

Exploring Overweight & Obesity amongst Affluent Adolescents of A Public School in Dehradun Region

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Abstract: Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population. India is following a trend of other developing countries that are steadily becoming more obese. Although the most common reason for being overweight is clear (people eat more calories in food than they burn in exercise), the reasons for the dramatic, nationwide increase in overweight & obesity in children & adolescents are unclear. Childhood obesity has more than doubled in children and tripled in adolescents in the past 30 years. In brief, the backdrop of my research is that the prevalence of child & adolescent obesity is increasing rapidly worldwide. In developing countries such as India, especially in urban populations, adolescent obesity is emerging as a major public health problem. Obesity is influenced not only by genetic, physical or medical causes, but also has pertinent Social Determinants, which leads to disproportionate adoption of protective mechanisms, & poor response towards treatment-seeking behaviors. The main aim of this article is to explore & understand the pertinent factors & psycho-social determinants of overweight and obesity amongst affluent public school going adolescents of 11-18 years of age in Dehradun region of Uttarakhand, India.

Keywords: Obesity, Overweight, Weight management

1. INTRODUCTION

Obesity has increased over in both developed and the developing countries.⁶ (Doll S, Paccaud F, Bovet P, Burnier M, Wietlisbach V 2002) The prevalence of overweight / obesity among reproductive age population is increasing in countries all over world. While the global public health problem of overweight/obesity is well described in the adult population, it is not well documented in children of low and intermediate income countries. As childhood and adolescent obesity progress into adulthood, The prevention of obesity in childhood must be important public health measure, as it is well documented that obesity is associated with adverse health consequences, and there is no clear cut to treatment. Childhood overweight/obesity has different risks factors in higher-income countries, from those in low and intermediate-income countries ,like total hours of television viewing, pattern of diet, and socioeconomic status may differ, with environment (socio-cultural and economic) may be quite different in these countries (Stettler et al. 2002). As has been previously cited, the obesity epidemic is one of the most major public health concerns of the 21st century (Flood, Webb, Lazarus, & Pang, 2000), henceforth showing the need for updated & extensive research in the area. Twenty million overweight children under the age of five & at least 400 million clinically obese with more than 1.6 billion adults were overweight in 2005 according to estimation (WHO, 2008). In India, the problem has also increased at an exponential rate, affecting millions of people (Paul Hawken, 2002). From last two decades trends over the

world indicate that the prevalence of obesity is continually increasing, affecting people of all ages, levels of economic status, & racial & ethnic groups (Ash et al., 2006; Atlantis, Barnes, & Singh, 2006; Curioni & Lourenco, 2005; Labib, 2003; Ozmen et al., 2007; WHO, 2008). Although the obesity epidemic was previously understood to only be a major public health concern in developed nations such as Australia, the United States, & the United Kingdom (Catford & Caterson, 2003; Popkin & Doak, 1998), body mass & size are now concurrently & rapidly escalating within middle & low-income countries such as India, Brazil, Cuba, & Egypt, particularly for those living in urban settings (Ash et al., 2006; Popkin & Doak, 1998; WHO, 2008). By 2015 obesity-related disease, disability, & death can affect 2.3 billion overweight adults & 700 million clinically obese individuals worldwide (WHO, 2008) if it is not prevented.

2. OPERATIONAL DEFINITIONS & METHODOLOGICAL CONSIDERATIONS

It is deemed necessary in the above context, to understand the meaning & operational definitions of the terms obesity & overweight. An excess energy intake out of energy expenditure is established as fat accumulation and obesity. (Atlantis et al., 2006). Fundamentally, when an individual's energy intake from food & drinks is greater than the amount of energy expended, the unused energy is converted into fat & deposited in the body. At present, the most common & effective technique of estimating an individual's adiposity is the body mass index (BMI). Using the WHO criteria, individuals with a BMI less than 18.5kg/ m² are deemed to be underweight, a BMI between 18.5 & 24.9kg/ m² considered to be of normal weight, a BMI between 25 & 29.9kg/ m² regarded as overweight, a BMI greater than 30kg/ m² obese, & very obese with a BMI greater than 40kg/ m² (Huang et al., 2006; Thompson, Cook, Clark, Bardia, & Levine, 2007; WHO, 2008). Since the underweight group is not of interest to the current investigation, & to assist in readability & practicality, the term "unhealthy weight" will be used to describe all adolescents, who are considered to be overweight or obese using the BMI classificatory system, in the case studies. Thus, the term "unhealthy weight" includes all individuals with a BMI greater than 25kg/ m² as the WHO has identified that the greater the BMI the more health risks an individual is susceptible to. The term "healthy weight" will be used to refer to those adolescents who have a BMI between 18.5 & 24.9 kg/ m². Also, since BMI is the most widely used tool measuring body weight, using this classificatory system allows for easier comparisons between past & future research. However, given the limitations that arise from self-report height & weight, this study utilizes accurate measures of body weight by weighing participants on calibrated scales of a digital weighting machine & measuring height using a stadiometer. Only few studies have been conducted in India regarding the prevalence of obesity in adolescents. Some of these studies are reported as follows. In a study amongst 625 females above 15 years of age residing in affluent localities of Varanasi, selected by multi-stage stratified random sampling technique, BMI and skin fold thickness were compared as indices of obesity. The prevalence of obesity by BMI (i.e. a BMI of 25 and above) and Burin Womersely criterion for skin fold thickness (i.e. a sum of skin fold thickness of 80 and above taken from four sites) was used to define obesity (Asthana et al. 1998). Ramachandran et al. conducted a study on the prevalence, in urban India adolescent school children that included 4700 school children (2382 boys and 2380 girls) in the age group of 13-18 years. To get an equal distribution of children by socioeconomic strata and gender, the 2 Government schools for low-income group and 2 private schools attended by middle-income and high-income groups were selected from different zones in the city. The prevalence of obesity as per the IOTF was 2.7%

