



A REVIEW OF MATERNAL NEAR MISS AND MATERNAL MORTALITY AT A TERTIARY REFERRAL CENTRE

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ABSTRACT

Introduction: Maternal health status is always assessed through estimation of mortality, morbidity, growth and development. Maternal mortality ratio is one such indicator of mother and child health care and reflects the overall effectiveness of health system. For every woman who dies from causes related to child birth, it is estimated that there are twenty other who suffer pregnancy related illness or experience other severe consequences and escape death called Near miss cases. So by evaluating these cases with severe maternal outcome [both near miss and maternal death] one can learn about lacuna in maternal health care.

Aims & Objectives: As the focus is now shifting from maternal mortality to morbidity so the study was done to review various maternal near miss indicators

Material & Methods: This was a prospective observational study for a period of 1 year (August 2016 to July 2017) conducted in Department of Obstetrics & Gynaecology, GMC and Rajindra Hospital, Patiala, Punjab. Maternal mortality during same period was seen. The near miss cases were identified by the WHO criteria. Mortality indices of life threatening obstetric conditions were determined.

Results: The total number of live births during study period was 4008, total near miss cases were 65 and total maternal deaths were 53. Maternal near miss mortality ratio came out to be 1.22:1. Severe maternal outcome ratio 29.44/1000 The Maternal near miss ratio (MNMR) came out to be 16.22/1000 live births.

Conclusion: To increase the maternal near miss mortality ratio or to decrease the mortality index we need to have better policies for antenatal care, more of institutional deliveries and early referral to better equipped centres where all emergency services are available round the clock.

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INTRODUCTION

Mother and child health is not a new specialty. It is a method of delivering health care to a special group in the population which is especially vulnerable to disease, disability and death. Women in the age group 15-44 and children under 5 years comprise about 32.4% of total population.¹

Maternal health status is always assessed through estimation of mortality, morbidity, growth and development. Maternal mortality ratio is one such indicator of mother and child health care and reflects the overall effectiveness of health system.

A woman is most vulnerable at the postpartum period. About 50-70% of maternal deaths occur in peripartum period, out of which 45% occur in the first twenty four hours of delivery and 2/3 in first week.¹ It is indeed tragic situation as these

deaths are not caused by disease but occur during or after a natural process. For every woman who dies from causes related to child birth, it is estimated that there are twenty other who suffer pregnancy related illness or experience other severe consequences and escape death called Near miss cases. So by evaluating these cases with severe maternal outcome [both near miss and maternal death] one can learn about lacuna in maternal health care.

WHO defined maternal near miss in 2011 as a woman who nearly dies but survives a complication during pregnancy, child birth or within 42 days after termination of pregnancy.²

So present study was conceptualized to study the maternal near miss and maternal mortality in tertiary care institute to determine the near miss ratio, identify various causative factors and to improve the quality of care.

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Aims & Objectives

As the focus is now shifting from maternal mortality to morbidity so the study was done to review various maternal near miss indicators

MATERIAL AND METHODS

This was a prospective observational study for a period of 1 year (August 2016 to July 2017) conducted in Department of Obstetrics & Gynaecology, GMC and Rajindra Hospital, Patiala, Punjab. It is a referral institute for nearby and far off public and private hospitals and provides 24 hour antenatal and delivery services to both low risk and high risk pregnant women. Maternal mortality during same period was analysed. The near miss cases were identified by the WHO criteria. Patient characterization including age, parity and gestational age on admission, booked/unbooked, mode of delivery, ICU admission, total hospital stay and surgical intervention to save the life of mother were considered. Potentially life threatening and underlying and contributory causes were analyzed in both the groups of maternal near miss and maternal mortality. The results were given in percentage, the frequency of near miss cases and maternal death to near miss ratio was calculated. Mortality indices were determined of life threatening obstetric conditions.

