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## Prevalence of Different Obesity Grades among Female of Childbearing Age in Saudi Population

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## Abstract

**Background and Objective:** Obesity is one of a major health problem in the world. It is associated with other diseases. We used a representative data from the primary care department to estimate the prevalence of different obesity grades among female in childbearing age.

**Methods:** We retrospectively analyzed 305 non-pregnant female participants with body mass index (BMI) ≥ 30 kg/m² who are between the ages of 15 to 44 years. All patients were from the population of the Primary health center at King Fahad Armed Forces Hospital. All data were collected on the basis of a review of electronic medical data and through a personal interview. Weight (kg) and height (cm) were measured. Body mass index (BMI) values classified into groups as obese Grade I (BMI=30-34.9 kg/m²), obese Grade II (BMI=35.0-39.9 kg/m²) and morbidly obese (obese Grade III) (BMI ≥ 40 kg/m²). Participants were defined as having type 2 diabetes (T2DM) according to self-report, clinical reports, use of antidiabetic agents and HbA1c (≥ 6.5). Hypertension (HTN) was defined when the systolic blood pressure was ≥ 130 mmHg and/or diastolic blood pressure was ≥ 85 mmHg in addition to receiving any medication for hypertension. The total number of females was separated on basis of age values into 6 groups: 15-19 years, 20-24 years, 25-29 years, 30-34 years, 35-39 years and 40-44 years.

**Results:** 305 female participants were analyzed. Age was 35.8 ± 6.7 (minimum 15 years and maximum 44 years). Mean BMI 36.7 ± 6.1. T2DM, HTN and T2DM with HTN cases were found in 114 (37.4%), 55 (18.0%) and 41 (13.4%) respectively. Obese Grade I (BMI=30-34.9 kg/m²) was found in 50.8%, obese Grade II (BMI=35.0-39.9 kg/m²) in 32.5% and morbidly obese (obese Grade III) (BMI ≥ 40 kg/m²) in 16.7%. The percentage of different obesity grades I, II and III were consistently increased with advanced age reaching 42.6%, 35,4%, and 37.3% respectively at age 40-44 years. T2DM was more frequent in obese grade I (54.9%) compared to grade II (34.2%) and III (33.3%), p=0.02. The percentage of T2DM of different obesity grades I, II and III were consistently increased with advanced age reaching 19.4%, 15.2%, and 29.4% respectively at age 40-44 years. HTN was less frequent in obese grade I (12.3%) compared to grade II (17.2%) and III (37.3%), p<0.0001. The percentage of HTN of different obesity grades I, II and III were consistently increased with advanced age reaching 6.5%, 8.1%, and 17.6% respectively at age 40-44 years.

**Conclusion:** Obesity remains a critical public health concern in the female of childbearing age. Our findings reinforce the need for further attention to the health and wellbeing of women of childbearing age. A national prevention program at the community level should be implemented.

## Keywords

Prevalence; Obesity; Childbearing age

## Conflict of Interest

The authors have no conflict of interest to disclose

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## Introduction

Obesity is one of a major health problem in the world. It is associated with other diseases. It might lead to the death of millions of people every year [1]. Obesity increases the risk of hypertension (HTN), pre-diabetes, type 2 diabetes (T2DM), dyslipidaemia, cardiovascular diseases (CVD) [2,3]. It is currently defined as a body mass index (BMI) equal to or greater than 30 kg of body weight per meter squared of height [4]. Globally, the worldwide prevalence of obesity had doubled between 1980 and 2008 whereby 14% of a female was found to be obese compared with 8% for female in 1980 [5]. The prevalence of obesity In the United States was increased from 15% in 1980 to 36% in 2010; the prevalence of extreme obesity was 8.2% in female [6]. In developing countries, including Saudi Arabia, obesity is rapidly becoming an emerging disease due to the increasing westernization of societies and change in lifestyle [7].

Although studies have shown that the mechanisms of impacts of obesity on fertility are not well understood, yet it has been shown to be associated with several reproductive disturbances, different menstrual disorders, infertility, anovulatory cycles, oligomenorrhoea, hirsutism, and recurrent miscarriages [8-10]. Moreover, female of reproductive age have higher rates of overweight and obesity and are more adversely affected by obesity-related complications than men [11]. This gender difference is mainly due to general weight gain during childbearing years, gestational weight gain and/or weight retention, adverse lifestyle, or risk factors associated with pregnancy and the postpartum period [12].

