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A two-year retrospective study of maternal mortality in tertiary care hospitals in South India

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Abstract

Background: The death of a woman during pregnancy or within 42 completed days after delivery of the baby, irrespective of the duration or site of pregnancy, from any cause related to or aggravated by pregnancy, but not from accidental or incidental causes is labelled as maternal mortality. The study was conducted with the objectives to assess the existing MMR and the causes of maternal mortality over 2 years in a tertiary care hospital.

Methods: Retrospective study done from March 2021 to February 2023 at RIMS Raichur. The medical records of all maternal death over 2 years were reviewed and analysed. The data of all the maternal deaths during the study period at the department of Obstetrics & Gynecology, RIMS Raichur were recorded using a predesigned and semistructured questionnaire.

Results: A total of 75 deaths were assessed over 2 years and MMR was calculated to be 726.5/1 lakh live births. Most of the maternal deaths occurred in the age group of 21-30 years (73.3%), most maternal deaths were observed in primipara (30.7%), 32% of deaths occurred within 24 hours of admission. Hypertensive disorders in pregnancy (32%) were the leading direct cause followed by non-obstetric complications (17%), and haemorrhage (16%).

Conclusion: To reduce maternal mortality, the crucial work starts at the grassroots level. Most deaths could have been prevented with the help of early referral, quick efficient transport facilities and the availability of blood and its products.

Keywords: maternal mortality ratio; post-partum haemorrhage; pregnancy; WHO ICD

Introduction

Maternal mortality is defined as the death of any woman while being pregnant or within 42 completed days of termination of pregnancy, irrespective of the duration or site of pregnancy, from any cause related to or aggravated by pregnancy, but not from accidental or incidental causes [1]. Maternal Mortality Ratio (MMR) is defined internationally as the maternal mortality rate per one lakh live births. Maternal mortality remains one of the most daunting public health problems in India. Even today 20% global maternal deaths occur in India [2].

MMR for India was 301 per 100,000 live births by Sample Registration Survey (SRS) 2003 estimate and came down to 97 by SRS survey 2018- 20 [3]. Maternal mortality is attributed to complications that most probably occur during or around labour and aaccurate prediction is difficult. The direct causes of maternal mortality, that is haemorrhage, unsafe abortion, eclampsia, obstructed labour, infection, and others account for about three-fourths of maternal deaths. The remaining one-fourth are indirect causes such as anaemia, hepatitis, heart

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disease, malaria, and Human Immunodeficiency virus (HIV)/ acquired immunodeficiency syndrome (AIDS). The other contributory causes are early marriage, adolescent pregnancy, poverty, malnutrition, harmful traditional practices, illiteracy/ignorance, etc [4].

These are mostly preventable through regular antenatal check-up, proper diagnosis, and management of labour complications [5]. Maternal mortality is an indicator of the quality of obstetric care in a community, directly reflecting the utilization of health-care services available. Maternal mortality is one of the cardinal goals of the Millennium Development Goals (MDGs) [6].

If all women could access high-quality essential and emergency obstetric care along with the promotion of overall safe motherhood then we can reach the highest point of development of reporting every pregnancy into a healthy mother and healthy baby. Overall, this study aims to contribute substantial additional information regarding the causes of maternal mortality in a tertiary care hospital in a tribal-dominated population so that timely measures can be taken to prevent such type of incidences in future. Most maternal deaths are preventable by optimum utilization of existing MCH facilities, identifying loopholes in health care delivery system, early identification of high-risk pregnancies and their timely referral to higher centre.

With this background, the present study was conducted with the objectives of assessing the existing MMR and the causes of maternal mortality over 2 years in a tertiary care hospital of RIMS, Raichur, Karnataka.