The following indices were calculated

- **Maternal near miss ratio (MNMR)**-number of maternal near miss cases per 1000 live births
- **Maternal near miss mortality ratio (MNM: IMD)** - ratio between maternal near miss (MNM) and maternal deaths (MD)
- **Severe Maternal Outcome Ratio (SMOR)**- refers to the number of women with life-threatening conditions (MNM + MD) per 1000 live births (LB)
- **Mortality Index** - 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)]

WHO criteria 2011²

Cardiovascular dysfunction

1. Shock
2. Cardiac Arrest
3. Severe hypoperfusion (lactate >5 mmol/L or >45 mg/dL)
4. Severe acidosis (pH<7.1)
5. Use of continuous vasoactive drugs
6. Cardio-pulmonary resuscitation

Respiratory dysfunction

1. Acute cyanosis
2. Gaspings
3. Severe tachypnea (respiratory rate>40 breaths per minute)
4. Severe bradypnea (respiratory rate<6 breaths per minute)
5. Severe hypoxemia
6. (O2 saturation <90% for ≥60min or PAO2/FiO2<200)
7. Intubation and ventilation not related to anaesthesia

Renal dysfunction

1. Oliguria non responsive to fluids or diuretics
2. Severe acute azotemia (creatinine>300 µmol/ml or >3.5 mg/dL)
3. Dialysis for acute renal failure

Coagulation dysfunction

1. Failure to form clots
2. Severe acute thrombocytopenia (<50,000 platelets/ml)
3. Massive transfusion of blood or red cells (≥ 5 units)

Hepatic dysfunction

1. Jaundice in the presence of pre-eclampsia
2. Severe acute hyperbilirubinemia (bilirubin>100 µmol/L or >6.0 mg/dL)

Neurologic dysfunction

1. Prolonged unconsciousness or coma (lasting >12 hours)
2. Stroke
3. Uncontrollable fit / status epilepticus
4. Total paralysis

Uterine dysfunction

1. Hysterectomy due to uterine infection or haemorrhage

Observations

The total number of live births during study period was 4008, total near miss cases were 65 and total maternal deaths were 53. Maternal near miss mortality ratio came out to be 1.22:1. Severe maternal outcome ratio 29.44/1000 (Table No 1)

Table No 1 Showing various indices

Indicators	Result
Maternal near miss ratio (MNMR)	16.22/1000 live births
Maternal deaths (MD)	53
Maternal near miss mortality ratio (MNM: IMD)	1.22:1
Severe Maternal Outcome Ratio (SMOR)	29.44/1000 live births
Mortality Index	44.91%

The main cause of mortality during the study period was hypertensive disease of pregnancy which included severe preeclampsia and eclampsia as compared to maternal near miss where main cause of maternal morbidity was obstetric haemorrhage (52.3%) of the total causes including atonic and traumatic PPH and APH. (Table No 2)

Table No 2 Showing causes of mortality and morbidity

Main causative factor	Maternal near miss	Maternal mortality
Hypertensive disorders of pregnancy	21 (32.3%)	24 (45.3%)
Obstetric haemorrhage	34 (52.3%)	9 (17%)
Sepsis	7 (10.8%)	9 (17%)
Medical diseases	-	6 (11.3%)
Rupture uterus	3 (4.6%)	3 (5.6%)
Ectopic pregnancy	-	2 (3.8%)
Total	65 (100%)	53 (100%)

About 87.6% of cases of maternal near miss and 66.03% case of maternal death were transfused with blood and blood products. Massive transfusion was needed in 46.2% of cases in maternal near miss. About 46 (86.8%) patients of maternal mortality were admitted to ICU and 32 (49.2%) patients needed admission in ICU in maternal near miss cases.

Maternal near miss were identified according to WHO criterion and it was seen that none of the patients had multiorgan failure while 35.8% of cases in maternal death group had multiorgan failure. Among underlying and contributory causes for maternal near miss were anemia (58.4%) followed by obstetric hemorrhage (52.3%), HDP (32.3%), early pregnancy with septic abortion and ectopic pregnancy (16.9%), medical disease in pregnancy 13.8%, and previous LSCS 27.6%.

