Original Research Article

Study of prevalence and factors associated with overweight and obesity among school children aged 6-14 years studying in affluent private schools in Hyderabad and associated social factors leading to obesity and overweight

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Abstract

Background: The term "obesity" refers to an abnormal expansion of the adipose tissue that can be caused by an increase in the number of fat cells (hyperplastic obesity), an increase in the size of the fat cells themselves (hypertrophic obesity), or a combination of both of these factors. The body mass index (BMI) is frequently used as a measurement of obesity.
Methods: The current investigation was carried out in schools near the Shadan Institute of Medical Sciences, Hyderabad, Telangana. Community-based descriptive cross-sectional study was the study's design. Participants in the study ranged in age from 6 to 14 years.
Results: In this study, 111 (55.5%) were under normal BMI, 46 (23%) were underweight, 34 (17%) were overweight, and 9 (4.5%) were obese. Mean value was 21.8 with standard deviation 3.8, maximum value 31 and minimum 14.5. Most students were aged 9-11, however 12-14 and 6-9 were fat.
Conclusion: 200 participants participated in the current study, "Study of Prevalence and Factors Associated with Overweight and Obesity Among School Children Aged 6-14 Years Studying in Affluent Private Schools in Hyderabad and Associated Social Factors Leading to Obesity and Over Weight," which took place between September 2019 and September 2021.

Keywords: Diabetes mellitus, obesity, children, BMI, abnormal growth, overweight

Introduction

Obesity is abnormal growth of adipose tissue due to an increase in fat cell size (hypertrophic obesity) or number (hyperplastic obesity) or both [1]. BMI measures obesity. Overweight can be caused by obesity, improper muscle development, or fluid retention. Obese people differ in the amount and distribution of fat they store. Weight growth affects the distribution of fat, which affects obesity risk and disease [2-4]. It's vital to separate people with abdominal fat distribution or android fat distribution from those with less significant Gynoid fat distribution, in which fat is more equally and peripherally dispersed about the body. More people are fat

than underweight in every region except sub-Saharan Africa and Asia [5-7]. Overweight and obesity, once a concern exclusively in high-income countries, are now on the rise in low-and middle-income countries, especially in metropolitan areas. Most overweight or obese children live in poor countries, where the pace of rise is 30% higher than in developed countries [8-10]. Diet, physical exercise, mechanisation, urbanisation, genetic predisposition, pharmaceuticals, mental problems, economic policies, endocrine disorders, and endocrine-disrupting substances cause obesity. Most obese people try to lose weight and are often successful, but research suggests that long-term weight loss is unusual. Weight cycling may be caused by decreased energy expenditure and increased biological hunger during and after calorie restriction [11-14]. Weight cycling and yo-yo dieting may increase obesity-related inflammation and illness risk. The WHO's "Global Strategy on Diet, Physical Activity and Health" outlines activities to promote healthy diets and regular exercise [15-17]. The Strategy calls on global, regional, and local partners to enhance population diets and physical activity. NCDs are a serious challenge for sustainable development in the 2030 Agenda. As part of the Agenda, Heads of State and Government promised to reduce premature death from NCDs by one-third through prevention and treatment by 2030. 3.4 is the SDG. The "Global action plan on physical activity 2018-2030" outlines viable and attainable policy initiatives 16 to improve global physical activity. In 2019, the WHO released new guidelines on physical activity, sedentary behaviour and sleep for children under 5 [18-21].

Methods

The current study was carried out in schools located in and around the Shadan Institute of Medical Sciences, which is located in Hyderabad in the state of Telangana. Community-based descriptive cross-sectional research was used for the study's design. Participants in the study were individuals between the ages of 6 and 14 years old.

Inclusion criteria

1. Patient aged 6-14years and above were included in study.
2. Patients who have given written informed consent.
3. Both the genders involved in this study.

Exclusion criteria

1. School children suffering from psychiatric illness.
2. Who had suffered from any illness for the past one month.
3. Patients less than 6years and more than 14years
4. Children who had attended any teaching programme on obesity and obesity related factors.

Study period: The total duration of study was 2 years from 2019-2021, divided into the following phases:

Table 1: The Study was done from Sep 2019-Sep 2021, divided into the following phases

1.	Review of study articles and study preparation	2months
2.	Writing and submitting the proposal to IRC	2 months
3.	Getting feedback and modification of study	2months
4.	Submission of proposal	1month
5.	Collection of data	12months
6.	Statistical analysis	2months
7.	Dissertation writing	3months

Results

Table 2: Distribution of children's according to age groups

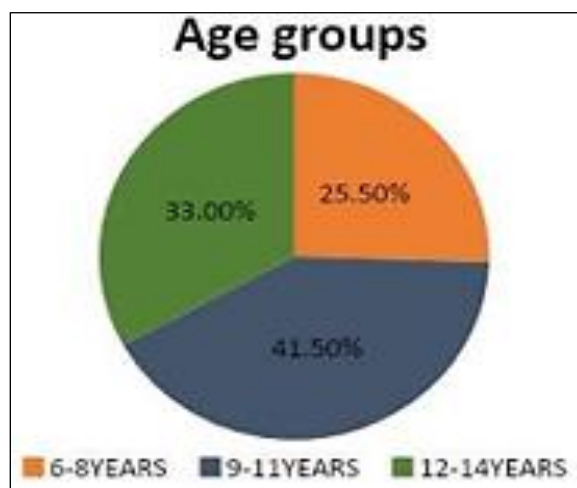| Age groups	Frequency	Percentages
6-8Years	51	25.5%
9-11Years	83	41.5%
12-14Years	66	33%
Total	200	100%