Understanding the obesity prevalence among this high-risk group may help inform the development of feasible public health interventions to reduce the burden of obesity and associated adverse health outcomes. We used a representative data from the primary care department to estimate the prevalence of different obesity grades among women in childbearing age.

## Methods

We retrospectively analyzed 305 non-pregnant female participants with body mass index (BMI) ≥ 30 kg/m$^2$ who are between the ages 15 to 44 years. All patients were from the population of the Primary health center at King Fahad Armed Forces Hospital. All data were collected on the basis of a review of electronic medical data and through a personal interview. Weight (kg) and height (cm) were measured by physician and nurse interviewers and recorded. BMI values classified into groups as obese Grade I (BMI=30-34.9 kg/m$^2$), obese Grade II (BMI=35.0-39.9 kg/m$^2$) and morbidly obese (obese Grade III) (BMI ≥ 40 kg/m$^2$) [13]. Participants were defined as having T2DM according to self-report, clinical reports, use of antidiabetic
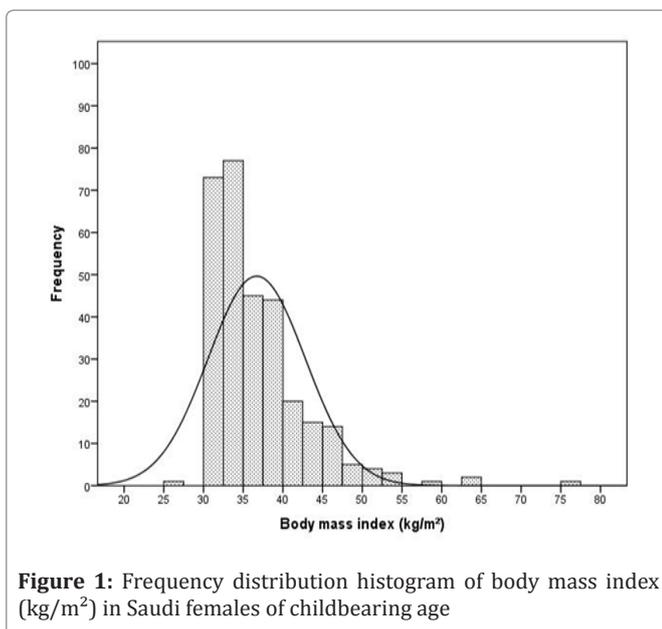
| Parameters | Total |
|---|---|
| n (%) | 305 |
| Age (years) | 35.8 ± 6.7 |
| Body mass index (kg/m$^2$) | 36.7 ± 6.1 |
| Type 2 diabetes mellitus | 114 (37.4) |
| Hypertension | 55 (18.0) |
| Type 2 diabetes mellitus and Hypertension | 41 (13.4) |

**Table 1:** Basic characteristics of the women under study (means ± SD or number (%))

agents and HbA1c (≥ 6.5) [14]. HTN was defined when the systolic blood pressure was ≥ 130 mmHg and/or diastolic blood pressure was ≥ 85 mmHg in addition to receiving any medication for hypertension [15]. The total number of females was separated on basis of age values into 6 groups: 15-19 years, 20-24 years, 25-29 years, 30-34 years, 35-39 years and 40-44 years.
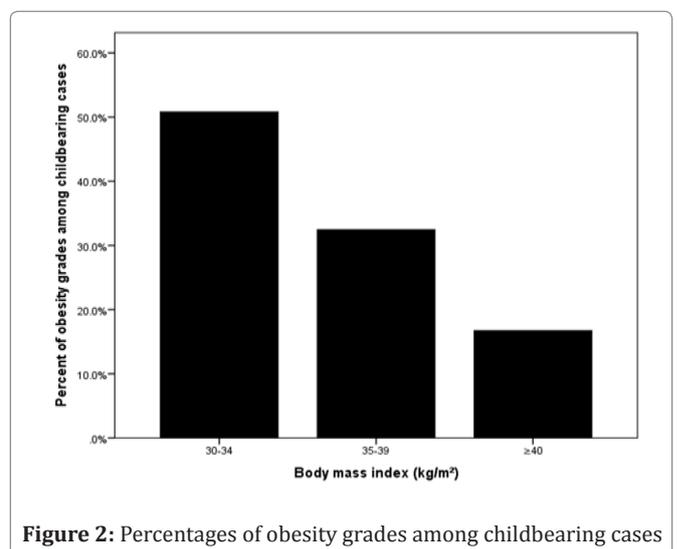
## Statistical analysis

