
The Effect of Maternal Obesity on Pregnancy Outcomes among Libyan Women with Singleton pregnancy

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● Abstract

Background: The rising rate of obesity is a major public health concern Worldwide. Studied as early as 1945 reported a clear association between maternal overweight and adverse obstetric and perinatal outcomes. **Objectives:** To determine the association between maternal body mass index and pregnancy outcome among Libyan women. **Methods:** A descriptive longitudinal study conducted at Tajoura National Heart Center at the Obstetrics and Gynecology Department in the period between October 2017 and August, 2018. It included 200 cases, antenatal, intra-partum, and postnatal complications were evaluated in relation to age, parity, and body mass index for each individual case. Where obesity was defined as body mass index (BMI) more than 30. Perinatal outcome of singleton newborns was evaluated after suitable adjustments. **Exclusion criteria:** Women with multiple gestation, and insulin dependent diabetes mellitus patients. **Results:** In the group of obese mothers, there was an increased risk of: gestational diabetes by 12.19% (P 0.009), pre-eclampsia 21.92% (P 0.02), anemia 22.22% (P 0.001), oligohydromins 6.80 (P 0.003), polyhydrominous 6.67% (P 0.02), ante partum hemorrhage 52.22% (P 0.002), varicosity 15.56% (P 0.013), as well as, urinary tract infection 6.59% (P 0.23) post-date 8.33% (P 0.12) intrauterine fetal death 9.72% (P 0.003) and multiple pregnancy 5.92% (P 0.01). Intrapartum complications: failed induction 16.67% (P 0.001), operative vaginal delivery 12% (P 0.03), and increase cesarean section rate 14.44% (P 0.016), birth injuries 5.22% (p0.027), and fetal distress 7.65% (p0.001). **Conclusion:** Maternal obesity in early pregnancy is strongly associated with a number of pregnancy complications and adverse prenatal outcomes.

Key words: obesity, maternal, neonatal, complications, Libyan women

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• Introduction

Obesity is defined as being a disease where excess body fat has accumulated to such a degree that your health may be negatively affected (Heslehurst, N. 2008), it has become one of the major health problems worldwide as several health problem and complications are associated with obesity. It can be the result of many factors including inactivity, poor diet and certain health-related complications or extra calories (Catalano, P. M., 2006).

The gold standard when discussing obesity is Body Mass Index (BMI) (Catalano, P. M, 2003). It is calculated by dividing weight in kilograms by height in meters squared, (Rooney, B. L., 2002). In pregnancy BMI is calculated by using pre pregnant women weight and if it is not known, the first weight measured in prenatal care (Reilly, J. J., 2005). In the United States, the prevalence of overweight and obesity has reached epidemic proportions, affecting more than 95 million adults. Obesity among American pregnant women ranges from 18.5% to 38.3%, depending on the study-cohort, in pregnant women it ranges from 1.8% to 25.3%, using WHO criteria, (Reilly, J. J., 2011).

Obesity during pregnancy has been associated with increased risk maternal complications, including, miscarriage, pregnancy-induced hypertension, gestational diabetes, thromboembolism, (International Association of Diabetes and Pregnancy Study Groups Consensus) (Panel, 2010), Intra-partum complications, including induction of labor, cephalo-pelvic disproportion and cesarean delivery, and its complications, as well as anesthetic complications, (Han, J. C, 2010 et al),

Regarding neonatal complications, there is an association with stillbirth and perinatal death (Sheiner, E., 2011), fetal macrosomia, and birth traumas (Knight, M., 2010), as well as birth defects, (Guelinckx, I., 2010).

