CHILDHOOD OBESITY: A STUDY AMONG TWO SOCIO-ECONOMIC GROUPS OF KOLKATA, WEST BENGAL.

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Abstract:

Obesity is a global health problem at epidemic proportions. The prevalence of childhood overweight and obesity increased during the 1980s to the late 1990s. The prevalence of obesity is higher in socially and economically disadvantaged communities in most Westernised countries. Potential links to childhood overweight and obesity include elevated risk of health concerns. The present study tried to understand the prevalence of obesity among children of contrasting socio-economic groups and its concomitants. A total of 200 participants have been included in the present study, The results show that none of the participants of either socio-economic groups are overweight or obese. Interestingly, less number of participants of HSEG are underweight that LSEG.

Introduction

Obesity can be defined simply as the condition where excess body fat has accumulated to such an extent that health may be adversely affected (Crowle et al. 2010). Obesity on the

other hand is defined as "an excessively high amount of body fat in relation to lean body mass" (Newfield. 2015).

Childhood obesity is associated with a range of health problems, emerging in childhood and later adult life. These include psychosocial problems such as social discrimination and reduced self-esteem, and physical health problems such as type 2 diabetes and risk factors associated with cardiovascular disease (Crowle et al. 2010). This project analyses the issue of childhood obesity within two economic group's framework.

There are several studies about 'juvenile obesity'. Some of the recent research relates 'juvenile obesity' with different aspects of our socio economic life. Crowle et al. (2010) undertook a large number survey among the Australian children to see the effect of economic factor on obesity. Jessica Newfield (2015) gave comparative data on food intake by the children which is a major source of children obesity. While Dehghan et al. (2005) tried to warn about the 'obesity epidemic' among the US children. Millimet et al. (2008) is concern about the same situation of USA children and how the school nutritional programs being helpful to reduce the obesity. Sandy et al. (2009) tried to find the obesity prevention methods at home and schools in several populations.

In Indian context there are several study going on in the recent times. Saraswathi et al. (2011) want to know the prevalence of childhood obesity in school children from rural and urban areas in Mysore population. Data on the prevalence of obesity in children were collected and analyzed from three and four major schools from urban and rural areas of Mysore district respectively. The prevalence of childhood obesity in Mysore is not very high as compared to other reports from different regions of the country. However, it is an important multi factorial condition which needs immediate medical attention to stop the march of healthy children towards chronic disorders. Raychaudhuri et al. (2012) describe 'juvenile obesity' as a grave issue, which needs to be addressed urgently. Raj and Kumar

(2009) see obesity as an independent risk factor for cardiovascular diseases and significantly increases the risk of morbidity and mortality. The last two decades have witnessed an increase in health care costs due to obesity and related issues among children. Jagadesan et al. (2013) worked on to determine the prevalence of overweight and obesity among children and adolescents in Chennai, India, using national and international age- and sex- specific body mass index (BMI). Another study by Kar et al. (2015) tried to light up the prevention of juvenile obesity in India. By doing so he gives a record of the best health care practises of the nations from all around the world.

In simple terms, obesity results from an imbalance between energy consumed and expended. But there is a complex web of factors that affect weight outcomes in children, some of which might account for the increased prevalence of obesity. Significantly, not all factors that affect children's weight outcomes will be completely within their control, and decisions about eating and exercise are not made exclusively with weight in mind. Although there is a genetic component to obesity also present' (Crowle et al. 2010). 'Childhood obesity is an important issue because of the staggering proportions that this disease has reached in the past few years. Widespread obesity has been the extreme result of certain genetic factors paired with changing lifestyles and culture' (Newfield. 2015). Body Mass Index (BMI) is the most commonly used method to measure obesity on a population level for both adults and children. For adults, it is calculated by dividing a person's weight in kilograms by their height in metres squared. This number is used to categorise adults into one of four widely accepted weight categories: underweight (BMI less than 18.5), normal weight (18.5 to 25), overweight (25 to 30) and obese (over 30) (WHO 2000). 'For children aged 2 to 18 years, to account for body composition changes during development, an internationally recognised set of age and gender specific BMI thresholds are used' (Cole et al. 2000; Cole et al. 2007). Childhood obesity has reached epidemic levels in developed countries. 'Twenty five percent of children