Fig1: Distribution according to age groups

Among study participants, a maximum of 41.5% were between 9-11years of age and minimum of 25.5% are under 6-8years of age and the mean age is 10.13±2.4 days and the highest age was 14years and the lowest was 6years old.

Table 3: Distribution of participants according to gender

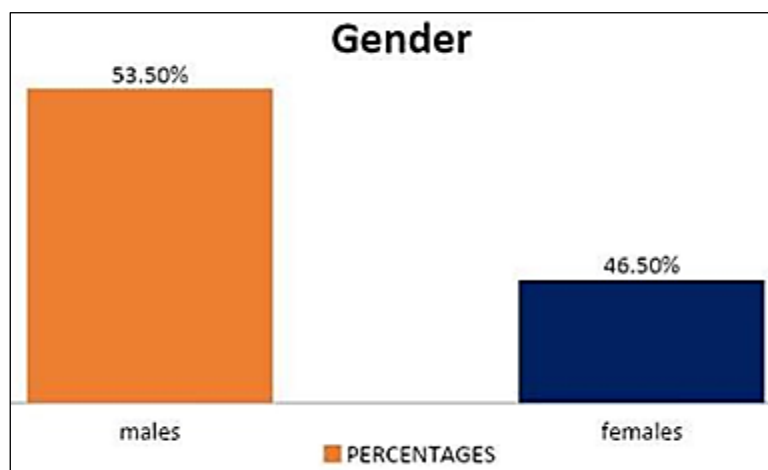| Sex	Frequency	Percentage
Males	107	53.5%
Females	93	46.5%
Total	80	100%

Fig2: Distribution of participants according to gender

Among the study children's maximum 53.5% were Males and 46.5% were Females.

Table 4: Distribution according to Age and Gender

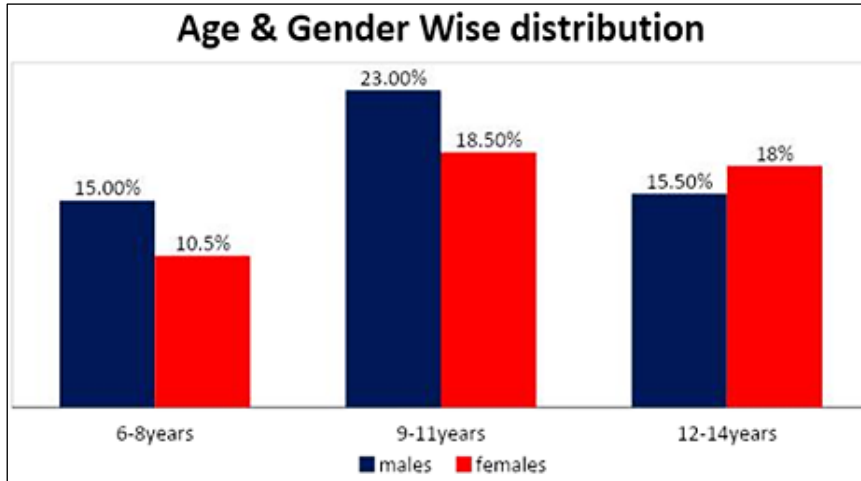| Age	Males	Females	Total	P value
6-8years	30(15%)	21(10.5%)	51 (25.5%)	
9-11years	46(23%)	37(18.5%)	83(41.5%)	0.3
12-14years	31(15.5%)	35(17.5%)	66(33%)	
Total	107(53.5%)	93(46.5%)	200(100%)	

Fig3: Distribution of participants according to age and Gender

Among study participants maximum of 23% are males and 18.50% are Females among age group 9-11years and the difference is not significant as the P-Value is 0.3.

Table 5: Distribution of participants according to Religion

Religion	Frequency	Percentage
Muslims	110	**55%**
Hindu	77	38.5%
Christian	13	6.5%
Total	200	100%

