

## Effect of Maternal Obesity on Pregnancy Outcome in Mansoura University Hospital

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**Abstract: Background:** The rising rate of obesity is a major public health concern in the world that considered a significant predictor for neonatal & maternal morbidity and mortality. Maternal obesity has emerged as an important risk factor in modern obstetrics worldwide however the proportion varies from country to country and within geographical areas in the country. **Aim:** The aim of this study was to assess the effect of maternal obesity on pregnancy outcome in Mansoura University Hospital. **Design:** descriptive correlational research design was adopted in this study. **Sampling:** purposive sample of 250 pregnant women admitted at labor ward, obstetrics and gynecology department at Mansoura university hospital was divided into normal group (n=143), overweight group (n=48) and obese group (n=59). **The tools used for data collection were; an interview questionnaire form;** labor and neonatal assessment sheet. **The present results revealed that** obese pregnant women were liable to pregnancy induced hypertension more than the non-obese (23.7% vs. 9.1%), gestational diabetes mellitus and preterm delivery more occurred among obese (49.2% & 16.9%) than normal and overweight women. The obese mothers had babies with macrosomia and congenital anomalies with (50.8% & 5.1%) compared to normal and overweight studied women. **It can be concluded that,** the increased maternal body mass index (BMI) was associated with many pregnancy worth outcomes. **The study recommended that,** further studies should be conducted, using a sample with a large size, different age group and in different geographical settings to generalize the study result.

**Key word:** Maternal Obesity, Body mass index, Pregnancy Outcome, Pregnancy Induced Hypertension, Gestational Diabetes.

### INTRODUCTION

Obesity is one of the most common metabolic disorder concerns among women of reproductive age and when it occurs before or during pregnancy constitutes a major risk factor for both maternal, fetal and neonatal complications<sup>(1)</sup>. Maternal obesity is now the commonest risk factor for maternal mortality in developed countries and also associated with the wide spectrum of adverse pregnancy outcomes<sup>(2)</sup>.

The prevalence of obesity is increasing worldwide and this trend also affects women of reproductive age. Indicators revealed that the rate of obesity in Egypt has risen markedly over the past 30 years. According to World Health Organization (WHO) statistics, an estimated that about 76 % Egypt adult females are overweight or obese<sup>(3)</sup>.

Obesity occurs when the weight exceeds 120% of the median weight for height. The most commonly used measurement for defining obesity is body mass index (BMI), which refers to an individual's weight in kilograms divided by the square of his or her height in meters. A healthy BMI is between 20 and 25. A result below 20 is defined as underweight; above 25 is defined as overweight, individuals are considered obese when BMI greater than or equal to 30 kg/m<sup>2</sup><sup>(4,5)</sup>.

Change to unhealthy lifestyle such as dietary habits, physical

activity, social and cultural environment are associated with the occurrence of obesity. It is well documented that morbidity and mortality rates elevated with an abnormal increase in body weight<sup>(5)</sup>.

The complications of obesity in a prospective mother include subfertility, miscarriage, thrombo-embolism, hypertensive disorders, metabolic syndrome, preterm delivery and higher frequency of cesarean section. Fetal complications include intrauterine death, congenital anomalies, and macrosomia. Moreover, the complications of maternal obesity not only involve the fetus but also extend beyond fetal life into childhood and adulthood<sup>(6,7)</sup>.

### SIGNIFICANCE OF THE STUDY

Control of body weight during pregnancy is of paramount importance for pregnancy outcome as well as the health status of the mother and the neonate. Maternal obesity constitutes a serious health risk for both mother and fetus, the impact of which increased with the degree of obesity.<sup>(6)</sup> Several studies showed that systematic effort for weight reduction is imperative in order to avoid transmitting obesity from generation to generation. Hence it is the responsibility of the health care provider to create awareness regarding obesity and its risk on mother and neonates which helps in early identification of problem in the initial stage. So the present study aimed to assess the effect of maternal obesity on pregnancy outcome.

**Research questions:**

\*What are the maternal complications that liable to occur during pregnancy and labor due to maternal obesity?

\*What are the neonatal complications that liable to occur due to maternal obesity?

**Subjects and Method:**

**Study Design:**

A descriptive correlational study design was utilized.

**Study Setting:**

This study was carried out at Mansoura university hospital. This was chosen because it's the largest public hospitals which introduce a wide range of maternity services, having higher rate of vaginal delivery.

**Subjects:**

Purposive sample was used to enroll 250 pregnant women attending labor ward and achieve the following criteria :women with singleton infant pregnancy, women who free from medical or gynecological diseases and no prior cesarean delivery since two years.

