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Comparison of Post- partum Hemorrhage in Obese versus Non- Obese Primigravida

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ABSTRACT

Background: Obesity is considered to be a global public health issue, and among different populations, obesity has varying rates of occurrence that are influenced by age and gender. This study was done to compare the frequency of postpartum hemorrhage (PPH) in obese versus non-obese primigravida (PG).

Methods: This cross-sectional, comparative study was performed at the department of obstetrics and gynecology, Bahawal Victoria Hospital, Bahawalpur, Pakistan, during September 2023 to March 2024. A total of 80 females (40 obese, and 40 non-obese) aged 18-35 years with singleton pregnancy of cephalic presentation, and gestational age 37-41 weeks were enrolled. Non-probability, quota sampling technique was adopted. Women with a BMI>30 kg/m^2 were labeled obese PG whereas BMI≤30 kg/m^2 were considered non-obese. The patients were followed for the next 24 hours, and the presence or absence of PPH was noted (estimated blood loss after a vaginal delivery>500 ml or following a cesarean section>1000 ml).

Results: In a total of 80 females, the mean age was 26.87±3.31 years (ranging between 18-35 years) while 66 (82.5%) females were aged between 18-25 years. The mean gestational age was calculated to be 38.88±1.42 weeks. Place of living was urban in 48 (60.0%) females. Educational status of 20 (25.0%) females was illiterate. Comparison of frequency of PPH showed significant association between obese and non-obese PG (45.0% vs. 15%, p=0.0034, relative risk = 3.00).

Conclusion: Frequency of primary postpartum hemorrhage in obese PG was significantly higher when compared to non-obese PG which highlights obesity as risk factor for postpartum hemorrhage.

Keywords: Body Mass Index, Obesity, Postpartum Hemorrhage, Primigravida, Singleton.
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INTRODUCTION

Obesity is considered to be a global public health issue, and among different populations, obesity has varying rates of occurrence that are influenced by age and gender.[1] The obesity rates among pregnant

females show a rising trend in different parts of the world [2,3] .Due to obesity, mothers are more likely to be affected but fetuses, neonates, and children of young age are also influenced.[4] With obesity, not only is the chance of having a conception reduces considerably, but it also carries the likelihood of spontaneous abortion and congenital abnormalities, a decreased response to treating infertility, and an additive incidence of fetal and maternal complications [5,6] .During the intrapartum stage, the incidence of emergency cesarean sections (CS), labour dystocia, and postpartum hemorrhage (PPH) is increased among obese women. Among obese pregnant females, the occurrence of infection and thromboembolism, along with an extended hospital stay and/or readmission, is common [7,8].

It has been recommended by "The International Postpartum Hemorrhage Collaborative Group" that maternal obesity should be investigated further as a major risk factor for PPH.[9] Numerous population-based reports have indicated that the odds of PPH, or atonic hemorrhage among obese pregnant females is relatively higher[10]. In contrast, some other studies mentioned that obesity either prevented PPH or had no association with it[11,12] .In a local study described that PPH was more common among obese primigravida (PG) women (30%) than in non-obese women (8%) [13].

Emerging evidence suggests that maternal obesity may amplify this risk of PPH.[10-13] Data from the Pakistani population, particularly among PG women, remain limited. Given the unique sociocultural and nutritional dynamics in Pakistan, it is crucial to investigate the extent to which obesity contributes to PPH risk in this context. Understanding this relationship may facilitate early identification of high-risk individuals and inform targeted prevention strategies in clinical practice. This study was conducted to compare the frequency of PPH between obese and non-obese PG women, with the hypothesis that obesity significantly increases the likelihood of PPH in this population.

