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Tracking the Distribution of Body Mass Index among Iron-Deficient Pregnant Women in Dubai, United Arab Emirates

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ABSTRACT

Background: One of the most common metabolic diseases in the world, obesity is increasingly acknowledged as a serious public health issue. It is characterized by an excessive or aberrant buildup of body fat, which raises the risk of several health issues, such as increased rates of morbidity and mortality.

Methods: Ethical Committee approval was granted for this research in accordance with local and international guidelines for research ethics. The study included a cohort of 1,818 pregnant women who were enrolled with obstetricians or gynecologists at Emirates Hospital in Dubai, UAE. Among them, 375 iron-deficient pregnant women were selected based on specific inclusion criteria during the initial one year period, from September 2022 to September 2023, across different trimesters. **Statistics:** Statistical software packages, Microsoft 365 (Excel) and the Statistical Package for the Social Sciences (SPSS) version 21.0 (Inc., Chicago, IL, USA) were utilized for data recording and subsequent statistical evaluation.

Results: Out of 375 iron deficient pregnant women, the majority showed higher body weight and Body Mass Index (BMI), indicating a tendency towards overweight and obesity within the study population. Most participants (61%) weighed between 55–74.9 kg, while 32.8% had a weight of ≥ 75 kg. Regarding BMI distribution, 39.73% of women had a normal BMI, whereas a substantial proportion were overweight (36%), obese (17.6%), or severely obese (5.33%), with only 1.33% underweight. The Participant ages spanned from 21 to 50 years, with a median value of 32 years, indicating that most were in their early to mid-thirties. The mean BMI was 26.57 ± 4.86 kg/m²

Conclusion: A substantial proportion of iron deficient pregnant women in Dubai exhibited higher body size (32.8% weighed ≥75 kg; 58.93% had a BMI ≥25 kg/m²; median BMI = 26.1 kg/m²), indicating an overweight-predominant profile within the iron-deficient cohort.

Keywords: *Obesity, Body Mass Index, Iron Deficiency, BMI Calculation, Maternal BMI, Pregnancy.*

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1. INTRODUCTION

Obesity has been recognized as one of the most prevalent metabolic disorders worldwide and is now recognized as a major public health concern. It is characterized by an abnormal or excessive accumulation of body fat that increases the risk of various health complications, including higher morbidity and mortality rates. The growing global burden of obesity has notably impacted women of reproductive age. Among the different measures available, BMI (Body Mass Index) serves as the standard tool for the assessment and classification of obesity. [(1)(2)]

Globally, overweight and obesity, refers to an excessive or irregular accumulation of body fat with a BMI ≥ 25 kg/m² (overweight) and BMI ≥ 30 kg/m² (obese), have become a major public health concern.[3]

According to the Institute of Medicine (IOM) 2009 guidelines, maternal body weight is classified based on pre-pregnancy Body Mass Index (BMI) as follows: underweight (BMI < 18.5 kg/m²), normal weight (BMI 18.5–24.9 kg/m²), overweight (BMI 25.0–29.9 kg/m²), and obesity (BMI ≥ 30 kg/m²). Obesity is additionally categorized into three classes: class I (BMI 30.0–34.9 kg/m²), class II (BMI 35.0–39.9 kg/m²), and class III or morbid obesity (BMI ≥ 40 kg/m²). For pregnant women, a BMI of ≥ 30 kg/m² at the initial prenatal assessment is considered obesity in pregnancy. The The Institute of Medicine (IOM) also provides recommendations for optimal gestational weight gain (GWG) based on maternal BMI: 12.5–18.0 kg for underweight women, 11.5–16.0 kg for those with normal weight, 7.0–11.5 kg for overweight women, and 5.0–9.0 kg for women classified as obese.[4]

D'Souza et al. (2019) demonstrated a significant linear association between maternal body mass index (BMI) and a broad spectrum of adverse pregnancy outcomes. Their systematic review and meta-analysis highlighted that stratification of risks based on BMI categories enhances clinical counselling and supports the development of targeted interventions aimed at improving both maternal and neonatal outcomes.[5]

