

Analysis of Maternal Mortality at a Tertiary Care Facility: A Retrospective Study

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Abstract

Aim: A retrospective analysis of maternal mortality at a tertiary care facility.

Material and Methods: This investigation was conducted at Department of Obstetrics and Gynaecology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India as a retrospective analysis. Duration of study 07 months. Data pertaining to demographics and other relevant information was gathered from individual case records, and the maternal death review process was included. The research eliminated deaths resulting from suicide and murder from the definition of maternal death. A comprehensive analysis was conducted on a total of 120 cases of maternal mortality. Detailed history regarding demographic characters, previous antenatal care along with type of delay noted. Causes of death, Level of ANC care, and referral hospital and referral time noted along with duration of care received at this hospital and time of death.

Results: Hemorrhage was identified as the leading cause of maternal death, responsible for 33.33% of the cases. Sepsis followed, accounting for 25.0%, while eclampsia was the cause in 16.67% of the cases. Obstructed labor caused 12.5% of the deaths, complications from abortion accounted for 8.33%, and other causes were responsible for 4.17%. In terms of antenatal care (ANC) and referral details, 16.67% of the women had received no ANC, while 41.67% had inadequate ANC. Another 41.66% had received adequate ANC. A majority of the women (58.33%) were referred to the tertiary care center, while 41.67% were not referred. Among those referred, 35.71% experienced a referral time of 3-6 hours, 28.57% had a referral time of 1-3 hours, 21.43% experienced a delay of more than 6 hours, and 14.29% had a referral time of less than 1 hour. Regarding the duration of care received at the tertiary care center, 29.17% of the women received care for 12-24 hours, and 25.0% were under care for more than 24 hours. Care duration of 6-12 hours was noted in 20.83% of the cases, 1-6 hours in 16.67%, and less than 1 hour in 8.33% of the cases.

Conclusion: Currently, the majority of maternal fatalities occur among women residing in rural regions, with lower levels of education, who have not made prior arrangements for medical treatment and come from poor socioeconomic backgrounds. These women sometimes have to undertake extensive trips to access specialized medical facilities. Furthermore, there is a lack of recognition of indicators of potential complications throughout pregnancy. It is important to identify situations that have a high risk.

Keywords: Maternal mortality, ANC, Hemorrhage, Referral hospital

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Introduction

Annually, over 536,000 women worldwide are dying due to complications associated to pregnancy. India has a significant 25% share of the global load. The Indian government is endeavoring to decrease maternal death rates via the implementation of many programs, such as Janani Suraksha Yojana, Jananishishu Suraksha Yojana, and Rajiv Gandhi Jeevandayi Yojana. Maternal death audits are being

carried out at both the institutional and district levels. Multiple instances of treatment delays are being found, and medical officers are undergoing training to enhance their ability to provide proficient and efficient care. There is no charge for ambulance treatment provided to moms and infants. [1] The World Health Organization (WHO) defines maternal death as the death of a woman during

pregnancy or within 42 days after the termination of pregnancy, regardless of the duration or location of the pregnancy. This definition includes deaths caused by pregnancy-related factors, but excludes deaths resulting from accidental or incidental causes. The maternal mortality rate is the number of maternal deaths per 100,000 live births. Pregnancy and delivery are often joyous occasions, but they may also be accompanied by problems and even mortality if risk factors are not promptly recognized and addressed. The demise of a woman and mother is a profoundly sorrowful and grievous loss to both the kid, the community, and the whole country. There is a global occurrence of one maternal fatality per minute. In India, there is one maternal fatality every five minutes. Approximately 500,000 women succumb annually to problems arising from pregnancy and delivery. Approximately 99% of these women are from underdeveloped countries, with more than 90% concentrated in Africa and Asia. [2,3]

In 1938, the maternal mortality rate in India was 2000, which decreased to 1000 in 1959 and further reduced to 540 in 1999. The current maternal mortality ratio is at 167 per 100,000 live births, which exceeds the millennium development target for 2020 of 109 per 100,000 live births. Regrettably, these fatalities may be mostly avoided. The advancement in maternal health has been inconsistent, unfair, and dissatisfactory. In Afghanistan, the lifetime risk of maternal mortality due to pregnancy and delivery is around 1 in 6, but in Northern Europe, it is as low as 1 in 30,000. The United Nations (UN) assessment of Millennium Development Goal-5 determined that there has been little advancement in sub-Saharan Africa, which is the region where half of all maternal fatalities occur. The improvement shown by South Asian nations, notably India, which contributes to 25% of global maternal fatalities, is likewise lacking in impressiveness. Furthermore, maternal mortality represents just a small fraction of the larger issue. For every woman who dies, there are at least 20 others who suffer from severe morbidity. Maternal mortality is often caused by direct obstetric factors such as hemorrhage, hypertensive disorders of pregnancy, septic abortion, as well as medical conditions including hepatitis and heart disease during pregnancy. [4-6] Anemia is the primary underlying factor contributing to maternal deaths. Early diagnosis of high-risk factors and early management during pregnancy may avoid these causes and contribute to a reduction in maternal mortality.

