Obesity: An Inevitable Consequence of Urbanization

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Abstract

**Background:** Today, obesity is considered a main health problem worldwide as well as Iran. The present study aimed at determining the prevalence of overweight and obesity in Hormozgan province, Iran to propose effective healthcare programs and strategies to reduce this dilemma in future.

**Objectives:** The current study conducted in the South of Iran aimed at exploring the prevalence of overweight and obesity in males and females in terms of social variables affected by demographic variables such as age, gender, marital status, education level, smoking, and physical activity.

**Methods:** In the current cross sectional, observational study, a sample of 5000 eligible males and females above 18 years old were selected based on a multi-stratified clustering sampling method. The data were collected by a researcher-made questionnaire consisting of variables such as weight, height, drug consumption, and physical activity. Statistical analysis was performed.

**Results:** The present study findings revealed that 31.8% of the population in Hormozgan province was overweight, while only 15.2% were obese. The highest percentage of obesity (18.3%) was observed among the subjects aged 35 - 44 years. The prevalence of obesity among females was higher in urban population.

**Conclusions:** The current study results showed that the urban married middle-aged females had the highest rate of obesity, which requires appropriate educational planning and utilization of efficient models in the realm of females’ health.

**Keywords:** Prevalence, Obesity, Overweight, Body Mass Index, Hormozgan Province

1. Background

Nowadays, obesity is considered as a main health problem worldwide as well as Iran. Recent studies show a tremendous rise in the prevalence of obesity and overweight, and this increase is observed both in the developed and developing countries (1-5). It is well documented that obesity has a negative influence on healthy population, especially in the ones with a lower socioeconomic status (6).

The prevalence of overweight and obesity together on a global scale increased 27.5% and 47.1% from 1980 to 2013 among adults and children, respectively. Conducted studies in the last 33 years showed an extent of obesity nearly in every country (7).

Epidemiology, changes in life style, and high prevalence of obesity made the Middle East face the highest load of non-transmissible diseases especially diabetes and cardiovascular disease (8, 9). As a Middle-Eastern country, Iran faces a high prevalence of obesity and relevant disorders such as diabetes and metabolic syndrome in different age groups (10, 11). These diseases impose high costs on national healthcare system (12).

Regardless of how obesity is perceived, either as a disease or a risk factor, people with overweight or obesity face a wide range of diseases and outcomes, which need evidence based diagnostic and therapeutic managements. Type 2 diabetes, cardiovascular disease, hypertension, gall-bladder diseases, and certain types of cancer are some of the outcomes of obesity (3,13-15).

In a study on the prevalence of obesity among adults in 20 European countries, Slovenia seemed to have the highest rate of obesity (20%), whereas the lowest rate (10%) was observed in Switzerland (16). Other researches in England on 2012 subjects of different age groups and social status showed a rise in the trend of obesity from 1993 to 2003 with a significant rise from 13.6% to 24% among males and from 16.9% to 24.4% among females, also in higher socioeconomic level (43%), compared with lower socioeconomic status (35%) (3). A study in Ghana showed the prevalence of obesity and overweight among the people holding state...
posts as 29.9% and 4.8%, respectively (6). Another study from Oman revealed an increase in obesity trend in a 10 year span from 10.5% to 16.7%; obesity in females reduced from 29.5% to 27.3%. The overall results showed decreasing and increasing trends of obesity among females and males, respectively (17). In Bangladesh, a study on 5495 subjects showed that 30.4% of individuals had low weight and poor nutritional status, 18.9% were overweight, and 4.6% obese (in fact people mostly had undernutrition and malnutrition than obesity and overweight) (18). In Iran, the statistics vary to some extent; i.e., in Tabriz, the prevalence of obesity (based on the value of body mass index (BMI) > 30 kg/m²) was 22% in the studied population; 24% in females and 18% in males. The study showed that obesity had a positive correlation with age and a negative correlation with the level of education and income (14). A systematic review and meta-analysis of Iranian studies showed that the prevalence of obesity was higher (21.7%) in individuals above 18 years old (19). A study from Shahroud city on 590 subjects of 40 - 64 years age group revealed the prevalence of overweight and obesity as 43.4% and 31%, respectively (20). In Bushehr, the prevalence of obesity and overweight was assessed in males and females above 64 years old and the results showed that 57.7% and 14.7% of males were overweight and obese, respectively. As for the females, these variables were 73.2% and 33.7%, respectively, which showed a gender tendency toward overweight and obesity in the studied population (21). The means of BMI in Hormozgan province in 2002 and 2008 were 28.24 ± 4.3 and 24.29 ± 4.3 kg/m², respectively (22). A study from Hormozgan province, on subjects aged 18 - 64 years old showed that the prevalence of obesity was 12%, which was 7% in males and 14.7% in females (23).

