Original Article

# Evaluation of Risk Factors in Maternal Near Miss Cases

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**Abstract**

**Background :** Maternal health and its importance in public health were realized in the Millennium Development Goals. Initial studies of maternal death paved way to assessment of Maternal Near Miss cases.

**Materials and Methods :** An observational descriptive study was conducted in Goa Medical College, the only Tertiary Care Hospital in Goa over a period of 18 months using the Operational Guidelines laid down by Government of India, based on the WHO Maternal Near Miss (MNM) approach.

**Results :** The incidence of MNM cases in our centre was low, 8.05 / 1000 live birth. For every five cases of MNM, one maternal death occurred. Obstetric hemorrhage was the leading cause for MNM, followed by hypertensive disorders.

**Conclusion :** Early identification of MNM cases and timely and evidence based intervention can help avert maternal death and improve health care facilities.

**Clinical Significance :** Analysis of MNM Cases can help identify deficiencies in maternal health care and ultimately improve its quality.

**Key words :** Maternal Near Miss (MNM), WHO Approach, Maternal Morbidity.

A WHO working group put forth a definition of Maternal Near Miss (MNM) in a paper published in April, 2009 as A woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy[1].

Maternal Near Miss (MNM) or Severe Acute Maternal Morbidity (SAMM) cases are more helpful in identifying failures in the system related to obstetric care and in identifying the delays in provision of care[2]. A number of studies from developing countries, over the last decade provide proof of the same.

Based on the success story of the WHO in studying MNM cases[3], focus in the recent times is on standardizing and measuring non-life threatening maternal morbidities[4].

In the year 2014 Government of India introduced MNM Operational Guideline based on WHO guidelines for better outcomes in maternal health. Any case meeting the criteria laid down for Maternal Near Miss when identified is further notified to the Maternal Death Review committee after having filled the Facility Based Maternal Near Miss Review (FBMNM-R) form. The State of Goa is implementing the same since 2018 and this study was undertaken to identify the factors and outcomes of Maternal Near Miss cases in the State of Goa. It is the first study on this topic in Goa, and among the first few studies performed in India as per published literature at the time of commencement of the study.

***Editor's Comment :***

- Maternal Health can be benefitted by simple steps of early recognition of high risk factors and appropriate referral.
- Timely action by adequately trained staff at the grassroot level, can help prevent a Maternal mortality and hence save a life.

## Materials and Methods

This study was conducted with the aim of determining the proportion of Maternal Near Miss Cases and to assess factors associated with such cases.

This Observational descriptive study was conducted in Goa Medical College in the Department of Obstetrics and Gynecology over a period of 18 months from November, 2018 to April, 2020. Census method of sampling on 45 study participants who fulfilled the inclusion criteria was carried out.

After necessary approval from the Institutional Ethics Committee, all women admitted in Goa Medical

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College under Department of Obstetrics and Gynecology either critically ill pregnant, labouring, post-partum and post-abortal who met the criteria as laid down by Government of India were included in the study. Information was obtained from medical records of the mothers as well as from patient and relative and entered in the Facility based Maternal Near Miss Review Form as provided by the Government of India. Data was analysed using SPSS software and results presented according to data distribution and percentages.

### Inclusion Criteria :

"For Diagnosis of Near Miss, the patient met Minimum 3 of the following Criteria :

One from each (a) Clinical findings (either symptoms or signs), (b) Investigations, (c) Interventions done

OR

Any single criteria which signifies Cardio respiratory collapse"[5].

The clinical findings, investigations and interventions were under three broad categories ie, (1) Pregnancy specific obstetric and medical disorders, (2) Pre-existing disorders aggravated during pregnancy, (3) Accidental / Incidental disorders in pregnancy.

### Exclusion Criteria :

Cases that did not meet the pre-requisites and those cases where a life was lost were excluded as study participants.

## Results

This study was carried out in Goa Medical College and Hospital (GMC), the only Tertiary Care Hospital in Goa and also a common referral hospital for bordering Districts of neighboring States of Maharashtra and Karnataka. The time period of the study was 18 months, from November, 2018 to April, 2020. This study included those patients that were booked in the Outpatient Department (OPD) of the Department of Obstetrics and Gynecology as well as those referred from other public and private hospitals and health centres, within Goa and from neighbouring states namely Maharashtra and Karnataka.

In the study period, there were a total of 32,388 obstetrics registrations in the OPD, of which 6,330 were new registrations. In this time frame, there were a total of 7,340 admissions in the obstetrics wards. This period also saw 5588 live births.

