PREVALENCE OF OBESITY IN KALYOBIA AND DAKAHLIA GOVERNATES AS JUDGED BY BODY MASS INDEX "AN ANTHROPOMETRIC STUDY"

Essam M. Mehlab MD, Gamal A. Salam, MD, Mustafa M.Sinna, MD and Saadia Shalaby MD

Published by
Benha Faculty of Medicine

Volume 22 Number 3
Sept. 2005
PREVALENCE OF OBESITY IN KALYOBIA AND DAKAHLIA GOVERNATES AS JUDGED BY BODY MASS INDEX "AN ANTHROPOMETRIC STUDY"

Essam M. Mehlab MD, Gamal A. Salam, MD, Mustafa M. Sinna MD and Saadia Shalaby MD
Department of Anatomy, Benha Faculty of Medicine, Benha University, Egypt.

Abstract

This study was designed to assess the relation between body mass index (BMI) and age, sex and parity of non-selected population sample of adults residing in six communities in Kalyobia and Dakahlia Governates so as to determine the prevalence of obesity in these governates and to specify age-, sex- and parity-adjusted prevalence of obesity in such sample. A total of 400 subjects (223 men and 177 women) with a mean age of 36.42±8.77 years; range: 22-58 years were recruited in the study. Body mass index was calculated; BMI = (weight [kg]) / (height [m])². Using BMI as the criterion, underweight was defined as BMI <20 kg/m², average weight as BMI 20-25 kg/m², overweight as BMI 25-30 kg/m², obesity as BMI 30-35 kg/m² and morbid obesity as BMI >35 kg/m². The mean crude BMI of the study participants was 31.1±4.3 kg/m²; range: 16.6-44.4 kg/m². Only 104 subjects (26%) had average BMI, while 31 subjects (7.75%) were below average and 7 subjects (1.75%) were under weight. On the contrary, 206 subjects (51.5%) were overweight, 48 subjects (12%) were obese and 4 subjects (1%) were morbid obese. Thus, the prevalence of obesity was about 64.5% of the studied subjects. Age-adjusted BMI revealed that higher BMI was reported in the age groups ranging between 30-50 years, while 109 subjects (27.25%) aged <30 years, and 48 subjects (12%) aged >50 years were less obese with a significant (P<0.05) increase of BMI of subjects aged 30-50 years compared to those younger than 30 years and those older than 50 years. There was a positive signif-
Essam M. Mehlab et al.

significant correlation ($r=0.108$, $P=0.031$) between age and BMI. Sex-adjusted BMI showed that women had significantly ($P<0.05$) higher BMI compared to men with a positive significant correlation ($r=0.217$, $P=0.004$) between BMI and parity irrespective of the number of living offspring. It could be concluded that urban migrations and sedentary lifestyle with less physical activities resulted in an increased frequency of obesity that approached 64.5% of the examined sample and was more manifest in middle-aged subjects especially women.

Introduc,tion

Obesity is a significant public health crisis in the developed world with a rapidly increasing prevalence in numerous developing nations worldwide. This growing incidence represents a pandemic that needs urgent attention if the potential morbidity, mortality, and economic tolls that will be left in its wake are to be avoided. (Uwaifo & Arioglu, 2004).

Nutritionally-related health patterns in the Middle East have changed significantly during the last two decades. The main forces that have contributed to these changes are the rapid changes in the demographic characteristics of the region, speedy urbanization, and social development in the absence of steady and significant economic growth. (Galal, 2003).

Egypt has occurred in the context of abundant dietary energy availability, urbanization and moderate fat intakes. Egypt has a relatively high child malnutrition rate of 16% that belong to the dietary energy surplus group. (Galal, 2003). In Africa, rural populations especially adolescents resort to urban migrations in order to diversify their livelihood. Their work and their living conditions may influence their health and development patterns. (Garnier et al., 2003).

Obesity represents a state of excess storage of body fat. Adults have a body fat percentage of 15-20%, whereas women have approximately 25-30%. Because differences in weight among individuals are only partly due to body fat variations, body weight is a rather limited, although easily obtained, index of obesity. (Papadakis, 2000).
There were multiple tests to determine the degree of obesity, the body mass index (BMI) is far more commonly used to define obesity and has been found to closely correlate with the degree of body fat in most settings. BMI = (weight [kg] / height [m])², (Abraham et al., 1979). The body fat percentage can be estimated using the Durenberg equation: body fat percentage = 1.2(BMI) + 0.23 (age [y]) - 10.8 (sex) - 5.4, with males coded as 1 and females as 0. This formula has a standard error of 4% and explains approximately 80% of the variation in body fat. Other indices used to estimate the degree and distribution of obesity include the 4 standard skin thicknesses; namely, subscapular, triceps, biceps, suprailliac and various anthropometric measures, of which waist and hip circumferences are the most important. (Durnin & Womersley, 1974).

