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Original Research Article

Review of maternal mortality in a tertiary care urban teaching hospital: 10 year retrospective study

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ABSTRACT

Background: The objectives of this study were to calculate the maternal mortality ratio, causes for maternal death in our institution and the duration of hospital admission to death interval.

Methods: The study included collecting and analyzing the details of maternal death in women who were admitted to St. Johns Medical College Hospital, Bengaluru, from January 2007 to December 2016.

Results: Total maternal deaths were 61 and live births were 26,001 during the study period. The maternal mortality ratio (MMR) was 234.6 per 100,000 live births. Majority of maternal deaths occurred in women aged 18 - 35 years 56 (91.80%) women, primipara 45 (73.77%) and referred cases to our institution from other hospitals 52 (85.24%). Most of the women died in the postnatal period 54 (88.52%). Direct obstetric causes accounted for 44 (72.13%) maternal deaths and indirect causes 17 (27.86%) deaths. Preeclampsia and eclampsia were the leading causes for death 13 (21.31%) followed by acute fatty liver of pregnancy 12 (19.67%), hemorrhage 7 (13.11%) and sepsis 6 (9.83%). Anemia was present in 77.04% of women at the time of admission to our hospital. Thirty six (59.01%) women died within a week of admission to the hospital, in which 13 (21.31%) women died in less than 24 hours of admission. Twenty five (40.98%) women died after a week of admission to hospital.

Conclusions: Apart from the triad of preeclampsia, obstetric haemorrhage and sepsis, acute fatty liver of pregnancy has emerged as an important cause of maternal death. Most of the maternal deaths are preventable. Early detection of complications and timely referral to tertiary care hospital in St. Johns Medical College Hospital, Bengaluru, Karnataka, India decreases maternal morbidity and mortality.

Keywords: Acute fatty liver of pregnancy, MMR, Preeclampsia, Obstetric haemorrhage, Sepsis

INTRODUCTION

Childbirth is a memorable event in a woman's life. It can turn into nightmare in no time. Hence the term normal delivery is a retrospective diagnosis. Maternal death has a devastating effect on the family especially for her surviving new born and other children.

According to WHO, a maternal death is defined as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by pregnancy or its management but not from accidental

or incidental causes.¹ Maternal mortality ratio (MMR) is defined as number of maternal deaths during a given time period per 100,000 live births during the same time-period.¹ MMR in India is 130 per 100,000 live births in 2014-2016.² The important causes for maternal mortality according to 1997-2003 SRS survey are hemorrhage (38%), sepsis (11%), hypertension (5%), abortion (8%), obstructed labor (5%) and other conditions (34%). Anemia (19%) is a leading cause of death and also an aggravating factor in hemorrhage, preeclampsia and sepsis.³

MMR indicates healthcare situation and health care

policy of a country. India is one of the countries with high maternal mortality rate. Goal of SDG is to reduce MMR to 70 by 2030.⁴ At present India's MMR is on declining trend as per goal set by MDG5.^{2,5}

In this review we studied the maternal deaths in our institutions and measures to prevent the same.

METHODS

The study was conducted at St. Johns Medical College and Hospital (SJMCH), Bengaluru, which is a tertiary care center catering patients from Bengaluru, other districts of Karnataka and neighboring states of Andhra Pradesh, Telangana and Tamil Nadu. The study included collecting and analyzing the details of maternal death in women who were admitted to St. Johns Medical College Hospital, Bengaluru, from January 2007 to December 2016. Antenatal, labor records, ICU records, operative notes and death records were reviewed. Demographic variables like age, parity, gestational age, delivery details, complications, any interventions, causes of death and admission to death interval were studied. We excluded maternal deaths occurring 42 days after termination of pregnancy and due to accident, homicide or suicide.

Statistical analysis

Data will be presented as descriptive statistics including mean and percentage.

RESULTS

During the study period there were 26,001 live births and 61 maternal deaths. Maternal mortality ratio was 234.6/100,000 live births.

In the present study the maximum number of maternal deaths 56 (91.80%) occurred in the age group of 18-35 years. Majority were primipara 45 (73.77%) (Table 1). Most of the women 52 (85.24%) were referred to our institution from other hospitals. Two pregnant women were booked regularly at our institution (3.27%), one had severe preeclampsia with pulmonary edema and another had auto immune hepatitis with liver cirrhosis. Three (4.91%) women were unbooked.

Fifty four (88.52%) women died in the postnatal period. There were 3 undelivered women (4.91%). Most of them had vaginal delivery 28 (45.90%) (Table 1). The major causes of death were direct obstetric causes 44 (72.13%) (Table 2). Preeclampsia and eclampsia 13 (21.31%), acute fatty liver of pregnancy 12 (19.67%), obstetric hemorrhage 7 (13.11%) and sepsis 6 (9.83%) accounted for important direct causes of death. Seventeen women (27.86%) died due to indirect causes. Most common indirect causes of death were viral hepatitis 3 (4.91%), cardiac diseases 3 (4.91%), H1N1 influenza 3 (4.91%) and leukemia 2 (3.27%). Anemia was present in 77.04% of patients at the time of admission to our hospital.

