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Original Research Article

## Maternal mortality and its causes in a tertiary care hospital

Goter Doke\*, Jyoti Kamda

Department of Obstetrics and Gynecology, TRIHMS, Naharlagun, Arunachal Pradesh, India

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**\*Correspondence:**

Dr. Goter Doke,

E-mail: [dokegoter@gmail.com](mailto:dokegoter@gmail.com)

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### ABSTRACT

**Background:** Maternal mortality is defined as the death of a woman while being pregnant or within 42 completed days of termination of pregnancy. The aim of this study was to study the maternal mortality and analyze the complications leading to maternal deaths.

**Methods:** A retrospective study of hospital records and death summaries of all maternal deaths over the period of two year from April 2017 to March 2019 was conducted in the Department of Obstetrics and Gynecology, Tomo Riba Institute of Health and Medical Science, a tertiary level healthcare referral center in Naharlagun, Arunachal Pradesh, India.

**Results:** There was a total of 6 maternal deaths out of 6311 live births giving maternal mortality ratio (MMR) of 95.07 per 1,00,000 live births. The majority of deaths were reported in the age groups 30-40 years (66.66%). More deaths were reported in multiparous women (83.33%) as compared to primiparous women (16.66%). Most of them were unbooked cases (66.66%). Haemorrhage (33.33) and pregnancy induced hypertension (33.33%) were the major direct cause of maternal deaths.

**Conclusions:** Haemorrhage and pregnancy induced hypertension were found to be major cause of maternal deaths. In our study, there was no maternal death from anemia and other medical disorder.

**Keywords:** Haemorrhage, Hypertensive disorders, Maternal mortality, Sepsis

### INTRODUCTION

Maternal mortality is defined as the death of a 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.<sup>1</sup> Maternal mortality ratio (MMR) is derived as the proportion of maternal deaths per 100000 live births. It is used as a proxy indicator to assess the country's maternal and reproductive health status. Reduction of maternal mortality is an area of concern for the governments across the globe. According to Millennium development goals report which aimed at reducing 75% of MMR over

a period of 15 years (1990-2015), most of these deaths were in the developing regions, where the maternal mortality ratio is about 14 times higher than in the developed regions.<sup>2</sup> Globally, there were an estimated 289,000 maternal deaths in 2013, equivalent to about 800 women dying each day. Maternal deaths were concentrated in Sub-Saharan Africa and Southern Asia, which together accounted for 86 per cent of such deaths globally in 2013. India and Nigeria together accounted for two third of the global maternal deaths.<sup>3</sup>

Following the focus on Millennium development goal 5 (MDG), India did made an extensive efforts to achieve the same and has seen sharp increase in the rate of

institutional delivery, but the concurrent high incidences of maternal mortality present a contradictory picture of the nation's progress in improving maternal health.<sup>4</sup> It is heartening that the maternal mortality ratio of India has declined from 167 in 2011-2013 to 130 in 2014-2016.<sup>5</sup> The decline has been most significant in empowered action group states and Assam from 246 to 188. Now with new sustainable development goal 3 (SDG) to reduce maternal mortality ratio to 70 per 100,000 live births by the year 2030, India faces more new challenges and needs extensive efforts in addressing the reproductive health issues.<sup>6</sup> The aim of this study was to assess the maternal mortality in the tertiary center and find out the causes leading to maternal mortality.

## METHODS

The retrospective study was conducted by reviewing the records of maternal deaths over the period of two year from April 2017 to March 2019 in the Department of Obstetrics and Gynecology at Tomo Riba Institute of Health and Medical Science, Naharlagun, Arunachal Pradesh, India. Inclusion criteria were only maternal deaths related to pregnancy and abortions as per standard WHO definition. Every maternal death was scrutinized from various aspects likely to be related to death, such as age, locality of residence, parity, literacy, antenatal care, admission-death interval, and the cause of death.

### Statistical analysis

Data was collected on a proforma and entered into computer using SPSS version 10 for analysis.

## RESULTS

During the two year study period, there were 6 maternal deaths out of 6311 live births giving an MMR of 95.07 per 100,000 live births. Five cases (83.33%) of these deaths were in the postnatal period. The epidemiological characteristics of maternal deaths are shown in Table 1.

**Table 1: Demography of maternal deaths and its characteristics (n=6).**

Characteristics	Groups	Maternal deaths	%
<b>Age (Years)</b>	20 -30	2	33.33
	30-40	4	66.66
<b>Parity</b>	Primi	1	16.66
	Multi	5	83.33
<b>Antenatal care</b>	Booked	2	33.33
	Unbooked	4	66.66
<b>Locality</b>	Urban	2	33.33
	Rural	4	66.66
<b>Gestational Age (weeks)</b>	<20	1	16.66
	20 ≤ 37	2	33.33
	≥ 37	3	50

The maximum deaths were reported in multiparous women (83.33%) and in the age group 30-40 years (66.66%). Also majority of them were unbooked case (66.66%) and belonged to rural areas (66.66%).

