Influence of Gender, Ethnicity, Eating Habits and Exercise on Body Mass Index Among Students of an Indian Medical School

**Corresponding Author:**
Dr. Barathi S Subramaniam,
Associate Professor, Melakka Manipal Medical College, Manipal, 576104 - India

**Submitting Author:**
Dr. Barathi S Subramaniam,
Associate Professor, Melakka Manipal Medical College, Manipal, 576104 - India

Previous Article Reference: [http://www.webmedcentral.com/article_view/2474](http://www.webmedcentral.com/article_view/2474)

Article ID: WMC002485
Article Type: Original Articles
Submitted on: 16-Nov-2011, 07:05:46 PM GMT    Published on: 17-Nov-2011, 12:45:24 PM GMT
Article URL: [http://www.webmedcentral.com/article_view/2485](http://www.webmedcentral.com/article_view/2485)

Subject Categories: OBESITY
Keywords: BMI, Eating habits, Ethnicity, Obesity, Physical activity

How to cite the article: Subramaniam B S, Mohammad C A. Influence of Gender, Ethnicity, Eating Habits and Exercise on Body Mass Index Among Students of an Indian Medical School. WebmedCentral OBESITY 2011;2(11):WMC002485
Influence of Gender, Ethnicity, Eating Habits and Exercise on Body Mass Index Among Students of an Indian Medical School

Author(s): Subramaniam B S, Mohammad C A

Abstract

Introduction: The relative associations of eating patterns and BMI, particularly at different life stages in various ethnic group are poorly understood.

Aims and Objectives: - To assess the influence of eating habits and physical activity on BMI, among medical students.
- To find the association of variables such as age, gender, race, and other lifestyles on BMI among these students.

Methodology: Medical Students of both genders, aged 18 to 24 years (124 males and 198 females), from 3 main races- Malays (52.2%), Chinese (24.8%), Indians (20.4%) and others (2.6%) of 3 consecutive batches (N=324) of Melaka-Manipal Medical College (Manipal Campus) were included in the study. A survey questionnaire covering the areas related to demographic details, eating habits, types of food, exercise and lifestyle was used. The BMI was calculated from the weight (kg) & square of the height (m).

Statistical Analysis: Descriptive Chi-squared analyses were used to examine group differences in prevalence of overweight and obesity between various subgroups of students.

Results: Though the mean BMI was within the normal range, significant gender variation was observed. Those who consumed dairy products, meat, egg and aerated drinks more than 5 times per day showed significant difference in BMI. When compared with age, the higher age group shows a tendency to be overweight and obese compared to the lower age group.

Conclusion: The Chinese were more underweight and the Indians were more towards overweight and obese when compared with Malays who in general had normal BMI.

Introduction

Changes in the lifestyle and physical activities have lead to obesity, diabetes, CHDs at one end of malnutrition scale. On the contrary decrease intake of food to avoid being overweight and not having enough food to eat has lead to poor health conditions such as anemia, malnutrition, poor resistance to microbes. Thus the two extremes of change in the life style have faded the quality of healthy life.

Epidemiological data indicate that the prevalence of overweight and obesity has doubled or tripled in the past few decades leading to a global epidemic [1]. This trend is of serious concern, given the consequences that are associated with childhood and adolescent obesity both during adolescence and adult life [2]. The most significant long-term consequence of childhood and adolescent obesity is its persistence into adulthood with all the attendant health risks [3].

The body mass index (BMI) is a simple, inexpensive screening tool used to identify possible weight problems for both adults and children and it is not a diagnostic tool. Children with a BMI indicating obesity or overweight do not necessarily have any illness, clinical complications, or health risks associated with over fatness [4,5]. It is age, gender, maturation stage, and ethnicity specific [6].

Physical fitness has three main aspects. These are static fitness (absence of disease), dynamic fitness (ability to perform strenuous work) and motor skills fitness.

Physical fitness is the result of regular exercise, proper diet and nutrition, and proper rest. Physical activity leads to numerous health and psychological benefits [7,8,9].

Endurance training improves cardio-respiratory fitness and cardiovascular risk factors. Performing at least 240 min of physical activity per week is associated with greater cardiovascular disease risk reductions as well as with less cardiovascular events compared with lower volumes of activity [10]. The physical fitness which determine the amount and regularity of the exercise tolerable for each individual vary with the BMI. Thus physical fitness becomes an important aspect to maintain the BMI of an individual.

