Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Risk factors, Repercussions, and Preventive strategies for Childhood Obesity and Overweight

Dr Subin Jolly[1], Dr Poornima RN[2*], Dr Fulton D Souza[3]

[1]Senior Resident, Dept of Pediatrics, St Johns Medical College and Hospital, Bangalore, Karnataka, India

[2]Assistant Professor, Dept of Pediatrics, St Johns Medical College and Hospital, Bangalore, Karnataka, India

[3] Professor, Dept of Pediatrics, St Johns Medical College and Hospital, Bangalore, Karnataka, India

Corresponding details- Dr Poornima RN, Assistant Professor, Dept of Pediatrics, St Johns Medical College and Hospital, Bangalore, Karnataka, India

rnpoornima@yahoo.com

Abstract

Background: In the twenty-first century, childhood obesity and its concomitant conditions represent a significant public health issue. In developing nations, obesity is an emerging problem and the health care system has prioritized malnutrition.

Methods: The study conducted at St. John's Medical College was a two-year case-control study from October 2019 to October 2021. Participants in the study included fifty children who were overweight or obese and an equal number of children who were normal weight, matched for age and gender. Focusing on childhood obesity, this study gathers information from mothers on sociodemographic characteristics and their responses to a KAP questionnaire. This dual approach aims to understand the factors influencing childhood obesity, with mothers providing key insights into their children's lifestyle choices.

Results: There were 29 females and 71 boys among the 100 children. The children's average age was 11.77 years. The mothers of overweight or obese children had a mean BMI of 27.5, while the control group's was 22.70. Higher maternal age, BMI, consumption of fast food more than once a week, snacking with packed foods, daily playtime<30mins, and screen time>2 hours were associated with obesity. Compared to mothers of OW/OB children, mothers of normal-weight children exhibited considerably higher attitude and practice scores. Maternal education level was exhibited with knowledge and attitude. While there was no correlation between knowledge and practices (r = +0.075, p = 0.456) or attitude and practices

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

(r = +0.151, p = 0.134), there was a correlation between attitude and knowledge (r = +0.471, p = 0.000).

Conclusion: This study concluded that higher maternal age, BMI, excess fast food intake, screen time and less play time are the associated risk factors for obesity. Although there is a correlation between positive attitude and knowledge, it does not guarantee effective practices.

Keywords: Childhood obesity, Risk Factors, Obesity, Cardiovascular Disease

Introduction

There is a pediatric obesity pandemic in the Indian Republic. After China, India is the second-highest country in the world for the number of patients with childhood obesity. The frequency of childhood obesity and overweight has increased significantly worldwide during the last few decades. In 2014, there were an estimated 14.4 million overweight or obese children under five in the world. Since childhood obesity increases the risk of cardiovascular disease and the development of chronic non-communicable diseases like diabetes, hypertension, and kidney failure, it is becoming a significant public health concern in India. [1-4] Childhood obesity is one of the twenty-first century's largest and most urgent public health challenges. Obesity is a global issue that is getting worse every year for many low- and middle-income countries, particularly those in metropolitan areas. It is alarming that the prevalence is increasing. In 2010, it was projected that over 42 million children under the age of five will be obese globally. Of these, almost 35 million live in developing countries. [5] Treating childhood obesity is essential to lowering healthcare costs, improving patient self-esteem and preventing problems associated with adult obesity. Hospital costs related to obesity in Americans aged 7 to 17 have increased to $127 million a year over the last 20 years. [6]

Obese individuals have enormous adipose tissue accumulations, which harms their health [7]. It is known to be caused by overindulging in food and not getting enough exercise, which leads to excess positive energy. Numerous factors, such as behaviour, genetic predisposition, and environmental factors, can impact an individual's risk of obesity [8–10]. Overweight and obesity affect millions of children under five globally [11]. There was a global trend towards a rise in the prevalence of adolescent obesity between 1975 and 2016, with a 6.9% increase in boys and a 4.9% increase in girls [12]. A recent study found that 330 million children and teenagers between the ages of five and nineteen are overweight or obese [13]. Overweight and childhood obesity have become more common worldwide during the past few decades. The few currently available data indicate that this trend is most pronounced in high-income

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

countries and is expanding swiftly in other countries with varying income levels [14]. For example, a comprehensive investigation carried out worldwide between 1980 and 2013 discovered a 47.1% increase in the prevalence of childhood obesity and overweight [15, 16].

