ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

Original research article

TO STUDY THE PREVALENCE OF OVERWEIGHT AND OBESITY AMONG CHILDREN IN TERTIARY CARE CENTRE

Dr. Shweta Singh Kalyani[1], Dr. Jayant Acharya[2]

[1]DNB Trainee, Department of Paediatrics, ISPAT General Hospital, Rourkela, Odisha, India

[2]Joint director, Department of Paediatrics, ISPAT General Hospital, Rourkela, Odisha, India

Corresponding Author: Dr. Shweta Singh Kalyani

Received: 11-08-2023. Revised:13-09-2023. Accepted:18-10-2023.

ABSTRACT

Aim: The aim of the present study was to assess the prevalence of overweight and obesity among children in a Tertiary care centre.

Methods: A hospital based study was conducted in the Department of Paediatrics, ISPAT General Hospital, Rourkela, Odisha from April 2019 to October 2020. The study population was children in the age group of 5 to 18years attending Paediatric OPD, ISPAT General Hospital, Rourkela, Odisha. 388 children were included in the study.

Results: Out of 388 children in the study population, out of 198 males majority of them are under the category of 10-15 years (49%), 52 (24.7%) were in the category 15-18 years, followed by 49 (24.7%) under the category 5-10 years. Out of 190 females majority of children (48.9%) were under age group10 to 15 years followed by (28.9%) under the age group 15 to 18 years and (22.1%) under the age group 5 to 10yrs respectively, which was statistically not significant. Out of all children in the study overweight & obesity were more commonly observed in higher age groups (>10 yrs.) which was statistically significant. It was observed that overweight and obesity were more prevalent in females as compared to males which was statistically significant.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

Conclusion: The prevalence of overweight and obesity was more among adolescent children and girls in our study which shows comparable trends with other parts of the country and worldwide. Lack of physical activity, sedentary lifestyle, using motor vehicle as the mode of transport to school, lack of parental awareness regarding importance of physical activity, non encouragement of children by their parents to actively participate in physical activity and Poor parental perception regarding their children weight status were significantly observed in those group of children who were overweight and obese.

Keywords: prevalence, overweight, obese, children

INTRODUCTION

Childhood obesity is a problem that needs to be dealt within the 21st century. The burden of this disease can be seen in many urban areas around the world with low- and middle-income levels. Obesity has been defined by World Health Organization (WHO) as "excessive or abnormal accumulation of fat which poses a risk to the health of that individual." At the population level, body mass index (BMI) can be used to determine overweight and obesity. This information is helpful for roughly estimating body fat percentage. There has been an alarming rise in the prevalence of this health disorder. Every year, more than 2.6 million people worldwide lose their lives due to obesity or being overweight.[1]

A sedentary lifestyle with low energy expenditure and consumption of high-calorie foods with low nutritional value are assumed to be the two most important factors responsible for the increasing rate of childhood obesity.[2] Overweight children have greater chances of becoming overweight or obese as they enter adulthood and are at a greater risk for chronic disease conditions in adulthood.[3,4] Globally, the prevalence of overweight individuals, including children aged 5-17 years is 10%; however, this prevalence varies according to region.[5,6]

Childhood overweight/obesity is a significant public health concern in the 21st century. At the global level, many middle- and low-income countries are affected by overweight/obesity, particularly in urban areas.[7] According to the WHO, approximately 39 million under-five-year-old children are overweight or obese.[8] Globally, childhood overweight and obesity are associated with more deaths than childhood underweight conditions. Worldwide, overweight/obesity is considered the fifth leading mortality risk factor, now representing a global epidemic. According

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

to Global Burden of Disease 2017, more than four million people die annually as a result of being overweight or obese.[9]

The mechanism of obesity development is not fully understood and it is confirmed that obesity occurs when energy intake exceeds energy expenditure. There are multiple etiologies for this imbalance, hence, the rising prevalence of obesity cannot be addressed by a single etiology. Genetic factors influence the susceptibility of a given child to an obesity conducive environment. However, environmental factors, lifestyle preferences, and cultural environment seem to play major roles in the rising prevalence of obesity worldwide.[10,11] In a small number of cases, childhood obesity is due to genes such as leptin deficiency or medical causes such as hypothyroidism and growth hormone deficiency or side effects due to drugs (e.g. steroids).[12] Overweight and obesity in childhood have significant impact on both physical and psychological health; for example, overweight and obesity are associated with hyperlipidemia, hypertension, abnormal glucose tolerance, and infertility. In addition, psychological disorders such as depression occur with an increased frequency in obese children.[13]

The aim of the present study was to assess the prevalence of overweight and obesity among children in a Tertiary care centre.

