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Evaluation of Excessive Weight Gain on Pregnancy Outcomes and Neonatal Morbidity

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Abstract:

Introduction: Maternal obesity is a common health problem in reproductive-age women. It is accompanied by excess maternal and neonatal adverse outcomes.

Aim of the study: To compare pregnancy outcomes among pregnant women with different BMIs.

Subjects and Methods: This prospective cohort study was conducted at the obstetrics and gynecology department of Fayoum University from March 2023 to November 2023. The research included pregnant women who came for regular antenatal care according to predetermined inclusion and exclusion criteria. Eligible women were split up into four groups based on their BMI. Follow-up was scheduled and pregnancy outcomes were recorded. These included pregnancy complications, intrapartum events (onset of labor, time of delivery, and type of delivery), postpartum events (postpartum hemorrhage), and fetal outcomes (fetal weight, need for neonatal intensive care unit admission).

Results: Both groups were matched in their demographic data. The mean weight gain was remarkably excessive as the BMI got larger (p =0.003). Also, the fasting blood sugar became greater as the BMI got larger (p =0.002). The onset of labor differed between groups. There was a significant in the rate of induced labor as the BMI got larger (p =0.001). Additionally, the cesarean delivery rate increased as the BMI got larger (p =0.001). The ability to breastfeed babies decreased significantly in women with higher BMI (p =0.021).

Conclusion: Maternal fatness was a risk factor for induction of labor, caesarean section rates, gestational diabetes, fetal macrosomia, and admission to neonatal ICU.

Keywords: weight gain; pregnancy outcome; neonatal; maternal.

1. Introduction

Obesity is defined as increased fat deposition in the body with an expanded body mass index (BMI) > 30 [1]. It is considered a great health problem affecting a large population, with possible increased prevalence by 2050 [1, 2]. This affected pregnant women also, with at least one-fifth of pregnant women diagnosed with obesity [2]. Increased pre-pregnancy weight or weight acquired during pregnancy increases the chance for unwanted pregnancy outcomes either maternal or fetal which increases the burden of obesity as a health problem [3]. Fat women were vulnerable to developing gestational diabetes and preeclampsia. This would lead to increased neonatal morbidity because of associated fetal macrosomia, preterm birth, and fetal congenital anomalies [4]. Additionally, maternal fatness was considered a risk factor for cesarean deliveries and anesthesia-related complications [5]. The study aimed to determine the degree of weight gain during pregnancy and to compare pregnancy-related events among these women.

2. Subjects & Methods

2.1. Subjects

This prospective cohort study was conducted at the obstetrics and gynecology department of Fayoum University from March 2023 to November 2023.

The research included pregnant women who came for regular antenatal care according to the following inclusion and exclusion criteria.

Inclusion criteria

a) Women with an age of 20-35 years.
b) Single viable pregnancy.
c) Medically free, and d) attending regular antenatal care visits.

Exclusion criteria

a) Women with preexisting medical disorders before current pregnancy.
b) Known fetal chromosomal or structural anomalies.
c) Multifetal pregnancy, and d) Women unable to continue regular antenatal care or refusing to share in the study.

2.2. Study design

Eligible women for the study were split up into four groups depending on their BMI:

- Group A "underweight": with BMI <18.5 kg/m^2.
- Group B "normal weight": with BMI 18.5 – 24.9 kg/m^2.
- Group C "overweight": with BMI 25 – 29.9 kg/m^2.
- Group D "obese": with BMI >30 kg/m^2.

2.3. Methods

All women were treated with:

- Proper evaluation of their history.
- Complete clinical assessment with special emphasis on vital signs (blood pressure, pulse and temperature), body mass index, pallor and signs of associated medical disorders.
- Routine antenatal laboratory investigations.
- Fundal level evaluation, BP measurement, and fetal heart auscultation at each antenatal care visit.
- Ultrasound evaluation of fetal wellbeing according to the antenatal care program.
- All women were tested for gestational diabetes mellitus (GDM) between 24 and 28 weeks of pregnancy.
- All cases will continue their antenatal care as regular and the investigator will follow up degree of acquiring weight and its relation with maternal and fetal consequences.

All intrapartum events were recorded including the obligation for labor stimulation, oxytocin use for labor augmentation, and the mode of delivery including the reason for operative abdominal delivers (cesarean section), and the degree of injury to the perineum including third- and fourth-degree perineal injuries.

