FREQUENCY OF OBESITY, ASSOCIATED FACTORS AND FETOMATERNAL OUTCOME IN WOMEN COMING FOR ANTENATAL CARE AT LADY WILLINGDON HOSPITAL, LAHORE.

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Abstract

Background and Objective: Obesity is now taking the shape of an epidemic worldwide and is on the rise among women of reproductive age especially over the last 40 years. This happening has a major bearing on reproductive outcomes as per latest studies. During pregnancy and childbirth, obese women are more likely to develop fetomaternal complications than women with a normal body mass index (BMI). The objective was to determine the frequency of normal weight, over weight and obese women among those presenting for antenatal care and to compare the fetomaternal outcome in different BMI categories.

Methods: This descriptive cross sectional study was conducted from 29 October 2022 to 29 April 2023 at Lady Willingdon Hospital, Lahore. 200 subjects meeting the inclusion criteria were enrolled in the study after informed consent. BMI was recorded and weight category assigned. All relevant details noted on especially designed performa. Data analysis was done using SPSS No. 24.

Results: Frequency of obesity in pregnant females was recorded as 25.5 %(n=51) and overweight women as 40.5 %(81). A total of 200 females with an overall mean age of 29.9 ± 3.5 years were included in this study. The mean body mass index was 27.5 ± 3.9. The proportion of preeclampsia was significantly (p-value < 0.05) higher in obese women (31.9%) followed by overweight (22.2%) and normal women (15.6%), respectively. Likewise, the rate of eclampsia (22.8%, 13.6% and 8.3%), gestational diabetes (28.6%, 18.5, and 9.7%) and hypertension (27.7%, 16.1% and 11.4%) was also significantly higher in obese women followed by overweight women and normal weight women. In addition, a significant (p-value < 0.05) greater rate of C-section (41.5% vs. 35.8% vs. 14.4%) was reported in obese weight groups as compared to overweight versus normal weight women. The mean birth weight of new born was significantly higher in obese women as compared to overweight and normal weight women. Six (11.8%) babies born to obese women were macrosomic and only (1.3% and 1.5%) babies had macrosomia in overweight and normal weight women. APGAR score at 1 minute and 5 minute was significantly higher in normal weight women followed by overweight and obese women. The requirement of admission to NICU was statistically significantly higher in obese women (55.4%) followed by overweight (45.7%) and normal weight women (28.3%).

Conclusion: Fetomaternal morbidity is significantly increased in obese and overweight pregnant females.

Keywords: Pregnancy, obese, over-weight, prevalence, fetomaternal, outcome.

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WHO labels obesity as one of the most important health problems facing the world. The women can be categorized into four groups according to body mass index (BMI): underweight ($<18.5 \, kg/m^2$), normal ($18.5–24.9 \, kg/m^2$), overweight ($25.0–29.9 \, kg/m^2$) and obese ($\geq 30.0 \, kg/m^2$) as per criteria set by WHO .Obesity is a problem seen frequently by the obstetric population as well.[1]

It has been reported that 15% to 30% women are overweight at the beginning of their pregnancy.[2] In United Kingdom about 50% of the women in reproductive age are either overweight or obese, and 15% are obese when they start their pregnancy.[3] In Pakistan 38.4 percent women of reproductive age group are obese and this prevalence has dramatically increased over last forty years.[4]

Obese pregnant females at the time of booking are at increased risk of complications during ante and intra partum period.[4] Women who are obese are at risk for Gestational Diabetes Milletus (GDM), miscarriage, preeclampsia, thromboembolism and postpartum hemorrhage. They are also found to be at high risk for abortions and perinatal disorders. High BMI during pregnancy was associated with a high risk of Gestational diabetes and low serum Vitamin B12 levels as well.[5] Recently, it has been seen that obese pregnant females are at risk for assisted vaginal delivery and caesarean delivery, macrosomia, shoulder dystocia and stillbirth.[5] Women are more likely to end up in an induced labour due to problems associated with obesity during pregnancy.[6]

A cross sectional study pooling the most recent data from eight South and South East Asian countries has shown that maternal obesity is associated with a higher risk of fetal and neonatal demise.[7]

There were more cases of poor APGAR scores, nerve damage due to shoulder dystocia, stillbirth, respiratory distress syndrome, bacterial sepsis, convulsions, and hypoglycemia of new born related to obese mothers.[8] Research has indicated an increased risk of obesity for those born by cesarean delivery.[9] The intra uterine exposure of fetus to obesity can lead to metabolic syndrome and obesity in the child. The child hood obesity could be carried into adult life, thus over – nutrition can affect the life of off- spring throughout.[10-11]