There were more than one underlying causes in some cases like patient with underlying hypertensive disorders of pregnancy had eclampsia followed by either abruption or post-partum haemorrhage.

Most of the cases were unregistered in both the groups and were referred from different institutes, 73.8% in maternal near miss and 62.76% in maternal mortality group. The referral was mainly because of lack of blood transfusion facility, 66.1% in MNM and 60.37% in MD group.

75.4% of patient in maternal death group reported late for treatment either antenatally or intranatally. This incidence was low in maternal near miss (49.2%) Exploratory laparotomy was done for 17 cases in maternal near miss as under

Rupture uterus	three(3)
Placenta accreta and placenta percreta	two(2)
Atonic PPH	two (2)
Complications of LSCS (traumatic PPH)	two (2)
Ruptured ectopic pregnancy	four (4)
Puerperal sepsis	four (4)

Exploration of traumatic PPH due to cervical tear and vaginal lacerations was done in 6 cases each of near miss.

In maternal mortality group underlying contributory cause included 45.28% hypertensive disease of pregnancy followed by 11.3% cases of hepatic encephalopathy or cardiovascular disease and severe anemia in 39.6% cases and obstructed labor in 7.5%

We noticed that majority of subjects in MNM and MD belonged to young age group (20-25 years) and maternal mortality occurred in 39.6% of primigravida patients. Also most of the patients in MNM (81.5%) and MD group (60.4%) belonged to low socioeconomic status. (Table No 3)

Table No 3 Demographic profile if maternal near miss and maternal death cases

Age (in years)	Maternal near miss	Maternal death
20-25	29 (44.6%)	30 (56.6%)
26-30	21(32.3%)	13(24.5%)
31-35	12 (18.5%)	7(13.2%)
>35	3(4.6%)	3(5.7%)
Total	65 (100%)	53 (100%)

Parity	Maternal near miss	Maternal death
G1	16(24.6%)	21(39.6%)
G2	16(24.6%)	15(28.3%)
>G2	33(50.8%)	17(32.1%)
Total	65 (100%)	53 (100%)

Socioeconomic status	Maternal near miss	Maternal death
Lower	53(81.5%)	32(60.4%)
Middle	12(18.5%)	21(39.6%)
Upper	-	-
Total	65 (100%)	53 (100%)

Table No 4 depicts the criteria of near miss cases seen in the present study. In many patients more than one criteria was identified to consider it as MNM thus the disparity in percentage

Table No 4 WHO criteria for near miss as applied to present study (65)

S No	WHO near miss criteria	No. of cases	Percentage
1.	SpO2<90% for > 60 mins	24	36.9%
2.	Thrombocytopenia<50000/ml	15	23.1%
3.	Serum bilirubin >6mg% + preeclampsia with increase in LFT	17	26.1%
4.	Respiratory rate>40 breaths per min	24	36.9%
5.	Hepatic encephalopathy or coma	2	3.1%
6.	Massive blood transfusion>5 PRBC	29	44.6%
7.	ICU admission	33	50.8%
8.	Ventilatory support	14	21.5%
9.	Continuous use of inotropes	30	46.1%
10.	Peripartum hysterectomy	3	4.6%
11.	Dialysis	3	4.6%

(there were multiple criteria of near miss in cases)

DISCUSSION

GMCand Rajindra hospital Patiala is a tertiary institute where there is referral round the clock. There were total of 5467 obstetrics admission in one year (during the study period) and total live births were 4008. The MNMR came out to be 16.21/1000 live births. Maternal near miss mortality ratio was identified as 1.22. The comparison with other studies is shown in the table no 5.