in the US are overweight and 11% are obese. About 70% of obese adolescents grow up to become obese adults. The prevalence of childhood obesity is in increasing since 1971 in developed countries. In some European countries such as the Scandinavian countries the prevalence of childhood obesity is lower as compared with Mediterranean countries; nonetheless, the proportion of obese children is rising in both cases. The highest prevalence rates of childhood obesity have been observed in developed countries, however, its prevalence is increasing in developing countries as well. The prevalence of childhood obesity is high in the Middle East, Central and Eastern Europe' (Dehghan et al 2005). Understanding the relationship between school nutrition programs and child weight is clearly important. As the incidence of overweight children has increased, so too has our understanding of the negative consequences that result. First and foremost, overweight children are signicantly more likely to become obese adults. Serdula et al. (1993) find that one-third of overweight preschool-aged children and one-half of overweight school-aged children become obese adults. 'The adverse health effects of obesity include, among others, depression, sleep disorders, asthma, cardiovascular and pulmonary complications, and type II diabetes' (Ebbling et al. 2002). Aside from recent policy developments, two federal programs that have long been in existence have been met with renewed interest in USA: the School Breakfast Program (SBP) and the National School Lunch Program (NSLP) are one of the well known school health programs which are causing immense effect on 'juvenile obesity' (Millimet et al. 2008). This trend is troubling because there are well-established connections between child obesity, other childhood diseases, and subsequent adult diseases. While reducing child obesity is a high priority in public policy, its precise causes and, consequently, effective public policies for its reduction, are far from clear. 'Although the physiology of weight gain or loss is attributable to calorie consumption and expenditure, the determinants of a child's calories or energy expenditure have yet to be explained. Simple addition of the impacts of all

of the variables that have statistically-significant effects on child weight leaves more than two thirds of the change in child body mass index (BMI) unexplained. Increasingly, environmental factors are being examined as candidates for obesity interventions. The built environment is potentially a good target for public policy interventions to increase physical activity or reduce calories consumption because environmental interventions have the potential to impact energy balance behaviors of entire communities. Moreover, the built environment may more susceptible to public policy interventions than either the home or the school. Shifting to schools, several experimental interventions in sets of primary schools that combined nutrition education, healthier school meals, removal of soft drink and snack food vending machines, and more physical education had no effect on children's weights' (Kolata, 2006). Sandy et al. (2009) took environmental factors such as fast food restaurants, supermarkets, parks, trails, and violent crimes, and 13 types of recreational amenities derived from the interpretation of annual aerial photographs as the method for studding the child 'obesity epidemic'.

'Obesity is not a single disorder but a heterogeneous group of conditions with multiple causes' (Saraswathi et al. 2011). 'Body weight is determined by an interaction between genetic, environmental, psychological factors acting through the physiological mediators of energy intake and expenditure. Even in India, malnutrition has attracted the focus of health workers, as childhood obesity was rarely observed. But over the past few years, childhood obesity is increasingly being observed with the changing lifestyle of families with increased purchasing power, increasing hours of inactivity due to addiction to television, videogames and computer, which have replaced outdoor games and other social activities' (Singh and Sharma 2005). Globally, an estimated 10 percent of school children aged between 5 to 17 years are overweight and obese (Childhood Obesity-the Global Picture 2006). The prevalence of obesity in children has increased over the past few decades and its statistics are