A recent study in Malaysia concluded that rate of cesarean deliveries was increased with the increase in BMI. The reasons were delay in labour progress, fetal macrosomia and increased soft tissue mass in mother contributing to cephalopelvic disproportion.[12] Babies of obese women are more prone to be large for gestational age and macrosomic, which makes these women more at risk to sustain second-degree perineal tears.[13] Conversely in a recent study conducted in Pakistan the frequency of IUGR in obese pregnant women was quite high.[14]

The rationale of this study is that obesity in our country has risen dramatically over the years in women of reproductive age. As limited local data are available regarding the prevalence of obesity during pregnancy in the local set up. Knowing the exact prevalence of obesity, risk factors during pregnancy would help influence the outcome. With control of weight before and during pregnancy, a better outcome of pregnancy can be achieved. Thus the objective of the study was to determine the frequency of normal weight, over weight and obese women presenting for antenatal care and to compare the fetomaternal outcome in normal weight, over weight and obese pregnant females.

METHODS

It was a descriptive cross sectional study conducted at Department of Obstetrics & Gynecology, Lady Willingdon Hospital, from 29 October 2022 to April 29, 2023. Non-probability consecutive sampling was done. Sample size was calculated using WHO sample size calculator: Expected frequency of macrosomia in obese women P= 19%, Absolute precision=5.5%, level of confidence = 95%. Estimated sample was rounded as 200. All women of age 20 to 35 years presenting at the start of pregnancy (on first antenatal visit) and consented to participate in the study were included in the study. Patients who were unaware of their weight at the start of their pregnancy, had complications during last childbirth, who did not consent, and who had some mental disorders were excluded from the study. After the approval from the Ethical Review Committee, 200 subjects meeting the inclusion criteria were enrolled in the study after informed consent. BMI was recorded and weight category assigned. All these women were followed-up till 37 weeks of gestation and till delivery. Indications for cesarean section were fetal distress on CTG, obstructed labour (partogram), postdate pregnancy, fetal growth restriction, and pre-labour rupture of membranes for more than 24 hours. Detailed history and examination were done in order to meet the

exclusion criteria. All the data regarding the outcome variables was noted in context with the operational definitions. Patient's height, weight, age and gestational age at inclusion and at delivery was noted. BMI was calcu-lated using weight in kg divided by (height in meter²). According to BMI (based on the World Health Organization categories for Asian population), patients with <24.9 kg/m² were labeled as of normal BMI, those with >25 kg/m² as overweight and those more 30 kg/m² as obese. It was calculated at the start of pregnancy or at the first visit in first trimester.

The maternal outcome was assessed in terms of presence of gestational hypertension, gestational diabetes, pre-eclampsia, eclampsia, IUGR, Preterm delivery and mode of delivery. Fetal outcome was assessed using mode of delivery, macrosomia(defined as birth weight more than 4 kg), Apgar score at 1 and 5 minutes, admission of neonate to NICU (Number of neonates admitted in the NICU within 24 hours of delivery were noted. Decision of admission in the NICU was made by a consultant pediatrician) and neonatal death.

The SPSS version 24 was used for statistical analysis. For quantitative/continuous variables such as age, gestational age and body mass index, the mean and standard deviation was reported. For qualitative/ categorical variables such as Gestational Diabetes Milletus status, fetal death status etc., frequency and percentage were calculated. One-way ANOVA test was used to check the mean difference of continuous variables among three different groups of body mass index. Chi-square test or the Fisher Exact test (where applicable) was used to check the association between two different categorical variables. A statistically significant P-value of less than 0.05 was regarded as significant.