**Table 2: Admission to death interval.**

Admission to death interval (in hours)	No. of maternal deaths	%
24	3	50
24-72	2	33.33
>72	1	16.66

As shown in Table 2, majority of the maternal deaths had occurred within the first 24 hours of admission to hospital (50%).

**Table 3: Causes of maternal deaths (n=6).**

Causes	No. of deaths	%
<b>Direct cause</b>		
Haemorrhage	2	33.33
Hypertensive disorder	2	33.33
Sepsis	1	16.66
Pulmonary embolism	1	16.66

Analysis of the causes of death revealed that obstetrical haemorrhage and hypertensive disorder were the leading cause of maternal deaths (Table 3).

Out of 6 deaths, 2 (33.33%) were due to haemorrhage, 2 (33.33%) were due to hypertensive disorders and 1 (16.66%) were due to postpartum sepsis. Pulmonary embolism was suspected as cause of death in 1 woman (16.66%). There was no maternal death due to indirect cause like anemia and other medical disorder in our study.

## DISCUSSION

The maternal mortality ratio in our study is 95.07 per 100000 live births which is very much lower than present national MMR data of India that is 130.<sup>5</sup> The maternal deaths reported in our study is very low, only 6 out of 6311 live births over two years. First reason could be because of demography of the state Arunachal Pradesh, where this study was carried out. According to census 2011, our population is only 13.84 lakhs with density of 17 persons per kilometer and annual live birth rate of 18,000.<sup>7</sup> Maternal deaths being a rare event require prohibitively large sample size to provide robust estimates. The northeastern states of India except Assam, has less population size and thus provides statistical difficulties for providing maternal mortality report annually. Secondly, SRS MMR bulletin 2014-16 has also projected an average MMR of 97 per 100000 live births for North Eastern states of India (except Assam) which is comparable with MMR of our study.<sup>5</sup> Lastly, we might have underestimated the levels of maternal mortality,

either because death reporting was incomplete or because pregnancy was under reported as cause of death.

Most deaths were observed in 30-40 year age group in the present study, whereas deaths were higher in the 21-30 year age group in other studies.<sup>8,9</sup> Older age group deaths could have been more because of high prevalence of grand multigravidae in our region. Advanced age pregnancy, on the other hand, exposes women to higher risk of pregnancy induced hypertension while age related morbidities may also complicate the pregnancy.<sup>10</sup> Postpartum deaths accounted for about 83.33%, whereas in other studies it was only 49.5%.<sup>8</sup>

Rural background and unbooked status (66.66%) in our study was comparable with reports of Bedi et al, and Khumanthem et al.<sup>8,11</sup> WHO survey by Karlsen et al on maternal and perinatal health in 24 countries showed that women with no education and those between one to six years of education are twice at risk of maternal mortality as compared to women with higher education and the findings were obtained after adjusting for marital status, maternal age and parity.<sup>12</sup> Awasthi et al, also reported a significant disparity in the usage of maternal and child healthcare services in the districts of India and found that urban residents are way ahead of marginalized rural residents in the usage of healthcare services.<sup>13</sup>

Fifty percent of deaths occurred within the 24 hours of admission to the hospital which was comparable with other reports of 60%.<sup>11</sup> Haemorrhage and hypertensive disorder were the major direct cause of deaths and were comparable to other studies.<sup>8,14</sup> Hypertensive disorders and eclampsia in our study accounted for 33.33% which is comparable with Konar et al report of 29.54%.<sup>14</sup> Although the use of magnesium sulfate and early termination of pregnancy has led to improve the scenario of eclampsia still early diagnosis of pregnancy induced hypertension needs to be emphasized to prevent deaths due to eclampsia. Sepsis accounted for about 16.66% and is comparable with other studies of 18.03% by Soni et al.<sup>15</sup> One woman had died of pulmonary embolism and such similar cause were also reported by other studies.<sup>8,11,16</sup> In our studies, there were no report of deaths by indirect cause like anemia and other medical disorder. Dietary habits of this region might be one of the reasons because of which maternal deaths from iron deficiency anemia are rare.

## CONCLUSION

Although, India has achieved a rise in institutional delivery according to NFHS 4 reports, maternal mortality still has not shown much improvement. It is high time to look at the maternal and reproductive health issue not just as a medical event but rather a social phenomenon and further build up a solution for underlying causes like socio-economic disparity, rural- urban differences, education level of women, caste and gender-based inequity. Further, there is a lot of disparity in MMR

among states, with some state achieving the set targets while some are still struggling at the initial stage. Hence, there is an urgent need to adapt the suitable strategies for maternal mortality reduction specific to the states while simultaneously taking lesson from the well performing states so that SDG 3 GOALS are achieved by 2030.

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