METHODS

This cross-sectional, comparative study was conducted at the department of obstetrics and gynecology, Bahawal Victoria Hospital, Bahawalpur, Pakistan, from September 2023 to March 2024. A sample size of 80 (40 in each group) was calculated considering the frequency of PPH in obese PG women as 30.0% and 8% in non-obese women,[13] 80% power of study and 95% level of significance. Inclusion criteria were females between 18-35 years of age with singleton pregnancy of cephalic presentation (assessed on ultrasonography) and gestational age between 37-41 weeks. Exclusion criteria were females who had anemia (hemoglobin<10.0 g/dl), pregnancy-induced hypertension, or diabetes mellitus. Patients with any bleeding disorder (international normalized ratio>1.2), chronic liver disease (serum bilirubin>2mg/dl), or chronic renal failure (serum creatinine>1.5 mg/dl) were also excluded. Patients were briefed about the study objectives, safety,

and confidentiality of their provided information, and then informed and written consents were taken. Approval from the Institutional Ethical Review Board (letter number 2142) was also obtained. Non-probability, quota sampling technique was adopted. To achieve equal group sizes, consecutive eligible PG women presenting for delivery were screened and assigned to either the obese group (BMI >30 kg/m²) or the non-obese group (BMI ≤30 kg/m²) according to their BMI at admission. Enrollment continued independently for each group until the required sample size of 40 participants per group was reached.

After the enrollment, socio-demographic and relevant laboratory parameters were noted. PG was defined as a woman who conceived for the first time. A consultant gynecologist (post-fellowship experience≥3 years) conducted the delivery process for all of the included patients. The patients were followed for the next 24 hours, and the presence or absence of PPH was noted. The estimated blood loss after a vaginal delivery>500 ml or following CS>000 ml was considered to be a PPH. It was measured by collecting the immediate blood loss in the 500-ml kidney tray, and after that, 3×11×1-inch-sized pads were used. If, after 24 hours of delivery, the pad was completely saturated with blood, its measure was calculated as 80 ml, and in the case of 50% saturation, it was considered to be 25 ml.[12]

Statistical analysis was done using SPSS, version 26.0. Qualitative variables were shown as frequencies and percentages. Quantitative variables were represented as mean and standard deviation (SD). The chi-square test was applied to compare PPH for both groups (obese versus non-obese). A p-value≤0.05 was considered significant. A calculation for relative risk was also made.

RESULTS

Table-1: Characteristics of the Primigravida Patients of the Two Groups (N=80)

Characteristics		Total (n=80)	Obese Primigravida (n=40)	Non-obese Primigravida (n=40)	P-value
Age (years)	18-25	66 (82.5%)	34 (85.0%)	32 (80.0%)	0.5562
	26-35	14 (17.5%)	6 (15.0%)	8 (20.0%)	
Gestational age (weeks)	37-39	47 (58.8%)	24 (60.0%)	23 (57.5%)	0.8203
	40-41	33 (41.3%)	16 (40.0%)	17 (42.5%)	
	10-12	52 (65.0%)	29 (72.5%)	23 (57.5%)	0.1596

Hemoglobin (g/dl)	>12	28 (35.0%)	11 (27.5%)	17 (42.5%)	
Booking status	Un-booked	41 (51.3%)	22 (55.0%)	19 (47.5%)	0.5022
	Booked	39 (48.8%)	18 (45.0%)	21 (52.5%)	
Place of living	Rural	32 (40.0%)	14 (35.0%)	18 (45.0%)	0.3613
	Urban	48 (60.0%)	26 (65.0%)	22 (55.0%)	
Socioeconomic status	Poor	07 (8.8%)	4 (10.0%)	3 (07.5%)	0.9126
	Middle	48 (60.0%)	24 (60.0%)	24 (60.0%)	
	Upper	25 (31.3%)	12 (30.0%)	13 (32.5%)	
Education	Illiterate	20 (25.0%)	10 (25.0%)	10 (25.0%)	0.9663
	Middle	35 (43.8%)	18 (45.0%)	17 (42.5%)	
	Matric and above	25 (31.3%)	12 (30.0%)	13 (32.5%)	
Mode of delivery	Spontaneous vaginal delivery	41 (51.3%)	21 (52.5%)	20 (40.0%)	0.8230
	Cesarean section	39 (48.8%)	19 (47.5%)	20 (40.0%)	

In a total of 80 females, the mean age was 26.87±3.31 years while 66 (82.5%) females were aged between 18-25 years. The mean gestational age was calculated to be 38.88±1.42 weeks. Place of living was urban in 48 (60.0%) females. Educational status of 20 (25.0%) females was illiterate. **Table 1** is showing socio-demographic and clinical details of females.

