



# **Obesity-pregnancy and Associated Risk Factors- A Cross Sectional Study in Hyderabad, Sindh, Pakistan**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author AQ designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors SD, BS, HS, YJ, SP and AA managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Background:** The incidence of obesity between pregnant females in Pakistan is increasing, and has been a greater burden on the obstetric care, the objective of this study is to analyze the effect of obesity on pregnancy and newborn fetus.

**Methodology:** This is the cross-sectional comparative study, of 200 pregnant females, bearing single fetus, Females were characterized into three groups depending on their body mass index (BMI): class 1 (BMI 30–34 kg/m<sup>2</sup>); Class II (BMI 35-39.9 kg/m<sup>2</sup>) and; Class III (BMI >40 kg/m<sup>2</sup>). Maternal and fetal outcomes were assessed using Chi-square and student's t- test.

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**Results:** Total study population was 200 out of which 65% females were in class I obese (BMI 30–34), while 24.5% in class II obese (BMI 35–39.9kg/m<sup>2</sup>), while 5% of them in obesity class III, , The obesity shows significant association with pregnancy induced hypertension, gestational diabetes, and Urinary tract infections, in all three groups  $p = 0.0001$ , The relationship for perineal tears was found non-significant,  $p .0.51$ , among all three obese classes, Obesity and episiotomy has significant relation  $P. 0.002$ . The method of delivery has strongly significant correlation with obesity, the  $p$  value is 0.005.

**Conclusion:** Pregnant females who are obese have an enhanced hazard of poor gestation results. Specifically, obese pregnant females are having more chances to develop diabetes during pregnancy, hypertension induced by pregnancy, and urinary tract infections. Appropriate strategic plans should be made to decrease the occurrence of obesity in pregnant women for better pregnancy outcome.

*Keywords: BMI; obesity maternal outcomes; fetal outcomes.*

## 1. INTRODUCTION

The frequency of obese in Pakistani population is increasing among population in all age groups [1] the time scale of 2004 to 2005, around 15% of females aged 25 to 34 years of age were found overweight and obese [2]. As this age group is highly fertile henceforth obesity during pregnancy has noteworthy consequences for the facility of obstetric care [3]. If the pregnant females are obese and overweight or obese, they usually face a lot of complications in pregnancy and post-pregnancy as well. Prenatal problems comprise of pregnancy induced hypertension [4], gestational diabetes, [5] and risk of abortion [6]. It is very difficult to have a normal delivery in obese pregnant women, most of the time they require an elective caesarian section [7]. Fetus of overweight women need special nursing care and hospitalization as they are macrosomic in appearance [8]. The antenatal care provision to the obese pregnant women is likely to be more costly than normal weight pregnant women with an increase up to 15 folds in the total cost [9]. Fetus born to overweight and diabetic women may have the tendency to develop insulin resistance and metabolic syndrome, which would have a greater chance to be running in generations after generations [10].

The purpose of this study was to assess the incidence and impact of obesity on pregnant females and their fetal outcome.

## 2. METHODOLOGY

This study is conducted from January 2020 to December 2020 at department of gynecology and obstetrics, Liaquat University of medical and health sciences Hyderabad/ Jamshoro.

The sample size is 200 obese females, aged 18-35 years with single pregnancy, sampling technique used was convenient random sampling, pregnant females BMI readings were available of first antenatal visit. Pregnant females having multiple pregnancy, suffering from any comorbidities, and no BMI record at first antenatal visit were excluded from study. The pregnant females were divided into three basic categories, depending on their BMI, all the pregnant females had BMI of more than 30, self-generated questionnaire was used for socio-demographic data, the pregnancy parameters that were assessed in this study includes, gestational diabetes, Pregnancy induced hypertension, urinary tract infections, perineal teras, episiotomy, induction of labor, and mode of delivery. The fetal parameters include the Apgar score, the gestational age at time of birth, preterm birth, small for gestational age babies.

### 2.1 Statistical Analysis

Data were analyzed by SPSS 21, the ordinal as well as nominal data was presented as percentages and frequencies, the  $X^2$  (Chi-square), and students t-test was applied to measure the association between the variables.

## 3. RESULTS

Total study population was 200 out of which 65% females categorized in group I obese (BMI 30–34), whereas 24.5% in group II obese (BMI 35–39.9kg/m<sup>2</sup>), and 5% of them in obesity group III (BMI more than 40). In Table 1: the characteristics of the three obese pregnant female groups was compared, including gravidity, parity, history of abortion, the Hb status, the blood sugar levels and history of contraception is given.

