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EGYPTIAN ACADEMIC JOURNAL OF

BIOLOGICAL SCIENCES

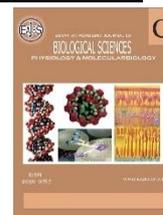
PHYSIOLOGY & MOLECULAR BIOLOGY



ISSN
2090-0767

WWW.EAJBS.EG.NET

Vol. 14 No. 1 (2022)



Maternal Complications of Pregnancies in Obese or Overweight Women in The Western Algerian Region

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ARTICLE INFO

Article History

Received:2/1/2022

Accepted:22/1/2022

Available:25/1/2022

Keywords:

Overweight and obesity, pregnancy, medical history, maternal complications

ABSTRACT

Background: Due to its high frequency and its multiple short- and long-term complications, obesity is considered a major public health problem. Its prevalence among women of childbearing age has doubled worldwide.

Objective: The objective of our study was to evaluate the risk factors and maternal complications associated with obesity or pre-existing overweight in pregnancy. **Materials and Methods:** We carried out a comparative prospective study including 289 pregnant women; the different maternal clinical Sociodemographic characteristics were studied in 181 overweight or obese parturient and were compared with those of 107 normal-weight parturients. **Results:** The mean age of normal weight parturient was 30.09 ± 6.55 and 32.31 ± 6.13 for overweight or obese parturient and the majority of obese cases were multiparous. The analysis of several factors and maternal complications showed that some of them were associated with overweight or obesity, namely: maternal age ≥ 32 years ($p=0.004$), duration of taking the oral contraception of 19.35 ± 23.92 ($p=0.002$), parity ≥ 1 ($p<0.001$). Moreover, 93.9% of obese had gestational diabetes history of ($p=0.012$), 78.8% suffered from allergies ($p=0.041$) and 63.4% from infertility problems ($p=0.047$). During pregnancy, 77.8% of overweight or obese parturients suffered from hypertension (HTA) ($p=0.045$) and 93.8% from gestational diabetes DG ($p<0.0001$). **Conclusion:** Our study shows that obese or overweight parturient was most affected by DG and arterial hypertension, for this reason, the care of overweight or obese women is necessary by establishing a follow-up program before and after conception in order to prevent or reduce maternal complications.

INTRODUCTION

The World Health Organization (WHO) had classified the 3 degrees or types of obesity according to BMI in terms of severity: type I or moderate obesity, for a BMI between 30.0 and 34.9 kg/m², type II or severe obesity for a BMI between 35.0 and 39.9 kg/m², and type III or massive obesity for a BMI greater than 40 kg/m² the last two types being associated with higher mortality, all combined causes (Frühbeck *et al.*, 2013). Obesity affects men and women with all age groups and different professions; according to the global estimation, the prevalence of obesity and overweight among women of reproductive age has doubled worldwide over the past last four decades thus, more than 30% are obese (Neeland *et al.*, 2018). In gynecology, obesity among the morbidity and mortality factors is considered as a real public health problem, its impacts on fertility and contraception are severe (Le Goff *et al.*, 2008; Neeland *et al.*, 2018). The prevalence of obesity varies from one country to another, in the United States of America obesity reached 18% of the population and 35% of women of childbearing age, in India 26% of women of childbearing age are overweight and 8% are obese; in China, 16% of women are overweight or obese, in the United Kingdom 33% of pregnant women are overweight or obese, in France 26% are overweight and 13.9% are obese; in Ghana, 64.7% of women of childbearing age are overweight or obese (Nathanielsz *et al.*, 2013; Picone *et al.*, 2007). In Morocco, a study carried out, only on women, found a prevalence of obesity of 47% and 36% overweight. In Tunisia, a prevalence of 71.1% overweight, 37% obesity with 33.5% in women (Jafri *et al.*, 2013). A study by the Atek team confirms a prevalence of obesity of 30.1% in Algerian women (Maatoug *et al.*, 2013).

Pregnancies in obese patients are marked by a high incidence of obstetrical (Atek *et al.*, 2013; Carlson & Lowe, 2014)

and maternal complications (gestational diabetes DG, arterial hypertension, preeclampsia, premature delivery, maternal morbidity)(Kriebs, 2014; Roberts *et al.*, 2015). This study aimed to highlight the impact of excessive maternal weight on the risk of pregnancy-related complications, such as diabetes, hypertension and caesarean delivery, which can affect the woman's health and foetal development.

