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Maternal Mortality at Tertiary Care Hospital: An Observational Study

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ABSTRACT

Background: Maternal mortality is a key indicator of healthcare quality and remains a significant challenge in developing countries.
Aim: To analyze maternal mortality at a tertiary care hospital with respect to demographic profile, obstetric factors, causes of death, and maternal and fetal outcomes.
Materials and Methods: This retrospective observational study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital over a period of 2 years and 3 months (December 2022 to February 2025). A total of 25 maternal deaths were analyzed. Data were collected from hospital records and analyzed using descriptive statistics.
Results: The Maternal Mortality Ratio was 142 per 100,000 live births. Most deaths occurred in women aged 26–30 years (48%) and among multigravida (72%). About 72% of deaths were due to direct obstetric causes, with hypertensive disorders (28%), postpartum hemorrhage (16%), and sepsis (12%) being the leading causes. A majority of deaths (80%) occurred in the postpartum period, especially within 24 hours (36%). Inadequate or absent antenatal care was noted in 72% of cases. Fetal outcome showed 68% live births, 24% intrauterine deaths, and 4% intrapartum deaths.
Conclusion: Maternal mortality is largely preventable. Strengthening antenatal care, early identification of high-risk cases, timely referral, and improved emergency obstetric care are essential to reduce maternal deaths.

Keywords*: Maternal mortality, postpartum hemorrhage, hypertensive disorders, antenatal care, tertiary care hospital.*

INTRODUCTION

Maternal mortality remains a major public health challenge, especially in developing countries like India. It is an important indicator of the quality of healthcare services and reflects the accessibility and effectiveness of maternal health programs. According to the World Health Organization, maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, from causes related to or aggravated by the pregnancy or its management (1).

Globally, maternal mortality continues to be unacceptably high, with approximately 287,000 maternal deaths reported in 2020, the majority occurring in low- and middle-income countries (2). India has shown a declining trend in maternal mortality due to improved healthcare infrastructure, institutional deliveries, and government initiatives; however, regional disparities persist (3).

The causes of maternal mortality are broadly classified into direct and indirect causes. Direct causes include complications such as postpartum hemorrhage, hypertensive disorders of pregnancy, sepsis, obstructed labor, and embolism. Indirect causes include pre-existing medical conditions aggravated by pregnancy such as anemia, cardiac diseases, and infections (4). Hemorrhage and hypertensive disorders remain the leading causes globally (5).

Most maternal deaths are preventable with timely and appropriate interventions. Factors such as inadequate antenatal care, delayed referral, poor transportation, and lack of emergency obstetric services significantly contribute to maternal mortality. The "three delays model" proposed by Thaddeus S and Maine D explains delays in seeking, reaching, and receiving care as major contributors (6).

Tertiary care centers play a vital role in managing high-risk pregnancies and obstetric emergencies. Analysis of maternal mortality in such settings helps identify preventable factors and improve healthcare delivery. Therefore, the present study was undertaken to evaluate maternal mortality with respect to demographic profile, obstetric factors, causes of death, and maternal and fetal outcomes.

MATERIALS AND METHODS

Study Design and Setting

This retrospective observational study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital located in the eastern part of Ahmedabad, Gujarat, India.

Study Duration

The study was carried out over a period of 2 years and 3 months, from December 2022 to February 2025.

Study Population

A total of 25 maternal death cases were included in the study during the study period, based on predefined inclusion and exclusion criteria.

Inclusion Criteria

- All cases of maternal deaths that occurred during the study period.

Exclusion Criteria

- Cases where relatives of the deceased did not provide consent for inclusion in the study.

Data Collection

Data were collected retrospectively by reviewing indoor case records, hospital registers, and relevant documentation related to maternal deaths. The collected data were entered into a predesigned and structured proforma.

