Determinants of Underweight and Overweight Among Khasi Males of Sained Village of Meghalaya, Northeast India

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Submitted: Nov 6, 2019; Accepted: Jan 16, 2020; Published: Feb 28, 2020

Abstract: Background: Problems of underweight and overweight are caused by chronic imbalance between energy intake and actual energy needs of the body.[1] Both over nutrition and under nutrition can have detrimental health consequences. The World Health Organization considers that poor nutrition is the single most important threat to the world’s health.[2] Many developing countries face the double burden of malnutrition affecting the whole populations. Methods: Cross-sectional data on 125 Khasi males aged between 14 and 60 years was collected through random sampling. The subjects were divided as adolescents (14-19 years) and adults (20+ years). 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 with subjects wearing light clothes following the standard technique of Lohman et al. Results: The overall prevalence of underweight and overweight/obese among males was 28.80 percent and 18.40 percent respectively. The higher frequency of overweight/obese (26.19%) was found among middle income group. The frequencies of underweight 31.48 percent, 28.57 percent and 24.14 percent were found among low income group, middle income group and high income group respectively. The frequency of overweight/obese (33.33%) was found higher among the graduate and above level of education. Conclusions: Present study indicates the double burden of underweight and overweight. Poor nutrition, unhygienic environment and improper health facilities may expose many individuals to underweight. On the other hand, socio-economic development, increasing urbanization and modernization may lead to overweight and obesity to some sections of the society.

Key Words: Overweight, socio-economic, lifestyle, Khasi

Introduction:
Problems of underweight and overweight are caused by chronic imbalance between energy intake and actual energy needs of the body.[1] Both over nutrition and under nutrition can have detrimental health consequences. The World Health Organization considers that poor nutrition is the single most important threat to the world’s health.[2] Many developing countries face the double burden of malnutrition affecting the whole populations. Under-nutrition is most common in low-income, developing countries like sub-Saharan Africa and Southern Asia where access to a well-balanced diet is very limited.[3] More specifically, India, the third largest country is that suffer from under-nutrition are reported mainly from seven countries, which include India, Bangladesh, Ethiopia, Indonesia, China, Pakistan and the Democratic Republic of Congo.[3] National Family Health survey-3[4] reported that the prevalence of under nutrition in India was 30.0 percent among males and 28.1 percent among females. In urban areas, these figures were 19.8 percent among males and 17.5 percent among females. In rural areas, these figures were 38.8 percent and 33.1 percent among males and females respectively. A study by FAO[5] reported extremely poor nutritional status in the states of Gujarat, Odisha, Arunachal Pradesh, Maharashtra, Madhya Pradesh and Andhra Pradesh. Another study by Das and Bose[6] also found that the states of Karnataka, Gujarat, Madhya Pradesh and Odisha are highly affected by adult malnutrition with half of the adults having BMI less than 18.5kg/m². However, overweight and obesity are now so common that they are replacing the more traditional public health concerns such as under nutrition and infectious diseases which are considered as some of the most significant contributors to ill health.[7] Obesity is growing epidemic problem worldwide. Shifts in diet and activity are contributing factors to change in the levels of obesity from one country to another.[8] The prevalence of overweight and obesity are increasing in developing countries, and even in low-income groups in richer countries.[9] Obesity is a major risk factor for diabetes, cardiovascular disease, hypertension and certain forms of cancer. These can result in an increased risk of premature deaths or serious chronic conditions that impair the overall quality of human life.[10]

Materials and Methods
The present study was conducted among Khasi males residing in the Sained village under Re-Bhoi District of Meghalaya, Northeast India. Sained village lies in half way between Guwahati and Shillong in the National Highway number 40 (NH-40). Meghalaya, one of the north eastern states is mountainous with stretches of valley and highland plateaus. The state is dominated by three tribal populations such as...
Khasis, Jaintias and Garos besides other plain tribes such as Koch, Rabhas and Bodos etc. Majority of the people are Christian, only few of them are Moslem and others follow traditional religion. The language spoken by the Khasis belongs to Mon Khmer family which is similar to the languages spoken by the tribes in the Chhotanagpur plateau. Meghalaya has historically followed a matrilineal system where the lineage and inheritance are traced through women. The total area of Saiden village is 40 square kilometer with seven localities. The village has a mixed population with more than one community residing there. This include the Bhoi (Khasi), Jaintia, Garo, Nepali, Bihari. But the dominant population comprises of Khasi (Bhoi), making up a total population of about 13000 people from all seven localities as provided by the statistic report from the Dorbar Shong. [11] The main occupation of the village is agriculture. About 50-60 percent of inhabitants are engaged in agricultural activities. The other half, about 40-50 percent are engaged in Government or Private sector jobs. [11]

