



Determinants of overweight/obesity among adult Tamang males and females of the Pakyong sub-division of East Sikkim, North-East India

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KEYWORDS

BMI, Overweight, Obesity, Lifestyle

ABSTRACT

The prevalence of overweight and obesity is becoming a global epidemic health problem. It is rapidly increasing in both developed and developing countries. Excess weight is associated with an increased risk of death resulting in around 2.8 million deaths of adults globally every year. Data for the present study was collected through random sampling method from adult Tamang males (84 participants) and females (102 participants) of the Pakyong sub-division of East Sikkim, North-East India. Data on height, weight, socio-economic conditions, lifestyles etc. were collected for the present study. The prevalence of overweight and obesity has been evaluated by using Asian cut-off points given by the World Health Organization. The result shows that 32.09 percent and 42.16 percent of adult males and females were overweight/obesity respectively. The prevalence of overweight/obesity was higher among the high-income group (males-66.67% and females-91.30%) and who attained secondary education (males-43.75% and females-44.44%). The frequency of overweight/obesity was significantly higher in both males (47.05%) and females (60.93%) who eat non-vegetables 3-4 times per week. Certain socio-economic factors such as family income, occupation, physical activities and dietary habits play an important role in determining the prevalence of overweight/obesity in the study population.

Introduction

Obesity is defined simply as the excess amount of adipose tissue in the body. It is a common manifestation of energy imbalance between energy consumption through eating and energy expenditure through metabolism and physical activity (Akil and Ahmad 2011). It is one of the emerging health problems for both the developed and the developing countries. It affects the health of the person to varying degrees and in certain cases becomes the cause of death directly or indirectly. The accumulation of excess fat in the abdominal region is considered as one of the greatest risk factor for disease (WHO 1998). WHO reported that about 2.3 billion of the world population over the age of 15 years were overweight and 700 million were obese. Excess weight is associated with increased risk of death resulting in around 2.8 million deaths of adults globally every year (WHO 2015). In addition, 44 percent of diabetes cases, 23 percent of heart disease cases and 7 percent to 41 percent of certain cancer cases are attributable to excess weight (Gouda and Prusty 2014). In addition to the increased risks of death, it decreases both the quantity and quality of life (Allison *et al.* 2006).

Often coexisting with under nutrition in developing countries, obesity is a complex condition with

serious social and psychological dimensions affecting all ages and socioeconomic groups (WHO 2003). The number of obese people has significantly increased in the past 20 years. Its prevalence is higher in middle and high-income countries. In certain developed countries, 50 percent to 65 percent of the total population is overweight or obese, which means only about one third of the people have normal body weight (Rosiek *et al.* 2015). The rapid economic growth, urbanization and consequent changes in the lifestyles are among the important factors for worldwide obesity epidemic (Karageorgi *et al.* 2013). According to the National Family Health Survey 4, India's obesity has doubled in the past ten years. States such as Andhra Pradesh, Andaman and Nicobar, Pondicherry and Sikkim have more than 30 percent of their population falling under the obese category (IIPS-4, 2015-16). More than 10 percent of population in Bihar, Madhya Pradesh, Meghalaya, Tripura and West Bengal is obese (Pandey 2016). The NFHS-4 fact sheet of Sikkim state shows that the prevalence of obesity (BMI ≥ 25.0 kg/m²) for men is 41.5 percent in the urban areas and 29.7 percent in the rural areas. Among the women, the data shows 34.1 percent and 23.1 percent in the urban and the rural areas respectively.

Therefore, under this backdrop, the present study is conducted to find the determinants of overweight/obesity among Tamang adult males and females of Sikkim, Northeast India.

