

Changing trends of maternal mortality with its causes- ten years retrospective study in a peripheral medical college of West Bengal, India

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ABSTRACT

Background: The estimates of maternal mortality can only be used as a rough indicator of maternal health situation in any given country. High maternal mortality reflects not only in inadequacy of health care services for mothers, but also a low standard of living and socio economic status of the community. Objective was to assess the maternal mortality ratio (MMR), its probable causes and changing trends.

Methods: The present study conducted at Midnapore Medical College (MMC), West Bengal. Data for analysis were collected from medical college record section and maternal death registrar book after having permission from higher authority of the college during the period from January 2009 to 2018 December. Total sample size for this period was 249. Statistical analysis was done through SPSS software.

Results: Ten years data analysis of 249 subjects showed that total live births from January 2009 to December 2018 was 1,39,126 with MMR 178.97%. Hypertensive disorder of pregnancy (40.56%) was the leading direct cause of maternal death followed by hemorrhage (24.49%) and septicemia (10.84%). Heart disease (6.42%) was the major indirect cause of death followed by anemia (3.6%). Maternal death rate found high among primi gravida (59.43%) mothers and within 20 years age group (46.18%).

Conclusions: Most maternal deaths are preventable by proper antenatal care, early diagnosis of high risk factors, timely referral to tertiary care centre along with community upliftment especially in rural and tribal based population.

Keywords: Hypertensive disorder, Maternal mortality ratio, Primigravida

INTRODUCTION

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), i.e. the number of maternal deaths per 100000 live births, when remains high, not only reflects overall ineffectiveness of health care system in a country, but also gives consideration to poor literacy, weak administration, failed implementations of strategic approaches, inadequate financial investments, technical incapacities and weak

transport system.² It is one of the leading causes of death for women of reproductive age in many parts of the world. An estimated 44000 mothers continue to die every year due to causes related to pregnancy, child birth and postpartum period.² A woman is most vulnerable at the postpartum period. About 50-70% maternal deaths occurs in the postpartum period of which 45% deaths occur in the first 24 hours delivery and more than two-thirds during first week.³ Despite substantial progress on maternal mortality, neither MDG4 nor MDG5 targets were met. Globally, women face a 1 in 180 lifetime risks of dying due to maternal causes which are dominated by hemorrhage, hypertensive disorders, sepsis and abortion. It is really tragic as these deaths are not caused by disease

but occurred during or after a natural physiological process. India is amongst those countries which have a high maternal mortality ratio though the MMR has reduced from 167 per lakh live births in 2011-13 to 130 per lakh live births in 2014-16. States of Kerala, Maharashtra, Andhra Pradesh, Gujarat and Tamil Nadu have already achieved the goal of a MMR of 100 per lakh live births.⁴ Most maternal deaths and pregnancy complications can be prevented if pregnant mothers have access of good quality antenatal, natal and postnatal care and certain harmful birth practices are avoided. In December 2015, the Millennium Development Goals came to an end of their term and a post-2015 agenda comprising 17 Sustainable Development Goals (SDGs) takes their place up to 2030, targets to reduce the global maternal mortality ratio to less than 70/100000 live births.⁵ This study attempts to study the trends and association of various causes of maternal mortality in last ten years in a peripheral medical college and various others factors responsible for it.

METHODS

This was a retrospective analysis of patients admitted between January 2009 to December 2018 in the department of Obstetrics and Gynecology of Midnapore Medical College, West Bengal. Patients who died due to complications of pregnancy, labor and puerperium were included. A total of 249 patients who died within 42 days of termination of pregnancy irrespective of duration and site of gestation and deaths resulted from disease present before or developed during pregnancy were also included in the study. During this period of 10 years, 1,39,126 live births was recorded with 249 maternal deaths, i.e. MMR found to be 178.97. The available records were collected from medical college record section and maternal death registrar book after having permission from higher authority of the college. Information regarding demographic and reproductive profile, booked or unbooked, cause of death and time interval from admission to death were collected from the records of labor room registrar. After collecting the data, statistical analysis was generated through MS excel sheet and analysis was done using SPSS 23 software.