Materials and Methods

The case-control study was conducted in Bangalore at St. John's Medical College Hospital and the study period was from October 2019 to October 2020. A purposive sampling method was used in the study. Written informed consent and assent were obtained from the child's parents before the child and parents were enrolled as research subjects. The formula BMI = WEIGHT IN KG / (HEIGHT IN METER) was used to calculate the BMI of the selected youngsters after their height and weight were assessed. When the individual was standing without shoes, a standard strip meter with 0.5 cm accuracy was used to measure height, and a dial scale with a 0.5 kg precision was used to determine weight. The CDC growth charts were used to categorize them into four groups: underweight, normal, overweight, and obese. Children between the ages of five and fifteen who were considered overweight or obese were categorized as cases. In addition, women were categorized according to WHO BMI cutoffs as underweight (BMI <18.5 kg/m2), normal weight (BMI 18.6-24.9 kg/m2), overweight (BMI 25-29.9 kg/m^2), and obese (BMI > 30 kg/m^2).

Inclusion Criteria

Individuals eligible for this study include children in the age range 5–15 years and their mothers who are attending the outpatient or inpatient department of paediatrics at St. John's Medical College in Bangalore.

CASE – Children whose BMI is >85th percentile according to CDC growth charts

Children whose BMI is between 85-95th centile are termed as overweight and >95th centile is termed as obese.

CONTROL – Age and Gender matched Children whose BMI is between 5th to 85th centile according to CDC growth chart.

Exclusion criteria

1.Children on drugs causing overweight/ obesity viz. Steroids, Anti epileptics (valproate, carbamazepine, gabapentin), antipsychotics (quetiapine, olanzapine, clozapine, thioridazine, risperidone), beta-blockers, amitriptyline, Other tricyclic antidepressants, paroxetine, lithium, cyproheptadine.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

2. Children with diagnosed endocrine/genetic disorders causing obesity.

Statistical analysis

The acquired data was entered into an Excel spreadsheet and subsequently subjected to statistical analysis using SPSS. Descriptive studies employing statistical measures such as percentage, proportion, central tendency, and variation were utilized. A two-sample independent t-test was utilized to assess differences between groups. A significance level of less than 0.05 was used to determine statistical significance.

Ethical approval

Each patient provided consent after learning about the study's procedures. The hospital's Ethical Committee has approved the research protocol.

Results

The study findings investigating childhood obesity and overweight indicate that, among the cases, there were 36 male participants and 14 female participants. At the same time, in the control group, there were 35 male participants and 14 female participants, reflecting the gender distribution within the examined population. In our study, males were more in number than females (71 % males and 29% females).