MATERIALS AND METHODS

A hospital based study was conducted in the Department of Paediatrics, ISPAT General Hospital, Rourkela, Odisha from April 2019 to October 2020. The study population was children in the age group of 5 to 18years attending Paediatric OPD, ISPAT General Hospital, Rourkela, Odisha. 388 children were included in the study.

INCLUSION CRITERIA:

Children of age group 5 to18 yrs attending Paediatric OPD for various problems from April2019 to October 2020.

EXCLUSION CRITERIA:

Those children already suffering from chronic diseases like Nephrotic syndrome, chronic liver disease, endocrine disorders like hypothyroidism, cushings disease, Diabetes mellitus, congestive

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

cardiac failure, and who are on chronic medications like (anti-epileptics, corticosteroids, antpsychotics, anti-depressants etc.)

METHOD:

All consecutive children attending Paediatrics OPD in age group 5-18yrs and were included in the study. Height and Weight of all the children included in the study was recorded and BMI was calculated (BMI= (kg/m2).[14] BMI was plotted on IAP BMI for Age and sex charts and subsequently categorised as normal weight, underweight, overweight and obese as per IAP BMI for Age and sex charts. The role of various influencing factors for obesity and overweight like physical activity, sedentary lifestyle and the awareness of parents towards obesity of their children was assessed by a pre designed self-structured questionnaire which was given to the parents.[15-17]

STATISTICAL ANALYSIS:

Descriptive and inferential statistical analysis[18-22] has been carried out in the present study. Results on continuous measurements are presented on Mean ±SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. Descriptive analysis was done for qualitative variables using percentage values, for quantitative variables using mean and standard deviation. Chi square test and Fischer's exact test were used for analysis of discrete variables Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. The Statistical software namely SPSS 22.0, and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS

Table 1: Demographic data

Age in Years	**Gender**		**Total**
	Female	**Male**	
5-10yrs	42(22.1%)	49(24.7%)	91(23.5%)
10-15yrs	93(48.9%)	97(49%)	190(49%)

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

15-18 yrs	55(28.9%)	52(26.3%)	107(27.6%)
Total	190(100%)	198(100%)	388(100%)

Out of 388 children in the study population, out of 198 males majority of them are under the category of 10-15 years (49%), 52 (24.7%) were in the category 15-18 years, followed by 49 (24.7%) under the category 5-10 years. Out of 190 females majority of children (48.9%) were under age group10 to 15 years followed by (28.9%) under the age group 15 to 18 years and (22.1%) under the age group 5 to 10yrs respectively, which was statistically not significant.

Table 2: BMI-frequency distribution according to age and gender in years of study population

BMI	**Age in years**			**Total**
	5-10	**10-15**	**15-18**	
Underweight	8(8.8%)	1(0.5%)	0(0%)	9(2.3%)
Normal	74(81.3%)	117(61.6%)	43(40.2%)	234(60.3%)
Overweight	5(5.5%)	38(20%)	45(42.1%)	88(22.7%)
Obesity	4(4.4%)	34(17.9%)	19(17.8%)	57(14.7%)
Total	91(100%)	190(100%)	107(100%)	388(100%)

BMI	**Gender**		**Total**
	Female	**Male**	
Underweight	3(1.6%)	6(3%)	9
Normal	96(50.5%)	138(69.7%)	234
Overweight	51(26.8%)	37(18.7%)	88
Obese	40(21.1%)	17(8.6%)	57
Total	190(100%)	198(100%)	388

