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Original Research Article

A comparative study of associated risk factors of overweight in normal and overweight children of 12-16 years of age

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ABSTRACT

Background: In 21st century childhood obesity has become one of the most serious public health problem. This now a global problem and affecting all the countries of the world. Overweight and obesity in children and adolescent is defined by American medical association as BMI between 85-95 centile and BMI >95th centile respectively for children aged 2-16 years. Risk factors for overweight and obesity in children are different for different regions, places, cultures and food habits of different people and society. New factors are coming up due to economic prosperity and change in lifestyle of the young population. Habit formation occurs mainly during childhood and adolescence so primary intervention targeting this age group has high possibility of yielding good results.
Methods: A comparative study of associated risk factors of overweight and obesity was conducted in D. Y. Patil Medical College in Children's age 12-16 years. The independent variable (parameters) for the study were age, gender, type of family, paternal education, maternal education, father's occupation, mother's occupation, socio-economic status, at least one overweight parent, sleeping time, TV viewing time, type of food, mode of transport to reach school, frequency of eating out and level of physical activity. Children were given questionnaire that was filled by their parents and return back to us.
Results: The analysis revealed that at least one overweight parent, mode of transport to reach school and frequency of eating out are associated with obesity while TV viewing duration and level of physical activity are strongly associated with obesity.
Conclusions: Childhood obesity is a chronic multifactorial medical condition. Its risk can be significantly reduced by avoiding and preventing some factors.

Keywords: BMI, Childhood obesity, Frequency of eating out, Independent variable, Mode of transport to reach school, Overweight parents, Physical activity, TV viewing duration

INTRODUCTION

WHO terms childhood obesity as exploding nightmare "the bottom line: It's never too early to start preventing obesity". Across the world Childhood obesity has emerge as a multifactorial health problem that is increasing very rapidly. In most of the developed countries it is now a major public health concern. With modernization, this rapidly growing problem is also seen in many developing countries.[1]

Overweight and obesity together refer to excessive body weight relative to height. This is measured in BMI. The 23kg/m^2 and 27kg/m^2 (for risk of overweight and obesity, respectively) are more relevant for use in Asian children

as Asians are more prone to have adiposity and increased heart risk at a lower BMI.[2]

In 2011 study conducted in many schools about the prevalence of overweight and obesity among 8-18 years old students, respectively, was 14.4% and 2.8% by International Obesity Task Force (IOTF) cutoffs, 14.5% and 4.8% by Center for Disease Control (CDC) cutoffs, and 18.5% and 5.3% by World Health Organization (WHO) cutoffs.[3]

Various processes participate in weight regulation are multi factorial and include hereditary, neuro-hormonal, psychological, metabolic, Socio-Cultural and environmental. Once obesity is there, the primary prevention is of great importance with various strategies to modify phenotypical and life style changes.[4]

In a developing country like India, there is gradual change in the income of the persons living in metropolitan cities, small cities, towns or even in villages. Various types of restaurant and junk food malls and restaurant which were predominantly seen in metropolitan cities now have been shifting to small cities and small towns. The main reason for the change in shift of prevalence of obesity from large cities to small towns is because of economic prosperity.

The concept of fetal origins of adult disease (FOAD) was first postulated by DR David Barker. Low birth weight not only act as envoy for fetal but also for adult health which were his observations. Today, LBW is associated with a host of chronic diseases ranging from coronary artery disease (CAD), Obesity, Dyslipidemia, Type II diabetes mellitus (T2DM), Hypertension, Stroke, Kidney Failure - glomerulosclerosis Coronary Artery Disease, Lung Abnormalities - BPD, reactive airway disease, Liver Failure - cholestasis, steatosis, Alzheimer's Disease, Depression, Immune Dysfunction, Schizophrenia, Reduced Bone Mass, Anxiety, Bipolar Disorder, and Cancer. That means Given the high low birth rates in our country, we have to prepare ourselves for the upcoming epidemic of metabolic disorders and cardiovascular diseases in the young adult population in the very near future, if we fail to do enough to limit this epidemic.

METHODS

A hospital based comparative study was conducted in Department of Paediatric, Dr. D. Y. Patil Medical College, Kolhapur, Maharashtra, India in Children's age 12-16 years attending get admitted with acute complaints only.

Children enrolled in this study were not suffering from any disease which lead to overweight or malnutrition for period of two year between May 2015 to May 2017.