A good diet becomes even more important when exercising to ensure the body has the correct ratio of macro- and micronutrients. This aid the body with the recovery process following strenuous exercise. When the body falls short of adequate nutrition, it depends...
on to fat content for survival. This may lead to low BMI level due to deprivation of nutrition and weight loss. Proper rest and recovery is also as important to health as exercise, otherwise the body exists in a permanently injured state and will not improve or adapt adequately to the exercise.

Faulty eating habits and lack of physical activities will be detrimental to the Body Mass Index (BMI) of an individual. Research reports that, women with temporal lobe atrophy have higher BMI [11]. Obesity in middle age increases the risk of future dementia independently of co morbid conditions [12]. Eating disorders such as exercise bulimia, anorexia and other bulimia may lead to the habit of dieting, skipping meals, vomiting out the food and starving. Such eating disorders certainly affects the BMI level of an individual. Research suggest that the production of thyroid hormones can be negatively affected by repeated bouts of dieting and calorie restriction [13].

The relative associations of eating patterns and dietary composition with BMI, particularly at different life stages, are poorly understood. Although several previous studies have shown lower eating frequency is associated with higher BMI, those studies were confounded by implausibly low dietary energy intake reports [14].

Aims and Objectives

The study was designed to:

• Assess the influence of eating habits and physical activity on BMI, among medical students of Melaka Manipal Medical College, Manipal Campus, Karnataka, India.

• Find the association of variables such as age, gender, race, and other lifestyles on BMI among these students.

Methodology

Medical Students of both genders, aged 18 to 24 years (124 males and 198 females), from 3 main races- Malays (52.2%), Chinese (24.8%), Indians (20.4%) and others (2.6%) of 3 consecutive batches (batches 20, 21 and 22) (N= 324) of Melaka-Manipal Medical College (Manipal Campus) were included in the study. Data were collected between June and July 2008 with an 82% response rate. The study was conducted after the regular class hours to ensure that the students had sufficient time to answer the survey. A survey questionnaire was constructed covering the areas related to demographic details of gender, age, ethnicity, eating habits, types of food, exercise and lifestyle (annex.1). The questionnaire was peer reviewed and validated by a senior faculty. It was then distributed to each participant. The BMI was calculated from the weight (kg) & square of the height (m).

Statistical Analysis The variables analyzed were age, sex, race, and diet on BMI. The data was analyzed using SPSS program (version 11.5). Descriptive Chi-squared analyses were used to examine group differences in prevalence of overweight and obesity between various subgroups of students. Differences were considered significant when P was

Results

Illustration 1: Age vs. BMI The mean age was 20.3±0.9 and the mean BMI was 20.9±3.5. This study did not show significant statistical association between Age and BMI. Illustration 2: Gender vs. BMI 38.5% males and 61.5% were females in the study group. The mean BMI for males was 21.8±4 and for females 20.4±3. 68.5% of the males & 67.2% of the females had normal BMI. Statistically significant difference was observed in BMI between gender (P =0.01) Illustration 3: Race vs.BMI There was no statistical significance between Race and BMI. Illustration 4: Diet vs. BMI Mean BMI of Vegetarians 22.4±4.9, Mean BMI for Non-Vegetarians was 20.9±3.4 No statistically significant difference was observed in BMI between the Vegetarians Non-Vegetarians Illustration 5-Skipping meals regularly vs. BMI There is statistical significance between those who regularly skip meals and those who don’t skip meals (P< 0.05). Illustration 6: Consumers and Non-Consumers of fast food vs.BMI No significance observed between the consumers and non-consumers of fast food. Students who consumed dairy products, meat, egg and aerated drinks more than 5 times per day showed significant difference in BMI when compared with other groups. (P < 0.05)

Eating Disorders The response to the questions regarding the eating habits viz; overeating, inducing vomiting and intake of drugs to curb appetite revealed nothing significant in relation to BMI. Exercise The students belonging to the normal BMI group had a positive attitude towards physical activities (P=0.001) as evidenced by their response to the questions related to physical activity. Q.Nos 12, 13 &17 of Part 2) Attitude The majority of the students who participated in the survey were not apprehensive of the opinions that others had about their weight, eating habits and felt that there was no need for any secrecy/privacy in these issues. (Q.Nos 8, 14, 20) however there was a significant number of responses
that reflected them being terrified of being overweight (P=0.001) and made them feel guilty and remorse (P=0.01) when they overeat (Q.Nos.2&3 part 2).

