MANUSCRIPT

Unlocking the Weighty Truth: Exploring Obesity's Grasp and Risk Factors Among Today's Teens

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Abstract

Background: The frequency of obesity among children has a significant impact on their general health, which in turn affects how they will age and live as adults. The objectives were to assess the obesity rate of prevalence and its corresponding risk factors among adolescents. **Material and methods:** The design adopted for the study was a descriptive cross-sectional study using a purposive sampling technique with 302 adolescents in the age group of 10-19 years at a selected private school, Kelambakkam. Ethical principles of research were followed. Assessment of risk factors of obesity was done by structured questionnaire and obesity was assessed by BMI using WHO Z score interpretation. **Results**: It shows that the majority (76.15) of the adolescents were male, most of them in the age group of 15-17 years (46.9%), most of the adolescents were residing in rural areas (56%), most adolescents were belonging to the joint family (53%), most of them were studying 8th-10th std level (44.7%).The prevalence rate of obesity was15.23% andthe majority of the adolescents (65.65%) hada moderate risk for obesity, 23.85% of them had a severe risk of obesity, and a few of them (8.6%) had a mild risk of obesity. The meanvalue of risk factors for obesity among adolescents was 16.88 ± 4.8. The results show that there was a statistically significant association between avoidance of sports & physical activity(p-0.00116), taking meals more than 3 times a day (p-0.0023), frequency of receiving packet money from the parents (p-0.0012), desire for eating outside processed foods (Pizza, burger, rolls, nuggets etc, p- 0.0195, frequency of eating carbohydrate or high calorie diet (sweet, chocolates, honey, jam, and biscuits, p-0.0196,like to go for bed immediately after dinner p-0.019426,Desire to eat dairy product [milk, cheese, butter etc, p-0.0195 and level of obesity among adolescents.The demographic association revealed that there was a statistically significant association between age (p-0.00067), total monthly income (p- 0.0006), extracurricular activities (p-0.0064), and the level of obesity. **Conclusion**: The findings showed that obesity was highly prevalent and majority of adolescents were at risk of becoming obese. The researcher advised that lowering the risk factors and prevalence of obesity is essential for reducing obesity-related morbidity and raising overall well-being.

Keywords: Prevalence of obesity, risk factors and adolescents

Introduction

The term "obese" is used to describe a body weight that exceeds the healthy range for a specific height. By detecting a BMI for age that exceeds one standard error and is at least two standard deviations above the WHO growth reference median, the WHO classifies adolescents aged 10 to 19 as overweight or obese. It is thought that the two most significant causes of the rising rate of child obesity are a sedentary lifestyle with low energy expenditure and a diet high in calories but low in nutritious content. compared to having a higher risk of getting chronic disease health issues as adults,

overweight children have a higher likelihood of being overweight or obese as they become older. (Khadilkar et.al., 2004,)**.**

Obesity prevalence among people which includes 5 to 17-year-olds, is 10% worldwide, however, it varies by area. In Asia and sub-Saharan Africa, Obesity and overweight were less common than previously imagined.2.3%, according to various studies. However, over the past three decades, Asia's tenacious GDP growth and growing economic stability have elevated the shifting lifestyles that have contributed to dietary problems and the emergence of chronic disease. Although obesity among children was once thought to be an epidemic that only existed in high-income nations, there is now clear evidence that this is changing in countries with low and medium incomes. (Sharma et.al., 2007,)**.**

In addition, many nations with middle- to low incomes have greater obesity rate prevalence in urban areas. India, a developing nation, is likewise struggling with the twin burden of disease, which has infectious diseases, malnutrition, and underweight on one end and young people and teenagers' obesity on the other. In India, the number of cases of adolescent obesity has gone up dramatically in recent years, rising from 9.8% in 2019, India has seen a considerable rise in terms of the predominance of adolescent obesity. (Kotian et.al., 2010,1).