A comparative study of 200 children out of which 100 will be overweight and 100 will be normal. Overweight will have BMI >23Kg/m^2 and normal will have BMI <23Kg/m^2.

Statistical analysis

Quantitative data is presented with the help of Mean and Standard deviation. Comparison among the study groups is done with the help of unpaired t-test as per results of normality test. Qualitative data is presented with the help of frequency and percentage table. Association among the study groups is assessed with the help of Fisher test, student t-test and Chi-Square test. 'p' value less than 0.05 is taken as significant.

Data collection

Pre-tested questionnaires to collect personal particulars, socio-economic particulars, life style patterns, socio-cultural aspects and dietary habits. Age as stated by parents, height by Measuring tape and weight by Weight machine.

Inclusion criteria

- Children between the age group of 12-16 years.
- 100 Students having BMI >23 Kg/m^2, 100 students having BMI <23 Kg/m^2.

Exclusion criteria

- Children below 12 years and above 16 years
- Children diagnosed to be obese due to any medical disorder. Children having chronic illness, endocrinal problems, physical and mental defects etc.

Criteria for obesity

BMI was used to assess the obesity based on the BMI charts developed by IAP percentile for BMI was taken as a standard for the present study.

BMI was calculated by using the formula:

$$\frac{\text{Weight in Kilogram}}{\text{Height in meter}^2}$$

For children, a child was considered obese if the BMI was >95th percentile, cut off point which is specific to the age and sex of the child. Similarly, BMI >85th percentile will be taken as overweight.

RESULTS

In the normal group, 30% children had at least one parent who was overweight whereas 58% children in Overweight group had one parent who was overweight. There was statistical difference between the groups as per Fisher test ($p<0.05$).

Table 1: Distribution of children based on at least one overweight parent.

At least one overweight parent	Normal		Overweight		P value
	N	%	N	%	
Yes	30	30%	58	58%	P<0.05
No	70	70%	42	42%	
Total	100	100%	100	100%	

The mean TV viewing duration of children in the Normal and Overweight groups was 2.3±0.09 and 2.7±0.16 hours per day. There was statistical difference between the groups as per Student t-test (p<0.05).

Table 2: Distribution of children based on TV viewing duration.

	Normal		Overweight		p Value
	Mean	SD	Mean	SD	
TV Viewing duration (hrs/day)	2.3	0.09	2.7	0.16	<0.05

In the normal group, 45% children travelled in a vehicle to school while 55% children walked or cycled to school. In overweight group 68% children travelled in a vehicle to school while 32% children walked or cycled to school. There was statistical difference between the groups as per Fisher test (p<0.05).

Table 3: Distribution of children based on mode of transport to reach school.

Mode of transport	Normal		Overweight		P value
	N	%	N	%	
Vehicle	45	45%	68	58%	P<0.05
Walk/cycle	55	55%	32	42%	
Total	100	100%	100	100%	

In the Normal group, 60% children ate outside 1-2 times per week while 25% and 15% children ate outside 3-4 times per week and >4 times per week respectively. In Overweight group 46% children ate outside 1-2 times per week while 22% and 32% children ate outside 3-4 times per week and >4 times per week respectively. There was statistical difference between the group eating more than 4 times per week as per Chi-Square test (p<0.05).

Table 4: Distribution of children based on frequency of eating out.

Frequency of eating out	Normal		Overweight		P value
	N	%	N	%	
1-2 times/week	60	60%	46	46%	<0.05
3-4 times/week	25	25%	22	22%	>0.05
>4 times/week	15	15%	32	32%	<0.05
Total	100	100%	100	100%	

In the Normal group, 17% children were physical active for less than 30 minutes per day while 21% and 62% children were physically active for 30 minutes to 2 hours and more than 2 hours per day respectively.

In Overweight group 55% children were physical active for less than 30 minutes per day while 27% and 18% children were physically active for 30 minutes to 2 hours and more than 2 hours per day respectively. There was statistical difference between the groups less than 30 mins as per Chi-Square test (p<0.05).

Table 5: Distribution of children based on level of physical activity.

Level of physical activity	Normal		Overweight		P value
	N	%	N	%	
<30 mins	17	17%	55	55%	<0.05
30 mins -2 hours	21	21%	27	27%	>0.05
>2 hours	62	62%	18	18%	<0.05
Total	100	100%	100	100%	

Table 6: Association of factors with overweight in children.