Materials and methods

The present research was conducted in the Pakyong sub-division under East district of Sikkim, North East India. Sikkim is a small Himalayan state, which is inhabited by three major ethnic communities, namely, Bhutia, Lepcha, and Nepali. Each community has their own language or dialect, traditions, cultures and religion. The data was collected from Tamang adult males and females aged 20 to 60 years through random sampling from villages like Chalamthang, Dugalakha, Nayabasty and Taza of Pakyong sub-division of East Sikkim. The Tamang is one of the ethnic groups of Nepali community of Sikkim. It is believed that they originally came from Tibet and spoke the Tibetan-Burman language (Gurung 2011). In 2003, they are included in the schedule tribe category of Sikkim. They have their own distinct culture as evident from their traditional and social customs, food habits, songs and dances, musical instruments, festivals and language. The majority of Tamang in study areas is engaged in agricultural occupation and few are engaged in government jobs and private sectors. Adult Tamang females are mostly engaged in house hold activities.

Total sample of 84 males and 102 females were collected for the present research. 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 was used to measure the height and weight of the subjects following the standard technique (Lohman *et al.* 1998). Prevalence of overweight/obesity was evaluated using Asian cut-off points (WHO 2000). According to Asian cut-off points, BMI ≥ 27.5 kg/m² has been considered as obese, BMI between 23.5-27.4 kg/m² considered as overweight. BMI between 18.5-23.4 kg/m² is considered as normal and BMI below 18.5 kg/m² considered as underweight. Data on various socio-economic conditions such as age, sex, marital status, education, occupation, income, family type, house type etc. were collected from each subject. Data on lifestyle factors like physical activity and television time were collected from each subject. Data on food habits was also collected for the present study. The per capita monthly income of the households was classified as follows: above 75th percentile (>Rs. 5000) = high-income group, 50th to 75th percentile (Rs. 2857-5000) = middle-income group and below 50th percentile (<Rs. 2857) = low-income group. Data on educational attainment of individuals were classified into three categories, namely, primary, secondary and higher secondary and above. Occupation was classified as housewife, private jobs and other occupations. Other occupations include students and government employees. Data on physical activity, television time, consumption of non-vegetables and alcohol consumption were collected following a recall method of one week.

The data collected was analyzed using MS-Excel software. The parameters taken were analyzed statistically to find out the mean and the standard deviation for the anthropometric measurements. In order to test the significance of the means of different anthropometric measurements, t-test was used in present study. The chi-square test was also used to test the significance of the prevalence of overweight/obesity with different socioeconomic conditions, lifestyles and food habits.

Results

Table 1 shows that the mean height was higher among Tamang adult males ($155.42\text{cm}\pm 7.89$) than females ($153.58\text{cm}\pm 6.75$) in the present study. The mean weight was found significantly ($P<0.05$) higher among Tamang males ($52.79\text{kg}\pm 9.42$) than females ($51.72\text{kg}\pm 8.36$). However, the mean BMI was found slightly higher among adult females (22.73 ± 3.75) than males (21.81 ± 3.33). The frequency of overweight/obese was also higher among adult females (42.16%) than the adult males (32.14%).

The prevalence of overweight/obesity in both males (66.67%) and females (91.30%) was found significantly higher in high-income family (table-2). This was followed by adult males (36.84%) and females (59.37%) from middle-income family and low-income family (male-13.64% and female-6.38%). The prevalence of overweight/obesity was higher among married males (34.38%), whereas, it was slightly higher among unmarried females (43.75%). The frequency of overweight/obesity in unmarried males and married females was 25 percent and 41.86 percent respectively. The frequency of overweight/obesity was higher in both males (43.75%) and females (44.44%) who attained secondary education. The frequency of overweight/obese among Tamang males who attained primary education and higher secondary education was 27.18 percent and 18.75 percent respectively. Among Tamang females who attained primary and higher secondary education, the frequency of overweight/obesity was 41.82 percent and 36.36 percent respectively. The table further shows that the frequency of overweight/obesity was found higher among other occupations in both males (43.33%) and females (53.33%) in the present study. This was followed by the frequency of overweight/obese in males (25.93%) who are doing private jobs and females (40.23%) who are housewife.