Table 1: Demographic details.

| Characteristics | Number (%) n=61 |
|---|-----------------|
| Age (years) | |
| <18 | 1 (1.63) |
| 18-35 | 56 (91.80) |
| >35 | 4 (6.55) |
| Parity | |
| Primipara | 45 (73.77) |
| Multipara | 13(21.31) |
| Grandmulti | 3 (4.91) |
| Booking status | |
| Booked at institution | 2 (3.27) |
| Late booking (3 rd trimester) at institution | 4 (6.55) |
| Unbooked | 3 (4.91) |
| Referred from elsewhere | 52 (85.24) |
| Delivery status | |
| Total delivered women | 54 (88.52) |
| Delivered at our institution | 33 (54) |
| Delivered outside | 21 (34.4) |
| Abortions | 4 (6.55) |
| Undelivered | 3 (4.91) |
| Mode of delivery | |
| Vaginal | 28 (45.90) |
| Instrumental | 2 (3.27) |
| LSCS | 24 (39.34) |

Table 2: Causes for maternal death.

| Causes of death | Number (%) n=61 |
|--------------------------------|-------------------|
| Direct causes | 44 (72.13) |
| Preeclampsia and eclampsia | 13 (21.31) |
| Acute fatty liver of pregnancy | 12 (19.67) |
| Obstetric hemorrhage | 7 (13.11) |
| Sepsis | 6 (9.83) |
| Peripartum cardiomyopathy | 2 (3.27) |
| Pulmonary thromboembolism | 2 (3.27) |
| Incomplete abortion | 1 (1.63) |
| Molar pregnancy | 1 (1.63) |
| Indirect causes | 17 (27.86) |
| Viral Hepatitis | 3 (4.91) |
| Cardiac diseases | 3 (4.91) |
| H1N1 influenza | 3 (4.91) |
| Leukemia | 2 (3.27) |
| Portal hypertension | 1 (1.63) |
| Dengue fever | 1 (1.63) |
| Immune thrombocytopenia | 1 (1.63) |
| Chronic liver disease | 1 (1.63) |
| Anaphylactic shock | 1 (1.63) |
| Hemolytic uremic syndrome | 1 (1.63) |

Admission to death interval analysis showed that most women 36 (59.01%) died within a week of admission to our hospital, among these 13 (21.31%) women died in less than twenty fours of admission. Twenty five

(40.98%) women died after a week of admission to the hospital (Table 3).

Table 3: Admission to death interval

| Admission to death interval | Number (%) n = 61 |
|-----------------------------|-------------------|
| <24 hours | 13 (21.31) |
| 24 - 72 hours | 11 (18.03) |
| 4 - 7 days | 12 (19.67) |
| >7 days | 25 (40.98) |

All of them received ICU care and supportive treatment. As seen from Table 4, 23 (37.70%) patients received multiple blood and blood product transfusion and 19 (31.1%) patients underwent dialysis. Various surgical intervention in the form of B-Lynch suture 5 (8.19%), relaparotomy 4 (6.55%), hysterectomy 3 (4.91%), tracheostomy 3 (4.91%), and hemicraniotomy 2 (3.27%) were done.

Table 4: Interventions performed.

| Interventions | Number (%) n = 61 |
|--|-------------------|
| Multiple blood and blood products transfusions | 23 (37.70) |
| Dialysis | 19 (31.14) |
| B-Lynch suture | 5 (8.19) |
| Relaparotomy | 4 (6.55) |
| Hysterectomy | 3 (4.91) |
| Tracheostomy | 3 (4.91) |
| Hemi-craniotomy | 2 (3.27) |

DISCUSSION

The MMR of our institution is 234.6 per 100,000 live births. It is high compared to national MMR which is 130 per 100,000 live births. Our institution being a tertiary care center is the reason for high MMR. Other studies show varying rate of MMR: Khumanthem et al, is 90.45, Hiralal K et al is 147, Rajeshwari et al is 544, Jadhav CA et al, is 395, Saini V et al, is 358.69, Shannon Fernandes et al, is 144.86.⁶⁻¹¹

The maximum number of maternal death 56 (91.80%) occurred in the age group of 18-35 years which is comparable to other studies.⁹⁻¹¹ In contrast a study by Khumathem et al, shows highest maternal death in the age group of 30-40 years.⁶ In our study primipara were 45, accounting for 73.77% of deaths and grandmulties were 3 (4.91%). In contrast other two studies multipararous women accounted for 75% and 64.78% of maternal death.^{6,10} In the same studies grandmulties had a considerable share of 20% and 19.71% in maternal deaths.^{6,10} This shows that pregnancy of any order carries the risk of morbidity and mortality. Hence all pregnancies need equal attention and care.

