

Content available at: <https://www.ipinnovative.com/open-access-journals>

Indian Journal of Obstetrics and Gynecology Research

Journal homepage: www.ijogr.org

Original Research Article

Maternal near miss in a tertiary care hospital: A retrospective and prospective observational study

Ankita Chonla^{1,*}, Sangeeta Gupta¹¹Dept. of Obstetrics and Gynaecology, Lok Nayak Hospital, Maulana Azad Medical College, New Delhi, India

ARTICLE INFO

Article history:

Received 13-05-2023

Accepted 03-07-2023

Available online 24-08-2023

Keywords:

Maternal near miss

Near miss ratio

Maternal near miss mortality ratio

Mortality index

ABSTRACT

Background: Maternal mortality is an indicator of the quality of maternal health services provided in the country. Despite the therapeutic advances in obstetric care and growing perception of the safety of childbirth over the past few decades, maternal morbidity and mortality remain to be a challenge in developing countries like ours where little attention has been given to the near miss obstetric events.

Aim: To study the prevalence and clinical profile of Maternal near miss in a tertiary care center.

Objective: To evaluate the underlying disorders, contributory factors and socio-demographic variables among maternal near miss cases.

Materials and Methods: This observational study was undertaken at the Department of Obstetrics and Gynecology, Maulana Azad Medical College (MAMC) & associated Lok Nayak Hospital (LNH), New Delhi for a period of one year. The study population was the patients attending OPD or casualty or admitted in the Department of Obstetrics and Gynecology at LNH, MAMC, who fulfilled the MoHFW maternal near miss identifying criteria and whose case records were available. The data for the study was collected both retrospectively and prospectively from January 2019 to December 2021. Detailed history of patients like name, age, date of admission and presenting complaints were recorded. Obstetric history including history of previous pregnancy and labor, complications during present pregnancy, past and present medical problems were also recorded. For each case of MNM, the primary obstetric complication leading to near miss was evaluated.

Results: There were 7064 live births during the study period. The study reveals a near miss ratio of 3.25 per 1000 live births. The near miss to mortality ratio was found to be 0.38:1 and the mortality index was 71.95%. Hemorrhage followed by hypertensive disorders of pregnancy were the most common disorders seen in near miss cases. All near miss cases required either HDU and/or ICU stay. The total requirement of blood and blood products by all near miss cases in the study was six whole blood, 61 packed red blood cells, 62 platelets and 42 fresh frozen plasma. The neonatal and perinatal mortality rate of our study was 38.8%.

Conclusion: A near-miss tool that is more generalizable, especially in a low-resource setting where many deliveries occur at home, needs to be developed. It should also be simple enough to be used by accredited social health workers, auxiliary nurse and midwife and other health care workers.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

Maternal mortality (MM) has been a very important maternal health indicator although it is frequently described as 'just the tip of the iceberg'. As per the Sample registration system (SRS) report by Registrar General of Maternal

* Corresponding author.

E-mail address: ankychonla@gmail.com (A. Chonla).

mortality ratio (MMR) of India has dropped from 130 per 100,000 live births in SRS 2014-16 to 113 per 100,000 live births in SRS 2016-18.¹ There is a vast base to the iceberg in the form of MNM which has remained unexplored. WHO defined MNM as “a woman who nearly died but survived a complication during pregnancy, childbirth or within 42 days after termination of pregnancy”.² In 2014, MoHFW defined MNM as a woman who survives life threatening conditions during pregnancy, abortion and childbirth or within 42 days of pregnancy termination, irrespective of receiving emergency medical/surgical interventions in the maternal near miss review operational guidelines.¹ Behind each maternal death, there are many more women with similar conditions who escape death. Little attention has been given to these near miss obstetric events and evaluation of these cases helps us in monitoring the quality of hospital-based obstetric care and aid in the investigation of maternal deaths. Near miss events occurs more frequently than maternal deaths and hence, have the potential to teach us lessons. They are useful in understanding and analysing the differences, similarities and relationships between characteristics of women who survived life-threatening pregnancy related complications and women who died of them. This study that was conducted provided an insight into the obstetric emergencies, near miss cases, the strength and weakness of the obstetric healthcare being provided in our tertiary care hospital.