Unpaired *t*-test analysis and Chi-square (X$^2$) test (categorical data comparison) were used between variables to estimate the significance of differences between groups for the demographic and clinical laboratory. All statistical analyses were performed using SPSS Version 23.0. The difference between groups was considered significant when p<0.05.
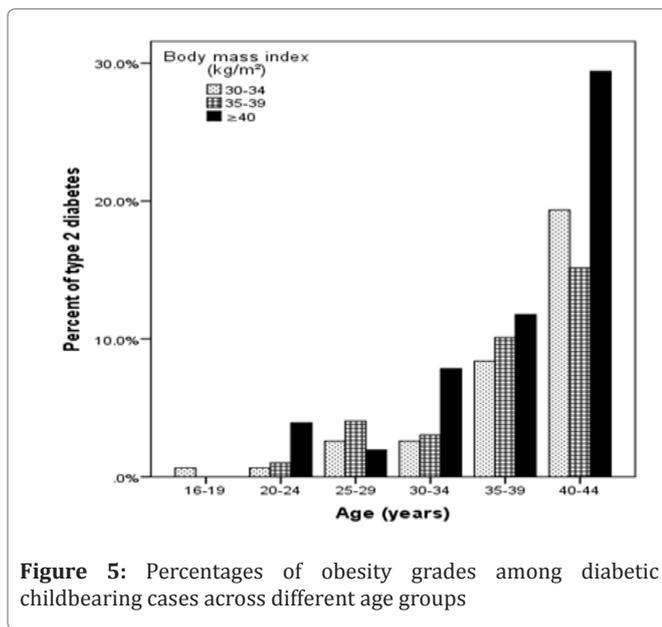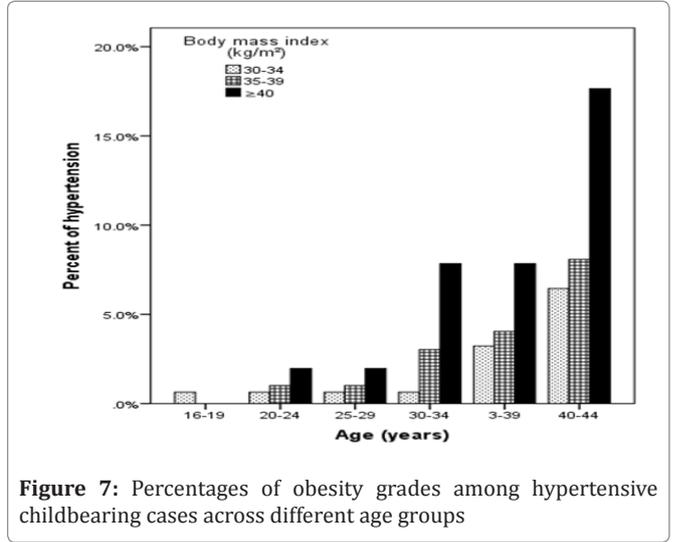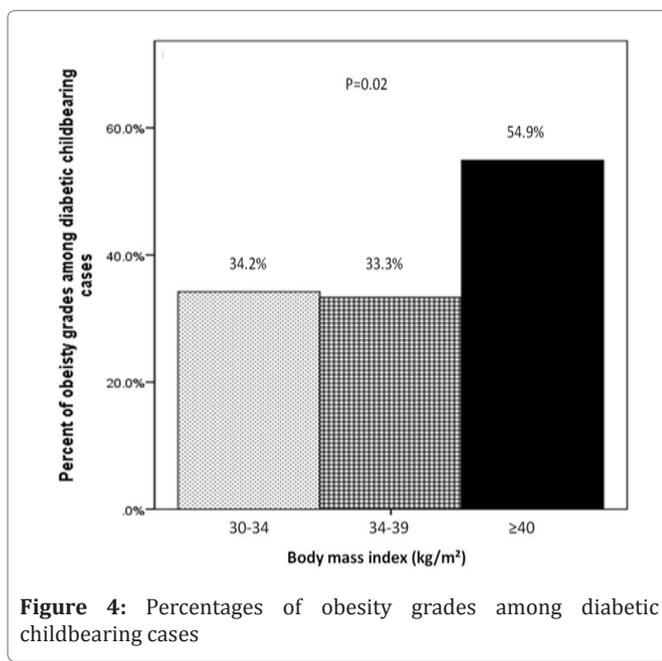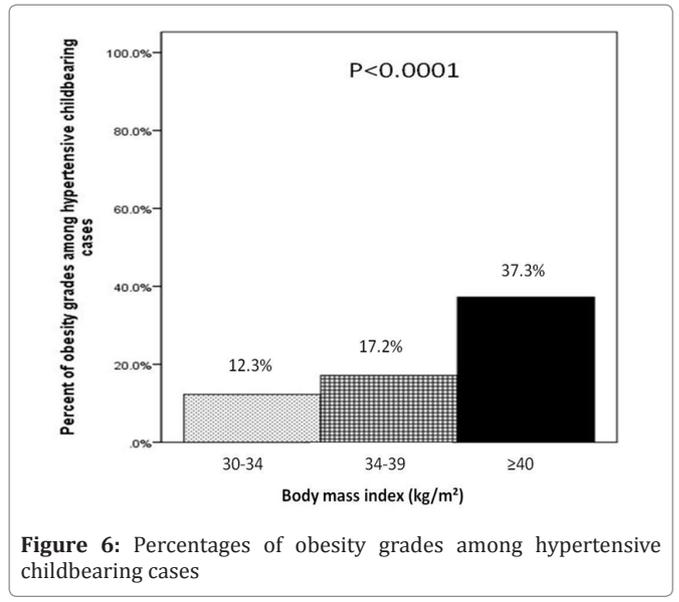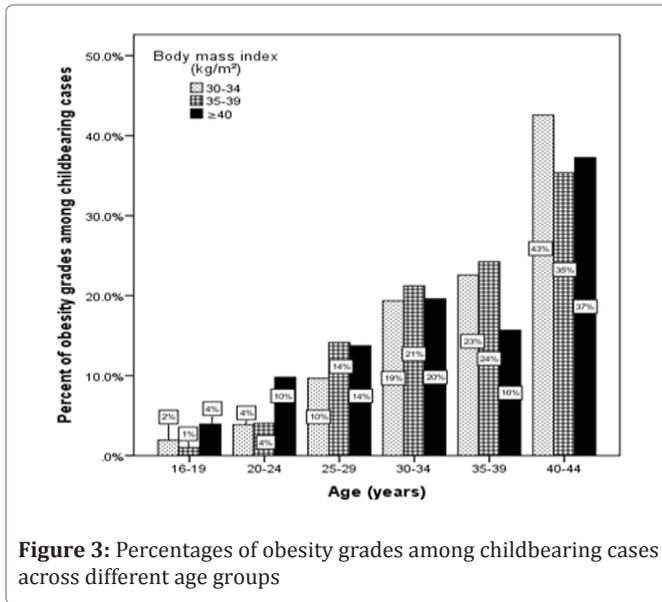
## Results