Among the study participants a maximum of 110 (55%) were Muslims, 11(38.5%) were Hindus and 13(6.5%) were Christians.
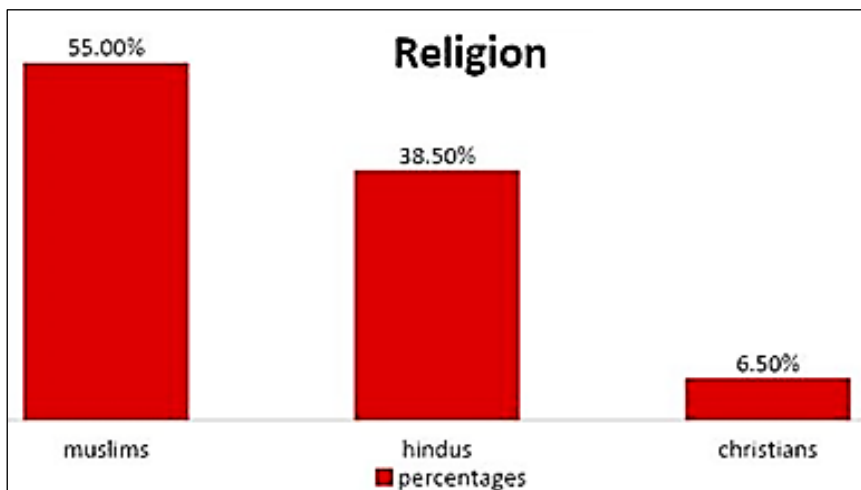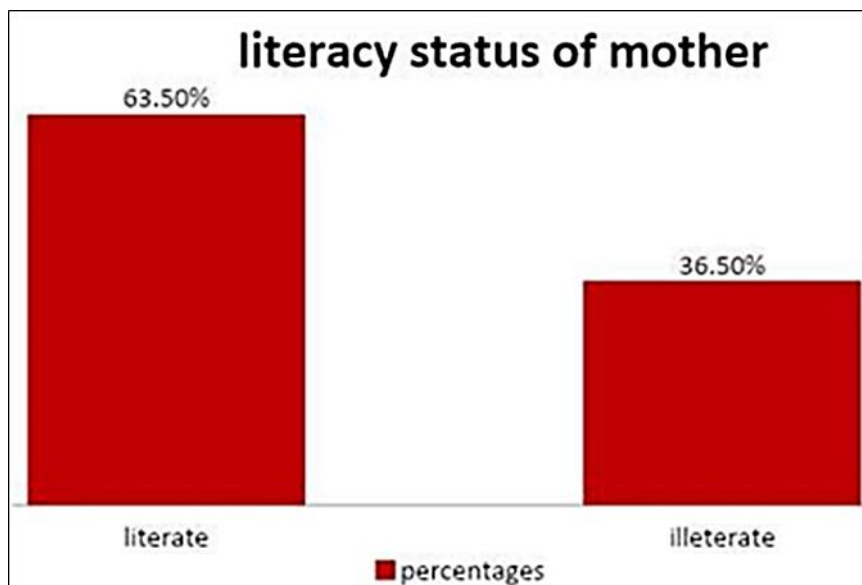

Fig4: Distribution of participants according to Religion

Table 6: Distribution of participants according to literacy status of mother

Mothers literacy	Frequency(n)	Percentage (%)
Literate	127	63.5%
Illiterate	73	36.5%
Total	200	100%

Fig5: Distribution of participants according to literacy status of mother

Among the study participants, a maximum of 63.5% were literate and 36.5% were illiterate.

Table 7: Distribution of study participants according to socioeconomic status

Socioeconomic status	Frequency	Percentage
Upper class	6	3%
Upper middle class	74	37%
Lower middle class	60	30%
Upper lower	57	28.5%
Lower	3	1.5%
Total	200	100%

Among the participants, a maximum of 74(37%) belong to upper middle class followed by 60(30%) lower middle class, 57(28.5%) belong to upper lower class and least 3(1.5%) seen of lower class.
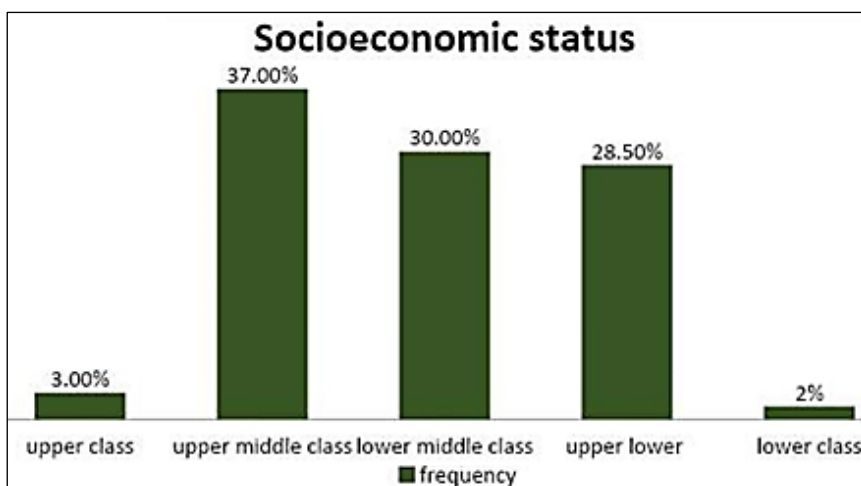
Fig6: Distribution according to socioeconomic status

