Section: OBG

Original Research Article

MATERNAL NEAR MISS: A RETROSPECTIVE STUDY IN TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Assessment of quality of care is an important metric in evaluation of universal access to reproductive health. Due to the inefficiency of maternal mortality alone in accurate assessment of the same, a new entity, maternal near miss (MNM) was evaluated to assess morbidity involved in obstetric care.

Materials and Methods: The occurrence of such MNM cases was studied at a tertiary care centre and the data related to patient demographics, common causes, pre-existing conditions were collected.

Results: Haemorrhage and hypertension were the leading causes of both MNM and maternal mortality. Haemorrhage accounts for 55.74% of near misses and 38.46% of maternal deaths. Hypertension constituted 37.9% of near miss and 30.7% of maternal mortality. Maternal mortality was higher in the third trimester and postnatal period (38.5%). This signifies the need for improvement of quality of care during the puerperal period and postnatal period. The Near Miss to Mortality Ratio in our study was 13.38: 1. A higher ratio correlates to a better survivability of sick cases in the obstetric ICU. Anaemia (54.02%) was the most common underlying cause of MNM. The incidence of which can be decreased by proper antenatal care.

Conclusion: Haemorrhage (55.74%) was the leading cause of MNM followed by Hypertensive disorders in pregnancy (37.93%). Anaemia (54.02%) was the most common underlying cause of MNM which indirectly led to other complications. Another ratio, the Mortality Index which represented mortality risk of critical patients was studied which was 6.95 in this study.

Keywords: maternal near miss; maternal mortality; severe acute maternal morbidity.

INTRODUCTION

The Millennium Development Goals aimed to pull down the Maternal Mortality Rate (MMR) by three quarters and achieve universal access to reproductive health. Between the years 1990 to 2015,[1] MMR in India has reduced by 26.9%. It decreased from 167 in 2011-2013 to 130 in 2014-2016 and 122 in 2015-2017.[2]

Maternal mortality ratio is widely used as a key indicator of the social, economic and health development and to assess maternal deaths in population.[3] Although maternal mortality remains a significant public health problem, maternal deaths are rare in absolute numbers especially within a community. Therefore, assessment of the effects of care is difficult to ascertain.[4] To overcome this challenge, the notion of Severe Acute Maternal Morbidity (SAMM) and Near Miss Events was introduced in maternal healthcare to complement information obtained by the process of reviewing maternal deaths.[5]

Severe Acute Maternal Morbidity (SAMM) or Maternal Near Miss (MNM) 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".[6] Women

who develop SAMM during pregnancy share many pathological and circumstantial factors related to their condition. Although some of these women die, a proportion of them narrowly escape death. Near miss cases and maternal deaths together are referred to as Severe Maternal Outcomes (SMO).

Recently, SAMM is widely used to evaluate the quality of obstetric care a woman receives in a given particular health facility.[7] The advantage of using MNM cases as a health indicator is that they out number maternal deaths to a large extent and the surviving pregnant women are available for interrogation and interviewing to assess the quality of care received by them.[8]

The near miss approach has been suggested to evaluate and improve the quality of care provided by the health system. By reviewing near miss cases, we can learn about the processes that are in place for the care of pregnant women and the deficiencies. This would result in identifying the pattern of severe maternal morbidity and mortality, strengths and weaknesses in the referral system and the clinical interventions available and the ways in which improvements can be made.[9]

Our aim here was to study the prevalence and clinical profile of Maternal near miss in a tertiary care centre and evaluate the underlying disorders, contributory factors and socio-demographic variables among maternal near miss cases.

MATERIAL AND METHODS

This observational study was undertaken at a tertiary care hospital for a period of one year. The study population were the patients attending casualty or admitted patients at hospital, who fulfilled the Ministry of Health and Family Welfare (MoHFW) maternal near miss identifying criteria10 and whose case records were available.

Data for the study was collected retrospectively from the records between the months of January 2023 and December 2023. Detailed history of patients, name, age, date of admission and presenting complaints were recorded. Obstetric history including history of previous pregnancy and labour, complications during present pregnancy, past and present medical problems were also retrieved. For each case of MNM, the primary obstetric complication leading to near miss was evaluated.