Out of total 388 children in the study population, 234 (60%) children were having normal weight, 9 (2.3%) children were underweight, 88 (22.7%) children were overweight and 57 (14.7%) children were in the obese category. Out of 107 children in age group 15 to 18 yrs., majority 42.1% were overweight and 17.8% were obese and out of 190 children in age group 10 to 15yrs., 20% were overweight while17.9% were obese. Whereas out of 91 children in the age group 5 to 10yrs only 5.5% and 4.4% were overweight and obese respectively. Hence, out of all children in the study overweight & obesity were more commonly observed in higher age groups

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

(>10 yrs.) which was statistically significant. 190 females (26.8%)were overweight and (21.1%) were obese and out of 198 males (18.7%) were overweight and (8.6%) were obese, hence it was observed that overweight and obesity were more prevalent in females as compared to males which was statistically significant

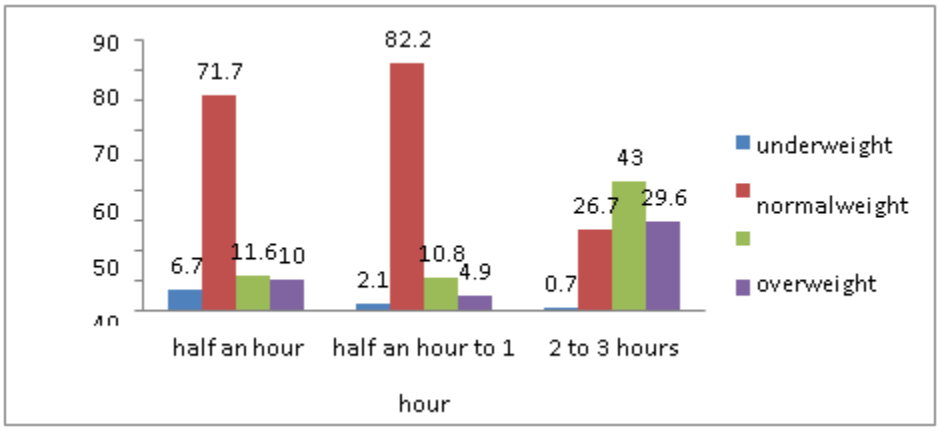
Table 3: Correlation between BMI categories and physical activity

Variables	**BMI**				**Total**	**P Value**
	Under weight	**Normal**	**Overweight**	**Obesity**		
Active participation in any sports						
a. yes	6(2.6%)	206(88.4%)	15(6.4%)	6(2.6%)	233	<0.001
b. no	3(2%)	28(18%)	73(47%)	51(33%)	155	
Total	9	234	88	57	388	

Out of 233 children (60.1%) of the total study population who actively participate in sports, amongst them majority were normal weight(88.4%) whereas 155 children(39.9%) of the total study population who did not actively participate in sports amongst them majority were overweight (47%) and obese (33%) which was statistically significant.

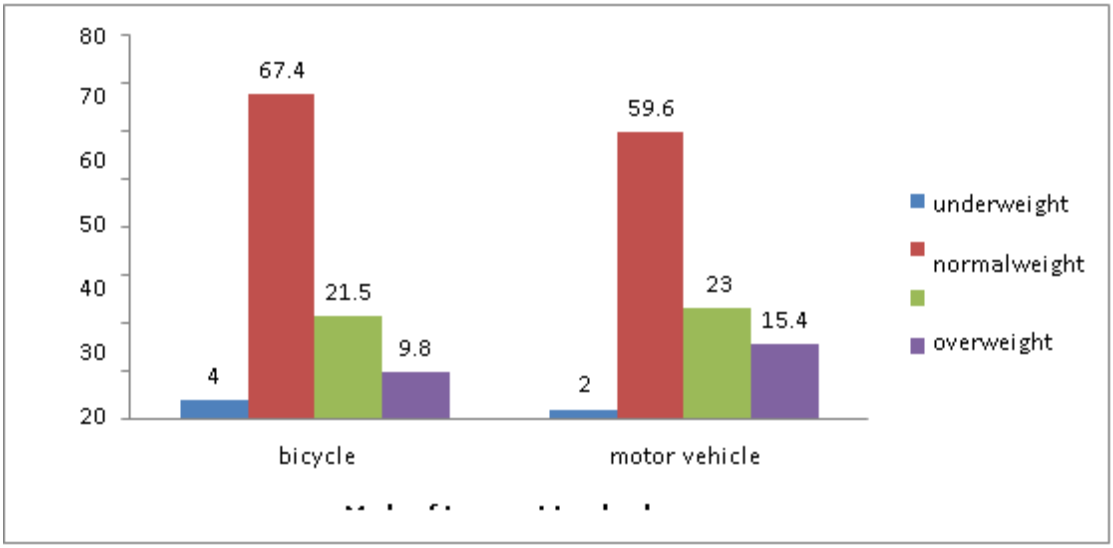
ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