Table 8: Distribution of study participants according to Diet pattern

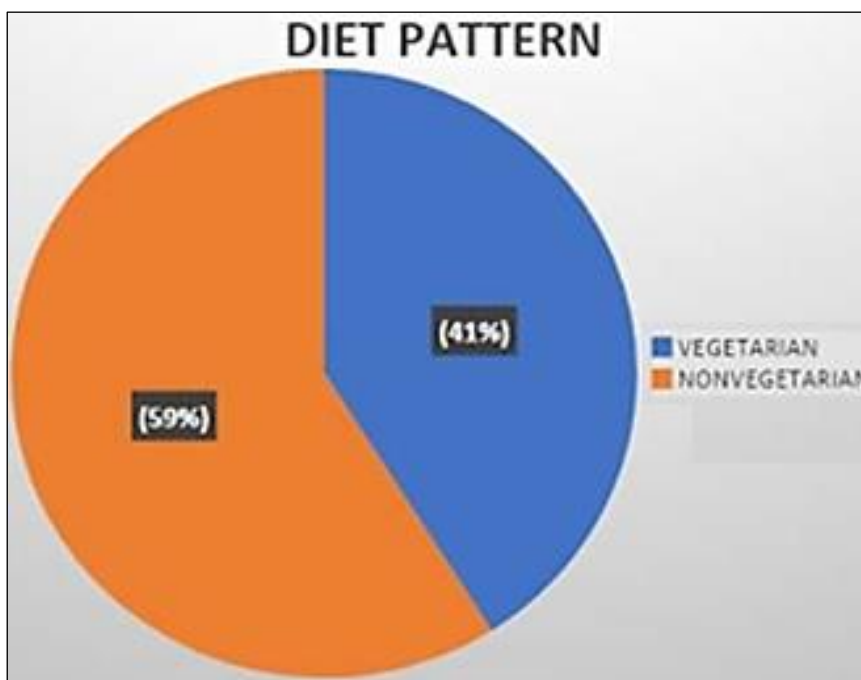| Diet pattern	Frequency	Percentage
Vegetarian	82	41%
Non-vegetarian	118	59%
Total	200	100%

Fig7: Distribution according to Diet pattern

Among the students maximum of 59% were non vegetarian followed by 41% vegetarian.

Table 9: Distribution of participants according to Intake of cereals

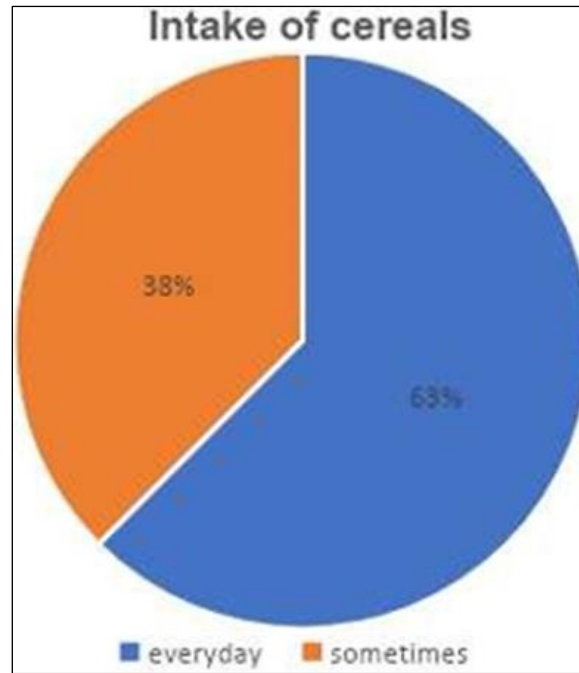| Intake of cereals	Frequency	Percentage
Everyday	125	62.5%
Sometimes	75	37.5%
Total	200	100%

Fig 8: Distribution according to intake of cereals

62.5% of students take cereals every day and only 37.5% take cereals sometimes.

Table 10: Distribution of participants according to intake of oils

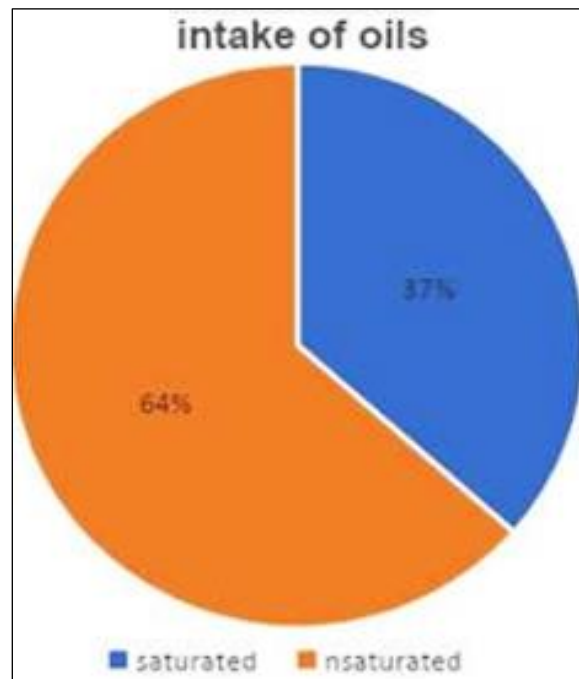| Intake of oils	Frequency	Percentage
Saturated	73	36.5%
Non-saturated	127	63.5%
Total	200	100%

Fig 9: Distribution according to intake of oils

Among the participants it was found that 73 (36.5%) take more saturated oils. 127 (63.5%) patients take unsaturated oil.

