Overweight and Obesity Prevalence and Predictors in People Living in Karachi

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 Authors’ contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

ABSTRACT

Objective: This study was aimed to establish the prevalence of overweight, obesity and related its factors among the citizens of Karachi.

Methodology: From Jan 2018 to August 2018. This cross-sectional analysis was conducted to obtain information from 772 persons using a validated questionnaire and traditional height and weight evaluation methods have been used. Overweight and obesity were described by South Asian cut-off points as 23 ≥ BMI (Normal), 25.0 - 29.9 BMI (Overweight) and 30 ≤ BMI (Obese) respectively. For data processing, version 21.0 of SPSS was used.

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**Keywords:** Overweight; obesity; body mass index; sedentary lifestyle; co-morbidities.

1. INTRODUCTION

An emerging public health crisis (overweight and obesity) in developing countries has correlated with the westernization of culture and associated lifestyle changes [1]. Many developed countries are facing a food transition [2,3] in which the level of under nutrition in the face of emerging overweight and obesity is consistently high [2,3]. The prevalence of childhood overweight and obesity in Nigeria and in other African countries varied between 0% - 26.7% across the age ranges, based on the measurement approaches used [4-13]. Different methodologies examples are BMI measurement [4,6,7] versus bio-electrical impedance [5] versus waist circumference [8], and differences in definition by WHO 2007 [4,6] versus International Obesity Task Force (IOTF) [7] versus National Centre for Health Statistics (NCHS) [4].

During infancy and adolescence complications from overweight and obesity may continue into adulthood and the risk of morbidity and mortality may be increased later in life [14,15]. This involves the occurrence of high blood pressure and the resulting risk of cardiovascular morbidity and early death [16,17]. The prevention and treatment of childhood overweight and obesity has been a significant focal point of pediatric science and clinical care because of these complications [15].

The prevalence of overweight and obesity was influenced by environmental and genetic factors [15,18,19] although some impact in consistencies were found [20]. In developed countries particularly, children who are born into a high-income household, higher levels of maternal schooling, inadequate physical activity, female gender and race are the main risk factors [21,22]. Prenatal factors such as motherly gestational diabetes and foetal nutrition are significant, however [15] Physical activity, TV watching and socioeconomic family status may have interdependent trends but few research in Nigeria explored the effect of television involvement or absence in the individual's sleeping area and the amount of hours spent on the screen are the prevalence of overweight and obesity. Moreover, there were contradictory consequences with such risk factors such as family socioeconomic status and race [22-24].

Early detection of childhood risk factors might provide an incentive action for action to minimize the prevalence of overweight and obesity [25]. Overweight and obesity are best matched to early life counseling and early intervention, which could mitigate both the short- and long-term impacts of overweight and obesity and crack the juvenile and adult care monitoring system [26].

The purpose of this study was to examine overweight and obesity threats among individuals living in Karachi, the City of lights, Pakistan, and the study possibly influence factors based on a broad epidemiology survey carried out in Karachi, which will lead to policy making in Karachi’s population over the management of obesity.

2. METHODOLOGY

2.1 Sample

This cross-sectional study was performed from January 2018 to August 2018 in Karachi, Pakistan using sample size of 743 healthy individuals of both sexes aged 20-90.

2.2 Ethics and Consent

The research was carried out with the approval from Baqai Institute of Pharmaceutical Sciences.
Ethical Board. In this study, the conditions for individuals informed consent is waived because there was no prior contact with the subject.

2.3 Study Plan and Methodology

During the study there was no participation of any therapy or treatment, so participants of the test were not harmed. The subject ID number has been used to identify the subject and the subject ID has been kept confidential and has not been published in a particular manner either before or after that analysis of the database. The data on the subject were also kept secret.

Those men and women who spontaneously agreed to take BMI steps for general medical examinations during the time of their hospital visits were analysed in the course of this research by a total of 743 (age range 20-90). In order to capture the data using a consecutive process, sampling was done.

