

ORIGINAL RESEARCH

Modifiable risk factors associated with overweight and obesity among 5-18 year children attending a tertiary care centre in south Kerala: A cross sectional study

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ABSTRACT

Introduction: Childhood obesity is associated with impaired health during childhood and it is a risk factor for later adult diseases if left untreated. There is a rising trend of over nutrition in developing countries including India. Hence the present study has been envisaged to determine the modifiable risk factors of overweight/obesity among 5-18 years old children of a tertiary care centre in South Kerala. The objective of this study was to identify the modifiable risk factors related to obesity among the study subjects. **Methods:** After getting ethical committee clearance this cross-sectional study was conducted among children between 5 and 18 years of age in the department of paediatrics of a tertiary care centre in South Kerala, during the period between August 2018-October 2020. The BMI was plotted and analysed with appropriate software. Modifiable risk factors for obesity were elicited using a semi-structured questionnaire with questions included from WHO STEPS instrument. **Results:** Among the 250 children the proportion of obesity and overweight was 88 (35.2%) by IAP standards, 63 (25.2%) by WHO standards. According to this study among the over nourished children 62 (70.5%) had at least one meal per week, which was not cooked at home. There was a significant association between hotel food intake and over nutrition. Children taking hotel food (p value < 0.001) were more obese than those not taking hotel food. Those children who watched television while having food had a greater chance of becoming over nourished. Majority of over nourished children consumed snacks on a daily basis. Physical activity like cycling and vigorous intensity sports were also found to be less in overweight/obese. **Conclusions:** Our data showed a high prevalence of unhealthy eating behaviours reported by the participants. Epidemiological data provided by this study suggests the urgent need to design preventive interventions. Childhood obesity problem can be reduced by educating children and parents about healthy nutrition and encouraging them to be physically active.

Key words: Childhood, overweight, obesity, body mass index, world health organization, Indian academy of paediatrics, food, physical activity

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INTRODUCTION

Childhood obesity is one of the most significant and serious public health challenges of the 21st century. The prevalence has increased, which is at an alarming rate. Globally, in 2016 the number of overweight children below the age of five is estimated to be over 41 million. Almost half of all overweight children below 5 lived in Asia and one quarter lived in Africa¹. The WHO has defined overweight and obesity as 'abnormal or excessive fat accumulation that may impair health'².

Overweight is Body mass index (BMI) [weight (kg)/(height)² (m²)] for age more than one standard deviation above the WHO growth reference median; and obesity is more than two standard deviations above the WHO growth reference median³. Over 340 million children and adolescents in the age group 5-19 were overweight or obese in 2016. Approximately 21% of Indian population is adolescents (about 243 million) which is the largest in the world⁴. The level of overweight and obesity has been increasing rapidly with 1 in 10 individuals in the age group 5-17 years

being overweight or obese globally⁵. The prevalence of overweight and obesity among children and adolescents (aged 5-19 years) has risen fiercely from 4% in 1975 to just over 18% in 2016, thus prompting the WHO to delegate obesity as a global epidemic^{3,6}. The rise has occurred comparably among both boys and girls, in the year 2016 18% of girls and 19% of boys were overweight³. Overweight and obese children are likely to stay obese into adulthood and are expected to develop non-communicable diseases like diabetes and cardiovascular diseases at a younger age. Overweight and obesity, as well as their associated diseases, are largely preventable. Prevention of childhood obesity therefore needs high concern. Overweight and obesity in the adolescence accredits to the increase in sedentary life style, unhealthy food habits, poor diet, deficiency of physical activity, and also to the overuse of electronic gadgets. Lack of awareness is also a governing factor when it comes to obesity in this age group.

To 'halt the rise in diabetes and obesity' in adults and children was one among the global health targets set by the World Health Assembly in 2013⁷. The immensity of the problem among children and adolescents in India is unclear due to paucity of well-conducted nationwide studies and lack of consistency in the cut-points used to define childhood overweight and obesity⁸.

The aim of the study was to find out the modifiable risk factors for overweight/obesity among 5-18 years old children of a tertiary care centre in South Kerala.

OBJECTIVE

The objective of this study was to identify the modifiable risk factors related to obesity among 5-18 years old children attending a tertiary care centre in South Kerala.

METHODS

TYPE OF STUDY: Cross-sectional study.

PLACE OF STUDY: Department of Paediatrics, SMCSI Medical College and hospital, Karakonam.

STUDY PERIOD: August 2018-October 2020.

STUDY POPULATION: 250.

INCLUSION CRITERIA

Those children between 5 to 18 years of age attending the hospital whose parents consented for the study were included.