A strong and congruous relationship between breakfast skipping and obesity, but not overweight, was reported among children in the southeastern European population. Medical students are prone to skip meals due to hectic schedules and are exposed to various infections during clinical postings. To date, there have been few studies conducted to determine the effect of skipping meals among medical students as discussed above. However, until now to the best of our knowledge, no study has been conducted to assess the association of skipping breakfast with obesity and its determinants (Vinoth Gnana Chellaiyan,2021)

BMI is directly related to adipose tissue (weight (kg) / height2) (m). Underweight is defined as having a BMI of less than 18.5 kg/m2. The average BMI range is between 18.5 and 24. Obesity: BMI greater than 25 but less than 29.9. First-degree obesity is defined as a BMI of more than 30 but less than 34.9. BMI over 35 but under 39 suggests type 2 obesity.Grade 3 obesity (BMI > 40, but 44)9. A BMI greater than 45 kg/m2 qualifies as IV-grade obesity. (Stabouli,et.al., 2011,).

As a result of this, widespread prevalence and significant mortality rates, obesity has come to be an essential healthcare issue on a global scale. Obesity, particularly abdominal obesity, is linked to a higher chance of developing several Chronic illnesses including diabetes, cardiovascular disease (CVD), hyper cholesterol, asthma, and cancer. Globally, there are an estimated 396 million overweight individuals and 937 million obese adults. Obesity, as previously said, has become a substantial public health concern. The overall amount of total body fat was found to be less of a factor in the association among obesity-related comorbidities visceral fat depots and abdominal adiposity. VAI can be used as a marker to predict cardiometabolic risk in the general population. (Chiplonkar et.al., 2012,).

Obesity originates in toddlers in the UAE and increases linearly with age, according to a more recent study, which also revealed an alarmingly high frequency of extreme obesity, particularly among males. From 4.2% in 1990 to 6.7% in 2010, the estimated number among children overweight and obesity grew globally, and in the years to come, it is expected to climb even more, reaching up to 9.1% in 2020. Childhood obesity is becoming as a major health problem in developing nations such as India, particularly among urban populations. Obesity is common among rich schoolchildren in India, according to research from major cities. Some studies, on the other hand, have found a significant frequency of malnutrition among rural schoolchildren and children living in urban slums12,13. Obesity was found to be prevalent in 6.2% and 7.4% of people in Chennai and Delhi, respectively, according to available studies.(Lindstrom,et.al., 2022,)

Objectives

1. To assess the prevalence of obesity and its associated risk factors among adolescents

2.To find the association between obesity and its associated risk factors among adolescents.

3. To find the association between obesity with their selected demographic variables of adolescents.

Hypothesis

H1: There is a statistically significant association between obesity and its associated risk factors among adolescents

H2: There is a statistically significant association between obesity with their selected demographic variables of adolescents

Methods and Materials

The descriptive cross-sectional study was conducted among school adolescent between the ages of 10 and 19 years. Clearance wasobtained from the Institutional Human Ethics Committee at Chettinad Academy of Research and Education, who provided their approval for the study with the proposal number (IHEC-1/1104/22), as well as from the school authorities.The sample size was calculated using the formulan = Z2Xp(1-q)/E2/1+Z2Xp(1-q)/E2/N, the final sample size was 302. The researchers adopted a purposive sampling method to choose the study participants from the 600 students (excluding those under the age of 10 years and those who did not meet the inclusion criteria).The participant information was given and obtained consent and data was collected through the structured questionnaire on demographic variables & risk factors of obesity and BMI calculated by assessing the weight in kilogram and height in M^2 and interpreted using WHO Z score values. All collected data were analyzed using SPSS.

Research Tool

Section I:Self-structured questionnaire to assess the demographic variables among adolescents.
Section II: Self-structured questionnaire to assess the risk factors of obesity among adolescents.
Section III:Obesity assessment by BMI calculation&interpretation using "WHO Z score Interpretation"

Results:

Table 1: Demographic variables of adolescents

N=302

S.no	Characteristics	Category	Frequency	Percentage
1	Gender	Male	230	76.15
		Female	72	23.85
2	Age	10-14Yrs	93	30.7
		15-17Yrs	142	46.9
		18-19Yrs	67	22.4
3	Area of residence	Urban	133	44
		Rural	169	56
4	Type of family	Nuclear	142	47
		Joint	160	53
5	Educational status of the child	5th -7th std	124	41
		8th - 10th std	135	44.7
		11th – 12th std	43	14.3
6	Educational status of the mother	No formal education	66	21.9
		primary &middle school level	96	31.7
		high school& high secondary	76	25.2
		diploma& graduate	64	21.2
7	Educational of the father	no formal education	56	18.5
		primary &middle school level	79	26.2
		high school& high secondary	85	28.2
		diploma& graduate	82	27.1

Table 1 shows that most of the adolescents in the age group of 15-17 years (46.9%), the majority of the adolescents were male (76.15%), most of the adolescents were residing in rural areas (56%), the majority of adolescent were belonging to

joint family (53%), most of them were studying 8th-10th standard (44.7%). Around 31.7 % of adolescent's father were educated up to high school & high secondary level and mothers were educated up to primary & middle school level (28.2%).

Prevalence rates of obesity

Among 302 adolescents 46 adolescents had obesity, and the prevalence rate of obesity was 15.23%.

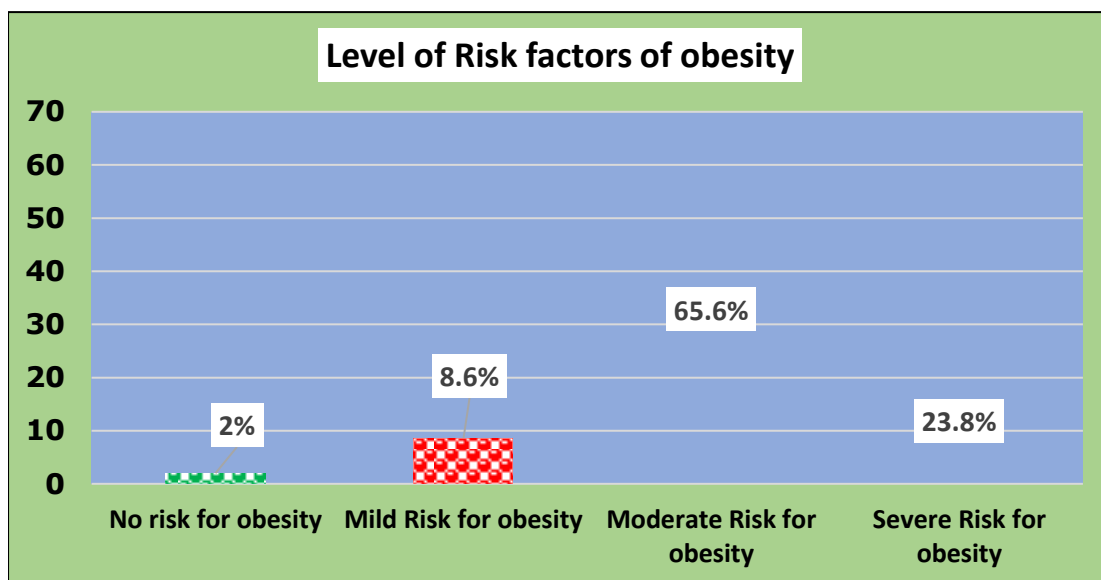**Figure 1:** Level of risk factors of obesity among adolescents

Table 2: The association between risk factors of obesity and the level of obesity among adolescents
N=302

S.NO	Risk factors	Obesity I	Obesity II	P-value
1	Family history of obesity			
	Never	20	2	
	Sometimes	10	2	0.7459
	Always	10	2	
2	Frequency of eating homemade fried items foods (Vada, pappadam, Bonda etc)			
	Never	10	2	
	Sometimes	14	3	0.0646
	Always	16	1	
3	Fond of drinking fizzy drink (Maaza, coka cola, Pepsi, spirit etc)			
	Never	20	2	
	Sometimes	15	2	0.065
	Always	5	2	
4	Desire for eating outside			

