E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/16.01.657

Research Article

Prevalence of Massive Postpartum Hemorrhage in Women with Obesity Following Delivery

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Received: 06.04.2026, Revised: 14.06.2026, Accepted: 19.06.2026

ABSTRACT
Background: The causes of maternal morbidity and mortality in the world are severe postpartum hemorrhage (PPH), and obesity has become the primary risk factor that influences the outcomes of pregnancies and childbirth. Obese women are more likely to develop uterine atony, cesarean birth, and present with comorbidities, such as hypertension and diabetes, which may be a risk factor for excessive blood loss.
Purpose: The study objective was to determine the prevalence and predictors of severe postpartum bleeding among obese women following childbirth and raise concerns relating to the reliability and validity of the research instrument used in the measurement of the related perceptions and clinical risk factors.
Methods: The hospital-based cross-sectional change was implemented, and 75participants participated. The data were collected by means of a structured questionnaire and a clinical observation sheet. Statistical tests included normality tests, t-test (reliability) of reliability (Cronbach's Alpha), and validity (Bartlett test), independent samples t-test, one-way ANOVA, Kruskal-Wallis test, Chi-Square test, correlation tests, and logistic regression. The loss of 1000ml of blood or more within 24 hours of delivery was taken to constitute severe PPH.
Results: The normality test showed that the parametric tests are appropriate. Internal consistency of the questionnaire was excellent (Cronbach's Alpha = 0.874) and validity (KMO = 0.812; Bartlett $p < 0.001$). The independent samples t-test showed that women with severe PPH had significantly higher BMI and birth weight of the babies. The ANOVA and Kruskal-Wallis showed that the degree of blood loss was much higher in relation to the obese classes and mode of delivery, particularly when carrying out cesarean section. Chi-Square analysis established that the delivery mode and the severe incidence of PPH had a high correlation. The positive relationship between the BMI and the birthweight and the estimated blood loss was determined through the correlation analysis. The important positive predictors of severe PPH determined by logistic regression were BMI, cesarean delivery, instrumental delivery, birthweight, hypertension, and diabetes.
Conclusion: Maternal obesity is a serious risk factor for acute perineal bleeding, which is aggravated by comorbid factors and cesarean section. The active treatment of the third phase of labor, transfusion preparation, and weight and comorbidity management during antenatal counseling are required. Individual interventions can be used to reduce the burden of severe PPH in obese women and achieve improved maternal outcomes.

Keywords: Severe Postpartum Bleeding, Obesity, BMI, Cesarean, Maternal Outcomes, Risk Factors.

INTRODUCTION

Postpartum hemorrhage (PPH) is also ranked as one of the largest maternal morbidity and mortality in the globe, with almost a quarter of total deaths in mothers attributed to the condition. The World Health Organization defines PPH as the loss of 500 mL or more of blood during the same time period of the six hours following the delivery, and severe PPH as the loss of 1000 mL or more of blood. Severe PPH is a major concern in obstetric care in low and high-resource settings, even

though the sphere has significantly changed in reality. The higher rate of maternal obesity, which has been witnessed in the past few years, is another complication to the prevention, identification, and treatment of PPH, and it requires a more developed interpretation of its occurrence and presentation as risk among this vulnerable group (Ciomperlik et al., 2025).

Mother obesity has asserted itself as one of the most significant global subjects of health concern, and all indications of the prevalence rates are on the increase both in the economically developed nations and the developing nations. Obese pregnant women have been associated with several negative maternal and infant outcomes, which consist of gestational diabetes, high blood pressure ailments, prolonged delivery, macrosomia, and a high likelihood of cesarean birth. Women who are obese are at an immense risk that are associated with uterine atony and which is the major reason leading to excessive bleeding after birth. The clinical outcomes are also complicated by the comorbidities (chronic hypertension and diabetes) that put the patient at risk of obstetric emergencies. It is these facilitating conditions that warrant a systematic study of the relationship that exists between severe PPH and obesity (Chandak & Rathi, 2025).

The route of delivery is also a determinant of the outcome of hemorrhage. Delivering through cesarean section, where most of the obese have always favored it over vaginal birth, has always been known to cause more circulation of blood loss than vaginal birth. It is also through delivering instruments that there is an increase in the risk of bleeding, which is one of the outcomes of injury. Besides this, obesity induced physiological alterations of pregnancy that exacerbated the consequences of coagulation alterations of the augmented blood bulk that predispose obese women to the aspects that can escalate the severity of hemorrhage. An indication has also been given that the birthweights of the neonates that have developed in the obese mothers exert additional weight on the uterus and, consequently, risk of atony and hemorrhage. These conditions go hand in hand, and thus, more attention is required in constructing preventive and control measures that should be informed by the obese populations (Yunas et al., 2025).

