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Original Research Article

Sociodemographic and dietary factors influencing overweight and obesity in school going children aged 10 to 15 years: a cross sectional community based study

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ABSTRACT

Background: Childhood obesity as a rampant public health problem as it is affecting both developed and developing countries. Understanding the trends in obesity prevalence among children, contributing factors and developing strategies for successful interventions is the need of the hour. Hence the present study was aimed at understanding the implication of dietary and socio-demographic factors influencing overweight and obesity among 10-15 year old school children.

Methods: The study was a cross sectional study, undertaken in eight private schools of Belgaum City, Karnataka from January 2010 to December 2010. School children of sixth to tenth standard aged between 10 to 15 years were included. Children were interviewed by the investigator. Examination was carried out which included general physical examination, measurement of height, weight, waist circumference, hip circumference, blood pressure and other vital signs. Overweight and obesity were defined basing on Based on WHO and International obesity task force (IOTF) BMI cut-off standards for Asia and India.

Results: A total of 600 children were included of which 52.33% were males. Majority of the study subjects belonged to socio economic class I and II. About 65.67% of students belonged to nuclear family. The prevalence of overweight and obesity was 18.83% in study population. Out of this overweight contributed 11.33% and obesity contributed 7.5%.The odds of overweight and obesity was higher in females (OR=1.19), In children aged 13 years (OR=3.21), in children belonging to Sikh community (OR=6.26) and in children with socio economic class II (OR=1.65). Children from joint family (OR=0.70) and third generation family (OR=0.29) had lower odds of overweight and obesity compared to children from nuclear families. Daily consumption of snacks between meals (OR=2.42), sweets (OR=1.985), ice-cream (OR=1.667), fast foods (OR=3.062) and beverages (OR=4.80) were strongly associated with increased risk of overweight and obesity in study population. Daily consumption of fruits (OR=0.095) and vegetables (OR=0.166) and pulses (OR=0.690) was associated with reduced risk of overweight and obesity in study population (Table 4).

Conclusions: Overall the study findings reveal that children had a relatively higher prevalence of overweight and obesity. Regular intake of fast foods, beverages, snacks between the meals and ice creams was associated with higher risk of obesity in study population. Regular consumption of fruits, vegetables and pulses had strong negative association with overweight and obesity in study population.

Keywords: Overweight and obesity, School children, Dietary factors

INTRODUCTION

Overweight and obesity have been overtly an associated side effect of modern diet of high caloric content along with reduced physical activity. The phenomenon has percolated even to the younger age groups. WHO considers childhood obesity as a rampant public health problem as it is affecting both developed and developing countries.[1] About 43 million children out of which 35 million in developing countries were estimated to be overweight and obese in 2010.[2] The worldwide prevalence of the condition in children has dramatically increased from 1990 onwards (4.2% in 1990: 6.7% in 2010).[2] A latest systematic review found that the combined prevalence of childhood overweight and obesity after 2010 was 19.3%, which was significantly higher compared to 16.3% found in 2001-2005.[3]

The health and dietary behaviours of the children are highly influenced by their parents' level of education and weight status.[4-7] Obese parents have a higher risk of having obese children as they provide both genetic and eating environment and the interaction of these influences the familial patterns of adiposity.[8-10] Teenage children are particularly vulnerable to the external environmental factors due to their new found independence, peer pressure influence and exposure to the wide variety of media.

Obesity is often seen as a wave of a defined cluster of non-communicable diseases called "New World Syndrome" creating an enormous socio-economic and public health burden in poorer countries. The most serious sequelae of childhood obesity is its persistence into adulthood with all its health risks like dyslipidemia, hyper-insulinemia, cardiovascular diseases, type 2 diabetes, osteoarthritis, gall bladder disease, hypertension and some sex hormone- sensitive cancers.[11-13]

Sedentary behavior characterized by wakeful activities that require little energy expenditure and during prolonged sitting or reclined position along with lack of physical activity is known to influence obesity, poor metabolic and poor psychosocial health.[14,15] WHO has underscored on the immediate and effective need of understanding the trends in obesity prevalence among children, contributing factors and developing strategies for successful interventions.[16] Hence the present study was conducted with objectives of assessing the prevalence of overweight and obesity in school children in the age group of 10 to 15 years in private schools in a urban locality in south India and to assess the association between socio-demographic factors, dietary practices and obesity in the study population.

METHODS

The study was a cross sectional study, undertaken in eight private schools of Belgaum City, Karnataka. Eight schools were selected, with 2 schools representing each of the 4 zones of the city, from the list of 92 schools acquired from Deputy Director of Public Instructions. The study was conducted for a period of one year from January 2010 to December 2010. As per the published literature, prevalence of obesity in children between the age group of 10 to 15 years is six percent in urban areas. Considering this prevalence, with 95% confidence level and 2% absolute error, the required sample size was 564 subjects, which was rounded off to 600. A total of 75 children from each school in the age group of 10 to 15 years studying in 6 to 10 standard (15 children from each class) were selected by systemic random sampling method. The study was approved by Institutional Ethics Committee, Jawaharlal Nehru Medical College, Belgaum. Based on the inclusion criteria the school children were selected and informed consent from the principal and ascent from the children was obtained.