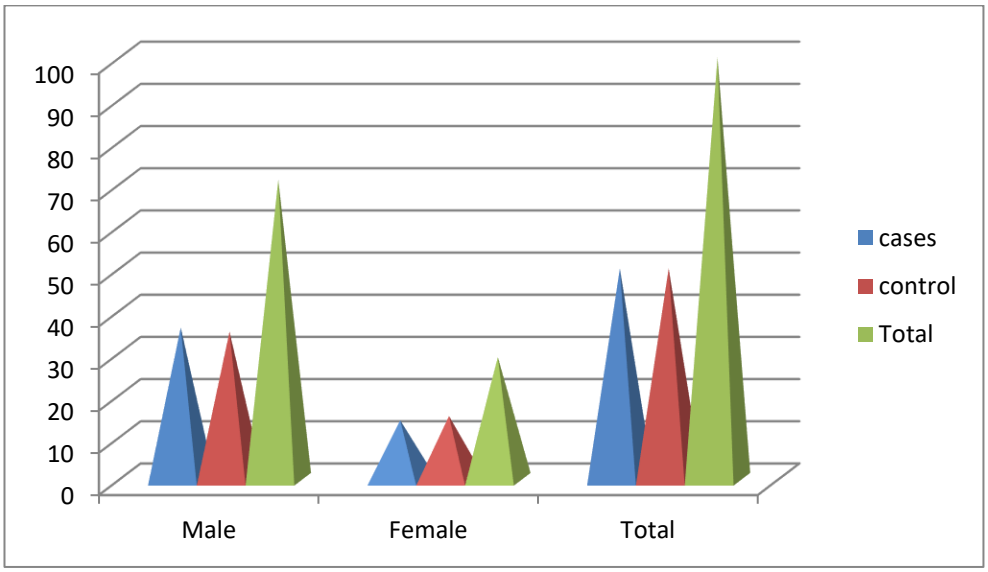

Figure 1: Gender distribution

Table 1: BMI CDC criterial-frequency table

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

CATEGORY	CASE (n'%)	Control n (n%)	Total n (n%)
UNDERWEIGHT	0	0	0
NORMAL	0	50 (100%)	50 (50%)
OVERWEIGHT	17 (34%)	0	17 (17%)
OBESE	33 (66%)	0	33 (33%)
Total	50 (100%)	50 (100%)	100

Based on the CDC criteria (Table: 1), a detailed examination of the case group demonstrated that 66% (33 children) were classified as obese, highlighting a significant prevalence of obesity, while 34% (17 children) fell into the overweight category, offering valuable insights into the distribution of weight categories among the studied children.

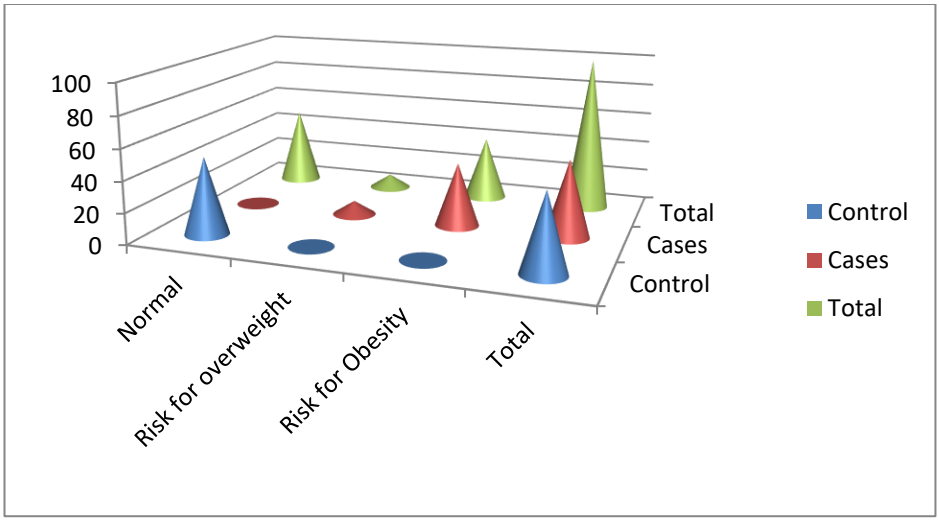

Figure 2: BMI IAP criteria-frequency

Table 2:BMI WHO criteria -frequency

CATEGORY	CONTROL n(n%)	CASE n'(n'%)	TOTAL N (N%)
UNDERWEIGHT	0	0	0
NORMAL	50 (100%)	0	50 (50%)
OVERWEIGHT	0	13 (26%)	13 (13%)
OBESE	0	37 (74%)	37 (37%)
Total	50	50	100

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

As per the IAP growth charts, the analysis revealed that 82% of children in the case group were identified as being at risk for obesity, while the remaining 18% were at risk for being overweight, as depicted in Figure 2. Contrarily, according to the WHO growth charts, within the case group, 26% of children were classified in the overweight category, and the majority, comprising 74%, were categorized within the obese range, as detailed in Table 2, highlighting variations in risk assessments based on different growth chart criteria.