2.4 Exclusion Criteria

The portion of this research is not required to include an individual who are under 20 and above 90 years age and/or who take any drug for obesity, or on hormone replacement therapy. Anyone with history of cancers, liver and renal disorders or an illness involving parathyroid have also been removed. Study also declined to consider mothers who were pregnant or lactating.

2.5 Data Collection

Depending on gender, age and height, weight, BMI status and food intake (Vegetarian, Semi-vegetarian, non vegetarian diet), data have been recorded. Data were also focused on the use of alcohol and smoking, activity levels, and other current co-morbidities.

The height and weight anthropometric data are measured by Floor type weighing machine. The measured height with standiometer, with precision of 1 mm and by the use of Weight Balance with the consistency of 0.05 kg "weighing machine " The body mass Index is dependent on weight and height. The formula for BMI was calculated as: weight (kg) / height (m²).

2.6 Entering and Processing Results

Microsoft Excel® and the Social Science Processing Package 21 have been used for data entering and processing (SPSS Inc., Chicago, IL, USA). Variables were grouped according to gender, age, dietary status lifestyle and BMI status, to promote study. Age of an individuals were categorized into four sub groups (Group 1: 20-39 years, Group 2: 40-59 years Group 3: 60-79 years, Group 4: 80 and above years). The lifestyle status contains multiple variables including dietary status which was classified in the vegetarian, semi-vegetarian and non-vegetarian category. Physical activity status, smoking or alcohol consumption status. Presence or absence of co morbidities factor were also assessed with respect to BMI. In all statistical analyses, the statistical significance was calculated at the basis of p-value.

2.7 Categories of Body Mass Index

Weight, height and BMI were collected on site during the hospital visit. Individuals is categorized as meeting the conditions specified by the WHO:

- Underweight (<18.5 kg/m²),
- Healthy weight (18.5 – 24.9 kg/m²),
- Overweight (25.0 – 29.9 kg/m²), and
- Obese (30.0 kg/m²–above) [27-29].

3. RESULTS

The number and proportion of individuals in various age groups were presented according to gender in the Table 1. Individuals aged 20-39 were the most numerous group (55.70%), led by individuals 40-59, 60-79, and ≥80 years age group. There is the least number of individuals in group ≥ 80. Individuals were on average 54.24 ± 33.75 years old. The survey contained 46.76% females of average aged 52.19 ± 32.49 and 53.23% male of average aged 54.09 ± 33.97.

Individual’s classification by BMI provides varying outcomes for different reference values. The findings reveal that the study of 772 individuals was divided into four groups dependent on the BMI status. For the WHO classification the obese figure is 23.83%, the overweight ratio is 29.53%, and the under weight ratio is 19.43% (Table 2).

Individual's classification by BMI provides varying outcomes for different reference values. The findings reveal that the study of 772 individuals was divided into four groups dependent on the BMI status. For the WHO classification the obese figure is 23.83%, the overweight ratio is 29.53%, and the under weight ratio is 19.43% (Table 2).

More females (84) were substantially underweight than men (66). In 56.19% of men and 43.81% of females healthy weight was observed, while for males the overweight and obese ratio was 55.10% and for females it was 44.90%. Men are more vulnerable to overweight and females are more susceptible to
underweight. The prevalence ratio definition and logistical regression models have shown that females are less likely to suffer obese and overweight. The healthy weight ratio of the females was lower than of men (25.48% compared with 28.71%) but considerably higher (56% vs. 44%) in case of underweight category (Table 2, Fig.1).

Table 1. Total frequencies and ratios of individuals split down by age and sex

<table>
<thead>
<tr>
<th>Age</th>
<th>20-39</th>
<th>40-59</th>
<th>60-79</th>
<th>≥80</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Count (n)</td>
<td>220</td>
<td>77</td>
<td>87</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Percentage (%)</td>
<td>51.16%</td>
<td>52.38%</td>
<td>61.26%</td>
<td>50.94%</td>
</tr>
<tr>
<td>Female</td>
<td>Count (n)</td>
<td>210</td>
<td>70</td>
<td>55</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Percentage (%)</td>
<td>48.84%</td>
<td>47.62%</td>
<td>38.73%</td>
<td>49.06%</td>
</tr>
<tr>
<td>Total</td>
<td>Count (n)</td>
<td>430</td>
<td>147</td>
<td>142</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>Percentage (%)</td>
<td>55.70%</td>
<td>19.04%</td>
<td>18.40%</td>
<td>6.86%</td>
</tr>
</tbody>
</table>