Inclusion criteria

School children of sixth to tenth standard aged between 10 to 15 years studying in private schools of Belgaum city.

Exclusion criteria

Exclusion criteria were schools having exclusively boys or girls (Non-Coeducational Schools), children having chronic illnesses such as, severe malnutrition, endocrinal problems and physically handicapped.

Data collection

All the included participants were interviewed by using predesigned and pretested questionnaire. The instruments used in this study included questionnaire, weighing machine, measuring tape, sphygmomanometer, stethoscope. All the instruments and techniques were initially standardized. The questionnaire included the information on socio-demographic variables, educational status, age of menarche in case of female children, family formation, personal history, physical activities, dietary habits and anthropometric measurements. Children were interviewed by the investigator. Examination was carried out which included general physical examination, measurement of height, weight, waist circumference, hip circumference, blood pressure and other vital signs. The entire procedure lasted for about 25 minutes for each child.

Socioeconomic status was assessed by Modified B. G. Prasad's classification.[17] Overweight and obesity were defined basing on Based on WHO and International obesity task force (IOTF) BMI cut-off standards for Asia and India.[18]

Statistical methods

The data was tabulated using Microsoft excel worksheet and analysed using mean, proportions and percentages.

Association between selected risk factors and obesity in school children was done by calculating odds ratio and its statistical significance was tested by using chi square test.

RESULTS

A total of 600 children were included in the final analysis. Males constituted 52.33% of the study subjects. The study participants were distributed uniformly from 10 to 15 years. The predominant religion in the study group was Hindu, followed by Muslim. Majority of the study subjects belonged to socio economic class I and II. About 65.67% of students belonged to nuclear family and 32% belonged to joint family (Table 1).

Table 1: Sociodemographic characteristics of the study population.

Parameter	Frequency	Percentage
Gender		
Male	314	52.33
Female	286	47.67
Age Years		
10	76	12.67
11	82	13.67
12	40	6.67
13	126	21.00
14	128	21.33
15	148	24.67
Religion		
Hindu	454	75.67
Muslim	106	17.67
Christian	8	1.33
Jainism	19	3.17
Sikh	11	1.83
Socio economic status		
Class I	505	84.17
Class II	88	14.67
Class III	7	1.17
Type of family		
Nuclear	394	65.67
Joint	192	32.00
Third Generation	14	2.33

Table 2: Prevalence of overweight and obesity in study population (N=600).

BMI Category 1	Frequency	Percentages
Normal	487	81.17
Overweight & Obesity	113	18.83
Over weight	68	11.33
Obese	45	7.50

The prevalence of overweight and obesity was 18.83% in study population. Out of this overweight contributed 11.335 and obesity contributed 7.5% (Table 2).

Table 3: Association between age, gender and overweight and obesity.

Parameter	Odds Ratio	95% CI		p Value
		Lower	Upper	
Gender (Baseline = Male)				
Female	1.198	0.795	1.804	0.387
AGE (Baseline = 10)				
11	1.690	0.628	4.546	0.299
12	2.862	0.977	8.383	0.055
13	3.217	1.338	7.730	0.009
14	2.513	1.033	6.111	0.042
15	2.300	0.954	5.543	0.063
Religion (Baseline = Hindu)				
Muslim	2.060	1.261	3.367	0.004
Christian	0	0	0	0.999
Jainism	1.392	0.449	4.313	0.567
Sikh	6.263	1.862	21.065	0.003
Socio economic status (Baseline = Class I)				
Class II	1.654	0.976	2.804	0.062
Class III	0.779	0.093	6.551	0.818
Type of family (Baseline = Nuclear)				
Joint	0.705	0.445	1.115	0.135
Third Generation	0.293	0.038	2.270	0.240

The odds of overweight and obesity was higher in females (OR=1.19), in children aged 13 years (OR=3.21), in children belonging to Sikh community (OR=6.26) and in children with socio economic class II (OR=1.65). Children from joint family (OR=0.70) and third generation family (OR=0.29) had lower odds of overweight and obesity compared to children from nuclear families (Table 3).

Daily consumption of snacks between meals (OR=2.42), sweets (OR=1.985), ice-cream (OR=1.667), fast foods (OR=3.062) and beverages (OR=4.80) were strongly associated with increased risk of overweight and obesity in study population. Daily consumption of fruits (OR=0.095) and vegetables (OR=0.166) and pulses (OR=0.690) was associated with reduced risk of overweight and obesity in study population (Table 4).

DISCUSSION

The onset and progression of obesity was well elaborated by Dietz in which he links to four critical periods of child development namely, intra-uterine life, infancy, the period of adipose rebound (5±7 years) and adolescence.[19] It should be emphasized that the inception of obesity at these sensitive periods enhances the risk of persistent obesity and its complications that has been found to be a significant predictor of long-term morbidity and mortality.[19,20]

Table 4: Association between dietary practices and overweight and obesity in study population.