Graph 1: Correlation between BMI categories and sedentary life style



142 children(36.6%) of the total study population spent more than 2- 3hours with T.V, mobile phones or videogames ,amongst them majority were overweight(43%) and obese (29.6%) whereas out of 186 children (47.9%)of the total study population who spent half an hour to one hour, majority of them were having normal weight (82.2%)which was statistically significant.

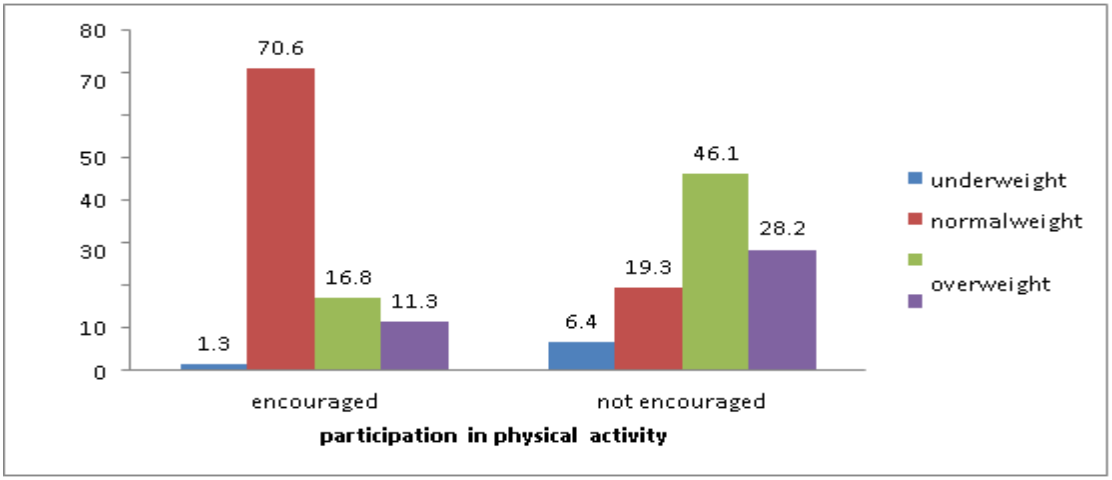
Graph 2: Correlation between BMI categories and mode of transportation to school



51 children (13.1%) of the total study population went to school by cycle, amongst them majority were having normal weight(64.7%) whereas overweight(21.5%) and obese(9.8%)were less in comparison to 337 children(86%) of the study population who went to school by motor vehicle which was statistically significant.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

Graph 3: Correlation between BMI categories and participation of parents with their children for common physical activity



310 children(79.9%)of the total study population were encouraged by their parents to actively participate in physical activities, amongst them majority were having normal weight(70.6%),whereas 78 children (20.1%)of the total study population were not encouraged by their parents to actively participate in physical activities, amongst them majority were overweight(46.1%)and obese(28.2%) respectively ,which was statistically significant.

