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Community Medicine

INCIDENCE OF MATERNAL NEAR MISS AND MORTALITY CASES AT TERTIARY CARE HOSPITAL, AJMER

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ABSTRACT **BACKGROUND:** Maternal health refers wellness of mother before, all through, and after being pregnant. It also include physical, mental, emotional, and social wellbeing of mother. A maternal near miss case is a female who nearly died however survived a life threatening condition that occurs in pregnancy, childbirth, or within 42 days of termination of pregnancy. Research of near miss can, offer a more speedy evaluation of the burden of maternal morbidity and mortality. **METHODOLOGY:** A hospital based cross sectional study done in Rajkiya Mahila Chikitsalya, tertiary care hospital, Ajmer. The objective of study is to know the various indices of maternal morbidity (Maternal near miss incidence ratio, Maternal near miss: Maternal mortality ratio, Mortality index, Maternal mortality ratio), to identify the MNM cases and to compare with WHO criteria and Mantel et al. criteria. Study period was of 6 months from November 2021 to April 2022. **RESULTS:** During study period 5683 deliveries, 5490 live births, 80 maternal near miss and 18 maternal deaths were observed. At the end of study, MNMR, MMR, MNM: MMR and SMOR was obtained 14/1000 live births, 327.9/1000 live birth, 4.4:1 and 17/1000 live birth respectively. Overall MI was 18%. There were 64 patients, who satisfied both the criteria, while 10 patients who only fitted into WHO criteria and 6 patients only fulfilled Mantel et al criteria. Among 80 MNM cases pre-term deliveries, cesarean section and stillbirths were observed 40.28%, 53.33% and 35.82% respectively. **CONCLUSION:** The maternal near miss analysis helps us in identification of programme gaps and preventable risk factors, which helps in reducing the maternal morbidity and mortality. Maternal near miss incidence ratio in this study is 14/1000 live births, which is comparable to MNMR in other developing countries. Once the reasons for near miss cases are unfolded, effective measures can be taken to prevent eventualities.

KEYWORDS : MNM, MNMR, MMR, SMOR

INTRODUCTION

Maternal health refers wellness of mother before, all through, and after being pregnant. It also include physical, mental, emotional, and social wellbeing of mother.[1] A maternal near miss case is a female who nearly died however survived a life threatening condition that occurs in pregnancy, childbirth, or within 42 days of termination of pregnancy.[2][3] Research of near miss can, offer a more speedy evaluation of the burden of maternal morbidity and mortality. It also assess quality of maternal health care services.[4] Worldwide about 140 million births take place annually. Deaths from complications throughout being pregnant, childbirth, and the postnatal period have declined by way of 38% in a long period, however at an average reduction of 3% is consistent with each year. Sub-Saharan Africa and Southern Asia proportion the best burden of maternal deaths, 86% of the worldwide overall in 2017. The Sustainable development goals (SDGs) targets for maternal health include worldwide MMR of less than 70 deaths per 1,00,000 births by way of 2030.[5] India has devoted itself to the UN target for the SDGs for MMR at 70 per 1,00,000 live births by way of 2030. As per NHP (National health policy) 2017,the goal for MMR is one hundred per 1,00,000 live births by way of 2020.[6] Maternal mortality is often described as" simply the top of the Iceberg" already that there may be a full-size base to the Iceberg in the form of maternal near miss (MNM).[7] To enhance maternal health, obstacles that limit assessment of maternal health care services must be recognized and addressed at health system and societal levels.[8] criteria for figuring out and notifying the MNM cases are WHO criteria[9] and criteria of Mantel et al.[10] There are several useful markers of maternal near misses and deaths, those encompass: Maternal near miss (MNM), Maternal death (MD), Maternal mortality ratio (MMR= MD/LB per 1 lakh live births), women with life-threatening conditions (WLTC = MNM + MD), severe maternal outcome ratio [SMOR = (MNM + MD)/LB per 1000 live births], MNM ratio (MNMR = MNM/LB per 1000 live births), Maternal near miss over mortality ratio (MNM : 1 MD) and Mortality index [MI = MD/(MNM + MD)].(11) Objectives of this study is to recognize the various indices of maternal morbidity and mortality, to identify near miss cases using WHO and Mantel et al. Criteria and to compare with both criteria.