Study Variables

Each maternal death was analyzed with respect to the following parameters:

- **Sociodemographic factors:** Age, residence (urban/rural), religion, education, occupation, and socioeconomic status.
- **Obstetric factors:** Gravidity, parity, abortion history, antenatal care status (booked/unbooked), gestational age, obstetric complications, and mode of delivery.
- **Clinical factors:** Chief complaints, past medical and surgical history, personal history (diet, addiction), and family history.
- **Admission details:** Date and time of admission, referral status, source of referral, and condition at admission.
- **Time intervals:** Admission-to-delivery interval and admission-to-death interval.
- **Examination findings:** General physical examination, vital signs, systemic examination, and obstetric examination (per abdomen, per speculum, and per vaginal).
- **Laboratory investigations:** Hemoglobin, blood group, renal function tests, liver function tests, blood sugar, coagulation profile (PT, APTT, INR), serology (HIV, HBsAg), urine examination, and imaging studies (USG, ECG, echocardiography, and other radiological investigations where applicable).
- **Cause of death:** Classified into direct obstetric causes, indirect obstetric causes, and non-obstetric causes, based on clinical diagnosis and available records.
- **Autopsy findings:** Where available, autopsy reports were reviewed.

Outcome Measures

- **Primary outcome:** Identification and analysis of causes and contributing factors associated with maternal mortality.
- **Secondary outcomes:** Timing of death (antepartum, intrapartum, postpartum), pregnancy outcome, and neonatal outcome.

Neonatal Outcome Assessment

Neonatal outcomes were recorded in terms of:

- Live birth (term/preterm) or stillbirth (fresh/macerated)

- Gestational age at birth
- Birth weight and APGAR score
- Presence of congenital anomalies
- NICU admission, indication, duration of stay, and neonatal mortality

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) software, version 26 (IBM Corp., Armonk, NY, USA). Descriptive statistics such as frequencies, percentages, mean, and standard deviation were used to summarize the data.

RESULTS AND OBSERVATIONS

TABLE 1: MATERNAL MORTALITY RATIO (MMR)

Duration of study	No.of maternal death	Total deliveries	Total live births	MMR (per 1 lac live birth)
December 2022 to Feb 2025	25	17874	17568	142

TABLE 2 DISTRIBUTION ACCORDING TO AGE OF PATIENTS (N=25)

Age (years)	Present study Number(%)
<20	2 (8%)
21-25	4 (16%)
26-30	12 (48%)
31-40	7(28%)

TABLE 3 DISTRIBUTION ACCORDING TO AGE OF PATIENTS (N=25)

Age (years)	Present study Number(%)
<20	2 (8%)
21-25	4 (16%)
26-30	12 (48%)
31-40	7(28%)

TABLE 4 DISTRIBUTION OF PATIENTS ACCORDING TO OBSTETRIC HISTORY (N=25)

Obstetric history	Present study Number(%)
Primi gravida	4(16%)
Second gravida	3 (12%)
Multigravida and grand multigravida	18 (72%)

TABLE 5: ANTENATAL VISITS (N = 25)

Antenatal Visits	Number (n)	Percentage (%)
Yes (Inadequate)	10	40%
Yes (Adequate)	7	28%
No Visit	8	32%

TABLE 6: DEATH IN RELATION TO STAGE OF PREGNANCY (N = 25)

Stage of Pregnancy	Category	Number (n)	Percentage (%)
Antenatal	1st Trimester	1	4%
	2nd Trimester	3	12%
	3rd Trimester	1	4%
Postnatal	Up to 24 hours	9	36%
	24 hours to 1 week	7	28%
	>1 week to 42 days	4	16%

TABLE ; 7 OUTCOME OF PRENANCY (N=25)

Outcome of pregnancy	Present study Number(%)
Abortion	1(4%)
Antenatal undelivered	5(20%)
LSCS	10 (40%)
Normal delivery	9(36%)

TABLE 8: FETAL OUTCOME (N = 24)

Fetal Outcome	Number (n)	Percentage (%)
Live Birth	17	68%
Intrauterine Death (Antepartum)	6	24%
Intrapartum Death	1	4%