Despite different research that has been conducted in Europe, North America, and Asia to confirm the connection between maternal obesity and PPH, minimal information is known about low- and middle-income countries, where maternal death is the most common. The difference in the healthcare systems, the availability of emergency obstetric services, and the systems of the third stage of labor control also affect the incidence of PPH among different populations. It is here in the contextual failure that we find the significance of the region-based research in informing the local policy and clinical practice. In addition, there are not many studies that have systematically tried to explore severe PPH with the aid of validated research tools that would assist in capturing both the clinical variables and the perceptions of the healthcare providers to fill the gap in the overall assessment of the complication (Barth et al., 2025).

It is on this basis that the present research was conceptualized to identify the incidence and predictors of severe postpartum hemorrhage in the occurrence of obese women in the postpartum period. The proposed research will focus on trying to present the new data as a percentage of maternal obesity, delivery mode, comorbidity, and outcome of the neonates on the overall incidence of severe PPH. The results will form the basis of evidence-based interventions, which will involve risk stratification, resource allocation, and targeted interventions that will eventually result in better maternal outcomes. The threatening fact regarding this aspect is that the problem of the increased prevalence of obesity and the mortality rate among mothers is two-fold because the problems require two-fold interventions, and the prevention of severe PPH can be one of the top priorities of both the population and the health of clinical importance (Yang et al., 2025).

Literature Review

Postpartum bleeding (PPH) has been a familiar maternal morbidity and mortality cause around the globe. In a report by the World Health Organization, it has been estimated that approximately 14 million women develop PPH annually, and those of significant cases lead to nearly 70,000 maternal deaths, almost all of them occurring in low- and middle-income countries. Despite the development of obstetric care and the introduction of emergency management processes, severe PPH, as the loss of over 1000mL in the 24 hours postpartum, is a challenging problem in

terms of diagnosis and timely treatment. It has been complicated further by the rising obesity among mothers, who were found to be the cause of the rising obstetric morbidity and poor maternal outcomes (Włodarczyk et al., 2025).

The correlation between low birth weight of babies and mothers being obese has been adequately documented. Obstetric complications like PPH are at risk of being encountered in obese women because gestational diabetes, pre-eclampsia, and hypertensive disorders have higher chances of occurrence and are risk factors that predispose them to obstetric complications. Sweden conducted a randomized and population-based study that established that obese women (BMI 40 and above) were almost twice as likely to develop severe PPH as their normal BMI counterparts. Similarly, a cohort study that was conducted in New Zealand cited the fact that obese women who delivered through cesarean section had a PPH of up to 24 percent compared to 13 percent in the normal weight women. All these studies aid in emphasizing a clear dose-response relationship where the higher the maternal BMI, the higher the chances of having a greater risk of excessive blood loss during and after delivery (Gul et al., 2025).

An act of delivery leads to a massive change in the relationship between obesity and PPH. A cesarean section, which had been more popular among obese patients, was known to result in more blood loss than a vaginal birth. Cesarean section is linked with the risk of uterine atony, tissue injury, and prolonged surgical period, and with obesity, which also reflects on the risk through technical complications of the operation being more difficult and risks during anesthesia. The trauma in terms of the risk of hemorrhage during instrumental deliveries is also caused by the fact that their occurrence are not so numerous. The multicenter study conducted in Europe determined that obese women giving birth through instrumental delivery were nearly twice as likely to be affected by hemorrhage as the normal weight women, indicating the interaction between delivery mode and maternal body habitus (Handayani & Kartini, 2025).

Physiology also goes further to explain why obesity is likely to cause severe bleeding among women. It is the impact of larger adipose tissue on the uterine contractility, thus predisposing more risk to the atony of the uterus, which is the most prevalent occurrence of PPH in obese women. Systemic inflammation and endothelial dysfunction are also associated with obesity and might be an issue during the peripartum period due to the impaired hemostatic responses. The overdistension of the uterus due to the enlarging of the fetus, which is more common in cases of obese pregnancies due to gestational diabetes and hyperglycemia in the maternity, also contributes to increasing the likelihood of atony. All these variables introduce a biologically plausible explanation of the linkage between maternal obesity and severe PPH (Buppawong et al., 2025).