	processed foods (Pizza, burger, rolls, nuggets etc)			
	Never	20	2	**0.0195**
	Sometimes	12	1	
	Always	8	3	
5	Frequency of eating deep fried foods (Vada, samosa, finger chips etc)			
	Never	9	4	0.565
	Sometimes	20	1	
	Always	11	1	
6	Frequency of eating carbohydrate or high calorie diet (sweet, chocolates, honey, jam, and biscuits)			
	Never	19	2	
	Sometimes	15	2	
	Always	6	2	
				0.0196
7	Avoidance of sports & physical activity.			
	Never	12	2	**0.00116**
	Sometimes	10	3	
	Always	18	1	
8	Having disturbed Sleep pattern			
	Never	5	3	0.7932
	Sometimes	16	2	
	Always	19	1	
9	Having illnesses including hypothyroidism, Cushing's syndrome			
	Never	21	1	0.305
	Sometimes	10	1	
	Always	9	4	
10	Taking medication under a doctor's prescription (specify the medicine)			0.0646
	Never	19	2	
	Sometimes	11	3	
	Always	10	1	
11	Having psychological mood swings like sadness, fear, anger, more happiness			0.195
	Never	19	2	

	Sometimes	9	2	
	Always	12	2	
12	Taking meal more than 3 times a day			**0.0012**
	Never	10	0	
	Sometimes	10	4	
	Always	20	2	
13	Desire of eating red meat and preserved meats			0.7932
	Never	12	2	
	Sometimes	10	3	
	Always	18	1	
14	Desire to eat diary product [milk, cheese, butter etc]			**0.0195**
	Never	19	2	
	Sometimes	15	2	
	Always	6	2	
15	Like to go for bed immediately after dinner			**0.019426**
	Never	15	2	
	Sometimes	15	3	
	Always	10	1	
16	Frequency of receiving packet money from the parents			**0.0012**
	Never	18	0	
	Sometimes	12	3	
	Always	10	3	

*- statistically significant at P<0.05 level.

Table 4.6 The result shows that there is a statistically significant association between Avoidance of sports & physical activity(p-0.00116), taking meals more than 3 times a day(p-0.0012), frequency of receiving packet money from the parents(p-0.0012), desire for eating outside processed foods (p- 0.0195), frequency of eating carbohydrate or high-calorie diet (p-0.0196),like to go for bed immediately after dinner p-0.019426,desire to eat dairy product (p-0.0195) and level of obesity among adolescents.

There is no association between obesity in the family, frequency of eating homemade fried items, frequency of eating deep fried foods, fondness of drinking fizzy drinks, having disturbed sleep patterns, having illnesses including hypothyroidism, polycystic ovary syndrome, and Cushing's syndrome, taking medication under doctor prescription, having psychological mood swings like sadness, fear, anger, more happiness, Desire of eating red meat and preserved meats and the level of obesity among adolescents. Hence the H1 hypothesis is partially accepted.

Table 3: The association between selected demographic characteristics of adolescents and the level of obesity

S.NO	Demographic Variables	Obesity I class	Obesity II class	P-value
1	Age in years			
	10—14	10	2	**0.001**[*]
	15-17	20	2	
	18-19	10	2	
2	Gender.			
	Male	20	3	0.60
	Female	20	3	
3	Area of residence			
	Urban	25	2	0.77
	Rural	15	4	
4	Family's Type			
	Atomic Family	20	3	0.34
	Coupled Family	20	3	
5	Educational status of children			
	5th -7th grade	12	1	0.62
	8th - 10th grade	15	4	
	11th - 12th grade	13	1	
6	Education of the mother			
	No formal Education	15	3	0.68
	Primary and middle school level	5	0	
	High school & higher secondary level	10	2	
	Diploma & Graduate Level	10	1	
7	Education of the father			
	No formal Education	10	1	0.87302
	Primary and middle school level	8	1	
	High school & higher secondary level	10	3	
	Diploma & Graduate Level	12	1	
8	Occupation of the mother			
	Homemaker	5	2	0.80057
	Self-Business	14	2	
	Private sector	7	1	
	Govt sector	14	1	
9	Occupation of the father			
	Self-Business	15	1	0.68874
	Private sector	5	1	
	Govt sector	10	3	
	Home worker	10	1	
10	Total income of the family per month			**0.000672***

	Less than 20,000 Rs	10	2	
	20,000-40,000 Rs	10	1	
	More than 40,000 Rs	20	3	
11	Food type			0.774617
	Vegetarian	2	1	
	Nonvegetarian	18	1	
	Mixed	20	4	
12	Extracurricular activity in the school			**0.006406***
	Yoga	20	1	
	Indoor games	10	3	
	Outdoor games	10	2	

*- statistically significant at P<0.05 level

The results reveal a significant association between age (p-0.00067), total monthly income (p- 0.0006) and extracurricular activities (p-0.0064), and the level of obesity among adolescents.