TABLE 9: CAUSE OF DEATH (N = 25)

Cause of Death	Number (n)	Percentage (%)
Direct Causes	18	72%
Indirect Causes	7	28%

TABLE 10: CAUSES OF MATERNAL MORTALITY (N = 25)

Category	Cause of Maternal Mortality	Number (n)	Percentage (%)
Direct Causes (18; 72%)			
	Hypertensive Disorders of Pregnancy	7	28%
	Postpartum Hemorrhage (PPH)	4	16%
	Sepsis	3	12%
	Pulmonary Embolism	2	8%
	Amniotic Fluid Embolism	1	4%
	Obstructed Labour	1	4%
Indirect Causes (7; 28%)			
	Respiratory Tract Infection	2	8%
	Raised Intracranial Pressure	2	8%
	Dilated Cardiomyopathy	1	4%
	Cardiorespiratory Arrest	1	4%
	Acute Kidney Injury	1	4%

DISCUSSION

The present study analyzed 25 maternal deaths over a period of 2 years and 3 months, with an MMR of 142 per 100,000 live births. This reflects improvement compared to earlier national figures but indicates that maternal mortality still remains a concern (3).

Most maternal deaths occurred in the age group of 26–30 years (48%), followed by 31–40 years (28%), which corresponds to the peak reproductive age group. Similar findings have been observed in other studies (7).

A high proportion of deaths (72%) occurred among multigravida and grand multigravida women, suggesting that increasing parity is associated with higher maternal risk due to complications like anemia, postpartum hemorrhage, and hypertensive disorders (8).

Antenatal care was inadequate in a large proportion of cases, with 32% having no visits and 40% having inadequate care. Only 28% received adequate antenatal care. Lack of antenatal supervision leads to delayed detection and management of high-risk conditions, contributing significantly to maternal mortality (9).

The majority of deaths (80%) occurred in the postnatal period, particularly within the first 24 hours (36%). This indicates that the immediate postpartum period is the most critical phase, requiring vigilant monitoring and prompt management of complications such as hemorrhage and eclampsia (10).

Regarding pregnancy outcome, 40% underwent cesarean section and 36% had vaginal delivery, while 20% died antenatally. The higher rate of cesarean section reflects referral of complicated cases to tertiary care centers.

Fetal outcome was poor, with only 68% live births, 24% intrauterine deaths, and 4% intrapartum deaths. Maternal complications such as hypertensive disorders, sepsis, and hemorrhage can adversely affect fetal survival (11).

Direct obstetric causes accounted for 72% of maternal deaths, while indirect causes contributed to 28%. Among direct causes, hypertensive disorders of pregnancy were the leading cause (28%), followed by postpartum hemorrhage (16%) and sepsis (12%). These findings are consistent with global trends (2).

Hypertensive disorders can lead to severe complications such as eclampsia, stroke, and multiorgan failure. Postpartum hemorrhage remains a major cause due to inadequate blood transfusion facilities and delayed intervention. Sepsis is often associated with poor aseptic practices and delayed treatment.
Indirect causes such as respiratory infections, neurological conditions, and cardiac diseases also contributed significantly. Pregnancy increases physiological stress, worsening pre-existing conditions and increasing mortality risk.

The findings support the "three delays model," emphasizing delays in seeking care, reaching facilities, and receiving treatment (6). Strengthening referral systems, improving antenatal care, and ensuring availability of emergency obstetric services are essential to reduce maternal mortality.

Limitations of the study include small sample size and retrospective design. However, the study provides valuable insights into preventable causes of maternal mortality in a tertiary care setting.

CONCLUSION

Maternal mortality remains a concern despite tertiary care facilities. Most deaths occurred in multigravida women with inadequate antenatal care, predominantly in the early postpartum period. Direct obstetric causes—especially hypertensive disorders, postpartum hemorrhage, and sepsis—were the leading contributors. Strengthening antenatal care, ensuring timely referral, and improving emergency obstetric and postpartum care are essential to reduce preventable maternal deaths.

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