Table 1: *Sociodemographic features of pregnant women.*

Variable	Overall 200 (100%)	Normal-weight (18.5-24.9) 68 (34.0%)	Over-weight (25-29.9) 81 (40.5%)	Obese (30-39.9) 51 (25.5%)	p-value
Age (years)					
mean ± SD*	29.9 ± 3.5	28.7 ± 3.9	30.1 ± 4.7	29.5 ± 3.1	0.51
Body mass index (kg/m²)					
mean ± SD*	27.5 ± 3.9	23.8 ± 5.5	28.6 ± 7.8	32.7 ± 7.5	0.001
Parity/Gravidity					
mean ± SD*	2.50 ± 1.10	1.04 ± 0.27	1.87 ± 0.91	2.87 ± 1.01	0.04
Gestational age (weeks)					
mean ± SD*	37.5 ± 1.8	36.9 ± 2.8	37.1 ± 2.5	38.0 ± 2.1	0.11
Education level f(%)					
Illiterate	49 (24.5)	15 (21.8)	22 (27.3)	12 (23.5)	
Under matric	51 (25.5)	21 (30.9)	16 (20.0)	14 (27.5)	0.61
Intermediate	29 (14.5)	10 (14.5)	12 (14.5)	7 (13.7)	
Graduate	71 (35.5)	22 (32.8)	31 (38.2)	18 (35.3)	
Occupation of the women f(%)					
House wife	183 (90.7)	62 (92.3)	74 (91.9)	47 (91.2)	0.87
Employed	17 (9.3)	6 (7.7)	7 (8.1)	4 (8.8)	
Socio-economic status f(%)					
Low	120 (60.0)	37 (54.6)	53 (65.5)	30 (58.8)	
Intermediate	51 (25.5)	21 (30.9)	16 (20.0)	14 (27.5)	0.59
High	29 (14.5)	10 (14.5)	12 (14.5)	7 (13.7)	
Area of residence f(%)					
Rural	116 (58.2)	49 (71.7)	44 (54.3)	23 (44.6)	0.03
Urban	84 (41.8)	19 (28.3)	37 (45.7)	28 (55.4)	

RESULTS

Frequency of obesity in pregnant females was recorded as 25.5 %(n=51) and overweight women as 40.5 % (81). A total of 200 females with an overall mean age of 29.9 ± 3.5 years were included in this study. All three body mass groups (normal weight, over weight and obese) were demographically comparable and not statistically significant (p-value ≥ 0.05) difference was observed in terms of age, gestational age, education. Additionally, the overall mean body mass index was 27.5±3.9kg/m^2. The mean value of body mass index, socioeconomic status and parity were statistically significant (p-value <0.05) different among three groups. The mean difference of parity, socioeconomic and body mass index was significantly higher in obese

groups as presented in Table 1.

Moreover, the results of the current study elaborated that the maternal outcome was significantly improved in women who had normal weight as compared to overweight and obese women. The proportion of preeclampsia was significantly (p-value < 0.05) higher in obese women (31.9%) followed by overweight (22.2%) and normal women (15.6%), respectively. Likewise, the rate of eclampsia (22.8%, 13.6% and 8.3%), gestational diabetes (28.6%, 18.5, and 9.7%) and hypertension (27.7%, 16.1% and 11.4%) was also significantly higher in obese women followed by overweight women and normal weight women. Therefore, there was statistically significant (p-value < 0.05) association observed in body mass index groups versus

Table 2: *Bifurcation of maternal outcomes among body mass index three categories (normal weight, over weight and obese patients).*

Variable	Overall 200 (100%)	Normal-weight (18.5-24.9) 68 (34.0%)	Over-weight (25-29.9) 81 (40.5%)	Obese (30-39.9) 51 (25.5%)	p-value
Preeclampsia					
No	155 (77.3)	57 (84.4)	63 (77.8)	35 (68.1)	0.03
Yes	45 (22.7)	11 (15.6)	18 (22.2)	16 (31.9)	
Eclampsia					
No	171 (85.5)	62 (91.7)	70 (86.4)	39 (77.2)	0.04
Yes	29 (14.5)	6 (8.3)	11 (13.6)	12 (22.8)	
Gestational Diabetes Mellitus					
No	164 (81.8)	61 (90.3)	66 (81.5)	37 (71.6)	0.02
Yes	36 (18.2)	7 (9.7)	15 (18.5)	14 (28.6)	
Hypertension					
No	167 (83.6)	60 (88.6)	68 (83.9)	39 (76.3)	0.04
Yes	33 (16.4)	8 (11.4)	13 (16.1)	12 (27.7)	
IUGR*					
No	182 (90.9)	65 (95.2)	74 (91.4)	43 (84.6)	0.09
Yes	18 (9.1)	3 (4.8)	7 (8.6)	8 (15.4)	
Preterm delivery					
Preterm	42 (20.9)	9 (11.7)	19 (23.5)	14 (27.2)	0.05
Term	158 (79.1)	59 (88.3)	62 (76.5)	37 (72.8)	
Mode of delivery					
SVD**	140 (70.0)	58 (85.6)	52 (64.2)	30 (58.5)	0.03
Cesarean Section	60 (33.0)	10 (14.4)	29 (35.8)	21 (41.5)	
Previous abortion					
No abortion	155 (77.5)	57 (84.6)	63 (77.9)	35 (68.8)	
1 abortion	32 (16.0)	8 (12.1)	12 (14.7)	12 (23.6)	0.04
2 abortion	10 (5.5)	2 (2.3)	5 (6.6)	3 (5.6)	
3 abortion	3 (1.5)	1 (1.0)	1 (0.8)	1 (2.0)	

* Intrauterine growth restriction, **spontaneous vaginal delivery

preeclampsia, gestational diabetes and hypertension, respectively. In addition, a significant (p-value < 0.05) greater rate of C-section (41.5% vs. 35.8% vs. 14.4%) was reported in obese weight groups as compared to overweight versus normal weight women as shown in Table 2.

