

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20231204>

Original Research Article

Analysis of maternal near miss cases in a tertiary care hospital

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Received: 23 March 2023

Accepted: 13 April 2023

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ABSTRACT

Background: The study of maternal near miss (severe maternal morbidity) is an alternative to study of maternal death. To reduce maternal mortality ratio (MMR), analysis of maternal near miss cases provide valuable information, which helps in implementing strategies to prevent maternal death. Aims and objectives were to determine maternal near miss indices and to analyse the causes of maternal near miss and other associated factors.

Methods: A retrospective analysis of health records of maternal near miss cases admitted to tertiary care hospital from October 2021 - September 2022 was done. Patient characteristics like age, parity, gestational age, risk factors, mode of delivery, lifesaving intervention were studied.

Results: A total of 9,744 patient admitted for seeking obstetric care and out of which there were 8,791 deliveries. A total of 164 maternal near miss cases and 24 maternal deaths were found during study period. The maternal near miss incidence ratio 18.76/1000 live birth, maternal near miss to mortality ratio 6.8:1 and mortality index was 12.7%. Hypertension and its complications are the most common cause for maternal near miss cases. Women in late trimester, multiparity, low education status, lack of awareness are at increased risk of near miss cases.

Conclusions: Hypertensive disorders in pregnancy and obstetric hemorrhage are leading cause for pregnancy specific obstetric disorder and anemia was found to be a leading cause for pre-existing condition aggravated during pregnancy. This study highlights the need for overall improvement in awareness among pregnant mothers and its timely accessibility with quality critical care management.

Keywords: Maternal death, Maternal near miss, Pregnancy

INTRODUCTION

Pregnant women are at risk of developing complication due to illness related to pregnancy or due to aggravation of pre-existing disease. Maternal mortality is a major health concern worldwide and is also an important indicator of maternal health.¹ Approximately 800 maternal death occur every day worldwide and 50 million or more experience morbidities every year.^{1,2}

Maternal mortality ratio (MMR) in India has declined from 130 per million live birth in 2014-2016 to 122 per million live birth in 2015-2017, with reduction of 6.2% in two years.³ To reduce MMR further and to achieve millennium

development goals (MDG)-5, Maternal near miss estimates can be considered as a valid proxy for maternal death.⁴ Once, severe maternal morbidity precedes maternal death, the systematic identification and study of near miss cases provide further understanding of determinants of maternal mortality.^{5,6}

According to WHO, maternal near miss is defined as “a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy”.⁷⁻⁹ The study of near miss cases has also been used to evaluate the quality of obstetrical care, leading to improved understanding of cases of maternal death, since survival in near miss cases occur mainly because of care available.¹⁰

Early intervention, vigilant monitoring and with early referral to tertiary care centre can reduce maternal morbidity and mortality.

METHODS

We aimed to study prevalence of maternal near miss cases, causes of maternal near miss and associated risk factors. A retrospective study was conducted at Cheluvamba hospital attached to MMCRI, Mysore, Karnataka, India during October 2021 to September 2022. The hospital has a 12 bedded HDU/ICU for obstetric patients. This hospital is a referral centre for cases from various peripheral centres. Approval from hospital ethics committee was sought. Near miss cases as per WHO near miss criteria admitted to HDU/ICU during the study period were part of the study and were managed by both obstetrician and intensivist. Medical and surgical consultation were taken as and when required.

The data collected were patient characteristics- maternal age, gestational age, parity, mode of delivery, live saving intervention, causes of severe morbidity and duration of HDU/ICU stay. Other factor which may influence on study objective such as educational status, lack of awareness, lack of transport and delay in referring were also considered in the study.

All patients were categorized into three broad categories: 1) Pregnancy specific obstetric and medical disorders. 2) Pre-existing disorders aggravated during pregnancy. 3) Accidental/ incidental disorders in pregnancy.

Statistical analysis

Quantitative variables such as age, parity were described as mean and other qualitative parameters were expressed through percentage and chi square test employed for finding out significance of difference between frequency. P value <0.05 is regarded as statistically significant.

RESULTS

During the study period of 12 months, there were a total of 9,744 admission seeking for obstetric care and 8,791 deliveries. There were total of 164 maternal near miss cases and 24 maternal mortalities. Out of admitted Obstetric patient, 1.9% required HDU/ICU care. The following maternal near miss indices were calculated Maternal near miss incidence ratio (IR=MNM/1000 live birth) was 18.76/1000 live birth; maternal near miss to mortality ratio was 6.8:1; mortality index (number of maternal deaths divided by number of women with life threatening condition, expressed in percentage) was 12.7%. Patient characteristics like are mentioned in following tables.

Women aged 25 to 35 years (50%) were significantly increased risk of near miss as compared to other age group.

Table 1: Age distribution of study population.

Age	N	%	P value
18-24	73	44.5	0.001
25-35	79	48.1	
>35	12	7	

Table 2: Parity distribution of maternal near miss cases.