**Table 1. Characteristics of study groups**

Characteristics	Class I (BMI 3–34 kg/m <sup>2</sup> ) n = 130 (%)	Class II (BMI 35–39.9kg/m <sup>2</sup> ) n = 49 (%)	Class III (BMI > 40.0 kg/m <sup>2</sup> ) n = 21(%)	p
Age (year)	31.18 ± 5.581	31.28 ± 5.150	31.21 ± 5.453	0.930
Gravida	2 (1–8)	2 (1–5)	2 (1–7)	0.692
Parity	1 (0–4)	1 (0–4)	1 (0–3)	0.566
Abortion	0 (0–3)	0 (0–1)	0 (0–5)	0.046
Hb (g/dL)	12.1 ± 0.517	12.6 ± 0.563	12.2 ± 0.522	0.269
Random blood glucose (mg/dL)	112 (70–420)	35 (63–793)	18 (67–301)	0.188
Contraception	20(15.3%)	10(20%)	1(4.7%)	0.54
None				
IUD	98(75%)	36(73%)	18(85%)	
Implant	12(9.2%)	03(6.1%)	02(9.5%)	

**Table 2. Association between obesity and obstetrics co-factors**

Characteristics	Class I (BMI 30–34 kg/m <sup>2</sup> ) n = 130 (%)	Class II (BMI 35–39.9kg/m <sup>2</sup> ) n = 49 (%)	Class III (BMI ≥ 40.0 kg/m <sup>2</sup> ) n = 21(%)	p -value
<b>Pregnancy induced hypertension</b>				
yes	2(1.5%)	7(14%)	8 (38%)	0.0001
no	128 (98%)	42 (85%)	13 (61%)	
<b>Gestational diabetes</b>				
Yes	31 (22.7%)	20 (40%)	14(66%)	0.0001
no	99 (77.3%)	29 (59%)	07(33%)	
<b>Urinary tract infection</b>				
yes	3 (2.3%)	6 (12.2)	07(33.3)	0.0001
no	127 (97%)	43 (87.7)	14 (66.6)	
<b>Perineal tear</b>				
First degree	45 (34.2)	21 (42.8)	10(47.1)	0.51
Second degree	14(10.8)	06(12.2)	3(14.2)	
Third degree	6(4.6)	01(4.0)	2(9.5)	
intact	65(50)	21(42.8)	6(28.5)	
<b>Episiotomy</b>				
yes	7(5.3)	08(16)	7(33.3)	0.002
No	123 (94.1)	41 (83.6)	14(66.6)	
<b>Induction of labor</b>				
yes	33 (25.3)	11 (2.04)	5 (23.8)	0.917
no	97(74.6)	38 (77.5)	16(76.1)	
<b>Method of Delivery</b>				
spontaneous vaginal delivery	60 (46.1)	10 (20.4)	4 (19)	0.005
Instrumental	14(10.7)	9(18.3)	2(9.5)	
Caesarean section (CS)	56 (43.0)	30(61.2)	15(75)	

Table 2 showing the association between obesity categories and associated factors, The obesity shows significant association with pregnancy induced hypertension in all three groups with 2(1.5) cases in group 1 obese, 7(14) in group II, obese,8(38) in group III, obese female and p =

0.0001, Similarly statistically significant association p = 0.0001, was found with gestational diabetes with obese pregnant females, 31(22.7) in obese group 1, 20(40) in obese group II, and 14(66) in group III obese females. The relationship between obesity and

UTI also shows statistically significant difference  $p = 0.0001$ , with maximum number of UTI present in group III obese females, 7(33.3) and 6(12.2) in group II obese pregnant females, and 3(2.3) in obesity group 1 pregnant females. The relationship for perineal tears was found non-significant,  $p .0.51$ , among all three obese classes, unbroken perineal wall at the time of birth was 65(50.) cases, whereas 45 (34.2) 14 (10.8) had first and second-degree tears, respectively. For obesity group II, 21 women (42.8%) deliver with an intact perineum, 21 (42.8%) and 6(12.2 %) cases had 1st and second-degree tears, respectively. In obesity group III, the ,6 (28.5%) suggest intact perineal wall, although tears were 10 (47.1%), and 3(14.2%) cases had first and second-degree tears, respectively. The association between obesity and episiotomy shows statistically significant association  $P. 0.002$ , that group 1 had 7(5.3%) out of 130 cases, and group II, had 8(16%) from 49 cases, and group III, had 7(33.3%) out of 21 episiotomy.

