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Prevalence of Overweight and its Associated Factors among Children Aged 13-60 Months in Urban and Rural Puducherry

[1]Kirasani Sivaram Prasad, [2]Manoj Patruni, [3]Bangi Sumalatha, [4]K.C. Premarajan and [5]S. Ganesh Kumar

[1,2,3]Department of Community Medicine, Government Medical College, Srikakulam, Andhra Pradesh, India

[4,5]Department of Community Medicine, JIPMER, Puducherry, India

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Corresponding Author
Kirasani Sivaram Prasad, Department of Community Medicine, Government Medical College, Srikakulam, Andhra Pradesh, India

Author Designation
[1]Assistant Professor
[2]Professor

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ABSTRACT

Childhood overweight and obesity is an emerging and most important public health issue globally. It is considered a global pandemic in many developing and developed countries. Globally, 43 million under-five children were overweight or obese, among them 35 million were from developing countries. To determine the prevalence of overweight and obesity and its associated factors among children aged 13-60 months in the field practice area of JIPMER. A community based cross sectional study was included 609 children among 2-5 years age group, from the urban and rural areas of Puducherry. The body mass index (BMI) of students was converted to Z-scores using by WHO growth charts. An Interview was conducted within the household by the principal investigator who used a pre-tested questionnaire to collect the demographic details and other information which include physical activity, dietary habits, nutritional history and sedentary behaviour. Univariate logistic regression analysis and multivariate logistic regression analysis was done to find out the association between independent variables and nutritional status with overweight/obesity of the participants and represented with prevalence ratio and p-value with 95% CI. The prevalence of overweight and obesity among the study population was found to be 4.8% (95% CI:3.2-6.8) and 1.8% (95% CI:0.9-3.2) respectively. Another significant finding seen that 32.3% of children were wasted, 6.9% were at possible risk of overweight and 54.2% were normal weight. Out of 609, 13-24 months old children had more chance of developing overweight and obese (PR: 14.06, P<0.001). Females had more chance of developing overweight/obesity than boys (PR: 2.39) and is statistically significant. This study reconfirmed the double burden of under nutrition and over nutrition among under-five children in rural and urban areas and identified the variables to be addressed urgently at the community level to decrease the burden of overweight/obesity in preschool age and preventing the incidence of CVD and diabetes in the adult population.

INTRODUCTION

Childhood overweight and obesity is an emerging and most important public health issue globally. It is considered a global pandemic in many developing and developed countries[1,2-5]. Globally, 43 million under-five children were overweight or obese, among them 35 million were from developing countries. About ninety-two million population are at higher risk of being overweight in different countries. The burden of obesity and overweight among aged 2-5 years is rapidly increasing, from 4.2% in 1990-6.7% in 2010, worldwide. It will be expected to reach 9.1% in 2020 with 60 million aged 2-5 years children. In Asia, the proportion of overweight and obesity among 2-5 years children were 4.9%, which constituted 18 million in 2010[1-5]. Childhood obesity may lead to a higher risk of developing obesity in adult life and developing chronic morbidities such as non-communicable diseases like type II diabetes, CVD, hypertension, hyperlipidaemia, cancer and respiratory and skin diseases[5].

