Original Research Article

To Study the Incidence and Adverse Events Associated with Maternal Near Miss Cases in Tertiary Care Hospital

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Abstract

Introduction: Maternal health is an integral part of country's health care system and the 5th Millennium development goal. It reflects status of obstetrics health and helps in reviewing achievements of facility /country. Near Miss case is an ill woman who would have died but for the good care received or sheer good luck. Maternal mortality is described as "just the tip of the iceberg", implying that there is a base maternal morbidity which remains largely undescribed. Maternal near miss case /Severe Acute Maternal Morbidity (SAMM) are defined by a WHO working group in 2009 as "a woman who nearly dies but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy".

Aims and Objectives: (a) To Study the Incidence and adverse events associated with Maternal Near Miss cases (b) To Study the Sociodemographic variables among Maternal Near Miss cases (c) To Study the Post-natal Obstetrical complications in the Maternal Near Miss cases (d) To Evaluate the level of care at maternal lifesaving emergency services by analysing Maternal Near Miss cases.

Materials and Methods: This study was conducted in the department of Obstetrics and Gynecology, MKCG Medical College, Berhampur, Odisha, India for a period of 2 years from September 2019 to august 2021. At the end of the study collected data were tabulated and analysed.

Results: During the study period, there were 18, 000 deliveries, 15, 000 live births. Among 250 women suspected of near miss, 200 were confirmed based on WHO management criteria. A total no. of maternal deaths was 100 resulted in a total maternal near miss ratio 13.3 per 1000 live births, incidence was 1.3%. Hypertensive disorders accounted for the most common event (n=100, 50%) followed by haemorrhage (n=66, 28%), sepsis (n=28, 14%) and dystocia (n=12, 6%).The mean age of admission was 25. Majority (77.7%) of women were rural based, 22.2% were urban. Around 180 cases were referred from peripheral hospital and 52 were booked cases. Around 77.5% belonged to BPL category. Only 15% had 3 or more ANC while 85% had less than 3 ANC. Among 200, 58 % were multigravida and 42% were primigravida. Among these, 39.5% at preterm gestation and 60.5% at term, 92% cases delivered in hospital and 8% at home, by LSCS in 34.2% and 66.8% by vaginal delivery. Outcome assessment showed 63.5% of livebirth and 36% were IUDs. After delivery, 39.5% in shock, 19.5% in PPH, 16% in sepsis/MODS, 3.5% in pulmonary oedema, 5% in HELLP / DI C.

Conclusion: The maternal health policy needs to be concerned not only with averting the loss of life, but also with preventing or ameliorating maternal near miss events (hypertensive disorders, sepsis, haemorrhage, and dystocia) at all care levels including primary level. Delayed diagnosis, inappropriate transfer, and inadequate utilization of resources might have been the

cause for maternal morbidities and mortalities in our study which needs to be addressed. Along with increased awareness of one's own health, health education may go a long way in improving the quality of obstetric care.

Introduction

Maternal health is an integral part of country's health care system and the 5th Millennium development goal. It reflects status of obstetrics health and helps in reviewing achievements of facility /country. In health care literature NEAR MISS refers to a severe life-threatening condition that did not cause death-but had the potential to do so. Near Miss case is an ill woman who would have died but for the good care received or sheer good luck. The investigation of near-miss provides superior information about disease burden and indicates quality of care in mothers. It can also broaden understanding of factors that contribute to both maternal morbidity and mortality. Maternal mortality is described as "just the tip of the iceberg", implying that there is a base maternal morbidity which remains largely undescribed [1].

Maternal near miss case /Severe Acute Maternal Morbidity (SAMM) are defined by a WHO working group in 2009 as "a woman who nearly dies but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy" [2]. So maternal near miss is an event where a pregnant woman comes close to death but escapes narrowly from missing (near miss). Maternal Near Miss (MNM) or SAMM has been studied extensively in the recent past as a complement for maternal mortality and also to evaluate the quality of obstetric care in that particular institution [3]. Review of near miss cases has the potential to highlight the deficiency as well as the positive elements in the provision of obstetrics services in any health system [4]. The WHO inclusion criteria for a maternal

near miss are categorized in three areas e.g clinical criteria, laboratory-based criteria and management-based criteria. The goal is that these identification criteria may be used in any setting, regardless of the development status [5]. The criteria were unique in that it incorporates both Mantel's and Waterson's criteria [6,7]. So, if one of them fails to pick the case then the other will make it up, thus, minimizing the chances of missing the cases. Maternal mortality is a sentinel event to assess the quality of a health care system. The very low figure of maternal mortality ratio (MMR) in developed countries and high figure of MMR in developing countries have therefore stimulated interest in investigating cases of life-threatening obstetric morbidity/maternal near miss case [8].