MATERIALS AND METHODS

Epidemiological Study:

Our study was a prospective cohort carried out at the level of the maternity hospital of Sidi Bel Abbes region (Western Algeria). Its aim is to compare the different socio-demographic and clinical maternal characteristics of 289 pregnant women aged from 16 to 45 years old; of which 181 parturient were overweight or obese and 107 had a normal weight and were considered as control cases. A questionnaire was given to the women to answer the various questions, the most requested epidemiological features were: mother's age, pregnancy, parity, socio-demographic data (socio-economic level, educational level), personal history (gestational diabetes, high blood pressure, allergy), gynecological and obstetrical history (caesarean section, abortion, death in utero, fertility problems), family history, and BMI measurement.

Statistical Analysis:

Descriptive analyses were conducted using percentages and relative frequencies for qualitative variables. Categorical qualitative variables were compared using the Chi-square test (chi-square χ^2), while quantitative variables were compared using Student's t test. Differences were considered significant when the p value was less than or equal to 0.05 ($p < 0.05$). All data were calculated and analysed using SPSS22 (Statistical Package for the Social Sciences, IBM Corporation, Chicago, IL August 2011).

RESULTS

A total of 289 pregnant women including 181 overweight or obese parturient were compared with 107 normal-weight women, they were admitted to the mother-child hospital of Aould Guablia Zoubida in Sidi Bel Abbes region

from September 2020 to January 2021. The obtained results were compared taking into consideration the body mass index (BMI). Figure 1 represents the distribution of the population according to the different types of obesity (according to BMI).

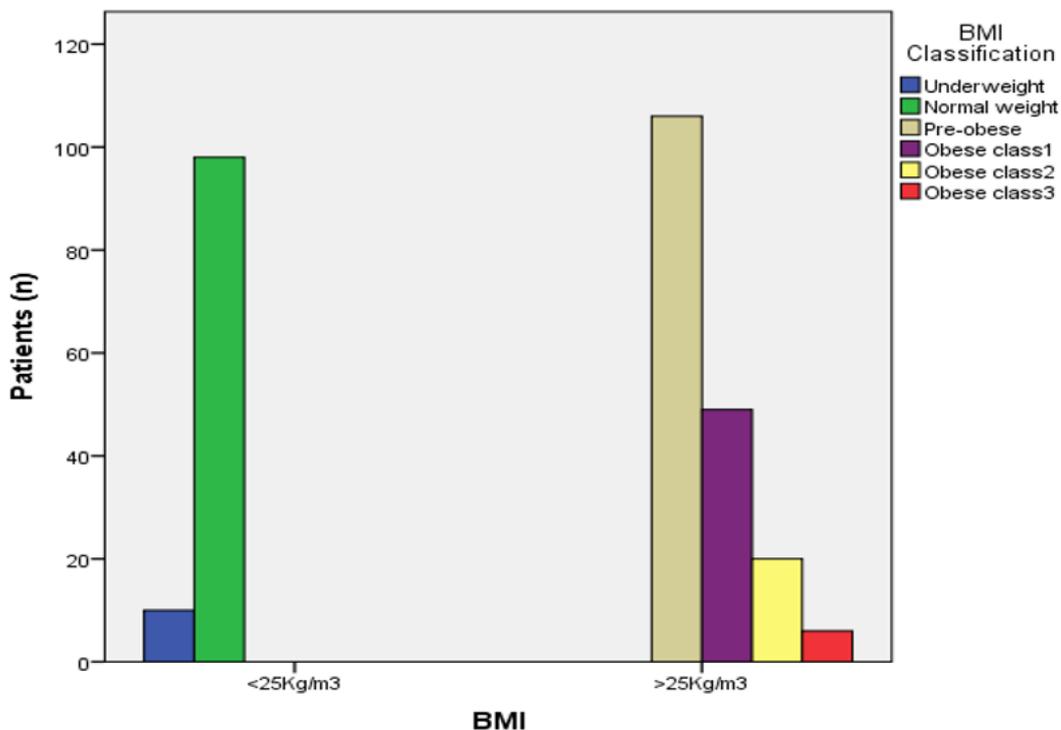


Fig. 1: Distribution of the population according to body mass index.

Our population had a minimum age of 16 years, and a maximum of 45 years, the average age of parturients with normal weight was 30.09 ± 6.55 and 32.31 ± 6.13 for an overweight or obese parturient with a statistical significance of $p=0.04$.