Parameters	Likelihood ratio tests			Significance
	p value	Chi - square	d_f	
Age	0.474	0.512	3	NS
Gender	0.564	0.333	3	NS
Type of family	0.772	0.084	3	NS
Paternal education	0.937	0.128	2	NS
Maternal education	0.882	0.520	3	NS
Father's occupation	0.242	0.834	3	NS
Mother's occupation	0.874	0.267	3	NS
Socio-economic status	0.474	1.490	2	NS
At least one overweight parent	0.023	15.909	1	S
Sleeping time	0.693	2.583	3	NS
TV viewing time	0.001	23.69	1	HS
Type of food	0.138	2.197	3	NS
Mode of transport to reach school	0.01	10.761	1	S
Frequency of eating out	0.017	8.189	4	S
Level of physical activity	0.0001	45.01	1	HS

The multiple logistic regression analysis is shown in Table 6. It was observed that obesity is due to various parameters and this analysis was made to determine level of significance of these parameters.

DISCUSSION

Distribution of children based on at least one overweight parent

It was observed in the present study that children with at least one overweight parent have more risk of being overweight than normal. There was statistical difference between the groups as per Fisher test ($p<0.05$).

A study by Sheetal Monga among 7-9 years old children in New Delhi showed family history as an important aspect for obesity in children.[5]

Similarly, Meenu Singh and Madhu Sharma is a study of Punjab school children reported that positive family history of obesity contributed significant for childhood obesity.[6]

If obesity present in any of the parent, the risk is high for their child to be obese despite the gender of the obese parent or child.[7]

Tchicaya A et al study found children with obese parents have higher mean BMI and it's not related to the sex of the child.[8]

Bahreynian M et al found in endocrinal study that males with overweight parents was comparatively 1.7 times more overweight than boys with normal-weight parents. Similarly, female child with overweight parents were more overweight compared to girls with normal-weight parents.[9]

Distribution of children based on TV viewing duration

It was observed in our study that more T V viewing time is significantly associated with obesity. Singh AK et al in a study reported that increased use of electronic devices and video games and television programs have more and less lead to adopt a lifestyle with less physical activity and more sedentary lifestyle.[10] Mendoza JA et al observed that there is a increase risk of being overweight with prolonged use of television or videos for >2 hours a day.[11]

Hajian-Tilaki K et al study reported that there is considerable increased risk of overweight and obesity in children with TV viewing duration ≥2 hours per day and playing videogames ≥1 hours in computer or mobiles.[12]

Distribution of children based on mode of transport

It was observed in our study that children using motor vehicle for going school have more risk of overweight then children go to school on bicycle or by foot. By using bicycle or going school by foot children use to spend calories and also increase their physical activity.

A study in Brazil showed significant associations with the prevalence of overweight/obesity and mode of transport to travel to school. Participants who use motor vehicles to go to school have high odd of overweight and obesity as compared to those who cycled and walked to school[13]. This correlates with our results too.

Distribution of children based on frequency of eating out

In our study children who dine >4 times per week outside in a restaurant have more risk of obesity.

Restaurants served foods have relatively high amount of calories and low nutritive values as compared with the home made food. In this study researchers found that both groups consume high calories from restaurant food but group with less frequency of eating in a restaurant compensates their high calories by adjusting their life style routines.[14]

Distribution of children based on level of physical activity

In our study children who have less than 30 min of physical activity have more risk of being overweight as compared to children who have more than 2 hours of outdoor physical activity.

In a study Bhuiyan MU et al stated that children who pursue outdoor physical activity more than 30 minutes each day had decreased odds (OR = 0.38, 95% CI: 0.1-0.8) of being overweight as compared to children who are mainly involved in indoor activities.[15] which support our result.

Health researchers has found that there is a decrease in overweight and obesity has close association with high levels of physical activity by children. Also, as noted by Patrick et al that in USA adolescent with low level of physical activity has high BMI[16].

In a study in northeast part of India showed that the prevalence of obesity was higher in children who played video or computer games more than 3-4 hours per day (5%), in those with maximal outdoor activity only 5 h per week (8.3%), and in those who were not involved in any physical activity like exercise/swimming/running (8.3%).[17]

Many studies says that boys and girls with high physical activity has low BMI and boys and girls with low activity has high BMI.[18]

The analysis revealed that at least one overweight parent, mode of transport to reach school and frequency of eating out are associated with obesity while TV viewing time and level of physical activity are strongly associated with obesity.

