



Relation between Maternal Obesity and Obstetric Outcome

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ABSTRACT

Background: Obesity in the general population is reflected in maternal obesity, which is becoming a public health concern in both industrialized and developing nations. There are no data on maternal obesity and overweight in our community. **Aim:** To evaluate relation between maternal obesity and obstetric outcomes. **Methods:** The study was conducted on 150 pregnant females in Department of Obstetrics and Gynecology at Abu Qir General Hospital and Zagazig University Hospital. Pregnant women were divided into group A (75 patients) included 75 normal pregnant females BMI 18 – 25 kg/m² and group B (75 patients) included 75 patients with obesity BMI > 30 kg/m². Maternal and neonatal outcomes were measured. **Results:** Obese women had a significantly higher incidence of gestational hypertension than normal-weight women. FBG is significantly higher in obese women than normal, there was also significant difference between the two groups regarding miscarriage. Neonatal macrosomia and shoulder dystocia were higher in obese patients than normal group. **Conclusion:** Both overweight and obesity significantly increase the risk of gestational DM, gestational hypertension, NICU admission, macrosomia, and shoulder dystocia.

Keywords: Obesity, Obstetric, Maternal.

INTRODUCTION

The definition of obesity is an abnormal or excessive build-up of fat [1]. It is one of the most worldwide public-health problems. It is increasing dramatically in general population, especially in the last decade [2]. Diabetes, heart disease, cancer, and other chronic illnesses are all significantly increased by obesity [3].

Numerous techniques have been employed to categorize and define obesity. Currently, body mass index, or BMI, is in use. Weight in kilos divided by height in meters squared yields the BMI (BW in kg /height in m²) [4]. The National Institutes of Health classifies adults,

according to BMI into: *Normal* (18.5 to 24.9 kg/m²) *Overweight* (25 to 29.9 kg/m²) and *obese* (≥ 30 kg/m²) [5].

Compared to women of normal weight, obese women before or even during the early stages of pregnancy are more likely to experience unfavorable results for both the mother and the newborn [6]. Moreover, poor obstetric outcomes are also linked to excessive gestational weight gain (GWG)[7].

Obese pregnant women are particularly at risk of developing medical complications; including diabetes mellitus, hypertension, and heart disease, postdate pregnancy, premature rupture of membranes,

malpresentation, antepartum, intrapartum and postpartum hemorrhage [6, 8].

In addition, obese mothers had increased risks of induction of labour, extended labour, a higher blood loss during the caesarean section, the use of instruments during delivery, and wound infection [9]. Besides to these maternal risks, there are several fetal risks, such as macrosomia, intrauterine growth restriction, prematurity, anomalies, admission of neonate into the intensive care unit and increased risks of shoulder dystopia [10, 11].

PATIENTS AND METHODS

The study was conducted on 150 pregnant females in Department of Obstetrics and Gynecology at Abu Qir General Hospital and Zagazig University Hospital after approval of local ethics committee (Number 50502-1-2019). All selected Prior to participating in the trial, patients provided their informed and signed consent. The study was carried out according to Helsinki Declaration.

Patients with average and obese body mass index, age from 20 to 35 years, gestational age 34-40 weeks with singleton pregnancy were included in the study.

Other associated medical disorders as renal and hepatic diseases, multiple pregnancies, smokers and alcoholic addicts and any babies with any congenital abnormalities were excluded from the study. Pregnant women were divided into group A (75 patients) included 75 normal pregnant females BMI 18 – 25 kg/m² and group B (75 patients) included 75 patients with obesity BMI > 30 kg/m².

All female were submitted to taking a complete medical history, doing a clinical assessment, doing an ultrasound examination, and doing blood tests.

Maternal adverse outcomes included pregnancy outcome (post-dates pregnancy, preeclampsia and eclampsia, deep vein thrombosis, early membrane rupture, and gestational diabetes mellitus), labor outcome (failed Induction of labour, obstructed labour, shoulder Dystocia, perineal, vulvar or cervical lacerations, mode of delivery, postpartum hemorrhage, puerperal sepsis and wound

infection) and neonatal Outcome (fetal macrosomia, fetal distress, intrauterine growth restriction and intrauterine fetal death) and newborn Outcome (apgar < 7 at 5 minutes, asphyxia, neonatal intensive care admission and fetal birth injuries).