In South-East Asia regions, nutritional transformation is required to modify dietary behaviour, physical activity. Obesity and overweight are the most important factors for developing chronic diseases, like diabetes, hypertension, CVD and cancer[6]. In developing countries, various studies have shown that the prevalence of obesity and overweight between 2-5 years old children was different across countries. Nigeria had the highest prevalence compared with Kenya, Vietnam and India[8]. A cross-sectional survey by Madhavi Bhargava *et al.,* among 6-17 years in North India, 2016, reported a pooled prevalence of obesity and overweight of 15.6%[20]. So, the proportion of overweight and obesity is increasing with age with higher problem among school children than in preschool children. Overweight and obesity in the age of under-five has become a great concern in developing countries. In Africa, 8.5% of 2-5 years children were overweight and 12.7% of school children were overweight in the same year[9,10]. WHO reported that, based on data from Cameroon, the burden of overweight among under-five children had more than doubled between 1991 and 2006, from 4.7%-9.6%[9]. Globally, from 1990-2016, the prevalence of stunting decreased among children aged under five years from 39.5%-22.9%. But, the trend of overweight among under-five children were increased, with prevalence increased from 4.9%-6.0%[10]. Currently, the burden of overweight and obese among adults also high resulted from recent higher prevalence during the childhood period. Worldwide, the prevalence of obesity will reach 18% in boys and 21% in girls by 2025. Therefore, it is important to prevent this problem during the preschool period[11,12]. Overweight and obesity at an early age are important because the majority of this category of children is un-recognized by the health care system, especially in developing countries. It is also one of the determinants for increased mortality among the adult population. Factors like sedentary behaviour with less energy disbursement and eating more calorie foods which are two main factors accountable for the expand the burden of obesity and mortality[13]. Overweight and obesity in early life may be influenced by many variables such as poverty, residential area, gender, family type, education levels of parents, type of father's occupation, exclusive breastfeeding, the weight of the children at birth, birth order, sedentary behaviour, sleeping pattern, etc[14]. In Asia, 12.4 million children were obese in the year 1990, which rapidly increased to 18 million in the year 2010. If the same trend continues, it will reach 24 million obese children in Asia by 2020[15]. In Pondicherry, the proportion of overweight among school going children were 4.41% and 2.12% were obese. The proportion of obesity (4.69%) and overweight (8.66%) was higher in Mahe district compared to the other three districts, girls in private schools with urban areas were more chance of developing overweight and obese[16]. Objective of the study to determine the prevalence of overweight and obesity and its associated factors among children aged 13-60 months in the field practice area of JIPMER.

Rationale and Novelty: Particularly in this study area, there was no information regarding the prevalence and contributing factors of overweight and obesity among preschool children aged 2-5 years, though it is known that early prevention of childhood obesity improves the quality of life by decreasing the disease burden of chronic diseases during adolescent and adulthood life[5]. After extensive literature search, we could find only few studies in India which assessed the prevalence of overweight among children aged between 13-60 months and there is paucity of information on associated risk factors.

MATERIALS AND METHODS

A community-based cross-sectional analytical study, was conducted in the urban and rural field practice areas of JIPMER, Puducherry from 2018-2020. The total population of four villages in JIRHC is 11080, out of which 1739 eligible couples and 588 children aged 2-5 years were present. Similarly, in JIUHC four areas of the total population is 9799, out of which 1150 eligible couples and 610 children aged 2-5 years were present. This study was included all children aged 13 months to 60 months residing in any of the eight areas of villages or wards in rural and urban Puducherry. Children belonging to the migrant population and not a permanent resident of the area were excluded. The sample size was estimated based on Kumar *et al.,* study and the prevalence of overweight and obesity as 5.88% in 13-60 months old pre-school children. Absolute precision was taken as 2% and the sample

size was calculated using formula-4pq/d2 to be 609 with 95% confidence level, 80% power and 10% non-response rate. The total population of 2-5 years children of UHC and RHC service area combined is 1198 with 588 from RHC and 610 from the UHC area. A total of 825 households were having 2-5 years of children, among which 407 from rural and 418 from the urban field practice area. Out of 825 households, 609 houses were selected proportionately based on the sampling fraction which was found to be 0.74 (609/825). The proportionate sample from the urban area will be 309 (418 multiplies 0.74) and the proportionate sample from the rural area will be 300 (407 multiplies 0.74). Thus among 609 children, selected proportionately 300 from JIRHC and 309 from JIUHC service area. All the houses with 2-5 years children were visited in each area till the required sample size is met. From one house, if two or more children were aged 2-5 years, then one child was selected by lots method for simple random sampling technique.

Study Procedure: Data collection was started after the ethics committee approval. The principal investigator collected data through a house-to-house survey and data collection was started after obtaining written informed consent from the parent/guardian. An Interview was conducted by a pre-tested questionnaire to collect the demographic details and other information which include physical activity, dietary habits, nutritional history and developmental history. We included children who are going to pre-school and Anganwadi centre. Those children who are not available during day time were approached after school timings. Weight and height were taken after the interview as follows and Dietary assessment was done by 24 hours dietary recall method. This assessment includes both home food and foods provided by Anganwadi centre. The physical activity level of children during a preceding day of the interview based on duration was assessed by using a semi-structured questionnaire. Mothers were interviewed for physical activity levels of 13-24 months children. Both mother and Anganwadi teachers were interviewed for its assessment among 25-60 months children.

