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Original Research Article

Trends of maternal mortality in a tertiary care hospital: a five year retrospective study

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ABSTRACT

Background: Maternal mortality is a measure of quality of health care in community. Maternal mortality ratio is a very sensitive index that reflect the quality of reproductive care provided to the pregnant women. The aims and objectives were to study the institutional maternal mortality, the causes of maternal death and the impact of COVID-19 on MMR.

Methods: A retrospective hospital-based study of 38 maternal death was done over a period of 5 years from June 2016 to May 2021 in obstetrics and gynaecology department, RIMS Imphal. Details of all the mortalities were collected from individual case sheets, facility based maternal death review forms and MDR case summary.

Results: A total of 38 deaths were analysed. MMR in the study period was 86 per 1 lakh live births. Maximum maternal deaths were reported in the age group of 30-34 years. Majority of maternal death were reported in multipara (57.9%) as compared to primipara (34.2%). Most of them were un-booked (63.2%) and belonged to rural areas (60.5%). The commonest cause was obstetrics haemorrhage (42.1%) followed by hypertensive disorders (23.6%). Acute respiratory distress syndrome associated with SARS-CoV-2 is one of the most important causes of increasing mortality rate (10.5%).

Conclusions: Early identification of high-risk pregnancy, regular antenatal check-up and proper training of health personnel along with timely referral to tertiary care centre can help to reduce the mortality. There is an increase in MMR during the current pandemic 2020-2021.

Keywords: Maternal mortality ratio, Haemorrhage, Hypertensive disorder, SARS-CoV-2

INTRODUCTION

Maternal mortality is an indicator of the quality of obstetric care in a community directly reflecting the utilisation of health care services available.¹ As per WHO, 'maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by pregnancy or its management but not from accident or incidental causes'.² Maternal mortality ratio is a very sensitive index that reflect the quality of reproductive care provided to the pregnant women. Maternal mortality ratio (MMR) is defined as the number of maternal deaths during a given time period per 1 lakh

live births during the same time period.² WHO target (2015): reduce MMR to 70 by 2030. As per sample registration system (SRS) for the last 3 years, MMR of India has reduced from 130 per 1 lakh live birth in SRS 2014-16 to 122 in SRS 2015-17 and to 113 in SRS 2016-18 to 103 in SRS 2017-2019.² The target 3.1 of sustainable development goals set by United Nations aims at reducing the global maternal mortality ratio to less than 70 per 1 lakh live births.⁴ The decline in MMR coincides with the launch of NRHM and initiation of various programmes like Janani Suraksha Yojana (JSY), Janani Shishu Suraksha Karyakram (JSSK), comprehensive abortion care services and skill building through training of MBBS doctors, nurses and ANM.

This study was carried out at Regional Institute of Medical Sciences, Imphal to determine the institutional maternal mortality, the causes of maternal death and impact of COVID-19 on MMR.

METHODS

A retrospective hospital-based study was done for a period of five calendar years with effect from June 2016 to May 2021 in the department of obstetrics and gynecology, RIMS, Imphal.

Data of all the mortalities were collected from individual case sheets, facility based maternal death review form, and MDR case summary.

Inclusion criteria

All the maternal deaths occurring during pregnancy and within 42 days of delivery, ectopic pregnancies, septic abortions, molar pregnancies were included in the study.

Exclusion criteria

All the maternal death occurring after 42 days of termination of pregnancies were excluded from the study.

RESULTS

There was a total of 43858 deliveries and 38 maternal deaths. MMR in the study period was 86.6 per 1 lakh live births. Maximum number of maternal deaths were reported in the age group of 30-34 years. Most of the death was seen in multipara (57.9%) as compared to primipara (34.2%), un-booked (63.2%) and belonged to rural areas (60.5%).

Table 1: Causes of mortality.

Causes of mortality	N (%)
Direct causes	27 (71.05)
PIH	9 (23.68)
Severe PE	4 (10.52)
Eclampsia	5 (13.1)
Obstetrics haemorrhage	16 (42.1)
PPH	11 (28.95)
Ruptured uterus	4 (10.52)
Ruptured ectopic	1 (2.6)
Puerperal sepsis	2 (5.26)
Indirect causes	11 (28.94)
Embolism	1 (2.63)
Cardiac disorder	2 (5.26)
Liver disorder	1 (2.63)
ARDS COVID-19	4 (10.52)
GBS	1 (2.63)
Anaemia	2 (5.26)

Out of the 38 maternal deaths 27 (71.05%) deaths were due to direct causes. In this group 42.11% died due to haemorrhage, 23.68% due to hypertensive disorder of pregnancy and sepsis accounted for 5.26% of deaths. Among 38 maternal deaths, 11 (28.95%) cases died due to indirect causes, of which maximum deaths (10.53%) were due to COVID-19 infection. Liver disorder, heart disease, pulmonary embolism, GBS accounted for 2.63%, 5.26%, 2.63%, 2.63% of deaths respectively. 10.5% of deaths were due to obstructed labour/ rupture uterus.

