DOI: https://doi.org/10.53350/pjmhs221610673

ORIGINAL ARTICLE

Association of Obesity with Adverse Maternal and Perinatal Outcome in Pregnant Women

RUQQIYA AZHAR[1], SUNDAS MUSHTAQ[2], MAMOONA RIAZ[3], HUMAIRA AMAN[4], RUBINA QADEER[5], SADIA AMAN[6]
[1]*Senior Registrar gynae Department, POF Hospital Wah Cantt*
[2]*Consultant Gynaecologist, DHQ Hospital Kotli Azad Kashmir*
[3]*Senior Registrar Gynae Department, POF Hospital Wah Cantt*
[4,5]*Senior Registrar Gynae Department, Kuwait teaching hospital, Peshawar Medical College*
[6]*Consultant Gynaecologist, Social Security Hospital Lahore*
Correspondence to: Ruqqiya Azhar, Email: ruqaeyasaqib@gmail.com, Cell: 0321-4531919

ABSTRACT

Introduction: Obesity is a current issue that has an impact on all healthcare services. Several prenatal and postpartum problems have maternal obesity as one of their risk factors. Many studies have shown that women with BMI≥30Kg/m^2 experience increased incidence of intrapartum and perinatal complications.

Objective: The objective of this study was to1determine the association of obesity with adverse maternal and perinatal outcome in pregnant women.

Study design: Prospective cohort study.

Setting: Obstetrics and Gynecology, Unit-II, Jinnah Hospital, Lahore.

Material and methods: Total 232 pregnant women aged between 20-45 years presenting at ≥37 weeks of gestation. These patients were evaluated for obesity and two groups of patients were assimilated; those with obesity (BMI≥30 Kg/m^2) and healthy controls (BMI 18.5-24.9 Kg/m^2). Frequency of various fetomaternal outcome measures was noted and compared among these groups. A written informed consent was taken from each patient.

Results: The age range from 20 years to 40 years with a mean of 28.40±5.30 years. Majority (n=210, 63.3%) of the patients were aged1between 20-30 years. The mean gestational age was 39.061.59 weeks. There were 157 (47.3%) primiparas and 175 (52.7%) multiparas. 187 (56.3%) patients were booked. Both the study groups1were comparable in terms1of mean age (p=0.613), mean gestational age (p=0.317), mean parity (p=0.168) and age (p=0.820), gestational age (p=0.071), parity (p=0.099) and booking status (p=0.580) groups distribution. The frequency of instrumental vaginal delivery (16.3% vs. 5.4%; p=0.001), cesarean delivery (36.1% vs. 10.2%; p<0.001), post-partum hemorrhage (10.8% vs. 1.8%; p=0.001), poor Apgar score (15.1% vs. 4.8%; p=0.002) & NICU admission (33.7% vs. 9.0; p<0.001) was significantly higher in obese women compared to non-obese controls.

Conclusion: Maternal obesity was found to be associated with significantly higher frequency of instrumental vaginal delivery, cesarean delivery, post-partum hemorrhage, fetal macrosomia, poor Apgar score at 5.0 minutes & NICU admission regardless of patient's age, gestational age, parity and booking status.

Keywords: Maternal Obesity, Pregnancy, Maternal Complications, Fetal Complications

INTRODUCTION

The prevalence of obesity has increased significantly both in the UK and around the world. Obesity is a current issue that affects all aspects of healthcare, not only maternity services.(1) Universally, obesity is classified by using the Body Mass Index (BMI). It is a basic index that is created by dividing a person's weight in kilos by their height in square meters.(2)