In the present study, the majority of obese or overweight women were multiparous 77% against 23% having a normal weight ($p <0.0001$), 62.6% of obese or overweight parturient had a low educational level against 37.4% in the

normal-weight parturient, 62.4% of obese had a low socio-economic level against 37.6% in the normal-weight parturient, 62.7% of obese or overweight parturient had an irregular menstrual cycle against 37.3% in the normal-weight parturient. The majority of overweight or obese women had a long duration of taking oral contraception of 19.35 ± 23.92 against 11.31 ± 15.95 in women of normal weight ($p = 0.002$). These results are summarized in Table 1.

Table 1: Evaluation of patients' basic and socio-demographic characteristics

Variables	Patient with IMC<25Kg/m ³	Patient with IMC>25Kg/m ³	pvalue*
Meanage	30.09±6.55	32.31±6.13	0.004
<25	21 (53.8%)	18 (46.2%)	
[25-30[27(39.1%)	42 (60.9%)	
[30-35[29 (34.9%)	54 (65.1%)	
[35-40[23 (35.4%)	42 (64.6%)	
≥40	07 (21.9%)	25 (78.1%)	
Meanparity	0.93± 0.843	1.70 ± 1.391	<0.0001
≤ 01	80 (4.9%)	87 (52.1%)	
≥ 01	28 (23%)	94 (77%)	
Meangravidity	2.38±1.44	3.07±1.66	<0.0001
≤1	40 (35.8%)	106 (64.2%)	
[1-4]	59 (49.6%)	210 (44.5%)	
>4	9 (19.6%)	37 (80.4%)	
Low educationallevel	52(37.4%)	87(62.6%)	0.98
Low socio-economiclevel	97(37.6%)	161(62.4%)	0.81
Menstrual cycle regularity	90(37.3%)	151(62.7%)	0.98
Contraception (month)	11.31±15.95	19.35±23.92	0.002

(*) means were compared with independent sample Student's t-test, p< 0.05 was considered as significant.

The study of personal medical history showed that the frequency of diabetes history was significant in overweight or obese women at 93.9% against 6.7% in normal-weight parturients (p = 0.0012). The history of arterial hypertension was more common in obese or overweight in 56.5% of cases. In our survey, 78.8% of allergic cases were overweight or obese against 21.2% in the control group (p= 0.0041). Obese or overweight women mostly suffered from thyroid disorders and polycystic ovary

syndrome PCOS in 66.7% and 55.6% of cases respectively. The gynecological-obstetrical history of obese or overweight participants was characterized by the high rate of caesarean delivery (69.7%), death in utero (68.8%), infertility problems (63.4%) with p = 0.047. Similarly, we noted a family history of diabetes and arterial hypertension respectively, in 65.2% and 65.9% of obese or overweight women. The results of the gynecological-obstetric examinations and the family history are reported in Table 2.

Table 2. Evaluation of personal medical, gynecological-obstetrical, and family history of studied patients

Variables	Patient with IMC<25Kg/m ³	Patient with IMC>25Kg/m ³	P value*
Medical and personal history			
Gestational diabetes	1(6.7%)	14(93.9%)	0.012
THA	10(43.5%)	13(56.5%)	0.52
Anemia	15(30.6%)	34(69.4%)	0.28
Polycystic Ovarian Syndrome	4(44.4%)	5(55.6%)	0.65
Allergy	7(21.2%)	26(78.8%)	0.041
Thyroid disorders	4(33.3%)	8(66.7%)	0.76
Gynecological and obstetrical history			
Cesareandelivery	30(30.3%)	69(69.7%)	0.073
Cholecystectomy	2(50%)	2(50%)	0.59
Abortion	21(34.4%)	40(65.6%)	0.59
Death in <i>Utero</i>	5(31.3%)	11(68.8%)	0.60
Fertility problems	104(36.6%)	180(63.4%)	0.047
Medical family history			
Diabetes	24(34.8%)	45(65.2%)	0.61
THA	29(34.1%)	56(65.9%)	0.46

As shown in Table 3, pathologies during pregnancy were dominated by a high frequency of arterial hypertension in 77.8% of obese or overweight cases against 22.2% in normal-weight

parturients ($p=0.045$). 57.8% of obese women had a urinary tract infection and gestational diabetes was predominant in obese women at 93.8% against 6.3% in normal-weight parturient of ($p<0.0001$).

Table 3. Follow up of comorbidities during pregnancy of studied patients.