Primary Outcomes

- Near Miss Ratio (Number of Maternal Near Miss cases per 1000 live births): It refers to the number of maternal near-miss cases per 1000 live births (NMR = MNM/LB).
- Maternal Near Miss Mortality ratio (MNMR): It refers to the ratio between maternal near miss cases and Maternal Deaths.
- Mortality index: Maternal Deaths / (Maternal Near Miss + Maternal Deaths) ×100: It refers to the number of maternal deaths divided by the number of women with life threatening conditions expressed as a percentage [MI = MD / (MNM + MD)].

Secondary Outcomes

Underlying disorders, factors contributing to near miss situations and socio-demographic variables among near miss cases were evaluated.

Statistical Analysis

The collected data was entered in Microsoft Excel and was analysed and statistically evaluated using the SPSS-25 version. Quantitative data was expressed by mean and qualitative data was expressed in percentage.

RESULTS

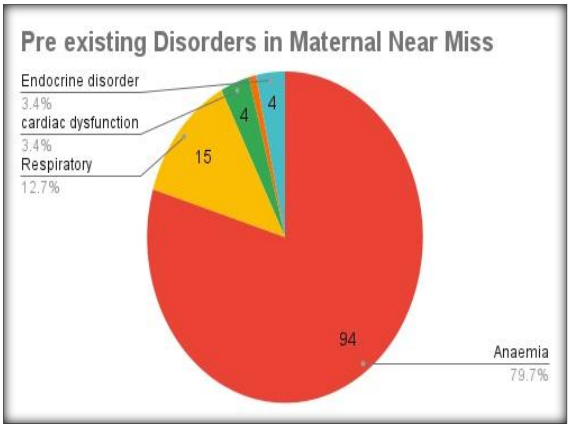

Figure 1: Pre existing disorder in Maternal Near Miss

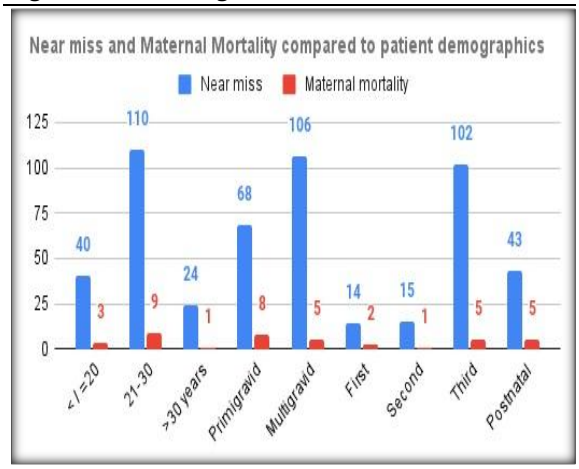

Figure 2: Near miss and Maternal Mortality compared to patient demographics

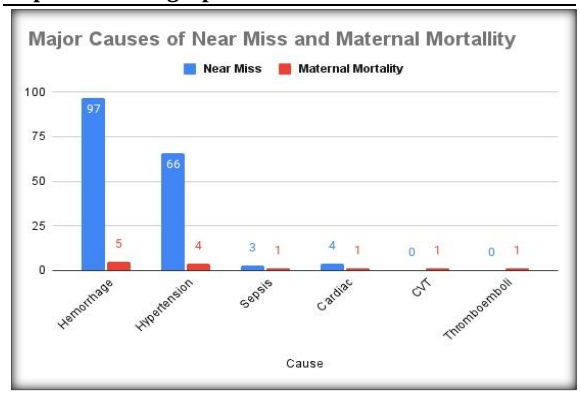

Figure 3: Major Causes of Near Miss and Maternal Mortality

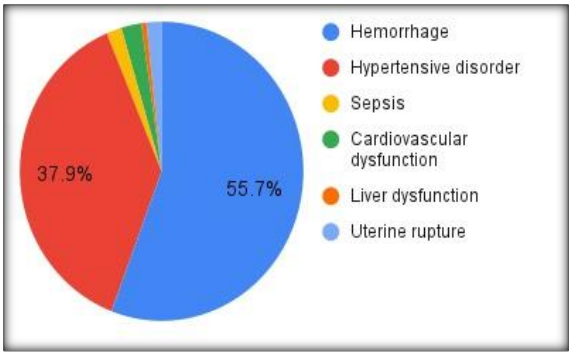

Figure 4

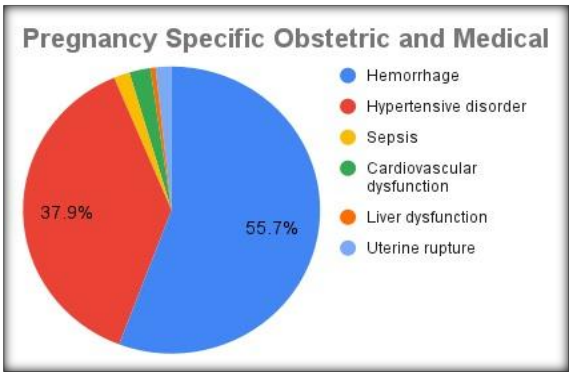

Figure 5: Pregnancy Specific Obstetric and Medical

There were a total of 5870 deliveries in the hospital over the duration of the study period. Total number of live births was 5714. A total of 13 maternal deaths during these years and 174 MNM cases were observed.

MNM to mortality ratio in our study was 13.38 :1. This means that for every single maternal death there were 13.38 MNM events. The mortality index was 6.95% in this study. [Table 1]

As depicted in Figure 1, the majority of patients were in the age group between 21 to 30 years (63.2.%). Multigravida was more in number as compared to primigravida (60.91%). Most of the near miss maternal morbidity occurred in the third trimester (58.62%). Most of them were booked cases.