2. Aim

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.

3. Materials and Methods

This observational study was undertaken at Department of Obstetrics and Gynaecology, Maulana Azad Medical College (MAMC) & associated Lok Nayak Hospital (LNH), New Delhi for a period of one year. The study population was the patients attending OPD or casualty or admitted in the Department of Obstetrics and Gynaecology at LNH, MAMC, who fulfilled the MoHFW maternal near miss identifying criteria and whose case records were available. The data for the study was collected both retrospectively and prospectively from January, 2019 to December, 2021. Prior permission from Ethical committee was taken before the study. Detailed history of patients like 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 recorded. For each case of MNM, the primary obstetric complication leading to near miss was evaluated.

3.1. Primary outcomes

1. 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 (MNMR = MNM/LB).
2. Maternal Near Miss Mortality ratio (It refers to the ratio between Maternal Near Miss cases and Maternal Deaths): It refers to the ratio between maternal near miss cases and Maternal Deaths.
3. 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): 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)].

3.2. Secondary outcomes

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

3.3. Statistical analysis

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

4. Results

A total of 23 cases fulfilling the inclusion criteria were recruited in the study. A total of 12 cases were collected retrospectively between January, 2019 to March, 2020 and 11 prospective cases from February, 2021 to December, 2021. During the study period, there were 7064 live births and 59 maternal deaths. Twenty maternal deaths were seen in the period of retrospective study and 39 maternal deaths during the prospective study period.

Table 1 shows frequency of near miss cases and maternal death. There were 7064 live births. Near miss ratio was 3.25 per 1000 live births. Near miss to mortality ratio was 0.38:1. Mortality index was 71.95%.

Table 1: Frequency of near miss cases and maternal death

	Total
Live birth	7064
Near miss cases	23
Near miss ratio	3.25
Maternal deaths	59
Maternal near miss mortality ratio	0.38:1
Mortality index	71.95%

Table 2 shows demographic features of near miss cases. Mean age of near miss cases was 28 years, with maximum (60.8%) cases seen in 20-29 years of age. 30.4% cases had no formal education.

Table 2: Demographic features

Characteristics	Near miss cases
Age (in years)	Mean age (28.13)
20-29	14 (60.8%)
30-39	8 (34.8%)
≥40	1 (4.3%)
Educational status	
illiterate	7 (30.4%)
<10 th	11(47.8%)
<12 th	3 (13%)
graduate	1 (4.3%)
postgraduate	1 (4.3%)
Religion	
Hindu	15 (65.2%)
Islam	8 (34.8%)
others	0

Obstetric parameters are shown in Table 3. 69.5% cases had received antenatal care. 34.8% were fully booked cases. 73.9% cases were multigravidas and laparotomy was the mode of delivery seen in 8 cases.

Table 3: Obstetric parameters

Antenatal care	Near miss cases
Yes	16 (69.5%)
No	7(30.4%)
Booking status	
Booked	8 (34.8%)
Unbooked	8 (34.8%)
Registered	7 (30.4%)
Gestational age	
Antenatal	
<22 weeks	
> 22 & < 34 weeks	4
> 34 & < 37 weeks	6
Intranatal	7
Postnatal	1
Ectopic	5
Parity	
Primigravida	6 (26.1%)
Multigravida	17 (73.9%)
Mode of delivery	
Vaginal delivery	4
Caesarean section	8
laparotomy	10

Twelve (52.2%) women were diagnosed as near miss on admission to the hospital. Eight women were admitted with severe illness and three were low risk pregnancies, who became near miss during the hospital stay.

As shown in Table 4, Haemorrhage followed by hypertensive disorders of pregnancy were the most common

disorders seen in near miss cases. Anaphylaxis was seen in one case due to parenteral iron preparation.