In our study, we observed that of the 54 women admitted with life threatening conditions, 45 survived, eligible to be included as Maternal Near Miss cases; while 9 lives were lost (who were excluded). We derived a Maternal Near Miss to Maternal Mortality Ratio of 5:1, indicating that for every 5 women who survived a severe maternal morbidity event, one woman died. Our study showed a Maternal Near Miss incidence ratio of 8.05 per 1000 live births and a severe maternal morbidity outcome ratio of 9.66 per 1000 live births. A mortality index of 16.66% was derived in our study.

Maternal Near Miss (herein after referred as MNM) Cases were seen to affect all age groups as explained below. The most commonly affected were young mothers in the age group of 20-29 years. The youngest of the Maternal Near Miss cases was aged 17, with the oldest aged 46. The most common being age 25.

Education status of a patient may define whether or not they seek early antenatal care. In cases of Maternal Near Miss in Goa Medical College, 40% were educated beyond 5$^{th}$ standard up to 12$^{th}$ standard, while only 9% were illiterate. 33% received primary education while 18% studied beyond 12$^{th}$ standard.

Majority of the pregnant mothers with MNM were local inhabitants from Goa ie, 38 (84%). Only 7 (16%) were those transferred from two neighboring States of Maharashtra and Karnataka.

A pregnant woman is said to be a booked case if excluding the booking visit, she attended at least three antenatal clinic visits and received at least one dose of tetanus immunization. In our study, amongst those cases which became MNM, only 8(18%) had one visit antenatally in our outpatient department, while majority 37(82%) were unbooked or booked elsewhere.

Goa Medical College being the only tertiary care centre in the State of Goa, a large number of patients are referred from both public and private sector. In 27 (60%) patients were referred from public hospitals including the two District Hospitals and other sub district hospitals and community health centres and primary health centres. About 8 (18%) patients were referrals from private hospitals, whereas 10(22%) came on their own for delivery to GMC.

A large number ie, 29(64%) cases in our study were noted to be referred in a condition with severe illness and became MNM cases at admission. Timely medical care provided prior to referral and at GMC result in their life being saved. About 14(31%) were admitted with a disorder and subsequently became a

MNM case, while 2(5%), were admitted with no disorder and inadvertently became MNM cases.

At the time of becoming a MNM case, 31(69%) cases were antenatal, 7(15.5%) were intranatal, and 7(15.5%) were postnatal. 17(38%) were primigravid patients, while 28(62%) were multigravida. Majority near miss cases were in their third trimester ie, 27(60%) at the time of near miss, 9(20%) were in their second trimester while 2(4%) were in the first trimester (Table 1). In 4(9%) had a conception via In vitro fertilization.

More than half 25(55.5%) of the MNM cases were delivered via LSCS, 19(42%) via emergency LSCS and 6(13%) via elective LSCS. Further 9(20%) were delivered via normal vaginal delivery, 2(4%) had a breech vaginal delivery and 6(13%) were cases of multiple (twin) pregnancy that delivered normally, while 3(6.6%) remained undelivered.

In a few cases, wherein patients were admitted early in pregnancy in view of the high risk nature of their pregnancy, or cases wherein patients developed complications in the course of their hospital stay, both resulted in long periods of hospital stay as seen, longest stay being 109 days. However majority of patients stayed for an average period of <15 days, wherein they were admitted as near miss cases, managed subsequently and were fit for discharge within this period. The average hospital stay duration was 23 days.

Hemorrhage in pregnancy was the most common cause for maternal near miss cases, accounting for 43% of cases. Placenta previa was seen to account for 8(18%) of these cases, followed by Atonic postpartum hemorrhage, accounting for 3(7%) of cases. Among the hypertensive disorders of pregnancy, seen in 13(29%), eclampsia accounted for 6(13%) of the near miss cases, followed closely by Hemolysis/ Elevated Liver enzymes/Low Platelet (HELLP) syndrome in 5(11%) of cases. Heart disease and infections were the cause in 6(13%) respectively (Table 2).

Table 1 — *Distribution according to Obstetric Status at time of Maternal Near Miss*

| Obstetric Status | | Number of MNM | Percentage |
|---|---|---|---|
| Antenatal | | 31 | 69% |
| Intranatal | | 7 | 15.55% |
| Postnatal | | 7 | 15.55% |
| Gravidity : | Primigravida | 17 | 38% |
| | Multigravida | 28 | 62% |
| Trimester : | First | 2 | 4% |
| | Second | 9 | 20% |
| | Third | 27 | 60% |
| | Postnatal | 7 | 16% |

## Discussion

Our study has comparable results in terms of the incidence ratio as in neighboring States eg, Maharashtra[6]. A low mortality index of 16% is indicative of good health care provided, in spite of cases being referred with severe illness, seen to be similar to a study done in Manipal, Karnataka[7].