Methodology

This study was a hospital-based retrospective cross-sectional study conducted at a tertiary health care facility. For this study, all the maternal deaths that occurred between March 2021 to February 2023 at the department of Obstetrics & Gynecology, RIMS Raichur were recorded. Ethical clearance from the Institutional Ethics Committee Raichur was obtained. The data were collected from the Maternal Death Review Forms (MDRF) which were maintained by the office of the Chief Medical Officer, Medical Record section, Raichur. A pre-designed and pre-tested proforma was developed based on the MDRF and maternal mortality report register maintained in the medical record section. Maternal deaths were described with the help of MDR files. Data was collected regarding the personal history (age, residence), medical and obstetric history (antenatal care, number of pregnancies, number of labor), surgical details and suspected cause of death according to ICD 10. To address the bias, those forms that were either incompletely filled or the maternal deaths due to causes unrelated to pregnancy were excluded. There was a total of 81 maternal deaths during the study period, after considering the exclusion criteria sample size arrived at 75 cases.

The information thus collected in the proforma was entered into a Microsoft Excel spreadsheet. The data were analysed using IBM SPSS version 22.0 software for the mean, median and other relevant statistical measures. Qualitative data will be expressed in the form of frequency, rates and percentages. Quantitative data will be expressed as mean and standard deviation.

Operational definitions: Maternal death is defined as the death of a mother during pregnancy or within 42 days of termination of pregnancy. It may be of any duration or any site of pregnancy, any source related to or aggravated by the pregnancy or its management and death not from accidental or incidental cause.

Results

From March 2021 to February 2023, a total of 75 maternal deaths were recorded during the two-year study period, out of 10,323 cases admitted at the Department of Obstetrics at our university hospital, giving a maternal mortality ratio (MMR) of 726.5 /100,000 deliveries. The MMR for 2021 was 778.5/100,000 and for 2022 was 686.5/100,000 live births. Compared to 2021-year maternal mortality drastically reduced in 2022 (Table 1).

Table 1: Year-wise maternal mortality ratios.

Year	*Total live birth*	*Maternal death*	*Maternal mortality ratio*
2021	4496	35	778.5
2022	5827	40	686.5
Total	10323	75	726.5

Table 2 shows causes of maternal deaths categorized according to WHO ICD-10 to deaths during pregnancy, childbirth and puerperium.[16] Present study shows Hypertensive disorders in pregnancy, childbirth, and the puerperium (32%) is major cause of maternal mortality. Other causes of maternal death were due to obstetric haemorrhage (21%), and non-obstetric complications (23%).

Table 3 shows the profile of mothers. The mean age of mothers was 24.5±4.45 at the time of delivery. 77.3% of mothers were in term gestation and 22.7% were in pre-term gestation. 70.7% of mothers were unbooked during pregnancy. 34.7% (26/75) of them had presented with intrauterine death (IUD). The IUD rate was higher

Table 2: Maternal death according to WHO ICD 10.

Group coding's according to WHO ICD 10	*Causes*	*Frequency*	*Percentage*
1	Pregnancy with abortive outcome	0	0
2	Hypertensive disorders in pregnancy, childbirth, and the puerperium	24	32%
3	Obstetric haemorrhage	16	21%
4	Pregnancy-related infection	6	8%
5	Other obstetric complications	1	1%
6	Unanticipated complications of management	6	8%
7	Non-obstetric complications	17	23%
8	Unknown/undetermined causes of death	3	4%
9	Coincidental causes	2	3%

(52.9%) among pre-term gestation mothers. 62.7% of the deliveries were referred cases to tertiary care centres from the periphery. The women were assessed for Haemoglobin status and found that 12% of them were severely anaemic, 48% moderately anaemic and 8% were mild anaemic. 72% of women gave birth to live baby and 28% had bad fetal outcome.

Table 4 shows the clinical profile of women. 32% of deaths occurred within 24 hours after the delivery, 32% of maternal death were between 1 to 6 days, and 36% after the 6 days of delivery. The mean pulse rate was found to be 103 ± 28.3 beats per minute, and it was non-recordable among 12% of mothers. The mean respiratory rate was 23.2 ± 10.9 cycles per minute, and it was non-recordable among 24% of mothers. The mean systolic and diastolic blood pressure (SBP and DBP) were 121 ± 29.9 mmHg and 76.7 ± 21.2mmHg respectively. The mean SPO2 was 88.2% ± 16.1%.