Table 11: Distribution of participants according to intake of sugars

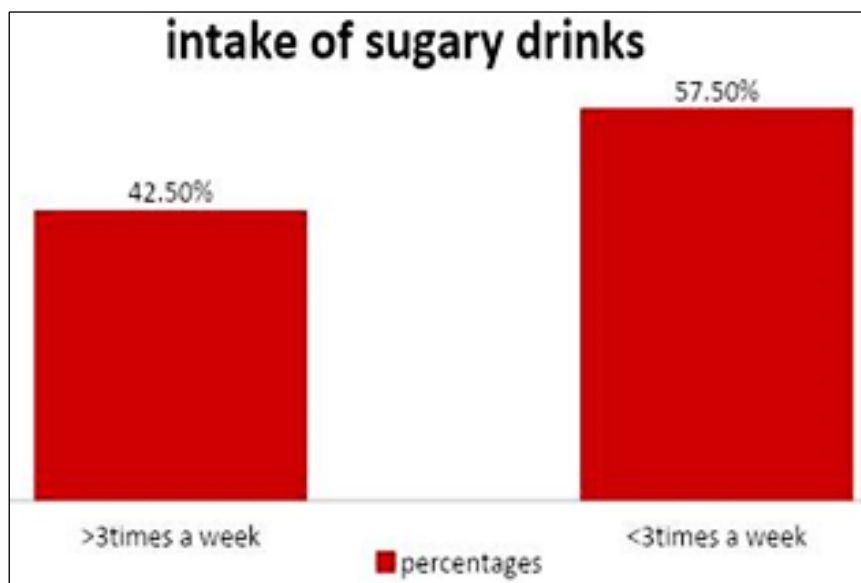| Intake of sugary drinks	Frequency(n)	Percentage (%)
>3times a week	85	42.5%
<3times a week	115	57.5%
Total	200	100%

Fig10: Distribution of participants according to intake of sugary drinks

Among the study participants maximum of 57.5% take sugary drinks <3times a week but 42.5% students do take sugary drinks >3times a week.

Table 12: Distribution of participants according to use of bakery items

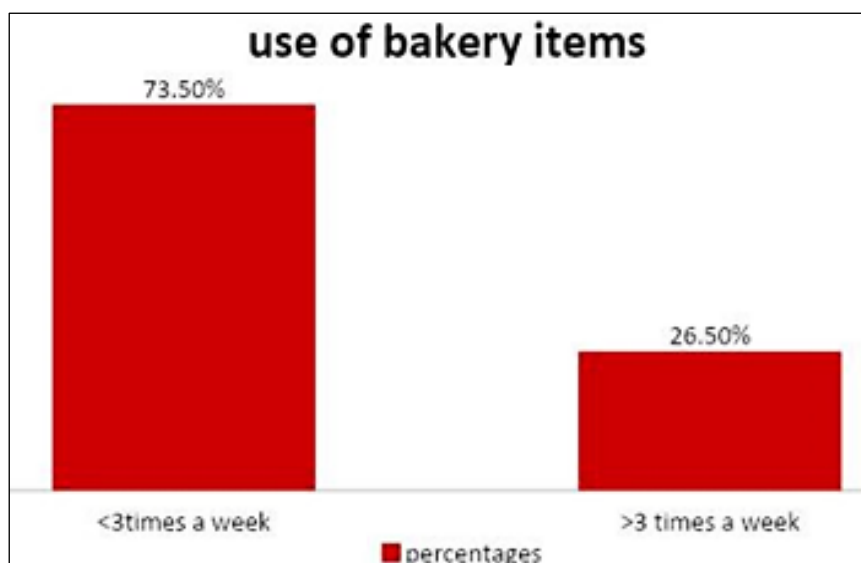| Use of bakery items	Frequency(n)	Percentage (%)
<3times a week	147	**73.5%**
>3 times a week	53	26.5%
Total	200	100%

Fig 11: Distribution of participants according to use of bakery items

Among the study participants maximum of 147(73.5%) use bakery items<3 time a week whereas 53(26.5%) use it >3 times a week.

Table 13: Distribution of participants according to hours of physical activity in a day