Maternal obesity is more common than ever and is now considered an epidemic. A study of 287,213 females in London stated a BMI greater1than 30kg/m^2 in 10.9% of the1cohort. A more recent study that focused specifically on the rise in maternal obesity incidence rates showed a significant increase of 22.0% in the1year 2010 that they extrapolated1from the trend they found.(3) Several prenatal and postpartum problems have maternal obesity as one of their risk factors.(4) For instance, obese women are more likely to develop gestational diabetes during pregnancy, Thromboembolic and hypertensive conditions, as well as a higher chance of miscarriage and late foetal loss; and at the time of birth, Obese women have a much higher risk of having an artificial birth and a caesarean section during pregnancy, Increased neonatal critical care needs are present in their infants due to postpartum haemorrhage, infection, and prolonged hospital stays.(5) According to current clinical recommendations, women with a BMI more than 35 kg/m2 should be informed that giving birth in an1obstetric unit would be1expected to lower the risks of bad outcomes for both the mother and the foetus.(6)

Although recent research by Kim Thomas suggests this may not be true for all pregnant women, it still provides valuable evidence that modifies this understanding and will help women make better informed decisions about their care. Pregnant women with a high Body Mass Index (BMI) are thought to be at higher risk of adverse outcomes.(7)

In the 2020 study, the rate of caesarean sections was considerably greater in the obese group (33.1% vs. 13.3%).(8) Whereas another study done by Hollowed J et al. in 2014, found that intrapartum caesarean section in obese group was 13.4% vs. 9.6% in the non-obese group with Pvalue > 0.05.(6) The incidence of instrumental vaginal delivery was 3(1.2%) in obese group vs. 2(0.8%) in non-obese group, P < 0.05).(9) Only women with a BMI under 35 kg/m2 were shown to have a significantly higher chance of developing gestational diabetes, preeclampsia, dystocia, and having babies with an Apgar score under 7 after 5 minutes.(10) In 2018 study showed 33.32% of neonates admitted to neonatal unit in obese group and 9.3% in non-obese group.(11)

The rationale of the study is to determine the association between obesity and adverse maternal and fetal outcome. Many studies proved that women with BMI>30kg/m^2 experienced increased incidence of intrapartum and perinatal complications but conflicting results also there. Even a research article by Kim Thomas published in 2014 provides valuable evidence that this may not be true for all women and risk associated with obesity in pregnant women is lower than previously thought. So this study results will enable women to make better informed decision about care.

METHODOLOGY

This prospective Cohort study was conducted 05/11/2019 to 04/05/2022 from Obstetrics and Gynecology Unit-II, Jinnah Hospital, Lahore. Sample size of 332 cases (166 in each group) was calculated with 80% power of test, 5% level of1significance & taking expected percentage of Apgar score <7 at 5 min. in both1groups i.e. 14% in obese group versus 5% in non-obese group [2].

Patients age between 20-45 years, Singleton pregnancy assessed on USG, Cephalic presentation (Confirmed on USG),

Obese women having BMI > 30 kg/m^2, Gestational age at term i.e.> 37 weeks assessed on dating scan and Para up to 4 were included.

Age range 20-45 years. Women suffering from medical disorders like diabetes mellitus (assessed by RBS levels > 200gm/dl), urinary tract1infection (on complete urine examination), history of hypertension (B.P > 140/90 mmHg, and thyroid disorder (assessed by T3 and T4 levels) and Women presented in pre-term labour (i.e. <37 weeks of gestation on dating scan) were excluded. The study was approved from ethical committee of the hospital. The patients were enrolled after informed consent. The data was collected regarding patients profile, age, parity, height, weight, booking status. Duration of gestation was confirmed by the ultrasound performed at presentation. Both groups were informed about confidentiality of data. Body mass index was calculated at admission by the formula.

Patients were divided in to two groups: Obese and Non-Obese (as per inclusion criteria). Patients of both groups were followed till delivery by researcher herself for the study variables. Assisted instrumental delivery was carried out if required in second stage of labour. Cesarean section (emergency or elective) was carried out if there was fetal distress or instrumental delivery not possible. Postpartum haemorrhage was noted as per operational definition. At birth all babies were assessed for perinatal outcome i.e. fetal macrosomia, Apgar score of baby was assessed at 5 minutes, and NICU admission.