The characteristics of the study participants are shown in Table 1. 305 female participants were analyzed. Age was 35.8 ± 6.7 (minimum 15 years and maximum 44 years). Mean BMI 36.7 ± 6.1. T2DM, HTN and T2DM with HTN cases were found in 114 (37.4%), 55 (18.0%) and 41 (13.4%) respectively. Frequency distribution histogram of body mass index (kg/m$^2$) in Saudi females of childbearing age is shown in Figure 1. The results show that the values of the mean (36.7), median (35) and mode (30) are very close to each other suggesting normal Gaussian distribution as shown by the histograms. BMI is skewed positively with a skewness of 2.1.

Obese Grade I (BMI=30-34.9 kg/m$^2$) was found in 50.8%, obese Grade II (BMI=35.0-39.9 kg/m$^2$) in 32.5% and morbidly obese (obese Grade III) (BMI ≥ 40 kg/m$^2$) in 16.7% (Figure 2). The percentage of across obesity grades were consistently increased with advanced age reaching 42.6%, 35.4% and 37.3% respectively at age 40-44 years (Figure 3). T2DM was more frequent in obese grade I (54.9%) compared to grade II (34.2%) and III (33.3%), p=0.02 (Figure 4). The percentage of T2DM across obesity grades were consistently increased with advanced age reaching 19.4%, 15.2% and 29.4% respectively at age 40-44 years (Figure 5). HTN was less frequent in