As shown in the figure 2, Haemorrhage (55.94%) followed by hypertensive disorders of pregnancy (37.93%) were the most common disorders seen in near miss cases. Most common cause of haemorrhage being PPH followed by Abruptio placentae and Incomplete abortion. Ectopic rupture with hemoperitoneum is also a common occurrence. Sepsis and uterine rupture were also the important cause of MNM but have high mortality rate. Peripartum cardiomyopathy complicating pregnancy was seen in 2.29%. Infection, especially LRTI more common, were complicating the pregnancy. Anaphylaxis was seen in 2 cases due to parenteral iron preparation and anaesthesia. 2 cases were due to postoperative complications.

Amongst the underlying disorders as illustrated in Figure 3, Anaemia was the most common entity seen in the majority of the near miss cases (94%). It is associated with Haemorrhage and also sepsis. Pre-existing respiratory disorders like asthma, bronchitis and cardiac disorders got aggravated during pregnancy. Asymptomatic thyroid disorders can complicate the pregnancy. Multisystem involvement is normally seen. Haematological system was the individual most involved system in most cases followed by the Cardiovascular system.

100 out of 174 patients required blood transfusion. 20 patients were categorised as near miss on standalone criteria of needing more than 5 units of transfusion of blood and blood products. 73.9% cases required both medical and surgical methods of intervention which included admission to intensive care unit, blood and blood product transfusion, mechanical ventilation and inotropic support, laparotomy/ caesarean section. Neonatal and perinatal mortality rate in near miss cases was 48.8%.

Haemorrhage and hypertension were the leading causes of both MNM and maternal mortality. Haemorrhage accounts for 55.74% of near misses and 38.46% of maternal deaths. Hypertension constituted 37.9% of near miss and 30.7 % of maternal mortality. Cardiac dysfunction and sepsis stood next in the line. The most common pre-existing disorder amongst both was Anaemia. The same has been depicted in Figure 4.