About 55.3% of the patients delivered a live baby while 15.8% had still birth and 5.2% had neonatal death and 18.5% undelivered. Only 10.5% of the patients were referred cases. Most of the patients (84.3%) were in third trimester.

Table 2: Distribution of death by delivery related characteristics (n=38).

Characteristics	Variables	Frequency	Percentage
Pregnancy outcome	Live birth	21	55.3
	Abortion	1	2.6
	Still birth	6	15.8
	Neonatal death	2	5.2
	Undelivered	7	18.5
	Ectopic	1	2.6
Place of delivery	RIMS	24	63.2
	PHC/CHC/private	3	7.9
	Home delivery	2	5.2
	Undelivered	7	18.5
	NA	2	5.2
Period of gestation	1st trimester	1	2.6
	2nd trimester	1	2.6
	3rd trimester	32	84.3
	Postpartum	4	10.5

Table 3: Condition of the patient at admission (n=38).

Variables	Frequency	Percentage
Severe preeclampsia	7	18.6
Eclampsia	2	5.2
Anaemia	2	5.2
Ruptured uterus with mismanaged labour in shock	4	10.6
Heart disease	2	5.2
APH with placenta previa	2	5.2
APH with abruption	1	2.6
PPH	2	5.2
Ruptured ectopic	1	2.6
Sepsis	2	5.2
ARDS COVID-19	4	10.6
GBS	1	2.6
No high risk	8	21.2

Table 4: Year wise distribution (n=38).

Months	N		
June 2016-May 2017	6	9099	65.9
June 2017-May 2018	6	9190	65.2
June 2018-May 2019	5	9567	52.26
June 2019-May 2020	8	9857	81.1
June 2020-May 2021	15	6145	244.1

Table 5: Booking status (n=38).

Antenatal check up	No. of cases	Percentage
Booked	14	36.8
Unbooked	24	63.2

Table 6: Distribution according to area of residency and literacy (n=38)

Characteristics	Variables	Overall (n=38)	Percentage
Area of residence	Rural	23	60.5
	Urban	15	39.5
Literacy	Literate	14	36.8
	Illiterate	24	63.2

Table 7: Distribution according to status of patient.

Characteristics	Variables	N=38	Percentage
Status at the time of presentation	Antepartum	27	71.05
	Intrapartum	7	18.43
	Postpartum	4	10.52
Status at the time of death	Antepartum	11	28.9
	Postpartum	26	68.5
	Post aborted	1	2.6

In our study average MMR was 86.6/100,000 live births from 2016-2021. Highest MMR reported was 244/100,000 live births in the year 20-21 and lowest 52/100,000 live births in 2018-19.

About 63.2 % deaths occurred among un-booked patients, 36.8% occurred among booked patients. Majority of deaths occurred in 30-34 years of age group (36.9%) and least (5.26%) in age group 20-24 yrs. Majority of deaths

occurred in multipara (58%) while 34% in primipara and 8% in grand multipara.

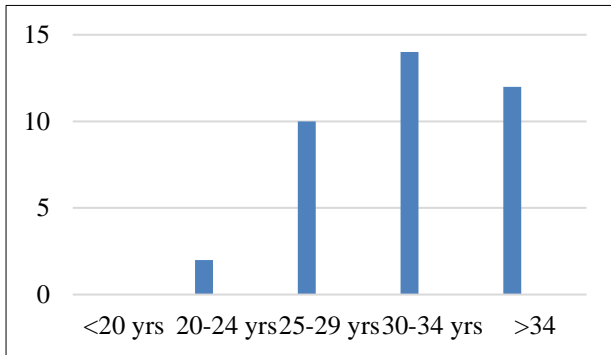


Figure 1: Distribution according to age.

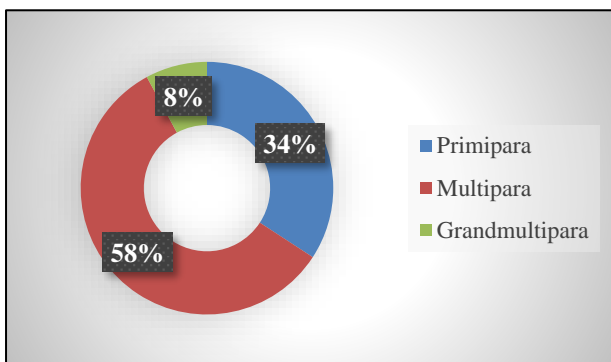


Figure 2: Distribution according to parity (n=38).

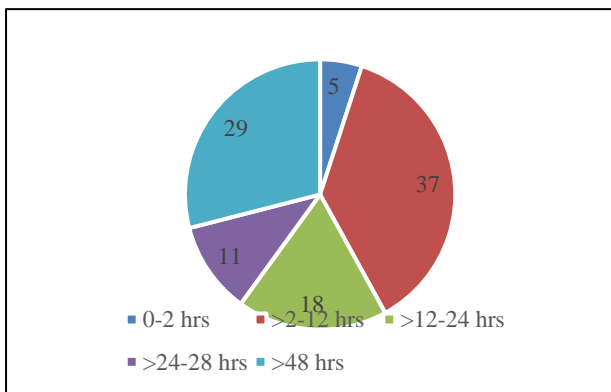


Figure 3: Distribution of interval from admission to death.