Table No 5 Comparison of various indices with other studies

Various studies	MNMR	MNM/MD	Mortality index
Roopa PS etal (2013) ³	17.8/1000 live births	5.6:1	14.9%
Pandey A etal (2014) ⁴	120/1000 live births	2.6:1	28.1%
Kalra P et al (2014) ⁵	4.18/1000 live births	2.07:1	32.53%
Singh A etal (2016) ⁶	15.18/1000 live births	2:1	32.58%
Ray N et al (2016) ⁷	54.5/1000 live births	13:1	7.17%
Ansari A et al (2016) ⁸	73.42/1000 live births	10:1	8.4%
Bindal J et al (2016) ⁹	37.65/1000 live births	5.4:1	15.58%
Yadav S et al (2016) ¹⁰	13.2/1000 live births	3.07:1	25%
Present study (2017)	16.21/1000 live births	1.22:1	44.1%

Maternal near miss ratio is low in our study because we followed WHO criteria strictly. There were total 1644 LSCS during study period, 112 laparotomies (for rupture ectopic, rupture uterus, intestinal obstruction, torsion ovarian cyst) but we included only those cases who needed either inotropic support or ICU admission. Similarly in one year 122 cases of eclampsia were admitted and treated, we included only those cases who needed ICU care and ventilator support. Exploration was done in 61 cases for cervical tear and vaginal lacerations. Since these cases were timely managed thus WHO criteria were not met for their inclusion in study.

Mortality index is higher in our study because ours is tertiary referral centre and cases are referred in already moribund state. The delay in referral and delay in seeking antenatal care by patient are the major causes of morbidity and mortality as we observed in our study and reported by Thaker R et al (2013).¹¹ There is also larger area of drainage for our institute. In our study most of the maternal deaths were those cases referred from peripheral hospitals in already exsanguinated state or in multiorgan failure, 73.8% in MNM and 76% in maternal mortality group. The ability of a referral institute to prevent maternal death, even in unmanaged, mismanaged and

unanticipated situation is reflected by the number of near miss cases.

As obstetric hemorrhage is the commonest cause of maternal mortality and morbidity, so there should be enough resources like blood banks and protocols to improve and manage obstetric haemorrhage and thereby helping in reducing the morbidity. Hypertensive disorders of pregnancy can be identified after proper and appropriate antenatal care and timely management during the antenatal period. Health education too plays an important role keeping in view the delay in seeking antenatal care and emergency care as the patient with high risk factors must understand their potential risk to life and seek timely care. Very few patients reported delay because of non-availability of transport because in Punjab, services of 108 ambulances have come a long way in preventing this delay. Most of the health facilities referred the cases because of lack of blood bank which is an important health facility to timely prevent multiorgan failure due to haemorrhage as reported by other authors.^{3,4,6,7,8,12}

The multipara was more in near miss group as compared to maternal death group where the number of primigravidae was more. Maternal near miss and maternal death have common pathway in the form of severe acute maternal morbidity, which have one or more underlying and contributory cause which are preventable. There is huge variation in maternal near miss to maternal death ratio ranging from 2:1 to 13:1 (Table No 5). Maternal near miss prevalence of 16.22 /1000 live births in our study is low and comparable to study by Roopa PS (2013)³, Singh A (2016)⁶ and Yadav S (2016).¹⁰

CONCLUSION

To increase the maternal near miss mortality ratio or to decrease the mortality index we need to have better policies for antenatal care, more of institutional deliveries and early referral to better equipped centres where all emergency services are available round the clock. An awareness drive to spread the required knowledge to masses to prevent anaemia and hypertensive diseases of pregnancy, lifestyle changes is first and foremost. Every pregnancy must be micro planned as to antenatal care to intrapartum and post-partum care. Every woman has the right to know about the status of ongoing pregnancy and she is made aware of any complication arising so that a timely help is sought. Maternal near miss criteria may be fixed according to institutional services. Larger studies are required to remove the artefacts in study groups

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