RESULTS

During the study period from January 2009 to December 2018, there were 1, 41,396 deliveries with 1,39,126 live births took place along with 11,581 abortions and 2018 ectopic pregnancies. There was 249 maternal deaths (Figure 1), so MMR in our study was 178.97 i.e. grossly 179/100000 live births. During 2009-2013, there were a total of 69,438 deliveries, 68,428 live births and 110 maternal deaths whereas during 2014-18, there were 71,958 deliveries, 70698 live births and 139 maternal deaths. It was observed that much higher death rates found among unbooked and referred cases (179, 71.89%) in comparison to booked cases (70, 28.11%). Out of total 1, 41,396 deliveries, 66.41% (93,908) had normal vaginal

deliveries, 1.04% (1476) instrumental deliveries (forceps and ventouse) and 32.54% (46,012) had cesarean sections.

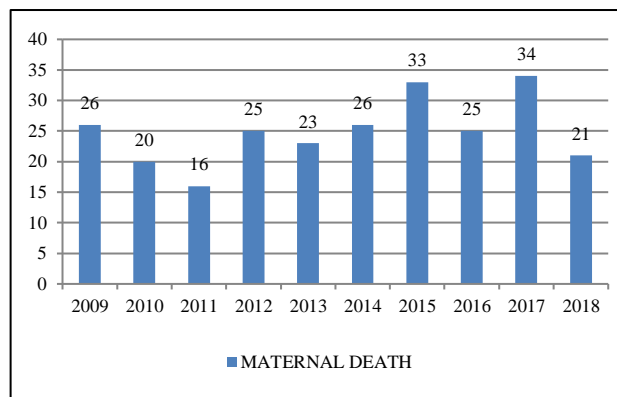


Figure 1: Year wise distributions of maternal deaths.

Figure 1 shows year wise distributions of maternal deaths in our study during the period from 2009-2018 along with its graphical representation. A minimum death recorded in 2011 and maximum in 2017.

Table 1: Shows age and parity wise distributions of maternal deaths.

Age (years)	Percentage	Parity	Percentage
<20 years	46.18	P1	59.43
21-25 years	35.34	P2	20.88
26-30 years	12.85	P3	13.25
31-35 years	2.81	P4	13.25
>35 years	2.81	P5	1.2
-	-	P6	0.4
Total	100		100

Table 2: Admission- death interval in relation to maternal death.

Time interval	Number of maternal death (n=249)	Percentage
<6 hours	62	24.90
6-12 hours	43	17.27
12-24 hours	47	18.87
24-48 hours	37	14.86
48-72 hours	14	5.62
72-96 hours	24	9.64
96-120 hours	09	3.61
5-15 days	13	5.23
Total	249	100

Table 2 shows details of time interval between admission and maternal death.

After analysing age wise distributions of maternal deaths, much higher death rate identified within 20 years age group, 46.18% (115) followed next by 35.34% (88) in 21-

24 years age group and combined these two groups responsible for more than 80% of total maternal deaths. (Table 1). Similarly, parity wise distributions showed primigravida being the major portion (59.43%) of maternal deaths (Table 1). After analysing of direct causes of maternal deaths (86.34%, Table 3), it was found that hypertensive disorder of pregnancy causing maternal death in 40.56% of cases whereas hemorrhage and septicemia responsible for maternal death in 24.49% and 10.84% of cases. These three main causes were responsible for 79.89% of maternal deaths in this study. Out of total 101 cases of hypertensive disorder in pregnancy, majority had eclampsia (64), 35 were severe preeclampsia and 2 were suffering from hypertensive

encephalopathy. Hemorrhage (24.49%, PPH-49, APH-03, ruptured ectopic- 07, abortion- 02) was the second and septicemia (10.84%, puerperal sepsis- 11, endotoxic shock- 02, infection- 12, septicemia with DIC- 02) was the third common cause maternal deaths. Embolism (6.42%, pulmonary embolism -14, amniotic fluid embolism- 2) and post cesarian complications (4.01%) were the other direct causes of maternal deaths. Among the indirect causes of deaths (13.66%), heart disease (6.42%) and severe anemia (3.6%) were the two major causes of maternal deaths in our study. Other indirect causes include death due to jaundice with hepatic encephalopathy, CNS disorder, anaphylactic reaction and acute renal failure.