(CI 2.2-3.5%) in girls in the present study (Ramachandran et al. 2002). A cross-sectional study of prevalence of obesity amongst affluent adolescent school children (10-16 years of age) was conducted in one public school of Delhi. For purpose of including affluent segment, school was selected by purposive sampling procedure keeping in view the operational feasibility. The prevalence of obesity in 16 year old girls (n=41) in this study was found to be 2.4% using the international cut-off points for obesity as BMI analogue for age and sex ≥ 30 according to IOTF (French et al. 2001).

3. MATERIALS & METHODS

The study was conducted during the months of December 2013, January, February, & March, 2014. It was an exploratory survey study, employing both quantitative & qualitative analysis. Current study field includes, studying overweight & obesity in the affluent adolescents of, one of the oldest public schools of Dehradun- the Marshall School, which was built during the British era, to understand & explore the determinants of increasing overweight/obesity in today's youth of Dehradun. There were many variables used in the study like BMI, Height, Weight, Age, Socioeconomic status, family history, diet, illness etc. This study included 50 participants (both male & female), 25 participants with a BMI above 30 (Obese) & 25 (Overweight) & 25 participants with normal BMI range (18.5-24.9), falling in the adolescent age group of 11-18yrs. The participants are urban, public school going students' adolescent girls & boys (11-18 yrs of age) of Dehradun Region (Uttarakhand State). All participants of the survey belonged to the senior section (6-12th Class) of one Public school of Dehradun City, i.e. the renowned Marshall School, Kanal Road, Dehradun. Since these students were studying in a Public school, & mostly belonged to affluent & good family backgrounds, they were all very proficient in English language & thereby the Interviews were also conducted in English language with them. The 25 normal weight participants were selected after careful matching with age, sex, & class of the 25 overweight/obese participants. The classification of the BMI, as used in the current study to select cases for unhealthy & healthy body weight is given in Table-3.1.

Table3.1: Classification of BMI

Level of obesity	Under wt. (Healthy Wt.)	Normal (Healthy Wt.)	Over wt. (Unhealthy Wt.)	Obese(Class 1) (Unhealthy Wt.)	Obese(Class 2) (Unhealthy Wt.)	Extreme obese (Unhealthy Wt.)
BMI	<18.5	18.5-24.9	25.0-29.9	30.0-34.9	35.0-39.9	> 40

A battery of 2 questionnaires was compiled to obtain the pertinent demographic data, & measure the reporting of the influence of psychological, social, biological, & environmental factors. In addition, levels of intrinsic & extrinsic motivation, eating self-efficacy, & differential emotions were acquired for all respondents.

For the purposes of the present study, a 12-item background questionnaire (Interview Schedule) was constructed (see Appendix A). The demographic questionnaire ensured that data could be compared with subsequent studies, & served two additional functions. First, seven items specifically addressed descriptive information including participant gender, age,

education level, geographical residence (which is relevant in terms of access to nutritional food & exercise), height, & weight. Second, five items focused on respondents' previous diet & weight loss attempts, medical conditions, & a personal opinion of his or her current physical health & shape.

4. STATISTICAL ANALYSIS

The information collected on the study tools was transferred to a computer based spread sheet using Microsoft Excel Software. Subsequently analysis of data was done on SPSS software version 20.0. First, descriptive statistics would be presented to show the distribution for socio-demographic profile of students, including gender, age, & weight-height categories. Thereafter, analytical thematic analysis of the responses of the healthy weight participants & unhealthy weight participants was done under the major themes with regard to- biological influences, self-efficacy, self monitoring, attention paid to weight related health behaviours, beliefs, social influences from family, sabotage from family, social influences from friends, sabotage from friends, environmental influences, intrinsic motivation, extrinsic motivation, over-eating in response to negative effect, over-eating in socially acceptable circumstances, positive emotions, & negative emotions, self-esteem, physical activity level, & diet behaviours. The frequency distribution according to the participant's age (in years), is depicted below.

