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Parental socioeconomic conditions and prevalence of overweight among Nepali adolescent girls of Sikkim, Northeast India

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KEYWORDS

BMI, overweight, adolescent, socio-economic conditions

ABSTRACT

Obesity is evolving as a major public health problem. The present study was conducted to see the prevalence of overweight with different socio-economic conditions of parents. Data were collected from Nepali adolescent girls aged 10-16 years from different villages of East Sikkim, West Sikkim and South Sikkim. The prevalence of overweight was calculated based on z-scores BMI for age and sex. Present study shows that the prevalence of overweight was higher in early adolescent (22.4%) than mid adolescent (20.2%). The frequency of overweight was higher among girls from high-income family (23.4%), whose mothers (22.8%) and fathers (22.7%) attained primary education. Adolescent girls whose mothers (24.2%) and fathers (25.0%) are government employees also show higher prevalence of overweight. In conclusion, there are positive association between the prevalence of overweight and parental socio-economic conditions. Inequalities in socioeconomic conditions may differ in the availability and access to good nutrition and health care facilities.

Introduction

Childhood obesity is one of the most serious public health challenges of the 21st century (Sahoo *et al*. 2017). It is a condition of excess body fat often associated with a large number of debilitating and life-threatening disorders (Dietz and Robinson 2000). It is an increasingly prevalent nutritional disorder among children and adolescents in the world (Ross *et al*. 1987; Shear *et al*. 1988). The central cause of overweight and obesity is the imbalance of energy intake from food and energy expended through physical activity (Williams and Greene, 2018). Childhood and adolescence is a critical period of human life as it is characterized by rapid physical and sexual growth and changes in body fat that determine adult weight and height (Cole *et al*. 2000). According to the WHO statistics, more than 1.6 billion people ≥15 year old are overweight or obese (WHO 2000). A study in India shows that 10-15 percent of school children are overweight (Jacob *et al*. 2016). Childhood obesity is evolving as a major public health problem, which increases the risk of subsequent morbidity (WHO 2005). It can lead to diabetes, high blood pressure, heart disease, sleep problems, cancer, liver disease, early puberty, asthma and other respiratory problems (Dixon *et al*. 2003).

The prevalence of overweight and obesity are increasing in developing countries, and even in low-income groups in richer countries (WHO 2000). Obesity is not only a problem of the individual but also a problem rooted in the neighbourhoods and schools, modes of transportation, local food availability, food advertising and government policies (Galvez *et al*. 2003). Since 1989, numerous studies

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have reported that childhood overweight is inversely correlated with parental education, occupation and income, which shows that lower parental SES is associated with less-healthful eating and more physical inactivity (Hanson and Chen 2007; Shrewbury and Wardle 2008). In addition, studies have consistently found that the inverse correlation with overweight was stronger for parental education than for parental occupation or income (Shrewbury and Wardle 2008). Children living with overweight parents, especially mothers, are more likely to become overweight (Gibson *et al*. 2002; Wang *et al*. 2002).

Under this backdrop, the present study focuses on the relationship of parental socio-economic conditions and prevalence of overweight among the Nepali adolescent girls of Sikkim, Northeast India.

Materials and methods

Sikkim is a small and beautiful multi-ethnic state located in the Eastern Himalayas of India. The State is divided into four districts, namely North, West, East and South. The major ethnic groups of the region are Lepcha, Bhutia and Nepali having each own distinct culture, language and traditions. The data for the present study was collected from 1007 Nepali adolescent girls aged 10-16 years residing in the rural areas of West, South and East district of Sikkim. From West district, data was collected from three closely situated villages namely Sombaria, Tekpur and Thapu. The villages from South district in data collection include Turung, Namathang, Namping, Tokal Bermiok and Yangang. From East district, data was collected from Samdong, Tumin, Rakdong and Makha village. Data were collected from the umbrella term Nepali, which includes different groups like Sharma, Chettri, Rai, Limboo, Tamang, Manger, Sherpa, Kami, Damii etc. Agriculture is the main occupation for livelihood in these villages. Besides agriculture, some of them sustained their daily activities through poultry and dairy farming.

Data on anthropometric measurements such as height and weight were collected from each subject wearing light clothes. An anthropometric rod and a weighing scale to the nearest of 0.1 cm and 0.5 kg respectively was used to measure height and weight (Lohman et al. 1998). The prevalence of overweight/obesity was calculated based on z-scores BMI for age and sex (WHO 2007). According to this interpretation, BMI z-score >+2SD is considered as obese, BMI z-score >+1SD, considered as overweight and BMI z-score <-2SD considered as underweight. Since the sample size was very large, the study subjects were divided as early adolescent (10-14 years) and mid adolescent (15-16 years) to see the differences in the prevalence of overweight.