Table 3: Causes of maternal death.

Direct causes (n=215) 86.34%		Indirect causes (n=34) 13.66%	
1. Hypertensive disorder		1. Heart disease	
Severe preeclampsia=35	101 (40.56%)	Vulvular disease=06	16 (6.42%)
Eclampsia=64		Other heart disease (cardiomyopathy and others)=06	
Hypertensive encephalopathy=02		Sudden cardiac arrest=03	
2. Haemorrhage		2. Severe anaemia	
PPH=49	61 (28.37%)	Acute myocardial infarction=01	9 (3.6%)
APH=03		3. Jaundice with hepatic encephalopathy	
Rupture ectopic=07		4 (1.60%)	
Abortion=02		4. CNS disorder	
3. Septicemia		4. CNS disorder	
Puerperal sepsis=11	27 (12.55%)	Meningo-encephalitis=02	3 (1.20%)
Entotoxic shock=02		5. Anaphylactic reaction following transfusion	
Infection=12		1 (0.40%)	
Septicemia with DIC=02	6. Acute renal failure		1 (0.40%)
4. Embolism			
Pulmonary embolism=14	16 (7.44%)		
Amniotic fluid embolism=02			
5. LUCS/post LUCS complications			
Ruptured uterus=06	10 (4.65%)		
Broad ligament hematoma=02			
Rectus sheath hematoma=01			
Re laparotomy=01			

DISCUSSION

Maternal mortality is a global health problem. Maternal death has severe impact not only on family and community, but also on the nation and that's why reduction of MMR is the primary objective of National Health Mission. The MMR in India has declined to 113 in 2016-18 from 122 in 2015-17 and 130 in 2014-16 according to the special bulletin released by the Office of the Registrar General's Sample Registration System (SRS).⁶ In our study, higher rate of maternal deaths (MMR-179) was documented. The probable factors responsible includes: patients often arrived late from

remote and rural geographic areas, less access of good quality transport/referral system, slightly lower awareness of antenatal care schedules, relatively younger age of marriage and first pregnancy and less than average nutritional status. In our study, highest number of mothers died among the age group <20 years to 25 years (81.52%, Table 1), primigravida (59.43%, Table 1) and unbooked/referred cases (71.89%). In the current study, hypertensive disorders of pregnancy was the leading cause (40.56%, Table 3) maternal death followed by hemorrhage (24.49%) and septicemia (10.84%). Other studies done by Purandre et al and Priya et al few years back, hemorrhage was the leading cause of maternal

death in 35.05% and 70.83% cases respectively.^{7,8} Here, our study shows the major causes of maternal deaths by different authors in their studies.⁹⁻¹¹ Eclampsia was the single most common cause of maternal death in our study (40.56%), which is similar to studies done by Mootha et al, Sundari et al and Milan Taye et al.^{9,12,13} Higher

mortality in eclampsia or severe preeclampsia may be due to lesser health awareness, late diagnosis of the condition and reach tertiary centre at severe condition. Rao et al and Sarkar et al reported similar results in their studies.^{14,15} Hemorrhage and sepsis are the two other important causes of maternal death in the list.

Table 4: Study comparison with other authors in India.