Statistical Analysis

All data were collected, tabulated and statistically analyzed using IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp. t test, Mann whitney u test, chi-square test, Fisher exact test, receiver Operating Characteristic (ROC) curve were used.

RESULTS

We conducted our study on 150 conducted on 150 pregnant females in department of obstetrics and gynecology at Abu Qir general hospital and Zagazig university hospitals after approval of local ethics committee. **Group A (75 patients):** The control group: included 75 normal pregnant females BMI 18 – 25 kg/m². **Group B (75 patients):** The study group included 75 patients with obesity BMI > 30 kg/m². The mean age of the study groups was 27 (± 5 SD) in group A and 29 (± 3 SD). There is no significant difference between the two groups except Gravity (Table 1).

Our results revealed that the incidence of vaginal delivery was significantly higher in the normal weight group than obese group. Obese women had a significantly higher incidence of gestational hypertension than normal-weight women (Table 2).

FBG is significantly higher in obese women than normal, there was also significant difference between the two groups regarding miscarriage, but we found difference between the two groups but with no significant (Table 3).

These results revealed that Neonatal ICU admission was significantly higher in obese patients. APGAR₁ and 5 min > 7 was statistically significant different between the two groups (Table 4).

Neonatal macrosomia and shoulder dystocia were higher in obese patients than normal group (Table 5).

Table 1: Baseline characteristics of the study population

Variable	BMI(18 – 25) kg/m ² Group A (N=75)	BMI > 30 kg/m ² Group B (N=75)	P
Age (years)			
Mean ± SD	27 ± 5	29 ± 3	0.617
Gravity			
1 N(%)	47 (62.7%)	13 (17.5%)	0.002*
2-3 N(%)	22 (29.3%)	25 (33%)	
>or = 4 N(%)	6 (8%)	37 (49.5%)	
Residency			
Urban N(%)	44 (59.3%)	50 (66%)	0.592
Rural N(%)	31 (40.7%)	25 (34%)	
Marital Status			
Married	73 (97.2%)	74 (99%)	0.871
Divorced	1 (1.4%)	1 (1%)	
Widowed	1 (1.4%)	0(0.0%)	
Education			
No education	61 (80.7%)	57 (76.3%)	0.21
Primary school	13 (18%)	8 (10.3%)	
High education	1 (1.3%)	10 (13.4%)	
Occupation			
Yes	5 (6%)	8 (10.3%)	0.791
No	70 (94%)	67 (89.7%)	

Table (2) Neonatal Outcomes of the study population

Variable	BMI (18 – 25) kg/m ² Group A (N=75)	BMI > 30 kg/m ² Group B (N=75)	P
Type of delivery			
NVD	64 (85.7%)	35 (54.8%)	0.001*
CS	10 (14.3%)	40 (45.2%)	
Type of CS			
Elective	50 (66.7%)	55 (73.8%)	0.275
Emergency	25 (33.3%)	20 (26.2%)	
Gestational hypertension in pregnancy			
Yes	10 (15%)	26 (35%)	0.002*
No	65 (85%)	49 (65%)	

Table (3) Neonatal Outcomes of the study population

Variable	BMI (18 – 25) kg/m ² Group A (N=75)	BMI > 30 kg/m ² Group B (N=75)	P
FBS			
≤ 110mg Count	74 (99.3%)	65 (86.6%)	0.004*
> 110mg Count	1 (1.7%)	10 (13.2%)	
Miscarriage			
Yes	1 (1.3%)	6 (7.5%)	0.003*
No	74 (98.7%)	69 (92.5%)	
Postpartum Hemorrhage			
Yes	13 (17.7%)	10 (12.9%)	0.58
No	62 (82.3%)	65 (87.1%)	

Table (4): Neonatal Outcomes of the study population

Variable	BMI (18 – 25) kg/m ² Group A (N=75)	BMI > 30 kg/m ² Group B (N=75)	P
Neonatal ICU admission			
Yes	2 (2.6 %)	15 (20.4%)	0.001*
No	73 (97.4%)	60 (79.6%)	
APGAR_1min > 7 count	73 (97.3%)	59 (78.5%)	0.004*
APGAR_5min>7 count	74 (98 %)	63 (83.5%)	0.003*