The mode of delivery has strongly significant correlation with obesity, with 56 (43.0%) having cesarian section in comparison to 60 (46.1) normal vaginal delivery in group 1, whereas there were 30(61.2%) cesarian in comparison to 10 (20.4%) normal deliveries in group II, and 15(75%) cesarian section in group III and only 4(19%) of normal deliveries, the  $p$  value is 0.005.

Table 3: shows relationship between overweightness and fetal outcome, the Apgar

score, age of gestation, the birth weight, and admission to NICU does not show any statistical relationship, with  $p$ . value of  $p.0.29$ ,  $p.0.16$ ,  $p.0.74$  and  $p. 1.000$  correspondingly.

#### 4. DISCUSSION

This study suggests that as the BMI of the mother's increases there is increase chances of adverse health effect on mother, findings are consistent with those of earlier researches suggesting strong relation among increasing BMI of mothers and an enhanced hazard of gestational hypertension, gestational diabetes and, urinary tract infection, and caesarian section. This study suggests statistically significant association between, increased obesity and gestational induced hypertension, similar results were observed by a study done by Zayed et al. [11] showing obese women are at higher risk of preeclampsia and pregnancy induced hypertension, as compared to normal weight women, another study also confirmed our results, [12]. A systemic review from (1992–2011) declared obesity is the high-risk factor for pre-eclampsia, and pregnancy induced hypertension [13]. In this study there is significant relation between pregnancy and gestational diabetes mellitus, which is consistent to previous studies, showing obesity in pregnancy have more danger of gestational diabetes [14], A meta-analysis study suggest that risk of gestational diabetes is increased two folds in obese

**Table 3. Association between obesity and neonatal outcomes**

Characteristics	Class I (BMI 30–34 kg/m <sup>2</sup> ) n = 130(%)	Class II (BMI 35.0–39.9 kg/m <sup>2</sup> ) n = 49 (%)	Class III (BMI—40.0 kg/m <sup>2</sup> ) n = 21 (%)	p Value *
APGAR score				
0–2 need resuscitation	2 (1.5)	2 (4.0)	2(9.5)	0.29
3–6 stimulation	3 (2.3)	2 (4.0)	1(4.7)	
7–10 no action	125 (96.)	45 (91.8)	18 (85.7)	
Gestational age				
Preterm	11 (8.4)	5 (10.2)	1(4.7)	0.16
Full term	117 (90)	40 (81.6)	18 (85.7)	
Postdate	2 (1.5)	4(8.1)	2 (9.5)	
Birth weight (Appropriate for G.A)				
SGA (Small for G.A)	11 (8.4)	40 (81.6)	16(76)	0.74
LGA (Large for G.A)	98(75)	5 (10.2)	2 (9.5)	
Admission to NICU	4 (3.1)	4(8.1)	3(14.2)	
Neonatal mortality	0	1 (2.0)	0	1.000
		1 (2.0)	0	0.312

pregnant women as compared to normal weight pregnant women [15]. This study does not show any significant association between obesity and the perineal tears, similar results were obtained by Garratto et al. [16], with no association of perineal tears with obesity, another study by Gaillard et al. [17] suggest obesity being a protective shield against perineal tears, this study shows strong statistically significant correlation between obesity with episiotomy, which is contrary to the studies conducted in past showing no significant relation between both [18,19], which could be because of the change in the ethnicity of study population.

This study shows increase incidence of cesarian sections in obese females which is consistent with previous studies showing increase incidence of vaginal births in females with normal BMI and increase in cesarian section with increase obesity [20]. This study shows no significant association between obesity and induction of labor and preterm birth which has formerly been recognized [21], our study did not find any significant results for Apgar score, infants weight or infant mortality, however significant difference in rates of mortality and morbidity among overweight and obese mothers have been verified by earlier studies [22].

## 5. CONCLUSION

Obesity during pregnancy is influencing the maternal health and child outcome; the findings suggest control of weight gain in antenatal period as well as in reproductive age. Pregnant females who are obese have an enhanced hazard of poor gestation results. Specifically, obese pregnant females are having more chances to develop gestational diabetes, pregnancy induced hypertension, and urinary tract infections. Appropriate strategic plans should be made to decrease the occurrence of obesity in pregnant women for better pregnancy outcome.

## CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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