Table 2. Prevalence between persons with underweight, overweight or obese depending on WHO standards

<table>
<thead>
<tr>
<th>WHO BMI Standards</th>
<th>Under Weight n</th>
<th>Healthy Weight n</th>
<th>Over Weight n</th>
<th>Obese n</th>
<th>Total n</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male Count</td>
<td>66</td>
<td>118</td>
<td>122</td>
<td>105</td>
<td>411</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>79.9</td>
<td>111.8</td>
<td>121.4</td>
<td>98</td>
<td>411</td>
</tr>
<tr>
<td></td>
<td>Female Count</td>
<td>84</td>
<td>92</td>
<td>106</td>
<td>79</td>
<td>361</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>70.1</td>
<td>98.2</td>
<td>106.6</td>
<td>86</td>
<td>361</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>150</td>
<td>210</td>
<td>228</td>
<td>184</td>
<td>772</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>150</td>
<td>210</td>
<td>228</td>
<td>184</td>
<td>772</td>
</tr>
</tbody>
</table>

Fig. 1. Gender specified BMI (Kg/m²)
Baseline feature in Table 3, demonstrates the trends of the gender-stratified population of the study. Alcohol intake and smoking were both significantly higher in men as compared to women. Physical activity registered to women was significantly lower than to men. Intakes of non-vegetarian food and semi-vegetarian food were found to be higher in men than in women, indicated that the vegetarian diet was higher in women. Presence of co morbidities revealed that men suffer the most with co morbidities than females.

The relationship between overweight and obesity prevalence and the chosen socio-demographic variables for the individuals is seen in Table 4. Overweight and obesity for age group ≥80 (p = 0.000) and individuals who smoked (p <0.001) and drink alcohol (p = 0.328) is substantially higher. The prevalence of overweight and obesity among the individuals with a semi vegetarian diet was also substantially higher (p = 0.000). There was no big disparity, however (Vegetarian to non vegetarian) or exercise (p=0.161), between overweight and obesity and the healthy and underweight individuals. The prevalence of overweight and obesity among the individuals with co morbidities is (33.96%, p= 0.000).

### Table 3. Base line characteristics (Life Style Characteristics) of Participants

<table>
<thead>
<tr>
<th>Life style characteristics</th>
<th>Total population n (%)</th>
<th>Females n (%)</th>
<th>Males n (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non- Smokers</td>
<td>592 (76.68)</td>
<td>329 (55.57)</td>
<td>263 (34.06)</td>
<td>0.000</td>
</tr>
<tr>
<td>Smokers</td>
<td>180 (23.32)</td>
<td>32 (17.77)</td>
<td>148 (82.22)</td>
<td></td>
</tr>
<tr>
<td>No Alcohol consumption</td>
<td>761 (98.75)</td>
<td>359 (47.17)</td>
<td>402 (52.83)</td>
<td>0.005</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>11 (1.42)</td>
<td>02 (18.18)</td>
<td>09 (81.81)</td>
<td></td>
</tr>
<tr>
<td>No Exercise</td>
<td>297 (38.57)</td>
<td>237 (79.80)</td>
<td>238 (20.20)</td>
<td>0.016</td>
</tr>
<tr>
<td>Exercise Present</td>
<td>475 (61.53)</td>
<td>124 (26.11)</td>
<td>173 (36.42)</td>
<td></td>
</tr>
<tr>
<td>Vegetarian Diet</td>
<td>169 (21.89)</td>
<td>85 (50.30)</td>
<td>84 (49.70)</td>
<td>0.072</td>
</tr>
<tr>
<td>Semi-Vegetarian Diet</td>
<td>431 (55.83)</td>
<td>210 (48.72)</td>
<td>221 (51.28)</td>
<td></td>
</tr>
<tr>
<td>Non-Vegetarian Diet</td>
<td>172 (22.28)</td>
<td>66 (38.37)</td>
<td>106 (61.63)</td>
<td></td>
</tr>
<tr>
<td>Co morbidities</td>
<td>288 (37.30)</td>
<td>122 (42.36)</td>
<td>166 (57.64)</td>
<td>0.042</td>
</tr>
<tr>
<td>No Co morbidities</td>
<td>484 (62.69)</td>
<td>239 (49.38)</td>
<td>245 (50.62)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4. Association with the prevalence of overweight and obesity between the chosen variables