alarming. 'The prevalence and etiologies behind the childhood obesity may vary according to an individual lifestyle and their socio-economic status' (Saraswathi et al. 2011). 'The combination of our genetic propensity to store fat, the ready availability of calorie dense foods, and sedentary lifestyle promotes overweight. The child's food environment at home and parental obesity are strong determinants. Urban poor in developed countries and urban rich in developing countries are both at risk. In developing countries, a number of beliefs passed down over generations are other important determinants' (Raychaudhuri et al. 2012). For children and adolescents, overweight and obesity are defined using age and sex specific body mass index (BMI). Parental food choices significantly modify child food preferences24, and degree of parental adiposity is a surrogate for children's fat preferences25. Children and adolescents of poor socio-economic status tend to consume less quantities of fruits and vegetables and to have a higher intake of total and saturated fat. Television viewing and other sedentary activities have also been related to childhood obesity. Unfortunately this habit is growing exponentially in developing countries as well. Low levels of physical activity are definitely promoted by an automated and automobile-oriented environment that is conducive to a sedentary lifestyle. Community design and infrastructure characteristics are also becoming increasingly important in determining levels of obesity in populations. Such factors include availability of safe walkways, bicycle paths, playgrounds and other avenues for physical activity related recreation (Raj and Kumar. 2009). 'Obesity has emerged as one of the global health problems with 200 million school-aged children world-wide categorized as being overweight or obese, of which 40-50 million are obese' (Jagadesan. 2013). 'Overprotection and forced feeding by parents, false traditional beliefs about health and nutrition, low knowledge about nutrition in parents and caregivers also contribute to obesity. Again limited availability of open spaces and parks due to population expansion and illegal settlements with abundance of fast-food outlets and eating points increase the chance of the

child becoming obese.' It is the socio-cultural factors and urbanization effect on obesity by Kar et al. (2015). In this paper how India can incorporate many of the foreign healthy habits are noted.

I have chosen the areas having different socio-economic background. In these area no such publish work is been present. As for two socio-economic schools I have chosen one street children school and another government sanctioned school.

Objectives –

1. To study the obesity among the two socio-economic groups.

2. To understand the socio-economic and lifestyle factors associated with obesity factors among the school going children.

Materials and Methods :

For this account, several measurements were undertaken, including Height, Weight, Head Circumference, Chest Circumference, Waist Circumference, Mid Upper Arm Circumference, Bicep Skinfold, Tricep Skinfold and Sub-scapular skinfold.

Height was measured in centimeters (cm) using a stadiometer. Weight was measured in kilograms (Kg) using a standardized weighing machine. Body mass index (BMI) was calculated using the formula weight (Kg) divided by height in square meters (m2). The circumferences were measured in centimeters using a non-stretchable fiber measuring tape. And the skinfolds were measured by skinfold calliper.

For calculating the BMI, WHO standard BMI charts (*http://www.who.int/growthref/who2007_bmi_for_age/en/*) for 5 to 19 years children are been followed. According to which male and female BMI rated are a little different.

Sampling method: Students of both the schools are randomly selected as per they present at the measurement taking days. Same number of children in a class in different schools tried to be maintained. Thus same number of participant's data had been taken from two schools.

Number of participants –

Total number of participants is 200; 100 from each school.

Area of study –

Two schools are situated in different localities. The low socio economic school, 'Sishumongal' situates at Sovabazar, North Kolkata and the high economic school, 'Akhaysmriti Madhymik Bidhyalaya' situates at Ariadaha, North 24 Parganas. The schools are chosen in the basis of their fee structures.

Result

Table No.1 Distribution of Age-

Age Groups (in years)	LSEG	HSEG
5-7	6.14 ± 0.4387	6.37 ± 0.135
8-10	8.83 ± 0.768	9.07 ± 0.447
11-13	11.92 ± 0.442	11.91 ± 0.467
14-16	14.33 ± 0.179	14.18 ± 0.258

Around same number of participants from both socio economic groups are taken. Thus the data would not be manipulated by participant number in respect to age.