Table 2: Postpartum Hemorrhage between Obese and Non-obese Primigravida (N=80)

Postpartum hemorrhage	Total (n=80)	Obese primigravida (n=40)	Non-obese primigravida (n=40)	P-value	Relative risk (RR)
Yes	24 (%)	18 (45.0%)	6 (15.0%)	0.0034	3.00
No	56 (%)	22 (55.0%)	34 (85.0%)		

Comparison of frequency of PPH showed significant association between obese and non-obese PG (45.0% vs. 15.0%, p=0.0034, relative risk = 3.00) as shown in **Table 2**.

Table 3: Stratification of Postpartum Hemorrhage with respect to Study Variables (N=24)

Study variables		Obese primigravida (n=18)	Non-obese primigravida (n=6)	Relative risk	P-value
Age (years)	18-25	15 (83.1%)	4 (66.7%)	3.53	0.3840
	26-35	3 (16.9%)	2 (33.3%)	2.00	
Gestational age (Weeks)	37-40	10 (55.6%)	3 (50.0%)	4.06	0.5135
	40-41	8 (44.4%)	3 (50.0%)	3.54	
Pre-op Hb (g/l)	10.1-12	11 (61.1%)	3 (50.0%)	2.91	0.6326
	>12	7 (38.9%)	3 (50.0%)	3.61	
Booking	Unbooked	10 (55.6%)	1 (16.7%)	10.6	0.0978
	Booked	8 (44.4%)	5 (83.3%)	1.53	
Place of living	Rural	4 (22.2%)	5 (83.3%)	1.03	0.0074
	Urban	14 (77.8%)	1 (16.7%)	11.8	
Socioeconomic status	Poor	4 (22.2%)	-	-	0.1353
	Middle	10 (55.6%)	6 (100%)	1.67	
	Upper	4 (22.2%)	-	-	
Education	Illiterate	4 (22.2%)	-	-	0.4381
	Middle	10 (55.6%)	4 (66.7%)	2.36	
	Matric or above	4 (22.2%)	2 (33.6%)	2.60	
Mode of delivery	Spontaneous vaginal delivery	10 (55.6%)	5 (83.3%)	1.90	0.2235
	Cesarean section	8 (44.4%)	1 (16.7%)	8.42	

Residential status as urban was found to have significant association among obese PG women for PPH (77.8% vs. 16.7%, p=0.0074, relative risk=11.8). All other study variables did not have any significant association with PPH and the details are given in **Table 3**.