Aims and Objectives

(a) To Study the Incidence and adverse events associated with Maternal Near Miss cases.(b) To Study the Sociodemographic variables among Maternal Near Miss cases (c) To Study the Post-natal Obstetrical complications in the Maternal Near Miss cases (d) To Evaluate the level of care at maternal lifesaving emergency services by analyzing Maternal Near Miss cases.

Materials and Methods

All maternal near miss cases that were admitted to the Department of O&G, M.K.C.G. Medical College & Hospital, Berhampur; Odisha were prospectively included in the study during from November 2019 to October 2021. Maternal near miss cases were defined as women with at least one near miss event as follows: acute obstetric complication that immediately threaten a woman's survival

but do not result in her death, either by chance or because of hospital care she receives during pregnancy, labour or within 6 weeks after termination of pregnancy or delivery. The cases were selected using the WHO near miss criteria basing upon following criteria's. Inclusion criteria: (a) Haemorrhage leading to shock; emergency hysterectomy; coagulation defects and / or blood transfusion of $\geq$ 2 litres. (b) Hypertensive disorders in pregnancy including both eclampsia and severe pre-eclampsia with clinical/ laboratory indications for termination of pregnancy to save the woman's life.(c) Dystocia; uterine rupture and impending rupture, e.g., prolonged obstructed labor with previous caesarean section.(d) Infection with hyperthermia or hypothermia or a clear source of infection and clinical signs of septic shock. Exclusion criteria: Women that develop these above conditions unrelated to pregnancy (i.e., not during pregnancy or 42 days after termination of pregnancy) are not eligible and are excluded.

Results

During the study period, there were 18, 000 deliveries. Among 250 women suspected of near miss, 200 were confirmed based on WHO management criteria. Other 50 were excluded from observation as 35 patients left against medical advice (LAMA) and 15 of them showed clinical improvement, not meeting the criteria of maternal near miss, exclusively total no. of maternal deaths was 100. This was resulted in a total maternal near miss ratio 13.3 per 1000 live births and maternal near miss incidence was 1.3 % (Table-I).

Table 1: Maternal Near miss ratio is 13.3 per 1000 live births.

Total No of Live Births	15000
Total no of Near Miss	200
Total no of Maternal deaths	100
Maternal Near miss ratio	13.3 per 1000 live birth
Maternal Mortality Ratio	667 per 1,00,000 live births
Near Miss to mortality ratio	2:1
Maternal Near Miss incidence	1.3%

Hypertensive disorders accounted for the most common event in 100 cases (50%) followed by hemorrhage in 68 cases (28%), sepsis in 28 cases(14%), dystocia in 12 cases(6%), heart disease in 2 cases (1%) and malaria in 2 cases (1%)(Table-II).

Table 2: Identified Near Miss Events

Near Miss Events		No of Cases	Percentage
Hypertensive Disorders(n=100)	Severe Preeclampsia	82	41%
	Eclampsia	18	9%
Hemorrhage(n=66)	Ectopic Pregnancy	7	3.5%
	Abortions	7	3.5%
	Placenta Previa	6	3%
	Abruption Placenta	3	1.5%
	Hydatidiform Mole	4	2%
	Post-Partum Hemorrhage	29	14.5%
Infection/Sepsis(n=28)		28	14%
Dystocia(n=12)	Impending Rupture	7	3.5%
	Ruptured Uterus	5	2.5%
Heart Disease		2	1%
Malaria		2	1%
Total		200	100%

Among the 200 near miss cases, the mean age of admission was 25, minimum at 18 and maximum at 41. In our study, ages of the women ranged from 18 to 43 years and most were in the age group of 20 to 30 years in 150 cases (75%). The mean age of admission was 26 years. (Table-III)