Parity	N	%	P value
Primi	73	44.5	0.25
Multi	91	55.4	

Among which 55.4% were multiparous women.

Table 3: Distribution of gestational age.

Gestational age	N	%	P value
<12 weeks	11	6.7	0.001
12-18 weeks	13	7.9	
>28 weeks	131	79.8	
Puerperium	9	5.4	

Majority were in late trimester 28 weeks onwards.

Table 4: Mode of delivery.

Mode of delivery	N	%	P value
Vaginal	37	22.5	0.001
LSCS	105	64	
Abortion	4	2.4	

64% women had c-section compared to vaginal delivery.

Table 5: Distribution of educational status among near miss cases.

Education	N	%	P value
Primary	14	8.5	0.001
Secondary	88	53.6	
Intermediate	50	30.4	
Degree	12	7.3	

Women with low education status were (53.6%).

Table 6: Distribution of other underlying factors contributing to maternal near miss.

Other underlying factors	N	%	P value
Lack of awareness	80	48.7	0.001
Lack of transport	30	18.2	
Delay in referral	16	9.75	

Women with lack of awareness (48.7%) contributed to majority of maternal near miss followed by lack of transport (18.2%) and delay in referral (9.7%).

Hypertension and its complication (33%) were the most common cause for maternal near miss followed by obstetric haemorrhage (26.3%), anaemia (10.3%), cardiac

diseases (7.3%), sepsis (6.09%). Ectopic pregnancy causing near miss was 7% which is shown Figure 1.

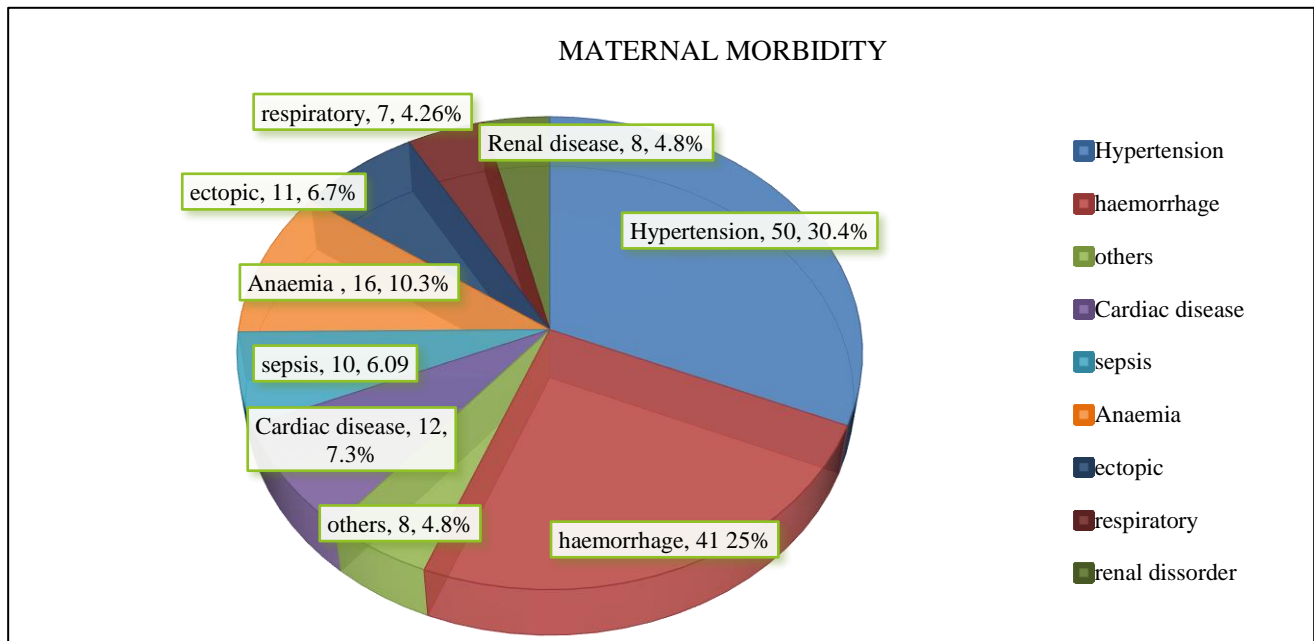


Figure 1: Causes of maternal near miss cases.

Among the patient categorized into three broad categories: category 1: pregnancy specific obstetric and medical disorders out of which hypertension and haemorrhage were leading cause- 70.7%, category 2: pre-existing disorders aggravated during pregnancy out of which anaemia was found to be leading cause followed by cardiac disease- 23.7%, category 3: accidental/incidental disorders in pregnancy were only 5.4%.

Duration of ICU/HDU study minimum 2 days and maximum 8 days and mean duration of stay was 3.3 days. Lifesaving intervention required during management of near miss cases is shown in Table 7.

