**Journal of Neonatal Surgery**
***ISSN(Online): 2226-0439***
***Vol. 14, Issue 8 (2025)***
*https://www.jneonatalsurg.com*

OPEN ACCESS

# Risk Factors Among Maternal Near Miss Cases Presenting In Tertiary Care Hospital

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Cite this paper as: Kiran Saeed, Nimra Abid, Syeda Tahira Sherazi, Sadaf Fayyaz, Sariya Tul Tahira, (2025) Risk Factors Among Maternal Near Miss Cases Presenting In Tertiary Care Hospital. *Journal of Neonatal Surgery*, 14 (8), 602-607.

## ABSTRACT

**Background**: A growing number of studies are using maternal near miss (MNM) cases to assess the standard of obstetric care. They are useful for determining risk factors that precede maternal deaths because they show cases where women survive life-threatening situations as a result of prompt intervention or resilience. Analysis of MNM events reveals trends and predictors that are essential for forming future clinical guidelines and health policies in tertiary care hospitals, where high-risk cases are routinely managed.

**Objective**: The objective of this study was to see the association of maternal risk factors with maternal near miss among females presenting in a tertiary care hospital.

**Methodology**: This case control study was done after taking approval from hospital ethical committee, 220 females fulfilling the inclusion and exclusion criteria were selected in the study through Emergency of Department of Obstetrics & Gynecology, Sir Ganga Ram Hospital Lahore. Informed consent was obtained. All females were divided in two groups on the basis of presence or absence of Maternal near miss (MNM). Then females were accessed for their gravidity, obesity, chronic medical conditions (hypertension, anemia and heart problem) and prior cesarean. This was confirmed through antenatal record and if present, then females were labeled as positive risk factor (as per operational definition).

**Results**: In our study (**n=220**), 80%(n=88) in cases while 74.55%(n=82) in control were between 18-30 years of age while 20%(n=22) in cases and 25.45%(n=28) in control were between 31-40 years age, Mean ± SD was *calculated* as 26.21±4.41 in cases and 27.25±3.75 years in control, mean gestational age was calculated as 38.3+0.99 and 38.28+1.00 weeks respectively, association of maternal risk factors with maternal near miss among females presenting in a tertiary care hospital was ruled out, gravida >5 was recorded as 27.27%(n=30) in cases and 13.64%(n=15) in control group, OR was calculated as 2.37, 55.45%(n=61) in cases and 19.09%(n=21) in control group were obese, O.R was calculated as 5.27, prior cesarean section was recorded in 43.64%(n=48) in cases and 12.73%(n=14) in control group, O.R was calculated 5.31 while chronic medical condition was calculated as 41.82%(n=46) in cases and 21.82%(n=24) in control group, O.R was calculated as 2.57.

**Conclusion**: We concluded that Gravida>5, obesity, prior cesarean section and chronic medical conditions are significantly associated with maternal near miss among females when compared to the control cases.

***Keywords:*** *Maternal near miss, risk factors, Gravida>5, obesity, prior cesarean section and chronic medical conditions*

## 1. INTRODUCTION

When a woman experiences a major problem during her pregnancy, delivery, or postpartum period; within 42 days after the termination of her pregnancy; she is said to be a near-miss case [1]. The near-miss technique is thorough and runs on the criterion-based clinical audit idea that is considered a useful and practical instrument for assessing the quality of mother health care [2]. In underprivileged countries about 99% of mother deaths occur and severe mortality as well as morbidity can be developed during pregnancy, delivery, and the postpartum period [3].

One of the sustainable development objectives is to lower the global mother mortality ratio to below 70 per 100,000 live births by 2030, hence improving mother health [4]. Maternal near miss (MNM) is a sign of the many different influences that

can affect a woman's pregnancy; from the quality of care she receives and the social conditions around her, to her own health and any medical problems she faces [5]. Linked to micro-clinical factors, the primary determinants of MNM include hypertensive disorders of pregnancy (HDP), uterine rupture, malaria, postpartum hemorrhage (PPH), and abortion-related problems [6].

Review of worldwide literature revealed several elements causing MNM events, which could have negative effects including inadequate prenatal care, mother age, rural residence, history of c-section, history of stillbirth, household income, referral status, deferred diagnosis and delayed hospital arrival, as well as inadequate resources [7].

