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A Study on the Risk Factors of Obesity among School Going Children (9-12 Years) of Chandigarh

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Abstract: ***Background: Lifestyle diseases such as obesity are an outcome of complex interaction between human biology, behaviour and society. It is a serious, chronic disease that can inflict substantial harm to a person's health. Several consequences result from childhood obesity. Overweight and obese children are prone to medical conditions like cardiovascular diseases, asthma, type 2 diabetes, sleep disturbances and many others. Objective: This study aims to examine the risk factors of Obesity among the school children (9-12 years) of Chandigarh. Methodology: Before conducting the study, initial permission from the school Principals was obtained. Total of 204 subjects were interviewed from 3 different private schools of Chandigarh. A self designed questionnaire was prepared for data collection. The analysis of the data obtained was performed using SPSS software (version 23.0). Result: Chi- square value when applied between Asthma and subjects BMI (Body Mass Index), a significant relationship was found with a p- value of 0.003 which shows that Asthma affects the BMI of the subjects. Diabetes Mellitus is another important risk factor associated with childhood obesity. A significant relationship was found (p-value 0.024) which shows that Diabetes Mellitus affects the BMI of the children. Sleep disorder is yet another important risk factor known to affect the children with obesity and the results too showed a highly significant relationship with a p-value of 0.001. Conclusion: The present study reveals that the childhood obesity has significant adverse effects on health in childhood so the risk profiles of obesity among school children must be fully considered while planning treatment and prevention programs for childhood obesity. The effects of these physical problems are very serious and are likely to follow an overweight or obese child into adulthood. Thus, there is an urgent need for greater awareness and education of the community on the importance of healthy food habits and lifestyle to prevent overweight/ obesity and its associated ill effects.***

1. Introduction

Childhood and adolescence are characterized by particular physical growth (an increase in body size as well as changes in body proportion and body composition), sexual maturation, as well as motor, cognitive, emotional and social development [1]. In many Western setting, a large proportion of children and adolescents do not meet recommended physical activity guidelines and those who are more physically active have lower levels of body fat than those who are less active. Active behaviours have been displaced by more sedentary pursuits which have contributed to reduction in physical activity expenditure [2]. Without appropriate activity engagement there is an increased likelihood that children will live less healthy than their parents. As a result there lies intraindividual difference among girls and boys that are often accentuated in adolescents. These changes make childhood and adolescence a special period imposing special challenges on obesity research as well as prevention and treatment of overweight and obesity.

Childhood obesity is a rising issue because of the possible clinical and public health consequences in childhood. According to WHO, 'the most important long term consequence of childhood obesity is its persistence into adulthood' (so called tracking), "with all the associated health risks" [3]. Childhood obesity is not just a cosmetic problem [4]. Overweight and obesity are associated with an increased burden of diabetes, hypertension, cardiovascular diseases, some types of cancer and premature mortality but also with the social and psychological effects of excess weight [5]. Epidemiological literature shows that about one-third of the obese pre- school children and about one-one of obese school- age children become obese adults [6].

In order to prevent the adverse effects of childhood obesity, due emphasis should be given to reduction of eat outs, planning of healthy snacks, balanced diet, adequate intake of fruits and vegetables and avoidance of high calorie/ high fat diet.

2. Methodology

A school based, cross sectional study was conducted on 204 Private school going children of Chandigarh in the age group of 9-12 years. The study respondents were chosen randomly for the purpose of seeking the required information and knowledge. A questionnaire consisting of the questions related to the medical aspect of the study respondents, whether the child suffers from any diseased conditions like Diabetes, Asthma or Sleep disorders, was used to obtain the required data.

Inclusion and Exclusion Criteria

Inclusion Criteria

- Children of the age 9-12 years.
- Only school going children.
- All children present on the day of the survey.

Exclusion Criteria

- Children not in the age group of 9-12 years.
- Differently abled children.
- Children absent on the day of the survey.

The analysis of the data was performed using SPSS software (version 23.0) based on the objectives of the study.