This study was designed to assess the relation between BMI levels and age, sex and parity of non-selected population sample of adults residing in Kalyobia and Dakahlia Governates so as to determine the prevalence of obesity in these governments and to specify age-, sex- and parity-adjusted prevalence of obesity in such sample.

**Materials and Methods**

This study was conducted at Anatomy Department, Benha Faculty of Medicine, since May till Dec 2004. A total of 400 subjects: 223 men and 177 women, aged 22-58 years, recruited from six communities in both governates.

**Anthropometric study:**
- Weight was determined using a lever-balance without shoes and in light undergarments. Weight was approximated to the nearest 100 gm.
- Height was measured without shoes with back-square against the wall-tape and a right-angled triangle resting on the scalp against the wall. Height was approximated to the nearest 0.5 cm.
- Body mass index was calculated as weight [in Kg] divided by square the height in meter, (Abraham et al., 1979). Using BMI as the criterion, underweight was defined as BMI <20 kg/m², below
average weight was defined as BMI $\geq$20-<25 kg/m². Average weight was defined as a BMI $\geq$25-<30 kg/m², overweight was defined as a BMI $\geq$30-<35 kg/m², obesity was defined as BMI $\geq$35-<40 kg/m² and morbid obesity was defined as BMI $\geq$40 kg/m². All participants were verified into BMI strata and then adjusted according to age and sex and among women according to number of parity irrespective of the number of living offspring.

**Statistical analysis**

The obtained results were analyzed and compared using SPSS statistical program (Version 10.2002). Descriptive statistics were performed for the generation of mean, standard deviation (SD) of mean, frequency and percentages. Statistical analysis was performed using paired t-test and possible correlations were studied using Pearson correlation coefficient.

**Results**

The study comprised 400 subjects, 223 men (55.75%) and 177 women (44.25%) with a male: female ratio of 12.6:10. The mean age of studied subjects was 36.42±8.77 years and within the age range between 22-58 years with the mean age of men was 36.3±9.26; range: 23-58 years while mean age of women was 36.57±8.14; range: 22-56 years. There was a non-significant (p>0.05) difference in mean age of men and women enrolled in this study. (Table 1).

<table>
<thead>
<tr>
<th>Table (1): Study participants data as regards age and sex distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number (%)</strong></td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Number (%)</td>
</tr>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>Sex: M:F</td>
</tr>
</tbody>
</table>

Data are presented as numbers & mean±SD; percentages & range are in parenthesis.
The mean crude weight was 80.6±10.2; range: 48-115 Kg, the mean height was 161.3±5.3; range: 148-180 cm. The mean crude BMI was 31.1±4.3; range: 16.6-44.4. (Table 2). Only 104 subjects (26%) had average weight with a mean BMI of 28.2±1.3; range: 25.3-29.9, while 31 subjects (7.75%) had BMI below average with a mean BMI of 23.1±1.4; range: 20.1-24.8 and 7 subjects (1.75%) were underweight with a mean BMI of 18.5±1.1; range: 16.6-19.7. On contrary, 206 subjects (51.5%) were overweight with a mean BMI of 32.5±1.3; range: 30-34.9; 48 (12%) were obese subjects with a mean BMI of 36.9±1; range: 35.1-39.5 and 4 (1%) were morbid obese subjects with a mean BMI of 43±1.4; range: 41.5-44.4, (Table 2, Fig. 1). Thus, the frequency of subjects with weight above the average was 64.5%, subjects with average weight was 26% and those with weight less than average was 9.5%. (Fig. 2).

Table (2): Distribution of study participants according to BMI strata

<table>
<thead>
<tr>
<th>BMI (Kg/m²)</th>
<th>Number (%)</th>
<th>Weight (Kg)</th>
<th>Height (cm)</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>104 (42%)</td>
<td>&lt;20-30</td>
<td>161.3±5.3</td>
<td>31.1±4.3</td>
<td>16.6-44.4</td>
</tr>
<tr>
<td>20-25</td>
<td>70 (27%)</td>
<td>20-25</td>
<td>157.3±4.3</td>
<td>28.2±1.3</td>
<td>25.3-29.9</td>
</tr>
<tr>
<td>25-30</td>
<td>31 (12%)</td>
<td>25-30</td>
<td>153.4±5.8</td>
<td>23.1±1.4</td>
<td>20.1-24.8</td>
</tr>
<tr>
<td>&gt;30&lt;40</td>
<td>14 (6%)</td>
<td>&gt;30&lt;40</td>
<td>150±5.9</td>
<td>28.2±1.3</td>
<td>25.3-29.9</td>
</tr>
<tr>
<td>&gt;40</td>
<td>4 (1%)</td>
<td>&gt;40</td>
<td>148.8±5.2</td>
<td>31.1±4.3</td>
<td>25.3-39.5</td>
</tr>
</tbody>
</table>

Fig. (1): Distribution of study participants according to BMI strata

457