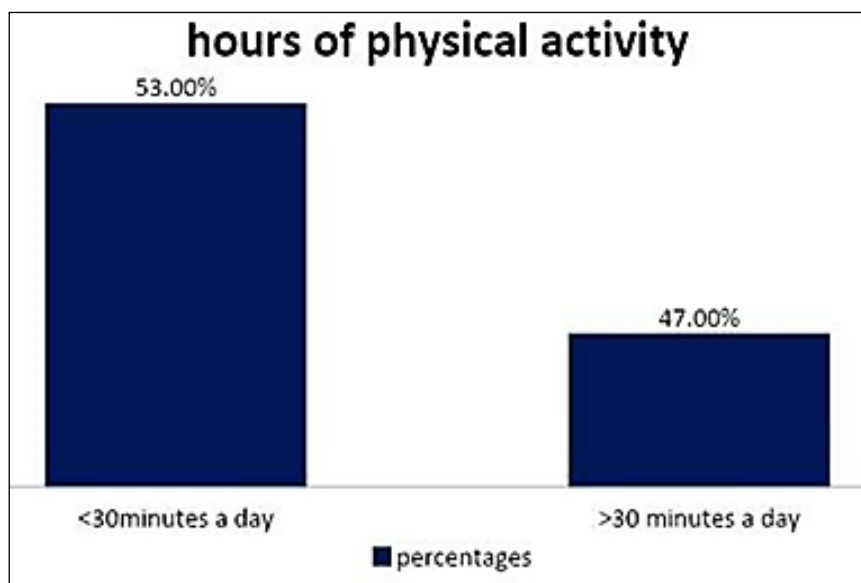| Hours of activity in a day	Frequency(n)	Percentage (%)
<30minutes a day	106	**53%**
>30minutes a day	94	47%
Total	200	100%

Fig12: Distribution of participants according to hours of physical

Among the study participants maximum of 106(53%) does physical activity <3 time a week whereas 94(47%) do it >3 times a week.

Table 14: Distribution of participants according to hours of sleep

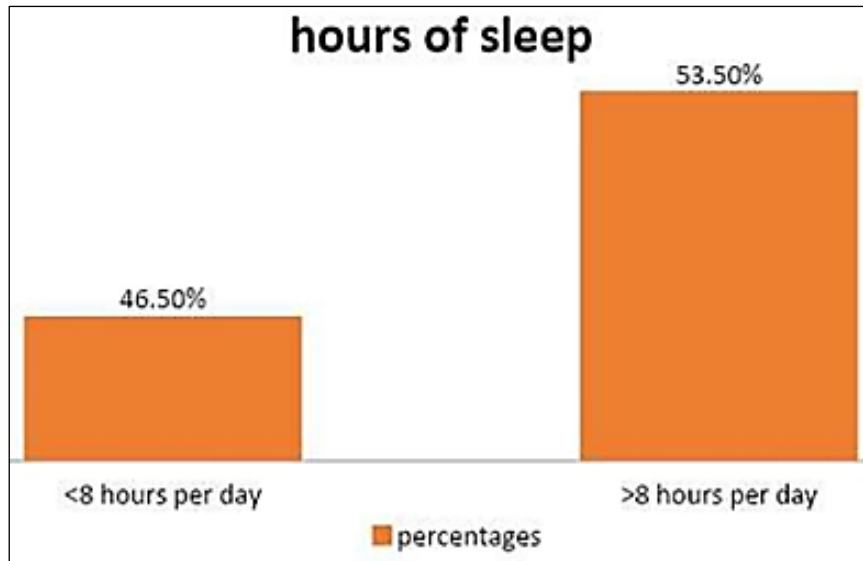| Hours of sleep	Frequency(n)	Percentage (%)
<8 hours per day	93	**46.5%**
>8 hours per day	107	53.5%
Total	200	100%

Fig13: Distribution of participants according to hours of sleep

Among the study participants, a maximum of 107(53.5%) sleep for >8hours per day whereas 93(46.5%) sleep <8 hours per day.

Table 15: Distribution of participants according to hours of watching TV

Hours of watching TV	Frequency(n)	Percentage (%)
<2hours	64	**32%**
>2 hours	136	68%
Total	200	100%

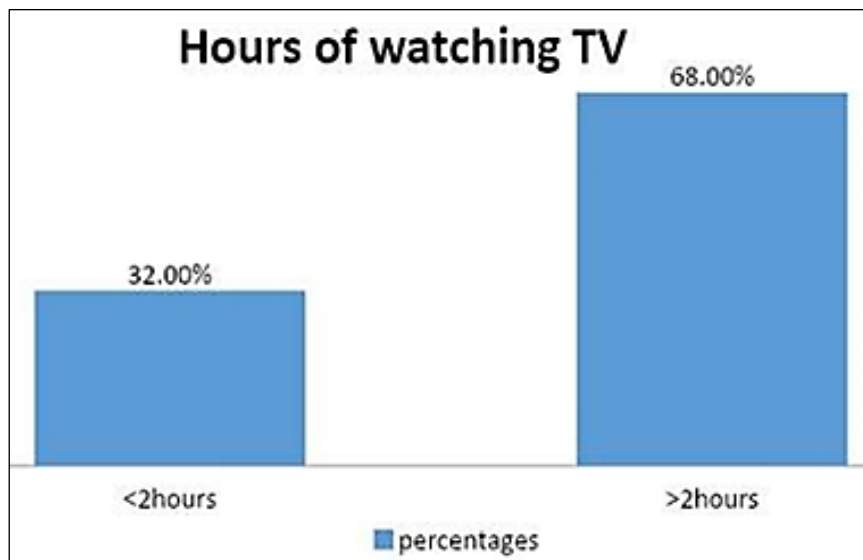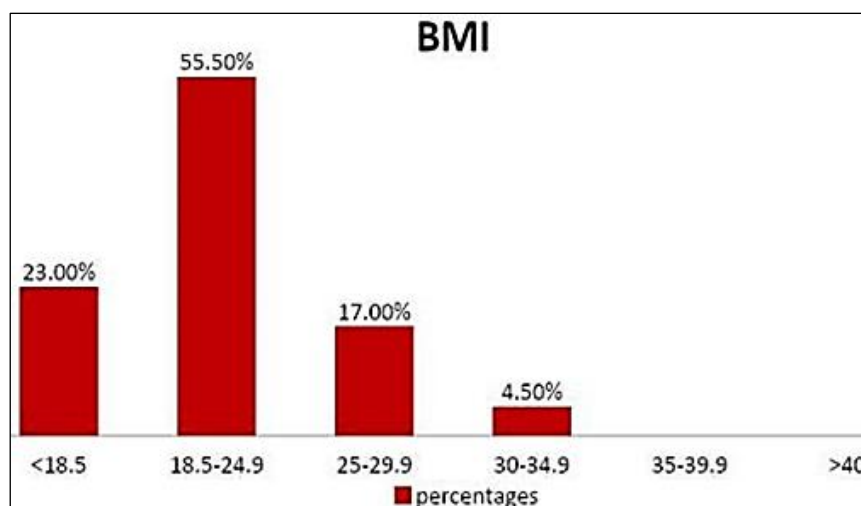**Fig14:** Distribution of participants according to hours of watching TV