3. Results

The study sample included a total of 204 children. Equal number of boys and girls i.e. 102 were included in the sample. Maximum number of boys and girls were at the age of 12, 18.6% and 15.7% respectively. [Table 1]

Table 1: Distribution of the respondents according to their Age and Gender

Gender	Age				Total
Boys	9	10	11	12	102 (50%)
	9 (4.4%)	33 (16.2%)	22 (10.8%)	38 (18.6%)	
Girls	23 (11.3%)	22 (10.8%)	25 (12.3%)	32 (15.7%)	102 (50%)
Total	32 (15.7%)	55 (27.0%)	47 (23.0%)	70 (34.3%)	204 (100%)

Table 2: Distribution of Subjects according to their BMI

Gender	BMI	Age					Total	Chi- square value	p- value
Boys	<18		9	10	11	12		14.161	0.117 (NS)
		Underweight (%)	2 (2.0%)	12 (11.8%)	7 (6.9%)	3 (2.9%)	24 (23.5%)		
	18.0-22.9	Normal (%)	6 (5.9%)	17 (16.7%)	13 (12.7%)	23 (22.5%)	59 (57.8%)		
	23.0-24.9	Overweight (%)	1 (1.0%)	2 (2.0%)	2 (2.0%)	9 (8.8%)	14 (13.7%)		
	>25	Obese (%)	0 (0.0%)	2 (2.0%)	0 (0.0%)	3 (2.9%)	5 (4.9%)		
Girls	<18	Underweight (%)	6 (5.9%)	5 (4.9%)	2 (2.0%)	4 (3.9%)	17 (16.7%)	8.204	0.514 (NS)
	18.0-22.9	Normal (%)	13 (12.7%)	9 (8.8%)	12 (11.8%)	19 (18.6%)	53 (52.0%)		
	23.0-24.9	Overweight (%)	2 (2.0%)	6 (5.9%)	7 (6.9%)	7 (6.9%)	22 (21.6%)		
	>25	Obese (%)	2 (2.0%)	2 (2.0%)	4 (3.9%)	2 (2.0%)	10 (9.8%)		
		Total	32 (15.7%)	55 (27.0%)	47 (23.0%)	70 (34.3%)	204 (100%)		

Obesity is associated with a number of co-morbidities in children and adolescents. The common co-morbid conditions related to obesity especially in children and adolescents are cardiovascular, endocrine, gastrointestinal, neurological, orthopedic, psychological, pulmonary and renal [7].

15.7% of the overweight and obese children suffered from Asthma, which is one of the most common chronic diseases among children [Table 3].

Table 3: Distribution of Subjects BMI according to the Risk Factor of Asthma

Gender	BMI	Asthma			Total	Chi- square value	p-value
Boys			No	Yes		8.892	0.031 (S)
	<18	Underweight (%)	24 (23.5%)	0 (0.0%)	24 (23.5%)		
	18.0-22.9	Normal (%)	54 (52.9%)	5 (4.9%)	59 (57.8%)		
	23.0-24.9	Overweight (%)	12 (11.8%)	2 (2.0%)	14 (13.7%)		
	>25	Obese (%)	3 (2.9%)	2 (2.0%)	5 (4.9%)		
Girls	<18	Underweight (%)	13 (12.7%)	4 (3.9%)	17 (16.7%)	6.805	0.078 (S)
	18.0-22.9	Normal (%)	46 (45.1%)	7 (6.9%)	53 (52.0%)		
	23.0-24.9	Overweight (%)	14 (13.7%)	8 (7.8%)	22 (21.6%)		
	>25	Obese (%)	6 (5.9%)	4 (3.9%)	10 (9.8%)		
		Total	172 (84.3%)	32 (15.7%)	204 (100%)		

By applying the Chi-square test, results showed a significant relationship between the subjects BMI and their increased risk for developing Asthma. The levels of obesity are associated with asthma symptoms regardless of ethnicity. The association is more consistent for BMI because obese children are more advanced in their maturation than other children [8].

Obesity has led to a dramatic increase in the incidence of type 2 diabetes among children and adolescents. [9] [Table 4].

