Original Research Article

Maternal mortality at a tertiary care teaching hospital of India: a retrospective study

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Abstract

Introduction: Pregnancy, carries risk of maternal mortality due to various complications that may arise during pregnancy, labour and thereafter. **Objectives**: To assess the causes of maternal death over a period of three years at a tertiary care teaching hospital at Kolkata, India. **Methods**: A retrospective hospital based study of maternal deaths over a period of 3 years from January 2015 to December 2017. The information regarding demographic profile and reproductive parameters were collected and results were analyzed. **Results**: Over the study period, there were 25,498 live births, and 81 maternal deaths, giving MMR of 317/1,00,000 live births. Pre-eclampsia/eclampsia was the leading direct cause while liver disease was leading indirect cause. **Conclusions**: Maternal deaths are preventable by early identification of high risk pregnancies, standard treatment and their timely referral to higher centre.

Keywords: Maternal mortality, Eclampsia, Maternal death

Introduction

Maternal mortality or death is defined (as cited in International Classification of Diseases or ICD-10 [WHO, 1992]) is the death of a woman while pregnant or within 42 completed days of termination of pregnancy, irrespective of the duration or site of pregnancy, and can arise 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 internationally, as maternal death rate per 1,00,000 live births and calculated as:

$$\frac{\text{All maternal deaths occurring within a reference period (usually 1 year) x100,000}}{\text{Total no. of live births occurring within the reference period}}$$

Traditionally India had avery high MMR; MMR was 1000 per 1,00,000 live births by 1959; it dropped down to 540 per 1,00,000 live births in 1999 [2]. Currently it is estimated to be 167 per 1,00,000 live births (2011-2013, NItiAyog data) [3, NitiAyog] which is still above the target of 100 per 1,00,000 live births as per the objectives of Millennium Development Goals (MDGs) [1].

The most common causes of maternal mortality worldwide are postpartum bleeding (15%), complications from unsafe abortion (15%), hypertensive disorders of pregnancy (10%), postpartum infections (8%), and obstructed labour (6%).Causes of all Maternal deaths fall into two groups:

Direct obstetric deaths: Direct obstetric deaths result from obstetric complications of the pregnancy, from interventions, omissions, incorrect treatment, or resulting from any of the above.

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Indirect obstetric deaths: result from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by pregnancy [1,2,4].

The aim of the present study was to review the causes of maternal death at a tertiary care teaching hospital of Kolkata, India. This study tries to evaluate changing patterns in the causes of maternal deaths over 3 years.

Previously known causes of MMR are replaced by different causes. The reasons behind these changes need to be evaluated and should be published in scientific journals.

Material and Methods

Place of study: The Department of Obstetrics and Gynaecology, NRS Medical College, Kolkata which is a tertiary level health care facility over a period of three (3) years from January, 2015 to December, 2017.

Type of study: A retrospective hospital based study.

Sample collection: A total 81 maternal deaths were noted from hospital records and analyzed depending on causes of deaths, demographic profiles of the patient, parity, admission to death time interval

Statistical methods: Results were analyzed by using percentage and proportion.

Inclusion criteria: All maternal deaths that were recorded included in this study.

Results

It is observed from table 1 that out of total 81 deaths, 49(60.5%) were in the age group of 19-29 years followed by 12(14.8%) deaths in 19 yrs or<19 years & 20(24.7%) at or over the age of 30 years. Majority of maternal deaths (67.9%) belonged to lower class, followed by (8.6%) from the upper class. Majority (62.9%) had only *primary* education.

Table-1: Distribution of maternal deaths according to demographic profiles (n= 81).