Table 1: Frequency of near miss and maternal death

Live birth	**5714**
Near miss cases	174
Near miss ratio	30.45 / 1000 live birth
Maternal deaths	13
Maternal near miss mortality ratio	13.38: 1
Mortality index	6.95

Table 2: Characteristics of maternal near miss

Characteristics	**Near miss cases**		**Maternal morality**	
	Number	**Percentage**	**Number**	**Percentage**
Age				
< / =20	40	23.1.%	3	23.1%
21-30 years	110	63.2%	9	69.2%
>30 years	24	13.79%	I	7.7%
Parity				
Primigravida	68	39.08%	8	61.5%

Multigravida	106	60.91 %	5	38. 4 %,
Gestational age				
First trimester	14	8.04%	2	15. 3%
second trimester	15	8.62%	1	7.7 %
Third trimester	102	58.62%	5	38.4%
Postnatal	43	24.73%	5	38.4. %
ANC booked / Unbooked				
Booked	158	90.8%	10	76.9%
Unbooked	5	9.19%	3	23.1 %

Table 3: causes of near miss

Disorder	Number of near miss cases	Percentage of near miss
Pregnancy Specific Obstetric and medical disorder		
Hemorrage	97	55.74%
Hypertensive disorder in pregnancyHaemorrhage	66	37.93%
Sepsis	3	1.72%
Cardiovascular dysfunction	4	2.29%
Liver dysfunction	1	0.57%
Postpartum collapse	0	0
Uterine rupture	3	1.72%
pre-existing disorder		
Anaemia	94	54.02%
Respiratory dysfunction	15	8.62%
cardiac dysfunction	4	2.29%
Renal disorder	1	0
Endocrine disorder	4	2.29%
Neurological dysfunction	0	0
Incidental and accidental causes		
Accidents	0	0
Anaphylaxis	2	1.14%
Infection	6	03.44%
Embolism	0	0

Table 4: Comparison of causes of near miss and maternal mortality

Cause	Near miss	Maternal mortality	Mortality index
Hemmorage	97	5	0.049
Hypertension	66	4	0.057
SepsisHaemorrhage	3	1	0.25
Cardiac dysfunction	4	1	0.2
Neurological dysfunction (CVT)	0	1	1
Thromboembolism	0	1	1

DISCUSSION

In recent years, MNM has been increasingly used as an indicator of obstetric care. These cases significantly outnumber maternal mortality cases. Maternal mortality ratio has decreased globally and hence it may be a less reliable indicator for assessing the quality of obstetric care a woman receives.[12] On the other hand, MNM cases, being in large numbers, provide robust data for assessment of quality of care.

MNM incidence ratio in our study was 30.45/1000 live births which is similar to other studies in India.[8,11] MNM events, as well as maternal deaths, were more common in the age group of 21-30 years. This statistic is confirmed by other studies as well.[14] MNM was also more common in multigravida (60.91 %) whereas maternal deaths were more common in primigravida (61.5%). Near miss has been observed to occur more so in the third trimester in comparative studies (58.62%).[13] In our study, more than half of MNM occurred in third trimester. In case of maternal mortality, they occur more in both the third trimester and postnatal period (38.5%). This signifies the need for educating the masses about puerperal care and improving quality of care during the postnatal period.

Our study had Haemorrhage (55.74%) was the leading cause of MNM followed by Hypertensive disorders in pregnancy (37.93%). Anaemia (54.02%) was the most common underlying cause of MNM. Due to the availability of blood and blood products, properly equipped emergency operative facilities, ICU and availability of life saving drugs including inotropes maternal mortality due to haemorrhage and shock are less (mortality index = 0.049). Even though Hypertension causes severe maternal morbidity, the death rate (mortality index =0.057) due to hypertensive complications was significantly lower.

Overall, the mortality index was 6.95 in our study which was comparable to other studies15. Haemorrhage (38.46%) was the leading cause of maternal mortality followed by hypertensive disorders in pregnancy (30.76%). The near miss to mortality ratio in our study was 13.38:1.

CONCLUSION

Haemorrhage is the leading cause of MNM. Early detection of shock and availability of blood and blood products and facilities for emergency surgeries have decreased mortality in cases of haemorrhage. Even Prompt detection of these disorders can significantly improve maternal outcomes. Anaemia is associated with more than half of the cases of maternal near miss. The incidence of Anaemia can be decreased by proper antenatal care. An effective audit system for maternal care should include both near miss obstetric morbidity and mortality, to devise strategies to overcome the shortcomings and to review the success of the interventions done.

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