**Sample size:**

The sample size was determined by annual rate of women attending labor ward in Mansoura university hospital at 2012 nearly 2991 and then 10% of this number was taken, so the sample size was 250 pregnant women were recruited for the study.

**Tools of Data Collection:**

To achieve the aim of this study, three tools were used for data collection.

**Tool I: Interview questionnaire:**

It was designed by the researcher based on reviewing the related literatures and experts' opinions. It entails three parts as follows :

**Part I:** concerned with the socio-demographic characteristics of the women (e.g., name, age, telephone number, education level, occupation, residence and family income).

**Part II:** related to the women obstetric history such as number of gravida, parity, abortion, preterm delivery, mode of delivery and complication occurs during last labor.

**Part III:** designed to collect details of present pregnancy such as weight before pregnancy, last menstrual cycle, expected date of delivery, duration of pregnancy in weeks...etc.

**Tool II: Labor assessment:**

Was used to assess date of delivery, time, general examination of vital signs, vaginal examination, duration of each stage...etc.

**Tool III: Neonatal assessment:**

It was used to assess Apgar score recorded at the first minute and fifth minute after delivery, weight, length, head, chest circumference and any neonatal complication may arise , etc

**Ethical Considerations:**

- Explain the aim of the study to the director of the hospital to take his permission to do this study.
- Explain the aim of the study to each participant to ensure their consent to be involved in the study.
- A brief explanation of the study was given assured to the pregnant women that the information obtained was confidential and used only the purpose of the study and will maintain their privacy.

**Pilot Study**

It was conducted on (10% of the total sample) to evaluate the validity & practicability of tools used and to estimate the time required for filling the required forms and to evaluate whether or not items were understood by women and then the necessary modifications were done, these women were excluded from the study sample.

**Field work:**

- Data were collected during the period from September 2014 to the end of March 2015 through seven months duration.
- In the previous selected study settings ,the researcher introduced herself to pregnant women, and based on pre-mentioned inclusion and exclusion criteria and suitable subjects were allowed to participate in the study. Oral consent was taken after explaining the purpose and procedures of the study. Data were collected from the previous setting on (Sunday, Monday, and Wednesday) every week in the labor ward in obstetric department to fill the questionnaire sheet to collect data such as socio demographic data, obstetric history, height and weight was measured with measuring tape and in harpenden caliper. The approximate time spent with each woman during the interview was 20-30 minutes.
- According to the women body mass index , the sample were categories into three groups as normal , overweight and obese .
- During labor the researcher assess the progress of labor including the duration of each stage between different groups of study, note assessment to the newborn including general condition, any congenital abnormalities, Apgar score at first and fifth minutes, measuring head and chest circumference finally complications occurred during delivery then performing complete measuring weight of baby.

**Statistical analysis:**

Data were coded and transferred into specially designed formats for data entry then data were analyzed and computed. The collected data were organized, categorized, tabulated in tables using numbers and percentage, mean percentage and standard deviation. Chi-square ( $\chi^2$ ) test was used to test the associations among the under studied qualitative variables, the statistical package for social sciences (SPSS version 16.0) was used for statistical analysis. Statistical significance was considered at p-value < 0.05.

**Limitations of the study:**

The emergency situations in obstetric unit sometimes lead to postponing the time of interviewing women because they were in labor pain

**RESULTS**

**Table (1): This table shows Socio-demographic characteristics among the studied women according to their BMI (n=250).** It shows that the higher percentage of mothers (49% & 45.8%) in the study group were in the age group less than 23 years within normal and overweight respectively, compared to those in the obese group 42.4% were more than 29 years old. Meanwhile, near one third 27.3% of normal group and 22.9% of overweight followed by less than one fifth 18.6% of obese group had university level of education and they were mostly housewives 86.4% obese and 72.9% overweight vs. 74.1% normal women respectively). Moreover, most of them had an income that meets their life expenses and was living in rural areas.

**Figure (1): Distribution of the studied women according to their BMI (n=250)**

Shows the distribution of the study subjects according to their BMI. It is obvious that the total numbers of the studied women were 250 pregnant women, more than half 57.2% of women were with normal BMI, 19.2% of them were overweight and 23.6% were obese.

**Table (2): This table describes the current labor data of the studied women according to their BMI (n=250).** It is clear that, there are no significant differences between normal, overweight and obese studied groups regarding

signs of labor, condition of membrane and mode of delivery. The table also revealed that the rate of c.s among overweight and obese studied women (4.2% & 6.8%) higher than normal studied women (0.7%).