MATERIALS AND METHOD

That is a hospital based cross-sectional study. it includes all near miss cases and maternal death for a period of 6 month from November 2021 to April 2022 in Department of Obstetrics and Gynecology, JLN medical College Ajmer, Rajasthan. MNM cases have been classified according to WHO and Mantel et al criteria during the study period. Data were collected by using semi-structured, pre-examined proforma meeting the objectives of the study. The frequency distribution of categorical data was expressed as frequency counts and proportions. Continuous data was expressed as Mean ± S.D. The significance difference in proportions of cases was inferred by Chi square test. 95% confidence intervals around the point estimates was reported. A 'P' value <0.05 was considered as significant. Cohen's Kappa test was used to check agreement between WHO and Mantel et al criteria. Any real difference in identifying cases by WHO or Mantel et al criteria was checked by applying McNemar test.

RESULTS AND DISCUSSION

Total 7265 antenatal cases were admitted in Rajkiya Mahila Chikitsalya during study period,out of which 5683 cases were delivered. There were 5490 live births. A total of 18 (0.32% of total deliveries) maternal deaths and 80 (1.4% of total deliveries) maternal near miss cases were observed in this duration.

Table 1. Indicators used to describe maternal events in our study

Indicators	Number
Absolute number of Near Miss cases	80
Absolute number of maternal death	18
Women with life threatening condition: MNMM + MM	98
Maternal Mortality Ratio (per 1 lakh live births)	327.9
Severe maternal outcome ratio: (MNM + MD)/LB (per 1000 live births)	17
Maternal near Miss incidence ratio: MNM/LB (per 1000 live births)	14
Maternal Near Miss: Mortality ratio: MNM:MD	4.4:1
Mortality Index (%): MD/(MNM + MD)	18%

Table 1 shows total number of maternal near miss cases (80), maternal deaths (18), women with life threatening condition (98), maternal mortality ratio 327.9 per 1 lakh live births, severe maternal outcome ratio (17 per 1000 live births), maternal near miss incidence ratio (14/1000 live birth), maternal near miss to mortality ratio (4.4:1) and mortality index (18%) were calculated in study duration.

In this study MMR was observed 327.9 per 1 lakh live births, similar findings of MMR was observed by Rathod AD et al[12](2016) and Shrestha NS et al[13](2010) MMR 299/100000 live births and MMR 324 per 100,000 live births respectively. In our study MNMR was observed

14/1000 live births. Where as Shrestha NS et al[13](2010) observed 23.04/1000 live births respectively which was more as compared to our study. Where as Rathod AD et al[12](2016) observed MNMR was 7.56/1000 live births which was less as compared to our study. In our study maternal MI was observed 18%, similar finding of mortality index 20.83% was observed by Sultana S et al[16](2019). In our study MNM:MR was observed 4.4:1. Where as Shrestha NS et al[13](2010) observed MNM:MR 7.2:1 which was more as compared to our study. In our study women with life threatening condition were observed 98(1.72% of total deliveries), similar finding of women with life threatening condition observed by Rathod AD et al [12](2016) and Kumari S et al[17](2020) were 1.03% and 1.19% of total deliveries respectively. In our study SMOR was observed 17 per 1000 live births. Where as Mbachu II et al[14](2017) observed SMOR 218 per 1000 live births, which was more as compared to our study.

Table 2. Comparison of maternal near miss events by WHO and mantel et al criteria

Mantel et al	criteria	WHO		total
		satisfy	Not satisfy	
	satisfy	64	6	70
	Not satisfy	10	0	10
total		74	6	80