Parameter	Odds ratio	95% CI		P value
		Lower	Upper	
Snacks between meals (Baseline = No)				
Yes	2.429	1.362	4.334	0.003
Pulses (Baseline = Consumed Everyday)				
Consumed 2 to 3 times a week	0.69	0.388	1.225	0.205
Vegetables (Baseline = No)				
Consumed Everyday	0.166	0.056	0.491	0.001
Consumed 2 to 3 times a week	0.122	0.032	0.46	0.002
consumed Occasionally	0.225	0.042	1.194	0.08
Fruits (Baseline = No)				
Consumed Everyday	0.095	0.036	0.25	0
Consumed 2 to 3 times a week	0.121	0.046	0.312	0
consumed Occasionally	0.054	0.019	0.157	0
Sweet (Baseline = No)				
Consumed Everyday	1.985	0.23	4.221	0.984
Consumed 2 to 3 times a week	1.462	0.408	5.231	0.56
consumed Occasionally	1.583	0.456	5.502	0.47
Ice Cream (Baseline = No)				
Consumed Everyday	1.667	0.344	8.07	0.526
Consumed 2 to 3 times a week	0.525	0.131	2.102	0.362
consumed Occasionally	0.808	0.218	2.997	0.749
Fast food (Baseline = No)				
Consumed Everyday	3.062	1.311	7.156	0.01
Consumed 2 to 3 times a week	2.095	0.966	4.545	0.061
consumed Occasionally	0.938	0.232	3.792	0.928
Beverage (Baseline = No)				
Consumed Everyday	4.802	1.956	11.785	0.001
Consumed 2 to 3 times a week	5.213	2.207	12.316	0
consumed Occasionally	3.422	1.655	7.075	0.001

The enormous burden of obesity globally can be best explained by the theory of epidemiologic transition, which symbolizes changes across levels of a country's development in patterns of morbidity and mortality from infectious causes to chronic and 'man-made' diseases.[21] Regarding obesity, the epidemiologic transition comprises both dietary changes (shifts from under nutrition and malnutrition to over nutrition, and from traditional diets to more energy-dense 'western' diets) and variations in physical activity (shifts away from high levels of occupation- and transportation-based physical activity to more sedentary lifestyles) often referred to as the 'nutrition transition and the 'physical activity' transition.[22,23]

The epidemiologic transition envisages a social patterning of obesity in countries in transition, where in groups with growing income, improved standards of living and levels of nutrition shift first, resulting in higher levels of obesity compared with the lower- income groups.[21] Even in developing and poorer countries also the growing levels of obesity can be viewed as first wave of a defined cluster of non-communicable diseases called "New World Syndrome" creating an enormous socio-economic and public health burden.

The children in the present study had a prevalence of 18.83% of overweight and obesity combined. And the overweight prevalence of 11.33 and 7.5% of obesity. A similar high prevalence of overweight and obesity was reported by Aggarwal et al, in Ludhiana (15.2% and 6.3% respectively), while Ghosh et al, found overweight to be 13.3% among 8-11 year old children in Calcutta.[24,25] Broyles et al, in their multi-national (12 countries) cross sectional study, Bangalore, India being on among them reported a very high prevalence of obesity (12.6%) among children with a mean age of 10.4 years.[26] However many other studies conducted in cities like Delhi, Hyderabad, Calcutta and Amritsar reported a relatively less prevalence of overweight and obesity ranging from 5.84% to 8.4% and 0. 35% to 5.2%.[25,27-29]

The relative higher prevalence of overweight and obesity among children in these cities of India might be due to better living standards of the people and their affordability as well as higher preference to eating outdoors with increased preference for high caloric

refined food.[27] Certain key factors like meal times consumed in the family, parents' BMI, brand awareness and physical activity seem to crucially affect the body size of the children especially in metro cities.[30]

In countries like Australia, Brazil, China etc. the prevalence of overweight and obesity ranged from 11.9%-18.1% and 2.6%- 8.3% respectively.[26,31,32] The lack of a consistent relationship between income and obesity in mid-human development index countries may be related to increased access to low- cost, energy-dense foods coupled with the compulsion of physically intense labor among the low-income groups and the ensuing increase in obesity prevalence approaching that of high-income populations in these countries.[26]

Regarding the association of gender with obesity females were as likely to be obese as males. However, age wise, there was significant association with obesity among children aged 13 years ($p < 0.009$) and 14 years ($p < 0.04$).

CONCLUSION

Overall the study findings reveal that children had a relatively higher prevalence of overweight and obesity and it can be said that it is becoming a serious public health problem.

Regular intake of fast foods, beverages, snacks between the meals and ice creams was associated with higher risk of obesity in study population

Regular consumption of fruits, vegetables and pulses had strong negative association with overweight and obesity in study population.

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