Among the study participants maximum of 136(68%) watch TV <2 hours per day whereas 64(32%) watches TV>2hours per day.

Table 16: Distribution of participants according to BMI

BMI	Frequency(n)	Percentage (%)
<18.5	46	**23%**
18.5-24.9	111	55.5%
25-29.9	34	17%
30-34.9	9	4.5%
35-39.9	0	0%
>40	0	0%
Total	200	100%

Fig 15: Distribution of participants according to BMI

Among the study participants maximum of 111(55.5%) were under normal BMI followed by 46 (23%) were underweight, 34(17%) were overweight and 9(4.5%) were obese with mean value was 21.8 with standard deviation 3.8 with maximum value 31 and minimum was 14.5.

Discussion

Current study helped us understand childhood obesity. Malnutrition in any form threatens health. Growing rates of overweight and obesity are connected to chronic diseases like cancer, CVD, and diabetes. These life-threatening illnesses are difficult to treat in places with limited resources and overwhelmed health systems, thus steps must be taken to reduce obesity. Comparing this study to others, we found the following. In this study, 111 (55.5%) were under normal BMI, 46 (23%) were underweight, 34 (17%) were overweight, and 9 (4.5%) were obese. Mean value was 21.8 with standard deviation 3.8, maximum value 31 and minimum 14.5. Most students were aged 9-11, however 12-14 and 6-9 were fat. Anand *et al*. discovered that overweight and obesity prevalence in their study group was 13.9% and 7.3% respectively (p0.001). Muhammad Junaid *et al*. discovered BMI 19.40 3.26 kg/m2. 71% of 165 children were obese, whereas 57% were not [21, 22]. Using IAP charts, Chandra N, Anne B *et al*. identified 24.6% obese and 35.8% overweight. Using CDC guidelines, obesity was 15.4% and overweight was 26.1%. Mean BMI for obese was 25.6 3.5 kg/m2 and for overweight was 21.1 1.9 kg/m2. Girls were more likely to be overweight (44.5% vs. 28.1%) and obese (32.8% vs. 17.3%). 8-10-year-olds had the greatest obesity rate [22-24].

Similar to this study, Panda *et al*. observed overweight and obesity prevalence of 8.9% and 3.4%. Shikha Khandelwal *et al*. observed that obesity and overweight prevalence was 6.2% (7.6% male, 4.7% female) and 12.9% (13.9% male and 11.8% female). 12.5% of children were overweight with a proportion between 85 and 95, while 5.6% were obese. 564 boys

(17.9%) were obese or overweight, while 436 boys (15.9%) were. 14.8% of 783 vegetarian kids were obese. In Prasad *et al.'s* study, overweight and obesity prevalence was 9.7% and 4.3%, respectively. Sunil Kumar *et al.* discovered 3.3% prevalence among 6-15-year-olds in three rich Tumkur schools. In this study, guys (3.47%) were more obese than girls (3.04%). Six, eleven, and twelve-year-olds have more obesity. Overweight and obesity were determined to represent 26.9% and 8.7% of the population, respectively. In the survey, 50.6% of males were overweight and 5.4% were obese, and 49.38% of girls were overweight and 3.4% were obese. Overall obesity prevalence was 7.4%, with no significant difference between boys (7.3%) and girls (7.6%). Both boys (12.2%) and girls (11.5%) were obese at age 11 in this study. 95 (7.6%) children were obese, with 61 (9.4%) females and 34 (5.7%) boys (p=0.20). In youngsters, overweight (85th percentile) and obesity (>95th percentile) were 4.41 and 2.12 percent, respectively. Mahe had the most overweight (8.66%) and obese (4.69%) residents. Mohsin F *et al.* observed that children and adolescents were split into four groups: 3-5, 6-9, 10-13 and 14+. (14-18 years). 468 kids and teens participated (male 266, female 202). Group 1 had 110 children, group 2 had 177, while groups 3 and 4 had 149 and 32 teens. Males (19.9%) were more obese than females (15.3%). Group 2 (27.7%) had the most obesity, followed by Group 1 (14.5%), Group 3 (10.7%) and Group 4 (9.4%).