<table>
<thead>
<tr>
<th>BMI</th>
<th>Under Weight n (%)</th>
<th>Healthy Weight n (%)</th>
<th>Over Weight n (%)</th>
<th>Obese n (%)</th>
<th>Total</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-39</td>
<td>98 (22.8)</td>
<td>128 (29.8)</td>
<td>124 (28.8)</td>
<td>80 (18.6)</td>
<td>430</td>
<td>0.000</td>
</tr>
<tr>
<td>40-59</td>
<td>25 (17.0)</td>
<td>43 (29.2)</td>
<td>43 (29.2)</td>
<td>36 (24.9)</td>
<td>147</td>
<td></td>
</tr>
<tr>
<td>60-79</td>
<td>21 (15.0)</td>
<td>33 (23.2)</td>
<td>43 (30.3)</td>
<td>45 (31.7)</td>
<td>142</td>
<td></td>
</tr>
<tr>
<td>≥80</td>
<td>06 (11.3)</td>
<td>06 (11.3)</td>
<td>18 (34.0)</td>
<td>23 (43.4)</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Smoker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>20 (11.1)</td>
<td>26 (14.4)</td>
<td>71 (39.4)</td>
<td>63 (35.0)</td>
<td>180</td>
<td>0.000</td>
</tr>
<tr>
<td>No</td>
<td>130 (22.0)</td>
<td>184 (31.0)</td>
<td>157 (26.5)</td>
<td>121 (20.4)</td>
<td>592</td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>01 (9.1)</td>
<td>01 (9.1)</td>
<td>05 (45.5)</td>
<td>04 (36.4)</td>
<td>11</td>
<td>0.328</td>
</tr>
<tr>
<td>No</td>
<td>149 (19.6)</td>
<td>209 (27.5)</td>
<td>223 (29.3)</td>
<td>180 (23.6)</td>
<td>761</td>
<td></td>
</tr>
<tr>
<td>Diet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetarian</td>
<td>44 (28.0)</td>
<td>47 (29.9)</td>
<td>40 (25.5)</td>
<td>26 (16.6)</td>
<td>157</td>
<td>0.000</td>
</tr>
<tr>
<td>Semi-Vegetarian</td>
<td>64 (14.8)</td>
<td>91 (21.1)</td>
<td>151 (35.0)</td>
<td>125 (29.0)</td>
<td>431</td>
<td></td>
</tr>
<tr>
<td>Non-Vegetarian</td>
<td>42 (22.8)</td>
<td>72 (39.1)</td>
<td>37 (20.1)</td>
<td>33 (17.9)</td>
<td>184</td>
<td>0.000</td>
</tr>
<tr>
<td>Exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>65 (21.9)</td>
<td>88 (29.6)</td>
<td>83 (27.9)</td>
<td>61 (20.5)</td>
<td>297</td>
<td>0.161</td>
</tr>
<tr>
<td>No</td>
<td>85 (17.9)</td>
<td>122 (25.7)</td>
<td>145 (30.0)</td>
<td>123 (25.9)</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>Co morbidities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>55 (21)</td>
<td>31 (11.9)</td>
<td>88 (33.7)</td>
<td>87 (33.3)</td>
<td>261</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>95 (18.6)</td>
<td>179 (35)</td>
<td>140 (27.4)</td>
<td>97 (19)</td>
<td>511</td>
<td>0.000</td>
</tr>
</tbody>
</table>

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4. DISCUSSION

Overweight AND Obesity, which ranges from 15% to 60% for adults, is considered to be a problem in wellbeing around the globe. [27-28] Asian development countries have been highly vulnerable to this severe public health threat over the past two decades. While updated population-based data are required on adult obesity prevalence in Pakistan, there have been few regional studies with adults which suggest that overweight and obesity are growing [30-34].