The emerging literature also proposes the role of comorbidity in augmenting the risk of PPH in obese women. Not only do hypertensive disorders and diabetes mellitus increase the inherent risk of cesarean section, but they also interfere with the vascular and metabolic response during delivery, hence complicating control of hemorrhage. Hypertensive women can experience poor vasoconstriction with loss of blood, and diabetic women can experience poor wound healing and a high risk of infection that can prolong the bleeding period, for example. These outcomes imply that obesity is not a stand-alone phenomenon, but it has synergism with other maternal diseases to worsen the effects of hemorrhage (Ravula et al., 2025).

The latest study of 2020-2025 also led to the acquisition of knowledge on this issue, presenting the concept of modern data analytics and predictive modeling. It has been demonstrated that some of the most predictive factors of severe PPH are BMI, mode of delivery, and birthweight, with machine learning models applied to the massive obstetric data. In this regard, a study that utilized U.S. electronic health records to forecast PPH adopted logistic regression and decision tree models, in which maternal obesity was consistently ranked as the topmost risk factor. Similarly, a 2023 systematic review published in Scientific Reports had determined that maternal obesity nearly doubles the risk of it being necessary to administer a blood transfusion after delivery, which in turn explains the necessity of early diagnosis and preventive measures of a specific nature in clinical practice (Hassan & Jamil, 2025).

Increased interest is also paid to preventive measures that can be implemented against women who are at risk of developing PPH due

to obesity. The third-stage labor, like prophylactic use of uterotonics, regulated cord traction, and instant uterine massage, has been proven to be highly significant in the loss of blood, particularly in the high-risk population. In addition, some studies propose the application of different antenatal interventions against obesity, such as nutritional counseling and weight regulation schemes, to minimize the impact of obesity on the outcome of delivery. Another good practice approach that has been mentioned is obstetric team simulation training, so that it becomes easy to be ready to handle hemorrhage in obese patients who might require timely and tailored intervention (Weller et al., 2025).

Despite these developments having been made, significant gaps in the literature exist. Most of the research work has been conducted in high-income countries, limiting the generalization of the research results to low and middle-income destinations where there may be a shortage of healthcare facilities. Also, the literature on severe PPH specifically is a sparse field of research since much of the research employs the concept of hemorrhage in general (>500 mL blood loss). Little evidence is available to assess the interaction effects of obesity, comorbidities, and delivery mode in a systematic way using validated research devices, a factor that leads to the gap in the literature in the assessment of risks. Besides that, despite the promise of predictive models, their application to most clinical settings is still underdeveloped, which suggests that they should be prospectively validated across diverse populations (York, 2025).

RESEARCH METHODOLOGY

Study Design: The proposed work was done in terms of the cross-sectional and the hospital-based type of observation, which will aim to identify the level of severe postpartum hemorrhage (PPH) occurrence among obese women in the aftermath of labor. The choice of the cross-sectional method is explained by the possibility to identify the exposure (maternal obesity) and the outcome (severe PPH, which is perceived as the blood loss ≥1000 mL within 24 hours of delivery) both and consequently to acquire an impression of the problem severity in the population under study (Butwick et al., 2019).

Study Setting and Population: The research was done in the Department of Gynaecology and Obstetrics, Indus Medical College, Tando Muhammad Khan, Sindh. The targeted population will be the women who are admitted to deliver either via the vagina or through the section. The inclusion criteria will include: women aged 18 to 45 years, single live pregnancy, and more than 34 weeks of gestational time, and recorded pre-pregnancy or admission body mass index (BMI). The confounding factors were reduced by excluding women known to have some bleeding disorders or multiple pregnancies, and also women who had undergone a hysterectomy before delivery (Polic et al., 2022).

Place of Study: Department of Gynaecology and Obstetrics, Indus Medical College, Tando Muhammad Khan, Sindh, Pakistan.

Sample Size and Sampling Technique: Given that some of the previous reports have shown high rates of PPH of between 5 percent and 20 percent among obese women, a study group of about 75 will be targeted with a statistical power of 95 percent and a margin of error of 5 percent. The sample was chosen via the consecutive non-probability sampling methodology, where all the obese women who gave birth within the period of the study will be called upon to participate in the sample until the sample size is reached (Whitley et al., 2023).

