



MATERNAL NEAR MISS EVENTS AND MORTALITY IN A TERTIARY CARE FACILITY, KOTA, RAJASTHAN – AN OBSERVATIONAL ANALYSIS

Obstetrics & Gynaecology

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KEYWORDS

INTRODUCTION

According to the World Health Organization (WHO), maternal death is defined as the death of a woman who is pregnant or has recently given birth, within 42 days of the end of the pregnancy, irrespective of the duration and site of the pregnancy, due to any cause related to or exacerbated by the pregnancy or its management. It is important to note that this definition does not include deaths that result from unintentional or accidental causes.^{1,2} Maternal mortality serves as a crucial metric for assessing the quality of maternal healthcare provided in a nation.³ The World Health Organization (WHO) establishes the criterion for severe maternal morbidity or Maternal Near Miss (MNM) as a situation in which a woman has experienced a potentially life-threatening complication during pregnancy, childbirth, or within six weeks postpartum, yet has survived the ordeal.⁴ MNM instances have comparable paths to maternal mortality that can directly provide information about the system's strengths and shortcomings that must be addressed in order to provide healthcare.^{5,6} According to the recent report by the Registrar General of India, the Maternal Mortality Rate (MMR) in India has shown a decline in the last three years. The MMR reduced from 130 per lakh live births during the period of 2014-2016 to 122 per lakh live births during the period of 2015-2017 and further reduced to 113 per lakh live births during the period of 2016-2018 as per the Sample Registration System (SRS).^{7,8}

Given the variations in MNM case prevalence in India, a review surveying the prevalence/incidence of MNM cases, examining the identification criteria, and reviewing the causes of MNM cases was necessary. Hence this study was conducted to calculate the proportion of maternal "near-miss" event at tertiary care hospital, and to study the maternal-fetal outcomes among the patients who suffered maternal near miss events.

MATERIALS AND METHODS

This hospital based prospective observational study was conducted under the department of obstetrics and gynaecology, tertiary care facility Kota. Study was conducted for the period of one year from January 2020 to December 2020 after approval from the Institutional Ethical Committee of the institution. All women who were visiting this health care facility, were included in our study.

All women individuals experiencing severe complications during pregnancy, labor, or the postpartum period, regardless of gestational age, along with those encountering abortions, ectopic pregnancies, and complications in the second and third trimesters, as well as postpartum complications, and meeting the near miss criteria established by the World Health Organization⁹, were considered eligible for inclusion in the study upon providing written informed consent. Women who developed the aforementioned conditions unrelated to pregnancy or within 42 days following termination of pregnancy, as well as critically ill patients with confirmed positive status for COVID-19, were excluded from participation in the study. All enrolled women underwent comprehensive history-taking, clinical examination, and relevant investigations tailored to the specific cause of their morbid condition. Detailed information and relevant data were documented using a predefined structured proforma.

All women underwent through complete blood count, bleeding time, clotting time, blood grouping, urine examination, renal function test, liver function test, ultrasonography.

Some Important Definitions-

1. Shock- a persistent severe hypotension, defined as a systolic blood pressure <90 mm Hg for sixty minutes with a pulse rate of ≥ 120 per minute. Despite aggressive fluid replacement (<2 L).¹⁰
2. Oliguria- an urine outcome of < 30 ml/hr for 4 hours less than 400ml/24 hr.
3. Pre-eclampsia- the present of hypertension associated with protein urea. Hypertension is defined as a blood pressure ≥ 140 mmHg (systolic) ≥ 90 mmHg (diastolic).¹²
4. Proteinuria- Is defined as a excretion of ≥ 300 mg protein/24 hour or 300 mg protein/litre urine or $\geq 1+$ on a dipstick.¹²
5. Eclampsia- is defined as the presence of hypertension associated proteinuria and fits. Hypertension is defined as a blood pressure ≥ 140 mmHg (systolic) ≥ 90 mmHg (diastolic).¹²
6. Sepsis- defined as a clinical sign of infection and 3 of the following: temperature $>38^{\circ}\text{C}$ or $<36^{\circ}\text{C}$. Respiratory rate >20 /minute or pulse rate >90 /minute. WBC count >12000 /cubic mm.¹³

Statistical Analysis

Done using SPSS Trial version 23 and primer. Discrete data were expressed in form of proportion and continuous data expressed as mean and standard deviations. The difference in proportion was analyzed by using chi square test and the difference in means was analyzed using the student t test. The level of significance was kept at 95% for all statistical analysis.