Women who are underweight before conception and experience rapid gestational weight gain (GWG) have a higher likelihood of developing iron deficiency anemia (IDA). Careful monitoring of weight gain and ensuring adequate iron supplementation, especially among underweight women, may be advisable. [6]

Obesity is highly prevalent in the UAE, with a reported 2–3-fold increase in its prevalence between 1989 and 2017. In contrast, providing a precise estimate continues to be difficult owing to methodological heterogeneity among epidemiological studies. These findings highlight the need for future longitudinal studies to better understand obesity trends and their implications.[7]

Despite the global and regional burden of obesity, there is limited evidence on the distribution of body mass index (BMI) among iron-deficient pregnant women in Dubai. This research seeks to resolve this gap by analyzing BMI patterns within this population.

2. MATERIALS AND METHODS

Design:

The study design was a time-bound prospective study involving a non-probability convenience sampling technique, conducted at Emirates Hospital, Dubai, UAE. Ethical approval for this research has been granted by the Dubai Scientific Research Ethics Committee (DSREC).

Sampling:

The study included a cohort of 1,818 pregnant women who were enrolled with obstetricians or gynecologists at Emirates Hospital in Dubai, UAE. Among them, 375 iron-deficient pregnant women were selected according to specific inclusion criteria during the initial one year period from September 2022 to September 2023, across different trimesters and excluded those suffering from pre-existing chronic medical conditions such as chronic kidney disease, autoimmune disorders, and any other complications related to unusual pregnancy, also excluded those under the age of 18, and cases of aborted pregnancy. Pregnant women who had no history of thalassemia or any genetic diseases were included. BMI was calculated using measurements obtained at the first antenatal visit whenever available. BMI was computed as weight (kg) divided by height squared (m²) and recorded to one decimal place. The reported height and weight measured during the first antenatal visit were used to calculate the Body Mass Index (BMI).

Data analysis:

In this study, Statistical software packages, Excel 2007 (Microsoft) and the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL), were used for data entry and statistical analysis, respectively. Data was collected, tabulated, and analyzed with percentages. Appropriate tools for primary and secondary data collection may be selected from observation techniques, questionnaires, interviews, checklists, etc.

3. RESULTS

Table 1 shows the frequency distribution of weight of Iron deficient pregnant women. The findings revealed that none of the women weighed below 35 kg, while only a single participant (0.27%) fell within the 35–44.9 kg range. A small proportion (6.67%) had a weight between 45 and 54.9 kg. Notably, the majority of the participants were in the 55 - 74.9 kg range, accounting for approximately 61% of the total participants. Furthermore, a substantial proportion of the women (32.80%) had a weight ≥ 75 kg, indicating a skew towards higher body weight categories among the studied population.

Table 1: Frequency distribution of weight of patients

Weight (In kg)	Frequency	Percentage (%)
< 35 kg	0	0.00%
35–44.9 kg	1	0.27%
45–54.9 kg	25	6.67%
55–64.9 kg	113	30.13%
65–74.9 kg	113	30.13%
≥ 75 kg	123	32.80%
Total	**375**	**100.00%**