2. Objectives

Regarding these estimates concerning the epidemiology of obesity, there are few effective interventional plans in Hormozgan province. Therefore, the current study aimed at providing the basic information required to control and prevent obesity-related disorders in Hormozgan province and exploring the prevalence of overweight and obesity in males and females in terms of social variables affected by demographic variables such as age, gender, marital status, level of education, smoking, and physical activity.

3. Methods

Hormozgan province is located in the South of Iran on the Northern coast of Persian Gulf and the Oman Sea. It is marked by a length of 1100 km and an area of about 70000 m². The capital city is Bandar Abbas located in the Center of the province and is about 400 km far from the farthest city in the East and 600 km far from the farthest city in the West. About 80% of its population (n = 1600000) live within a radius of 100 km from the Center.

The current descriptive, analytical, and cross sectional study was conducted on all people over 18 years old in Hormozgan province. The sample size required in the research was determined 5000 subjects. The cluster sampling method was employed to access the mentioned community.

For proper distribution of samples and considering the urban and rural population of the province, 100 clusters, 50 urban and 50 rural, were considered. Participants were selected from each cluster by simple random sampling. Design effect of the study was 1.5. The study setting was Hormozgan province in South of Iran and data were collected from 2015 to 2017.

Urban and rural health centers were randomly selected as clusters. The sampling was carried out in such a way that by referring to the desired health center, a family sheet was randomly selected. Then the questionnaire was filled out for people over the age of 18 years in the same family and then, they continued on the basis of clockwise movement in each cluster and completed the cases in every cluster. If the participants were not sufficient in a cluster (n = 50), the adjacent clusters were visited to provide the required number of people.

The data collection instrument was a questionnaire comprised of demographic information as well as participants’ weight, height, smoking habit, and physical activity. Height and weight were measured to the nearest 0.5 cm and 0.5 kg, respectively, and the average of the two measurements was used to calculate the BMI. The weight was measured with the least clothes on and no shoes by means of a digital scale, while the height was measured by a tape measure in a standing position with a normal shoulders posture. BMI was used to evaluate weight and health state (BMI = weight (kg)/height (m²). A BMI is interpreted if < 18.5 kg/m² as low weight; 18.5 - 24.9 as normal; 25 - 29.9 as overweight, and > 30 as obese. The collected data were then statistically analyzed with SPSS version 19 using descriptive statistics. In the current study, chi-square test was used to assess a significant correlation between the variables and BMI.

4. Results

The present study was conducted on 5074 people over 18 years old in Hormozgan province; however, only 5000 questionnaires were completed and 74 cases were excluded due to incomplete data; 2078 (41%) subjects were
male and gender ratio (M:F) was 0.63%. Most of the participants (85.2%) were married and 358 (8.2%) had a university education. Most of the females (93.5%) were housewives and the low-income families comprised the majority of participants.

According to the data summarized in Table 1, males within the age range of 25 - 44 years had the highest percentage of obesity. As for education, subjects holding a bachelor’s degree or higher were more obese (14.3%). Among males, the singles (11.8%) and occasional smokers (10.9%) were more obese. Moreover, urban male participants (11%) and the ones with sedentary lifestyle (11%) were more obese than the others. Females within the age range of 35 to 44 years included 23.2% of all subjects with obesity; the subjects holding a junior high school degree (23.8%), the married (20.6%) and occasional smokers (23.1%) had the highest percentage of obesity. More details are presented in Table 1.

The data presented in Table 2 show that 31.8% of Hormozgan province population had overweight, while 15.2% had obesity and the subjects 35 - 44 years old had the highest percentage of obesity (18.3%).

The data showed that 1573 participants were overweight, 751 were obese, 406 had low weight, and the rest had normal weight, as shown in Figure 1, based on percentage and gender.

Also, Figure 2 shows the distribution of gender, frequency, and percentage of overweight and obesity in urban and rural populations.

5. Discussion

The present study findings revealed that obesity was significantly lower among males (9.4%) than females (19.3%), which was consistent with those of other studies on obesity (6, 18, 21, 24-26). In the gender ratio of the participants (i.e., M:F = 0.63), Vania et al., reported that the prevalence of obesity was 32% and 25% among females and males, respectively. In some other studies by Dickson Abanimi Amugsi et al., the trend of overweight and obesity was investigated among females in 24 African countries. An increasing trend was observed in the 24 countries (27). It can be claimed that females were more likely to have obesity than males due to less physical activity, sedentary lifestyle, hormonal imbalance, and their body shape, which facilitates fat deposit and storage in breasts, thighs, hips, and waist (28, 29).

