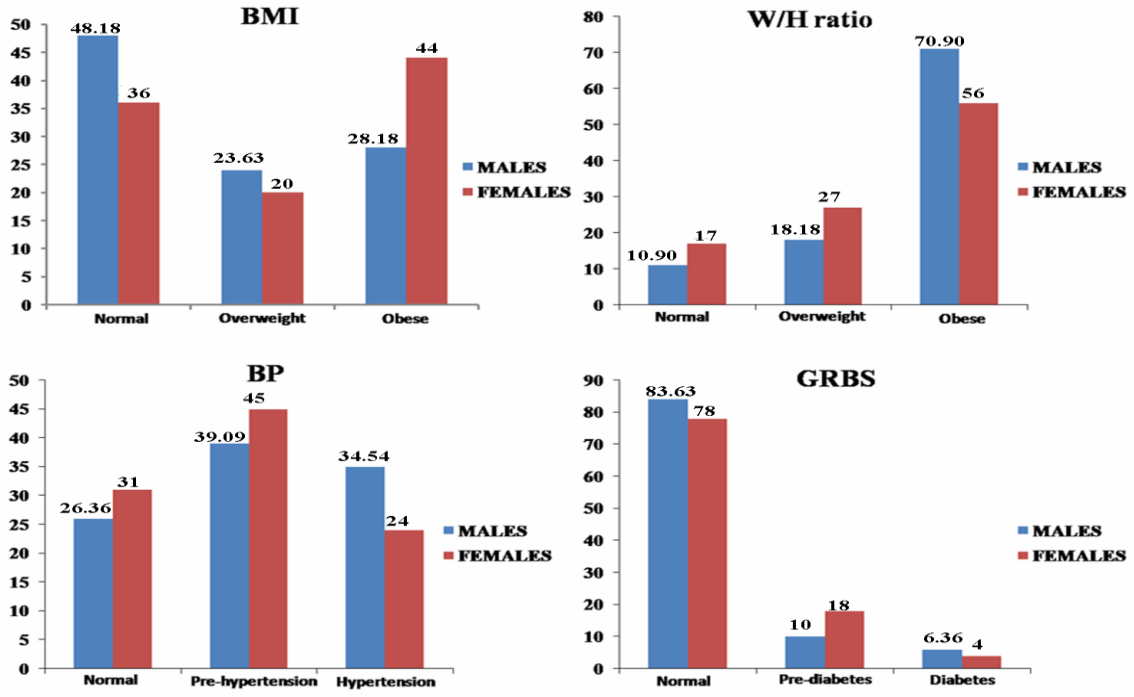

Figure 1: Comparative Bar diagram distribution of various parameters such as BMI, W/H ratio, BP and GRBS between adult males and Females of the

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rural areas of Ranga Reddy district in Telangana State

The above **Figure 1** shows the following results for various parameters such as BMI, W/H ratio, BP and GRBS between adult males and Females of the rural areas of Ranga Reddy district in Telangana state.

According to BMI classification, out of 110 rural adult males, only 53 (48.18 %) are Normal, while 26 (23.63 %) are overweight and 31 (28.18 %) are obese. Whereas, out of 100 rural adult females, only 36 (36 %) are Normal, while 20 (20 %) are Overweight and 44 (44 %) are Obese.

According to W/H ratio classification, out of 110 rural adult males, only 12 (10.90 %) are Normal, while 20 (18.18 %) are Overweight and 78 (70.90 %) are Obese. Whereas, out of 100 rural adult females, only 17 (17 %) are Normal, while 27 (27 %) are Overweight and 56 (56 %) are Obese.

According to BP classification, out of 110 rural adult males, only 29 (26.36 %) are Normal, while 43 (39.09 %) are Pre-hypertensive and 38 (34.54 %) are Hypertensive. Whereas, out of 100 rural adult females, only 31 (31 %) are Normal, while 45 (45 %) are Pre-hypertensive and 24 (24 %) are Hypertensive.

According to GRBS classification, out of 110 rural adult males, only 92 (83.63 %) are Normal, while 11 (10 %) are Pre-diabetic and 7 (6.36 %) are Diabetic. Whereas, out of 100 rural adult females, only 78 (78 %) are Normal, while 18 (18 %) are Pre-diabetic and 4 (4 %) are Diabetic.