Two cross-sectional studies conducted in Pakistan; one in Rawalpindi and one in Hyderabad/Jamshoro; found that the main causes of MNM events were PPH and HDP. Masood et al. study found an MNM incidence of 9.43 per 1,000 live births; PPH accounted for 29.7% and HDP for 27.3% of cases. With a higher prevalence of MNM at 26 per 1,000 live births, Murtaza et al. study linked 44.2% of cases to PPH and 35.1% to HDP. Both studies underline how urgently targeted interventions are needed to solve these issues and improve mother health outcomes [8, 9].

Another local study at Services Hospital in Lahore found a MNM incidence of 28.4 for every one thousands live births and the main causes were PPH (49.18%) and HDP (33.44%). According to this study, 62.5% of MNM cases were unscheduled; 1st and 2nd delays in seeking treatment are very common in these cases [10]. Although PPH and HDP have been found by research in Pakistani tertiary care hospitals as main causes of MNM events, there is a clear lack of knowledge on the impact of obesity, chronic medical conditions, parity, and past cesarean sections on MNM events. The present studies show differences on these problems, which have not been thoroughly examined in the Pakistani setting previously. Analyzing these features might provide important information for developing focused programs to lower MNM rates in Pakistan.

## 2. MATERIALS AND METHODS

**STUDY DESIGN:** Case Control study.

**SETTING:** Department of Obstetrics and Gynecology, Sir Ganga Ram Hospital, Lahore.

**DURATION OF STUDY:** The study was done in six months [21st Oct 2015 till 21st April, 2016].

**SAMPLE SIZE:** Sample size of 220 cases; 110 cases in each group were calculated with 80% power of test, 5% level of significance and taking expected percentage of gravidity ≥5 i.e. 24.7% in MNM females and 11.3% in controls among pregnant females presenting for delivery in a tertiary care hospital.

**SAMPLE TECHNIQUE:** Non-Probability, Consecutive Sampling.

**SAMPLE SELECTION:**

***Inclusion criteria:***

Females of age 18-40 years with any parity undergoing delivery at term (through LMP and antenatal record).

***Exclusion criteria:***

Females not giving informed consent.

## 3. DATA COLLECTION PROCEDURE

Two hundred and twenty females were recruited according to the criteria from the Emergency Department of Obstetrics & Gynecology at Sir Ganga Ram Hospital in Lahore, after obtaining approval from the ethical committee. Patients are asked to give informed consent. Demographic data (name, age, parity, gestational age,) were also noted. Then, using the operational criteria, all women were divided into 2 groups depending on whether or not MNM occurred. After that, women were assessed for past cesarean sections, obesity, gravidity, and chronic medical conditions including anemia, cardiovascular disorders, and hypertension. Prenatal data confirmed this, and if relevant, females were categorized as having a positive risk factor based on operational criteria. SPSS version 21 was used to entered and analyzed this data. Mean and standard deviation were used for Quantitative variables such as age and gestational age. Frequency and percentage were utilized for Qualitative variables such as parity. The association between risk factors (gravidity ≥5, obesity, chronic medical conditions and previous c-section) were measured by calculating Odds ratio among cases and control. OR>1 was considered as significant risk factor if doesn't contain in 95% of C.I.

## 4. RESULTS

Two hundred and twenty females were recruited presenting in a tertiary care hospital. according to the criteria from to evaluate the correlation between maternal risk factors with MNM among females. All patients were distributed according to their age, presenting that 80%(n=88) in cases while 74.55%(n=82) in control were between 18-30 years of age while 20%(n=22) in cases and 25.45%(n=28) in control were between 31-40 years age, mean± SD was measured as 26.21±4.41 in cases and 27.25±3.75 years in control. In both groups, gestational age was also evaluated, 85.45%(n=94) in cases and

88.18%(n=97) in control group were between 37-39 weeks of gestation while 14.55%(n=16) in cases and 11.82%(n=13) in control group had >40 weeks of pregnancy, mean ± SD was measured as 38.3±0.99 and 38.28±1.00 weeks respectively.

