An epidemiological study of mortality among mothers admitted in a rural tertiary hospital of West Bengal

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ABSTRACT

Background: Maternal mortality reflects the quality of obstetric services given to pregnant women in the community. Objectives: The objectives of this study were to calculate the maternal mortality rate in a teaching institution, to assess the epidemiological aspects of maternal mortality, and to assess the different causes of maternal mortality. Materials and Methods: This was a retrospective study where individual records of all maternal deaths occurring in our hospital during the past 6 years from 2009 to 2014 were studied. The cause of death and the factors which led to death in each individual case were analyzed. Results: A total of 105 maternal deaths occurred during the study period. The mean maternal mortality ratio in the study period was 233/100,000 live births. Most maternal deaths (37.14%) occurred in the age group of 20–24 years, multiparous women (74.28%) and in women from rural areas (70.47%). Most of the women were unbooked or unregistered patients (64.76%), and 40.95% cases were referred cases. Direct causes accounted for 90.47% of maternal deaths whereas 9.52% of maternal deaths were due to indirect causes. Hemorrhage (26.6%) and eclampsia (27.6%) were the major direct causes of maternal deaths. Conclusion: There is scope for improvement as a large proportion of the observed deaths are preventable. Improving the rural health centers, upgrading the referral centers, and proper transport system is the need of the hour.

Keywords: Eclampsia, hemorrhage, maternal deaths, maternal mortality ratio

Introduction

“A maternal death is defined as 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” (World Health Organization; International Classification of Disease-10). The global maternal mortality ratio (MMR) was 210 maternal deaths per 100,000 live births in 2013, which had reduced down from 380 maternal deaths per 100,000 live births in 1990.[1]

The United Nation (UN) report card on the Millennium Development Goal (MDG)-5 concluded that little progress had been made in sub-Saharan Africa where half of all maternal deaths take place. The progress shown by the South Asian countries including India which accounts for 25% of all maternal deaths is also not impressive.[3] MMR is still high in India though it is decreasing with time. In 2010, India had MMR of 200/100,000 live births[4] while the MMR in 2010–2012 was 178 per 100,000 live births.[5]

This study was done in a tertiary medical college hospital situated in rural part of West Bengal to assess maternal mortality where a large number of patients are referred from surrounding rural areas. This study also explores the local causes of maternal mortality and suggests measures to reduce the same.

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How to cite this article: Bhadra B, Choudhury RR, Sarkar D, Sarkar S. An epidemiological study of mortality among mothers admitted in a rural tertiary hospital of West Bengal. J Family Med Prim Care 2017;6:270-3.
Materials and Methods

Aims and objectives

The aims and objectives of this study were as follows:

- To calculate the maternal mortality rate in a teaching institution
- To assess the epidemiological aspects of maternal mortality
- To assess the different causes of maternal mortality.

Our hospital is a rural tertiary care center situated in West Bengal where a large number of patients are referred from district hospitals, primary health centers, and surrounding rural parts. The present study was a 6-year retrospective descriptive study, conducted in the department of obstetrics and gynecology of this hospital. Data regarding maternal mortality were collected from maternal mortality register from January 2009 to December 2014 after obtaining permission from the medical superintendent of the hospital. The details of maternal deaths were collected and analyzed with a view to know the avoidable risk factors.

Direct causes of maternal death included hemorrhage, eclampsia/pregnancy-induced hypertension (PIH), sepsis, ectopic pregnancy, embolism, and other causes (rupture uterus, retained placenta, inversion of uterus, etc.). Indirect causes included anemia, jaundice, heart disease, and miscellaneous causes (fever, carcinoma of cervix/ovary with pregnancy, rupture of ovarian cyst with pregnancy, anesthetic cause, etc.).

Results

During our study period, January 2009 to December 2014, there were a total of 45,052 live births and 105 maternal deaths. The mean MMR in the study period was 233/100,000 live births. Table 1 shows year-wise maternal mortality. The epidemiological characteristics of maternal deaths are shown in Table 2.