DISCUSSION

This study showed the rate of PPH occurrence in obese females as 45.0%, and among non-obese females, it was 15.0% (p=0.0034, relative risk=3.00). A large-scale study from the USA examined the association between maternal BMI and the risk of PPH, including atonic hemorrhage.[14] The researchers found that women who were overweight had a modestly increased likelihood of experiencing both PPH and atonic hemorrhage, with adjusted odds ratios of 1.06 (99% CI: 1.04–1.08) and 1.07 (99% CI: 1.05–1.09), respectively, compared to women of normal weight. The risk further increased among women categorized as having class-I obesity, where the adjusted odds ratio reached 1.08 (99% CI: 1.05–1.11) for PPH and 1.11 (99% CI: 1.08–1.15) for atonic hemorrhage. These findings highlight that, even after adjusting for potential confounding variables, elevated body mass index is an independent risk factor for both overall PPH and specifically atonic hemorrhage.[14] Complementing the present results, a retrospective cohort analysis demonstrated that the frequency of PPH was substantially higher in overweight and obese women, with reported rates of 9.7% and 15.6%, respectively, as compared to 7.2% in women with a normal BMI.[15] This difference was statistically significant ($p<0.001$), indicating a clear trend of increased PPH incidence with rising BMI categories. The study further observed that severe or major PPH episodes were more commonly encountered in women with obesity, underscoring the need for heightened vigilance and preventive strategies in this population.[15] These studies along with the present one underscore the clinical relevance of maternal overweight and obesity as important contributors to increased risk of PPH, warranting careful intrapartum and PPH management in these patients.[14,15] An extensive population-based study conducted in Sweden evaluated over 1.1 million women with singleton pregnancies and found a clear dose-response relationship between increasing obesity class and the risk of atonic PPH.[16] The risk of atonic hemorrhage was elevated by 14% in women with class-I obesity, by 47% in those with class-II obesity, and by 114% among women classified as class-III obese, when compared to women without obesity.[16] This gradient emphasizes that higher degrees of maternal obesity are associated with progressively greater risks of severe PPH. Evidence from Japan supports these findings.[10] In an analysis of 97,157 women with singleton pregnancies, the study observed that obese women were at substantially increased risk of PPH compared to their non-obese counterparts. The risk was found to be 1.1 times higher after vaginal delivery and nearly double (1.9 times higher) following cesarean section.[10] These results suggest that obesity not only contributes significantly to the overall risk of PPH but that the degree of risk is also influenced by the mode of delivery, with CS posing an even greater risk among obese women.

A study from Peshawar analyzing outcomes between obese and non-obese pregnant women revealed that the incidence of PPH was significantly higher among obese women, further aligning with the findings of this study.[17] On the other hand, another study showed that the frequency of PPH was 9% among obese women which is significantly lower that what was found in this study.[18] Regional data have shown difficulties in predicting PPH as the researchers estimated 56% PPH cases to be without any notable risk factors.[19] A multicenteric chinese cohort study concluded that PPH burden is notable among nulliparous women in comparison to multiparous women, so these women have high degree of risk for PPH which could be preempted at the time of presentation.[20]

A local study documented that 11.1% obese women went on to have severe PPH. They also suggested that obese females should be considered at increased risk of PPH.[21] Some other researchers have also stated that higher BMI is found to have significant linkage with PPH.[22] Regional data proposed that all pregnancies that occur in obese females be considered at high risk and that the guidelines be strict.[23] Weight reduction prior to conception should be a part of the management, but in the course of pregnancy, weight reduction is not established. Although “the Institute of Medicine” believes in weight reduction, some others do not accept it as true.[24]

The findings of this study can help the obstetricians in assessing the burden of PPH among obese PG. There is a need to encourage routinely exercise by arranging extensive educational and awareness programs for the general public that may assist in preventing obesity and consequently improving maternal and perinatal outcomes.[25] Being a single center study conducted on a relatively small sample size were some of the potential limitations of this research. Further studies investigating post-natal outcomes should also be planned to further not the association of obesity on these outcomes.

CONCLUSION

Frequency of primary postpartum hemorrhage in obese PG was significantly higher when compared to non-obese PG which highlights obesity as risk factor for postpartum hemorrhage

LIST OF ABBREVIATIONS

PG: primigravida

PPH: postpartum hemorrhage

RR: relative risk

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CONFLICT OF INTEREST

None

ETHICAL APPROVAL

Approval from the Institutional Review Board of Bahawal Victoria Hospital, Quaid-e-Azam Medical College, Bahawalpur was obtained through letter number 2142, dated 18-05-2023.

AUTHORS' CONTRIBUTION

SUN1: Conception, design, data collection, proofreading, critical revisions, approved for publication. **SUN2:** Drafting, data analysis, proofreading, critical revisions, approved for publication. **AZ:** Data collection, data analysis, proof reading, critical revisions, approved for publication. **SN:** Data collection, data synthesis, responsible for data's integrity, proof reading, critical revisions, approved for publication.

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