Our results on overweight (29.5%) and obesity (23.9%) are higher to previous studies on the populations of China. [35-37] Studies in Canada, [38] USA, [39] Greece, [40] Korea, [41] Turkey [42] and England, [43] showed that the prevalence rates are lower which confirms that the burden of obesity differs between countries due to socioeconomic and environmental shifts (e.g., climate, diet, physical activity, etc.). In an urban Karachi survey, 28% of overweight/obesity were seen, mean while with the BMI being held as a cutoff point at 25.0 kg/m² [34]. A further research by Khan et al. reported 4.8% obesity prevalence in Balochistani adults; [30] 8.0% obesity rate in Peshawari adults, [31] and overall 25.0% of adults reported overweight or obese in Pakistan [44]. However, the cut-off point for an irregular BMI was used in this analysis as 23.0 kg/m². Some of the regional difference was also seen in Pakistani adults about the prevalence of overweight (29.0%–46%) and obesity (20.8%–27.85%) [32-33]. The variation in race, age and use of BMI cut-off points suggested for the Asia-Pacific region by the WHO can explain this difference in contrast with the international cutoff for obesity definition.

Overweight and obesity in adults of the age group ≥80 (i.e., aged 80–90) were both greater and lesser in the youngest Pakistani adults (i.e., ages from 30–39). The percentages in women were significantly lower than in men in all ages. In a preliminary analysis in Pakistan, different trends were observed [44]. Some surveys showed the lowest obesity rates in Turks, [45] Iranians, [46] and Omani [47] for those under the age of 30 and the lowest obesity for aged between 30 and 60. The difference in findings also emerged from an analysis of the Saudi adult population [48] in line with previous research. [35,40,45,46,47,48] Pakistani men had a mean BMI higher than women and more obese than women (e.g., in the overall sample, obesity rates were 25.54% in men vs. 21.88% in women which is different from the study conducted in Libya in which women were slightly more likely to be overweight or obese than men [49-50]. This may be because men in Pakistan always live in a sedentary way of life. Being limited in activities after desk job and doing less physical exercise may also be the key cause for a weight increase. The significance of the consequences for overweight and obesity according to their age and gender has been demonstrated by different literature [30,44,46]. Parallel to this, the logistical return analysis demonstrates that adults ((≥80 years old) are at greater risk of overweight than their peers.

The WHO has proposed the use of cutoff points for the determination of overweight and obese for the adult population, 85th and 95th percentile, equivalent to BMI 25 kg/m² and 30 kg/m², respectively. By considering the overall data in our study, a BMI of 25 kg/m² also correspond to be high in both sex, and a BMI corresponds of 30 kg/m² to be higher in men, while level was low among women.BMI is used for obesity but cannot provide body fat statistics, so overweight/obesity were not categorized as metric with body fat percentage.

In the population of Pakistan's adults, there is a high incidence of overweight and obesity. Overweight and obesity are most likely for elderly (≥80 years) persons in this group. In particular, Pakistani citizen are in trouble, which are smoker individuals and having co morbidities. These results indicate that harmful practices, such as excess food and an imbalance diet, sedentary behavior, and smoking, [51] must be avoided in order to improve the wellbeing of adults. Global promotions should also be introduced to reduce potential obesity epidemics and obesity-related chronic diseases.

5. CONCLUSION

Overweight and obesity prevalence was found to be linked with age, alcohol, co morbidity, and dietary status among people in Karachi. Therefore, it is recommended for people, specifically men age group ≥ 80, to use preventive programs for the prevention of overweight and obesity.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely
no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT
It is not applicable.

ETHICAL APPROVAL
It is not applicable.

COMPETING INTERESTS
Authors have declared that no competing interests exist.

REFERENCES