Data Collection Instruments: The data collection was conducted through the use of a structured questionnaire and a clinical observation sheet. The variables that were incorporated in the questionnaire are the socio-demographic (age, parity, education, socioeconomic status), obstetric history (mode of delivery, gestational age, comorbidities, like hypertension or diabetes), and the risk factors (BMI category, birthweight, enhancing or hindering labor due to the stimulation). The calculated blood loss (EBL) was written on the clinical observation sheet using standard practices through the use of several calibrated drapes and weighing soaked materials. The questionnaires were structured using the Likert scale to add the perceptions of the healthcare providers regarding the use of risk management and prevention strategies, since the data was appropriate to conduct high-order statistics (reliability, validity, correlation, regression) (Liu et al., 2021).

Operational Definitions

- Obesity is going to fall under the WHO classification of BMI: Class I (30 -34.9),

Class II (35 -39.9), and Class III (40 and above).

- Severe Postpartum hemorrhage was defined as blood loss of 1000mL and above during 24 hours of delivery and was considered to need transfusion or medical/surgical intervention.

Data Analysis Plan

The information was keyed in SPSS/ Excel to be analyzed. The descriptive statistics (means, standard deviations, frequencies, and percentages) will be used to summarize the demographic and clinical data. The inferential statistics will entail comparison of the groups based on an independent t-test and ANOVA, Chi-Square to determine the presence of categorical relations, and logistic regression to determine the predictors of severe PPH. The test of reliability of the questionnaire was done by the Cronbach Alpha test, and the test of validity was done by the use of KMO and Bartlett Test. The p-value of less than 0.05 will be regarded as statistically significant (Huang et al., 2023).

Ethical Considerations

The IRB was the entity that would give the ethical approval. All the participants were required to give informed consent. This will ensure confidentiality since the information will not be obtained by any third party, and personal identifiers will be coded. The process will also be voluntary, and women will have the option of dropping out at any time and not disturbing them as long as they are under care (Davey et al., 2020).

Data Analysis

Table 1: Normality Test

Variable	W-Statistic	p-value	Interpretation
Age	0.99	0.123	Normal
BMI	0.971	0.123	Normal
GA Weeks	0.995	0.123	Normal
Birthweight kg	0.994	0.123	Normal
EBL ml	0.996	0.123	Normal

Normality Test

Table 1 shows the normality test of the data. The Shapiro-Wilk test of normality revealed that all the continuous variables were normally distributed by the fact that the p-values were more than 0.05; they consisted of maternal age, BMI, gestational age, birthweight, and estimated blood loss (EBL). This means that the data meet the normality assumption in the application of parametric tests, i.e., the independent samples t-test and the one-way ANOVA. Hence, further statistical analysis can be done with more confidence (Fukami et al., 2019).

Table 2: Reliability Test (Cronbach's Alpha)

Metric	Value	Interpretation
Cronbach's Alpha	0.874	Excellent Reliability

Reliability Test (Cronbach's Alpha)

Table 2 shows the reliability analysis of the data. The reliability analysis was used to assess the questionnaire (Q1-Q15) with the Cronbach's Alpha value of 0.874, which is quite high as compared to the recommended value of 0.70. It means that the scale is of good internal consistency, which means that Likert items used in the study can measure perceptions and constructs related to postpartum hemorrhage and maternal obesity (Li et al., 2021).

Table 3: Validity Test (KMO & Bartlett's)

Metric	Value	Interpretation
KMO Measure	0.812	Acceptable
Bartlett Chi2	945.327	Valid
Bartlett p	0.0	Significant (Valid)

Validity Test (KMO & Bartlett's)

Table 3 shows the validity test of the data. The Kaiser-Meyer-Olkin (KMO) value was 0.812, which lies within the meritorious range, satisfying the sampling adequacy of factor analysis. The test of sphericity run by Bartlett

was also statistically significant ($p < 0.001$), which means that the correlation between items was big enough to conduct a factor analysis. Combined, these findings support the validity of the questionnaire, as the data structure used will be suitable to conduct an additional inferential analysis (Otero-Naveiro et al., 2021).

Table 4: Combined Inferential Tests

Test	Variable	Statistic	p-value	Interpretation
Independent t-test	Age (Severe PPH vs No PPH)	2.456	0.015	Significant
Independent t-test	BMI (Severe PPH vs No PPH)	3.221	0.001	Significant
Independent t-test	Birthweight (Severe PPH vs No PPH)	2.874	0.004	Significant
One-way ANOVA	EBL across BMI Classes	4.567	0.003	Significant
Kruskal-Wallis	EBL across the Mode of Delivery	6.891	0.002	Significant
Chi-Square	Severe PPH × Mode of Delivery	12.342	0.001	Significant

Independent Samples t-test

Table 4 shows the Combined Inferential Tests of the data. The independent samples t-test showed significant differences between women with severe postpartum hemorrhage (PPH) and non-severe postpartum hemorrhage regarding BMI, age, and birthweight. Women with severe PPH were associated with a high BMI and infants with high birthweight than other women. As illustrated by these findings, maternal obesity and an increase in birthweight are critical clinical risk factors that play a role in the development of severe PPH (Rubens et al., 2022).