Table 4: Correlation between BMI categories and awareness of parents regarding physical activity

Variables	**BMI**				**Total**	**P Value**
	Underweight	**Normal**	**Overweight**	**Obesity**		
lack of physical activity causeweight related problems						
a.yes	7(2%)	221(64%)	71(20.5%)	46(13.4%)	345	<0.001**
b.no	2(4.7%)	13(30.2%)	17(39.5%)	11(25.6%)	43	
Total	9	234	88	57	388	

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

345 children (88.9%) of the total study population, their parents were aware that lack of physical activity causes weight related problems, amongst them majority were having normal weight(64%),whereas 43 children(13.4%)of the total study population, their parents were not aware that lack of physical activity causes weight related problems, amongst them majority were overweight(39.5%)and obese(25.6%)respectively, which was statistically significant.

Table 5: Correlation between BMI categories and concern of the parents about their child's weight

Variables	**BMI**				**Total**	**P Value**
	Underweight	**Normal**	**Overweight**	**Obesity**		
Concern with child's weight						
a.concerned	7(2.3%)	196(64.7%)	60(19.8%)	40(13.2%)	303	0.009
b.not concerned	2(2.3%)	38(44.7%)	28(3.3%)	17(20%)	85	
Total	9	234	88	57		

303 children (78.1%)of the total study population, their parents were concerned about their child's weight amongst them majority were having normal weight(64.7%),whereas 85 children(21.9%)of the total study population, their parents were not concerned about their child's weight ,amongst them obese were(20%), normal weight(44.7%) and overweight(3.3%) respectively, which was statistically not significant.

DISCUSSION

Childhood obesity is one of the most serious public health challenges of the 21st century.[23] In the last 30 years, childhood obesity has more than doubled in children and quadrupled in adolescents.[24] Obesity has become a pandemic now and it has been estimated that about 13% of

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

the world's adult population (11% of men and 15% of women) are obese.[25] The report from the 2016 non communicable disease (NCD) Risk Factor collaboration study (relating pooled analysis of study data published from 1975 to 2016)reveal an increase in the global age-standardized prevalence of obesity among children and adolescents aged 5–19years of age.[26]

In our study the prevalence of overweight and obesity was 22.7% and 14% respectively which was statistically significant. Similar observations were seen in study done by Aryeetey et al[27] among school-aged children in urban Ghana where prevalence of overweight and obesity was 14.7% and 4.4% respectively. In another study done by Karki et al[28] in urban Nepal 18.6%children were overweight and 7.1% were obese. In our study it was observed that girls were more overweight and obese (26.8%overweight and 21.1% obese respectively) in comparison to boys (18.7% overweight and 8.6% obese respectively) which was statistically significant(pvalue<0.001).This was similar to the observation seen in previous study conducted by Cherian et.al[75] in urban school children in Kerala, India where prevalence of overweight(12.1%)and obesity(5.3%) among girls was more as compared to boys(3% obese and 10.2% overweight respectively).

According to our study overweight and obesity were more prevalent (42.1%overweight and17.8% obese) in adolescents as compared to younger children (5.5%overweight and 4.4%obese). Similar results were seen in the study conducted by Rohilla et al[30] among adolescents in Rohtak where maximum prevalence of obesity (6.6%) and overweight (14.2%) was observed in adolescents. In our study it was observed that lack of participation in physical activity was significantly associated (p value<0.001) with higher prevalence of overweight and obesity (47% and 33% respectively) as compared to active participation in physical activity. The study done by Ip et al[31] among school going children (6 to18years) in Hong Kong also reported similar findings that participation in physical activity had much lower risk of obesity (11.7%) (p<0.001) as compared to non-participation in physical activity where the risk of obesity is (23.7%). In our study it was observed that the prevalence of overweight(23%) and obesity(15.4%) among children using motor vehicle as a mode of transport to school was more as compared to children using a bicycle as a mode of transport to school which was statistically significant(p value<0.001).Similar result was seen in study done by Kabbaoui et al[32] among adolescents in Morocco where the prevalence of overweight and obesity was higher among

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

adolescents who went to school in motor vehicles than among those who walked to school (p= 0.001).