Demographiccharacteristics	No. of Maternal Deaths	Percentage
Age		
</=19 yrs	12	14.8%
19 yrs -29 yrs	49	60.5%
30 yrs and above	20	24.7%
Residence		
Urban	20	24.7%
Rural	61	75.3%
Socio-economic status		
Lower	55	67.9%
Middle	19	23.5%
Upper	7	8.6%
Education		
Illiterate	20	24.7%
Primary education	51	62.9%
Higher education	10	12.4%

It is evident from table 2, out of total 81 deaths, 18 (22.22%) primigravidas, 63 (77.78%) were multigravidas, and 9 (3.51%) were grand multipara. Maximum deaths (70.37%) have occurred to mothers who were registered at hospitals other than NRSMCH. Majority (74.09%) deaths occurred in post-partum period. As observed from table 3, out of 81 deaths, 15 (18.6%) women died within 6 hour of admission and 9 (11.1%) died between 6 hrs to less than 24 hours of admission. It is also seen from table 3 that, 36 (44.4%) women died between 24 hours to less than 7 days of admission and 21 (25.9%) after 7 days of admission.

Table-2: Distribution of maternal deaths by delivery related characteristics

Variables	No. of Maternal Deaths	Percentage
Time interval from admission to death(n= 54)		
< 6 hrs.	15	18.6%
>6 hrs to <24 hrs	9	11.1%
>24 hrs to < 7 days	36	44.4%
>7 days	21	25.9%
Place of delivery(n=64)		
Tertiary centre	26	40.6%
Dist/SD hospitals	15	23.4%
PHC/RH	3	4.7%
Private institutions	17	26.6%
Home	3	4.7%
Delivery Status (n= 81)		
Antenatal	17	20.98%
Post-Partum	60	74.09%
Abortion	04	4.93%
Antenatal Registration(n= 81)		
Registered at NRS MCH	21	25.92%
Registered at other hospitals	57	70.37%
Un-booked	3	3.71%
Parity(n=81)		
Primigravidae	18	22.22%
Multigravidae	63	77.78%

Table-3: Causes of Maternal Deaths (n= 81)

Causes of Death	No. of Maternal Deaths	Percentage
Direct causes(56)		
1.Haemorrhage	14	17.28%
2.Eclampsia/PIH	27	33.33%
3.Sepsis	13	16.06%
4.Embolism	2	2.47%
Indirect causes(25)		
1.Anaemia	1	1.24%
2.Liver diseases	12	14.81%
3.Heart diseases	10	12.34%
4.Infections(Malaria/Encephalitis)	2	2.47%

As evident from Table 3, direct causes responsible for 56(69.13%) and indirect causes contributed to 25 (30.87%) of maternal deaths. Amongst the direct causes, 14 (17.28%) were due to hemorrhage. Eclampsia/PIH responsible for 27(33.33%) and sepsis responsible for 13 (16.06%) deaths.Embolism accounted for only 2 (2.47%) of the deaths. Amongst the indirect causes, Hepatitis and liver failure accounted for 12 (14.81%) deaths; heart disease for 10 (12.34%) deaths; Infections including malaria/viral encephalitis responsible for only 2 (2.47%) deaths and anemia for 1 (1.24%) death.

Discussion

Death of a mother has profound impact on the family, community and on overall national health picture. Reduction of maternal mortality is the objective of MDGs. In the present study, there were 81 maternal deaths amongst 25,498 live births, giving a MMR of 317.6 per 1,00,000 live births, which is higher than the national averages.

NRS Medical College, Kolkata, being a teaching institution and a tertiary care centre, used to get complicated cases from vast areas of West Bengal. Admissions of high risk moribund cases referred from peripheral institutions have inflated this mortality ratio. Other similar studies from tertiary care institutions reported MMR ranged between 213 to 879 per 1,00,000 live births [3,5,6].

In the present study, Maximum deaths 49 (60.5%) were in the age group of 19-29 years, followed by 20 (24.7%) deaths in & over the age of 30 years and 12 (14.8%) below the age of 19 years.