EXCLUSION CRITERIA

1. Unable/Not Interested in giving consent.
2. Hospitalized Children.

DATA COLLECTION TOOLS

After calibration and standardization, an electronic weighing machine ESSAE accurate trade links and

stadiometer (SECA portable Stadiometer height-rod) were used to measure weight and height respectively.

DATA COLLECTION

A pretested and semi-structured Performa with questions included from WHO steps instrument was used for data collection⁹. The date of birth of the child was recorded and age was measured in completed months and later rounded off to the nearest 6 months' interval. Anthropometric measurements like height and weight of each subject was measured. Height was measured using a portable standardised stadiometer SECA portable stadiometer height-rod with the child standing bare foot, head in Frankfurt plane and arms by the side. A thin, wooden scale was placed above the head perpendicular to the ruler and parallel to the ground and the measurements recorded to the nearest 0.1 cm. Weight was measured using electronic weighing machine (ESSAE accurate trade links) which was calibrated daily against standard weight, with the child standing barefoot, head in Frankfurt plane, empty pockets and measurements recorded to the nearest 0.1 kg. The weighing machine was calibrated to zero prior to each measurement¹¹. The proportion of overweight and obesity was determined using the IAP standard for BMI, 2015¹². The adult equivalent of 23 and 27 BMI cut-off lines as presented in the IAP BMI charts were used to define overweight and obesity respectively^{10,12}. As per recommendations of WHO the 85th and 95th age and gender specific percentiles were used to classify as overweight and obesity¹³.

STATISTICAL ANALYSIS

Data was entered into MS excel and was analysed using the SPSS trial version software and MS excel. Proportion of children with overweight and obesity were calculated using the IAP BMI charts by employing WHO BMI charts as gold standard. Appropriate statistical tests were done for all tests p value ≤ 0.05 was considered as statistically significant.

RESULTS

Among the 250 children, females 148 (59.2%) were more than males 102 (40.8%) and the female: male ratio is 1.45:1. This study group had maximum children belonged to the age group 5 to 6.5 years 53 (21.2%) and minimum in age group 15 to 16.5 years 17 (6.8%). The proportion of obesity and overweight in the study group was 88 (35.2%) by IAP standards, 63 (25.2%) by WHO standards. We combined overweight and obese children, based on previous research suggesting that children who are overweight are at risk of becoming obese (Refer Table 1). Out of the 250 children, maximum children belonged to the age group 5 to 7 years 53 (21.2%) and minimum in age group 15 to 16 years 17 (6.8%). In this study, Females 148 (59.2%) were more than Males 102 (40.8%) Female: Male ratio is 1.45:1 (Refer Table 1).

The proportion of over nutrition (obesity + overweight) was compared using the two standards namely WHO 2007 BMI reference and revised IAP 2015 BMI standard. According to revised IAP BMI standards among girls, 20(13.5%) were obese and 29(19.6%) were overweight, while among boys, 19(18.6%) were obese and 20(19.6%) were overweight. According to 2007 WHO BMI standards in girls, 18(12.2%) were obese and 16(10.8%) were overweight, while in boys, 18(17.7%) were obese and 11(10.8%) were overweight. The overall proportion of obesity in the study group was 39(15.6%) by IAP standards, 36(14.4%) by WHO standards. The overall

proportion of overweight children was 49(19.6%) with revised IAP standards and 27(10.8%) by WHO standards Obese.(Refer Table 2).

According to this study among the over nourished children 62(70.5%) had at least one meal per week, which was not cooked at home. There was a significant association ($p < 0.001$) between hotel food intake and over nutrition. Fruits and vegetable intake was found to be less in all categories. Walking, cycling and sports were found to be protective. Screen time, snacks intake and sleep duration were generally found to be more in all age groups irrespective of their built(Refer Table no 3).

Table 1: Showing baseline characteristics of the study population

Age in years(yrs.)	Frequency	Percentage
5-7	53	21.2
7-9	46	18.4
9-11	32	12.8
11-13	35	14
13-15	21	8.4
15-17	17	6.8
>17	46	18.4
Total	250	100
Maximum Age 5-6.5 yrs	53	21.2%
Minimum Age 5-16.5 yrs	17	6.8%
Males	102	40.8%
Females	148	59.2%
Sex Ratio	1.45:1	

Table2: Showing Distribution of BMI status according to Indian Academy of Pediatrics and World Health Organization references