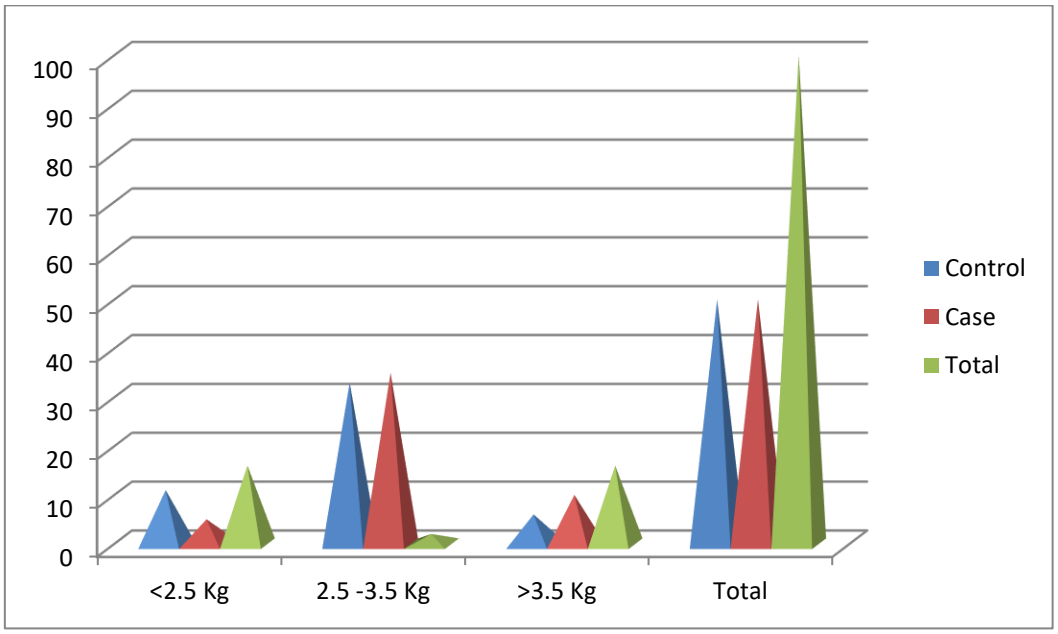

Figure 3: Birthweight-frequency

Most of the study population (68%) had a birth weight between 2.5 and 3.5 kg, with 16% of the general population being LBW, 22% of the children in the control group, and only 10% of the children in the case group being LBW.

Discussion

In the twenty-first century, obesity is a significant public health concern due to its link to childhood obesity as well as higher adult mortality and morbidity rates. One of the top five risks to global health is obesity. The World Health Organization now regards obesity as an epidemic since it causes 2.8 million morbidities and deaths annually [17]. More deaths are currently associated with obesity than underweight. Children of school age who are obese are far more prevalent than they used to be. Exogenous obesity, or obesity brought on by dietary and lifestyle choices, has been determined to be the predominant cause of childhood obesity. Other potential causes include endocrine disorders, genetic abnormalities, and pharmaceutical side effects. The purpose of this study was to determine the several factors linked to

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

childhood obesity as well as to evaluate the knowledge, attitudes, and practices of mothers from South India.

For this study, 50 overweight and obese children were selected using BMI and CDC cutoffs. The mothers were given a questionnaire with four sections: knowledge, attitude, practice, and demographics. Their answers were carefully examined. Analysis was also done on fifty controls that matched for age and gender. The youngsters in this research ranged in age from five to fifteen. The youngsters in this study were 11.77 + 2.77 years old on average. The children ranged in age from nine to fifteen, most resembling the study of M. Hossain et al.'s research [18]. In India, between 10% and 30% of teenagers are overweight or obese.

In our study, boys made up 72% of the children who were overweight or obese. This was in line with findings from several previous studies, such as those by Bener et al., Oner et al., and Shete et al. [19–21], which demonstrated that boys had a higher likelihood of obesity than girls. This disparity could be explained by the possibility that males in Indian society are more likely to be the focus of attention, eat more fast food, and spend more time on computers playing video games. Since boys prefer to play outside in their spare time, they would have been more affected than girls. There is a possibility that the youngsters were indoors during and before the study period due to the COVID-19 pandemic's enforced lockdown. The current study extensively examined various risk variables that are known to be linked with childhood obesity, such as the mother's BMI, age, and education status, as well as the family history of obesity, birth weight, birth order of the kid, screen time, duration of physical activity, and dietary preferences.

According to our research, the case group mother's mean BMI was 27.5, while the control group mothers' mean BMI was 22.70. This difference was statistically significant, with a p-value of 0.000, indicating that children of obese and overweight mothers were more likely to grow up to be overweight or obese. This is consistent with research done in the same field by Bhuiyan et al. and Parikka et al. [22, 23]. This may be a by-product of unhealthy dietary and behavioural patterns in the family and genetic factors. In our study, 47% of the children had the first birth order. A child's birth order and BMI are strongly correlated with a higher prevalence of obesity among first-born children, according to studies on Indian children by Dasappa et al. [24], Bangladeshi children by Hossain et al. [25], and Italian children by Cilia et al. [26]. However, we could not discover any solid proof that obesity and birth order are related.