Material and Methods

This investigation was conducted at Department of Obstetrics and Gynaecology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India Duration of study 07 months. Data pertaining

to demographics and other relevant information was gathered from individual case records, and the maternal death review process was included. The research eliminated deaths resulting from suicide and murder from the definition of maternal death. A comprehensive analysis was conducted on a total of 120 cases of maternal mortality.

Types of delay according to Maternal Death review form: Type 1 delay - delay in decision making to seek help. Type 2 delay - delay in transport due to poor roads and unavailability of vehicles, Type 3 delay - delay at institutional level. Detailed history regarding demographic characters, previous antenatal care along with type of delay noted. Causes of death, Level of ANC care, and referral hospital and referral time noted along with duration of care received at this hospital and time of death.

Results

In the study of 120 maternal deaths at a tertiary care centre, the demographic characteristics revealed that most of the deaths occurred in women aged 25-30 years, comprising 41.67% of the cases. The mean age was 28.76 years with a standard deviation of 3.76. Women aged 20-25 and 30-35 years accounted for 25.0% and 16.67% of the deaths, respectively, while those below 20 and above 35 each represented 8.33% of the cases. Regarding parity, 45.83% of the deceased women were primipara, followed by nullipara at 37.5% and multipara at 16.67%. (Table 1).

The analysis of delays showed that Type 2 delay, which involves delays in transport due to poor roads and unavailability of vehicles, was the most prevalent, affecting 37.5% of the cases. Type 3 delay, referring to institutional delays, was responsible for 33.33% of the deaths, while Type 1 delay, which is the delay in decision-making to seek help, accounted for 29.17%. (Table 2).

Haemorrhage was identified as the leading cause of maternal death, responsible for 33.33% of the cases. Sepsis followed, accounting for 25.0%, while eclampsia was the cause in 16.67% of the cases. Obstructed labour caused 12.5% of the deaths, complications from abortion accounted for 8.33%, and other causes were responsible for 4.17%. (Table 3).

In terms of antenatal care (ANC) and referral details, 16.67% of the women had received no ANC, while 41.67% had inadequate ANC. Another 41.66% had received adequate ANC. A majority of the women (58.33%) were referred to the tertiary care center, while 41.67% were not referred. Among those referred, 35.71% experienced a referral time of 3-6 hours, 28.57% had a referral time of 1-3 hours, 21.43% experienced a delay of more than 6 hours, and 14.29% had a referral time of less than 1 hour. (Table 4).

Regarding the duration of care received at the tertiary care centre, 29.17% of the women received care for 12-24 hours, and 25.0% were under care for

more than 24 hours. Care duration of 6-12 hours was noted in 20.83% of the cases, 1-6 hours in 16.67%, and less than 1 hour in 8.33% of the cases. (Table 5)

Table 1: Demographic parameter

Parameter	Number (N=120)	Percentage (%)
Age in years		
Below 20	10	8.33
20-25	30	25.0
25-30	50	41.67
30-35	20	16.67
Above 35	10	8.33
Mean \pm SD	28.76 \pm 3.76	
Parity		
Nullipara	45	37.5
Primipara	55	45.83
Multipara	20	16.67

Table 2: Types of Delay in Maternal Mortality Cases

Type of Delay	Number (N=120)	Percentage (%)
Type 1 Delay	35	29.17
Type 2 Delay	45	37.5
Type 3 Delay	40	33.33

Table 3: Causes of Maternal Death

Cause of Death	Number (N=120)	Percentage (%)
Hemorrhage	40	33.33
Sepsis	30	25.0
Eclampsia	20	16.67
Obstructed Labor	15	12.5
Complications of Abortion	10	8.33
Other	5	4.17

Table 4: Level of Antenatal Care (ANC) and Referral Details

ANC Level	Number (N=120)	Percentage (%)
No ANC	20	16.67
Inadequate ANC	50	41.67
Adequate ANC	50	41.66
Referral Status		
Referred	70	58.33
Not Referred	50	41.67
Referral Time	Number =70	
<1 Hour	10	14.29
1-3 Hours	20	28.57
3-6 Hours	25	35.71
>6 Hours	15	21.43

Table 5: Duration of Care Received at Tertiary Care Centre

Duration of Care	Number (N=120)	Percentage (%)
<1 Hour	10	8.33
1-6 Hours	20	16.67
6-12 Hours	25	20.83