Table No.2 Distribution of Height (cm) -

Age Groups (years)	LSEG	HSEG

Age Groups	LSEG	HSEG
5-7	117.1±161.204	102.174±1064.679
8-10	123.533±5.598	125.977±869.652
11-13	142.454±38.287	136.092±26.678
14-16	148.675±128.923	139.327±141.767

Height is most diversified in 5-7 age groups among the HSEG rather than LSEG. But variation of height in 8-10 age group is very minimum among LSEG than HSEG. Though variation is less in 11-13 age group for both LSEG and HSEG, according to HSEG the rate dropped greater in number. Thus for LSEG the rate indicate a little increase in height variation. For 14-16 age group, diversity of heights are high in case of HSEG than LSEG.

Table No.3 Distribution of Weight (kg) -

Age Groups (years)	LSEG	HSEG
5-7	17.143±1.029	18.25±3.642
8-10	21.917±8849.132	24.846±25.769
11-13	28.692±7.216	29.25±12.924
14-16	38.167±8.049	35.545±27.474

Weight is more diversified among high socio economic group in 11-13 and 14-16 age groups. But the diversification is most among 8-10 age group of LSEG. But weight differences between two age groups are more in case of low socio economic group rather than high socio economic group. And they have a high margin of weight rather than HSEG belonging children.

Table No.4 Distribution of Waist Circumference-

Age Groups (years)	LSEG	HSEG
5-7	51.357$\pm$34.406	48.437$\pm$0.595
8-10	54$\pm$33.199	53.038$\pm$30.129
11-13	32.413$\pm$243.599	57.583$\pm$4.993
14-16	62.958$\pm$34.32	66.227$\pm$6.193

The rate of waist circumference is high among the HSEG. The 11-13 age group of LSEG has very low deviated score. The changing scores of HSEG in respect of age groups, has increasing rates.

Table No.5 Distribution of Mid Upper Arm Circumference –

Age Groups (years)	LSEG	HSEG
5-7	19.143$\pm$9.857	17.625$\pm$265.258
8-10	18.692$\pm$2.08	18.885$\pm$0.049
11-13	11.369$\pm$977.959	19.375$\pm$1.868
14-16	21.625$\pm$13.054	20.909$\pm$4.89

Stabilize increase in mean rate of mid upper arm circumference is seen among the HSEG. But varied increase and decreased mean rates are seen among LSEG. While deviated score is highest at the 5-7 age group in case of HSEG, the LSEG has the highest deviated score in 11-13 age group.

Table No.6 Distribution of BMI –

Age Groups (years)	LSEG		HSEG	
	Male	Female	Male	Female
5-7	13.2+6.202 (underweight)	13+1 (underweight)	13.8+0.552 (underweight)	13+0 (underweight)
8-10	14.5+1.411 (normal)	13.9+1.951 (underweight)	15+4.286 (normal)	14.5+1.402 (normal)
11-13	14.9+1.538 (normal)	14.6+0.756 (underweight)	15.2+2.747 (normal)	15.3+1.881 (normal)
14-16	16.3+0.236 (underweight)	19.5+15.427 (normal)	18.6+8.177 (normal)	20+40.395 (normal)

BMI Categories	LSEG		HSEG	
	M (%)	F (%)	M (%)	F (%)
Underweight	64	79	11	18
Normal	46	21	89	82
Overweight	0	0	0	0
Obese	0	0	0	0

In the low socio economic group males are found underweight as per mean in 5-7 and 14-16 age groups. But as per deviation the BMI rate differentiate at 5-7 age group much higher than 14-16 age group. Both the 8-10 and 11-13 groups have normal BMI by mean and their deviated scores are not high and also not much varied from each other.

In the LSEG females are found underweight as per mean in 5-7, 8-10 and 11-13 age groups. And as per deviation the BMI rates are also not very much differentiated in these age groups. But at 14-16 age group BMI is normal with a little high deviated score.

In the HSEG males are found underweight as per mean only in 5-7 age group with a very little deviated score. While all the 8-10, 11-13 and 14-16 age groups are normal as per means but deviated scores are differentiated. In 14-16 age group BMI deviation score is highest and lowest is in 11-13 age group.

In the HSEG males are found underweight as per mean only in 5-7 age group with no deviation. While all the 8-10, 11-13 and 14-16 age groups are normal as per means but deviated score is very high at 14-16 age group.