Statistical Analysis: Data were entered into Microsoft Excel sheets and analysed using Stata Version 14. (Stata Corp. Texas, USA)[17]. Independent continuous variables are summarized as means with standard deviation. The categorical variables are summarized as proportions. Height, Weight, summarized as mean with SD. Chi-square test was used for age-wise categorization of selected variables (consumption of junk foods and fast foods, sedentary behaviour, sleeping pattern). The growth status will be combined for analysis purposes as follows that Overweight and obesity to Overweight. Wasting and Severe Wasting of Wasting. Normal and Possible Risk of overweight to Normal. Univariate logistic regression analysis and multivariate logistic regression analysis was done to find out the association between independent variables and nutritional status with overweight/ obesity of the participants and represented with prevalence ratio and p-value with 95% CI. Overweight participants were compared with normal participants to find out the associated factors of overweight. If $p<0.05$ which is considered as statistically significant.

RESULTS AND DISCUSSIONS

Conducted a community-based study to identify the prevalence of overweight with its related factors among 13-60 months children in rural and urban Puducherry. Majority of the participants were 13-24 months age group (29.9%) followed by 25-36 months (25.9%). About 51.7% were boys and 48.3% were girls. Children from the Hindu religion was 94.1% and 94.4% are from nuclear family. Most of the participant mothers have completed secondary level education (51.1%) and 70.8% of the mothers were housewives. The father's occupational status was 65.3% unskilled and 34.7% skilled jobs. Out of the total, 64.9% were birth order of more than or equal to two and 34.5% were birth order between 3-4 and 0.6% were birth order in between 5-6. The majority of the children (88.5%) were birth weights between 2.5-3 kg and 6.1% had a birth weight <2.5 kg and only 5.4% had more than 3kg. Among all, almost 80% of children were exclusively breast-fed up to six months and 6.4% had <six months and 13.7% had >six months. Among all participants, 4.4% were started supplementary feeding before six months and 95.6% were started after six months. Dietary habits were observed among the preschool children by 24 hours recall method It is found that out of 609 children, 207(34.1%) were taking fewer calories and 89(14.6%) taking excess calories and 319(52.3%) taking normal quantity. Regarding intake of protein 511(83.9%) children were taking the recommended quantity, 52(8.5%) were taking less protein and 46(7.5%) were consumed excess protein. On analysing the fat intake, it was found that 529 (87%) were taking normal quantity, 8.1% taking excess and 5.0% taking less than the recommended amount of fat. The prevalence of overweight and obesity among the study population was found to be 4.8% (95% CI:3.2-6.8) and 1.8% (95% CI:0.9-3.2) respectively. Another significant finding seen from table. 5 is that 32.3% of children were wasted, 6.9% were at possible risk of overweight and 54.2% were normal weight.

Table 1: Growth Status of Study Participants in the Rural and Urban Field Practice Area of JIPMER

BMI categories*	Number (n=609)	Percentage (95% CI)
Normal	330	54.2 (95% CI 50.1- 58.1)
Possible risk of overweight	42	6.9 (95% CI 50.1- 92.0)
Overweight	29	4.8 (95% CI 3.2- 6.8)
Obese	11	1.8 (95% CI 0.9- 3.2)
Wasting	197	32.3 (95% CI 28.6- 36.2)

On studying the frequency of consumption of junk food per week it was seen that 54.9% of children were eating junk food (chips, biscuits, cakes, chocolates, candy, Ice creams, etc.) more than five times per week and 45.1% were eating <or equal to five times per week. Similarly, 88.18% of study participants were taking fast foods (fried rice, noodles, French fries, soft drinks, etc.) between 3-5 times/week and 3.12% were taking >five times/week and 8.70% were taking <or equal to two times/week.