In addition to the above, the combined total classification data of both rural adult males and females for various parameters such as BMI, W/H ratio, BP and GRBS was also represented in the form of Bar diagram distribution **(as shown in Figure 2)** to understand its overall population impact on the prevalence of overweight, obesity, and its associated risk on Hypertension and Diabetes.

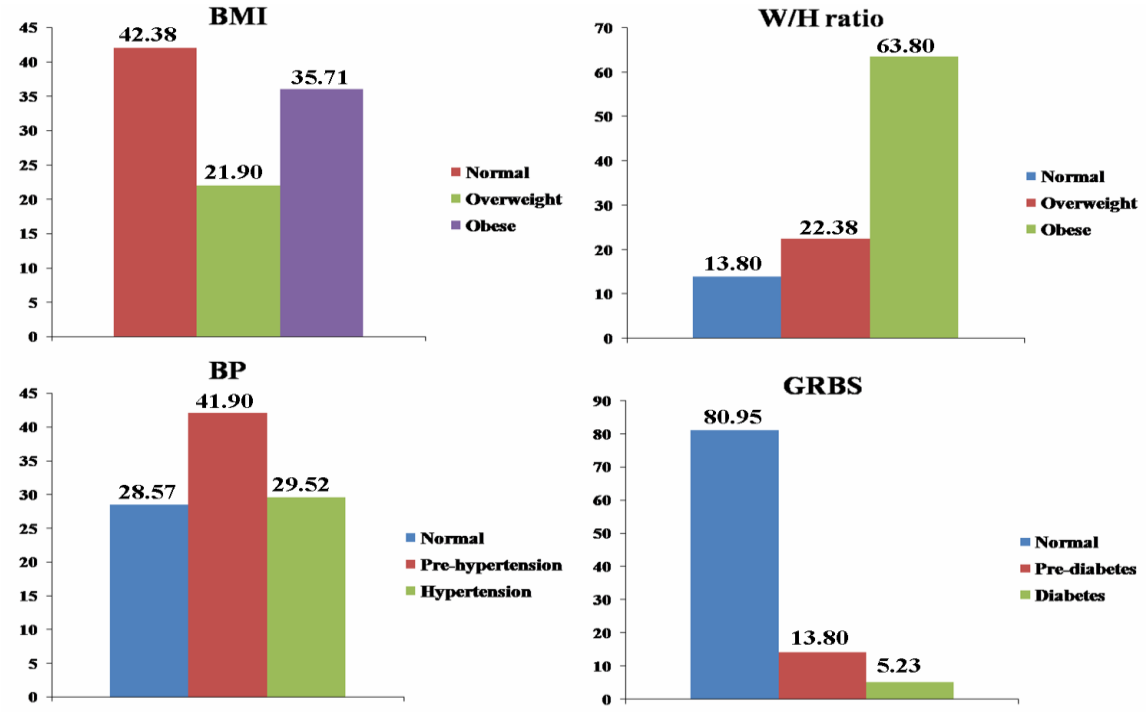

Figure 2: Bar diagram distribution of various parameters such as BMI, W/H ratio, BP and GRBS among the total adult males and adult Females of the rural areas of Ranga Reddy district in Telangana State

The above **Figure 2** shows the following results for various parameters such as BMI, W/H ratio,

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BP and GRBS among the total 200 adult males and Females of the rural areas of Ranga Reddy district of Telangana State.

According to BMI classification, out of 210 rural adults (i.e. 110 males and 100 females), only 89 (42.38 %) are Normal, while 46 (21.90 %) are overweight and 75 (35.71 %) are obese.

According to W/H ratio classification, out of 210 rural adults (i.e. 110 males and 100 females), only 29 (13.80 %) are Normal, while 47 (22.38 %) are overweight and 134 (63.80 %) are obese.

According to BP classification, out of 210 rural adults (i.e. 110 males and 100 females), only 60 (28.57 %) are Normal, while 88 (41.90 %) are Pre-hypertensive and 62 (29.52 %) are Hypertensive.

According to GRBS classification, out of 210 rural adults (i.e. 110 males and 100 females), 170 (80.95 %) are Normal, while 29 (13.80 %) are Pre-diabetic and 11 (5.23 %) are Diabetic.