**Table (3): The complications of current labor among the studied women according to their BMI (n=250).**

Reveals that obese group more likely had vaginal tears with 15.3% compared with 1.4% normal and 8.3% overweight group. The tables also show that overweight and obese groups had cervical tears and shoulder dystocia on current labor with (14.6% & 18.6%) and (4.2% & 10.2%) compared to those in the normally studied group.

**Table (4): Relationship between the presence maternal gestational diabetes mellitus, pregnancy induced hypertension, preterm labor and the BMI status of the studied group (n=250).**

Shows that obese studied women had the greater percent of having gestational diabetes mellitus 49.2% compared to (11.9%, 29.2%) among normal and overweight groups. The figure also reveals that obese group had PIH and preterm labor than among normal women and overweight groups with 23.7% and 16.9%.

**Figure (2): Relationship between the newborn abnormalities and BMI among the studied women (n=250)**

Demonstrates that obese women had a newborn with macrosomia and congenital anomalies (50.8% and 5.1%) compared with normal and overweight groups, while overweight group had death babies with (6.2%) than normal and obese groups

Table 1: Socio-demographic characteristics among the studied women according to their BMI (n=250).

Demographic characteristics	Normal (n=143)		Overweight (n=48)		Obese (n=59)	
	N	%	N	%	N	%
<b>Age (years)</b>						
<23	70	49	22	45.8	23	39
23 – 29	22	15.4	12	25	11	18.6
>29	51	35.7	14	29.2	25	42.4
<b>Education</b>						
Illiterate	8	5.6	8	16.7	7	11.9
Primary/preparatory	32	22.4	13	27.1	18	30.5
Secondary	64	44.7	16	33.3	23	39
University	39	27.3	11	22.9	11	18.6
<b>Occupation</b>						
Housewife	106	74.1	35	72.9	51	86.4
Work	37	25.9	13	27.1	8	13.6
<b>Residence</b>						
Rural	112	78.3	33	68.8	38	64.4
Urban	31	21.7	15	31.2	21	35.6
<b>Family income (L.E)</b>						
Enough	134	93.7	46	95.8	50	84.7
Not enough	9	6.3	2	4.2	9	15.3

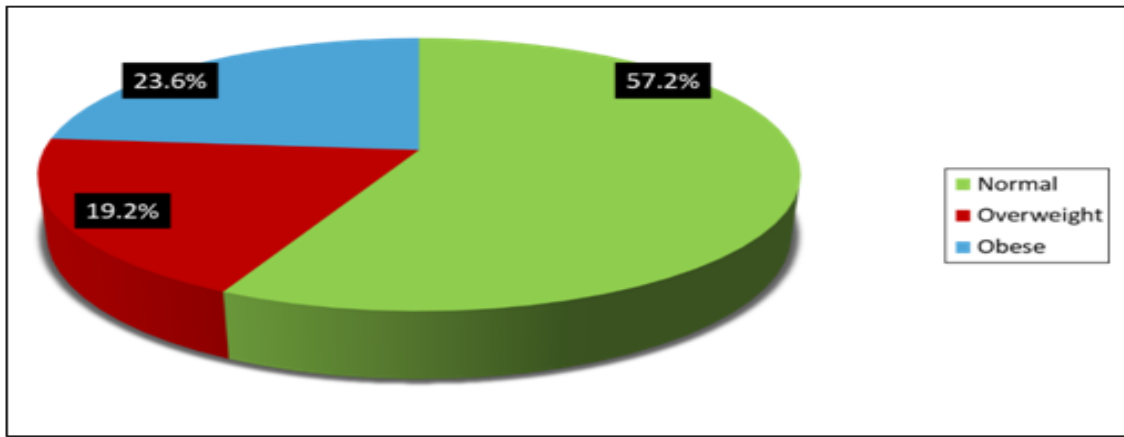


Figure1:Distribution of the studied women according to their BMI (n=250)

Table 2: The current labor data of the studied women according to their BMI (n=250).

	Normal (n=143)		Overweight (n=48)		Obese (n=59)		Significance test	
	N	%	N	%	N	%	X2	P
<b>1-Signs of onset of labor :</b>								
True labor pain	143	100	48	100	59	100	0	1.000
<b>Bag of waters:</b>								
No	54	37.8	19	39.6	25	42.4	0.376	0.829
Yes	89	62.2	29	60.4	34	57.6		
<b>C. Cervical changes:</b>								
Ripeness	61	42.7	21	43.8	14	23.7	18.233	<0.001*
Dilatation	42	29.4	10	20.8	33	55.9		
Effacement	40	28.0	17	35.4	12	20.3		
<b>2-Condition of membranes on admission:</b>								
Intact	68	47.6	20	41.7	23	39.0	1.497	0.827
<b>Ruptured</b>								
Spontaneous ruptured	63	44.1	24	50.0	30	50.8	1.497	0.827
Artificial	12	8.4	4	8.3	6	10.2		
<b>3-Aminotic fluid :</b>								
Clear	72	50.3	23	47.9	31	52.5	3.765	0.469
Blood stained	43	30.1	14	29.2	22	37.3		
Meconium stained	28	19.6	11	22.9	6	10.2		
<b>4-Mode of delivery</b>								
C.S	3	2.1	12	25	18	30.5	36.643	<0.001*
Vaginal delivery	140	97.9	36	75	41	69.5		