Table 4: Disorders in near miss cases

Haemorrhage	12 (52.2%)
Hypertension	7 (30.4%)
Sepsis	0
Anaemia	1 (4.3%)
Cardiac dysfunction	2 (8.69%)
Anaphylaxis	1 (4.34%)
Post-partum collapse	0

Anaemia was the most common underlying medical disorder seen in near miss cases followed by ectopic pregnancy and morbidly adherent placenta. Out of the 23 subjects, 10 cases had involvement of single system and 13 had multiple systems involved. Haematological system was involved in most cases followed by Cardiovascular system. All near miss cases required either HDU and/or ICU stay. Out 23 patients, 19 required ICU and HDU assistance and 4 required only obstetric HDU care.

Nineteen out of 23 patients required blood transfusion. Seven patients were categorised as near miss on standalone criteria of more than 5 units of transfusion of blood and blood products. 73.9% (17) cases required both medical and surgical methods of intervention which included admission to intensive care unit, blood and blood product transfusion, dialysis, mechanical ventilation and inotropic support, laparotomy/ caesarean section. Twenty one (91.3%) subjects had fully recovered and discharged from the hospital. One (4.3%) subject had residual morbidity as she developed vesico-vaginal fistula which was managed conservatively. One (4.3%) subject was lost to follow up. Neonatal and perinatal mortality rate in near miss cases was 38.8%.

5. Discussion

MNM is a surrogate for poor pregnancy outcomes. MNM cases, being large in numbers provide robust data for the assessment of obstetric care. MNM can generate more information as women themselves can be a source of information to enable identification of common causes of MNM.

The near miss ratio was 3.25 per 1000 live births. The ratio was low in our study as (a) our hospital is a tertiary care referral centre in Delhi taking in a high load of sick and moribund patients who are referred not only from Delhi but from the adjoining states where the health care facilities and infrastructure is under performing (b) our facility is not purely a referral centre but also provides routine antenatal care to low risk pregnant women as well. Our ratio is in close range with the one estimated by Gupta et al³ in their study (3.98 per 1000 live births) and both the facilities have similar health care facilities and infrastructure. In a

prospective observational study by Rakesh HJ et al⁴ in Pondicherry, near miss ratio was calculated to be 2.81 per 1000 live births. One of the highest near miss incidence (379.51 per 1000 live births) reported so far is by Kumar and Tewari et al⁵ using the Filippi et al. criteria and the high frequency of near-miss cases was attributed to the selective referral of high-risk pregnancies and use of the disease specific near miss criteria used in the study.

The MNMR was 0.38:1. This meant that for every 1 maternal death, 0-1 MNM cases were identified. Though higher ratios indicate better care, our facility has low MNMR. The low MNMR was observed as neither our facility exclusively caters only to its booked patients nor it is geared up to provide antenatal care to all women referred from the adjoining states. Many mortalities that occur are the patients who reported to our facility in morbid conditions and not much can be done for those patients, and they are also responsible for skewing the MNMR. MNMR in our study is less as compared to the study conducted by Gupta et al³ (3.37:1). This can be due to (a) different criterion being used for identifying near-miss (b) delay in referral to our centre and (c) increased mortality rate due to higher number of patients who are referred in sick and moribund state.