The present study findings revealed that the highest rate of obesity among males and females belonged to the 25 - 45 years age group. The percentage of obesity above the age of 18 years followed a curve-like trend. In fact, the 18 - 24 as well as above 55 years age group was associated with a lower prevalence than the middle-aged group (35 - 54 years). It was in line with the findings reported by Biswas et al., Nikooyeh et al., and Gaio et al. (18, 25, 30). It is essential to raise awareness about the importance of weight loss in the middle-aged group. A variety of educational programs can help to control obesity among the middle-aged people. Mazloomy-Mahmoobad et al., found a statistically significant reduction in the BMI value and waist circumference among adolescents in the post intervention phase (31).

The reason for these divergent findings can be the fact that at this age, many symptoms of the disease are not started yet. Moreover, at this age, people often consume unhealthy food. However, aging is followed by the development of many diseases such as diabetes, hypertension, etc., which make people care more about their health and lifestyle.

According to the current study results, the prevalence of obesity among more educated females (bachelor graduates or higher) was 6% lower than those of the others. However, obesity was more prevalent among more educated males (14.3%). It was in line with the findings reported by Nikooyeh et al. and He et al. (30, 32). Sulaiman et al., reported a higher rate of obesity among more educated population (26). Making females aware of obesity
Table 1. The Prevalence of Overweight and Obesity in the Target Sample Across Independent Variables

| Variable                      | Low weight | Normal | Overweight | Obese | P Value |
|-------------------------------|------------|--------|------------|-------|---------|
| **Part I - Males**            |            |        |            |       |         |
| **Age, y**                    |            |        |            |       |         |
| 18 - 24                       | 25         | 40     | 25         | 10    | < 0.001 |
| 25 - 34                       | 7.8        | 56.4   | 30.2       | 10.5  |         |
| 35 - 44                       | 6.6        | 44.2   | 38.4       | 10.8  |         |
| 45 - 54                       | 6.1        | 45     | 38.5       | 9.9   |         |
| 55 - 64                       | 10.1       | 49.5   | 31         | 9.1   |         |
| > 64                          | 13         | 56.8   | 23.6       | 4.6   |         |
| **Education level**           |            |        |            |       | < 0.001 |
| Uneducated                    | 11.9       | 54.2   | 26.8       | 7.2   |         |
| Elementary school             | 7.7        | 10     | 32.5       | 9.8   |         |
| Junior high school            | 8.1        | 40.5   | 35.6       | 9.7   |         |
| Diploma                       | 9.2        | 42.9   | 40         | 7.9   |         |
| Bachelor's degree and higher  | 2.6        | 39.7   | 43.4       | 14.3  |         |
| **Marital status**            |            |        |            |       | < 0.001 |
| Married                       | 8          | 48     | 34.8       | 9.3   |         |
| Single                        | 16.8       | 52.1   | 19.3       | 11.8  |         |
| Divorced                      | 4.3        | 75.9   | 13         | 8.7   |         |
| Widow                         | 11.7       | 57.1   | 23.4       | 7.8   |         |
| **Smoking**                   |            |        |            |       |         |
| Yes, sometimes                | 10.9       | 50.5   | 27.1       | 10.8  |         |
| Yes, regular                  | 14.7       | 56.7   | 19.9       | 8.8   |         |
| No                            | 7.2        | 46.3   | 36.9       | 9.6   |         |
| **Physical activity**         |            |        |            |       | 0.01    |
| Yes                           | 8          | 47.7   | 36         | 8.2   |         |
| No                            | 9.2        | 49     | 30.8       | 8.2   |         |
| **Residential area**          |            |        |            |       |         |
| Urban                         | 8.4        | 45.2   | 35.4       | 8.1   |         |
| Rural                         | 8.9        | 56.9   | 20.5       | 7.6   |         |
| **Part II - Females**         |            |        |            |       | < 0.001 |
| **Age, y**                    |            |        |            |       |         |
| 18 - 24                       | 35.7       | 45.5   | 18.6       | 10.6  |         |
| 25 - 34                       | 8          | 42.5   | 32.6       | 9.9   |         |
| 35 - 44                       | 6.4        | 41.3   | 30.1       | 22.2  |         |
| 45 - 54                       | 5.7        | 41.7   | 30.6       | 22    |         |
| 55 - 64                       | 6.4        | 38.6   | 33.3       | 19.7  |         |
| > 64                          | 14.4       | 53.3   | 23.8       | 8.5   |         |
| **Education level**           |            |        |            |       | < 0.001 |
| Uneducated                    | 10.7       | 46.6   | 20.1       | 14.7  |         |
| Elementary school             | 6.8        | 42.2   | 28         | 21    |         |
| Junior high school            | 6.7        | 37.3   | 32.2       | 23.8  |         |
| Diploma                       | 4.8        | 38.4   | 33.4       | 16.5  |         |
| Bachelor's degree and higher  | 7          | 40.7   | 38         | 6.3   |         |
| **Marital status**            |            |        |            |       | < 0.001 |
| Married                       | 7.3        | 41.2   | 30.9       | 10.6  |         |
| Single                        | 11.4       | 50.6   | 27.7       | 10.2  |         |
| Divorced                      | 4.7        | 46.5   | 30.2       | 10.6  |         |
| Widow                         | 12         | 47     | 27.6       | 15.4  |         |
| **Smoking**                   |            |        |            |       | 0.001   |
| Yes, sometimes                | 7.6        | 40.2   | 28.8       | 23.1  |         |
| Yes, regular                  | 10.8       | 51     | 22.4       | 15.7  |         |
| No                            | 7.6        | 41.8   | 31.1       | 10.6  |         |
| **Physical activity**         |            |        |            |       | 0.580   |
| Yes                           | 7          | 45.7   | 29.1       | 20.3  |         |
| No                            | 8.3        | 40.1   | 31.9       | 19.7  |         |
| **Residential area**          |            |        |            |       | < 0.001 |
| Urban                         | 5.4        | 36.6   | 34.3       | 19.7  |         |
| Rural                         | 10.7       | 40.4   | 26.5       | 14.5  |         |