In our study it was observed that prevalence of overweight(20.5%) and obesity(13.4%) was less among children of parents who were aware regarding the role of physical activity in decreasing the risk of overweight and obesity as compared to children of parents who were unaware of such information which was statistically significant(p value<0.001). The study done by Babela et al[33] among parents in congo also depicted that 71.3% of the parents were aware that outdoor play is essential in preventing childhood obesity which was statistically significant (pvalue<0.001). Hence, majority of parents of overweight children had wrong perception that their children were normal weight as compared to the parents of normal weight children which was statistically significant(p value<0.001). Similar results were seen in the study conducted by Nemecek et al[34] where among overweight and obese children only 15.7% were correctly perceived by their parents compared to 85.5% in normal weight group. In another study conducted by Huybrechts et al.[88]among preschool children in Belgium it was seen that more than one half of the overweight children and >75% of the obese children were wrongly perceived as normal weight by their parents.

From the above studies, it was evident that parental perception of their children's overweight is very poor and overweight children are misjudged more often, compared with the normal weight children. The reasons for poor awareness might include denial or reluctance to admit a weight problem, or desensitization to excess weight. This misperception could be a major risk factor in the development of overweight and hence it is the major responsibility of pediatricians to promote parental awareness and provide information on the necessity to prevent and treat overweight especially in childhood.

CONCLUSION

The prevalence of overweight and obesity was more among adolescent children and girls in our study which shows comparable trends with other parts of the country and worldwide. Lack of physical activity, sedentary lifestyle, using motor vehicle as the mode of transport to school, lack of parental awareness regarding importance of physical activity, non-encouragement of children by their parents to actively participate in physical activity and Poor parental perception regarding

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

their children weight status were significantly observed in those group of children who were overweight and obese.

REFERENCES

1. Onis MD, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. Bulletin of the World health Organization. 2007 Sep;85(9):660-7.
2. Ranjani H, Mehreen TS, Pradeepa R, Anjana RM, Garg R, Anand K, Mohan V. Epidemiology of childhood overweight & obesity in India: A systematic review. The Indian journal of medical research. 2016 Feb;143(2):160.
3. World Health Organization. Obesity and Overweight [Internet]. WHO; 2016.
4. National Heart, Lungs, and Blood Institute. Overweight and Obesity: What are Overweight and Obesity? [Internet]. National Institute of Health; 2016.
5. Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 1999-2000. Jama. 2002 Oct 9;288(14):1723-7.
6. Bhardwaj S, Misra A, Khurana L, Gulati S, Shah P, Vikram NK. Childhood obesity in Asian Indians: a burgeoning cause of insulin resistance, diabetes and sub-clinical inflammation. Asia Pacific journal of clinical nutrition. 2008 Mar 2;17.
7. Neupane S, KC P, Doku DT. Overweight and obesity among women: analysis of demographic and health survey data from 32 Sub-Saharan African Countries. BMC public health. 2015 Dec;16:1-9.
8. WHO. Obesity.
9. GBD 2015 Obesity Collaborators. Health effects of overweight and obesity in 195 countries over 25 years. New England journal of medicine. 2017 Jul 6;377(1):13-27.
10. Hill JO, Peters JC. Environmental contributions to the obesity epidemic. Science. 1998 May 29;280(5368):1371-4.
11. Grundy SM. Multifactorial causation of obesity: implications for prevention. The American journal of clinical nutrition. 1998 Mar 1;67(3):563S-72S.
12. Link K, Moëll C, Garwicz S, Cavallin-Ståhl E, Björk J, Thilén U, Ahrén B, Erfurth EM. Growth hormone deficiency predicts cardiovascular risk in young adults treated for acute

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

lymphoblastic leukemia in childhood. The Journal of Clinical Endocrinology & Metabolism. 2004 Oct 1;89(10):5003-12.