In our study 52 (85.24%) women were referred to our institution from other hospitals. It is similar to other

studies: 68.8% and 73.8%.^{8,11} Many women had two to three referrals and admissions in other hospitals before reaching our institution wasting precious time.

In our study 3 (4.91%) patients were unbooked and rest all were booked. Only 2 patients were regularly booked in our institution. It is comparable to a study by Jadhav CA et al, where 78.48% of patients were booked.⁸ Studies by Khumanthem et al, and Shannon et al, shows only 22.5% and 26.2% patients were booked respectively.^{6,11} This shows that not just booking but early detection of risk factors, suitable action and timely referral are very important to decrease morbidity and mortality.

Most of the deaths occurred in the postpartum period 54 (88.52%) which is comparable to other studies - 69.2%, 66.1% and 80.95%.^{8,10,11} Some complications may appear during labor or postpartum period, hence intense monitoring is needed in the fourth stage of labor and postpartum period.

Direct obstetric causes were responsible for 44 (72.13%) deaths. This is similar to other studies.⁶⁻¹⁰ Preeclampsia and eclampsia were the leading cause for death 13 (21.31%) followed by acute fatty liver of pregnancy 12 (19.67%), hemorrhage 7 (13.11%) and sepsis 6 (9.83%). Seventeen women (27.86%) died due to indirect causes. Most common indirect causes of death were viral hepatitis 3 (4.91%), cardiac diseases 3 (4.91%), H1N1 influenza 3 (4.91%) and leukemia 2 (3.27%). Anemia was present in 77.04% of patients at the time of admission to our hospital. Triad of haemorrhage, preeclampsia and sepsis constituted the main causes of death in all studies.⁶⁻¹¹ Early detection of preeclampsia, monitoring, use of antihypertensives and magnesium sulphate and timely delivery prevents major maternal morbidity and mortality. The deaths due to preeclampsia related cases in our study mainly occurred due to failure to detect associated complications, timely termination of pregnancy and delayed referral to tertiary care centre. Detection of antepartum hemorrhage and further management, referral to tertiary care center, active management of third stage of labor, detection of postpartum hemorrhage, use of oxytocics, intravenous fluids, blood and blood products and appropriate surgical intervention prevents many haemorrhage related maternal deaths. The women who died of hemorrhage related cause have reached our institution very late or in the stage of irreversible shock. Management of acute fatty liver of pregnancy includes delivery, use of blood and blood products and supportive treatment in intensive care unit. In our institution maternal mortality and morbidity were high in case of acute fatty liver of pregnancy despite above measures.

Admission to death interval analysis showed that most of the women died within a week of admission 36 (59.01%), among these 13 (21.31%) women died within twenty four hours of admission to hospital. Twenty five (40.98%) women died after a week. In contrast other studies

showed early death: 60%, 46.83% and 35.7% within 24 hours of admission.^{6,9,11} In one study 38.1% women died after 72 hours.¹¹ Availability of good ICU care with multidisciplinary team and blood bank facility in our institution has prolonged the admission to death interval. All patients received ICU admission, supportive care and interventions when required. All these measures have prolonged the life compared to other studies. These facilities have prevented death in many women. We have also observed discharge against medical advice of the patients by relatives in case of poor prognosis and prolonged duration of ICU stay.

CONCLUSION

Many causes of maternal morbidity and mortality are preventable. Regular antenatal care, early detection of high risk factors, complications and timely intervention and referral to a tertiary care hospital and institutional delivery is needed. Detection of obstetric hemorrhage and hypertensive disorders of pregnancy and appropriate management of the same saves many lives. Aseptic precautions during operative procedures, use of antibiotics and proper operative technique will minimize sepsis. Women should be educated about availability of medical termination of pregnancy services, which prevents unsafe abortions. Detection of early pregnancy complications and proper management decreases maternal deaths. Maternal death should be reviewed in hospitals and pitfalls in the management have to be discussed without blame. Confidential enquiry of maternal death is needed at the state level. Nutrition, hygiene, education and empowerment of the girl child and women are the need of the hour. Late marriage, contraceptive use, spacing pregnancy and limiting family size decreases maternal death considerably. Apart from medical intervention, social, cultural, education, financial factors, public transport, availability of twenty four hours blood bank facility even at periphery and infrastructure plays crucial role in decreasing maternal death. Sincere implementation of the existing health care policies has a huge impact on improving the health status of the population, thus in turn decreasing the maternal morbidity and mortality.

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