Variables	Patient with IMC<25Kg/m ³	Patient with IMC>25Kg/m ³	<i>p-value</i> [*]
THA	8(22.2%)	28(77.8%)	0.045
Gestational diabetes	2(6.3%)	30(93.8%)	<0.0001
Anemia	41(40.6%)	60(59.4%)	0.40
Urinary infection	27(42.2%)	37(57.8%)	0.36

DISCUSSION

In the present study, we investigated the effect of pre-pregnancy BMI, as an indicator of maternal adiposity, on the course of pregnancy and the onset of medical complications.

The survey aimed to compare the characteristics of an overweight or obese parturient with normal weight candidates. The average age of pregnant women was 32.31 ± 6.13 for obese cases and 30.09 ± 6.55 for non-obese cases; our results are consistent with the study carried out by Chowdhury *et al.*, 2018, which showed a strong increase in the prevalence of overweight and obesity in women aged 35-44. 62.7% of obese or overweight parturients had an irregular menstrual cycle against 37.3% of normal weight parturients. The study by Xinyu *et al.*, 2020 showed that 22.6% of obese patients had irregular periods (Zhou & Yang, 2020).

The majority of obese or overweight women in our series were multiparous (77%) versus 23% in normal-weight women. In addition, 62.4% of obese had a low socio-economic level against 37.6% of normal weight and 62.6% of obese or overweight parturient had a low educational level against 37.4% of normal-weight patients. Our results agree with those of Hollowell *et al.*, 2013 who found that overweight or obese women were more likely to live in a

socioeconomically disadvantaged area and to be multiparous (Hollowell *et al.*, 2014).

Another Iranian cross-sectional study was conducted by Taghdir *et al.*, 2020 found that the prevalence of obesity and overweight was at 27.50% and 43.70%, respectively; after adjusting for potential confounding factors, women having ≥ 3 parities had a higher risk of being obese and those who were overweight represented women who had a lower level of education. Liang *et al.*, 2020 showed that compared to normal weight, overweight and obesity were associated with advanced maternal age, low education, and multiparity. Our results showed that the majority of overweight or obese women had a long duration of taking oral contraception unlike women of normal weight. This result resembles those of Endalifer *et al.*, 2020 highlighting the existence of a significant association between the combined use of oral contraception and overweight or obesity.

Obesity is increasingly recognized as a key factor influencing fertility in women, as it is associated with anovulation and menstrual irregularity; in our study, obese or overweight participants were characterized by a high rate of infertility problems, at 63.4%. This result concurs with those of two studies by Vahratian & Smith, 2009 and Klenov & Jungheim, 2014.

In our cohort 55.6% of obese and overweight cases suffered from polycystic ovary syndrome PCOS; which is similar to the results of the study conducted by *Álvarez-Blasco et al.*, 2006, where a higher prevalence of PCOS in overweight or obese women was highlighted. Likewise, in a population of overweight or obese Spanish women, the prevalence of PCOS was estimated to be over 28%.

Gestational diabetes was predominant in the obese with 93.8% against 6.3% in normal-weight parturients; this significant percentage coincides with other research papers. Indeed, a meta-analysis of 20 different studies concluded that high maternal weight is associated with a significantly higher risk of gestational diabetes (*Chu et al.*, 2007). Another American study carried out from 2004 to 2006 showed that the risk of 46, 2% of developing gestational diabetes was attributable to being overweight (*Kim et al.*, 2010). We also noted a positive association in the group of women suffering from overweight, obesity and other pregnancy pathologies with a higher frequency of arterial hypertension in 77.8% of cases against 22.2% in the normal-weight parturient. Similarly, gestational diabetes was noted in 93.8% of obese parturients; which is similar to the results found by *Simko et al.*, 2019.

Regarding urinary tract infections, 57.8% were noted in obese or overweight women; which is similar to the results of *Magan et al* 2013, with a significant value for a BMI \geq 35 (*Magann et al.*, 2013).

CONCLUSION

This study seems to confirm that, higher BMI values before pregnancy were strongly associated with a higher risk of pregnancy-induced hypertension and gestational diabetes. These medical and obstetrical complications can harm the maternal prognosis and can cause these pregnancies to be considered at risk. Early, appropriate and multidisciplinary management is necessary to prevent these complications.

Acknowledgements: We would like to thank the patients for their participation and staff at the Obstetric and Gynecologic Hospitalist- Sidi-Bel-Abbés for their invaluable support, guidance, and educational insight.

Ethics Approval: The local Ethics Committee of University Hospital has approved our study.

Conflict of interest: The authors declare no conflicts of interest.

Funding: Not applicable.

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