Table 3: Distribution of Age

Age in years	No of cases	Percentage
<20	18	9%
20-30	150	75%
>30	32	16%

Majority of cases i.e 155 cases (77.7%) were rural based while 45 cases (22.2%) were urban based. Most of cases were Hindu. Regarding the educational status, 142 cases (71%) were literate while 58 cases (29%) were illiterate in the near miss group. Around 180 cases (90%) were referred from peripheral hospital. Among all cases studied, 52cases (26%) were booked cases of this hospital in maternal near miss group. Around 155 cases (77.5%)as majority belonged to BPL (Below Poverty Line) category in current study. The place of delivery was hospital in 184 cases (92%) and at home in 16 cases (8%) (Figure-I).
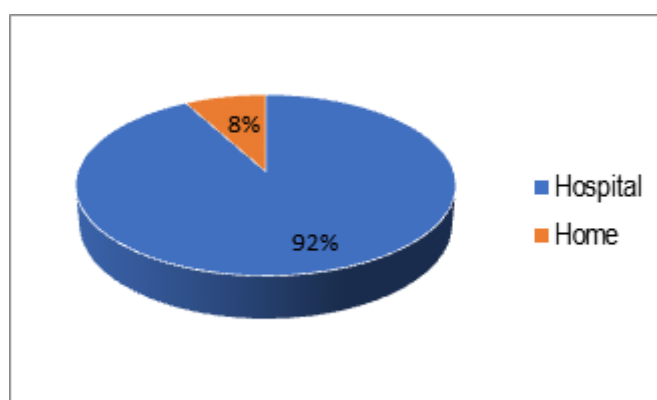

Figure 1: Distribution According to Place of Delivery

Only 30 cases (15%) had 3 or more antenatal check up (ANC) while 170 cases (85%) had less than 3 ANC. The mode of transport was108 ambulances (provided by Govt. of Odisha) in 121 cases (60.5%) while self-transported in 79 cases (39.5%).

Among 200 cases, 116 cases (58%) were multigravida and 84 cases (42%) were primigravida. The gestational age at which they presented varied, around 79 cases (39.5%) were preterm gestation and 121 cases (60.5%) were term (Table-IV).

Table 4: Distribution of Cases according to Gestational Age

Duration of Pregnancy	No of Cases	Percentage
< 28 Weeks	25	12.5%
28-37 Weeks	54	27%
>37 Weeks	121	605%

The most common mode of delivery was vaginal delivery in 121 cases (66.8%) followed by caesarean section in 62 cases (34.2%) in MNM (Figure-II).
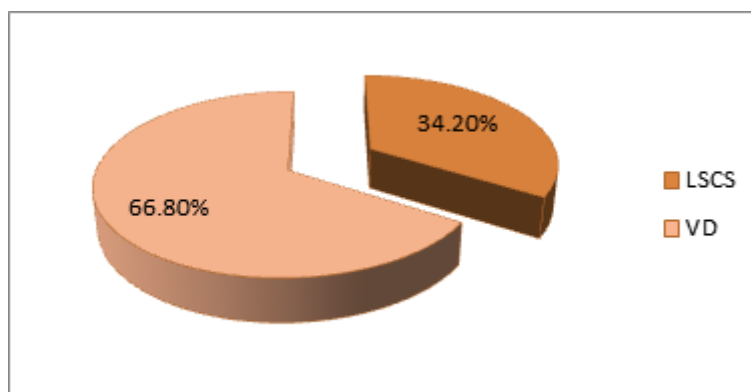
Figure 2: Distribution of Cases according to Mode of Delivery

Outcome assessment showed 115 cases (63.5%) of live birth and 66 cases (36.4%) of intrauterine death (IUD). The postnatal complications were observed as follows;79 cases (39.5%) presented in shock, 39 cases (19.5%) presented in PPH, 32 cases (16%) presented in sepsis/Multi-organ dysfunction syndrome(MODS), 7 cases (3.5%) presented in pulmonary edema, 10 cases (5%) presented in HELLP (Hemolysis Elevated Liver Enzymes Low Platelet Count) syndrome / DIC (Disseminated Intravascular Coagulation). The duration of hospital stay ranged from 5 to 32 days, there were 182 cases (91%) cases having duration of hospital stay >7 days as compared to 18 cases (9%) having duration <7 days.