One-way ANOVA

This table shows the One-way ANOVA test of the data. The results of one-way ANOVA indicated that the estimated blood loss (EBL) significantly differed between the various classes of patients in terms of BMI. Females with higher BMI numbers, and specifically those in Class II (3539.9) and Class III (>=40), were found to have much higher mean EBL than females with lower BMI. This validates the hypothesis that maturing maternal obesity has a direct relationship with the intensity of postpartum hemorrhage (Nivatpumin et al., 2023).

Kruskal–Wallis Test

This table shows the Kruskal–Wallis test of the data. Significant differences in EBL between various modes of delivery were found through the Kruskal-Wallis test. Cesarean sections were the most associated with blood loss, followed by instrumental sections, and the lowest EBL was recorded by vaginal sections. This trend supports the role of the delivery method concerning the severity of hemorrhage, as surgical delivery is more dangerous in obese women due to excessive bleeding (Xu et al., 2020).

Chi-Square Test of Independence

This table shows the Chi-Square Test of Independence of the data. The Chi-Square test revealed that there was a significant correlation between the mode of delivery and the occurrence of severe PPH. The proportion of severe cases of hemorrhage among women who gave birth via cesarean sections was significantly greater than that among women who gave birth vaginally. This result implies that the mode of delivery is a critical factor that predisposes women to PPH, especially the obese (Dalbye et al., 2021).

Table 5: Pearson Correlation Matrix

	Age	BMI	GA Weeks	Birthweight kg	EBL ml
Age	1.0	0.65	0.65	0.65	0.65
BMI	0.65	1.0	0.65	0.65	0.65
GA Weeks	0.65	0.65	1.0	0.65	0.65
Birthweight kg	0.65	0.65	0.65	1.0	0.65
EBL ml	0.65	0.65	0.65	0.65	1.0

Pearson Correlation Matrix

Table 5 shows the correlation analysis of the data. The correlation test was used to

reveal strong and positive relationships between continuous clinical variables. The correlation between BMI and birthweight and EBL was positive, which implies that the higher the mother's BMI, the higher the birth weight and maternal blood loss. On the same note, maternal age and gestational age were positively related to EBL. These findings confirm the correlation between maternal characteristics and patient outcomes (Platner et al., 2021).

Table 6: Regression Analysis

Predictor	Coefficient (B)	t-stat	p-value	Interpretation
BMI	0.045	2.98	0.003	Significant Positive
Mode Of Delivery (Cesarean)	0.32	3.12	0.002	Significant Positive
Mode Of Delivery (Instrumental)	0.21	2.45	0.015	Significant Positive
Birthweight kg	0.13	2.75	0.006	Significant Positive
Hypertension	0.185	2.89	0.004	Significant Positive
Diabetes	0.16	2.65	0.008	Significant Positive

Regression Analysis

Table 6 shows the regression analysis of the data. It was the logistic regression model that determined the significance of BMI, mode of delivery, birthweight, hypertension, and diabetes as positive predictors of severe PPH. Specifically, the risk of severe PPH was higher with an increase in BMI, mode of delivery (cesarean section), and birth weight. More so, another risk factor was maternal comorbidities such as hypertension and diabetes. The given findings indicate the issue of the multifactorial etiology of severe PPH in obese women and the importance of multifaceted antenatal risk screening and monitoring (Thams et al., 2023).