\* P < 0.05 (significant)

Table (3): The complications of current labor among the studied women according to their BMI (n=250).

	Normal (n=143)		Overweight (n=48)		Obese (n=59)		Significance test	
	N	%	N	%	N	%	X2	P
<b>Need for episiotomy</b>								
No	88	61.5	20	41.7	27	45.8	7.823	0.020
Yes	55	38.5	28	58.3	32	54.2		
<b>Sphincter injury</b>								
No	143	100	47	97.9	59	100	4.225	0.121
Yes	0	0	1	2.1	0	0		
<b>Vaginal tears</b>								
No	141	98.6	44	91.7	50	84.7	14.791	<0.001*
Yes	2	1.4	4	8.3	9	15.3		
<b>Cervical tears</b>								
No	138	96.5	41	85.4	48	81.4	13.533	<0.001*
Yes	5	3.5	7	14.6	11	18.6		
<b>Need for instrumental assisted</b>								
No	143	100	48	100	58	98.3	3.25	0.197
Yes	0	0	0	0	1	1.7		
<b>Shoulder dystocia</b>								
No	143	100	46	95.8	53	89.8	14.124	<0.001*
Yes	0	0	2	4.2	6	10.2		

\* P < 0.05 (significant)

Table 4. Relationship between the presence maternal gestational diabetes mellitus, pregnancy induced hypertension, preterm labor and the BMI status of the studied group

	Normal (n=143)		Overweight (n=48)		Obese (n=59)		Significance test	
	n	%	n	%	n	%	X <sup>2</sup>	p
<b>Gestational DM</b>	17	11.9	14	29.2	29	49.2	32.667	<0.001*
<b>PIH</b>	13	9.1	10	20.8	14	23.7	8.812	0.012
<b>preterm</b>	2	1.4	3	6.2	10	16.9	17.915	<0.001*

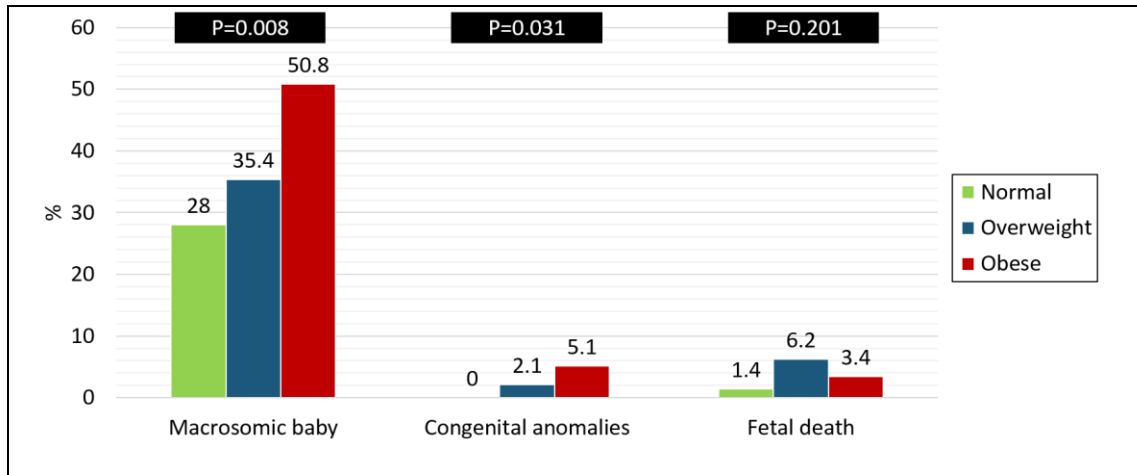


Figure 2: Relationship between the newborn abnormalities and BMI among the studied women (n=250)

## DISCUSSION

A growing body of evidence suggests that obesity measured by BMI predisposes women to complicated pregnancies and increased obstetric interventions. Obesity is a risk factor for pregnancy induced hypertension, the mechanisms of which are still unknown but this might be the due effect of obesity on increasing insulin resistance so the risk of PIH rises dramatically with an increase in pre-pregnancy BMI<sup>(8)</sup>.