Physical activity is one of the most important influencing factors for developing overweight and obesity. Children who are playing outside their house it was found that 53.9% of children were spending three to five hours playing in a day and 40.2% of them playing more than five hours. It was observed that only 5.9% were playing outside the house less than or equal to two hours per day. Another important factor studied was the sedentary behaviours such as watching TV or video games and playing toy games. Out of 609 children, 73.4% of children are watching TV/playing video games between 3-5 hours in a day and 11.3% were spent >5 hours and 15.3% were spent ≥2 hours per day. Similarly, 66.5% spent less than or equal to two hours playing toy games and 30.7% were spent 3 to 5 hours/day and 2.8% were spent >five hours/day. Another important habit affecting the weight of under-five children is hours of sleep per day. Out of 609 children, 82.6% were sleeping in between 10-13 hours/day and only 17.4% were sleeping for 6-9 hours/day.

Univariate Analysis of Associated Factors of Overweight and Obesity: The association of socio-demographic characteristics with obesity/ overweight among 13-60 months children. Urban area children had 1.18 times more risk of being overweight and obese than rural area children, but it was not significant. Regarding the age of the participants, children aged 25-36 months had 2.83 (P=0.03) times higher risk of developing overweight and obesity compared with 13-24 months followed by 37-48 months and 49-60 months. Female children were 1.07 times more at risk of being overweight and obese than male children. Children from the upper class had 3.63 times more chance of being overweight/obesity followed by upper-middle-class 3.04 times and middle class about 2.40 times more risk of developing overweight and obesity when compared with the lower middle class. upper-middle and middle class showed statistically significant. Among all participants, children of housewives were 1.21 times more chance of being obese/overweight than those of working mothers, but it was not statistically significant. To find the associated factor with obesity we have recategorized mother's education into no schooling, primary, secondary, graduation and above. Association of mother's education and children weight was found that participant mothers with no schooling were 4.5 times overweight and obese (p=0.02). Other factors such as urban-rural, gender, religion, mother occupation, father's occupation was not significantly related to obesity/overweight.

Association of age category with overweight and obese Among all participants, the prevalence of overweight and obese was higher in 25-36 months age (10.1%) children followed by 13-24 months (7.6%) and 37-48 months (3.8%) children and aged between 49-60 months was 3.5%.

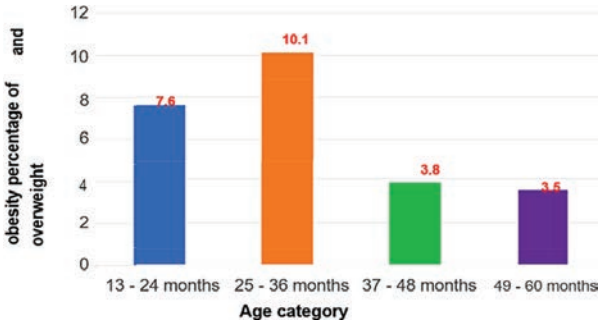

Fig 1: Age-Wise Distribution of Overweight and Obesity

Observed the association between birth order, birth weight and overweight/obesity. Of all, birth order less than or equal to 2 were 1.24 times more prone to developing obese/overweight compared with birth order in between 3-4. Children with birth weight <2.5kg were 1.57 times more chance of being overweight/obese compared with birth weight of 2.5 to 3 kg and it was not found to be significant. The association of feeding practices with overweight and obesity. Children who had exclusively breast-feed less than 6 months were 2.21 times more at risk of being overweight and obese compared with those who had >six months. Those who had taken supplementary feeding before six months were 1.74 times more prone to develop overweight and obesity than those who had taken at or after six months. Observed the association between dietary intake with overweight and obesity. Out of 609, those who were consuming excess calories were an 18.00 (P<0.001) times higher chance of being obese and overweight with who consumed normal and fewer calories per day. Similarly, those who were consuming excess proteins had 2.68 (P= 0.01) times more risk of being overweight and obese compared with those who were taking normal and fewer proteins per day. Those who were consuming excess fats were 1.59 more chance of being childhood obese and overweight as compared to those who were consuming normal and fewer fats per day.