There is no association between gender, area of residence, family type, adolescent education status, father & mother, both the mother's and father's jobs, food type, and the level of obesity among adolescents. Hence the H2 hypothesis is partially accepted

Discussion:

Among 302 adolescents 46 adolescents had obesity, the prevalence rate of obesity was 15.23**%.**

A similar study was conducted by Sonya Jagadesan et.al., 2021 on prevalence of overweight and obesity among school children and adolescents in Chennai. The prevalence of overweight/obesity was significantly higher in private compared to government schools both schools, (private schools: 21.4%, and government schools: 3.6%, (OR: 7.4, 95% CI:6.3–8.6; *P*<0.001) and by Khadilkar criteria (private school: 26.4%, government schools: 4.6% OR: 6.9, 95% CI:6.2–7.8; *P*<0.001).

Jitendra Malviya et.al., 2021 A Cross-sectional Study to Determine the Prevalence of Obesity among School-age Children in Selected Schools of Secunderabad. The maximum number of study participants (120, 40%) belonged to the overweight category, followed by obesity (95, 31.66%) and normal health status (85, 28.34%)

In this study, among adolescent's majority of them had (65.6%) moderate levels of risk of developing obesity.

The study conducted by Mohamed El Kabbaoui et.al., 2018 on the prevalence of risk factors for overweight and obesity among adolescents in Morocco showed thatthe prevalence of overweight was 7.69% and that of obesity was 3.41%. Overweight and obesity in adolescents were positively correlated to having a father (odds ratio (OR) = 1.58, P = 0.008) or a mother with higher education (OR = 1.56, P = 0.009), high family income (OR = 2.115, P = 0.028), motorized transport to school (adjusted OR = 1.77, P = 0.017), using a computer for > 4 h/day (OR: 2.56, P = 0.004) and frequent consumption of soda and soft drinks (OR = 1.42, P = 0.04) were also correlated with an increased risk for overweight and obesity.

The current study results show thatthere is a strong association between selected risk factors, and demographic variables with the level of obesity among adolescents.

C Maiano 2011 Prevalence and risk factors of overweight and obesity among children and adolescents with intellectual disabilities (ID). Results demonstrated that overweight and obesity represent a significant secondary health problem in youths with ID; and obesity risk significantly increases with age.

Vinoth Gnana Chellaiyan et al conducted a study on determinants of obesity among undergraduate students between 18 to 23 years in tertiary care hospitals. The result showed that overweight prevalence was 23.6% and obesity prevalence was 27%, and there was no association between skipping breakfast and obesity.

Conclusion

The findings showed that obesity was highly prevalent and that the majority of adolescents were at risk of becoming obese. The researcher addressed that lowering the risk factors and prevalence of obesity is essential for reducing obesity-related morbidity like type II diabetes, hypertension, heart disease etc. and creating awareness among adolescents on obesity prevention helps to maintain appropriate nutritional status and promote level of well-being.

Recommendation

The findings showed that obesity was highly prevalent and that the majority of adolescents were at risk of becoming obese. The researcheraddressed that lowering the risk factors and prevalence of obesity isessential for reducing obesity-related morbidity. The researcher recommended that creating the awareness among the younger generation on prevention obesity and periodical assessment of BMI and maintenance of health record in the school enable the adolescents to maintain physical fitness and also the schools should promote aerobic play activity and there should be education pamphlets in the school environment on avoidance of junk foods and importance of healthy foods. Creating the awareness among parents on obesity prevention facilitate for regular follow up of children. Appropriate nutritional status promotes health status and prevent obesity related morbidity and complications.

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