Maximum maternal deaths (37.14%) were reported in the age group of 20–24 years. More deaths were reported in multiparous women (74.28%) as compared to primiparas (25.71%). Majority of maternal deaths were reported in women from rural areas (70.47%) as compared to women from urban areas (29.5%). Out of 105 maternal deaths, 43 (40.95%) were referred cases from health centers, district hospitals, etc., Maximum maternal deaths were reported in unbooked patients (64.76%) as compared to booked patients (35.23%).

In the study period, 90.47% of maternal deaths were due to direct causes. Year-wise distribution of direct causes of maternal deaths is shown in Table 3. Hemorrhage (26.6%) and eclampsia/PIH (27.6%) were the major direct causes of maternal deaths.

In the study period, 9.52% of maternal deaths were due to indirect causes. Anemia and heart disease accounted for 4.76% and 3.8% of maternal deaths, respectively, as shown in Table 4.

Discussion

Maternal mortality reflects the quality of obstetric services given to pregnant women in the community. MMR is still high in India and appropriate steps need to be taken at grassroot level.

Increased coverage of skilled birth attendance and delivery in facilities properly resourced for emergency obstetric care is essential for prevention of the maternal deaths. High incidence of maternal deaths reflects poor quality of maternal services, late referral, and low socioeconomic status of the community.

The mean maternal mortality rate in the study period was 233/100,000 births. The MMR in India is 178/100,000 live births (2013). Various studies done in India in the past 15 years have shown a wide variation in MMR ranging from 47/100,000 to 625/100,000 births. Our study has comparatively high MMR, which could be due to the fact that our hospital is a tertiary care hospital and receives a lot of complicated referrals from rural areas and often at a very late stage. In West Bengal, MMR was 117/100,000 live births in 2013–2014. However, the maternal deaths vary in districts from 31% to 235%.

| Year | Total births | Live births | Maternal deaths | MMR/100,000 live births |
|------|--------------|-------------|----------------|------------------------|
| 2009 | 8631         | 8525        | 18             | 211                    |
| 2010 | 7672         | 7288        | 22             | 302                    |
| 2011 | 7772         | 7564        | 9              | 118                    |
| 2012 | 7573         | 7390        | 21             | 277                    |
| 2013 | 7029         | 6901        | 11             | 156                    |
| 2014 | 7564         | 7384        | 24             | 317                    |
| Total| 46,241       | 45,052      | 105            | 233                    |

Table 1: Year-wise maternal mortality

| Patient characteristics | n (%) |
|-------------------------|-------|
| Age (years)             |       |
| <20                     | 4 (3.8)|
| 20-24                   | 39 (37.14)|
| 25-29                   | 32 (30.47)|
| 30-34                   | 27 (25.71)|
| >35                     | 3 (2.85)|
| Parity                  |       |
| Primipara               | 27 (25.71)|
| Multipara               | 78 (74.28)|
| Area                    |       |
| Rural                   | 74 (70.47)|
| Urban                   | 31 (29.5)|
| Referred                | 43 (40.95)|
| Inpatient               | 62 (59.04)|
| Booked                  | 37 (35.23)|
| Unbooked                | 68 (64.76)|

Table 2: Epidemiological characteristics of maternal deaths
Table 3: Year-wise distribution of direct causes of maternal deaths

| Year | Direct causes | Hemorrhage (APH/PPH) | Eclampsia/PIH | Sepsis | Embolism | Others |
|------|---------------|-----------------------|---------------|--------|----------|--------|
| 2009 | 16            | 5                     | 6             | 2      | Nil      | 1      |
| 2010 | 20            | 6                     | 7             | 3      | 1        | 1      |
| 2011 | 6             | Nil                   | 1             | 2      | Nil      | Nil    |
| 2012 | 21            | 9                     | 4             | 1      | 1        | 4      |
| 2013 | 9             | 3                     | 1             | Nil    | 1        | 1      |
| 2014 | 23            | 5                     | 10            | 2      | 3        | 1      |
| Total| 95            | 28                    | 29            | 10     | 6        | 8      |