In addition, Table 3 reported the bifurcation of fetal outcomes among body mass index three categories (normal weight, over weight and obese patients). Similarly, fetal outcomes was also significantly better in women having normal weight as compared to overweight and obese women. The mean birth weight of new born was significantly higher in obese women as compared to overweight and normal weight women. Six (11.8%) babies born to obese women were macrosomic and only (1.3% and 1.5%) babies had macrosomia in over-

(55.4%) followed by overweight (45.7%) and normal weight women (28.3%), respectively as presented in Table 3. At last, Figure 1 reported the graphical presentation of distribution of fetal NICU admission and death status among body mass index three categories.
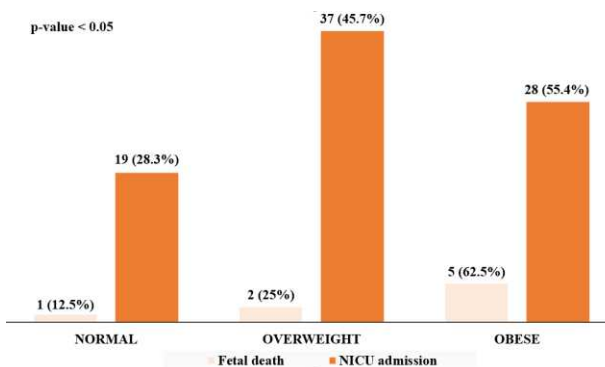

Figure 1: *Distribution of fetal NICU admission and death status among body mass index three categories.*

Table 3: *Bifurcation of fetal outcomes among body mass index three categories (normal weight, over weight and obese patients).*

Variable	Overall 200 (100%)	Normal-weight (18.5-24.9) 68 (34.0%)	Over-weight (25-29.9) 81 (40.5%)	Obese (30-39.9) 51 (25.5%)	p-value
Mean birth weight (grams)					
mean ± SD*	3.32 ± 1.09	2.40 ± 0.31	2.87 ± 0.67	3.21 ± 1.12	0.001
Macrosomia					
Absent	192 (96.0)	67 (98.5)	80 (98.7)	45 (88.2)	0.04
Present	8 (4.0)	1 (1.5)	1 (1.3)	6 (11.8)	
APGAR score at 1 minute**					
< 7	49 (24.5)	9 (12.6)	21 (25.9)	19 (37.3)	0.004
≥ 7	151 (74.5)	59 (87.3)	60 (74.1)	32 (62.7)	
APGAR score at 5 minute**					
< 7	34 (16.7)	7 (9.7)	15 (18.5)	12 (22.7)	0.003
≥ 7	166 (83.3)	61 (90.3)	66 (81.5)	39 (77.3)	
NICU admission					
No	116 (58.2)	49 (71.7)	44 (54.3)	23 (44.6)	0.02
Yes	84 (41.8)	19 (28.3)	37 (45.7)	28 (55.4)	
Death					
No	(96.2)	-	-	-	-
Yes	(3.8)				

*standard deviation, ** appearance, pulse, grimace, activity, and respiration, a neonatal intensive care unit.

weight and normal weight women. Additionally, appearance, pulse, grimace, activity, and respiration (Apgar score) at 1 minute and 5 minute was significantly higher in normal weight women followed by overweight and obese women. The requirement of admission to NICU was statistically significantly higher in obese women

DISCUSSION

The increase in prevalence of obesity is becoming a public health concern especially among women of child bearing age. Obese women are known to be at risk of antenatal, intrapartum, postpartum and neonatal complications. Knowing the exact prevalence of

obesity, and its complications during pregnancy would help to ensure a better fetal outcome. With control of weight before and during pregnancy, many fetomaternal complications could be avoided.

A total of 200 females with an overall mean age of 29.9 ± 3.5 years were included in this study. All three body mass groups (normal weight, over weight and obese) were demographically comparable and not statistically significant (p-value ≥0.05) difference was observed in terms of age, gestational age, socioeconomic status, education. Additionally, the overall mean body mass index was 27.5±3.9. Prevalence of obesity in pregnant females was recorded as 25.5 % (n=51) and overweight women as 40.5 %(81).