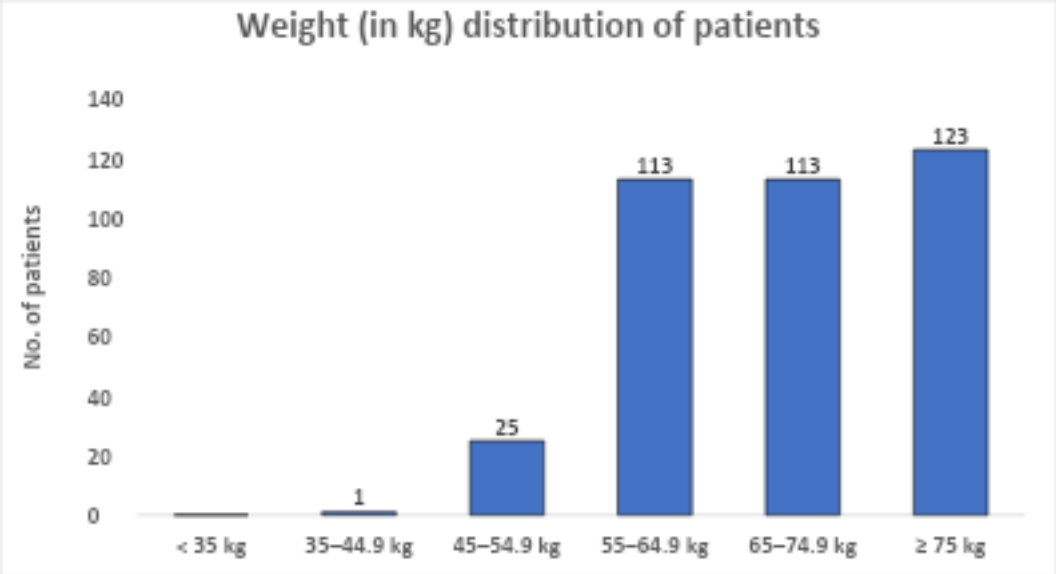

Figure 1: Frequency distribution of weight of patients

Table:2 describes the frequency distribution of body mass index of Iron deficient pregnant women. The majority of participants (39.73%) had a normal BMI (18.5–24.9 kg/m²), while 36.00% were classified as overweight (BMI 25–29.9 kg/m²). Additionally, 17.60% were obese (BMI 30–34.9 kg/m²), and 5.33% fell into the severely obese category (BMI ≥ 35 kg/m²). Only a small proportion (1.33%) were underweight (BMI < 18.5 kg/m²).

Table 2: Frequency distribution of body mass index of patients

BMI Range (kg/m²)	Frequency	Percentage (%)
Underweight (BMI < 18.5)	5	1.33%
Normal (BMI: 18.5–24.9)	149	39.73%
Overweight (BMI: 25–29.9)	135	36.00%
Obese (BMI: 30–34.9)	66	17.60%
Severe Obese (BMI ≥ 35)	20	5.33%
Total	**375**	**100.00%**

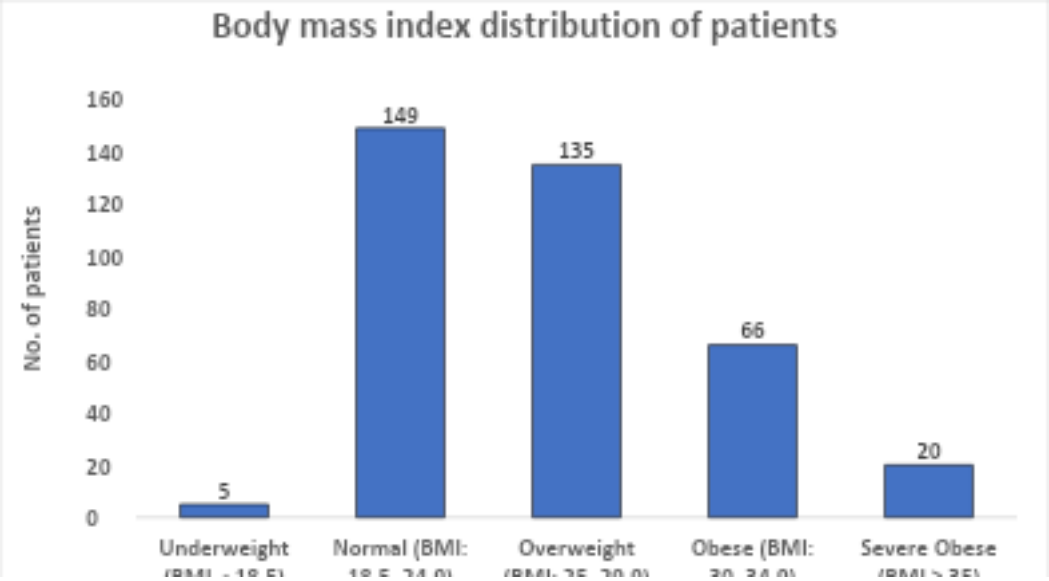

Figure 2: Frequency distribution of body mass index of patients

Table:3 illustrates the descriptive statistics of age, weight, and body mass index (BMI) among 375 iron-deficient pregnant women were analyzed. The age of the participants ranged from 21 to 50 years, with a median age of 32 years (IQR: 29–36) and a mean age of 32.46 ± 4.58 years, indicating that the majority of the women were in their early to mid-thirties.