Discussion

Over weight and obesity are one of the common health related problems. BMI and W/H ratio are the commonly used parameters for evaluating overweight and obesity. The effects of high values of these parameters can lead to other cardiovascular and metabolic diseases. So for all those who comes under the above said categories should be urged for weight loss. In the present study an attempt has been made to identify the prevalence of overweight, obesity and its associated risk factors such as hypertension and diabetes among rural adults of Ranga Reddy District in Telangana state. For this purpose so as to understand the prevalence and its associated risk factors, the study of parameters such as BMI, W/H ratio, BP and GRBS were utilized. The data was collected from 210 young adults of Ranga Reddy District out of which 110 are Males and 100 are Females in the age group of 20 – 50 years. Moreover, to better understand the prevalence conditions of all the parameters, data was compared between both 110 adult males and 100 adult females as shown in **Figure 1** to know the gender contribution towards overweight, obesity and its associated risk factors such as hypertension and type 2 diabetes. The parameters data was also represented in the total combination of both 210 adult males and females as shown in **Figure 2** to understand its overall population impact on the prevalence of overweight, obesity, and its associated risk on Hypertension and Diabetes.

Prevalence of overweight, obesity and its associated risk factors such as hypertension and diabetes between adult males and adult females (Discussion of Figure 1):

As indicated by BMI classification, about 57 (51.81 %) of adult males and 64 (64 %) adult females were found to be overweight and obese. However the percentage of overweight and obese among adult males and adult females increases to 98 (89.09 %) and 83 (83 %) respectively when the classification was based on W/H ratio. From the results of BMI it is observed that the prevalence of overweight and obesity was more in adult females while compared to adult males, whereas as per the W/H ratio the prevalence of overweight and obesity was more in adult males while compared to adult females. It means that general obesity as per BMI is more prevalent is adult females and central obesity as per W/H ratio is more prevalent is adult males. It is due to the reason that adult males are most likely to accumulate fat in the upper body parts i.e. in the belly, and whereas adult females often accumulates fat in the lower body parts i.e. on the buttocks, thighs and hips. Because sex hormones appears to play an important role in this aspect. As the central obesity in adult males is correlated with comparatively low testosterone levels. Whereas, in adult females estrogen is believed to be the cause for storage of fat in the buttocks, thighs, and hips.

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As indicated by BP classification, 81 (73.63 %) of adult males and 69 (69 %) of adult females were found to be detected for pre-hypertension and hypertension. From this results, it is observed that associated risk of hypertension was somewhat higher in adult males while compared to adult females. Although the difference in percentage was not much higher in adult males while compared to adult females, but still this 4.63 % higher BP in adult males may be attributed to the stress for earning their livelihood, diet, smoking and alcohol consumption.

Whereas as indicated by GRBS classification, 18 (16.36 %) of adult males and 22 (22 %) of adult females were found to be detected for pre-diabetes and diabetes. From this results, it is observed that associated risk of diabetes was somewhat higher in adult females while compared to adult males. This associated risk of diabetes in adult females may be attributed to their less physical inactivity and also due to their overweight and obese nature. As such in this study also as per BMI, almost 64 (64 %) of adult females were found to be overweight and obese which is much higher than their male counterparts i.e. only 57 (51.81 %). It may be due to the reasons that the rural adult males are much more involved in physical activities for earning their livelihood while compared to the females. On the other hand, rural adult females because of their cultural restrictions for remaining at house, taking care of their children and household related activities like cooking are very less involved in physical related activities. Thus, all these aspects have made the adult females to be more susceptible for diabetes.

From the above discussion, it was found that there was some differences between the percentages of BMI, W/H ratio, BP and GRBS for adult males and adult females. As such because of these differences, prevalence of central obesity and the risk factor such as hypertension was high among adult males, whereas prevalence of general obesity and the risk factor such as diabetes was higher among adult females.

Prevalence of overweight, obesity and its associated risk factors such as hypertension and diabetes among total adult males and adult females (Discussion of Figure 2):

In addition to the above, although there are some differences between the percentages of BMI, W/H ratio, BP and GRBS for adult males and adult females, but still the prevalence rate of overweight, obesity and its associated risk factors such as hypertension and diabetes is very much higher among both the adult males and females of rural areas of Ranga Reddy district in Telangana state.