The frequency of overweight/obesity was significantly higher among adult Tamang males (70.37%) and females (94.44%) who watched television 3-4 hours a day (table 3). The frequency of overweight/obesity in both males and females was 14.03 percent and 13.64 percent respectively who watched television for two hours per day. The table further shows that distribution of overweight/obesity was higher among Tamang adult males (35.62%) and females (44.44%) who did physical activity below two hours per day.

The distribution of overweight/obesity in relation with the intake of non-vegetables and alcohol consumption among adult Tamang males and females are given in table 4. Table shows that the frequency of overweight/obesity was higher significantly in both males (47.05%) and females (60.93%) who eat non-vegetables 3-4 times per week. The prevalence of overweight/obesity was higher among adult Tamang males (42.11%) and females (61.54%) who took alcohol three times and above per week. The distribution of overweight/obesity in both males and females was 29.23 % and 35.53 % respectively who took alcohol less than two times per week.

Discussion

Obesity is a serious global epidemic problem affecting both developed and developing countries. There are many factors affecting overweight/obesity. The environmental factors that are changing rapidly could be considered for rapidly increasing prevalence of overweight. Urbanization has tremendously increased in Sikkim in the past few years. This may have influenced people to move away from their traditional way of living leading to change in their dietary habits, physical activity and overall lifestyles.

This study shows that the higher prevalence of overweight/obesity was found among adult Tamang females than males. It also increases along with increasing level of family income in the present study. Higher income families can easily afford and get easy access to better food and better health facilities as compared to the lower income family (Schmeisher 2008). However, the prevalence of overweight/obesity shows fluctuation in both male and females in relation to education with higher frequency among secondary education. Education provides awareness and knowledge about proper nutrition and healthy lifestyles. Several studies suggested that educated individual have better understanding of healthy life and more capable to make better choices about their health (Kenkel 1991). Adult Tamang males and females who are government employees and students reported higher prevalence of overweight/obesity. On average, government employees are involved more in light physical activities while on job and more sitting hours. It may relatively increase the lifestyles that are more sedentary. Berlin and Mercan (2016) explain that occupations are closely related with specific socio-economic factors and behavioral traits that are potential for influencing the risk of obesity in individuals.

The positive association of overweight/obesity and television watching in the present study is found consistent with other study (Tucker and Bagwell 1991). Spending more time on television watching may relatively increase lifestyles that are physically less active. Physical activity is another parameter that plays an important role in determining one's nutritional status. The frequency of overweight/obesity is inversely associated with physical activity in both the sexes in the present study. Inactive physical activity means less movement of the body leading to less energy expenditure and higher deposition of fat. Jeffery reported the role of low physical activity at work in the increasing prevalence of obesity (Jeffery 1991). Most of the individuals in the study population eat non-vegetables and consumed alcohol. The higher frequency of overweight is positively linked with frequent consumption of meat rather than vegetables. Wang and Beydoun (2009) reported that consumption of meat is most important predictor for prevalence of overweight and obesity. Female with drinking habits are highly prone to overweight/obesity as compared to those females who never drinks (Wang *et al.* 2010). Consumption of alcohol sometimes associated with consumption of more junk food like chips, fries, meat, etc (Traversy and Chaput 2015). This can indirectly increased the risk for overweight/obese.

Conclusion

This study shows the prevalence of overweight/obesity among adult Tamang males and females of the Pakyong sub-division, East Sikkim. Certain socio-economic conditions such as family income and occupation have significant association with overweight/obesity. Lifestyles like television watching and level of physical activity also influenced the prevalence of overweight/obesity in the study population. In addition, the frequent consumption of non-vegetables and alcohol is also seen as another important factor for determining overweight/obesity. Understanding and awareness is required among the people in regards to basic knowledge about health, exercise, proper nutrition and overall lifestyles for the wellbeing of individual as well as whole population in both urban and rural areas.