The body weight of the participants varied between 44.5 kg and 108 kg, with a median weight of 68.4 kg (IQR: 61.9–78) and a mean weight of 70.21 ± 11.86 kg. This shows that a considerable proportion of the women had higher body weights, placing many within the overweight and obese categories.

The BMI values ranged from 17.6 to 57.8 kg/m², with a median BMI of 26.1 kg/m² (IQR: 23.3–29.05) and a mean BMI of 26.57 ± 4.86 kg/m². According to WHO BMI classification, this mean value falls within the overweight range (BMI: 25.0–29.9 kg/m²), suggesting that the majority of the iron-deficient pregnant women in this study were either overweight or obese.

Table: 3 Descriptive statistics of age, weight and body mass index of ID pregnant women

Variables	Minimum	Maximum	Median (IQR)	Mean ± SD
Age (In Yrs.)	21	50	32 (29-36)	32.46 ± 4.58
Weight (In Kg.)	44.5	108	68.4 (61.9-78)	70.21 ± 11.86
BMI (kg/m2)	17.6	57.8	26.1 (23.3-29.05)	26.57 ± 4.86

4. DISCUSSION

This study indicates that a significant proportion of iron-deficient pregnant women (32.80%) had a weight ≥ 75 kg, indicating a deviation towards higher body weight categories among the studied population. These findings suggest that a significant percentage of iron deficient pregnant women in Dubai fall into the overweight and obese ranges, highlighting the coexistence of micronutrient deficiencies even among individuals with higher body mass. Tussing-Humphreys et al. (2010) reported similar findings, demonstrating that obese women exhibited iron deficiency despite adequate dietary intake. Elevated hepcidin reduces intestinal iron absorption and restricts mobilization of stored iron, leading to functional iron deficiency even when dietary intake is sufficient. These findings suggest that in overweight and obese pregnant women, iron deficiency may be largely driven by inflammation mediated hepcidin dysregulation rather than inadequate dietary iron intake. [8]

In the present study, a considerable proportion (58.93%) of iron-deficient pregnant women presented with a BMI ≥25 kg/m², indicating overweight or obese status. This pattern aligns with findings from Jones et al. (2021), who reported that overweight and obese pregnant women exhibited elevated hepcidin levels and compromised iron status, despite sufficient dietary iron intake.[9]

Similarly, Wawer et al. (2021) found that obese mothers had significantly lower iron stores (as indicated by serum ferritin)

and persistently higher hepcidin throughout pregnancy.[10]

This study also presents the descriptive statistics of age, weight, and body mass index (BMI) of iron-deficient pregnant women. The mean age of 32.46 years suggests that the majority of the participants were within their optimal reproductive age range. However, a meaningful fraction approaches or exceeds advanced maternal age (≥35 years), which is recognized as a risk factor for several adverse obstetric outcomes and therefore merits age-stratified analysis in subsequent models.[11]

The BMI median of 26.1 kg/m² (IQR 23.3–29.05) indicates that a substantial proportion of participants began pregnancy overweight, resembling regional trends observed in the UAE. Taha, Hassan & Papandreou (2022) reported that pre-pregnancy overweight and obesity are common among women in the UAE and are more frequent in women aged ≥35 years. They observed a mean pre-pregnancy BMI of 26.4 kg/m² among mothers in Abu Dhabi, UAE, with 25.4% classified as overweight and 6.1% as obese.[12]

5. CONCLUSION:

A substantial proportion of iron-deficient pregnant women in Dubai exhibited higher body size (32.8% weighed ≥75 kg; 58.93% had a BMI ≥25 kg/m²; median BMI = 26.1 kg/m²), indicating an overweight-predominant profile within the iron deficient cohort. These findings highlight the coexistence of iron deficiency with excess adiposity, likely driven by inflammation mediated hepcidin dysregulation that impairs iron absorption and mobilization rather than dietary insufficiency alone.

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CONFLICT OF INTEREST:

None

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