Table 2 shows that 64 cases satisfied both the criteria, while 10 cases were who only satisfied WHO criteria and 6 patients were who only fulfilled Mantel et al criteria. On applying Cohen's Kappa test, values obtained are as Kappa= 0.888, SE= 0.028, CI= 0.815-0.956, as value of kappa obtained in above test is 0.888, indicates that there is strong agreement in identifying cases by WHO and Mantel et al. criteria because a kappa greater than 0.75 is considered excellent and a kappa less than 0.40 is considered poor . As more cases were identified by WHO criteria, still both criteria do not differ much in 'near miss' case identification. On applying Mc Nemar's test, values obtained are as follows (P= 0.454) P value obtained at 95% CI is more than 0.05, indicates that difference which is observed in identifying cases by both criteria was not in real, it was due to chance. This shows that cases identified by both the criteria WHO or Mantel et al are similar in most of the cases.In our study MNM cases who satisfied both the criteria were 1.13% of total deliveries. Similar finding was observed by Parmar NT et al[15](2016) MNM cases who satisfied both the criteria were 1.5% of total deliveries. In our study MNM cases who satisfied only WHO criteria were 0.18% of total deliveries. Where as Parmar NT et al[15](2016) observed MNM cases 0.39% of total deliveries who only satisfied WHO criteria which was more as compared to our study. In our study MNM cases who satisfied only criteria of Mantel et al. were 0.11% of total deliveries. Where as Parmar NT et al[15](2016) observed MNM cases 0.29% of total deliveries which was more as compared to our study.

Table 3. Distribution of cases according to mantel et al criteria

Criteria	No. of patients
Admission to ICU for sepsis or other causes	36
Hypovolemia (requiring 5 or more units of whole blood or packed cells for resuscitation)	34
Emergency hysterctomy	16
Acute thrombocytopenia requiring platelet transfusion	13
O2 saturation below 90% for more than 60 minutes	7
Ventilation for more than 60 minutes, except for general anasthesia	5
Urine output less than 400ml/24 hours, refractory to hydration , furosemide or dopamine	1
Acute detoriation of BUN and creatinine (>15 ml and >400 mol)	1
Jaundice with preeclampsia	1
Total	114

*patient ,may fit in multiple criteria

Table 3 shows distribution of near miss cases according to mantel et al criteria. 36(45%) of total cases were who required ICU admission under Mantel et al criteria in our study. where as Parmar NT et al[15](2016) observed 14(30.43%) out of 46 MNM cases required ICU admission under Mantel et al criteria, which was less as compared to our study. In our study 30.56% of total ICU admission were due to Hypertensive disorders of pregnancy. Where as Upadhyaya I et al[16](2014) observed 50% of total ICU admission were due to Hypertensive disorders of pregnancy which was more as compared to our study. In our study 41.67% of total ICU admission were due to post-partum haemorrhage. Where as Upadhyaya I et al[16](2014) observed 14.46% of total ICU admission were due to post-partum haemorrhage which was less as compared to our study.

Table 4. Distribution of cases according to WHO criteria

Clinical criteria	No. of patients
Coagulation disorders	8
Loss of consciousness for >12 or =12h	5
Jaundice with preeclampsia	1
Laboratory criteria	
Bilirubin>100 mmol/L or >6.0 mg/dl	26
Acute thrombocytopenia (<50000 platelets)	16
O2 saturation below 90% for more than or equal to 60 minutes	7
Creatinine > or = to 300 mmol/L or > or = to 3.5 mg/dL	1
Management criteria	
Transfusion of 5 or more units of packed RBCs	34
Hysterectomy for PPH or infection	16
Dialysis for acute renal failure	1
Intubation and ventilation for > or = to 60 minutes not related to anasthesia	5
Total	120