It indicates that age of marriage is increasing for women and teenage pregnancies are reducing in number. Kaur et al [7] revealed that 51.8% of deaths in 20- 30 years, 23.3% in >30 years; Taneja P [8] showed that 78% of deaths in 20-30 years; Sengupta et al [5] observed that 61% of deaths in 20-29 years, 28.62% of deaths in >30 years and only 9.94% deaths in <19 years; Dogra et al [9] revealed that 48% deaths in 20–25 years while 10.3% in >30 years.

The reduction in the number of deaths in women <19 years of age is partly due to spreading of women education and women empowerment thus increasing the age of marriage and partly due to availability of specialist doctors for legal medical terminations, thus reducing the number of criminal abortions and subsequently the deaths associated with its complications.

In the present study, out of the 81 deaths, 18 (22.22%) deaths were among primigravidas and 63 (77.78%) among multigravidas, almost similar to that reported by other studies, Thomas et al [10] showed that primigravida contributing to 29.2% and multigravida 50.8% of deaths.

Purandare et al [11] observed that out of the 30 deaths, 21 were multigravida and 9 were primigravidas. Spacing of pregnancies is still a problem and close pregnancies adversely affect the mother's health.

In the present study, 15 women died within 6 hour of admission; 9 (11.1%) between 6-24 hours of admission; and 36 (44.4%) between 24 hours to 7 days of admission and 21 (25.9%) after 7 days of admission. Purandare et al [11] 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. This change in statistics shows availability of basic obstetric care in peripheral institutions and improved infrastructure in tertiary institutions which in turn either reducing the number of deaths or trying to save critical patients which shows in maximum deaths occurring after 24 hrs. In the present study, maximum 60 (74.09%) deaths occurred in post-partum period. Similar results have been reported by other studies, Purandare et al [11] showed that (73.33%) in the post-partum period followed by (26.66%) during the ante-partum. Thomas et al [10] showed that maternal deaths in the 1st, 2nd and 3rd trimester and post natal/ post-abortal were 3.5%, 9.7%, 31.9% and 54.9% respectively.

In the present study, direct causes contributed to 69.13% and indirect causes 30.87% of maternal death. Common direct causes were PIH/Eclampsia 27 (33.33%), deaths due to hemorrhage including post-partum hemorrhage, ante-partum hemorrhage and abortion related hemorrhage contribute to 14 (17.28%) deaths, sepsis (Puerperal sepsis, ante-partum sepsis and intra-partum sepsis) accounts for 13 (16.06%) and pulmonary embolism is cause of death in only 2 (2.47%) cases. Indirect causes were hepatitis and liver disease 12 (14.81%), heart disease 10 (12.34%), infections including malaria/viral encephalitis 2 (2.47%), and anaemia 1 (1.24%).

Similar to that reported by the other studies. Purandare et al [11] observed that among the direct causes, hemorrhage in 70.83% of deaths; followed by septicemia (3.3%) and among the indirect causes, anemia in 55.3%; hepatic disorders in 3.3% and pulmonary embolism accounting for 6.67%. Thomas et al [10] noticed that among the direct causes, hemorrhage in 20.15% and sepsis in 17.4% and among the indirect causes, hepatitis in 11.9%.

In the present study deaths due to hemorrhage are less; it indicates better availability of blood products and rapid surgical intervention following admission. Also availability of newer generations of anti-microbials are reducing deaths due to sepsis.

Conclusion

The MMR in our study is higher than the national averages. Most deaths could have been avoided with the help of early referral, quick, efficient and well equipped transport facilities, availability of adequate blood and blood components, and by promoting overall safe motherhood.

Analysis of every maternal death through maternal death audit, either at community level (C-MDR) or at the institutional level (FBMDR) should be carried out.

What this study adds to existing knowledge: This study help in identifying the reasons and deficiencies in health care delivery system that contribute in causing pregnancy related deaths. At the same time this study shows better availability of blood and blood products and higher antimicrobials can reduce maternal deaths from previously known common causes of maternal mortality.

Conflict of Interest: None declared

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