Only a few studies interfered through gestational weight gain (GWG) management through lifestyle interventions. In one study a small group of obese women were advised to restrict energy intake, and compared with three control groups, the GWG in the intervention group was halved compared with the other groups (Siega-Riz, 2009). In the third trimester, the fasting insulin concentrations in the intervention group increased only 38% compared with the 140% of the obese women in the control group, in addition to other studies that investigated also education regarding balanced food intake, and adequate consumption of vitamins, and minerals, (Thangaratinam, S., 2012 et al), Regarding physical

activity, The American College of Obstetricians and Gynecologists recommends that, in the absence of either medical or obstetric complications, pregnant women should perform 30 min or more of moderate exercise every day. Physical activity may reduce the risk for pre-eclampsia, abnormal glucose tolerance and gestational diabetes, Post-partum physical activity is also advisable, however, support from professionals and family is crucial for women to exercise during the post-partum period, (Zilko, C. E, 2010 et al).

● **Objectives:**

To determine the association between maternal body mass index and pregnancy outcome, including maternal complications and adverse perinatal outcomes during the antenatal, intra-partum, and postnatal periods.

● **Methods:**

This is a descriptive longitudinal study, it was conducted at the Department of Obstetrics and Gynecology at Tajoura National Heart Centre (TNHC) during the period between October 2017 till August 2018, a sample of two hundred singleton pregnant women were selected randomly for the study, and were interviewed, in OPD, and delivery department, in addition, information were obtained from their medical files, where the attending physicians or nurses register data including demographic information, reproductive history, weight and height, maternal characteristics, prenatal care, labor management, maternal complications during pregnancy, delivery, and the puerperium, and neonatal outcomes

Women were categorized in three groups, those with normal BMI (18.5-24.9 kg/m²), overweight women (BMI of 25-29.9 kg/m²), and obese women (BMI of 30 kg/m²). Distribution of the sample in the study, was based on BMI at first prenatal visit, intra-partum, and post-partum and related complication. BMI was calculated as weight in kilograms divided by the square of the height in meters. A verbal consent was taken from each women involved in the study before the interview began.

● **Inclusion criteria:**

Uncomplicated singleton pregnancies, the period of gestation for women included in the study ranged from 13 to 40 weeks.

● **Exclusion criteria:**

Women with insulin dependent diabetes mellitus, presence of vaginal bleeding, abnormal investigation results, and multiple gestation.

•Statistical analysis:

Statistical analysis was computerized using the Statistical Program for Social Sciences (SPSS version 21.0) that is used for data entry and analysis. Descriptive statistics were used, and all results are presented as frequencies, means \pm standard deviation and percentages. The t-test of significance was used to compare quantitative data where appropriate, while categorical data were compared using the Chi-square test, and Fisher's exact test if appropriate. A P-value of less than or equal to 0.05 was considered statistically significant.

• RESULTS

Tables 1 and 2 show the distribution according to the sociodemographic characteristics of the studied patients. Table I shows that women with normal BMI were 36%, compared 41% overweight, while obese women were 23%. Women in the lowest BMI category tended to be younger, and have a higher levels of education compared to women in the other categories including, over weight and obese (Table 1, Table 2).

Table 1:-Demographic Characteristics of maternal age, and Body Mass Index (BMI)

Age	1720-	2135-	>36	Total
Normal	3	57	12	72
Obese	1	18	64	83
Overweight	1	19	25	45
Total	5	140	55	200
%	2.5%	70%	27.5%	100%

Table2:- —Demographic Characteristics of Maternal education level and Body Mass Index (BMI)

	Non	Primary	Secondary	High	Total
Normal	0	18	43	11	72
Obese	0	22	54	7	83
Overweight	2	17	25	1	45
Total	2	57	122	19	200
%	1%	28.5%	61%	9.5%	100%

Table 3 shows that the distribution, according to parity of the normal weight women was between nullipara to para 5, while the parity of the overweight

and obese were between nullipara to para 4. Most of the patients were between para 0 and para 2, which was approximately 30.5, 29.5%, 24.5% in normal weight, obese and overweight respectively.

Table 3:- Distribution of patients was according to parity, and Body Mass Index (BMI).