The association of consuming junk foods and fast foods with overweight and obesity. Out of 609, those who were consuming junk foods <5 times per week were

2.17 times (P=0.02., statistically significant) more prone to develop overweight and obesity when compared with those who were taking <5 times per week. Similarly, fast food eaters who were consuming >5 times per week had 1.48 times more possibility of developing overweight/obese with those who were taking >5 times per week. Regarding association of sedentary behaviour with overweight and obesity, those children who spend >5 hours/day watching TV and playing video games had 2.35 times more likely to develop overweight and obesity compared with those who spend <5 hours/day. Children who spend >2 hours/day for playing toy games were 1.29 times more prone to being overweight and obese compared with those who spent ≥2 hours/day. Study is showed the relationship between physical activity, sleeping pattern with overweight and obesity. Children who spent less than or equal to 2 hours/day were 1.91 times higher risk of being overweight and obese as compared to those who spend >2 hours/day. Children who spent time between 10-13 hours/day for sleeping were 1.19 times higher risk of developing obesity and overweight compared with those who spent <10 hours/day.

Table 2: Multivariate Analysis of the Association of Selected Factors and Childhood Obesity and Overweight

Variables	Adjusted PR	95% CI	P-value
Age of the child (in months)			
13- 24	14.06	4.08 - 48.43	<0.001*
25- 36	7.22	2.81 - 18.57	<0.001*
37–48	4.12	1.15 - 14.79	0.02*
49- 60	Ref.	Ref.	-
Gender			
Male	Ref.	Ref.	-
Female	2.39	1.02 - 5.56	0.04*
Socio economic status**			
Upper class	6.57	0.43 - 99.77	0.17
Upper middle class	3.90	0.92 - 16.55	0.06
Middle class	Ref.	Ref.	-
Lower middle class	0.16	0.05-0.47	<0.001*
Lower class	1.67	3.83 - 7.27	<0.001*
Mother's education			
No schooling	12.68	2.72 - 58.96	<0.001*
Primary (Class 1-8)	2.49	0.65 - 9.52	0.18
Secondary (Class 9-12)	3.89	1.26 - 12.03	0.01*
Graduation and above	Ref.	Ref.	-
Initiation of Supplementary feeding			
Before 6 months	8.48	1.77 - 40.67	<0.001*
At 6 months or later	Ref.	Ref.	-
Duration of playing outside the house/Number of hours/days			
≥2	1.11	0.53 -2.35	0.76
3 - 5	Ref.	Ref.	-
>5	0.24	0.06 - 0.92	0.03*
Duration of playing toy games /number of hours/days			
≤2	1.13	0.89 - 2.840.11	0.11
3- 5	5.99	1.83 - 1.96	<0.001*
>5	Ref.	Ref.	-
Intake of calories/previous day***			
Deficit	0.10	0.02- 0.47	0.004*
Normal	Ref.	Ref.	-
Excess	31.42	11.46 - 86.13	<0.001*

The relationship between selected factors and obesity and overweight by multivariate regression analysis. Out of 609, 13-24 months old children had more chance of developing overweight and obese (PR: 14.06, P<0.001). Children aged 25-36 months and 37-48 months also had a higher chance of being overweight and obese which was statistically significant. Females had more chance of developing overweight/obesity than boys (PR: 2.39) and is statistically significant. Regarding the socio-economic status of participants, upper-class children were 6.57 times higher risk of being overweight and obese and lower middle class. The lower class were a lesser risk of being overweight and obese than the upper class. (P<0.001). Regarding mother's education, it was observed that children's mothers with no schooling were 12.68 times more chance of being overweight and obese (p<0.001). Among all those who started supplementary feeding before six months had 8.48 times (P<0.001) more being overweight and obese than those who started after six months. Out of all, those who spend less than or equal to 2 hours/day for playing outside the house had an 11% more chance of developing obesity and overweight than those who spent >2 hours per day(P=0.03). Those who are playing toy games in between 3-5 hours/day were 5.99 times more risk of developing overweight and obesity compared with those who spent ≥2 hours/day (P<0.001., statistically significant). Regarding dietary habits, those who were consuming excess calories were 31.42 times more risk of being overweight and obese compared with those who were taking normal calorie intake (P<0.001).