*Values are expressed as percent.

bP < 0.05.
and its increased adverse effects might persuade them to consciously control their weight and lifestyle including workouts. However, in the present study, it appears that males do not improve their lifestyle if they are highly educated. In other words, it can be said that improving their lifestyle and eating habits may not be that much important to them, unless an acute adverse health event might be threatening them. Females with lower education and their families can be encouraged to show appropriate behavior with proper awareness-raising plans.

In the present study, single males were more obese than others, whereas married females were more obese than others, which can be explained by the fact that single males go for unhealthy food especially fast foods. Most housewives have an unhealthy lifestyle and limited physical activity. They follow unhealthy eating habits, and even some may take oral contraceptives or injectable forms of progesterone, which is also a cause of weight gain in married females; therefore, married females have higher tendency toward obesity than others and this difference is statistically significant.

Smoking was associated with obesity and overweight in the current study both in males and females (P < 0.001 and P = 0.003, respectively), which was similar to other studies. Middle-aged smokers were more obese than their younger counterparts in the study by Brook et al. (33). A study on smokers in the UK showed that current cigarette smokers were more likely to be obese if the number of cigarettes they smoked per day was more. Also current heavy smokers were more likely to be have obese obesity than moderate or light smokers (34). Dvorak et al., hypothesized that smoking was associated with physical inactivity, causing increased BMI in tobacco smokers (35). Kim et al., found a dose-dependent association between abdominal obesity and smoking (36). The current study interpreted that this association of smoking alters the metabolism and low-density lipoprotein levels, which could lead to increased weight and obesity alongside physical inactivity and nutritional deprivation present in smokers that mostly have low socioeconomic status.

The present study findings indicated that the urban population including male and female were significantly more obese than the rural residents (P = 0.006 and P < 0.001, respectively), which were similar to those of some other studies; it seems to be due to healthy lifestyle including the healthy nutrition among rural residents. According to the results obtained and reported by Dastgiri et al., in the Northwest of Iran, rural residents consumed more fruit and vegetables in their daily diet and, hence, were less susceptible to obesity (14). On the other hand, obesity was more prevalent in cities due to more sedentary lifestyle and unhealthy food consumption, especially fast foods. Educational programs seem to be essential, especially for lower age groups in students; therefore, the habit of physical activities and sports can be established in students from young age. It is essential to raise awareness of the benefits of consumption of healthy food and ample physical activity to reduce the rate of obesity in near future in urban population, and improve the quality of life.

5.1. Conclusions

The current study revealed that the urban married middle-aged females had the highest rate of obesity, which requires severe educational programs and efficient models within the realm of female health. It is necessary to focus on lifestyle modification including physical activity, smoking cessation, healthy diet, and also better management of obesity as the health-related priorities of the province.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].
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Footnotes

Conflict of Interests: The authors declared no conflict of interest.

Ethical Approval: The study protocol was approved by the Ethics Committee of Hormozgan University of Medical Sciences (ethical code: HUMS.REC.1394.174).

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