Association of maternal risk factors with MNM among females presenting in a tertiary care hospital was ruled out, gravida >5 was recorded as 27.27%(n=30) in cases and 13.64%(n=15) in control group, OR was calculated as 2.37, 55.45%(n=61) in cases and 19.09%(n=21) in control group were obese, O.R was calculated as 5.27, prior cesarean section was recorded in 43.64%(n=48) in cases and 12.73%(n=14) in control group, O.R was calculated 5.31 while chronic medical condition was calculated as 41.82%(n=46) in cases and 21.82%(n=24) in control group, O.R was calculated as 2.57. (**Table No. 2**)

**Table No. 1: Comparison of Age (years) and gestational age (weeks) and both groups (n=220)**

| | | **Cases (n=110)** | **Control (n=110)** | **p-value** |
|---|---|---|---|---|
| **Age (in years)** | 18-30 | 88 (80%) | 82(74.55%) | 0.334 |
| | 31-40 | 22(20%) | 28(25.45%) | |
| | **Mean ± SD** | **26.21 ± 4.41** | **27.25 ± 3.75** | 0.061 |
| **Gestational Age (in weeks)** | 37-39 | 94(85.45%) | 97(88.18%) | 0.550 |
| | ≥40 | 16(14.55%) | 13(11.82%) | |
| | **Mean ± SD** | **38.3 ± 0.99** | **38.28 ± 1.00** | 0.88 |

**Table No. 2: Association of maternal risk factors with maternal near miss among females presenting in a tertiary care hospital (n=220)**

| **Risk factors** | **Cases** | **Control** | **O.R** | **p-value** |
|---|---|---|---|---|
| | **n=110** | **n=110** | | |
| Gravida>5 | 30(27.27%) | 15(13.64%) | 2.37 (1.19-4.72) | 0.012 |
| Obesity | 61(55.45%) | 21(19.09%) | 5.27 (2.87 – 9.67) | <0.001 |
| Prior cesarean section | 48(43.64%) | 14(12.73%) | 5.31 (2.70 – 10.43) | <0.001 |
| Chronic medical condition | 46(41.82%) | 24(21.82%) | 2.57(1.42 – 4.64) | 0.001 |

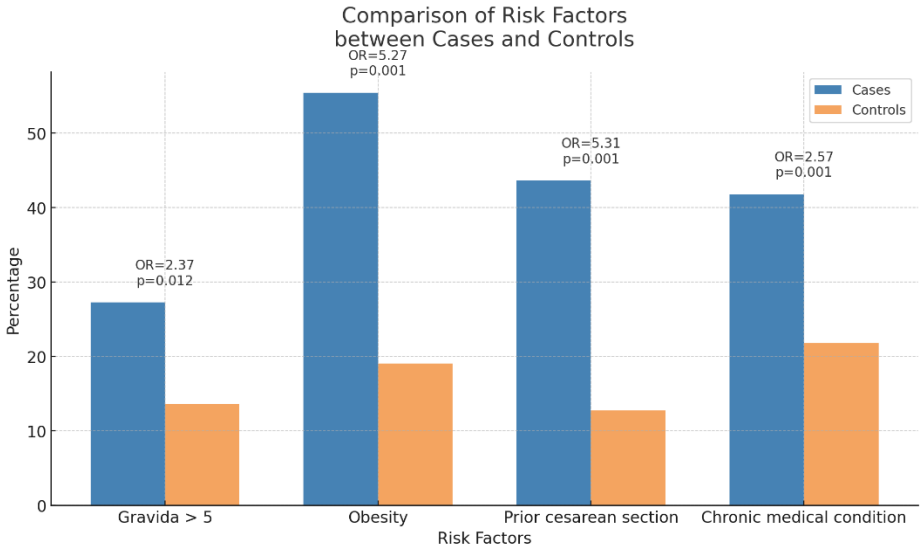


**Fig-1: Risk of Maternal near miss in presence of other factors (n=220)**

## 5. DISCUSSION

This case-control study performed at Sir Ganga Ram Hospital in Lahore investigated the association between specific maternal risk factors and the occurrence of maternal near-miss (MNM) events. The research included 220 term pregnant women between the ages of 18 and 40, divided them equally into cases (women experiencing MNM) and controls (women having non-complicated pregnancy). The gravidity over five, past cesarean births, obesity, and chronic medical conditions were observed to be primary risk factors. Our study found that 27.27% of MNM cases had a gravidity greater than five, compared to 13.64% in the control group, yielding an odds ratio (OR) of 2.37. Increasing gravidity and MNM showed a significant relationship. Ethiopia's research revealed that mothers with >5 children had an elevated risk of MNM events (AOR = 3.84), thereby stressing the need of targeted interventions among multipurous women [11]. Similarly another study was performed in Iraq found that high parity was considerably related to MNM events (p = 0.004) [12]. Correspondingly, another study from China indicated that the frequency of pregnancies (gravidity) become a significant risk factor for MNM. The study revealed that females having 2 or >2 pregnancies had an adjusted odds ratio (aOR) > 1 for suffering from MNM, stressing the high risk association of higher gravidity [13].