Although there was no significant correlation found in our study between the child's BMI and birth weight, research on Iranian children by Mahmood et al., Chinese children by Heq et al.,

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

and Afro-Indian children by Gulliford et al. found a significant correlation between birth weight and obesity, which was linked to metabolic and endocrine activities during embryonic development [26–28]. Our study revealed a correlation between childhood obesity and maternal age, with women over 35 years old accounting for 44% of obese or overweight children. This may be connected to their having adolescent children who are more likely to become obese, as well as their inferior family background and educational attainment.

Conclusion

The prevalence of childhood obesity is turning into a widespread health issue on a global scale. The increased prevalence of childhood obesity leads to an increase in hospital admissions for comorbid illnesses such as asthma, OSA, and CVD. It also causes a spike in complications across pediatric age groups. Modifiable risk factors can operate as a launchpad for proactive measures for which parents, the food industry, community organizations, educational institutions, healthcare systems, and the public and private sectors of government all have a stake. According to the study, inconsistent playtime, increased screen time, fast food consumption, snacking habits, and overweight mothers were the primary risk factors for childhood obesity. Obese children are more likely to have mothers who have a negative attitude toward obesity. A large sample size and a well-designed prospective study are necessary to extrapolate the results to the full population. Early identification of the risk factors for juvenile obesity is essential to halt this epidemic, which has a severe financial impact on both society and the healthcare system.

References

1. Harish Ranjani, RajendraPradeepa, T. S. Mehreen, Ranjit Mohan Anjana. Determinants, consequences and prevention of childhood overweight and obesity: An Indian context. Indian J EndocrinolMetab. 2014 Nov; 18(Suppl 1): S17–S25
2. Mary Helen Black, Ning Smith, Amy H. Porter, Steven J. Jacobsen .Higher Prevalence of Obesity among Children with Asthma. Obesity (2012) 20, 1041– 1047.
3. Roseann T. Spiotta and Gregory B. Luma. Evaluating Obesity and Cardiovascular Risk Factors in Children and Adolescents.Am Fam Physician. 2008 Nov 1;78(9):1052-1058.
4. Steinbeck, K. Childhood Obesity: Consequences and Complications. Clin. Obes. Adults Child. 2010, 392–407
5. Ambili Susan Jacob, Reetha G. Prevalence of metabolic comorbidities in obese children. Jacob AS et al. Int J ContempPediatr. 2017 Jul; 4(4):1450- 1455.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

6. Krushnapriya Sahoo, Bishnupriya Sahoo, Ashok Kumar Choudhury, Nighat Yasin Sofi, Raman Kumar,Ajeet Singh Bhadoria. Childhood obesity: causes and consequences. J Family Med Prim Care. 2015 Apr-Jun; 4(2): 187– 192.
7. Syed, N.K.; Syed, M.H.; Meraya, A.M.; Albarraq, A.A.; Al-Kasim, M.A.; Alqahtani, S.; Makeen, H.A.; Yasmeen, A.; Banji, O.J.F.; Elnaem, M.H. The association of dietary behaviors and practices with overweight and obesity parameters among Saudi university students. PLoS ONE 2020, 15, e0238458.
8. Albuquerque, D.; Nóbrega, C.; Manco, L.; Padez, C. The contribution of genetics and environment to obesity. Br. Med. Bull. 2017, 123, 159–173
9. Chaput, J.-P. Sleep patterns, diet quality and energy balance. Physiol. Behav. 2014, 134, 86–91.
10. Carolan-Olah M, Duarte-Gardea M, Lechuga J. A critical review: early life nutrition and prenatal programming for adult disease. J Clin Nurs2015;24:3716-3729. Epub 2015 Aug 9
11. Swinburn, B.A.; Kraak, V.I.; Allender, S.; Atkins, V.J.; Baker, P.I.; Bogard, J.R.; Brinsden, H.; Calvillo, A.; De Schutter, O.; Devarajan, R.; et al. The Global Syndemic of Obesity, Undernutrition, and Climate Change: The Lancet Commission report. Lancet 2019, 393, 791–846
12. Bentham, J.; Di Cesare, M.; Bilano, V.; Bixby, H.; Zhou, B.; Stevens, G.A.; Riley, L.M.; Taddei, C.; Hajifathalian, K.; Lu, Y.; et al. Worldwide Trends in Body-Mass Index, Underweight, Overweight, and Obesity from 1975 to 2016: A Pooled Analysis of 2416 Population-Based Measurement Studies in 128.9 Million Children, Adolescents, and Adults. Lancet 2017, 390, 2627–2642.
13. Di Cesare, M.; Sori´c, M.; Bovet, P.; Miranda, J.J.; Bhutta, Z.; Stevens, G.A.; Laxmaiah, A.; Kengne, A.P.; Bentham, J. The epidemiological burden of obesity in childhood: A worldwide epidemic requiring urgent action. BMC Med. 2019, 17, 212
14. Lobstein, T.; Jackson-Leach, R.; Moodie, M.L.; Hall, K.D.; Gortmaker, S.L.; Swinburn, B.A.; James, W.P.T.; Wang, Y.; McPherson, K. Child and adolescent obesity: Part of a bigger picture. Lancet 2015, 385, 2510–2520.
15. Ng, M.; Fleming, T.; Robinson, M.; Thomson, B.; Graetz, N.; Margono, C.; Mullany, E.C.; Biryukov, S.; Abbafati, C.; Abera, S.F.; et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: A systematic analysis for the Global Burden of Disease Study 2013. Lancet 2014, 384, 766–781.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

