Original Research Article

An audit of maternal near-miss and **mortality cases in a tertiary healthcare centre of Central India : A retrospective study**

Abstract

Background: In a country like India decrease in maternal mortality with growing advances has given rise for the need of a indicator of severe maternal morbidity-"maternal near-miss" (MNM) event World Health Organization (WHO) defines MNM "a woman who, being close to death, survives a complication that occurred during pregnancy, delivery or up to 42 days after the end of her pregnancy".
Methodology: A one year cross sectional study was done at MTH Hospital, Indore a tertiary care referral hospital in Indore, Madhya Pradesh from January 2022 to December 2022. MNM were identified according to the WHO guidelines.
Results: During study period, 9963 live births, 143 maternal deaths and 166 "near-miss" cases were recorded. Among these 166 near-miss cases, Calculated MNM ratio was 16.6/1000 live births, the ratio of maternal death to MNM event was 1. 1/1, and overall Mortality index was 53.7%.
Conclusion: hemorrhage and hypertension were the two most common cause of near miss and deaths and Identification of preventable factors and special preventive actions would further enhance the quality of health care**.**

Keywords- maternal near-miss. Maternal mortality. Ratio. Identification.

INTRODUCTION

Globally, maternal mortality has been used for years to look for maternal health, reproductive health services and progress towards national and international goals. Since last decade, the decrease in the maternal mortality rates has led to an elevated interest in observing "near miss" event. This has led to the emergence of the concept of maternal near miss (MNM), for keeping in check the maternal health care as an indicator of measuring maternal health. According to World Health Organization (WHO), MNM defined as "a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy". [1] "It also serves as a proxy in gaining an understanding of a set of factors which contribute to maternal mortality. India's performance in the field of maternal mortality has been consistently improving as the country gets its national target of reducing MMR to below 100. As per the recent reports, Significant Decline in the Maternal Mortality Ratio (MMR) from 130 in 2014-16 to 97 per lakh live births in 2018-20 was seen". [2] "on achieving this, India has

accomplished the National Health Policy (NHP) target for MMR of less than 100/lakh live births and is about to achieve the SDG target of MMR less than 70/ lakh live births by 2030" [2].
Our tertiary healthcare setup which is a profound government medical college of Madhya Pradesh, the state which is identified with the third worst maternal mortality rate in india. It receives ample number of obstetric maternal csses daily from rural and suburban areas. Many of them get admission in the hospital in a disturbimg state. While most of them receive help in the right time, few patients don't. A study was carried out on these critical mothers to know the various factors leading to maternal near miss and mortality cases in our set up.
This study was to determine the demographical factors of the cases, assess the causes of maternal near miss and maternal mortality and interventions were taken for these cases. Various indices like maternal near miss and mortality ratio, mortality index, maternal near miss incidence ratio per 1000 live birth, and maternal mortality rate were calculated.
This research was carried out in Madhya Pradesh tertiary care centre to identify causes a being the third worst state with the highest maternal mortality rate.

METHODS

This study was conducted in the obstetrics and gynecology department of MGMMC and MTH Hospital, Indore, serving for both referred and non referred mothers. The study was conducted from 1st January 2022 to 31st December 2022.

The mothers who met the criteria of MNM as per the Maternal Near Miss Operational Guidelines, were included for audit by the Maternal near miss team with maternal death cases. They were enrolled for the study at the time of discharge.
Data collection was done through review of all the investigations using a standard checklist for this purpose. MNM Review form for MNM cases were filled by the resident doctors. Monthly audits were conducted based on these filled forms.
Maternal cases were categorized by final diagnosis with respect to hemorrhage, renal dysfunction, Anemia, thrombocytopenia, hypertension, sepsis, hepatic dysfunction, and other medical disorders were considered as indirect causes contributing to MNM and deaths. [3]
The above data was analyzed to calculate the near miss indices as mentioned in the WHO guidelines.

STATISTICAL ANALYSIS

Data was collected and entered simultaneously in statistical package for social sciences (SPSS) version 23 and coded appropriately. The data was analyzed keeping in view the aim and objectives of the study. Descriptive statistics were calculated for the sample characteristics in terms of frequency and percentage. Graphs and Charts were made. Analytical and inferential analysis was done. Significant was set at standard 0.05.

RESULTS

During the study, there were 9963 live births in our 1 year study period. In the year 2022 from January 2022 to December 2022, there were total 10330 deliveries in our institute out of which 9963 were live births. The total near miss cases were 166 and total maternal mortality was 143.

Table 1: Near miss incidence

Incidences	**Numbers**
Total no. of deliveries/ year	10330
Total no. of live births (LB)/year	9963
Number of near miss cases (MNM) /year	166
Number of maternal mortality cases (MM) /year	143
Maternal near miss incidence ratio	16.6
Maternal near miss: Maternal mortality ratio (MNM: MD)	1.1:1
Mortality index (MD/MNM+MD)	46.2%

The general demographic profile of the near miss patients as compared to that of the mortality cases is listed in Table 2. Maximum near miss and mortality patients were between the age group of 21-30yrs, primipara in their antenatal period in their third trimester.