Discussion

The death of a mother is a calamitous event. It has varied consequences on the family, community, and eventually, the nation in practical life. In MDG maternal mortality reduction is one of the important objectives, especially in low-income countries, where 1 in 16 women die of pregnancy-related complications [7]. Hospitals either secondary or tertiary centres receive pregnant women who are at high risk or developed life-threatening complications, hence, estimated hospital data may be more than community data and thus increase the number of hospital deaths [8].

The maternal mortality ratio (MMR) in the present study is 726.5 per 1,00,000 live births over two years which is very much higher than the national standard of MMR in India which is 97 per 1,00,000 live births for 2018-2020 and also seven times higher than the target of the

Table 3: The Socio-demographic profile of mothers.

Variable	*Frequency*	*Percentage*
Age in years		
21-30	55	73
<21	14	19
≥30	6	8
Mean ± SD (in years)	24.5 ± 4.45	
Term/ preterm		
Preterm	17	22.7
Term	58	77.3
Parity		
Primipara	50	66.7
Multipara	25	33.3
Mode of present delivery		
FTND	43	57.3
LSCS	28	37.3
Preterm, expelled	3	4
Emergency laparotomy	1	1.3
Booking status		
Booked	22	29.3
Unbooked	53	70.7
Anaemia status (Hb % in gms/dl)		
Normal (11.0)	24	32
Mild (10-10.9)	6	8
Moderate (7-9.9)	36	48
Severe (<7.0)	9	12
Mean ± SD (gms/dl)	9.71 ± 2.47	
Referral		
Referred	47	62.7
Non- referred	28	37.3

Table 4: The clinical profile of mothers.

Variable	*Mean ± SD*	
Pulse rate (n= 66)	103 ± 28.3	
	Non-recordable	9(12%)
Respiratory rate (n=57)	23.2 ± 10.9	
	Non-recordable	18 (24%)
Systolic BP (n=62)	121 ± 29.9	
	Non-recordable	13 (17.3%)
Diastolic BP (n= 60)	76.7 ± 21.2	
	Non-recordable	15(20%)
SPO2 (n= 66)	88.2 ± 16.1	
	Non-recordable	9(12%)
The time gap between delivery to death	97 ± 156	
<24 hours	24	32%
1-6 days	24	32%
>6 days	27	36%

United nations sustainable development goals to reduce maternal mortality ratio to less than 70 per 100 000 live births to be achieved by 2030. The present study has a comparatively higher MMR which could be because our hospital is a tertiary care hospital with connections to many rural places where difficult to access primary care and even though the availability of improved services is there we had more maternal mortality in our place. Many other studies from tertiary care hospitals reported an MMR of 66 to 1124 per 1,00,000 live births [9-12].

The estimated tertiary care hospital data may be more compared to primary or secondary care hospital data as a reference of high-risk women for delivery and women with development of life-threatening complications will be more and which will be very late to address and thus add to increase in-hospital deaths.

The present study revealed that 32% of MMR was due to hypertensive disorders during pregnancy, 23% of MMR due to non-obstetric complications and 21% because of obstetric complications. Other studies have shown varied causes for MMR. Behuria S [11] reported that 37% of MMR was due to hypertensive disorders of pregnancy and 18.5% was due to indirect obstetric causes which is comparable to our study. This result was similar to the other studies findings [9, 10, 12-15], which showed 60% to 68.7% of MMR was due to direct obstetric causes. The pregnancy diagnosed with eclampsia can be treated as an emergency and can plan for early termination of pregnancy using magnesium sulphate and more importance should be given to early diagnosis of PIH to prevent maternal deaths due to it. The decrease in death due to bleeding or haemorrhage is mainly ascribed to skilled birth attendant (SBA) training for all staff nurses and the availability of effective oxytocic.