In our study, mortality index was 71.95%. The most common cause of maternal mortality in our study was hypertensive disorders of pregnancy. Twenty maternal deaths occurred during the retrospective study period and the mortality index during that was 62.5% and most common cause of mortality was sepsis. Mortality index during the prospective study period was 78% and hypertensive disorders were seen to be the most common cause of mortality. The mortality index has been observed to increase post covid pandemic indicating the lack of antenatal care as the non-covid services were hampered during the pandemic. Hypertensive disorders of pregnancy have been the common cause of mortality in various other studies.^{3,6,7} In our study, near miss was higher amongst younger women. 30.4% women aged less than 24 years. Thirteen percent women in our study were more than 35 years of age which is comparable to the multicountry study conducted by WHO where the prevalence of pregnant women with AMA was 12.3%.⁸ The mean age of women in our study was 28.13 years which is comparable to Indian and international studies like Rakesh HJ et al. where mean age was 27.75 years and Bolivian study⁹ where it was 27 years. Most near miss cases had no form of formal education in our study which was also seen in the Nigerian study.¹⁰ The Nigerian study also concluded that amongst the women with tertiary level education, the MM was the least being 3%, while the MNM was the highest being 97%. Those in the group with no formal education had the highest MM of 41.7% and the least MNM of 58.3%.

Sixteen out of 23 near miss cases in our study were booked. Out of the booked cases, 8 were fully booked and 8 were registered at any health care facility. Reasons for not seeking antenatal care was lack of awareness in 2 patients, lack of accessibility in 3, lack of funds in 1 and 1 woman stated that she has both family problems and lack of funds.

Near miss has been observed to occur more in third trimester across several studies conducted in India and globally. In our study, most near miss were seen in second and third trimester and in first trimester, all near miss cases were due to haemorrhage secondary to ectopic pregnancy. This is comparable to Rakesh HJ et al⁴ where prevalence of near miss was more (59.25%) in third trimester. Near miss was higher among the multigravidas. Only 6 women were primigravida and 17 were multigravidas.

Haemorrhage (52.2%) and hypertensive disorders of pregnancy (30.4%) were the major primary obstetric complications responsible for near miss cases followed by cardiac dysfunction (8.69%) and anaemia (4.34%) in our study. Similar statistics were seen in the study by Rakesh HJ et al⁴ where haemorrhage was also the commonest cause of near miss followed by hypertensive disorders of pregnancy. Anaemia was the most common underlying disorder in the near miss cases in our study. Similarly, anaemia was the major contributory factor of severe morbidity in 75% of the near miss cases in the study conducted by Gupta et al.³

A three-delay model has been used in near miss cases and delays have been observed to occur at three levels.^{11,12} In our study, first and second level delay were seen in most near miss cases; 4 patients were referred from nearby hospitals after a lag of one day (level 2 delay), 2 patients accessed health care after 7 days of illness (level 1 delay) and one patient could not get ICU bed in our facility (level 3 delay).

Around 82.6% of the cases in our study required blood transfusion out of which 30.4% of the cases required blood transfusion of more than 5 packed red blood cells (PRBC) or whole blood which was more as compared to the requirement of blood components in the study by Ingole et al¹³ where 14.4% near miss cases received massive blood transfusion (more than or equal to 5 PRBC). The total requirement of blood and blood products by all near miss cases in our study was 6 whole blood, 61 PRBC, 62 platelets and 42 fresh frozen plasma.

The neonatal and perinatal mortality rate of our study was 38.8%. Near miss cases were associated with 55% live birth, 16.6% stillbirth and 22.2% mortality in our study. Similarly, the foetal outcomes observed in the near miss study by Pragati et al and Kalra et al^{14,15} were that a live birth was present in less than two-thirds of the near miss and still birth was reported in 25% of the near miss cases.

6. Conclusion

Lessons can be learned from near miss cases which can serve as a useful tool in reducing maternal mortality

ratio. This study underscores the importance of monitoring obstetric care and identifying near miss cases to enhance maternal health outcomes. Hence, an effective audit system for maternal care which includes both near miss obstetric morbidity and mortality should be developed to identify both, our strength and weaknesses, to devise strategies to overcome the shortcomings and to review the success of the interventions done.

7. Strength and Limitation

It was a first of a kind study in our department. We also took this as an opportunity to identify the gaps within our system and formulate remedies on how to plug them. Since there was no follow up, postpartum and long-term perinatal complications were not addressed in the study. The women could not be followed up till 42 days after pregnancy, which may have led us to miss some cases. A control group was not taken in the study for comparison with normal population.