patient ,may fit in multiple criteria

Table 4 shows distribution of near misses according to WHO criteria. 42.5% of MNM cases required transfusion of 5 or more units of packed RBCs under WHO criteria in our study where as Parmar NT et al[15](2016) observed 23.91% of MNM cases required transfusion of 5 or more units of packed RBCs under WHO criteria, which was less as compared to our study.20% of MNM cases who required Hysterectomy for PPH or infection classified under WHO criteria in our study. Similar finding was observed by Parmar NT et al[15](2016) 21.74% of MNM cases required Hysterectomy for PPH or infection classified under WHO criteria.32.5% of MNM cases with Bilirubin>100 mmol/L or >6.0 mg/dl classified under WHO criteria in our study. Where as Parmar NT et al[15](2016) observed 17.39% of MNM cases with Bilirubin>100 mmol/L or >6.0 mg/dl classified under WHO criteria, which were less as compared to our study. 20% of MNM cases diagnosed with acute thrombocytopenia (<50000 platelets) classified under WHO criteria in our study. Where as Parmar NT et al[15](2016) observed 17.39% of MNM cases who diagnosed with acute thrombocytopenia (<50000 platelets) which were less as compared to our study. 8.75% of MNM cases were with O2 saturation below 90% for more than or equal to 60 minutes classified under WHO criteria in our study. Similar finding was observed by Parmar NT et al[15](2016) 8.69% of MNM cases with O2 saturation below 90% for more than or equal to 60 minutes classified under WHO criteria. 1.25% of MNM cases were with Creatinine > 300 mmol/L classified under WHO criteria in our study. Where as Parmar NT et al[15](2016) observed 2.17% of MNM cases with Creatinine > 300 mmol/L classified under WHO criteria which were more as compared to our study. 10% of MNM cases were with coagulation disorder classified under WHO criteria in our study.

Where as Parmar NT et al[15](2016) observed 8.69% of MNM cases with coagulation disorder classified under WHO criteria which was less as compared to our study. 6.25% of MNM cases were with loss of consciousness for 12 hour or more than 12 hour classified under WHO criteria in our study. Where as Parmar NT et al[15](2016) observed 4.34% MNM cases which was less as compared to our study. 1.25% of MNM cases fulfilled jaundice with pre-eclampsia criteria under WHO criteria in our study. Where as Parmar NT et al[15](2016) observed 2.17% MNM cases which was more as compared to our study.

Table 5. Comparison of events between near miss cases and total confinements in study period

Events	Among MNM	%	Among total confinements	%	Chi-square value	P value
Pre-term delivery	29	40.28%	1420	24.99%	8.824	0.003
Term	43	59.72%	4263	75.01%		
Stillbirths	24	35.82%	193	3.40%	191.70	<0.001
Live births	43	64.18%	5490	96.60%		
-caesarean section	40	62.5%	1933	34.01%	22.779	<0.001
-normal delivery	24	37.5%	3750	65.99%		

Table 5 shows comparison of events between near miss cases and total confinements in study period. Out of 80 MNM 64.18% were live birth, which was less as compare to 96.60% live birth among total confinements. Similar finding was observed by Parmar NT et al[15](2016) 60.98% live birth among MNM which was less as compare to 90.61% live birth among total confinements. In our study among 80 MNM 35.82% were still births which was more as compare to 3.40% still births among total confinements. Similar finding was observed by Parmar NT et al[15](2016) 39.02% still births among 46 MNM which was more as compare to 9.39% still births among total confinements. In our study 40.28% MNM cases were pre-term deliveries which was more as compare to 24.99% of term deliveries among total confinements. Similar finding was observed by Parmar NT et al [15](2016) 41.86% pre-term deliveries among MNM which was more as compare to 27.34% of pre-term deliveries among total confinements. In our study 37.5% normal deliveries among MNM were observed which was less as compare to 65.99% normal deliveries among total confinements. Similar finding was observed by Parmar NT et al[15](2016) 50% normal deliveries among MNM which was less as compared to 66.7% normal delivery among total confinements. In our study 53.33% cesarean section among MNM were observed which was more as compare to 34.01% cesarean section among total confinements. Similar finding was observed by Parmar NT et al[15](2016) 50% cesarean section among MNM which was more as compared to 33.3% cesarean section among total confinements.

LIMITATION

More evidence-based studies should be generated to prepare local operator manual for the implementation of local protocol in the facility. New maternal near miss guidelines by Government of India needs proper implementations at peripheral and central levels. Hospital records are the main source of information so embedding the MNM data form should be a part of routine hospital record.

CONCLUSION

The causes of maternal near miss reflect the pattern of maternal death. Maternal Near Miss analysis helps us in identification and prevention of risk factors which helps in reducing the maternal morbidity and mortality. Analysis of MNM cases is a surrogate indicator for maternal health. The mortality index is 18% because this institute is a tertiary care center and cases are referred from nearby districts, CHCs and PHCs. The maternal near miss incidence ratio in this study is 14 per 1000 live births, which is comparable to other developing countries.

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