Table 4.1: Frequency Distribution of Participant's AGE

Age (in yrs.)		Frequency (N=50)	Percentage (in %)
Valid	11.00	1	2.0
	12.00	1	2.0
	13.00	2	4.0
	13.50	1	2.0
	14.00	16	32.0
	15.00	12	24.0
	16.00	6	12.0
	17.00	9	18.0
	18.00	2	4.0
	Total	50	100.0

Out of the 50 study subjects, the number of girls in the current study was 30 & the number of boys was 20 (N=50), representing 40% & 60% of the study sample. The sample distribution according to participant's sex has also been depicted in Table 4.2.

Table 4.2: Frequency Distribution according to the Participant's SEX

Sex		Frequency	Percentage (in %)
Valid	MALE	20	40.0
	FEMALE	30	60.0
	Total	50	100.0

Out of the 50 sample of adolescents, maximum number of students belonged to 9th & 12th class, i.e. 20 & 12 students, incorporating 40% & 24% of the entire sample. Next highest number of students belonged to the classes of 10th & 11th, i.e. 6 & 5 students, incorporating 12% & 10% of the total sample, as depicted in the table below.

Table 4.3: Frequency Distribution of the study subjects according to the Participant's class

Class		Frequency	Percentage (in %)
Valid	6.00	1	2.0
	7.00	2	4.0
	8.00	4	8.0
	9.00	20	40.0
	10.00	6	12.0
	11.00	5	10.0
	12.00	12	24.0
	Total	50	100.0

There are some interesting findings in the survey, as regards to the occupation of the subject's father. Fathers of most of the students (13) in the study (26%) were from Army /Navy while parents of 9 (i.e. 18%) students were businessman & other Govt. services (18%). This was because Dehradun has multiple offices of Army (I.M.A, I.TB.P.) & Navy (National Hydro-graphic Office), & thereby most of the students fathers in the current sample, emanated from armed services.

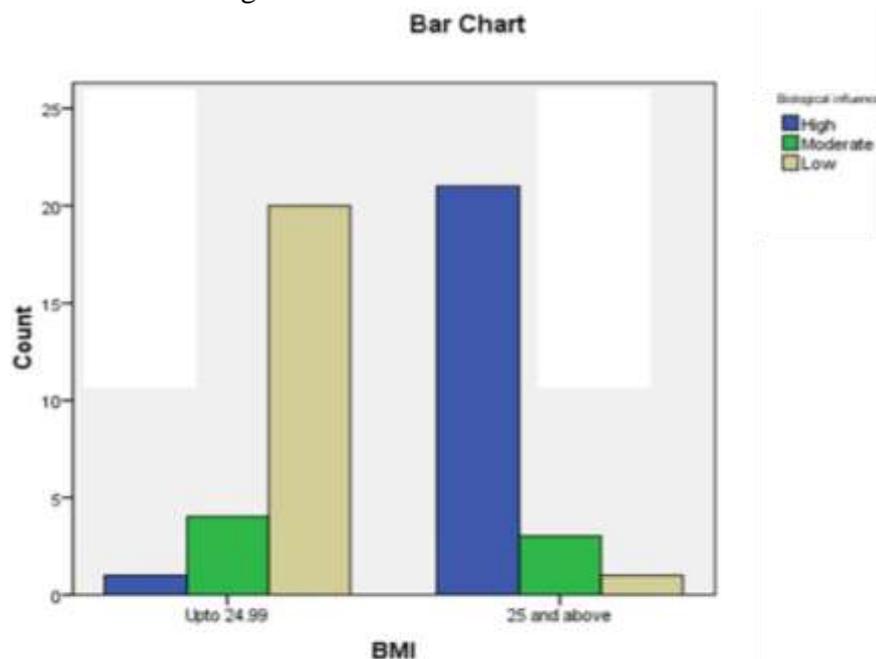
5. DATA ANALYSIS

The biological subscale of eating questionnaire consisted of six items assessing respondents' weight history & past or present parental obesity. Response options were dichotomised & scored 1=yes vs. 2=no. The raw scores of all the 50 participants were analysed, on the subscale. Lower scores on the biological subscale indicate higher levels of biological influences on body weight. As shown in this Table & figure below, level of biological influence was high in overweight and obese participants while it was low in participants where BMI was up to 24.99. Interestingly moderate level of biological influence was more in BMI range up to 24.99 compare to those where BMI was 25 or above. Thus, the overweight & obese adolescents had high biological influence over their current health status.