Table 4: Year-wise distribution of indirect causes of maternal deaths

| Year | Indirect causes | Anemia | Jaundice | Heart disease | Miscellaneous |
|------|-----------------|--------|----------|---------------|---------------|
| 2009 | 2               | 2      | Nil      | Nil           | Nil           |
| 2010 | 2               | Nil    | Nil      | 1             | 1             |
| 2011 | 3               | 2      | Nil      | 1             | Nil           |
| 2012 | Nil             | Nil    | Nil      | Nil           | Nil           |
| 2013 | 2               | Nil    | 2        | Nil           | Nil           |
| 2014 | 1               | 1      | Nil      | Nil           | Nil           |
| Total| 10              | 5      | 4        | 1             |               |

In our study, 68% of maternal deaths were in the age group of 20–29 years as a highest number of births are reported in this age group. This is concomitant with the prevailing custom of early marriage in rural areas.11

About 74.28% of maternal deaths were reported in multiparous patients. More maternal deaths were reported in women from rural areas (70.47%) and unbooked patients (64.76%). Our findings were similar to studies by Murthy,6 Jadhav,9 Pal,8 Onakewhor,10 and Mukherjee.13

In our study, 90.47% of maternal deaths were due to direct causes. Hemorrhage (26.6%) and eclampsia (27.6%) were the major direct causes of maternal deaths. Our findings were consistent with studies by Murthy,6 Jadhav,9 Onakewhor,10 and Shah.11 In a systematic review by the World Health Organization, hemorrhage was the leading cause of maternal death in Africa and Asia at 33.9% and 30.8%, respectively.14 Maternal death review meetings conducted monthly in the institution analyzed the cause of deaths and the steps needed to prevent such deaths. It was observed that many of these deaths were preventable if patients were given appropriate treatment at periphery and timely referral to higher centers was done. The 24 h cesarean section facility and blood bank facility are not available in few peripheral centers which lead to delay in patient treatment. Delay in the arrangement of transport of patients to our center and the reluctance of patient attendants in giving consent for operation also added to the delay of treatment. Awareness regarding antenatal checkup is essential as most of the deaths occurred in unbooked cases.

Training of medical officers and staff nurses working in rural areas by programs such as basic emergency obstetrics care and skilled attendant at birth training gives a ray of hope of reducing maternal mortality. Maternal deaths can be prevented by improving the health-care facilities in rural areas by ensuring continuous availability of certain basic drugs such as injection magnesium sulfate and tablet misoprostol as most maternal deaths in rural areas are still due to eclampsia and postpartum hemorrhage.4 Blood banks should also be available in the rural health centers. Provision of 24 h ambulance services for transportation of patients should be seriously considered. Roads of rural areas should be well connected to the nearby towns. Proper health education and iron supplementation should be started in schools itself to reduce the incidence of anemia.

The Reproductive and child health program (1997), National Rural Health Mission in 2005, etc., were few government programs to improve basic health-care delivery system. At present, Janani Shishu Suraksha Karyakram, a central Government-sponsored program, is running in states to increase institutional deliveries. Delivery in institutional facilities has risen from 26% in 1992-1993 to 72% in 2009. The MDG was established in the UNs in 2000. One of the targets was to reduce MMR by three-quarters (75%) between 1990 and 2015 and also to achieve, by 2015, universal access to reproductive health.15 Since MDG could not be achieved, new post-2015 target (sustainable development goal) has been set up. By 2030, all countries should reduce MMR by at least two-thirds of their 2010 baseline level. The average global target is an MMR of <70/100,000 live births by 2030. The supplementary national target is that no country should have an MMR >140/100,000 live births (a number twice the global target) by 2030.16

**Conclusion**

There is scope for improvement as a large proportion of the observed deaths are preventable. Early detection of high-risk pregnancies and early referral of such patients to a tertiary center can reduce the complications of high-risk pregnancies. Improving the rural health centers, upgrading the referral centers, and proper transport system is the need of the hour.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.
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