Moreover, the results of the current study elaborated that the maternal outcome was significantly improved in women who had normal weight as compared to overweight and obese women. The proportion of preeclampsia was significantly (p-value < 0.05) higher in obese women (31.9%) followed by overweight (22.2%) and normal women (15.6%), respectively. Likewise, the rate of eclampsia (22.8%, 13.6% and 8.3%), gestational diabetes (28.6%, 18.5, and 9.7%) and hypertension (27.7%, 16.1% and 11.4%) was also significantly higher in obese women followed by overweight women and normal weight women. In addition, a significant (p-value < 0.05) greater rate of C-section (41.5% vs. 35.8% vs. 14.4%) was reported in obese weight groups as compared to overweight versus normal weight women

Similarly, fetal outcomes was also significantly better in women having normal weight as compared to overweight and obese women. The mean birth weight of new born was significantly higher in obese women as compared to overweight and normal weight women. Six (11.8%) babies born to obese women were macrosomic and only (1.3% and 1.5%) babies had macrosomia in overweight and normal weight women. Additionally Apgar score at 1 minute and 5 minute was significantly higher in normal weight women followed by overweight and obese women. The requirement of admission to NICU was statistically significantly higher in obese women (55.4%) followed by overweight (45.7%) and normal weight women (28.3%), respectively. As far as distribution of fetal NICU admission and death status among body mass index three categories was seen, they were higher in obese women.

In a study conducted in Klang Valley[12], the maternal obesity was associated with higher parity. The maternal obesity was seen to be associated with Hypertensive Disorders of Pregnancy, Cesarean delivery and macrosomic baby. These findings are consistent with our study.

In a study,[13] the mean age of the obese pregnant females recruited in the study was around 29.5 years, belonged to socio economic class 4 and 5, and had a higher parity. 16(32%) developed GDM, 19(38%) developed gestational hypertension. There was increased incidence of gestational diabetes mellitus, hypertension, and induction of labour cesarean section in the obese females as compared to non-obese population. In another study conducted in India[14], our neighboring country in more than 30 districts, older maternal age, urban residence, increasing wealth and secondary education were seen in obese pregnant females.

In another recent study conducted in Saudi women,[15] the normal age range is 33.82 years in normal weight females and 34.05 years in obese females. Amongst the study population, 34.8% were obese, 29.7% had normal BMI and 33.3 % were of normal weight. Pre-pregnancy obesity was seen to be associated with adverse outcomes including GDM, hypertensive events in pregnancy and emergency cesarean section. There was increased association with macrosomia.[15] In a recent study, the frequency of obesity was 13.3% and 25% of the females were over-weight. There was a trend towards increasing parity. Compared to females of normal weight, obese women had a higher risk of pre eclampsia, IOL, cesarean section, macrosomia and admission to NICU. There is no difference in rates of Gestational Diabetes Milletus, but there was higher rate of chronic hypertension.[16]

In a local study conducted by Yousaf and colleagues, the prevalence of obesity was around 55% and most of the obese women were multiparous. This led to increased cesarean section in Primigravida.[17]

Sebire et al[18] found that maternal obesity was associated with a higher still birth rate. While Studies by Kumari[19] and Bianca et al[20] did not show significant increase in still birth rates in obese women.

In a study conducted in a developing country, the prevalence of obesity was 35 % and it was associated with significant maternal and neonatal complications.[21]

In another study maternal obesity was associated with hypertension and gestational diabetes. The obese women had lesser weight gain as compared to women having normal weight. There was no difference in fetal and neonatal outcome.[22] The mean age in the obese cases was 28.67 years. There was an association between higher parity and high BMI in obese cases, there was increased rate of eclampsia, pre-eclampsia, GDM, preterm delivery, cesarean section, increased birth weight and low Apgar score. There was increased rate of admission to NICU.[4] Thus the literature presents a conflicting picture but more evidence points towards increased association of maternal obesity with adverse outcome.

CONCLUSION

We concluded that on comparison for the outcome in normal weight, over weight and obese pregnant females, the fetomaternal morbidity is significantly increased in obese and overweight females. Institution of strategies for control of weight before and during pregnancy, leads to a better outcome for pregnancy.

Ethical Approval:

The ethical Approval for this study was obtained from Lady Wallington Hospital, King Edward Medical University, Lahore. (Reference No. PF-0233 LHW)

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