Cross-sectional data on 125 Khasi males aged between 14 and 60 years was collected through random sampling. The subjects were divided as adolescents (14-19 years) and adults (20+ years). 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 with subjects wearing light clothes following the standard technique of Lohman et al. [12]

Data on household income were collected directly from the subjects or the head of the households. The per capita monthly income of the households was classified as high income group (above 75th percentile), middle income group (50th to 75th percentile) and low income group (below 50th percentile).

Data on educational attainment of individuals were classified into four categories, namely, primary, secondary, higher secondary and graduate and above. The primary level of education includes those individuals who studied up to class V. In the secondary level of education, we included those individuals who attended standard VI to X. Higher secondary level of education included those who attended standard XI to XII.

In the graduate and above level of education, we included those individuals who are pursuing and have completed graduation. Data on occupation of each subject were classified as government employee, private service, farmer and student.

Information on physical activity, television watching and food habits were collected from each subject following a recalled method of one week periods. The data on television time were divided into two categories; less than or equal to two hours and three hours above. Data on physical activity was classified into two groups, viz less than or equal to one hour, and two hours above. Data on food habits especially the consumption of non-vegetable foods were divided as one-two times a week, three-four times a week and five times above.

The data were analyzed using MS-Excel software for the present research. The parameters taken were analyzed statistically to find out the mean, standard deviation for the anthropometric measurements. Prevalence of overweight and obesity has been evaluated using Asian cut-off points. [13] According to Asian cut-off points, BMI ≥27.5 kg/m² has been considered as obese, BMI between 23.5-27.5 kg/m², considered as overweight, BMI between 18.5-23.4 kg/m² indicating normal and BMI below 18.5 kg/m² considered as underweight. Prevalence of overweight/obesity was calculated in relation to different socio-economic conditions, physical activity, television time and food habits. In order to test the level of significance, chi square has been used in the present study.

Results

Table 1 shows basic data on mean height, weight and BMI with standard deviation of males of Saden village. The table shows that mean height (159.89±5.79) was found higher among adult males than adolescent boys (157.17±6.56). Similarly, the mean weight (54.80±11.88) was found higher among adult males than adolescent boys (48.25±6.31). Table further shows that mean BMI was also higher among adult males (21.36±4.15) than adolescent boys (19.46±4.84).

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number</th>
<th>Height (cm)± SD</th>
<th>Weigh (kg)±SD</th>
<th>Mean BMI±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-19</td>
<td>52</td>
<td>157.17±6.56</td>
<td>48.25±6.31</td>
<td>19.46±1.84</td>
</tr>
<tr>
<td>20+</td>
<td>73</td>
<td>159.89±5.79</td>
<td>54.80±11.88</td>
<td>21.36±4.15</td>
</tr>
</tbody>
</table>

Table-2 shows the nutritional status among adolescent boys and adult males of Saden village. The table shows that the frequency of overweight/obese (30.13%) was higher among adult males than adolescent boys (1.92%). However, the frequency of underweight (32.69%) was higher among adolescent boys. The frequency of overweight (26.02%) was found among adult males. The overall prevalence of underweight and overweight/obese among males was 28.80 percent and 18.40 percent respectively. The differences in the distributions of different BMI values in different age groups were statistically significant ($\chi^2=16.277; df=2; p<0.01$).

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number</th>
<th>Under weigh</th>
<th>Normal</th>
<th>Over weight/obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-19</td>
<td>52</td>
<td>32 (61.54%)</td>
<td>12(23.08%)</td>
<td>8(15.42%)</td>
</tr>
<tr>
<td>20+</td>
<td>73</td>
<td>19 (26.19%)</td>
<td>26 (35.65%)</td>
<td>28 (38.16%)</td>
</tr>
<tr>
<td>total</td>
<td>125</td>
<td>51 (40.80%)</td>
<td>38 (30.40%)</td>
<td>36 (28.80%)</td>
</tr>
</tbody>
</table>

Table-3 shows the overall distribution of different BMI value in relation to income, education and occupation among males.