Growth standards	Growth status				
	Obesity (%)	Overweight (%)	Normal (%)	Thinness (%)	Severe thinness (%)
REVISED IAP, 2015					
Boys	19(18.6%)	20(19.6%)	52(51.0%)	11(10.8%)	
Girls	20(13.5%)	29(19.6%)	92(62.2%)	7(4.7%)	
Total	39(15.6%)	49(19.6%)	144(57.6%)	18(7.2%)	
WHO,2007					
Boys	18(17.7%)	11(10.8%)	54(52.0%)	11(10.8%)	8(7.8%)
Girls	18(12.2%)	16(10.8%)	102(68.9%)	8(5.4%)	4(2.7%)
Total	36(14.4%)	27(10.8%)	156(62.4%)	19(7.6%)	12(4.8%)

Table3: Showing Lifestyle-related risk Factors associated with Overweight & Obesity in 5-18 years old study subjects

Modifiable Risk Factors		BMI				Total		P-value
		Abnormal Overweight+ Obesity		Normal		N	%	
		N	%	N	%			
Hotel Food	Yes	26	29.5	92	56.8	118	47.2	0.000
	No	62	70.5	70	43.2	132	52.8	
Fruits Intake	Up to 2 days	60	68.2	94	58	154	61.6	0.115
	>2 days	28	31.8	68	42	96	38.4	
Fruits Intake Per day	Up to 2 servings	60	68.2	94	58	154	61.6	0.115
	>2 servings	28	31.8	68	42	96	38.4	
Veg servings	≤1 serving/day	47	53.4	100	61.7	147	58.8	0.202
	≥1 serving/day	41	46.6	62	38.3	103	41.2	
Screen time	No	20	22.7	47	29	67	26.8	0.284
	Yes	68	77.3	115	71	183	73.2	

Snacks	Occasionally	33	37.5	60	37	93	37.2	0.942
	Daily	55	62.5	102	63	157	62.8	
Walk/cycle	No	61	69.3	87	53.7	148	59.2	0.016
	Yes	27	30.7	75	46.3	102	40.8	
Vigorous Sports	No	56	63.6	84	51.9	140	56	0.073
	Yes	32	36.4	78	48.1	110	44	
Mod. to low sports	No	42	47.7	52	32.1	94	37.6	0.015
	Yes	46	52.3	110	67.9	156	62.4	
Sleep	<8 hours	18	20.5	46	28.4	64	25.6	0.169
	>8 hours	55	62.5	102	63	157	62.8	

DISCUSSION

This hospital based cross-sectional study was conducted to find out the dietary factors related to obesity among the study subjects. The prevalence of overweight and obesity reported in the present study is higher than different studies conducted in different parts of India^{14, 15, 16}. The prevalence of obesity in the present study was slightly higher among boys when compared to girls, a finding consistent with other studies from India^{17, 18} and abroad^{19, 20, 21}.

This study confirmed the findings of earlier studies carried out in Western countries and emphasizes that regular physical exercise, doing household activities, regulated television viewing and healthy eating behaviors could contribute to controlling overweight and obesity¹⁸.

The risk for development of overweight/obesity in 5-18 years old children who slept for 8 hours or more per night was approximately 0.65 times less than that of 5-18-year-old children who slept for less than 8 hours. Shortened sleep duration has been hypothesized to influence weight status through decreased physical activity as a result of tiredness and increased energy intake given greater opportunity to eat²².

Francis and Birch in 2005 reported higher child weight and adiposity was associated with higher use of restrictive feeding²³. High levels of control over children's food intake have been linked with subsequent disinhibited child eating²⁴ and childhood overweight^{25, 26}. Most studies have included fewer predictors of overweight, such as parental obesity,^{27, 28} breastfeeding duration,²⁹ childhood television use,³⁰ diet,³¹ and night-time sleep duration.³² However, these risk factors often do not occur in isolation. It is well accepted that there is no single cause of childhood obesity, but coactions at multiple levels (e.g., genetic, cellular, physiological, psychological, social and cultural) determine outcomes³³.

CONCLUSION

There is a high prevalence of overweight and obese cases among school-aged children of south Kerala. Our data showed a high prevalence of unhealthy eating behaviours reported by the participants. Epidemiological data provided by this study suggests the urgent need to design preventive interventions. Childhood obesity problem can be reduced by educating children and parents about healthy nutrition

and encouraging them to be physically active. The findings of this study alert us to concentrate on the diet habits, physical activity and screen time for early prevention of childhood obesity and overweight.

LIMITATION

The limitation of the present study was its use of a health centre-based sample rather than population-based sample.

Risk factors, such as diet and physical activity, were assessed using self-reports that might be the reason for some non-significant findings. Ambiguity in information given by parents and children.

Other childhood obesity risk factors identified by previous studies, such as parity, smoking during pregnancy and maternal BMI pre-pregnancy, could not be assessed because of unavailability of data.

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