Table 2: Demographic profile of the patient

Patient characteristics	**Maternal Near miss**	**Maternal mortality**
AGE		
<20yrs	8.9%	0.09%
21-30yrs	85.9%	77.4%
>31yrs	5.4%	13.3%
PARITY		
Primipara	42.3%	39.5%
Multipara	57.7%	60.5%
ANTENATAL/POSTNATAL STATUS		
Antenatal	78%	64. 1%
Postnatal	22%	35.9%
REFERRAL		
Referred	61.8%	72.2%
Self referred	38.2%	27.8%
PERIOD OF GESTATION		
First trimester	5.8%	7.6%
Second trimester	28.9%	17.7%
Third trimester	65.3%	74.7%

The most common cause of maternal near miss was hemorrhage (55.9%). The most common cause of maternal mortality was hypertensive disorders of pregnancy (19.7%). Most common intervention done was admission in ICU(92.8%).

Table 3: Distribution of maternal near miss and mortality according to their primary cause

Primary determinant	**Maternal near miss (n=166)**	**Maternal mortality (n=143)**
DIC	3 (1.8%)	5 (3.5%)
Hypertension	9 (5.4%)	5 (3.5%)
Antepartum eclampsia	12 (7.2%)	12 (8.4%)
Postpartum eclampsia	07 (4.2%)	11 (7.7%)
Obstetric hysterectomy	08 (4.8%)	00%
Rupture ectopic	16 (9.6%)	00%
Rupture uterus	6 (3.6%)	01 (0.37%)
AKI	7 (4.2%)	00%
Heart disease	8 (4.8%)	01 (0.70%)
Sepsis	20 (12%)	07 (4.9%)
Post abortal	9 (5.4%)	01 (0.70%)
Hepatic dysfunction	10 (6.02%)	04 (2.8%)
Respiratory dysfunction	5 (3.01%)	08 (5.6%)
Antepartum hemorrhage	10 (6.02%)	04 (2.8%)
Postpartum hemorrhage	18 (10.8%)	13 (9.8%)
Placenta previa	08 (4.8%)	05 (3.5%)
Abruption	09 (5.4%)	07 (4.9%)
Uterine inversion	01 (0.6%)	01 (0.70%)

Table 4: critical life saving procedures in maternal near miss group

INTERVENTION	**Maternal near miss (n=166)**
ICU admission	92.8%
Resuscitative procedure	2.1%
Use of cardiotonics/vasopressors	6.6%
Mechanical intubation	29.6%
Massive blood and blood product transfusion	33.1%
Surgical procedures	19.2%
Intravenous higher antibiotics	88.5%
Renal/ peritoneal dialysis	3.6%
Blood coagulation disorder leading to heparinization and anti coagulant use	1.2%
Management of ketoacidosis	0%
Any other intervention which is life saving	2.06%

DISCUSSION

The data that we have collected for our study is a hospital based data. The sample size is adequate and collected over the period of 1 year. We have conducted this study in our hospital which have a dedicated obstetric ICU facility and facility for most relevant Radiological and pathological investigations. “16.6/1000 live births was the maternal near miss incidence ratio (MNMR) in our hospital. Studies done in the developing countries show the same trend and vary between 15–40/1000 live births”. [4] Hemorrhage being the most common cause of near miss cases in our study as followed by hypertensive disorders. Similar results were found in other studies as well. Even in hemorrhage post partum hemorrhage is the most contributory factor. Hemorrhage consist of 26.62% of all near miss cases followed by hypertensive disorders of pregnancy consisting of 16.8% near miss cases. We also studied the outcomes of various interventions as mentioned by the WHO near miss approach. We found that identifying potential nearmiss cases and admitting them in ICU for monitoring was the most common and initial intervention done. Out of the live saving interventions- massive blood transfusions, mechanical intubation followed by aggressive and judicious use of higher antibiotics with inotropic supports on indicated patients did bridge up the gap between near miss and mortality. Also early decision of surgical procedures contributed to many near miss case management.

The leading cause of maternal mortality in our setup was eclampsia(16.1%) followed by post partum hemorrhage(9.8%). The eclamptic mothers that were subjected to mortality were mostly referred in moribund condition to our institute and were therefore could not be salvaged. This calls for a rapid response team and more education about the early diagnosis and timely referrals of high risk patients before they go into irreversible damage. In our institute mortality due to rupture ectopic patients is zero as all the patients are promptly diagnosed on admission and were taken up for surgery without any delay. Maternal mortality index of our set up is 46.2% which is very high. Near miss to mortality ratio was 1.1:1 which means for every 2-3 life threatening condition, there is one maternal death.

Our study has similar results in comparison with some international studies on near miss cases in brazil and few African countries. [4] [5] [7] we also compared our studies with few recent studies on near miss in health centres in india These findings are similar to studies done by Yasmin et al. [8] Kamal et al. [9]and Doreswamy et al. [10] “where hemorrhage was the most common cause for near miss mortality and hypertensive disorders was the second-most common cause. This complication is preventable and can be managed successfully provided proper treatment protocol is followed”. In contrast to our study, “a study conducted in Syria showed hypertensive disorder (52%) to be the most common cause followed by hemorrhage and a study in Ethiopia concluded obstructed labor (45%) to be the predominant cause followed by hemorrhage”. [11] [12]

CONCLUSION

Our study result indicates that there is a need of better quality antenatal care and extra resources are needed for identification and transport of the women to reach hospital when the women

develops complications. Delayed diagnosis and transfer and inadequate utilization of resources might have been the cause for maternal morbidities in our study. As near miss analysis indicates quality of health care, it should be presented in national maternal indices and there is a need for development of an effective audit system for both near miss and mortality cases. The audit system also allows us to identify the problems in early stage to initiate various corrective measures to reduce morbidity and mortality.

LIMITATIONS

The study has certain limitations like it was conducted on a single center, the population was restricted to a certain district and, hence, could not give the picture of a large geographical area.

Ethical Approval:

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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