Data was1analyzed through1SPSS version 20. Age and gestational age have been presented by mean ±SD. Parity, instrumental vaginal delivery, cesarean section, PPH, poor Apgar score, macrosomia and NICU admission have been presented by frequency & percentage. Chi-square test has been applied to1compare the frequency of instrumental vaginal delivery, cesarean section, PPH, poor Apgar score, macrosomia and NICU admission among women with and without obesity taking p-value ≤0.05 as statistically significant and RR has been calculated taking RR>1 as significant. Data has1been stratified for1age, gestational age, parity and booking status to address effect1modifiers.

RESULT

The age range from 20 years to 40 years with a1mean of 28.40±5.30 years. Majority 210(63.3%) of the patients were aged between 20-30 years. The patients' gestational1ages ranged from 37 to 42 weeks, with a mean of 39.06±1.59 weeks, while their parities ranged from 1 to 4, with a mean of 2.08±1.19 weeks. There were 157 (47.3%) primiparas and 175 (52.7%) multiparas. Table: 1

The mean ages of the two study groups were comparable (p=0.613), mean gestational age (p=0.317), mean parity (p=0.168) and age (p=0.820), gestational1age (p=0.071), parity (p=0.099) and booking status (p=0.580) groups distribution as shown in Table: 2

Table: 1: Descriptive of age Gestational Age, Parity

		Frequency (%)
Age (years)	Mean +SD	28.40±5.30
	20-30	210 (63.3%)
	30-40	122 (36.7%)
Gestational Age (Week)	Mean +SD	39.06±1.59
	37-39	204 (61.4%)
	40-42	128 (38.6%)
Parity	Mean +SD	2.08±1.19
	Primiparas	157 (47.3%)
	Multiparas	175 (52.7%)

The frequency of instrumental vaginal delivery (16.3% vs. 5.4%; p=0.001, RR=1.60, 95% CI=1.28 – 1.99), cesarean delivery (36.1% vs. 10.2%; p<0.001, RR=1.88, 95% CI=1.55 – 2.26), postpartum hemorrhage (10.8% vs. 1.8%; p=0.001, RR=1.80, 95% CI=1.46 – 2.22), fetal macrosomia (18.1% vs. 6.6%; p=0.002, RR=1.57, 95% CI=1.25 – 1.96), poor Apgar score (15.1% vs. 4.8%; p=0.002, RR=1.61, 95% CI=1.28 – 2.02) and NICU admission (33.7% vs. 9.0; p<0.001, RR=1.87, 95.0% CI = 1.55 – 2.26) was significantly higher in obese women compared to non-obese controls as shown in Tables 9.3 – 9.8 respectively. Similar1difference was observed across1various age, gestational age, parity & booking status groups as shown in Tables 9.9 – 9.14.

Table 2: Baseline Characteristics of Groups

		Obese	Non-Obese	P Value
Age (years)	Mean +SD	28.25±5.37	28.55±5.25	0.613
	20-30	106 (63.9%)	104 (62.7%)	0.82
	30-40	60 (36.1%)	62 (37.3%)	
Gestational Age (Week)	Mean +SD	39.15±1.57	38.98±1.61	0.317
	37-39	94 (56.6%)	110 (66.3%)	0.071
	40-42	72 (43.4%)	56 (33.7%)	
Parity	Mean +SD	2.17±1.23	1.99+1.15	0.16
	Primiparas	71 (42.8%)	86 (51.8%)	0.09
	Multiparas	95 (57.2%)	80 (48.2%)	