About 60.5% of death occurred among rural patients and 39.5% among urban patients. Majority of maternal deaths occurred in illiterate (63%), as compared to literate (37%).

68.5% of maternal deaths occurred in the postpartum and puerperal period, 28.9% in antepartum period, 2.6% in post-abortal. About 42% of deaths occurred within first 12 hours of admission, 18% died within 12-24 hours. 11% of deaths occurred within 24-48 hrs, 29% after 48 hours of admission.

DISCUSSION

Majority of the mortality were due to obstetrical haemorrhage followed by hypertensive disorders.

Increased in number of maternal deaths in the current COVID pandemic period may be due to lack of antenatal care and regular follow up, delay in referral and non-availability of vehicles in hilly areas.

Complications can be minimised by early detection of high-risk pregnancies and timely referral of complicated cases to higher centres.

In our study, majority of death occurred in multipara (58%) while 34% in primipara and 8% in multipara. Study by Khumanthem et al showed 75% of maternal death in multipara while 25% in primipara.¹⁴ Thomas et al showed that primigravida contributed to 29.2% and multigravida 50.8% of deaths.⁴ Purandare et al observed that out of the 30 deaths, 21 were multigravida and 9 were primigravida.⁵ Too many and too frequent pregnancies together adversely affected the mother's health and have its roots in the social status of the patient. In our study, 42.1% died within 12 hours of admission; and 18% between 13-24 hours of admission and 10.5% between 24-48 hrs and 28.9% beyond 48 hrs of admission. Similar to that reported by the other studies. Purandare et al showed that among the 30 deaths, 3 died within 30 minutes of admission, 14 died between 30 minutes and 6 hours, 7 died between 6 and 24 hours and remaining 6 died after 24 hours of admissions.^{5,8} Priya et al showed that 54.63% of deaths were within 24 hours of admission, Puri et al 45% of deaths within 24 hours of admission.^{7,8} Khumanthem et al showed 60% of maternal death within the first 24 hr of admission.¹⁴

In our study 71.05% maternal deaths were due to direct causes and 28.95% were due to indirect causes. Similarly, in the study by Das 61.51% of maternal deaths were due to direct causes.⁹ Whereas in the study by Bangal et al both direct and indirect causes contributed to (50.00%) of maternal death.¹⁰ Study by Khumanthem et al 14 showed 85% were direct while 15% were indirect cause.¹⁴

Our present study showed 68.5% of maternal death in postpartum period, followed by 28.9% in antepartum period and 2.6% in post abortal. Similar results had been reported by other studies, Purandare et al showed that (73.33%) in the postpartum period followed by (26.66%) during the ante-partum and (3.3%) during intra-partum period.⁵ Saini et al reported 66.1% of post-natal deaths; Puri et al showed 63.08% of deaths in postnatal period.^{8,11}

In the present study, direct causes contributed to 71.05% of maternal deaths and indirect causes resulted in 28.95% deaths. Direct causes were haemorrhage 42.11%, hypertensive disorders 23.68%, and sepsis 5.26%. Indirect causes include ARDS following COVID-19 infection 10.53%, heart disease complicating pregnancy 5.26%, anaemia 5.26%, GBS 2.63%, pulmonary embolism 2.63%

and acute fulminant hepatitis 2.63%. Similar results were seen in studies by Priya et al who found postpartum haemorrhage 35.05% as the leading cause followed by hypertensive disorders 27.83% and anaemia 25.7%; Yadav et al who reported haemorrhage 43.16%, hypertension 33.09% and sepsis 12.67% as direct causes and anaemia 26.8% as leading indirect cause.^{7,12} Kittur found causes of maternal deaths as haemorrhage 35%, hypertensive disorders 27.5% anaemia 10%, pulmonary embolism 10% and heart disease 2.5%.¹³ Hemorrhage (52.5%) were the major cause of death according to Khumanthem et al.¹⁴

So it was clear from our and other studies that haemorrhage, hypertensive disorders and anaemia were leading causes of maternal deaths. Pre-existing anaemia worsens as pregnancy advances leading to cardiac failure and death. It also impedes the mother's ability to resist infection or cope with haemorrhage and increases the likelihood of her dying in childbirth by a factor of four.¹

CONCLUSION

In the present study most common cause of maternal mortality was haemorrhage. Most maternal death were seen in rural areas, un-booked and illiterate patients. Highly effective emergency care and prompt treatment facility for early referral is the key for reducing, maternal mortality rate in our country. MMR in RIMS is increased during the pandemic. A total of 4 maternal deaths due to ARDS associated with COVID-19. Increase in maternal mortality may result from direct maternal illness related to COVID-19 infection or indirect effect of health service disruption or either indirect effect caused by pandemic. ANC detects high risk patient, prevents unwanted pregnancy and complications and ensure safe delivery of mother and child.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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