8. Source of Funding

None.


9. Conflict of Interest

None.

References

1. Maternal Near Miss Review operation guidelines. India: Ministry of Health and Family Welfare, Government of India; 2014. Available from: https://nhm.gov.in/images/pdf/programmes/maternal-health/guidelines/Maternal_Near_Miss_Operational_Guidelines.pdf.
2. Pattinson R, Say L, Souza JP, Broek N, Rooney C, Rooney C; WHO Working Group on Maternal Mortality and Morbidity Classifications. WHO maternal death and near-miss classifications. *Bull World Health Organ*. 2009;87(10):734.
3. Sangeeta G, Leena W, Taru G, Sushma K, Nupur G, Amrita P. Evaluation of severe maternal outcomes to assess quality of maternal health care at a tertiary center. *J Obstet Gynaecol India*. 2015;65(1):23–7.
4. Rakesh HJ, Diana. Study of prevalence and factors associated with Maternal Near Miss (MNM) cases and maternal death at Rajiv Gandhi Government Women and Children Hospital, Pondicherry, India. *Int J Reprod Contracept Obstet Gynecol*. 2018;7(3):1048–53.
5. Kumar R, Tewari A. Near-Miss obstetric events and its clinico-social correlates in a secondary referral unit of Burdwan District in West Bengal. *Indian J Public Health*. 2018;62(3):235–8.
6. Chaudhuri S, Nath S. Life-threatening Complications in Pregnancy in a Teaching Hospital in Kolkata, India. *J Obstet Gynaecol India*. 2019;69(2):115–22.
7. Tallapureddy S, Velagaleti R, Palutla H, Satti CV. Near-Miss" obstetric events and Maternal mortality in a tertiary care hospital. *Indian J Public Health*. 2017;61(4):305–8.
8. Laopaiboon M, Lumbiganon P, Intarut N, Mori R, Ganchimeg T, Vogel JP, et al. Advanced maternal age and pregnancy outcomes: a multicountry assessment. *BJOG*. 2014;121(1):49–56.
9. Roost M, Altamirano V, Liljestrang J, Essén B. Priorities in emergency obstetric care in Bolivia—maternal mortality and near-miss morbidity in metropolitan La Paz. *BJOG*. 2009;116(9):1210–7.
10. Samuels E, Ocheke AN. Near miss and maternal mortality at the Jos University Teaching Hospital. *Niger Med J*. 2020;61(1):6–10.
11. Barnes-Josiah D, Mynnti C, Augustin A. The "three delays" as a framework for examining maternal mortality in Haiti. *Soc Sci Med*. 1998;46(8):981–93.
12. Pacagnella RC, Cecatti JG, Osis MJ, Souza JP. The role of delays in severe maternal morbidity and mortality: expanding the conceptual framework. *Reprod Health Matters*. 2012;20(39):39–63.
13. Ingole SJ, Chaudhary SN. Maternal Near Miss Events in Tertiary Care Hospital: A Retrospective Observational Study. *J Clin Diagn Res*. 2021;15(4):14–7.
14. Chhabra P, Guleria K, Bhasin SK, Kumari K, Singh S, Lukhmana S. Severe maternal morbidity and maternal near miss in a tertiary hospital of Delhi. *Natl Med J India*. 2019;32(5):270–6.
15. Kalra P, Kachhwaha CP. Obstetric near miss morbidity and maternal mortality in a Tertiary Care Centre in Western Rajasthan. *Indian J Public Health*. 2014;58(3):199–201.

Author biography

Ankita Chonla, PG Resident  <https://orcid.org/0009-0001-1744-9395>

Sangeeta Gupta, Director Professor  <https://orcid.org/0000-0001-7580-9304>

Cite this article: Chonla A, Gupta S. Maternal near miss in a tertiary care hospital: A retrospective and prospective observational study. *Indian J Obstet Gynecol Res* 2023;10(3):289–293.