Data on family income, parents' educational level, parents' occupation, family type and house type were collected from each subject or head of the household through structured schedule. The per capita monthly income of the households was classified as high income (above 75th percentile), middle income (between 50th-75th percentile) and low income group (below 50th percentile). Educational attainments of the parents were divided as illiterate, primary education (class I-V), secondary education (class VI-X) and higher secondary education (XI-XII). The illiterate and higher secondary education are clubbed them together with primary education and secondary education respectively. Occupations of the participant's parents were classified as housewife, farmer, self employ and government employee. Self-employ includes shopkeeper, social worker, carpenter, plumber, driver, beautician, gym instructor etc. House type in the present study was divided as pakka house (cement and brick house) and kaccha house (mud and wood). Family type was divided as nuclear family and joint family. The data collected was analysed using both MS-Excel and SPSS software for the present research. The parameters taken were analysed statistically to find out the mean and the standard deviation for the anthropometric measurements. In order to test the significance, t-test and chi square was used in the present study. Binary logistic regression analysis was also used to see the risks of overweight among adolescent girls in relation with parental socioeconomic conditions.

Results

The distribution of mean height, weight and BMI shows gradually increase with increasing the age in the present study (table 1). The higher frequency of mean height was found more or less the same among the girls in the age group 15 years (153.1cm) and 16 years (152.9 cm). The higher frequency of mean weight was found in the age group of 16 years (51.0kg). Table further shows that the mean BMI was found slightly higher in the age group 16 years (21.9). The higher frequency of overweight (36.7%) was found among the girls of 10 years of age. This was followed by the frequency of overweight 27.8 percent, 24.1 percent, 20.2 percent, 20.1 percent, 19.1 percent and 18.2 percent in the age group 11 years, 13 years, 15 years, 16 years, 12 years and 14 years respectively. The overall prevalence of overweight was 21.5 percent among the girls in the present study.

Table 1: Distribution of mean height, weight, BMI and overweight among Nepali girls of Sikkim

Age	N	Mean height (cm) ±SD	Mean weight(kg) ±SD	Mean BMI±SD	Overweight
10 year	30	136.1±8.1	34.0±8.9	18.2±2.9	11(36.7%)
11year	72	139.2±8.0	35.8±8.6	18.5±3.0	20(27.8%)
12 year	89	144.9±8.1	40.2±8.6	19.1±3.0	17(19.1%)
13 year	172	148.7±8.1	44.6±8.6	20.1±3.0	42(24.1%)
14 year	203	152.1±8.0	47.6±8.5	20.6±3.0	37(18.2%)
15 year	242	153.1±8.0	50.1±8.6	21.4±3.0	49(20.2%)
16 year	199	152.9±8.0	51.0±8.6	21.9±3.0	40(20.1%)
Total	1007	149.9±8.0	46.4±8.6	20.6±3.0	216(21.5%)

Table 2 shows that mean height (152.9cm), mean weight (50.5kg) and mean BMI (21.6) was significantly higher among mid adolescent Nepali girls. Mean height, weight and BMI among early adolescent Nepali girls was 147.4cm, 43.3kg and 19.8 respectively. The prevalence of overweight was higher among early adolescent Nepali girls (22.4) than mid adolescent Nepali girls (20.2%).

Table 2: Distribution of mean height, weight, BMI and overweight among early adolescent and mid adolescent Nepali girls of Sikkim

Category	N	Mean height (cm)±SD	Mean weight(kg)±SD	Mean BMI±SD	Overweight
Early adolescent	566	147.4±8.4	43.3±8.5	19.8±2.9	127(22.4%)
Mid adolescent	441	152.9±6.2	50.5±6.9	21.6±2.8	89(20.2%)
		P<0.01	P<0.01	P<0.01	

Table 3 shows that the prevalence of overweight was higher among early adolescent girls from high income family (26.8%). This was followed by the prevalence of overweight among early adolescent girls from low income family (22.1%) and middle income family (19.8%). Whereas, among mid adolescent girls, the prevalence of overweight was found more or less the same in middle income (20.3%) and low income family (20.6%). The prevalence of overweight among mid adolescent girls from high income family was 18.9 percent. Early adolescent girls from the nuclear family (22.7%) show higher percentage of overweight than joint family (19.5%). Similarly, the mid adolescent girls from nuclear family (20.2%) show slightly higher percentage than joint family (19.4%). Table further shows that early adolescent girls living in *pakka* house (24.7%) recorded higher percentage of overweight than girls living in *kaccha* house (19.8%). However, it was found more or less the same in mid adolescent girls living in *kaccha* house

(19.9%) and *pakka* house (20.4%).