Table (5): Neonatal Outcomes of the study population

Variable	BMI (18 – 25) kg/m ² Group A (N=75)	BMI > 30 kg/m ² Group B (N=75)	p
Macrosomia			
Yes	3 (3.4%)	16 (21.5%)	0.004*
No	72 (96.6%)	59 (78.5%)	
Congenital Anomalies			
Yes	1 (1.4%)	0 (0.0%)	0.521
No	74 (98.6%)	75 (100%)	
Shoulder dystocia			
Yes	0 (0.0%)	2 (2.2%)	0.003*
No	75 (100%)	73 (97.8%)	

DISCUSSION

Obesity is defined as an abnormal or excessive build-up of fat [1]. It is one of the most worldwide public-health problems. It is increasing dramatically in general population, especially in the last decade [2]. Diabetes, heart disease, cancer, and other chronic illnesses are all significantly increased by obesity [3].

Numerous techniques have been employed to categorize and define obesity. Currently, body mass index, or BMI, is in use. Weight in kilos divided by height in meters squared yields the BMI ($BW \text{ in kg} / \text{height in m}^2$) [4].

The National Institutes of Health classifies adults, according to BMI into: *Normal* (18.5 to 24.9 kg/m²) *Overweight* (25 to 29.9 kg/m²) and *obese* ($\geq 30 \text{ kg/m}^2$) [5]. Compared to women of normal weight, obese women before or even during the early stages of pregnancy are more likely to experience unfavorable results for both the mother and the newborn [6]. Moreover, excessive Negative obstetric results are also linked to gestational weight gain (GWG) [7].

Obese pregnant women are particularly at risk of developing medical complications, including diabetes mellitus, hypertension, heart disease, postdate pregnancy, premature rupture of membranes, malpresentation, antepartum, intrapartum and postpartum hemorrhage [6, 8].

In addition, obese mothers had increased risks of induction of labour, extended labour, a higher blood loss during a cesarean section, the use of instruments during delivery, and wound infection [9].

Besides to these maternal risks, there are several fetal risks, such as macrosomia, intrauterine growth restriction, prematurity, anomalies, admission of neonate into the

intensive care unit and increased risks of shoulder dystopia [10, 11].

This study sought to assess the relationship between obstetric outcomes and mother fat we conducted our study on 150 conducted on 150 pregnant females in department of obstetrics and gynecology at Abu Qir general hospital and Zagazig university hospitals after approval of local ethics committee. **Group A (75 patients):** The control group: included 75 normal pregnant females BMI 18 – 25 kg/m². **Group B (75 patients):** The study group included 75 patients with obesity BMI $> 30 \text{ kg/m}^2$. The mean age of the study groups was 27 ($\pm 5 \text{ SD}$) in group A and 29 ($\pm 3 \text{ SD}$). There is Except for Gravity, there was no discernible difference between the two groups In agreement with us **Eweis et al.** [12] revealed that 300 women, with a mean age of 27 years, were split into three groups based on their BMI: 150 women in the normal weight group, 53 women in the overweight group, and 97 women in the obese group. Age ($p = 0.49$), domicile ($p = 0.57$), married status ($p = 0.87$), occupation ($p = 0.81$), and educational attainment ($p = 0.12$) were similar amongst the three groups under investigation. On the other hand, the multiparity rate was much greater in obese women (82.5% versus 37.3%, respectively) than in normal-weight women.

In a study of **Miao et al.** [13] who found that the 832 women's median age at delivery was 31 years old (with a range of 23 to 45 years), their median gestational age at delivery was 39.2 weeks, and their median gestational weight at delivery was 14.2 kg. 96 women (11.5%) were underweight, 558 (67.1%) were of normal weight, 134 (16.1%) were overweight, and 44 (5.3%) were obese based on their BMI prior to pregnancy.

Our results revealed that Compared to the obese group, the normal weight group had a

considerably higher incidence of vaginal deliveries. When ladies of ordinary weight were compared with obese ladies, obese women a noticeably greater prevalence of gestational hypertension.