In our study, the majority of maternal deaths (73%) occurred in the age group of 21- 30 years followed by 19% MMR in less than 21 years with a mean age of 24.5 ± 4.45 years. Yerpude et al [2] found that the age group in which most (74.36%) maternal deaths occurred was 21-30 years, followed by <20 years (15.38%) and >30 years age groups (10.26%). Similarly, Behuria S et al [14] reported that 66.6% of MMR occurred in the age group of 21-29 years. Most of the studies showed a similar incidence of MMR with the age of the mother as most of the pregnancies occur during that age group only. A study done in Nigeria by Akaba GO et al [16], reported that 57.7% of maternal deaths have occurred in the age group 25-34 years, so this may be because of the comparatively more occurrence of pregnancy during that age group. Maternal deaths occurred more among primi para (66.7%) in our study. This may be attributed to the less knowledge among primi mothers. And in the present study, 70.7% of pregnancies were unbooked cases. Lack of education or awareness regarding antenatal care among mothers may find it difficult to identify danger signs, have poor health-seeking behaviours and sometimes need approval from the husband or head of the family to access health care which may be denied due to poverty or lack of education. Hence they may present late to health care facilities for check-ups and land up in complications. This is supported by previous studies [17-19].

It is regrettable to note that 62.7% of the cases were referred from primary or secondary care centres, likely, that the interventions at primary health centres are not yielding fruitful results or the women are reaching late to primary health centres and getting delayed in referral leading to death. This conforms with previous reports from Andrapradesh and Maharastra [18, 19]. In the present study 68% of mothers were anaemic. Singh NP et al [18] confirms a similar result (66.7% are anaemic). Anaemia is one of the preventable causes and can be easily managed at the primary health centre or secondary health centre by the provision of proper antenatal care with the help of grassroots healthcare workers in the form of Iron Folic acid tablets administration and making the diagnosis of high-risk pregnancy at the earliest. Also, the screening is a critical step for early diagnosis and treatment. 32% of MMR occurred within 24 hours and 32% within 6 days and the rest of the deaths after 6 days. It becomes apparent that many of the deaths that occurred could have been avoided if they had been transferred earlier further highlighting the need for adequate and quick transport facilities.

Many studies have depicted the 3-D delay model that the delays at every step had increased the probability of maternal deaths, which is a dreadful scenario. Efficient health professionals are most needed to diagnose and prevent complications during intra and postpartum periods for the prevention of level 1 delay. To do this primary health centres should have the facility to screen the risk factors at the earliest and treat them [20, 21].

At the same time health professional's knowledge of treating high-risk pregnancies and referral facilities, and when to refer is of utmost importance to prevent maternal deaths. And this becomes level 2 prevention. The strengthening of the policies of government and institutions could help to avoid delay in transportation either from home to hospital or from one institution to another. Access to health care facilities mainly primary care and the presence of blood and blood products at primary care becomes the 3rd level of prevention.

"Reducing maternal mortality remains one of the most pressing global health challenges," said John Wilmoth, Director of the Population Division of the Department of Economic and Social Affairs. Ending preventable maternal deaths and providing universal access to quality maternal health care require sustained national and international efforts and unwavering commitments, particularly for the most vulnerable populations. It is our collective responsibility to ensure that every mother, everywhere, survives childbirth, so that she and her children can thrive [22].

Limitations: This was a retrospective cross-sectional study for only 2 years duration, hence there may be chances of missing data are there. A prospective study will always yield better results for the definitive causes of maternal mortality. Our country is a developing nation, the findings may vary from urban to rural places, state to state and, therefore have less external validity.

Conclusion

Every pregnancy should crown in a healthy mother and healthy baby and for this, we should make sure that all women have access to high-quality essential and emergency obstetric care along with an advancement of overall safe motherhood. To reduce maternal mortality, the crucial work starts at the grassroots level. Proper training and retraining of primary care providers and family physicians for identifying the risk factors, recognising the danger signs, and acquainting them with up-to-date knowledge are most important for the management of maternal mortality by early referral and prompt treatment. Most deaths could have been prevented with the help of early referral, quick efficient transport facilities and the availability of blood and its products.

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Conflicts of interest

There are no conflicts of interest.

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