Table 7: Lifesaving interventions.

Life saving interventions	
Hemodialysis	8 (4.8%)
Blood transfusion	54 (32.9%)
Peripartum hysterectomy	10 (6.09%)
Intubation	15 (9.14%)
Inotropes support	8 (4.8%)
Emergency laparotomy	5 (3.04%)

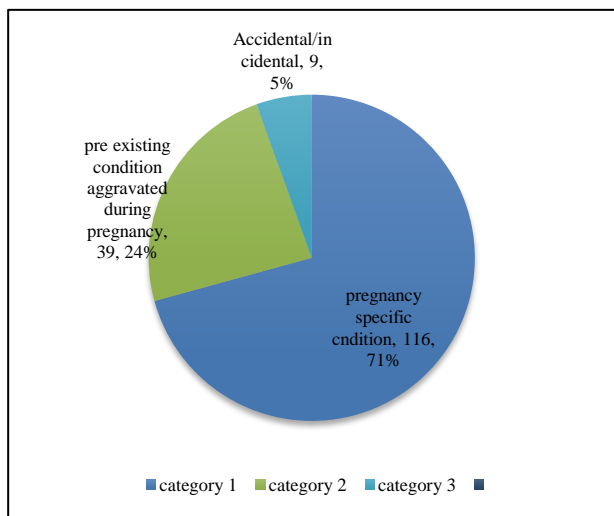


Figure 2: Broad categorisation of near miss.

DISCUSSION

In the present study, we identified women with near miss using the WHO criteria. Although near miss criteria was vaguely defined for some years, lack of uniformity was the hindrance. WHO criteria, 2009 are unique in considering not only clinical but also laboratory and management-based criteria.⁹ Hence it incorporates both Mantel’s criteria and Waterston’s criteria.^{11,12} So if one of the criteria fails to pick the case, the other makes it up, thus minimizing the chance of missing the case.

The maternal near miss incidence ratio (MNMR) which is the ratio of number of maternal near cases and live births

was 18.76/1000 livebirths in our hospital. It is an important estimation of amount of resources and care required in any facility. Studies done in the developing countries by Souza et al showed the same trend which varied between 15-40/1000livebirths.^{13,14}

The near miss to mortality ratio was 6.8:1, which means for every six life-threatening condition there was one maternal death. This ratio is used evaluate the quality of care offered. Higher the ratio indicates better the care. According WHO systematic review this ratio was observed to be poor in low resource developing countries compared to developed countries. Kumar et al study showed 7:1, whereas Roopa et al study showed 5.6:1.^{15,19} If this maternal near miss indices shows positive deflection over period of time, it reflects on the improvement achieved in obstetric care.

Majority of the cases were in the age group 25-35 years (50%) followed by 18-24 years (46%), this could be probably due to a large number of pregnancies and deliveries were in this age group. Aoyama et al study found that extremes of ages have higher risk of developing morbidity.¹⁶ Increased parity in our study group were observed to have more complication which are comparable to Koski-Rahikkala et al study.¹⁷

In our study higher rates of c-section were noted compared to vaginal delivery, which is acceptable among women who develop severe morbidity due to the urgency required to resolve the gestation. The primary determinants of maternal near miss were hypertension disorders of pregnancy and obstetric hemorrhage which were similar to the study by Vandana et al and Souza et al which showed preeclampsia as the major determinant of near miss.^{14,18} In study by Roopa et al found that sepsis was the major cause.¹⁹

The lack of education is the major cause of morbidity. Delayed diagnosis, inappropriate transfer, and inadequate utilization of resources might have been the cause for maternal morbidities in our study. Along with increased awareness of one's own health, health education may go a long way in improving the quality of obstetric care. Poor maternal education significantly results in higher maternal mortality even if women have access to amenities providing intrapartum care.²⁰

Women should be made aware about the disease and its complication by proper health education, and emphasis on prenatal counselling. Awareness to be built to identify need for transfer as early as possible and optimization of available resources.

This study attempts to elaborate the causes of maternal near miss among pregnant women and the associated risk factors. Although this is a single centric retrospective observational study with small study population, it is hoped that this study would provide insight to maternal near miss among pregnant women and the associated risk

factors and stimulate further multi-centric prospective interventional study with larger study population in future.

CONCLUSION

Hypertension and its complication and obstetric haemorrhage are the pregnancy specific leading causes and anemia is the pre-existing condition that aggravated during pregnancy for maternal near miss cases. Early identification of near miss events based on WHO criteria, vigilant monitoring, health education, early referral and timely intervention with multidisciplinary approach can help in reducing maternal morbidity and mortality. As near miss analysis indicates quality of health care it is worth presenting in national indices.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sunanda N, Sudha R, Impana M. Analysis of maternal near miss cases in a tertiary care hospital. *Int J Reprod Contracept Obstet Gynecol* 2023;12:1248-52.