Discussion

Weight in adolescence becomes a better predictor of adult weight [15] and later health. In a 55-year follow-up of adolescents, for example, the weight status in adolescence predicted later adverse health events [16]. In spite of the importance of childhood and adolescent weight, it is clear that most overweight people develop their problem in adult life [17]. Obesity is moreover associated with an increased risk of cardiovascular disease and mortality. Therefore the study was conducted with an objective to assess the effect of eating habits & physical activity on body mass index (BMI), find the association of factors such as age, sex, race, and lifestyles on BMI among the medical students of Melaka Manipal Medical College, Manipal Campus, India. Although "overweight" technically refers to an excess of body weight and "obesity" to an excess of fat, these two words can be defined operationally in terms of body mass index. [18, 19]. The body mass index (BMI) is the most practical way to evaluate the degree of overweight. Hence BMI was taken as a guideline. In the present study group the mean BMI was within the normal range. According to many studies people can become overweight at any age; weight gain tends to occur with gender variation. In our study there is significant gender variation and when compared with age, the higher age group shows a tendency to be overweight and obese compared to the lower age group. In the present study there was no significant difference in vegetarians and Non-vegetarians as reflected by the BMI. This is in concurrence with the fact that energy expenditure is more important than food intake in causing obesity. We found significant variation in the BMI in regular skippers; this establishes the fact that energy intake and the composition of the diet play a role of variable importance in the pathogenesis of obesity. Many people have a pattern of conscious limitation of food intake termed "restrained" eating [20]. This restraint pattern is common in many, if not most, middle-aged women who are of "normal weight." It may also account for the inverse relationship between body weights with social class; women of higher socioeconomic status more often maintain their weight. Overeating relative to energy expenditure will uniformly cause obesity [21]; most obese subjects have lost control of their eating (disinhibition) [20]. Japanese sumo wrestlers and linemen on professional football teams who eat large quantities of food for many years, but have a very active training schedule, have low visceral fat relative to total weight. When their active career ends, however, they tend to remain overweight and have a high probability of developing diabetes mellitus. With regard to overeating and restrained eating we didn’t find any contributory results as our study group was of adolescence and young adults. In addition they are from higher socioeconomic strata. Frequency of eating: The relationship between the frequency of meals and the development of obesity is unsettled. There are many anecdotal reports that overweight persons eat less often than normal-weight persons, but documentation is difficult. This study also could not contribute to settle the dispute. The frequency of eating does change lipid and glucose metabolism. When normal subjects eat several small meals a day, their serum cholesterol concentrations are lower than when they eat a few large meals each day. Similarly, mean blood glucose concentrations are lower when meals are frequent [22]. One explanation for the effects of frequent small meals versus a few large meals could be the difference in insulin secretion associated with these meal sizes (e.g., increased with large meals). Though psychological factors and attitude are important in the development of obesity, attempts to define a specific personality type associated with obesity have been unsuccessful. One condition that has been linked to weight gain is seasonal affective disorder, which refers to depression that occurs during the winter season in people living in the far North; it can be treated by exposure to light. These patients tend to have a winter increase in body weight that can be effectively treated with drugs that modulate serotonin release or reuptake. There was no psychiatric illness in the subjects and associating personality type with obesity was unsuccessful. This study revealed that the students who consumed dairy products, meat, egg and aerated drinks more than 5 times per day showed significant difference in BMI when compared with other groups. This is in concurrence with the epidemiological data which suggest that a diet high in fat is associated with obesity. The relative weight in several populations, for example, is directly related to the percentage of fat in their diets [23]. A high fat diet, which often results from the introduction of palillllustration foods into the diet, may result in overeating to obtain enough carbohydrate to maintain glycogen stores, which are much smaller than the fat stores (which contain more than 100 times the daily intake). Obesity is more prevalent in lower socioeconomic groups in the United States and elsewhere (5). The reason for this
association is not known. The current study was conducted amongst medicos who belong to higher socioeconomic strata hence no significant obesity is observed.

Conclusion

Though not significant difference; there is a tendency amongst the three major ethnic groups studied. The Chinese were more underweight and the Indians were more towards overweight and obese when compared with Malays who in general had normal BMI.

Limitation

The study group is very small. We have not analyzed the gender difference in various ethnic groups and not quantified the diet intake and energy utilized.

References

Illustrations

Illustration 1

Influence Of Gender, Ethnicity, Eating Habits And Exercise On Body Mass Index Among Students Of An Indian Medical School.