Table 3: Prevalence of overweight in relation to family income, family type and house type among early adolescent girls and mid adolescent girls of Sikkim

Income	N	Early adolescent	N	Mid adolescent
High Income Group Middle Income Group Low Income Group	127 167 272	34(26.8%) 33(19.8%) 60(22.1%)	95 128 218	18(18.9%) 26(20.3%) 45(20.6%)
Family type	χ^2=0.353;df=2;p>0.05		χ^2=0.942;df=2;p>0.05	
Nuclear Family Joint Family	525 41	119(22.7%) 8(19.5%)	405 36	82(20.2%) 7(19.4%)
House type	χ^2=0.641;df=1;p>0.05		χ^2=0.908;df=1;p>0.05	
Kaccha House Pakka House	262 304	52(19.8%) 75(24.7%)	196 245	39(19.9%) 50(20.4%)
	χ^2=0.170;df=1;p>0.05		χ^2=0.894;df=1;p>0.05	

Table 4 shows that the prevalence of overweight was higher among early adolescent girls whose mothers attained primary education (24.6%) than secondary education (20.3%). In mid adolescent girls, the prevalence of overweight was also found slight higher among girls whose mothers attained primary education (20.7%) than secondary education (19.5%). The frequency of overweight was higher among girls whose mothers are government employees in both early adolescent (25.9%) and mid adolescent girls (22.0%).

Table 4: Prevalence of overweight among Nepali girls in relation to mothers' education and occupation of Sikkim

Education	N	Early adolescent	N	Mid adolescent
Primary Secondary	276 290	68(24.6%) 59(20.3%)	251 190	52(20.7%) 37(19.5%)
Occupation	χ^2=0.221;df=1;p>0.05		χ^2=0.747;df=1;p>0.05	
Housewife Government employee	508 58	112(22.0%) 15(25.9%)	400 41	80(20.0%) 9(22.0%)
	χ^2=0.509;df=1;p>0.05		χ^2=0.767;df=1;p>0.05	

Table 5 shows that the frequency of overweight was found slight higher among early adolescent girls (23.7%) and mid adolescent girls (21.4%) whose fathers attained primary education. The frequency of overweight was higher among early adolescent girls whose fathers are government employees (30.8%). It was found more or less the same among early adolescent girls whose fathers are farmers (21.7%) and self-employ (21.4%). In case of mid adolescent girls, the frequency of overweight was found higher among those whose fathers are farmers (22.0%), followed by government employee (18.8%) and self-employ (16.4%).

Table 5: Prevalence of overweight among girls in relation to fathers' education and occupation of Sikkim

Education	N	Early adolescent	N	Mid adolescent
Primary Secondary	241 325	57(23.7%) 70(21.5%)	201 240	43(21.4%) 46(19.2%)
Occupation	χ^2=0.551;df=1;p>0.05		χ^2=0.562;df=1;p>0.05	

Farmer	318	69(21.7%)	277	61(22.0%)
Self-employ	196	42(21.4%)	116	19(16.4%)
Government employee	52	16(30.8%)	48	9(18.8%)
	χ^2=0.318;df=2;p>0.05		χ^2=0.431;df=2;p>0.05	

Adolescent girls from higher income family shows higher prevalence of overweight (23.4%) in the present study (table-6). This was followed by low income family (21.4%) and middle income family (20.0%). Adolescent girls from nuclear family (21.6%) show slightly higher overweight than joint family (19.5%). Table further shows that adolescent girls from *pakka* house (21.8%) have slightly higher prevalence of overweight that *kaccha* house (19.9%). The frequency of overweight was higher among girls whose mothers (22.8%) and fathers (22.7%) attained primary education. Adolescent girls whose mothers are government employees (24.2%) show higher prevalence of overweight than housewife (21.1%). Similarly, adolescent girls whose fathers are government employees (25.0%) show higher prevalence of overweight. This was followed by adolescent girls whose fathers are farmers (21.8%) and self-employ (19.6%).