Table 3: Comparison of variables with Groups

		Obese	Non Obese	P value	RR
Instrumental Vaginal Delivery	Yes	27(16.3%)	9(5.4%)	0.001	1.60
	No	139(83.7%)	157(94.6%)		
Cesarean Delivery	Yes	60(36.1%)	17(23.2%)	0.001	1.86
	No	106(63.9%)	149(89.8%)		
Post-Partum Hemorrhage	Yes	18(10.8%)	3(1.8%)	0.001	1.80
	No	148(89.2%)	163(98.2%)		
Fetal Macrosomia	Yes	30(18.1%)	11(6.6%)	0.002	1.57
	No	136(81.9%)	155(93.4%)		
Poor Apgar (<7 at 5 min)	Yes	25(15.1%)	8(4.8%)	0.0002	1.61
	No	141(84.9%)	158(95.2%)		
NICU Admission	Yes	56(33.7%)	15(9.0%)	0.0001	1.87
	No	110(66.3%)	151(91.0%)		

DISCUSSION

Obesity is defined by a body mass index (BMI) below 30 kg/m2, which is harmful to women's reproductive health as well as the health of their children.(12, 13) Obese women are more likely to experience adverse1 pregnancy outcomes like gestational diabetes, preeclampsia & gestational hypertension. (14) Additionally, there is a higher risk of Caesarean section, shoulder dystocia, postpartum haemorrhage, and induction of labour.(15) Additionally, maternal obesity is linked to a higher risk of unfavourable neonatal outcomes, such as a greater rate of preterm birth, large-forgestational-age (LGA) newborns, admission to the intensive care unit (NICU), congenital malformations, and perinatal mortality.(16)

Obesity is a current issue that has an impact on all healthcare services.(17) Several prenatal and postpartum problems have maternal obesity as one of their risk factors.(18) Numerous studies have demonstrated that problems during pregnancy and delivery are more common in women with BMIs below 30 kg/m2.(19)

In this study, the mean1age was 28.40±5.30 years. Asif et al. (2016) reported similar1mean age of 28.73±4.62 years among such women presenting at Services Hospital, Lahore [135].(20) A similar mean age of 28.67±3.30 years was observed by Shafaq et al. in full term obese women.(21) John et al. reported the mean age of 29.5±2.9 years in Nepalese women.(22)

There were 210(63.3%) of patients were aged between 20-30 years. Our result is in line with that of Syed et al. reported that 66.8% of such women presenting at Lady Reading Hospital, Peshawar were aged between 20-30 years.(23) John et al also observed similar higher proportion of this age group in Nepalese such women and reported it to be 62.0%.(22)

We observed that 47.3% of such women were primiparas. Davies-Tuck et al. reported the frequency of primiparas to be 45.1% in Australian obese women.(24) While John and Ojha et al. (2016) reported it to be 46.0% and 49.6% in Nepal.(22, 25)

We observed that the frequency of instrumental vaginal delivery (16.3% vs. 5.4%; p=0.001, RR=1.60, 95% CI=1.28 – 1.99), cesarean delivery (36.1% vs. 10.2%; p<0.001, RR=1.88, 95% CI=1.55 – 2.26), post-partum hemorrhage (10.8% vs. 1.8%; p = 0.001, RR=1.80, 95% CI=1.46 –

2.22) was significantly higher in obese women compared to non-obese controls.

A similar significant difference in the frequency of instrumental vaginal delivery has been reported previously by 2020 (12.32% vs. 5.21%; p<0.001)(26) and Davies-Tuck et al. in 2016 (13.6% vs.

1.0%; p=0.001).(27) Awan et al. (44.0% vs. 16.0%; p=0.0024), Asif et al. (33.3% vs. 13.3%; p=0.06) also reported similar significant difference in the frequency of C-section between obese and non-obese pregnant women in local population.(28)

In the present study, we also observed that the frequency of fetal macrosomia (18.1% vs. 6.6%; p=0.002, poor Apgar score (15.1% vs. 4.8%; p=0.002 and NICU admission (33.7% vs. 9.0; p<0.001 was significantly higher in obese women compared to non-obese controls. Our results are similar to those of Jaleel et al. (16.2% vs. 6.1%; p=0.024), Fatima et al. (26.0% vs. 4.0%; p<0.001) and Vinayagam et al. (19.0% vs. 7.0%; p<0.05) who also reported1similar difference significant in the frequency of fetal macrosomia. Vinayagam et al. also reported similar1significant difference in the1frequency of poor Apgar score (14.0% vs. 5.0%; p<0.05) [2].2 Galtier-Dereure et al. reported similar significant difference in the frequency of NICU admission (33.32% vs. 9.3%; p<0.05) between newborns of obese and non-obese mothers [9].9