Scholars concur that there is a substantial relationship between BMI and cesarean delivery; nonetheless, a link has been found between maternal weight increase and cesarean delivery as a contentious issue in recent times [13].

Gante et al. [14] discovered that there is a substantial correlation between high GWG and an increased risk of cesarean section. Obese women with GDM have an increased risk of cesarean sections, which should be avoided because they carry additional risks after the procedure, including deep vein thrombosis, excessive blood loss, wound infection or dehiscence, and postpartum endometritis [15].

Anwar et al. [16] found that for every 5-7 kg/m² the incidence of hypertension illnesses increased by about two times with an increase in maternal body mass.

Numerous writers suggested that the development of hypertension issues during pregnancy may be influenced by the elevated release of inflammatory mediators in obese women and the ensuing endothelial dysfunction, even though the precise pathogenic mechanisms of this link remain unknown [17]. In agreement with us **Eweis et al. [12]** showed that Obese or overweight pregnant women were more likely to develop gestational hypertension.

Miao et al. [13] showed that women who were obese or overweight before having pregnant had significantly greater risks of getting GHT (ORs of 4.10 and 9.78, respectively) **Gaillard et al. [18]** found that women with a high BMI before to becoming

pregnant had three times the chance of having GHT **Tanaka et al. [19]** revealed that high GWG and an elevated pre-pregnancy BMI were related to GHT.

The FBG is significantly higher in obese women than normal, additionally, there was a notable distinction between the two groups with regard to miscarriage, but we found difference between the two groups but with no significant.

Eweis et al. [12] demonstrated that Obese and overweight women had gestational diabetes at rates of 13.4% and 13.2%, respectively; these rates were much higher than the 0.7% rate in the normal weight group (p = 0.004).

The idea of diabetes was developed as a result of the recognized, independent risk factor for hyperglycemia and DM that is obesity. When there is maternal obesity, an excess of adipose tissue leads to an overproduction of adipocytokines. This, in turn, causes dyslipidemia, insulin resistance, and an impaired response to insulin [20].

Confirming to us, **Yee et al. [21]** reported that Pregnancy-related problems for mothers and newborns are a concern for women with GDM, and this risk seems to be increased in those who are overweight or obese and experience high gestational weight gain.

In line with us, **Eweis et al. [12]** who sought to look into the effects of pregnant women's higher body mass index (BMI) on the health of mothers and newborns. They found that miscarriage risk was greater in women with higher BMIs.

Our results revealed that Neonatal ICU admission was significantly higher in obese patients. APGAR₁ and 5 min > 7 was statistically significant different between the two groups. Neonatal macrosomia Compared to the normal group, obese patients had greater rates of shoulder dystocia. This is

agreed with **Madi et al. [22]** research, which found that babies of obese women (17.1%) had a higher frequency of NICU admission than babies of normal weight (15.9%).

Eweis et al. [12] further found that obese or overweight women had NICU admissions at much higher rates than women of normal weight. Furthermore, compared to fetuses of Monosomia and shoulder dystocia were more common in women of normal weight and in fetuses of overweight and obese moms. Furthermore, ladies of average weight had higher newborn Apgar ratings in the first and fifth minutes of life than did overweight and obese women.

In line with previously reported studies [23, 24], A strong, dose-dependent correlation was observed between rising maternal macrosomia, LGA, and BMI, with extremely obese women having the highest levels (almost five-fold) chance of giving birth to a macrosomic child.

Gante et al. [14] shown that low Apgar scores and high GWG are substantially linked to an increased risk of cesarean delivery (5 min Apgar<7). Macrosomia raises the possibility of delivery trauma, perinatal mortality, and shoulder dystocia [25].

In contrast to our study [26] and [27] low frequency of macrosomic kids born to obese and overweight mothers has been recorded.

CONCLUSION

There is clear evidence linking higher BMI to a higher chance of unfavorable pregnancy outcomes, including complications for both the mother and the newborn. The risk of macrosomia, shoulder dystocia, NICU admission, gestational diabetes mellitus, and gestational hypertension is considerably increased by being overweight or obese.

Declaration of interest

The authors report no conflicts of interest. The authors along are responsible for the content and writing of the paper.

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