Table 4: Distribution of Subjects BMI according to the Risk Factor of Diabetes Mellitus

Gender	*BMI*	*Diabetes Mellitus*			*Total*	*Chi- square value*	*p- value*
Boys			No	Yes		6.865	0.078 (S)
	<18	Underweight (%)	21 (20.6%)	3 (2.9%)	24 (23.5%)		
	18.0-22.9	Normal (%)	58 (56.9%)	1 (1.0%)	59 (57.8%)		
	23.0-24.9	Overweight (%)	12 (11.8%)	2 (2.0%)	14 (13.7%)		
	>25	Obese (%)	5 (4.9%)	0 (0.0%)	5 (4.9%)		
Girls	<18	Underweight (%)	15 (14.7%)	2 (2.0%)	17 (16.7%)	8.655	0.034 (S)
	18.0-22.9	Normal (%)	53 (52.0%)	0 (0.0%)	53 (52.0%)		
	23.0-24.9	Overweight (%)	22 (21.6%)	0 (0.0%)	22 (21.6%)		
	>25	Obese (%)	9 (8.8%)	1 (1.0%)	10 (9.8%)		
		Total	195 (95.6%)	9 (4.4%)	204 (100%)		

3% of the overweight and obese children suffered from Diabetes Mellitus. The results are in accordance with the study conducted by Raj et al 2010, The association of obesity with Type 2 Diabetes is in children and adolescents

is very strong and confirmed by various studies [7]. Childhood obesity has been linked with many co morbidities, including sleep disturbances and daytime sleepiness [Table 5].

Table 5: Distribution of Subjects BMI according to the Risk Factor of Sleep Disorder

Gender	*BMI*	*Sleep Disorder*			*Total*	Chi- square value	p- value
			No	Yes		11.857	0.008 (S)
Boys	<18	Underweight (%)	24 (23.5%)	0 (0.0%)	24 (23.5%)		
	18.0-22.9	Normal (%)	56 (54.9%)	3 (2.9%)	59 (57.8%)		
	23.0-24.9	Overweight (%)	12 (11.8%)	2 (2.0%)	14 (13.7%)		
	>25	Obese (%)	3 (2.9%)	2 (2.0%)	5 (4.9%)		
Girls	<18	Underweight (%)	17 (16.7%)	0 (0.0%)	17 (16.7%)	7.654	0.054 (S)
	18.0-22.9	Normal (%)	48 (47.1%)	5 (4.9%)	53 (52.0%)		
	23.0-24.9	Overweight (%)	16 (15.7%)	6 (5.9%)	22 (21.6%)		
	>25	Obese (%)	8 (7.8%)	2 (2.0%)	10 (9.8%)		
		Total	184 (90.2%)	20 (9.8%)	204 (100%)		

11.9% of the overweight and obese children suffered from sleep disorders. By using the Chi- square test, a significant relationship was found at 0.001. Strong associations have been found between obesity and obstructive sleep apnea [10].

4. Discussions

Childhood obesity has been linked various medical conditions. These include Asthma, Diabetes Mellitus, Sleep disorders and many others. Until recently, many of the above health conditions had been only found in adults but now they are extremely prevalent in obese children as well [11]. The findings of the present study, too, reveal that most of the overweight and obese children were suffering from type 2 Diabetes, Asthma and Sleep disorders. Obesity was found to be more in girls as compared to the boys.

In a similar study conducted by Visness *et al* (2010), the results revealed that excess weight in children is associated with higher rates of asthma, especially asthma that is not accompanied by allergic disease. Obesity and Asthma have both risen among children over the last several decades [12].

The findings of the present study showed a significant relationship between the subjects BMI and diabetes mellitus and the results are in accordance with the study conducted by Hannon (2005), which reveal that childhood obesity has led to a dramatic increase in the incidence of type 2 Diabetes among children and adolescents [13].

Gozal (2009) conducted a research and the results revealed that the likelihood of excessive daytime sleepiness is greater for obese children as compared to the non- obese children [14].

5. Conclusion

The present study explored a significant relationship between the subjects BMI and the risk factors of Asthma, Diabetes Mellitus and Sleep Disorders. In the long run, children have become less active due to their sedentary lifestyle and also because of the consumption of fatty foods in their daily routine. Due to this, the development of chronic diseases is on a rise. Therefore to conclude it can be said that these fluctuating changes and changed dietary patterns combined together can put the subjects at the increased risk of obesity. There is no simple or single solution to the problem of obesity. It is a complex problem and the approach has to be multifaceted. On a smaller level, pediatric obesity can be managed with a little awareness and creating several ways that provide a supportive environment to promote healthy living behaviours that help in combating the problem of childhood obesity. Furthermore a positive approach for generating awareness to the family, school and society about the impact of junk food, obesity and its impact on health and quality of life need to be undertaken to prevent and further manage the growing epidemic of obesity in the youngsters of the nation.

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