Parity	P 0	P1-P2	P3-P4	P5<	Total
Normal	24	20	18	10	72
Obese	22	30	19	12	83
Overweight	13	9	12	11	45
Total	59	59	49	33	200
%	30.5%	29.5%	24.5%	16.5%	100%

Table 4 shows the relation between antenatal complications, and BMI, it shows that the percentage of women who developed gestational diabetes, preeclampsia, or eclampsia consistently increased with BMI (Table 4), in obese women there is an increased risk of gestational diabetes by 12.19% (P 0.009), pre-eclampsia 21.92% (P 0.02), anemia 22.22% (P 0.001) oligohydromins 6.80 (P 0.003), polyhydrominous 6.67% (P 0.02), ante partum hemorrhage 52.22% (P 0.002), and lower limb varicosity 15.56% (P 0.013) . Women categorized as having normal pre-pregnancy BMI had slightly elevated risks of urinary tract infection 6.59% (P 0.23), postdate 8.33% (P 0.12), intrauterine fetal death 9.72% (P 0.003), and multiple pregnancy 5.92% (P 0.01).

Obstetric complications	Normal BMI 18.5-24.9-kg\m ²	Overweight 25-29.9-kg\m ²	Obese BMI>30kg\m ²
Gestational Diabetes	5(7.29%)	10(12.05%)	6(13.33%)
Pre-eclampsia	9(12.5%)	11(21.69%)	18(22.22%)
Anemia	20(07.8%)	9(10.84)	21(22.22%)
Poly hydromious	3(6.65%)	3(3.61%)	5(6.67%)
Oligohydrominous	2(2.78%)	2(2.4%)	3(6.80%)
Urinary tract infection	5(6.95%)	1(1.21%)	3(6.67%)
Ante partum Hemorrhage	1(24.56%)	5(6.02%)	6(52.22%)

Obstetric complications	Normal BMI 18.5-24.9-kg\m ²	Overweight 25-29.9-kg\m ²	Obese BMI >30kg\m ²
Deep vein thrombosis	2(3.41%)	3(3.61%)	4(8.89%)
Varicosity	3(4.17%)	11(13.25%)	17(15.56%)
Post date	6(8.33%)	13(15.66%)	5(11.11%)
Cervical incompetence	3(4.17%)	2(3.15%)	3(4.20%)
Multiple pregnancy	8(5.24%)	2(2.4%)	2(4.45%)
Intrauterine fetal death	7(9.72%)	6(7.23%)	3(6.67%)
Total	72	83	45

Table 4:- Antenatal complications in relation to BMI

Table 5 shows that the increase in BMI was associated with more complications intrapartum, including increased risk of failed induction 16.67% (P 0.001), operative vaginal delivery 12% (P 0.03), increase cesarean section rate 14.44% (P 0.016), when compared to normal BMI (18.5-24.9-kg\m²), also there is increased risk of birth injuries and lacerations 5.22% (p0.027), and fetal distress (p0.001) as it is clearly illustrated.

Table 5:- Intra-partum complications in relation to increase of BMI

Obstetric complication	Normal BMI 24.9kg\m ² -18.5	Overweight 29.9kg\m ² -25	Obese BMI > 30kg\m ²
Normal vaginal delivery	(22.22%)16	(12.05%)10	(8.8%)4
Failed induction	(9.72%)7	(5.67%)3	(16.67%)13
Cesarean section	(9.44%)14	(8.1%)15	(14.44%)22
Operative vaginal delivery	(6.94%)5	(6.02%)5	(22.22%)12
Meconium	(12.5%)9	(10.34%)9	(15.65%)7
Fetal distress	(6.94%)5	(8.43%)7	(2.22%)1
CPD	(1.34%)1	(1.205%)1	(6.67%)3
Vaginal birth injury	(2.78%)2	(4.82%)4	(5.22%)10
Rupture uterus	0	(1.205%)1	0
Leaking	(4.14%)3	(6.02%)5	(4.44%)2
Total	72	83	45

Table 6 shows the relation between BMI and post-partum complications, it was found that obese and overweight women were at significantly increased risk for post-partum infection 15.17% (P 0.040), post-partum pyrexia 4.34% (P 0.001), and Manual removal of placenta 24.11% (P 0.04). With regard to intrauterine growth retardation measured by the adjusted birth weight, a strong association was found with maternal BMI. While the risk of low birth weight (birth weight less than 2,500 g) was higher in normal weight women, macrosomia (birth weight more than 4,000 g) was much more common in the overweight and obese groups.