Burden of Overweight and Obesity: The current study showed the prevalence of obesity as 1.8% and overweight as 4.8% respectively. T Fatemeh *et al.,* study showed that, according to BMI, the burden of overweight and obesity in 2-5 years old children was 10.6%, 7.6% respectively[5]. A cross-sectional study done in Ethiopia in 2015, found that the proportion of overweight and obesity was 4.1% and 2.8% and this study prevalence was similar to the current study[8]. A study among aged 6-60 months in Cameroon, 2011. the prevalence of overweight was 6.3% and 1.7% were obese[9]. However, the present study conducted in 2018-2020 showed a higher prevalence of overweight 4.8% and obesity 1.8%. Similarly, a cross-sectional study by Kumar *et al.,* in Mangalore reported the prevalence of overweight and obesity among pre-school children in semi-urban areas was 4.5% and 1.4% respectively.

Associated Factors of Overweight and Obesity: The current study reported the burden of overweight/ obesity in the rural area (6.0%) and urban area (7.12%). A cross-sectional survey done by Tchoubi *et al.,* reported the burden of obesity and overweight as 8.7% in urban and 7.6% in rural, similar to the present study[9]. The urban population had more prevalence of obesity and overweight than the rural population in

this study. This may be because of urbanization, easy availability of junk foods, lack of physical activity among preschool children. Ethiopia and Cameroon studies showed similar findings with the exposure of these risk factors among preschool children[9,10]. The present study reported that the prevalence of overweight/obesity, children among 25-36 months were (10.13%) followed by 13-24 months (7.69%), 37-48 months (3.88%) and lowest was 49-60 months (3.57%). Cameroon's study showed that 25-36 m children had a high prevalence of obesity and overweight[9] similar to the current study. Factors like mother's education, caring for the child, body metabolism, physical activity influence younger children more to weight gain than older pre-school and school-going children.

The current study reported that the overall proportion of overweight and obesity was more in female children (6.8%) than male children (6.3%). T Fatemeh *et al.,* study showed the burden of overweight and obesity were 11.7% and 6.3% in girls, 9.6% and 8.8% in boys[5]. Many studies estimated that females had a high prevalence of overweight and obesity than males[4-6] similar to the current study, because of various factors such as social factors, gender differences in family, and economic status. Should be created awareness about healthy dietary habits to both the parents and children to reduce the prevalence of childhood obesity. In the current study, the proportion of overweight and obesity was more in the upper class (16.67%) and upper-middle class (13.91%) followed by the middle class (11.02%) and lower middle class (4.59%). A review study by Sitansu Sekhar Kar *et al.,* reported the prevalence of overweight and obesity among school children in the higher socio-economic status (5.59%) when compared to the lower socio-economic status (0.42%).

The present study showed birth weight <2.5 kg had 1.23 times more risk of developing overweight and obesity than birth weight 2.5-3 kg (1.01). Taheri Fatemeh *et al.,* study among children aged 2-5 years in Iran 2008, reported the prevalence of overweight and obesity was higher in children with birth weight more than 2.5 kg than <2.5 kg. The current study observed that those children who were birth order ≥2 were 1.24 times higher risk of being overweight and obesity followed by birth order 3-4 (1.01). Taheri Fatemeh *et al.,* study among children aged 2-5 years in Iran 2008, birth order <three were 1.8 times more chance of being overweight and obese than third a more birth order children[5].

Regarding feeding practices, those who had exclusive breastfeeding <6 months were 10.5% and introduce the supplementary feeding before 6 months were 11.1% more chance of being overweight and obese. Therefore, there is a need to promote exclusive breastfeeding up-6 months to reduce childhood obesity. The current study observed that children taking excess calories, proteins and fats based on the 24-hour dietary recall method were at higher risk to develop overweight and obesity. Dietary habits are playing a crucial role in childhood obesity and therefore the need to provide knowledge about healthy nutrition in peripheral health care centres like primary health centre and Anganwadi centres. The current study observed that those who were consuming junk foods and fast foods >5 times per week are more chance to develop obesity/overweight. Consuming more fast foods and junk foods causes obesity which can lead to cardiovascular diseases, cancer etc. Awareness among mothers about taking healthy foods and avoiding junk foods, fast foods and substitution of healthy snacks need to be promoted. VHND programs can focus on knowledge and awareness about healthy dietary habits.