Maximum cases (54%) were seen in the age group of 20-29 years. The mean age in this study was 28.6 years. Similar results were obtained in a study by Purandare, *et al*[8], with 64% in the age group of 20-29 years and in another study by Kumar, *et al* wherein 66.6% were in the age group of 20-29 years[9]. This may be explained by the peak of fertility in this age group[10]. The female literacy rate is 84.66% in Goa[11], explaining our results wherein 40% of MNM cases received a secondary level education, higher in comparison to other states. Similar results were obtained in a study by Patankar, *et al* in Nagpur, Maharashtra[12].

As seen in our study, majority cases (82%) that resulted in MNM cases were among those who were unbooked at any hospital. Similar results were seen in the study by Shreshta, *et al* in Nepal, with 92.5% unbooked at the hospital[13] and also in another study by Bindal, *et al* in Gwalior, with 65.24% cases being unbooked[14].

A majority of the MNM cases are among those that are referred, from the health centers, district hospitals, private hospitals. Our finding is similar to the study done by Purandare, *et al* with 39% referred cases, 11.4% referred from private institutions, 27.6% from public hospitals, while 19% reported with illness directly from home[8].

Table 2 — *Distribution of cases based on Obstetric Cause for Maternal Near Miss*

| Obstetric cause | Number of Cases | Percentage |
|---|---|---|
| **Obstetric hemorrhage :** | | |
| Ectopic pregnancy | 1 | 2% |
| Abruptio placenta | 2 | 4% |
| Placenta previa | 8 | 18% |
| Traumatic PPH | 2 | 5% |
| Atonic PPH | 3 | 7% |
| Mixed PPH | 1 | 2% |
| Rupture uterus | 2 | 4% |
| **Hypertensive disorders in pregnancy :** | | |
| Severe pre-eclampsia | 2 | 5% |
| Eclampsia | 6 | 13% |
| HELLP syndrome | 5 | 11% |
| Infection | 6 | 13% |
| Heart disease | 6 | 13% |
| Incidental | 1 | 2% |

Cases in the third trimester constituted a majority, also multigravida patients. The least complications were during the second trimester, while first trimester cases were complications included abortions and ectopic pregnancy. Similar results were seen in a study by Shreshta, *et al* with 85% of cases in their third trimester at the time of near miss event, while 5% and 10% were in their 1st and 2nd trimester respectively. Also, the risk of maternal near miss cases was higher in multiparous patients (82%)[13].

A higher incidence of MNM cases were noted in those pregnancies terminated via cesarean section, including those done in view of placenta previa or cases complicated by hypertensive disorders of pregnancy, similar to the study by Patankar, *et al* in Nagpur, where maximum deliveries were by cesarean section (46.93%)[12]. A hospital stay of around 15 days was necessary in more than half the cases, similar to the study by Patankar, *et al*, with 74.48% recovering in 9 to 14 days[12].

The leading causes of MNM in most studies were found to be similar. In the pilot programme done in India, by Purandare, *et al*, it was noted that 72% cases were the result of hemorrhage, 26.5% due to hypertensive disorder[8]. In a study by Kalra, *et al* in Rajasthan, hemorrhage was noted to be the most common cause, with 56% of cases as a result of the same and hypertension accounting for 17.8% cases[15].

## Conclusion

Introduction of measures at the grass root level can help reduce maternal morbidity and finally mortality. This includes simple means such as regular checks of blood pressure, hemoglobin levels and general assessment of antenatal mothers, as well as early identification of high risk cases. The care a patient receives at the first point of contact is most important and may determine the ultimate outcome. Decisions of referral must be made at the appropriate time, so as to improve the outcome. For this, early recognition of red flag sings is necessary. Availability of emergency drugs at basic facilities can also be lifesaving. Lastly, round the clock transport services for quick referral is necessary. All the above may help achieve the ultimate aim of a healthy mother and child.

### Clinical Significance :

The study of maternal deaths paved the way for analysis of Maternal Near Miss cases which provided a wider case profile. Analysis of Maternal Near Miss helps identify deficiencies and lacunae in the health care system starting from the first hospital visit, including the referral centres upto the last health care establishment where patient is provided care. Our study identifies those patients who may be at a higher risk of complications, to allow timely and appropriate intervention. Each case acts as a lesson when subsequently reviewed.

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**Conflict of Interest :** None

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