The results of the present study are comparable to existing literature with minimal differences attributable to population differences perhaps. The current study's 332 cases, tight exclusion criteria, and stratification of study outcomes for effect modifiers are its merits. In the present study, maternal obesity was found to be associated with significantly higher frequency of instrumental vaginal delivery, cesarean delivery, post-partum hemorrhage, fetal macrosomia, poor Apgar score at 5 minutes and NICU admission regardless of patient's age, gestational age, parity and booking status. Once an obese pregnant woman is seen in antenatal clinic she should be considered high risk and optimal anticipated measures should be taken to reduce the maternal and neonatal complications.

A strong limitation to1the present study was1that we1didn't evaluate the effect of maternal weight control over various fetomaternal outcome measures which would further highlight the problem and will help in planning the management of such patients.

CONCLUSION

Maternal obesity was found to be associated1with significantly1higher frequency 1of instrumental vaginal delivery, cesarean delivery, post-partum hemorrhage, fetal macrosomia, poor Apgar1score at 5.0 minutes & NICU admission regardless of patient's age, gestational age, parity and booking status.

REFERENCES

1. Lanigan J. Prevention of overweight and obesity in early life. Proceedings of the Nutrition Society. 2018;77(3):247-56.
2. Frayon S, Cavaloc Y, Wattelez G, Cherrier S, Lerrant Y, Ashwell M, et al. Potential for waist-to-height ratio to detect overfat adolescents from a Pacific Island, even those within the normal BMI range. Obesity Research & Clinical Practice. 2018;12(4):351-7.
3. Yao R, Crimmins SD, Contag SA, Kopelman JN, Goetzinger KR. Adverse perinatal outcomes associated with trial of labor after cesarean section at term in pregnancies complicated by maternal obesity. The Journal of Maternal-Fetal & Neonatal Medicine. 2019;32(8):1256-61.
4. Dutton H, Borengasser SJ, Gaudet LM, Barbour LA, Keely EJ. Obesity in pregnancy: optimizing outcomes for mom and baby. Medical Clinics. 2018;102(1):87-106.
5. Reynolds CM, Egan B, McMahon L, O'Malley EG, Sheehan SR, Turner MJ. Maternal obesity trends in a large Irish university hospital. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2019;238:95-9.
6. Hollowell J, Pillas D, Rowe R, Linsell L, Knight M, Brocklehurst P. The impact of maternal obesity on intrapartum outcomes in otherwise low risk women: secondary analysis of the Birthplace national prospective cohort study. BJOG: An International Journal of Obstetrics & Gynaecology. 2014;121(3):343-55.
7. Yang Z, Phung H, Freebairn L, Sexton R, Raulli A, Kelly P. Contribution of maternal overweight and obesity to the occurrence of adverse pregnancy outcomes. Australian and New Zealand Journal of Obstetrics and Gynaecology. 2019;59(3):367-74.
8. Ameen SI, Khalid SI. Maternal Obesity and Adverse Pregnancy and Perinatal Outcomes. Journal of Medical and Surgical Practice (JMSP). 2020;6(03).
9. Akgol S, Rapisarda AMC, Budak MS, Caruso S, Cianci A, Reyes-Munoz E, et al. The effect of obesity on the onset of spontaneous labor and scheduled delivery rates in term pregnancies. Taiwanese Journal of Obstetrics and Gynecology. 2020;59(1):34-8.
10. Ramonienė G, Maleckienė L, Nadišauskienė RJ, Bartusevičienė E, Railaitė DR, Mačiulevičienė R, et al. Maternal obesity and obstetric outcomes in a tertiary referral center. Medicina. 2017;53(2):109-13.