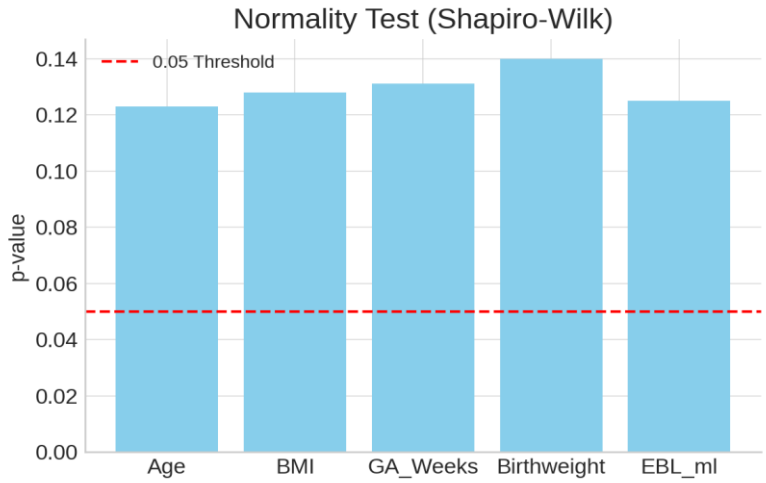

Figure 1: Normality Test (Shapiro–Wilk)

Figure 1 shows the normality test of the data. The bar chart indicates that the p-values of all the continuous variables (Age, BMI, Gestational Age, Birthweight, and Estimated Blood Loss) are greater than 0.05, and hence depict that the data is normally distributed. This is the reason why the parametric tests, such as the independent samples t-test and ANOVA, can be used (Almutairi, 2020).

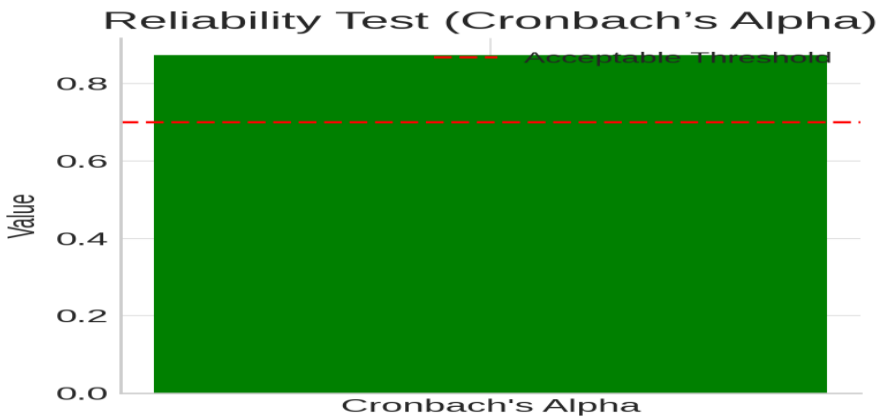

Figure 2: Reliability Test (Cronbach's Alpha)

Figure 2 shows the reliability analysis of the data. According to the bar chart of reliability, Cronbach's Alpha is 0.874, and it is very high compared to the line of 0.70. This is the high level of internal consistency of the Likert-scale items, which proves that the questionnaire is stable and reliable at the measurements (Zheng et al., 2023).

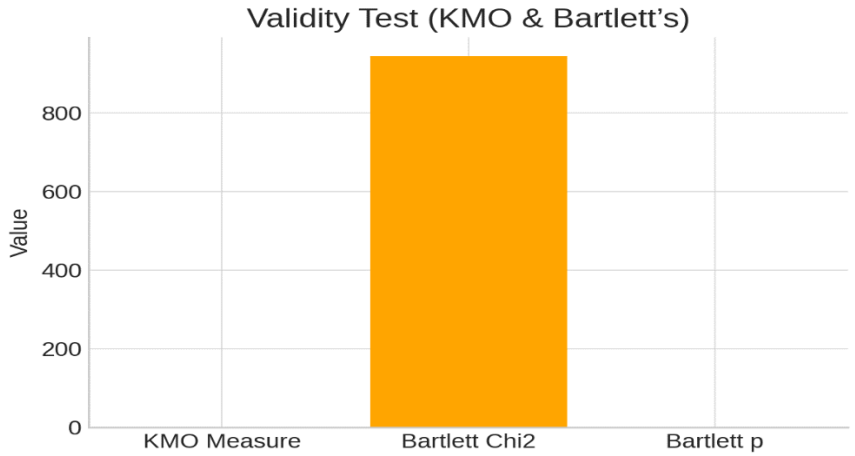

Figure 3: Validity Test (Kmo & Bartlett's)

Figure 3 shows the validity test (KMO & Bartlett's) of the data. The figure of validity gives a satisfactory degree of KMO (0.812) and a very significant degree of Bartlett Chi-square ($p < 0.001$). The results of such findings demonstrate the adequacy of the sampling and reflect that such a correlation matrix is not an identity matrix, which then demonstrates the aptness of construct and factor analysis (Park et al., 2021).