In the current study, a significant relation was found between obesity and the risk of PIH, GDM, preterm labor, congenital anomalies and macrosomia. This results gone in the same line with the study results of Athukorala et al. (2010); Ducarme et al. (2007)<sup>(10,11)</sup>, which reported that there is a significant relation between obesity and increase risks of PIH, GDM, Preterm labor, congenital anomalies and macrosomia.

Our results also went in the same line with Unnisa et al. (2009)<sup>(12)</sup> results who found that PIH remained significantly high in overweight and obese groups as compared to normal weight group.

The present study revealed that gestational diabetes mellitus more common occurred among obese women than normal and overweight studied women, this might be due to the metabolic changes and increase resistance of cells to insulin due to obesity, Such finding is in the same line with Xuemin et al. (2009)<sup>(13)</sup> who reported that the risks of gestational diabetes are 0.4 in normal women versus 4.4 in obesity women.

The current study revealed that obese women had higher risks of complications during labor with vaginal, cervical

tears and shoulder dystocia more than among normal women due to the significant long duration of the three stages of labor obese women taken until delivery.

The percentage of cesarean section was significantly higher in our study among overweight and obese women compared to normal women that might be due to increased risk of intrapartum and postpartum complications among obese women as (failure of progress of stages of labor, postpartum uterine infection, wound infection, fetal distress and blood loss), so the rate of C.S is constantly higher among obese women and this agreed with Tosson et al. (2005)<sup>(14)</sup> results.

The present study was in disagreement with Tosson et al. (2005)<sup>(14)</sup> who said that shoulder dystocia present among non-obese pregnant women more than among obese pregnant women

Our result also goes in the same line with Pakniat et al. (2015)<sup>(15)</sup> who found a significantly higher rate of C.S among overweight and obese groups (p=0.000) compared to the reference group, that might be due to the association with frequent pregnancy complications such as HIN and macrosomia.

In the current study, the incidence of preterm birth increased among obese women this may be due to increasing gravida and fertility rate in Egypt helps in increased rate of preterm delivery.

According to the study by Ducarme et al. (2007)<sup>(11)</sup> the risk of preterm birth may increase in obese women, considering the probable occurrence of comorbidities, this agreed with our study about obese group significant risk only for preterm labor but not in the same line with Bhattacharya et al.

(2007)<sup>(16)</sup> who failed to show any differences or association between BMI and preterm delivery.

The current study agreed with **Pakniat et al. (2015)**<sup>(15)</sup> who revealed that obese and overweight women had the greater risk of having a macrosomic baby than normal group. Also the present study finding in the same line with Study done by **Unnisa et al.(2009)**<sup>(12)</sup> who found that the frequency of macrosomia remained significantly high in obese as compared with normal weight women.

According to **Galal et al. (2002)**<sup>(18)</sup> the result of the present study agreed with him about obesity and its significant effect on developing congenital abnormalities.

The present study was in disagreement with **Tosson et al .(2005)**<sup>(14)</sup> who said that shoulder dystocia and congenital anomalies present among non- obese pregnant women more than among obese pregnant women due to the small sample size that gives limitation of her results.

Studies by **Kumari. (2001); Unnisa et al.(2009)**<sup>(19,12)</sup> showed no significant increase in fetal death rates in obese women so the present study finding agreed with the previous studies which shown no significant increase in fetal death rates in obese women.

The present study has disagreed with **Sebire et al. (2001)**<sup>(17)</sup> who found that maternal obesity was associated with a higher fetal death.

Maternal obesity 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 mothers in Egypt. It is impossible to control the epidemic of obesity if broad-based comprehensive interventions are not instituted in near future stressing a need to have healthy diet, active life with exercise and promote awareness about obesity and its adverse effects especially among females of reproductive age.

## CONCLUSION

Increased maternal body mass index was associated with many worth pregnancy outcomes .Maternal outcomes included gestational diabetes mellitus, pregnancy induced hypertension and preterm labor. Fetal and neonatal outcomes included congenital anomalies and macrosomia.

## RECOMMENDATIONS

*Based on the findings of this study, the following recommendations are suggested:*

\*Preconception assessment and counseling are strongly encouraged and should include the provision of specific information concerning the maternal and fetal risks of obesity with pregnancy and encouragement to undertake a weight-reduction program.

❖ Simple illustrative booklets and pamphlets in Arabic language about obesity and its nutritional and therapeutic needs which is informative and conclusive should be

prepared and made available to adolescent girls and pregnant women.

❖ More researches are needed to duplicate the study in different setting using a large sample size and women with different age group during pregnancy.

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