Age vs. BMI

<table>
<thead>
<tr>
<th>Age in years</th>
<th>BMI</th>
<th>Normal</th>
<th>Underweight</th>
<th>Overweight</th>
<th>Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.3±0.9</td>
<td>18.50-24.99</td>
<td>67.3%</td>
<td>23.3%</td>
<td>0%</td>
<td>2.8%</td>
</tr>
<tr>
<td>18-20</td>
<td>&lt;18.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-24</td>
<td>25.00-29.99</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>=30.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Illustration 2

Gender vs. BMI

<table>
<thead>
<tr>
<th>Gender</th>
<th>BMI</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18.50-24.99</td>
<td>&lt;18.50</td>
<td>25.00-29.99</td>
<td>=30.00</td>
</tr>
<tr>
<td>Normal</td>
<td>67.7%</td>
<td>22.7%</td>
<td>6.5%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Males</td>
<td>68.5%</td>
<td>16.1%</td>
<td>8.9%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Females</td>
<td>67.2%</td>
<td>26.8%</td>
<td>5.1%</td>
<td>1%</td>
</tr>
</tbody>
</table>
### Illustration 3

**Race vs. BMI**

<table>
<thead>
<tr>
<th>Race</th>
<th>BMI</th>
<th>18.5-25</th>
<th>25-30</th>
<th>&gt;30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malay 21±3.5</td>
<td>20%</td>
<td>70%</td>
<td>6.7%</td>
<td>3%</td>
</tr>
<tr>
<td>Chinese 20±3.2</td>
<td>30.8%</td>
<td>62.8%</td>
<td>3.8%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Indian 21.6±3.8</td>
<td>18.8%</td>
<td>68.8%</td>
<td>7.8%</td>
<td>4.7%</td>
</tr>
<tr>
<td>Others 21±3.2</td>
<td>25.0%</td>
<td>50.0%</td>
<td>25.0%</td>
<td>0%</td>
</tr>
<tr>
<td>Total 20.9±3.5</td>
<td>22.6%</td>
<td>67.5%</td>
<td>6.7%</td>
<td>3.2%</td>
</tr>
</tbody>
</table>
Illustration 4

Diet vs. BMI

<table>
<thead>
<tr>
<th>Diet</th>
<th>BMI</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;18.5</td>
<td>18.5-25</td>
<td>25-30</td>
<td>&gt;30</td>
</tr>
<tr>
<td>Vegetarian</td>
<td>20</td>
<td>70</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Non-vegetarian</td>
<td>22.9</td>
<td>67.6</td>
<td>6.7</td>
<td>2.9</td>
</tr>
<tr>
<td>Total</td>
<td>28.8</td>
<td>67.7</td>
<td>6.5</td>
<td>3.1</td>
</tr>
</tbody>
</table>
Illustration 5

Skipping meals regularly vs. BMI

| Skipping Meals         | BMI  
|------------------------|------
|                        | <18.5| 18.5-25 | 25-30 | >30 |
| Skippers (41.8%)       | 15.4%| 75.7%   | 7.4%  | 1.5%|
| Non-skippers (58.2%)   | 28%  | 61.9%   | 5.8%  | 4.2%|
| Total                  | 28.8%| 67.7%   | 6.5%  | 3.1%|
Illustration 6

Consumers and Non-Consumers of fast food vs. BMI

<table>
<thead>
<tr>
<th>Fast Food</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;18.5</td>
</tr>
<tr>
<td>Consumers</td>
<td></td>
</tr>
<tr>
<td>69.5%</td>
<td>21.2%</td>
</tr>
<tr>
<td>Non-consumers</td>
<td></td>
</tr>
<tr>
<td>30.5%</td>
<td>26.3%</td>
</tr>
<tr>
<td>Total</td>
<td>22.8%</td>
</tr>
</tbody>
</table>
Disclaimer

This article has been downloaded from WebmedCentral. With our unique author driven post publication peer review, contents posted on this web portal do not undergo any prepublication peer or editorial review. It is completely the responsibility of the authors to ensure not only scientific and ethical standards of the manuscript but also its grammatical accuracy. Authors must ensure that they obtain all the necessary permissions before submitting any information that requires obtaining a consent or approval from a third party. Authors should also ensure not to submit any information which they do not have the copyright of or of which they have transferred the copyrights to a third party.

Contents on WebmedCentral are purely for biomedical researchers and scientists. They are not meant to cater to the needs of an individual patient. The web portal or any content(s) therein is neither designed to support, nor replace, the relationship that exists between a patient/site visitor and his/her physician. Your use of the WebmedCentral site and its contents is entirely at your own risk. We do not take any responsibility for any harm that you may suffer or inflict on a third person by following the contents of this website.