**Figure 1:** Frequency distribution histogram of body mass index (kg/m$^2$) in Saudi females of childbearing age



**Figure 2:** Percentages of obesity grades among childbearing cases

**Figure 3:** Percentages of obesity grades among childbearing cases across different age groups



**Figure 4:** Percentages of obesity grades among diabetic childbearing cases



**Figure 5:** Percentages of obesity grades among diabetic childbearing cases across different age groups



**Figure 6:** Percentages of obesity grades among hypertensive childbearing cases



**Figure 7:** Percentages of obesity grades among hypertensive childbearing cases across different age groups

obese grade I (12.3%) compared to grade II (17.2%) and III (37.3%), p<0.0001 (Figure 6). The percentage of HTN across obesity grades were consistently increased with advanced age reaching 6.5%, 8.1% and 17.6% respectively at age 40-44 years (Figure 7).

## Discussion

In this hospital-based cohort of Saudi female of childbearing age, the prevalence of Obese Grade I was found in 50.8%, obese Grade II in 32.5% and morbidly obese in 16.7%, moreover, tended to increase significantly with age. Obesity is caused by a complex interaction between the environment, genetic predisposition, and human behavior. Environmental factors are likely to be major contributors to the obesity epidemic [16]. Recent estimates show the prevalence of obesity to be increasing at alarming rates, in both developed and developing countries [17]. Obesity is a medical disease that poses unwanted consequences on the female of childbearing age if proper control measures are not implemented early. It can lead to various reproductive health problems such as difficulty in conceiving, poor health during pregnancy, reduced fertility and less successful assisted reproduction, thereby resulting to conception difficulty or failure in female and poor perinatal and postpartum outcomes [18-20]. The chances of female to become pregnant decreases as BMI increases and the risks of adverse pregnancy outcomes are increased if maternal BMI is beyond the normal range [21]. Morbid obesity occurs when the excess body fat becomes a danger to the overall health of people with obesity [22]. This occurs when a body mass

index exceeds 40 kg/m² and thence she will not be able to perform her activities of daily living effectively and would need other people's support for survival [23].

In concordance with the previous report in Saudi females of childbearing age [24], when the females are grouped into different age groups, a decrease in BMI occurs from 37.8 ± 6.3 in the 16–19 years group to 36.7 ± 6.1 in the 40–44 years age group. The correlation coefficient is low and the negative correlation between age and BMI is statistically not significant (r=-0.1, p=0.3). An increase in the prevalence of obesity and morbid obesity occurred in the total group with age. In the age group 16–19 years, 1.0%, 0.3%, and 0.7% females were either obese grade I, II or had morbid obesity respectively. However, by the age of 40–44 years, 21.6% were obese grade I, 11.5% were obese grade II and 6.2% had morbid obesity. A study from Bangladesh has also demonstrated this association, with increased age as a significant predictor [25]. Same results were found in India and Jordan. In both, the association between obesity increased significantly with the increase in age [26,27].

A recent report in the United States showed 1 in 5 adult Americans are obese [28]. We see a similar prevalence in Saudi adults and as obesity may be regarded as an epidemic in Saudi Arabia [29]. Control of obesity is essential in order to prevent the development of other chronic diseases such as T2DM, HTN, and CVD. In a study from Saudi Arabia showed the prevalence of obesity was significantly higher in diabetic and hypertensive Saudis compared to the non-diabetic and non-hypertensive controls [30-32]. Compared to the general population of the female of reproductive age, those with high BMI had higher levels of T2DM and HTN. Others have shown that overweight or obese individuals have twice the risk of developing hypertension and pre-eclampsia and are four times more likely to develop gestational diabetes [33-35]. T2DM, HTN and being obese are major modifiable risk factors for a range of conditions that can increase mortality in female including maternal death, so the potential and need for intervention in Saudi Arabia is significant [36].

This study has a number of limitations that warrant mention. First, this study was retrospective that limits the causal interpretation of the associations described. Second, women included in this study cannot be thought of as a random sample of all Saudi women and results cannot be totally extrapolated to the general female. Finally, the present study was having considered only overall obesity (assessed by BMI) and not abdominal obesity (measured by waist circumference), which is known to bear a close relationship with the target diseases.

## Conclusion

Obesity remains a critical public health concern in the female of childbearing age. Our findings reinforce the need for further attention to the health and wellbeing of women of childbearing age. A national prevention program at the community level should be implemented.

## Acknowledgments

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