Name of the author	Vidhyadhar et al ¹⁰	Jadhav et al ¹⁶	Patil et al ¹⁷	Zaman et al ¹⁸	Mootha et al ⁹	Taye et al ¹³	Our study
Year	2006-10	2007-12	2009-11	2012-13	2006-14	2012-15	2009-18
Total live birth	12,544	39,905	13,188	10,291	85,404	33,833	1,39,126
Maternal deaths	38	158	63	73	183	279	249
MMR	302.9	395	477	709.35	341.90	824.64	178.97
Age group in years	19-29 years- 68.42%	20-29 years- 74.67%	20-29 years- 74.6%	18-29 years- 75.32%	20-29 years- 80.7%	20-30 years 80.29%	17-25 years 81.52%
% of primi gravida	42.10%	49.36%	46.03%	43.835%	45.2%	52.32%	59.43%
Booked /unbooked	28.94%/ 71.06%	78.48%/ 21.51%	74.60%/ 25.40%	8.62%/ 91.38%	66.8%/ 33.2%	17.20%/ 82.80%	28.11%/ 71.89%
Adm-death interval	-	-	-	-	-	<4 hours- 21.52%	<6 hours- 24.90%
Direct cause	50%	73.2%	52.35%	69.84%	62.7%	70.61%	86.34%
Indirect cause	50%	26.8%	47.65%	30.16%	37.3%	29.39%	13.66%

Table 4 shows few parameters of MMR studies by different authors which includes study span in years, total number live births and maternal deaths, MMR, most vulnerable age group and parity, booked or un-booked, admission-death interval during first few hours and percentage of direct and indirect causes of maternal deaths. It has shown in every study that primigravida and younger age group are at the greater life risk for pregnancy and child birth. Among 18-29 years age group, Vidhyadhar et al showed 68.42, Jadhav et al showed 74.67%, Patil et al showed 74.60%, Zaman et al showed 75.32% and Mootha et al showed 80.7% maternal deaths.^{9,10,16-18} In comparison to above mentioned studies, much higher results had been found in our study, 81.52% maternal death found in 17-25 years age group (Table 1). Much higher rate of maternal death has also found among primigravida group (Table 1).

Jadhav et al reported 49.36%, Patil et al reported 46.03% and Mootha et al reported 45.2% maternal deaths among primigravida whereas in our study, it was 59.43%.^{9,17} Higher rate of unbooked patients found in different studies like Vidhyadhar et al (71.06%), Zaman et al (91.38%) and Taye (82.80%), in our study it was (71.89%).^{10,13,18} Earlier admission and initiation of definitive treatment is necessary to reduce maternal deaths as maximum death occurs within first 24 hours of admission. Taye et al showed 21.52% maternal death within 4 hours; similarly in our study, it was 24.90% within 6 hours (Table 2). Direct causes responsible for 50% to 73.2% maternal death in different studies,

whereas in our study it was 86.34% (Table 3). Pulmonary embolism responsible for 5.62% maternal deaths in our study, where as it was 1.43% in study done by Taye et al. It is interesting to note that preeclampsia-eclampsia associated with 50% cases of pulmonary embolism.

Due to much liberalization of cesarian section in recent years, there is increasing maternal complications which leads to increasing maternal morbidity and mortality. In our study, 4.01% maternal deaths had recognized due to LUCS complications (Table 3). Though anemia is the major indirect cause of maternal deaths in studies done by Taye et al (24.73%), Doddamani et al and Kashyap et al (11.8%), heart disease was responsible for 6.42% and anemia contributes 3.6% of maternal deaths in current study.^{11,13,19}

CONCLUSION

Most of the maternal deaths are preventable. This study was an attempt to provide information on different factors which had contributed to maternal deaths in a tertiary care hospital and timely interventions could prevent such type of mishaps in a majority. As obstetrical causes account for a considerable portion of those deaths, can only be prevented if antenatal mothers are motivated for regular antenatal check-up, diagnosed earlier the high risk factors and could avail quick transport system to tertiary care centre whenever necessary. Last but not the least, upliftment of the social and environmental factors like

poverty, female literacy, prejudices and low level of nutrition are necessary to decline MMR. .

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