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Tables and Figures

Table-1: Basic data on mean height, weight, BMI and overweight among adult Tamang males and females

| Age group | Number | Mean height (cm) ± SD | Mean weight (kg) ±SD | Mean BMI ±SD | Overweight/ obesity |
|-----------|--------|--------------------------|-------------------------|-----------------|------------------------|
| Male | 84 | 155.42 ±7.89 | 52.79± 9.42 | 21.81±3.33 | 27(32.14%) |
| Female | 102 | 153.58±6.75 | 51.72±8.36 | 22.73±3.75 | 43(42.16%) |
| | | t=1.97p>0.05 | t=3.10;p<0.05 | t=1.98;p>0.05 | |

Table-2: Prevalence of overweight/obese in relation with family income, marital status, education levels and occupational level among adult Tamang males and females

| Income group | Male sample | Overweight/obese | Female sample | Overweight/obese |
|-----------------------|-------------|-----------------------|---------------|------------------------|
| Lower income | 44 | 6(13.64%) | 47 | 3(6.38%) |
| Middle income | 19 | 7(36.84%) | 32 | 19(59.37%) |
| High income | 21 | 14(66.67%) | 23 | 21(91.30%) |
| Marital status | | $\chi^2=18.57;P<0.01$ | | $\chi^2=50.13;P<0.001$ |
| Married | 64 | 22(34.38%) | 86 | 36(41.86%) |
| Unmarried | 20 | 5(25.00%) | 16 | 7(43.75%) |
| Education | | $\chi^2=0.61;P>0.05$ | | $\chi^2=0.26;P>0.05$ |
| Primary | 36 | 10(27.78%) | 55 | 23(41.82%) |
| Secondary | 32 | 14(43.75%) | 36 | 16 (44.44%) |
| Higher secondary+ | 16 | 3(18.75%) | 11 | 4(36.36%) |
| Occupation | | $\chi^2=3.61;P>0.05$ | | $\chi^2=2.23;P>0.05$ |
| Private/housewife | 54 | 14(25.93%) | 87 | 35(40.23%) |
| Others | 30 | 13 (43.33%) | 15 | 8 (53.33%) |
| | | $\chi^2=1.81;P>0.05$ | | $\chi^2=0.52;P>0.05$ |

Table-3: Prevalence of overweight/obesity in relation with television watching and physical activity among adult Tamang male and females

| Television time | Male sample | Overweight/obese | Female sample | Overweight/obese |
|--------------------------|-------------|-----------------------|---------------|------------------------|
| ≤2hrs. | 57 | 8(14.03%) | 66 | 9(13.64%) |
| 3-4hrs. | 27 | 19(70.37%) | 36 | 34(94.44%) |
| Physical activity | | $\chi^2=18.08;P<0.01$ | | $\chi^2=41.02;P<0.001$ |
| ≤2hr. | 73 | 26 (35.62%) | 90 | 40 (44.44%) |
| 3-4hrs. | 11 | 1(9.09%) | 12 | 3(25.00%) |
| | | $\chi^2=2.08;P>0.05$ | | $\chi^2=0.86;P>0.05$ |

Table-4: Prevalence of overweight/obesity in relation with intake of non-vegetables and alcohol consumption among adult Tamang males and females

| Non-vegetable intake | Male sample | Overweight/obese | Female sample | Overweight/obese |
|-----------------------|-------------|----------------------|---------------|-----------------------|
| 1-2 times | 33 | 3(9.09%) | 38 | 4 (10.52%) |
| 3-4 times+ | 51 | 24 (47.05%) | 64 | 39 (60.93%) |
| Alcohol intake | | $\chi^2=8.98;P<0.05$ | | $\chi^2=14.73;P<0.01$ |
| ≤2 time. | 65 | 19(29.23%) | 76 | 27 (35.53%) |
| 3+ time | 19 | 8(42.11%) | 26 | 16(61.54%) |
| | | $\chi^2=1.12;P>0.05$ | | $\chi^2=5.37;P<0.05$ |