Table 6: Post-partum complications in relation to BMI

Obstetric complication	Normal BMI 18.5-24.9- kg/m ²	Overweight 25-29.9-kg/m ²	Obese BMI > 30kg/m ²
Postpartum hemorrhage	3(4.16%)	7(8.53%)	3(6.52%)
Postpartum infection	9(6.54%)	3(3.61%)	11(15.17%)
Pyrexia	1(1.3%)	2(2.41%)	2(4.34%)
Manual removal of placenta	7(12.4)	2(2.41%)	10(24.11%)
Urinary tract infection	2(2.78%)	3(3.61%)	3(6.52%)
Still birth	1(5.65%)	2(2.41%)	3(2.17%)
Birth weight < 2500 g	33(45.8%)	13(28.8)	11(13.2%)
Birth weight > 4000 g	7(9.7%)	10(22.2%)	19(22.8%)

Discussion

Obesity is rising in the obstetric population, yet there is an absence of services and guidance for the management of maternal obesity. Our results confirmed that obesity is a strong risk factor for pregnancy complications and adverse outcomes. Importantly, not only obese women (BMI ≥ 30.0) but also overweight women (BMI = 25.0–29.9) had a markedly increased risk for gestational diabetes, preeclampsia, and eclampsia compared with women

with BMI of less than 20kg/m². Higher BMI was also inversely associated with delivery of a small-for-gestational- age infant. Obese and overweight women were at increased risk for delivering at or before 32 weeks' gestation and were slightly more likely to deliver before 37 weeks. Infants born to obese women had a nearly two-fold increased risk of death within the first year of life.

Although most data completed from patients were self-reported at the time of delivery, self-reported weights tend to be underestimates of true weights, and the degree of underestimation may be greater for women of higher weight, and this will lead to misclassification of risk of exposure only among women whose amount of underestimation caused them to enter a different BMI category. Height is generally accurately self-reported. Differential reporting of outcomes by maternal BMI could lead to bias in our results, although we controlled for several potential confounding factors. Socioeconomic status may be related to both maternal obesity and pregnancy complications. We approximated socioeconomic status by including age, and maternal education in our analyses, but these variables may not fully reflect socioeconomic status.

Our results were consistent with the findings of previous studies. Obesity before or during pregnancy is a known risk factor for developing gestational diabetes and hypertension. Obese women consistently have been shown to be at increased risk for cesarean delivery compared with non-obese women. The greater rate of very early (≤ 32 weeks' gestation) delivery for obese women confirmed the 2005 findings of Clausen and colleagues, (Clausen, T., 2005) who reported a 60% increased risk for these women compared with lean women (Ngondi, J. L., 2005). The risk profile observed in this study for women who, according to current definitions, are overweight but not obese has not been documented previously. Given that more than one third of Libyan women of child bearing age are overweight and that this prevalence is increasing rapidly among younger women, our findings are of public health importance.

• Conclusion & Recommendations

This study concluded that a large population of women had increase in BMI the incidence of gestational diabetes was increased with increased BMI in obese and overweight, only obese had a higher incidence of preeclampsia intrapartum.

Our results reinforce current recommendations to avoid excessive weight gain during adolescence and early adulthood, before a first pregnancy. Maternal overweight is one of the few risk factors for poor gestational outcomes amenable to modification before a pregnancy, and this study further strengthens the arguments for weight control to improve the health status of populations in the Libya.

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