<table>
<thead>
<tr>
<th>Income group</th>
<th>Number</th>
<th>Under weigh</th>
<th>Normal</th>
<th>Over weight/obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower income</td>
<td>54</td>
<td>32 (59.26%)</td>
<td>17 (31.48%)</td>
<td>5 (9.26%)</td>
</tr>
<tr>
<td>Middle income</td>
<td>42</td>
<td>19 (45.24%)</td>
<td>12 (28.57%)</td>
<td>11 (26.19%)</td>
</tr>
<tr>
<td>High income</td>
<td>29</td>
<td>15 (51.72%)</td>
<td>7 (24.14%)</td>
<td>7 (24.14%)</td>
</tr>
</tbody>
</table>

Table-1: Basic data on mean height, weight and BMI among adolescent boys and adult males

Table-2: Distribution of different BMI values among adolescent boys and adult males

Table-3: Overall distribution of different BMI value in relation with income, education and occupation among males
The Table further shows that the frequency of overweight/obesity (33.33%) was found higher among the graduate and above level of education. However, the frequency of overweight/obesity 23.08 percent, 14.92 percent and 19.04 percent was found among primary, secondary and higher secondary level of education respectively. However, the frequency of underweight (34.33%) was found higher among secondary level of education. This was followed by the frequency of overweight/obesity 26.92 percent, 23.80 percent and 11.11 percent among primary, higher secondary and graduate and above level of education respectively. The higher frequency of overweight/obesity (56.52%) was found among government employees. This was followed by higher frequency of overweight/obesity among private services (28.57%), farmers (7.69%) and students (6.45%). The frequencies of underweight 33.87 percent, 38.46 percent, 13.04 percent and 14.28 percent were found among students, farmers, government employees and private services respectively. The distributions were statistically significant ($\chi^2 = 57.642; df=6; p<0.01$).

Table-4 shows that the frequency of overweight/obesity (18.81%) was slightly higher among those who spent two hours television watching. The prevalence of overweight/obesity among males who watched television more than three hours was 16.67 percent. The frequency of underweight among males who spent more than three hours on television watching was 33.33 percent whereas; it was 27.72 percent among those who spent two hours on watching television. Overweight/obesity frequency was higher among males who exercised less than or one hour (26.03%) than exercised two hours and above (7.69%). The frequency of overweight/obese among males who exercised two hours and above 32.69 percent. The prevalence of overweight/obesity among males who exercised one hour and below was 26.03 percent. The result further shows that the higher frequency of overweight/obesity (28.12%) was found among males who eat non-vegetables over five times a week. This was followed by frequency of overweight/obese among males who eat non-vegetables between one-two times (15.55%) and three-four times (14.58%). The frequencies of underweight 28.89 percent, 27.08 percent and 31.25 percent were reported among males who eat non-vegetables one-two times, three-four times and over five times a week respectively.

Table-4: Overall distribution of BMI values in relation with television watching, physical activity and non-vegetables intake among males

<table>
<thead>
<tr>
<th>Television time</th>
<th>Number</th>
<th>Under weight</th>
<th>Normal</th>
<th>Over weight/obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>2hrs.</td>
<td>101</td>
<td>28(27.72%)</td>
<td>54(53.46%)</td>
<td>19(18.81%)</td>
</tr>
<tr>
<td>≥3hrs.</td>
<td>24</td>
<td>8(33.33%)</td>
<td>12(50.00%)</td>
<td>4(16.67%)</td>
</tr>
<tr>
<td>$\chi^2=0.304; df=2; p&gt;0.05$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Physical activity

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>Number</th>
<th>Under weight</th>
<th>Normal</th>
<th>Over weight/obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤1hr.</td>
<td>73</td>
<td>19(26.03%)</td>
<td>35(47.94%)</td>
<td>19(26.03%)</td>
</tr>
<tr>
<td>≥2 hrs.</td>
<td>52</td>
<td>17(32.69%)</td>
<td>31(59.61%)</td>
<td>4(7.69%)</td>
</tr>
<tr>
<td>$\chi^2=3.559; df=2; p&lt;0.05$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Non-veg intake