Table 6: Risks of overweight among adolescent girls by parents' socio-economic conditions of Sikkim

Variables	N	Overweight	OR (95% cl)	P
Age group				
Early adolescent	566	127(22.4%)	1	
Mid adolescent	441	89(20.2%)	0.841(0.618-1.145)	0.272
Income				
HIG	222	52(23.4%)	1	
MIG	295	59(20.0%)	0.861(0.500-1.484)	0.590
LIG	490	105(21.4%)	0.859(0.469-1.575)	0.624
Family type				
Nuclear family	930	201(21.6%)	1	
Joint family	77	15(19.5%)	0.893(0.489-1.630)	0.712
House type				
Kaccha house	458	91(19.9%)	1	
Pakka house	594	125(21.8%)	1.233(0.893-1.701)	0.203
Mothers' education				
Primary	527	120(22.8%)	1	
Secondary	480	96(20.0%)	0.819(0.579-1.159)	0.260
Fathers' education				
Primary	442	100(22.7%)	1	
Secondary	565	116(20.5%)	0.867(0.609-1.236)	0.431
Mothers' occupation				
Housewife	908	192(21.1%)	1	
Govt. employee	99	24(24.2%)	1.232(0.700-2.167)	0.469
Fathers' occupation				
Farmers	595	130(21.8%)	1	
Self-employ	312	61(19.6%)	0.818(0.543-1.234)	0.338
Govt. employee	100	25(25.0%)	1.081(0.545-2.143)	0.824

OR-odd ratio; cl-confidence level; 1-reference value (regression analysis)

Discussion

An ideal nutritional status occurs when the supply of nutrients conforms to the nutritional requirements (Popkin 2001). Weight disorders such as overweight and underweight are now recognized as risk factors for health problems in childhood and adolescence (Bandini 2001). The prevalence of overweight is steadily increasing among children and adolescents. It is marginally higher in pubertal age group of girls (Kaur et al. 2005). In present study, the prevalence of overweight is higher among adolescent girls aged 10 years. It is also found higher among early adolescent Nepali girls than mid

adolescent Nepali girls. The increasing prevalence of overweight may adversely affect physical and psychosocial health among children and adolescents (Sato *et al*. 2011). Physical activity is important for determining the body weight of an individual. A recent study in Iran found that lack of safe and easy access place for physical activity and unsupportive family were the main barriers to physical activity among adolescents (Kelishadi *et al*. 2009). Decreased in physical activity along with sedentary lifestyle and altered eating patterns relatively increased the prevalence of overweight (Kapil *et al*. 2002). Further, the differences in the availability of healthier foods in homes and schools, as well as the availability of safe environments for physical activity could cause obesity (Lieb *et. al* 2009). In present study, the prevalence of overweight was found higher among adolescent girls from high income family, nuclear family and living in *pakka* houses. Rapid economic growth has improved the nutritional and health status of many countries (WHO 2003). Higher income family can relatively provide and easily afford good nutrition, better health care and overall better lifestyles. Children from upper class families experiences more sedentary lifestyle as they tends to spend most of their time in front of television, play video games and watch computers (Karnik and Kanekar 2012). Studies conducted in India show that income inequality had the same effect on the risk of being overweight (Subramanian *et al*. 2007).

Educational and occupational levels of parents are considered as important factors for determining overweight of the children. Illiteracy and lack of proper knowledge of diet are important for causing malnutrition among Korku tribe (Das 2010; Venkaish *et al*. 2002). In the present study, adolescent girls show higher prevalence of overweight whose parents attained primary level of education. It further shows that the prevalence of overweight was found higher among girls whose parents are government employees in the present study. Differences in socioeconomic factors are important in explaining the variation in the prevalence of overweight. In low income countries, obesity in children has been associated with high parental socioeconomic status and underweight with lower socioeconomic status, in wealthy countries the opposite is true (Shrewsbury and Wardle 2008). In Denmark, an increased prevalence of overweight in children from low educational levels families has been attributed to social inequalities (Matthiessen *et al*. 2014).

Conclusion

Present study shows that the prevalence of overweight was higher among early adolescent Nepali girls than mid adolescent Nepali girls. Parental socio-economic conditions play an important role in the prevalence of overweight among adolescent girls. Inequalities in socio-economic conditions may differ in the availability and access to good nutrition and health care facilities. Besides this, Sikkim being rough and steep mountainous regions, availability and easy access of playground and open spaces are limited. This may relatively increased the restriction to home environment thereby leading to lifestyles that are more sedentary.

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