RESULTS

In our investigation, during our study period total of 17400 women were seen in OPD, 8300 women in IPD, and total of 4500 live births took place in the study settings. A total of 50 women meeting the near miss criteria were incorporated, among whom 37 individuals, constituting 74% of the sample, died. The maternal near miss incidence ratio (MNM/LB) was computed as 11 per 1000 live births, while the severe maternal outcome ratio stood at 19.33, with a mortality index of 0.425. The mean age of women within our study was 27.16 years.

The table I illustrates the distribution of study participants according to various demographic and obstetric characteristics, including residence, educational status, booking status, parity, gestational period, and history of previous lower segment cesarean section (LSCS). Among the participants, predominantly rural residents (64%) and literate participants (70%). Referrals comprised the majority of the booking status (58%), while multiparas represented the majority in terms of parity (76%). Most participants were in the third trimester (70%), with a notable proportion having a history of previous lower segment cesarean section (22%).

Table II represents the etiology of near miss mortality among participants, with pregnancy-specific diseases with hemorrhage being the most prevalent (70%), followed by hypertension disorders (16%) and sepsis (6%). Organ dysfunction types, based on clinical and

laboratory findings, varied, with hematological dysfunction being the most common (56%), followed by neurological dysfunction (12%). Management criteria indicated significant interventions such as transfusion of >5 units of blood (56%) and hysterectomy due to infection or hemorrhage (12%).

Table I- Sociodemographic Distribution Of Cases

Variable	Number	Percentage
Residence		
Rural	32	64
Urban	18	36
Educational status		
Literate	35	70
Illiterate	15	30
Booking status		
Booked	8	16
Un booked	13	26
Referral	29	58
Parity		
Prime	12	24
Multi	38	76
Gestational		
1 st Trimester	3	6
2 nd Trimester	5	10
3 rd Trimester	35	70
Post natal	7	14
History of previous LSCS		
Yes	11	22
No	39	78

Table II- Etiology Of Near Miss Mortality

Category	Subcategory	n-50
Pregnancy specific disease	Hemorrhage	35(70%)
	Hypertension disorder of pregnancy	8(16%)
	Sepsis	3(6%)
	Postpartum collapse	2(4%)
	Indirect cause	2(4%)
Organ dysfunction type (clinical +laboratory findings)	Renal dysfunction	2(4%)
	Hepatic dysfunction	4(8%)
	Respiratory dysfunction	3(6%)
	Hematological dysfunction	28(56%)
	Cardiac dysfunction	2(4%)
	Neurological dysfunction	6(12%)
	Uterine dysfunction	2(4%)
Management based criteria	Use of vasopressor drugs	11(22%)
	Mechanical ventilation for >60 min not related to anesthesia	2(4%)
	Transfusion of >5 units of blood	28(56%)
	Dialysis for acute renal failure	1(2%)
	Hysterectomy following infection or hemorrhage	6(12%)

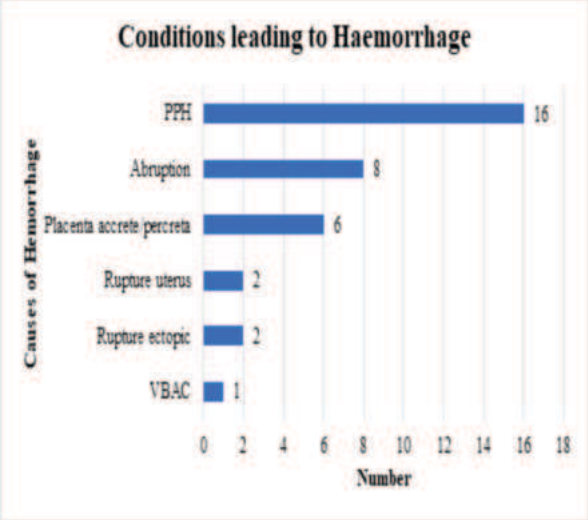


Figure I- Conditions Leading To Haemorrhage

Figure I represent the varying rates of hemorrhage as rupture ectopic (5.71%), rupture uterus (5.71%), placenta accrete/percreta (17.14%), VBAC (2.85%), abruptio (22.85%), and PPH (45.71%).