Discussion

During the study period, our study results were comparable to the studies of other developing countries, but these studies did not consider the WHO criteria. This is the first report of maternal near-miss cases in southern Odisha. Maternal near miss and its incidence reflect the quality of care provided by a health facility. Generally, less than 10% of near miss cases in low resource settings receive intensive care where we the health care providers were faced with a higher percentage of life-threatening obstetric situations [9]. Complications results in near miss with septicemia and hypertensive disorders with a higher mortality index, which constitute an important and significant threat to the survival of pregnant women in the current study. Most of the cases were in the age group of 20-30 years which is comparable to Brazilian study by Souza JP et al where their mean age was 26.4 years [10]. Most of them were literate, from lower socio-economic status and from rural area; those who were illiterate had an increased risk of morbidity and mortality. Majority of them were referred (90%) cases from peripheral hospitals, indicating non availability of specialists at the First Referral Unit (FRU) and lack of infrastructure. In the present study it was seen that those who had incomplete ANCs had an increased risk of MNM suggesting the role of minimum 3 ANCs recommended under RCH programme. The multi-para were at an increased risk of MNM as compared to primigravida, suggesting a decreased gap in between two successive pregnancies, poor contraceptive practice not allowing the women body to achieve pre-pregnancy weight gain and restoring iron and calcium status which is not concurring to that of Roopa et al [11]. The women carrying fetuses of gestational age less than 37 weeks were at increased risk between MNM as compared to term pregnancies. In our study women carrying fetuses of gestational age less than 37 weeks (preterm) had rate of MNM cases compared to term pregnancies which is comparable to study by Aziem Ali et al in Sudan [12]. The post-natal complications were shock, post-partum haemorrhage, acute renal failure, pulmonary edema, disseminated

intravascular coagulation and MODS was associated with an increased risk of morbidity in our study. The most common causes of maternal near miss case were hypertensive disorders, haemorrhage, sepsis, and dystocia respectively. Out of all studied, 184 cases (92%) delivered in the hospital and 16 cases (8%) delivered at home or on their way to the hospital in the near miss group which is comparable to a study by Ellen JT Nellissen et al [13].

The findings showed MNM prevalence rates that varied from 0.04% to 14.98% depending on the different inclusion criteria that were used. The findings from 14 studies from Africa showed that there is a near-miss prevalence rate ranging from 0.5% to 14.98% [14,15,16]. The maternal near miss ratio which our study describes 13.3 per 1000 live birth is within the wide range of ratio reported in studies from other developing countries. The maternal near miss ratio is 13.75 per 1000 live births and near miss to mortality ratio is 1.6:1 in a study conducted in SCB medical college in 2012. Our ratio is similar to those of Africa country where the range is 1:5-12. Hypertensive disorders accounted for the higher number of near miss cases 100 (50%), followed by haemorrhage 56 (28%), sepsis 28 (14%) and dystocia 12(6%) in our study whereas preeclampsia, PPH and sepsis are the major causes by Jayarathnam et al in developed countries [17]. Near miss mortality ratio was 2:1 in current study which means for every life-threatening condition there were two maternal deaths. Higher the ratio indicates better the care. Most of the cases (90%) were referred from rural hospitals, which are managed by medical officers who are not well trained in emergency obstetric care. So training of these providers as well as system management in all its levels might improve and ultimately change these results. [18] There were several limitations to this study; (a) it is a single centre and hospital-based study and therefore findings may not reflect the situation in other settings or the population in general (b) information is gathered from hospital files, therefore data quality depends on the quality of record keeping. Poor documentation has negative impact on the identification of inclusion criteria. Human resource shortage and low educational levels of staff may affect the quality of documentation and therefore may negatively interfere with case identification and data collection

Conclusion

The present study shows that the hospital based maternal near-miss ratio is quite high compared to the country level ratio; maternal morbidity and mortality remain challenging problems in a referral hospital like M.K.C.G. Medical College & Hospital, Berhampur; Odisha which is a tertiary care centre covering other districts in and around Ganjam district, with most of the cases being referred in an already moribund state. Improvement in the quality of obstetric care can be made through up scaling the use of evidence-based interventions. Therefore maternal health policy needs to be concerned not only with averting the loss of life, but also with preventing or ameliorating maternal near miss events (hypertensive disorders, sepsis, hemorrhage, and dystocia) at all care levels including primary level. Delayed diagnosis, inappropriate transfer, and inadequate utilization of resources might have been the cause for maternal morbidities and mortalities in our study which needs to be addressed. Along with increased awareness of one's own health, health education may go a long way in improving the quality of obstetric care.

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