Table 5.1: Depicting the Percentage of Level of 'Biological Influence' in Normal & Overweight/Obese Adolescents

	BMI		Level of Biological influence			Total
			High	Moderate	Low	
BMI	Upto 24.99	Count	1	4	20	25
		% within BMI	4.0%	16.0%	80.0%	100.0%
	25 and above	Count	21	3	1	25
		% within BMI	84.0%	12.0%	4.0%	100.0%
Total		Count	22	7	21	50
		% within BMI	44.0%	14.0%	42.0%	100.0%

Figure 1: Depicting the Count of 'Biological Influence' in Normal & Overweight/Obese Adolescents



Four questions assessed respondents' level of *self-monitoring* of weight & related health behaviours. Questions were prefaced with the statement "Over the past 2 years, on average, how often have you done the following?" with response options ranging from 1 (not at all) to 6 (every day). Items assessed self-monitoring of weight, physical activity, Time spent in sitting, & eating patterns. Responses were summed across the four questions to give a total self-monitoring score, with higher scores indicate greater self-monitoring of weight-related behaviours. It is clearly mentioned that level of Self-monitoring was low (60%) in overweight & obese compare to group where BMI was up to 24.99 (72%). Thereby as per the responses of the respondents, it could be inferred that overweight & obese adolescents displayed low level & behaviours related to self-monitoring their health-status.

Table 5.2: Depicting the Percentage of 'Level of Self-Monitoring' in Normal & Overweight/Obese Adolescents

		BMI	Level of Self-monitoring			Total
			Low	Medium	High	
BMI	Upto 24.99	Count % within BMI	1	6	18	25
			4.0%	24.0%	72.0%	100.0%
	25 and above	Count	15	9	1	25
			% within BMI	60.0%	36.0%	4.0%
Total	Count	16	15	19	50	
		% within BMI	32.0%	30.0%	38.0%	100.0%

Table 5.3: Depicting the Percentage of 'Beliefs about Weight-gain' in Normal & Overweight/Obese Adolescents

	BMI		Beliefs about weight gain			Total
			Low	Moderate	High	
BMI	Upto 24.99	Count	15	9	1 4.0%	25
			% within BMI	60.0%	36.0%	
	25 and above	Count	8	7	10 40.0%	25
			% within BMI	32.0%	28.0%	
Total	Count	23	16	11 22.0%	50	
		% within BMI	46.0%	32.0%		100.0%

Table 5.4: Depicting the Percentage of Correlate 'Social Support of friends' in Normal & Overweight/Obese Adolescents

	BMI		Social support of friends			Total
			Low	Medium	High	
BMI	Upto 24.99	Count	1	12	12	25
			% within BMI	4.0%	48.0%	48.0%
	25 and above	Count	24	0	1	25
			% within BMI	96.0%	.0%	4.0%
Total		Count	25	12	13	50

	% within BMI	50.0%	24.0%	26.0%	100.0%
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6. CONCLUSION

An exploratory survey research was conducted in one public school (The Marshall School, Kanal Road) of Dehradun, from December 2013 to March 2014. A total of 50 affluent senior secondary school students of 11-18 years of age were studied. The study aimed at exploring & determining the critical factors that are associated with an unhealthy body weight for adolescents (11-18yrs of age), in order to assist in the development of an improved understanding of these factors (biological, environmental, social, & psychological factors). Secondly this study, aimed to determine the critical psychological factors (self-esteem, social correlates, & socio-cultural attitudes towards appearance) that are associated with an unhealthy body weight in order to assist in the development of an improved understanding of these factors. Accordingly, the results from the current research highlighted the most salient & pertinent factors implicated in the etiology & maintenance of obesity & overweight in the adolescent population. Once Body mass index (BMI) was found to be in the range of 16.43 to 38.46 with mean value of 24.497 and 4.700 standard deviation. 44% of the sample had good weight (students having BMI in range of 18.5 to 25 were 22), while 19 (38%) were overweight and 6 (12%) were obese in the current sample. Weight of students in this study was found to be in the range of 37 kg to 96 kg, where 10% students were from 52 & 60 kg respectively. Students were having height in the range of 137.5 cm. to 180 cm. In the current sample of 50 affluent adolescents, prevalence of obesity (BMI of ≥ 30) amongst the study subjects was 12% (i.e. 6 out of 50 were obese) and prevalence of overweight (BMI ≥ 25) was 38% (i.e. 19 out of 50 were overweight) as per International Obesity Task force (IOTF) definition. Out of the 6 obese students 5 belonged to OBESE CLASS 1 (BMI 30-35) & 1 belonged to the OBESE CLASS 2 (BMI 35-40). It was observed that only 6% (i.e. 12 students, in the age group of 11-18yrs.), were consuming alcohol & smoking, & 88% (i.e. 44 students), did not consume alcohol or smoke & had no history of alcohol consumption or smoking as well.

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