16. Ledikwe, J.H.; Ello-Martin, J.A.; Rolls, B.J. Portion Sizes and the Obesity Epidemic. J. Nutr. 2005, 135, 905–909.
17. Ramos Salas X, Buoncristiano M, Williams J, Kebbe M, Spinelli A, Nardone P, et al. Parental Perceptions of Children's Weight Status in 22 Countries: The WHO European Childhood Obesity Surveillance Initiative: COSI 2015/2017. Obesity facts. 2021 Dec 5;14(6):658–74
18. Hossain M, Zannat IA, Begum S, Rahman S. Risk Factors for Overweight and Obesity among Children and Adolescents in Bangladesh: A Hospital Based Study. Bangladesh Journal of Child Health [Internet]. 2019 Apr 28 ;43(1):9–14.
19. Bener A. Prevalence of obesity, overweight, and underweight in Qatari adolescents. Food and nutrition bulletin [Internet]. 2006 ;27(1):39–45.
20. Oner N VUSAEEGAKSBNW. Prevalence of underweight, overweight and obesity in Turkish adolescents. Swiss Med Wkly. 2004 Sep 4;134(35-36):529-33
21. Shete JS, Wagh A v. A cross sectional study to estimate prevalence of obesity and its risk factors in adolescent school children in Western Maharashtra, India. International Journal of Research in Medical Sciences. 2018 Aug 25;6(9):3072.
22. Uddin Bhuiyan M, Zaman S, Ahmed T. Risk factors associated with overweight and obesity among urban school children and adolescents in Bangladesh: a case-control study [Internet]. 2013.
23. Parikka S, Mäki P, Levälahti E, Lehtinen-Jacks S, Martelin T, Laatikainen T. Associations between parental BMI, socioeconomic factors, family structure and overweight in Finnish children: a path model approach. BMC public health [Internet]. 2015; 15(1).
24. Dasappa H FFGKPS. Prevalence, risk factors and attitude of parents towards childhood obesity among school children in Bangalore city. Int J Community Med Public Health. 2018; 5(2): 749–53.
25. Celi F, Bini V, de Giorgi G, Molinari D, Faraoni F, di Stefano G, et al. Epidemiology of overweight and obesity among school children and adolescents in three provinces of central Italy, 1993-2001: study of potential influencing variables. European journal of clinical nutrition. 2003 Sep 1 ;57(9):1045–51
26. Gulliford MC, Mahabirb D, Rockeb B, Chinna S, Ronaa R. Overweight, obesity and skinfold thicknesses of children of African or Indian descent in Trinidad and Tobago. International journal of epidemiology [Internet]. 2001 ;30(5):989–98.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

27. He Q, Ding ZY, Fong DYT, Karlberg J. Risk factors of obesity in preschool children in China: a population-based case--control study. International journal of obesity and related metabolic disorders : journal of the International Association for the Study of Obesity [Internet]. 2000; 24(11):1528–36.
28. Karimy M, Armoon B, Fayazi N, Koohestani HR. A Study on the Knowledge, Attitude, and Practices of Iranian Mothers towards Childhood Obesity. Obesity facts [Internet]. 2019 Dec 1 ;12(6):669–77.