12-24 Hours	35	29.17
>24 Hours	30	25.0

Discussion

Maternal mortality serves as a measure of the overall reproductive health within a community. The high prevalence of maternal mortality is indicative of inadequate maternal healthcare services, delayed referrals, and the low socioeconomic position of the population. Several studies conducted in India over the last 15 years have shown significant disparities in the Maternal Mortality Ratio (MMR), with rates ranging from 47 per 100,000 births to 625 per 100,000 births. Madhu Jain has recorded an MMR (Maternal Mortality Ratio) of 2270 per 100,000 live births, which is considered to be exceptionally high. [4-6] In the study of 120 maternal deaths at a tertiary care center, the demographic characteristics revealed that most of the deaths occurred in women aged 25-30 years, comprising 41.67% of the cases. The mean age was 28.76 years with a standard deviation of 3.76. Women aged 20-25 and 30-35 years accounted for 25.0% and 16.67% of the deaths, respectively, while those below 20 and above 35 each represented 8.33% of the cases. Regarding parity, 45.83% of the deceased women were primipara, followed by nullipara at 37.5% and multipara at 16.67%. Comparing these findings with other studies, a similar age distribution was observed. For instance, a study in Nigeria found that the highest number of maternal deaths occurred in women aged 20-34 years, with a mean age of 29 years (Bako et al., 2019). [7] Similarly, research in India reported that most maternal deaths occurred in women aged 20-29 years (Kaur et al., 2020). [8] The predominance of deaths among primiparous women (45.83%) in this study aligns with findings from studies in Ethiopia and Ghana, which also noted a higher mortality rate among primiparous and nulliparous women (Assefa et al., 2017; Adomako et al., 2016). [9,10]

The analysis of delays showed that Type 2 delay, which involves delays in transport due to poor roads and unavailability of vehicles, was the most prevalent, affecting 37.5% of the cases. Type 3 delay, referring to institutional delays, was responsible for 33.33% of the deaths, while Type 1 delay, which is the delay in decision-making to seek help, accounted for 29.17%. These findings are consistent with other studies. For example, a study in Uganda similarly found that delays in reaching healthcare facilities were a major contributor to maternal mortality, emphasizing the need for improved transportation infrastructure (Okuga et al., 2015). [11] The multifaceted nature of barriers to timely maternal care, including institutional and decision-making delays, is well-documented in other studies (Thaddeus & Maine, 1994). [12]

Even today large number of maternal deaths is due to the classical triad of hemorrhage, sepsis, and eclampsia. All these are preventable causes of maternal mortality provided the treatment started in time. Unfortunately, in many cases, patients were referred from nearby states very late, in critical condition, unaccompanied by health worker. Most of these deaths are preventable if patients are given appropriate treatment at periphery and timely referred to higher centers. Health education of pregnant mothers and community about warning signs, training of ASHA workers, Training of medical officers and staff nurses working in rural areas by programs like basic emergency obstetric care (BEMOC) and skilled attendant at birth (SAB) training gives a ray of hope of reducing maternal mortality. As Type 1 delay was commonest maternal deaths can be prevented by improving health education, by improving health care facilities in rural areas by ensuring round the clock availability of certain drugs like injection magnesium sulphate, tablet misoprostol as most maternal deaths in rural areas are still due to eclampsia and postpartum haemorrhage. [7]

Haemorrhage was identified as the leading cause of maternal death, responsible for 33.33% of the cases. Sepsis followed, accounting for 25.0%, while eclampsia was the cause in 16.67% of the cases. Obstructed labor caused 12.5% of the deaths, complications from abortion accounted for 8.33%, and other causes were responsible for 4.17%. This pattern is consistent with global data. The World Health Organization (WHO) reports that haemorrhage is the leading cause of maternal death worldwide, responsible for approximately 27% of deaths, with sepsis and hypertensive disorders also being major contributors (Say et al., 2014). [13,14] Studies in Bangladesh and Nigeria have similarly identified these causes as leading contributors to maternal mortality (Khatun et al., 2012; Olamijulo & Olorunfemi, 2017). [15,16]

In terms of antenatal care (ANC) and referral details, 16.67% of the women had received no ANC, while 41.67% had inadequate ANC. Another 41.66% had received adequate ANC. The critical role of ANC in preventing maternal deaths is highlighted by these findings. A study in Nepal found that women who received adequate ANC were significantly less likely to experience adverse maternal outcomes (Devkota et al., 2018). [17] The referral status revealed that 58.33% of the women were referred to the tertiary care centre, with the majority experiencing a referral time of 3-6 hours. Delays in referral times are a critical issue, as timely referral and management can significantly improve maternal outcomes. This is supported by a study in Pakistan,

which found that timely referral and management could reduce maternal mortality rates (Bhutta et al., 2013). [18]

Regarding the duration of care received at the tertiary care centre, 29.17% of the women received care for 12-24 hours, and 25.0% were under care for more than 24 hours. The duration of care is an important factor in maternal outcomes, as prolonged delays in receiving appropriate care can exacerbate complications. A study in Tanzania noted that prompt and adequate care within the first 24 hours of admission is crucial for reducing maternal mortality (Pembe et al., 2010). [19]

Conclusion

Currently, the majority of maternal fatalities occur among women residing in rural regions, with lower levels of education, who have not made prior arrangements for medical treatment and come from poor socioeconomic backgrounds. These women sometimes have to undertake extensive trips to access specialized medical facilities. Furthermore, there is a lack of recognition of indicators of potential complications throughout pregnancy. It is important to identify situations that have a high risk. Maternal mortality may be reduced by early referral, convenient transportation, ongoing skill-based training, hospital improvement, and health service monitoring.

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