<table>
<thead>
<tr>
<th>Non-veg intake</th>
<th>Number</th>
<th>Under weight</th>
<th>Normal</th>
<th>Over weight/obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 times</td>
<td>45</td>
<td>13(28.89%)</td>
<td>25(55.55%)</td>
<td>7(15.55%)</td>
</tr>
<tr>
<td>3-4 times</td>
<td>48</td>
<td>13(27.08%)</td>
<td>28(58.33%)</td>
<td>7(14.58%)</td>
</tr>
<tr>
<td>≥5 times</td>
<td>32</td>
<td>10(31.25%)</td>
<td>13(40.62%)</td>
<td>9(28.12%)</td>
</tr>
<tr>
<td>$\chi^2=3.580; df=4; p&gt;0.05$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Economic inequality between and within nations is a primary cause of both over nutrition and under nutrition. Studies conducted in India show that income inequality had the same effect on the risk of being overweight as it did on the risk of being underweight.[14] Tribal constitute about 8.2 percent of the total population in India,[15] which probably has the largest number of tribal communities in the world. Many investigations found the worse condition of nutritional status among different tribal populations.[15-18] In general the tribal populations are among the most underprivileged and undernourished people in India. However, the new millennium has also signaled an important transition for our species with more people being overweight than underweight globally.[19,20] In several of the developing countries across the world, the prevalence of obesity is increasing.[20] Socio-economic development, increasing level of urbanization, mechanization of jobs, dependence of television for leisure along with decline in physical activity have increased sedentary behavior leading to overweight and obesity.[21-26] The present study among Khasi tribes of Saden village of Meghalaya shows the higher frequency of overweight among adult than adolescent. A significant proportion of overweight co-exist with high frequency of underweight like in other studies in India.[27] The co-existence of both underweight and overweight indicates poor nutritional conditions in the study population. The middle income family shows the higher percentage of overweight followed by high income family. Whereas, the prevalence of underweight decreases with increasing the level of family income. The prevalence of overweight among Khasi male shows fluctuation in different educational level being higher in graduate and above level of education. The frequency of overweight is least in lower educated men. Education provides knowledge and awareness about good health and values of proper nutrition and healthy dietary habits. Economic and social development has caused rapid changes in dietary patterns, physical activity, overall lifestyles and prevalence of obesity.[28]

Rich and wealthy persons are more likely to be obese especially in developing countries as they have enough resources at their disposal to eat well all the time.[20,29] The last decade of the 20th century shows an increase in prevalence of obesity among high educated men and women.[30,31] The higher educated involved in more of sedentary lifestyle as they spent more times on reading and writing. Khasi males who are government employees are found with more prevalence of overweight. The less prevalence of overweight was among male who are farmers. Farmers are more prone to underweight compared with other occupations. People who work in farm have low BMI values as compared to those who work in anywhere.[32]

Working in office may relatively increase relative sedentism which is the result from more sitting hours. Decrease in occupational related activities coupled with sedentary lifestyles could result in increasing mean weight. The television time has less impact on overweight as it is more or less the same between male who watched television two hours and three hours above. Physical activity is found an important determining factor for being overweight in the study population. The frequency of overweight was higher among men who spent fewer hours on physical activities. Underweight was recorded more among men who involved more hours in physical activity. Inactive physical activity may lead to more sedentary lifestyles and finally unhealthy weight gains due to the accumulation of unwanted fats in the body. However, the higher amount of physical activities might see larger reductions in body fat, but that physical activities, even if slightly below the recommended levels, can effectively reduce body fat.[33] The more frequent consumption of non-vegetable foods is positively associated with increasing prevalence of overweight/obesity. Khasi populations are mostly non-vegetarians and consumed meats of different kinds more frequently. Such a frequent consumption of non-vegetables may relatively increase in the accumulation of fat in the body.
Conclusion
In conclusion, present study indicates the double burden of underweight and overweight. Poor nutrition, unhygienic environment and improper health facilities may expose many individuals to underweight. On the other hand, socioeconomic development, increasing urbanization and modernization may lead to overweight and obesity to some sections of the society. Socioeconomic inequalities and poor nutrition are considered as the risks factors for the double burden of underweight and overweight. Therefore, immediate interventions are required to improve the poor nutritional status of the population. Awareness programs should be organized to spread the importance of proper nutrition and health at the village and local level.

References
11. Lapang EK. Project work on the packages of the Integrated Child Development Scheme (ICDS) with special reference to Sained Anganwadi Centre-1 Ri-Bhoi District, Meghalaya, (Unpublished); 2010.