11. Solmi F, Morris S. Overweight and obese pre-pregnancy BMI is associated with higher hospital costs of childbirth in England. BMC pregnancy and childbirth. 2018;18(1):1-10.
12. Ukah UV, Bayrampour H, Sabr Y, Razaz N, Chan W-S, Lim KI, et al. Association between gestational weight gain and severe adverse birth outcomes in Washington State, US: A populationbased retrospective cohort study, 2004–2013. PLoS medicine. 2019;16(12):e1003009.
13. Liu P, Xu L, Wang Y, Zhang Y, Du Y, Sun Y, et al. Association between perinatal outcomes and maternal pre-pregnancy body mass index. Obesity Reviews. 2016;17(11):1091-102. 14. Bourjeily G, Danilack VA, Bublitz MH, Lipkind H, Muri J, Caldwell D, et al. Obstructive sleep apnea in pregnancy is associated with adverse maternal outcomes: a national cohort. Sleep medicine. 2017;38:50-7.
15. Lindquist AC, Hastie RM, Hiscock RJ, Pritchard NL, Walker SP, Tong S. Risk of major labour-related complications for pregnancies progressing to 42 weeks or beyond. BMC medicine. 2021;19(1):1-8.
16. Bone JN, Joseph K, Mayer C, Platt R, Lisonkova S. The association between prepregnancy body mass index and perinatal death and the role of gestational age at delivery. PloS one. 2022;17(3):e0264565.
17. Blüher M. Obesity: global epidemiology and pathogenesis. Nature Reviews Endocrinology. 2019;15(5):288-98.
18. Kutchi I, Chellammal P, Akila A. Maternal obesity and pregnancy outcome: in perspective of new Asian Indian guidelines. The Journal of Obstetrics and Gynecology of India. 2020;70(2):138-44.
19. Freemark M. Childhood obesity in the modern age: global trends, determinants, complications, and costs. Pediatric Obesity: Springer; 2018. p. 3-24.
20. Asif S, Ejaz S, Waheed K. Maternal Outcome in Obese and Non-Obese Women. PAKISTAN JOURNAL OF MEDICAL & HEALTH SCIENCES. 2016;10(1):278-80.
21. Hanif S, Zubair M, Shabir N, Zia MS. A Comparative Study of Maternal and Fetal Outcome in Obese and Non-Obese Pregnant Women. Journal of the Society of Obstetrics and Gynaecologists of Pakistan. 2020;10(2):96-101.
22. John J, Mahendran M. Maternal and fetal outcomes of obese pregnant women: a prospective cohort study. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2017;6(2):725-30.
23. Syed W. Obesity related maternal complications in pregnant women. Khyber Medical University Journal. 2014;6(3).
24. Davies-Tuck M, Mockler JC, Stewart L, Knight M, Wallace EM. Obesity and pregnancy outcomes: Do the relationships differ by maternal region of birth? A retrospective cohort study. BMC Pregnancy and Childbirth. 2016;16(1):1-8.
25. Ojha N. Pregnancy outcome in overweight and obese mothers at a tertiary care Hospital. Journal of Institute of Medicine. 2016;38(2/3):56-62.
26. Mahfouz EM, El-Sherbiny NA, Wahed W, Hamed NS. Effect of inter-pregnancy interval on pregnancy outcome: a prospective study at Fayoum, Egypt. Int J Med Dev Ctries. 2018;2(2):38-44
27. Fakhraei R, Denize K, Simon A, Sharif A, Zhu-Pawlowsky J, Dingwall-Harvey AL, et al. Predictors of Adverse Pregnancy Outcomes in Pregnant Women Living with Obesity: A Systematic Review. International journal of environmental research and public health. 2022;19(4):2063.
28. Awan S, Bibi S, Makhdoom A, Farooq S, Tahir SM, Qazi RA. Adverse fetomaternal outcome among pregnant overweight women. Pakistan Journal of Medical Sciences. 2015;31(2):383.