13. Daniels SR, Arnett DK, Eckel RH, Gidding SS, Hayman LL, Kumanyika S, Robinson TN, Scott BJ, St. Jeor S, Williams CL. Overweight in children and adolescents: pathophysiology, consequences, prevention, and treatment. Circulation. 2005 Apr 19;111(15):1999-2012.
14. Deurenberg P, Weststrate JA, Seidell JC. Body mass index as a measure of body fatness: age-and sex-specific prediction formulas. British journal of nutrition. 1991;65(2):105-14.
15. Karimy M, Armoon B, Fayazi N, Koohestani HR. A study on the knowledge, attitude, and practices of Iranian mothers towards childhood obesity. Obes Facts. 2019;12(6):669–77.
16. NCDs | Global school-based student health survey (GSHS) purpose and methodology. 2020.
17. Reethesh SR, Ranjan P, Arora C, Kaloiya GS, Vikram NK, Dwivedi SN, Jyotsna VP, Soneja M. Development and validation of a questionnaire assessing knowledge, attitude, and practices about obesity among obese individuals. Indian journal of endocrinology and metabolism. 2019 Jan;23(1):102.
18. Bernard Rosner (2000), Fundamentals of Biostatistics, 5th Edition, Duxbury, page 80-240.
19. Robert H Riffenburg (2005) , Statistics in Medicine , second edition, Academic press. 85-125.
20. Sunder Rao P S S , Richard J(2006) : An Introduction to Biostatistics, A manual for students in health sciences , New Delhi: Prentice hall of India. 4th edition, 86-160.
21. Suresh K.P. and Chandrasekhar S (2012). Sample Size estimation and Power analysis for Clinical research studies. Journal Human Reproduction Science,5(1), 7-13.
22. IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.
23. Sahoo K, Sahoo B, Choudhury AK, Sofi NY, Kumar R, Bhadoria AS. Childhood obesity: causes and consequences. J Family Med Prim Care. 2015;4(2):187–92.
24. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. Jama. 2014 26;311(8):806-14.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

25. World Health Statistics [Internet].Who.int. [cited 2019 nov 24].
26. Khadilkar VV, Khadilkar AV, Cole TJ, Chiplonkar SA, Pandit D.Overweight and obesity prevalence and body mass index trends in Indian children. Int J Pediatr Obes. 2011;6(2–2):e216-24.
27. Aryeetey R, Lartey A, Marquis GS, Nti H, Colecraft E, Brown P. Prevalence and predictors of overweight and obesity among school-aged children in urban Ghana. BMC obesity. 2017 ;4(1):1-8.
28. Karki A, Shrestha A, Subedi N. Prevalence and associated factors of childhood overweight/obesity among primary school children in urban Nepal. BMC public health. 2019 ;19(1):1-2.
29. Cherian AT, Cherian SS, Subbiah S. Prevalence of obesity and overweight in urban school children in Kerala, India. Indian Pediatr. 2012;49(6):475–7.
30. Rohilla R, Rajput M, Rohilla J, Malik M, Garg D, Verma M. Prevalence and correlates of overweight/obesity among adolescents in an urban city of north India. J Family Med Prim Care. 2014;3(4):404–8.
31. Ip P, Ho FK, Louie LH, Chung TW, Cheung YF, Lee SL, Hui SS, Ho WK, Ho DS, Wong WH, Jiang F. Childhood obesity and physical activity-friendly school environments. The Journal of pediatrics. 2017 Dec 1;191:110-6.
32. El Kabbaoui M, Chda A, Bousfiha A, Aarab L, Bencheikh R, Tazi A. Prevalence of and risk factors for overweight and obesity among adolescents in Morocco. Eastern Mediterranean Health Journal. 2018;24(6):512-21.
33. Mabiala Babela JR, Nika ER, Nkounkou Milandou KG, Missambou Mandilou SV, Bouangui Bazolana SB, Monabeka HG, Moyen G. Knowledge, Attitudes, and Practices of Parents Facing Child and Adolescent Obesity in Brazzaville, Congo. Glob Pediatr Health. 2016 Nov 7;3:2333794X16675546.
34. Nemecek D, Sebelefsky C, Woditschka A, Voitl P. Overweight in children and its perception by parents: cross-sectional observation in a general pediatric outpatient clinic. BMC pediatrics. 2017 Dec;17(1):1-0.
35. Huybrechts I, De Bacquer D, Van Trimpont I, De Backer G, De Henauw S. Validity of parentally reported weight and height for preschool-aged children in Belgium and its

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE11, 2023

impact on classification into body mass index categories. Pediatrics. 2006 Nov 1;118(5):2109-18.