The present study found that those who spent more than 5 hours/day watching TV/video games were 2.35 times and those 3-5 hours/day for playing toy games were 1.29 times more prone to develop overweight and obesity. Taheri Fatemeh *et al.,* study among children aged 2-5 years in Iran, in the year 2008 reported that those who spent >2 hours in a day watching TV were 1.2 times more chance of developing overweight and obesity than those who <2 hours in a day[5]. According to WHO, screen time should be <60 mins/day for under-five children[1-5]. Screen time more than 1 hour leads to childhood obesity. Children should avoid or reduce the spending time to watching TV/Playing toy games. Parents should be educated about the effect of sedentary behaviour on their children's health. The current study found that those who spent time <2-hour per/day for physical activity were 11.11 times more risk of developing overweight and obesity compared with those who spent >2 hours per/day. Physical activity is required for a healthy life and prevents non-communicable diseases like diabetes, HTN, cancers in both children and adults, thus awareness needed for physical activity. This study observed children who sleep 10-13 hours/day were more risk of being overweight/obese. The recommended sleep for preschool children is 10-13 hours per day based on WHO criteria.

Strengths and Limitations: Limited studies are available regarding community-based studies on the burden/prevalence of obesity and overweight between 2-5 years old children, in developing countries like India, therefore the current study gives valuable

information about the burden of obesity/overweight among preschool children in the community. Used standard instruments like the WHO growth chart for assessment of obesity and overweight by using standard criteria and assessment of dietary habits by 24 hours dietary recall method. Therefore, we assume that there may be lesser bias due to the assessment of these measures.

Being a cross-sectional study design, it may be difficult to draw the causal linkage or temporal relationship between various factors and overweight and obesity. There may be recall bias for collecting information like dietary factors, frequency of intake of fast foods and junk foods, physical activity of the child. Certain associated factors like social customs related to food intake, gender differences, food security measures in the family were not assessed which may also be associated with obesity and overweight of pre-school children. There may be selection bias and volunteers bias due to use of consecutive sampling technique.

Recommendations: As the present study is a cross-sectional study design further follow-up studies, will be useful to establish causal association and trend of the burden of childhood overweight and obesity. Monitoring of nutritional status with appropriate dietary advice by gross root level workers like Anganwadi teachers, Accredited Social Health Activist (ASHA) and Auxiliary Nurse Midwife (ANM) may assist to decrease the burden of overweight/obesity along with reducing the undernutrition of the child. Encourage mothers for exclusive breastfeeding, avoidance of fast foods and junk foods which will help in the prevention and control of childhood overweight and obesity. Advice should be given to the mothers/guardians to limit watching TV/playing video games by preschool children along with supervision by parents, which is also one of the associated factors for overweight and obesity. Supervised outdoor/Indoor physical activity should be promoted among preschool children by their parents which may assist to prevent the burden of overweight and obesity. Regular counselling to the mothers/guardians of the participants about the growth status of the child will be helpful to create awareness about nutritional status and its complications. Regular training session for ANM, ASHA, Field staff and Anganwadi teachers about malnutrition as well as overnutrition is also important for the dissemination of correct information to the mothers on prevention of malnutrition in the community.

CONCLUSION

The community-based study carried out 609, of aged two to five years old children found that 4.8% overweight and 1.8% obese respectively. It is very essential to address the issue of overweight/obesity among two to five years children as it can result from a significant health issue and socio-economic burden, especially in India. study reconfirmed the double burden of undernutrition and overnutrition among under-five children in rural and urban areas and identified the variables to be addressed urgently at the community level to decrease the burden of overweight/obesity in preschool age and preventing the incidence of CVD and diabetes in the adult population. Regarding dietary habits and consuming junk foods and fast foods those who are taking excess calories, proteins and fats were more at risk of developing overweight and obesity. Similarly, those who are taking junk foods and fast foods more than 5 times per week were more prone to being overweight and obese. So, health talks are needed about a healthy diet and avoiding fast foods and junk foods.

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