None of the participants of either socio-economic groups are overweight or obese. Interestingly, less number of participants of HSEG are underweight that LSEG.

Description of questionnaire

In the low socio economic group it has been noted that their fathers either street vendors or work in shops mainly. Their mothers are though being as much educated as their fathers are house wife. Most of the teenager females can perform all the house works. Only a few of them have thought to have a job later in their life.

The participants get rice only at one time in a day. As per teenager females, skipping of dinner is present at a regular basis. Most of them brought street food as tiffin. In holidays they mainly took fish while everyday they mainly eat cereal and leafy vegetables or boiled vegetables. Thus they have less protein and skip one time meal their every day calorie intake is less. As they cannot eat homemade foods in tiffin, they have to intake fast food from street vendors which are not very healthy or hygienic to take.

Only two boys and a girl are associated with sports. Most of them are indifferent to wards exercise and fonder of indoor games.

In the high socio economic group parents of the participants are related with various occupations. There are teachers, doctors but the dominated occupation is business. Mothers are also took various jobs as their occupation though most of them are housewives. At least one of the parents (mostly fathers) is graduate.

The participants took at least one meal of the two with fish. One or two days in a week are forbidden to eat non-vegetable foods. And most of them have chicken or mutton preparation once in a week, mainly at Sundays. There are a varied kind of foods are taken in tiffin by the participants. Some of them take puffed rice, ruti and fried vegetables/ vegetable curry, fruits etc. They are less relied on fast food than low socio economic group. Some of the participants has chicken or mutton preparations twice within a week and has different kind of international cuisines. As most of them have ruti or bread along with several other food items in their tiffin so their caloric impute are balanced and sometime a little excess.

Six of the males are associated with sports in regular basis. Females are quite less attracted towards sports.

Discussion

For the first conclusion according to sex and mainly age the results differ dramatically. In some of the results, LSEG provided high rate of data than high socio economic group. For example in height, weight and head circumference are produced higher rates of data in case of LSEG group rather than HSEG. It has been derived from the result that the LSEG participants have more fast foods rather than the HSEG.

In the second conclusion the participants doing everyday sports are marked with normal BMI. Overweight children are two in number in HSEG and none in LSEG. As for getting obese individuals, only one boy is from LSEG and a girl and a boy from HSEG. So the main difference lies between how many of them are underweight or normal. In that case, LSEG has more number of underweight participants than HSEG. And the HSEG has more number of normal individuals than LSEG.

Not only the participant, but his/her family also took into account through the income and occupation of parents, daily food intake habits etc. (Raychaudhuri M. et al. 2012). It is surely indicate a large difference between two groups. Like in LSEG we found most of the students family has only one member working and thus they either are street vendors or work in shops mainly. As only a few of the parents passed Madhymik, their educational backdrop should be a cause for lack concentration on children health (Kar S. S. 2015). For example the teenage girls do not eat dinner as regular basis (Jagadesan S. 2014). But nun like this statements found from any male side. A clear matter of gender inequality indentified in this section. As for mid upper arm circumference LSEG have higher data only in case of 5-7 and 14-16 age groups. All of these examples are represent very few amounts of exceptions.

The obese children are also very few in number in HSEG because some health consciousness are build up among them from childhood (Raj M. 2009). They maintain exact timing of a day to have food. They are aware of unhygienic foods, so most of them are not fond of having snacks from street vendors even when they feel hungry.

Though there is an expectation to find low rates of measurements among LSEG than HSEG but in many of the cases this expectation differed. In Height measurements without 8-10 age group of LSEG children have more height than HSEG school children. As for weight measurement only the 14-16 age group has higher rate in case of LSEG rather than HSEG. In 11-13 age group of LSEG school children have more head and waist circumference than

HSEG school children. The same account is true for the 5-7 age group for the chest circumference.

The present paper is a first effort in using these data. As the total number of children could not be measured sure there is some dissatisfaction present of having more varied results.

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