Also, postpartum events were recorded including Primary postpartum hemorrhage (PPH), and post-partum pyrexia.

Neonatal consequences included the timing of delivery, macrosomia (defined as a birth weight>4000gm), or low fetal weight at birth (<2500gm) small for gestational age, APGAR score 2 times (1 and 5 minutes), need to admit the baby to neonatal intensive care unit (NICU).

The main goal was the degree of acquiring weight during pregnancy among pregnant women across variable body mass index categories.

The Secondary outcome measures included possible maternal and fetal complications that may occur as gestational

hypertension, preeclampsia, gestational diabetes mellitus (GDM), fetal macrosomia, and preterm labor. Intrapartum events such as obstructed labor in cases of vaginal birth and increased cesarean section rates or septic wound in cases of cesarean section were included. Additionally, anesthetic complications and difficulties in initiating and sustaining breastfeeding were reported.

2.4. Statistical Methods

Statistical calculations were performed using SPSS V.16. Data was presented as mean and standard deviation. The chi-square test was used for differentiation between quantitative data. A *P*-value < 0.05 was considered statistically significant.

3. Results

The study recruited 18 patients in each group. Both groups were matched regarding the demographic data as age (p =0.23), parity (p =0.56) and gravidity (p =0.44). Also, the fasting blood sugar increased as the BMI got larger (p =0.002) (**Table 1**). The mean acquired weight was significantly increased as the BMI got larger (p =0.003) (**Figure 1**).

Table 1. Demographic data of the studied groups.

Variables	Group A	Group B	Group C	Group D	test of significance
Age (years)	23 ± 4.1 (20-35)	22.7 ± 3.7 (20-35)	22.1 ± 4.7 (20-34)	24 ± 31 (21-35)	*P* =0.23
Parity					
• **PP**	5	4	5	3	
• **P1**	3	5	3	4	
• **P2**	5	4	6	5	*P* =0.56
• **P3 or more**	5	5	5	6	
Gravity					
• **PG**	6	5	6	4	
• **G1**	3	5	3	4	
• **P2**	5	5	5	5	*P* =0.44
• **P3 or more**	4	3	4	4	
Fasting blood glucose	91.6 ±7.1	97.3 ±5.7	105.2 ±4.6	110.3 ±4.1	*P* =0.002*

* significant at p <0.05.

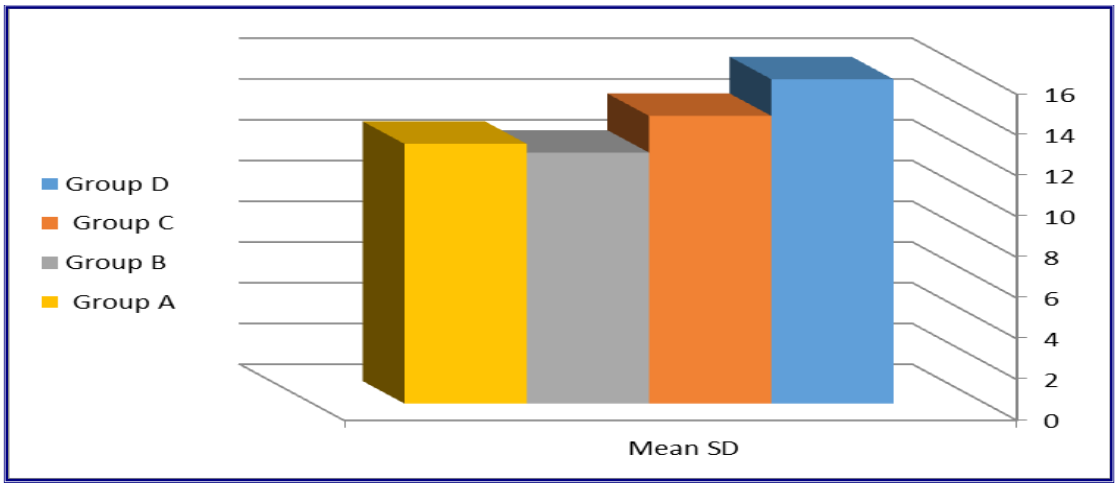

Figure 1: Weight gain of the studied groups.