Conclusions

The study "Study of Prevalence and Factors Associated with Overweight and Obesity among School Children Aged 6-14 years in Affluent Private Schools in Hyderabad and Associated Social Factors Leading to Obesity and Over Weight" involved 200 participants studied for 2 years from September 2019 to September 2021. Maximum 41.5% of students were between 9-11 years old, and minimum 25.5% were under 6-8 years old. The mean age was 10.132.4 years, and the highest age was 14 and the lowest was 6. 53.5% of research participants were male and 46.5% female. The P-Value for the difference between boys and females in the 9-11 age group is 0.3. 110 students (55%) were Muslims, 11 (38.5%) Hindus and 13 (6.5%) Christians.

References

1. Aykroyd WR, Mayer J. Food and nutrition terminology. In. WHO Doc NUT/68.6, Geneva, 1968.
2. Park K. Park's textbook of preventive and social medicine. 26th edition. Jabalpur, India, Banarasidas Bhanot Publisher, 2021.
3. Yazdi FT, Clee SM, Meyre D. Obesity genetics in mouse and human: back and forth and back again. PeerJ. 2015;3:e8-56. Doi:10.7717/peerj.856. PMC 4375971. PMID 25825681.
4. Kassotis Christopher D, Vandenberg Laura N, Demeneix Barbara A. Porta, Miquel; Slama, Remy; Trasande, Leonardo, 2020 Aug.
5. Bleich S, Cutler D, Murray C, Adams A. Why is the developed world obese?. Annual Review of Public Health (Research Support). 2008;29:273-95.
6. Strohacker Kelley, Carpenter Katie C, Mcfarlin Brian K. Consequences of Weight Cycling: An Increase in Disease Risk? International Journal of Exercise Science. 2009 July;2(3):191-201.
7. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

8. https://www.who.int/southeastasia/health-topics/obesity
9. Kapil U, Singh P, Pathak P, Dwivedi SN, Bhasin S. Prevalence of obesity among Affluent adolescent school children in Delhi. Indian Pediatrics. 2002;39:449-52.
10. Vedavathi S, Jayashree R, Rafi M. Prevalence of overweight and obesity in affluent adolescent girls in Chennai in 1981 and 1998. Indian Pediatrics. 2003;40:332-6.
11. Kotian M, Kumar G, Kotian SS. Prevalence and Determinants of Overweight and Obesity Among Adolescent School Children of South Karnataka. Indian Journal of Community Medicine. 2010;35:176-8.
12. Chandra N, Anne B, Venkatesh K, Teja GD, Katkam SK. Prevalence of childhood obesity in an affluent school in Telangana using the recent IAP growth chart: A pilot study. Indian J EndocrMetab. 2019;23:428-32.
13. FalknerF.ed. Prevention in childhood of health problems in adult life, WHO, Geneva, 1980.
14. Kopelman, Peter G. Clinical obesity in adults and children: In Adults and Children. Blackwell Publishing, 2005, 493. ISBN 978-1-4051-1672-5.
15. BessesenDH.Update on obesity". J. Clin. Endocrinol. Metab. 2008June;93(6):202-734.
16. ShahBindra, CostKatherine Tombeau, FullerAnne, BirkenCatherine S, AndersonLaura N.Sex and gender differences in childhood obesity: contributing to the research agenda.BMJ Nutrition, Prevention & Health. 2020Sep;3(2):387-390. Doi:10.1136/bmjnph-2020-000074. ISSN 2516-5542. PMC 7841817.
17. Deurenberg P, Weststrate JA, Seidell JC. Body mass index as a measure of body fatness: age-and sex-specific prediction formulas, 1991March.
18. Berger, Kathleen Stassen.Invitation to the LifeSpan, Second Edition. New York: Worth Publishers, 2014, 247.
19. Indian Academy of Pediatrics Growth Charts Committee, Khadilkar V, Yadav S, Agrawal KK, Tamboli S, Banerjee M, *et al*. Revised IAP growth charts for height, weight and body mass index for 5- to 18-year-old Indian children. Indian Pediatr. 2015;52:47-55.
20. de Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school aged children and adolescents. Bull World Health Organ. 2007;85:660-7.
21. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: International survey. BMJ. 2000;320:12-40.
22. World Health Organization (WHO). The Sexual and Reproductive Health of Young Adolescents: Research Issues in Developing Countries. WHO, 2011. Available from: http://www.whqlibdoc.who.int/publications/2011/9789241501552_eng.pdf.
23. "Healthy Weight: Assessing Your Weight: BMI: About BMI for Children and Teens". CDC.
24. Experts Available to Discuss Childhood Obesity, Role of BMI. Business Wire ExpertSource Group, 2005. Retrieved 15 December 2013.