In this study, obesity turned up as a major predictor of MNM. With an odds ratio of 5.27, it was shown in 55.45% of MNM cases compared to 19.09% of controls that obese women had more chance of experiencing MNM. This result line with studies showing that body mass index (BMI) of median 28 ultimately suggests obesity as a significant factor [14]. Prepregnancy BMI and severe mother morbidity (SMM) or mortality among Medicaid participants were explored for a relationship. With adjusted relative risks rising from 1.07 for BMI 25.0-29.9 to 1.71 for BMI ≥40.0, the results showed that women with elevated BMI had increased chances of SMM. Obesity clearly has a dose-response effect on adverse mother outcomes [15]. Furthermore, a large Swedish study involved over 1.9 million pregnancies attributed 8.5% of SMM cases to overweight and obesity, including MNM events. The findings show that obesity significantly increases the incidence of mother and newborn morbidity, presumably by mechanisms related to increased risk of hypertensive disorders, gestational diabetes, and complications during delivery [16].

In our study, a history of cesarean delivery was noted in 43.64% of MNM cases compared to 12.73% of controls, resulting in an OR of 5.31. This aligns with existing literature indicating that past cesarean surgeries significantly increase the risk factor for SMM. According to a Malaysian study, a previous cesarean section was observed to be an independent risk factor (OR = 2.68, 95% CI: 1.41, 5.10) [17]. Recent Ethiopian research found that factors such as a past Caesarean section (AOR=4.07) affected the defined MNM in Ethiopia [18]. While another research conducted in Southern Ethiopia reporting an aOR of 3.53 (95% CI: 1.79–6.98) for prior cesarean section [2]. These results underline the need of realizing that a history of cesarean delivery is a major risk factor for MNM. Problems including uterine rupture, morbidly adherent placenta, and hemorrhage are more prevalent in women who have past cesarean sections and could be blamed for the higher risk [19].

Chronic medical conditions were observed in 41.82% of MNM cases and 21.82% of controls, with an OR of 2.57 in our study. This finding is consistent with previous literature showing that pre-existing conditions like anemia and diabetes tend to increase the risk of MNM. According to a study the reported OR for chronic medical conditions was (OR = 1.51, 95% CI: 1.28, 1.78) which indicates that patients had considerably increased odds of suffering from MNM [17]. Consistent with our studies, which found significant correlations between hypertension, diabetes, and cardiovascular diseases and MNM, the results of a retrospective study confirm these chronic medical conditions on MNM. In this study, cardiovascular disease (18%) and diabetes (14%), were chief contributors to MNM, resonating with our results where 41.82% of cases had pre-existing conditions with an OR of 1.91, emphasizing a strong association [14].

Similarly, an American-based study finds a strong relationship between diabetes during pregnancy and MNM events. With OR exceeding 3.0, women with diabetes mellitus had far higher rates of in-hospital death and maternal cardiac arrest. Moreover, both DM and GDM were linked to a higher risk of poor fetal outcomes and preterm delivery [20]. Also, according to a recent Ethiopian study, MNM was significantly associated with anemia (AOR=4.86) and the presence of chronic medical conditions (AOR=2.41) [18]. In support of all these study, another retrospective Ethiopian study revealed important determinants connected with MNM, including age over 35, absence of prenatal care, past cesarean section, chronic hypertension, and anemia related to pregnancy. Emphasizing the need of focusing on these high-risk groups for better prevention and treatment, the results show that past cesarean sections and chronic medical conditions increase the chance of MNM [21]. These results emphasize the need of thorough prenatal surveillance, particularly in women with high gravidity, obesity, past cesarean sections, and chronic medical conditions. Early identification and control of these risk factors should be underlined by medical experts in order to lower the likelihood of MNM events. Using targeted therapies like weight control programs for obese pregnant women and customized care plans for those with chronic diseases might show benefits.

While the study provides valuable insights, certain limitations should be acknowledged. The use of non-probability consecutive sampling may limit the generalizability of the findings. Additionally, the study's observational design precludes establishing causal relationships between the identified risk factors and MNM events. Unmeasured confounding factors may have influenced the results. The study's setting in a single tertiary hospital may not reflect experiences in other healthcare contexts.

## 6. CONCLUSION

In conclusion, the study confirms the association of high gravidity, chronic medical problems, obesity, and past cesarean sections with MNM events. These results highlight the need of tailored prenatal care treatments to reduce these risk variables, therefore trying to lower the frequency of severe mother morbidity and improve mother health outcomes.

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