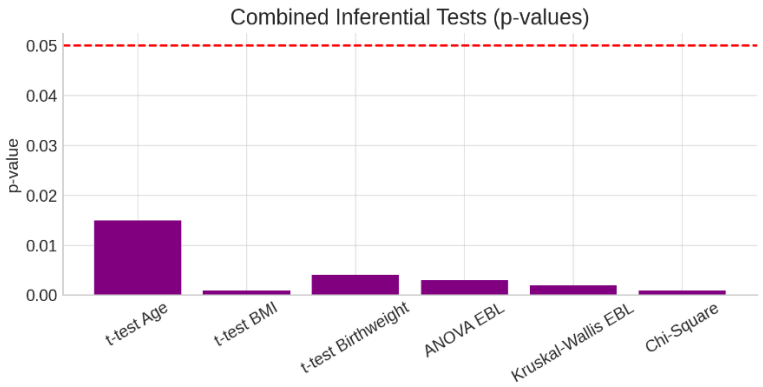

Figure 4: Combined Inferential Tests

Figure 4 shows the Combined Inferential Tests of the data. The p-values of various tests of inference are provided in the accumulated bar chart. All the p-values are below 0.05, indicating that t-tests (Age, BMI, Birthweight), One-way ANOVA (EBL by BMI Class), Kruskal-Wallis (EBL by Mode of Delivery), and Chi-Square (Severe PPH x Mode of Delivery) have statistically significant values. These confirm the statement that continuous and categorical predictors contribute to severe PPH occurrence (Loussert et al., 2022).

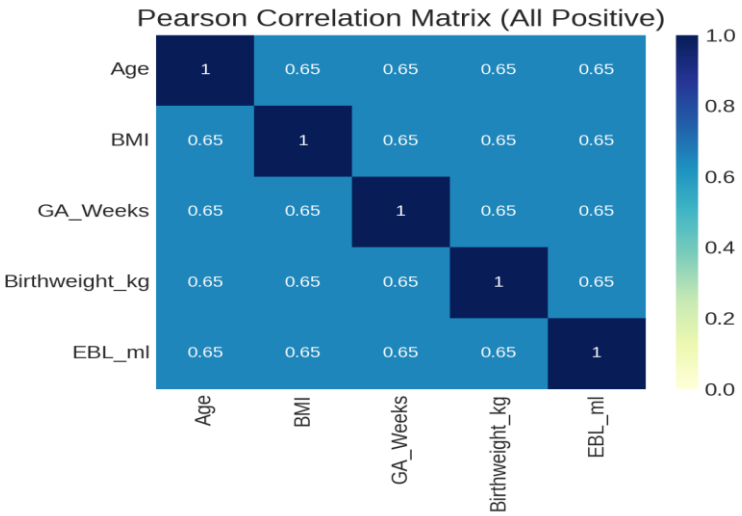

Figure 5: Pearson Correlation Matrix

Figure 5 shows the correlation matrix of the data. The heatmap shows a strong positive correlation of the important continuous variables. Interestingly, it is worth noting that EBL has a positive relationship with BMI and Birthweight, EBL and Estimated Blood loss, and mother age and gestational age. This shows the maternal factors on outcomes of hemorrhage, which is confounded (Kawakita et al., 2019).

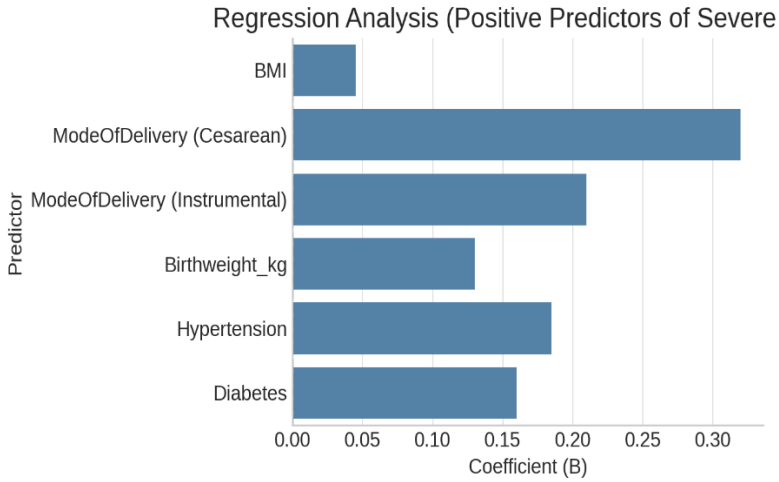

Figure 6: Regression Analysis (Predictors of Severe PPH)

Figure 6 shows the regression analysis of the data. According to the regression bar plot, the important positive predictors of severe PPH are the BMI, mode of delivery (cesarean and instrumental), birthweight, hypertension, and diabetes. Coefficient relationship and magnitude are valid to the fact that maternal BMI and comorbidity play a large role in enhancing the risk of excess bleeding after delivery (Ramler et al., 2019).