The onset of labor differed between groups. There was a significant in the rate of induced labor as the BMI got larger (*p* =0.001). Additionally, the CS rate expanded as the BMI got larger (*p* =0.001). The gestational age at delivery showed increased full-term gestations in women with lower BMI (*p* =0.023). The rate of NICU admission and macrosomic babies was significantly increased among women with higher BMI (*p* =0.023 and 0.031, individually) (**Table 2**).

The ability to breastfeed babies decreased significantly in women with higher BMI (*p* =0.021) (**Table 3**).

Table 2: Intrapartum data of the studied population.

	Group A N (%)	Group B N (%)	Group C N (%)	Group D N (%)	test of significance
Onset of labar					
Spontaneous	14 (77.7%)	8 (44.4%)	5 (27.7%)	3 (20%)	*P* =0.001**
Induced	4 (22.3%)	10 (55.4%)	13 (72.3%)	12 (80%)	
Mode of delivery					
Normal	14 (77.7%)	8 (44.4%)	5 (27.7%)	3 (20%)	*P* =0.001
CS	4 (22.3%)	10 (55.4%)	13 (72.3%)	15 (80%)	
Maturity of baby					
Preterm (28-33)	1 (5.5%)	2 (11.1%)	3 (16.6%)	4 (22.2%)	*P* =0.023*
weeks	17 (94.4%)	16 (88.8%)	13 (72.2%)	11 (61.1%)	
Full-term (34-36)	0 (0%)	0 (0%)	2 (11.1%)	3 (16.6%)	

weeks Post maturity (37-40) weeks					
NICU admission	0 (0%)	1 (5.5)	3 (16.6%)	5 (27.7%)	*P* =0.023
Fetal macrosomia	0 (0%)	1 (5.5)	1 (5.5%)	3 (16.6%)	*P* =0.031*

* significant at $p < 0.05$.

Table 3. Maternal outcomes were compared among the study groups.

Variables	Group A	Group B	Group C	Group D	test of significance
Retained placenta	0 (0%)	0 (0%)	1(5.5%)	1 (5.5%)	*P* =0.66
PPH	0 (0%)	0 (0%)	1 (5.5%)	1 (5.5%)	*P* =0.66
Induction of breastfeeding	5 (27.7%)	10 (55.5%)	10 (55.5%)	5 (27.7%)	*P* =0.021*

* significant at $p < 0.05$.

4. Discussion

The current study reported increased rates of induced labor among women with higher BMI. This agreed with previous results [6-8]. Additionally, earlier studies reported decreased rates of labor stimulation among women with decreased BMI [9,10]. Another one reported increased rates of labor stimulation among obese ladies with reported increased CS rates [11]. This would be rendered to impaired myometrial activity among obese women [12].

We reported an expanded rate of CS among fat participants. This agreed with previous results that reported increased CS rates among fat ladies than ones with normal weight [7]. Another one mentioned that ladies with a BMI > 35, had 3.8 times more liability to CS than women with BMI >25 [13]. This would be explained by the fact that fat ladies were more liable to increased duration of labor and more liable to the cessation of the normal progression of labor. This is due to their expanded pelvic soft tissue with stiff bony pelvis leading to narrow birth passage [14]. Other causes for increased CS among obese women were fetal distress, cephalopelvic disproportion (CPD), and previous cesarean delivery [15]. CPD in obese women was rendered to increase fetal weight and the build-up of adipose tissue in the maternal pelvis [14].

Additionally, fat participants were more liable to emergency CS than elective ones [16]. Also, fetal macrosomia may be an additional cause together with weak pelvic and abdominal muscular effects on fetal position [17].

The current research demonstrated increased gestational diabetes among obese women. Previous studies reported increased rates of impaired glucose tolerance test (GTT) rather than gestational diabetes [7, 18]. Another one reported the occurrence of gestational diabetes among fat ladies [19]. Gestational diabetes was rendered to increase insulin resistance among obese women [19].

Fat ladies were more prone to get macrosomic babies. This was following previous results [18, 20]. It has been reported that fetal macrosomia was more prevalent among overweight women and those who gained more weight during pregnancy [21]. This was explained by abnormal fetal growth among obese women [22].

5. Conclusion

There was a relation between maternal acquired weight during gestation and some pregnancy events including increased rates of induction of labor, caesarean section, gestational diabetes, fetal macrosomia, and admission to neonatal ICU.

Ethical approval and consent to participate: The current research was approved by the research ethics committee at the Faculty of Medicine, Fayoum University, before the commencement of the study. The researchers obtained consent to participate from each lady before recruitment.

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