In our study, two patients were on ventilator, and both were cases of antipartum eclampsia and were unconscious for more than 12 hours. Table III depicts that the termination of pregnancy was carried out through various methods, vaginal delivery (30%), LSCS with hysterectomy (58%), VBAC (2%), laparotomy with uterine repair (4%), laparotomy for ectopic pregnancy (4%), and evacuation for missed abortion (2%).

Table III- Mode Of Termination Of Pregnancy

Mode of termination of pregnancy	Number	Percentage
Vaginal delivery	15	30
LSCS+CS with hysterectomy	29	58
VBAC	1	2
Laparotomy with uterine repair	2	4
Laparotomy for ectopic pregnancy	2	4
Evacuation for missed abortion	1	2

Table IV depicts that out of the 50 near-miss women, 39 (78%) successfully delivered live babies. Among these 39 babies, 24 weighed between 2-3 kg, 6 weighed over 3 kg, 7 weighed between 1-2 kg, and 2 weighed less than 1 kg. Additionally, 8 babies were stillborn, 2 were associated with ruptured ectopic pregnancies, and 1 resulted in abortion.

Table IV- Pregnancy Outcome Among Women

Pregnancy outcome	Number	Percentage
Alive < 1 Kg	2	4
Alive 1-2 Kg	7	14
Alive 2.1-3 Kg	24	48
Alive >3Kg	6	12
Dead	8	16
Rupture ectopic	2	4
Abortion	1	2

DISCUSSION

The MNMM incidence ratio is reported to range from 3.8 to 12 per 1000 live births in developing countries.¹⁴ According to the Ps R et al study conducted in INDIA, the ratio was found to be 17.8 per 1000 live births.¹⁵ In the Salem study 16, the ratio was 5 per 1000 live births, while in the Tallapureddy et al study¹⁷, it was 8.46 per 1000 live births. In the present study, the MNMM incidence ratio was found to be 11.11 per 1000 live births. This study was conducted at a tertiary care center where a substantial number of critically ill mothers are referred from peripheral healthcare facilities. However, the MNMM incidence ratio is high, primarily due to the elevated institutional maternal mortality rate. This indicates that despite the institution's efforts to provide critical care and medical interventions, maternal deaths remain relatively frequent, reflecting challenges in managing severe maternal complications effectively within the healthcare system.

In the present study, the rate of delivery by caesarean section in maternal near-miss (MNM) cases was found to be 58%. This percentage falls within the range reported in other studies. Specifically, the rate of caesarean section delivery in MNM cases was 43.6% in the Dutch survey¹⁸, 40.22% in Tallapureddy's study¹⁷, 63% in the Bolivian study¹⁹, and 35% in the Salem study¹⁶.

Across different regions, studies highlight various causes of maternal near-miss mortality (MNMM). In the Netherlands, major obstetric hemorrhage and preeclampsia are significant factors. Meanwhile, in Bolivia¹⁹, hypertension is the leading cause, followed by hemorrhage and sepsis. In Manipal¹⁵, India, hemorrhage, hypertensive disorders, and sepsis are prevalent. Abbottabad, Pakistan, sees hypertension as a major contributor, alongside sepsis and hemorrhage. Salem¹⁶ also notes hypertensive disorders and major obstetric hemorrhage as common, along with heart issues, fever, and sepsis. The current study underscores major obstetric hemorrhage and hypertensive disorders, alongside postpartum collapse, fever, and sepsis. These variations emphasize the importance of tailored interventions to address maternal healthcare needs effectively.²⁰ This study was done at single centre, so a large multicentric study is needed to make findings more generalisable.

CONCLUSION

Maternal near misses are now recognized as a valuable tool for

understanding maternal deaths because they often share similar underlying factors leading to severe outcomes. Hypertension and hemorrhage stand out as primary causes of near miss incidents. Given that analyzing near misses reflects healthcare quality, it's vital to integrate this data into national indices and establish a robust audit system for both near miss and mortality cases. Identifying risk factors for conditions like preeclampsia early on and promptly starting treatment, while addressing related factors like anemia, are key to effectively managing near-miss cases.

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