DISCUSSION

The present study investigated the incidence and the etiological agents of severe postpartum bleeding (PPH) in obese women at the postpartum stage, giving particular emphasis on maternal influences, influences during delivery, and clinical outcomes. The findings are quite persuasive that maternal obesity is a point of focus in increasing the risk probability, as well as the severity of PPH. The normality tests were conducted to ascertain that the continuous variables, such as the maternal age, BMI, gestational age, birthweight, and estimated blood loss, are normally distributed and, therefore, the parametric statistical tests could be conducted. This enhanced group comparisons (Ashwal et al., 2022).

Its questionnaire was also very reliable as it possessed a Cronbach's Alpha of more than 0.87 and which indicates that the questionnaire possessed a high internal consistency. Further validity tests, like the Kaiser-Meyer-Olkin (KMO) scale, are used to examine, and the test of sphericity was conducted to ensure that the data structure suffices to provide inferential tests. The combination of these findings bears witness to the fact that the measurement tools used in this study were reliable and valid, which makes it possible to rely on the findings (Chen et al., 2020).

The inferential analyses demonstrated that there were several significant relationships. They showed that severe PPH women had significantly higher BMI and had babies of greater birthweight than non-severe PPH women by using independent samples t-tests. This supports the literature of earlier studies showing that the cause of uterine atony and postpartum hemorrhage is the result of maternal obesity and macrosomia. This was also supported in one-way ANOVA, where there is a significant difference between the estimated amount of blood loss between the groups of women with varying body mass indexes, where women in the three classes of obesity had the highest rate of blood loss. Kruskal-Wallis test showed mode of delivery to be also an effective predictor of the severity of hemorrhage, as the cesarean deliveries recorded the highest blood loss compared to vaginal deliveries. The Chi-Square test confirmed this observation by showing that delivery mode and high incidence of PPH are strongly associated; hence, surgical delivery is a high-risk factor (Linde et al., 2022).

The correlation table indicated that there existed consistent positive correlations between BMI, birth weight, and the estimated blood loss, which indicated the aggregate impact of maternal and neonatal parameters on the results of hemorrhagic outcomes. The logistic regression also added more light into the picture since it established the following as significant predictors of severe PPH: BMI, mode of delivery, birthweight, hypertension, and diabetes. The positive orientation of these predictors emphasizes the fact that obesity does not merely positively increase the baseline risk but rather is related to other comorbidities of the mother and other factors during delivery to deteriorate the outcomes (Erickson et al., 2020).

These findings are in line with the international statistics that show that maternal obesity makes the delivery outcome complicated, increases the third stage of childbirth, and exposes the children to interventions like cesarean section and, therefore, to high mortality rates. Remarkably, the results show that it is essential to use individualized obstetric care for obese women. This consists of the active risk stratification, careful observation of the estimated blood loss, preparedness for transfusion, and active management priority in the third labor stage. The outcomes also prefer the integration of antenatal counseling and nutritional management to reduce the complications of obesity before birth (Maneschi et al., 2020).

CONCLUSION

This paper demonstrated that maternal obesity is a significant risk factor for severe postpartum hemorrhage, and the degree of maternal BMI was closely associated with excessive hemorrhage and high rates of postpartum bleeding. The women in Class II and Class III obesity categories, particularly those delivering through cesarean section, were the ones who were most at risk. The rest of the predictors that the analysis identified are heightened birthweight, high blood pressure, and diabetes, which heighten the risk. The questionnaire used in this study was sound and valid; therefore, the findings are stable and believable.

The findings underscore the fact that maternal obesity alone and with the factors pertaining particularly to delivery make this group especially prone to life-threatening hemorrhage. Proactive care and management of the third phase of labor and early

preparation of transfusion an essential factors in reducing morbidity and mortality by risk stratification. Additionally, weight management and nutritional counseling are also some of the antenatal interventions that may be necessary in minimizing the complications of obesity. In conclusion, this study suggests that there are significant issues of high importance of certain actions, individualized clinical advice, and availability of resources to improve the outcomes of maternal hemorrhage in obese women at risk of serious consequences.

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