As such evident in **Figure 2**, which is represented as bar diagram by combining the entire data of total 210 adult males and adult females, it was found that almost 121 (57.61 %) were found to be overweight and obese as per BMI and almost 181 (86.19 %) were found to be overweight and obese as per W/H ratio. However, the percentage of overweight and obese increases by 28.58 % when the classification was based on W/H ratio. It means the central obesity as per W/H ratio is more prevalent than general obesity in the population of Ranga Reddy district in Telangana state. Moreover, the importance of central accumulation of fat has been known since decades. AIso in the interheart study as reported by Ounpuu et al, 2001 and Yusuf et al, 2004, it was clearly stated that out of different anthropometric measures W/H ratio shows the strongest correlation with the risk of myocardial infarction and this ratio was the strongest predictor of myocardial infarction irrespective of sex, age, smoking status, lipid levels, diabetes, and blood pressure **(27, 28)**. Prineas et al, 1993 has also confirmed in his study that W/H ratio as an important risk factor for death due to coronary heart diseases **(29)**. The incidence of overweight and obesity as per both

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W/H ratio and BMI in our study are fairly high. The possible reasons for higher widespread rate of overweight and obesity might be because of their improper lifestyles, food habits and imbalanced nutrition.

Moreover, the relationship between hypertension, type 2 diabetes and body weight/ obesity is well known. As such it is reported that being overweight or obese is greatly associated with increase in the risk of developing hypertension and type 2 diabetes. Also, apart from overall level of adiposity, the abdominal accumulation of body fat i.e. central obesity is strongly associated with increased risk of developing hypertension and type 2 diabetes. Because in hypertension, due to excess accumulation of fat in the kidneys surrounding and abdominal area, there is a greater risk for high intra-renal pressure and increased abdominal pressure which may impair natriuresis. Thus, obesity related hypertension is caused due to renal sodium retention and impaired pressure natriuresis. Whereas in type 2 diabetes, the abdominal obesity may cause the fat cells to release pro-inflammatory chemicals and these chemicals further makes the body less sensitive produced to insulin, thereby disrupting the function of insulin responsive cells and their ability to respond the insulin.

The similar finding has been reflected in this study which has indicated an association between abdominal or central obesity, hypertension and type 2 diabetes. As it is evident in **Figure 2**, that almost 150 (71.42 %) were found to be detected for pre-hypertension and hypertension as per BP classification and almost 40 (19.04 %) were found to be detected for pre-diabetes and diabetes as per GRBS classification. However, the percentage of pre-diabetes and diabetes found was not much higher as similar to pre-hypertension and hypertension (i.e. 19.04 % vs. 71.42 % respectively), but still 19.04 % detection of pre-diabetes and diabetes among the human subjects of Ranga Reddy district is a matter of growing concern about this problem.

In a study which was conducted in china, it was reported that the widespread of overweight and obesity in young adults has increased from 10% to 15% in urban areas and 6% to 8% in rural areas within a period of 10 years i.e. from 1982-1992 **(17)**. As such, if the present widespread trend of overweight and obesity continues, then the situation can even become worse and can emerge as one of the most prominent health problems among the rural adults of Ranga Reddy District in Telangana state. Obesity and overweight can be considered as a single specific problem, but if not controlled then it can further increases the chances of hypertension, type 2 diabetes and cardiovascular diseases in the later years of life. Whereas, hypertension and type 2 diabetes are further associated with several other diseases. Thus, leads to disability of work, unhealthy years of life, need for long term medication, hospitalization due to diabetic and cardiovascular diseases and finally increase in the overall healthcare costs. Therefore, prevention and control of overweight and obesity is highly required in the rural areas of Ranga Reddy District in Telangana state. Enabling the rural populations by creating awareness about the proper lifestyle, food habbits and also by supplying the balanced nutrition related foods among them can be a solution to this problem.

Conclusion

As this study was initiated to assess the prevalence of overweight, obesity and its associated risk factors such as hypertension and type 2 diabetes in the rural areas of Ranga Reddy district in Telangana state. It was found that the combined overall widespread rate of overweight and obesity, according to body mass index and waist hip ratio classification, in the present study

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is 57.61 % and 86.19 % respectively. Moreover, 71.42 % were found to be detected for pre-hypertension and hypertension and almost 19.04 % were found to be to be detected for pre-diabetes and diabetes. The frequency of central obesity and the risk factor such as hypertension was high among adult males, whereas frequency of general obesity and the risk factor such as diabetes was higher among adult females. This results clearly shows that there is a alarming rise situation for overweight and obesity in the rural areas of Ranga Reddy district in Telangana state which requires special measures to be controlled. There is also a strong need for prospective epidemiological studies so as to better understand the possible causes of this growing obesity epidemic in Telangana. Therefore, because of the above mentioned reasons, a variety of approaches and research is highly required with reference to this rising epidemic which is undergoing such nutritional transition.

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