In this study many factors were associated to overweight and obesity. Out of that mode of transport to reach school and frequency of eating out, TV viewing duration and level of physical activity are avoidable risk factors. Change the motor vehicle to cycle or by walk to reach school, decrease the frequency of eating out in restaurant and prefer home food, decrease the T V viewing duration and increase the physical activity for more than 2 hours decrease the risk of overweight and obesity. Even children with overweight parents we should encourage parents to adopt a healthy life style, increase their physical activity, have healthy food and reduce their weight which in turn make good healthy environment at home and also promote their children to adopt a healthy lifestyle.

CONCLUSION

Overweight and obesity in children is a chronic multifactorial medical condition. Parental obesity has direct relationship on childhood obesity. Increase in the frequency of eating out in a restaurant is more in obese children than in non-obese children. Decrease in duration of physical activity was seen more in overweight children. Increase in duration of sedentary activity like more TV duration seen in overweight children. Use of motor vehicle while going to school is seen more in overweight children then non-obese children.

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REFERENCES

1. Konda SG, Giri PA, Otiv AS. Prevention of overweight and obesity in preschool children: an updated review. Int J Res Med Sci. 2017;2(3):798-804.
2. WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004;10:157-63.
3. Misra A, Shah P, Goel K, Hazra DK, Gupta R, Seth P, et al. The high burden of obesity and abdominal obesity in urban Indian schoolchildren: a multicentric study of 38,296 children. Ann Nutrition Metab. 2011;58(3):203-11.
4. Luttikhuis OH, Baur L, Jansen H, Shrewsbury VA, O'Malley C, Stolk RP, et al. Interventions for treating obesity in children. Cochrane Database Syst Rev. 2009;1:CD001872.
5. Monga S. Obesity among school children (7-9 years old) in India, prevalence and related factors: public health and the environment: the 132nd annual meeting of APHA, November 6-10 2004.
6. Singh M, Sharma M. Risk Factors for obesity in Children. Indian Paediatr. 2005;42:183-5.
7. Dietz WH. Childhood obesity. Annals of the New York Academy of Sciences. 1987 Jun 1;499(1):47-54.
8. Tchicaya A, Lorentz N. Relationship between Children's body mass index and parents' obesity and socioeconomic status: A multilevel analysis applied with Luxembourg data. Health. 2014 Sep 30;6(17):23-2.
9. Bahreynian M, Qorbani M, Khaniabadi BM, Motlagh ME, Safari O, Asayesh H, et al. Association between Obesity and Parental Weight Status in Children and Adolescents. J Clinic Res Pediatr Endocrinol. 2017 Jun 1;9(2):111
10. Dwyer T, Blizzard CL. Defining obesity in children by biological end point rather than population distribution. Int J Obest Relat Metab Disord. 1996;20:472-80.
11. Singh AK, Maheshwari A, Sharma N, Anand K. Lifestyle associated risk factors in adolescents. Indian J Pediatr. 2006;73:901-6.
12. Hajian-Tilaki KO, Sajjadi P, Razavi A. Prevalence of overweight and obesity and associated risk factors in urban primary-school children in Babol, Islamic Republic of Iran. Eastern Mediterranean Health J. 2011;17(2):109.
13. Duncan S, Duncan EK, Fernandes RA, Buonani C, Bastos KD, Segatto AF, et al. Modifiable risk factors for overweight and obesity in children and adolescents from São Paulo, Brazil. BMC Public Health. 2011 Jul 22;11(1):585.
14. Sahoo K, Sahoo B, Choudhury AK, Sofi NY, Kumar R, Bhadoria AS. Childhood obesity: causes and consequences. Journal of family medicine and primary care. 2015;4(2):187.
15. Bhuiyan MU, Zaman S, Ahmed T. Risk factors associated with overweight and obesity among urban school children and adolescents in Bangladesh: a case–control study. BMC Pediatr. 2013 May 8;13(1):72.
16. Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. Med Sci Sports Exerc. 2000;32:963-75.
17. Bhattacharya PK, Gogoi N, Roy A. Prevalence and awareness of obesity and its risk factors among adolescents in two schools in a northeast Indian city. Int J Med Sci Public Health. 2016;5(6):1111-22.
18. Berkey CS, Rockett HRH, Gillman MW, Colditz GA. One-year changes in activity and in inactivity among 10-15 years old boys and girls: Relationship to changes in body mass index. Pediatr. 2003;111:836-43.

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