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Analysis of Maternal Mortality in Tertiary Care Centre

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ABSTRACT
Maternal mortality remains a significant global challenge, particularly in low-and middle-income countries. Despite advancements in healthcare, preventable maternal deaths due to inadequate antenatal care, delayed access to emergency obstetric services and co-existing medical conditions persist. This study aims to analyze maternal mortality in a tertiary care centre, focusing on demographic, clinical and healthcare-related factors to identify trends and risk factors for improved maternal health outcomes. A cross-sectional study was conducted over one year at a tertiary care center, analyzing 58 cases of maternal deaths. Data on age, gravida status, antenatal visits, co-existing morbidities and causes of death were collected and analyzed using descriptive statistics to calculate frequencies and percentages. The highest proportion of maternal deaths occurred in the 20-24 age group (37.9%), with primigravida women accounting for 43.1% of cases. Most mothers (77.6%) had fewer than three antenatal visits, indicating inadequate antenatal care. Hypertension (34.3%), anaemia (28.4%) and heart disease (18.6%) were the most common co-existing morbidities. Eclampsia (30.3%) and HELLP syndrome (14.7%) were the leading causes of death, followed by septicaemia (13.7%) and pulmonary oedema (8.8%). The COVID-19 pandemic contributed to 18.6% of co-existing morbidities and 13.7% of maternal deaths. Maternal mortality in this study highlights the critical need for improved antenatal care, timely medical interventions and strengthened healthcare systems. Hypertensive disorders, anemia and the impact of the COVID-19 pandemic were significant contributors to maternal deaths. Targeted interventions, enhanced healthcare access and pandemic preparedness are essential to reduce maternal mortality and improve outcomes.

INTRODUCTION

Maternal mortality is a critical indicator of a nation's healthcare quality and equity. Globally, approximately 287,000 maternal deaths were recorded in 2020, with 94% occurring in low-and middle-income countries[1]. Despite advancements in healthcare, preventable maternal deaths remain a significant challenge due to factors such as inadequate antenatal care, delayed access to emergency obstetric services and co-existing medical conditions[2]. Hypertensive disorders, hemorrhage, sepsis and indirect causes such as anemia and heart disease are among the leading contributors to maternal mortality[3]. In recent years, the COVID-19 pandemic has further exacerbated maternal health risks, highlighting the need for resilient healthcare systems to address emerging challenges[4]. This study aims to analyze maternal mortality in a tertiary care center, focusing on demographic, clinical and health care-related factors. By identifying trends and risk factors, this research seeks to provide insights for targeted interventions and improved maternal health outcomes.

MATERIALS AND METHODS

Study Design: Cross-sectional study.

Setting: Tertiary care centre.

Study Population: 58 cases of maternal deaths recorded over a period. 1 year of study duration.

Data Collection: Data on age, gravida status, antenatal visits and causes of death were analyzed.

Data Analysis: Descriptive statistics were used to calculate frequencies and percentages for categorical variables.

Inclusion Criteria:

- **Confirmed Maternal Deaths:** Cases of maternal mortality occurring during pregnancy, childbirth, or within 42 days postpartum, irrespective of the pregnancy outcome.
- **Age Range:** Women aged 15-49 years.
- **Location:** Maternal deaths that occurred at the tertiary care centre or were referred to the centre during the study period.
- **Documentation:** Cases with complete medical records, including demographic details, antenatal care visits, clinical diagnoses and cause of death.

Exclusion Criteria:

- **Non-Maternal Deaths:** Deaths unrelated to pregnancy or its complications.
- **Incomplete Records:** Cases with missing or incomplete data on key variables such as cause of death, antenatal care, or gravida status.
- **Deaths Outside the Facility:** Maternal deaths that occurred outside the tertiary care centre and were not referred or documented at the centre.
- **Indeterminate Cause:** Cases where the cause of death could not be determined despite medical evaluation.
- **Postpartum Period Beyond 42 Days:** Deaths occurring after 42 days postpartum, unless directly attributable to pregnancy-related complications.

RESULTS AND DISCUSSIONS

Table 1: Age Distribution of Cases

Age group(years)	Frequency	Percentage
<20	12	20.7
20-24	22	37.9
25-29	10	17.2
30-34	5	8.6
>35	9	15.5
Total	**58**	**100%**

Age Distribution (Table 1): Most deaths occurred in the 20-24 age group (37.9%), followed by <20 years (20.7%). Least deaths were observed in the 30-34 age group (8.6%).

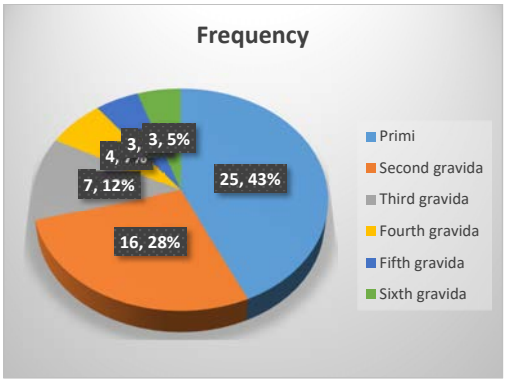

Fig. 1: Gravida Status

Primigravida accounted for 43.1% of maternal deaths, followed by second gravida (27.6%). Higher parity (fifth and sixth gravida) contributed to the least number of cases (5.2% each).

Antenatal Visits: In our study, we found that most mothers had fewer than three antenatal visits, with 28 cases (48.3%) reporting two visits and 17 (29.3%) reporting a single visit.

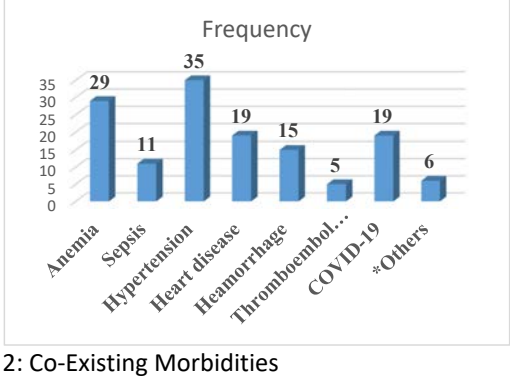

Fig. 2: Co-Existing Morbidities

Hypertension was the most prevalent co-morbidity (34.3%) in our study, followed by anaemia (28.4%) and heart disease (18.6%). COVID-19 contributed to 18.6% of cases, highlighting the pandemic's impact.

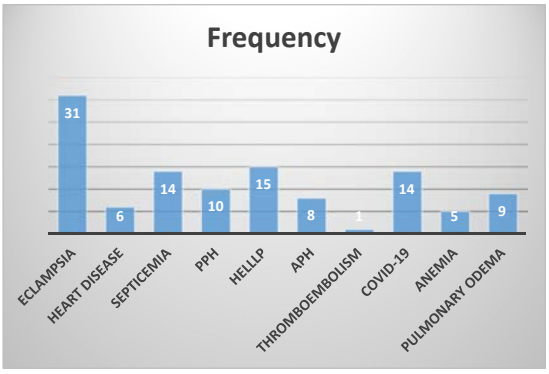

Fig. 3: Cause of Death

In present study, eclampsia (30.3%) and HELLP syndrome (14.7%) were the leading causes. Septicaemia, COVID-19 and pulmonary oedema accounted for significant proportions, underscoring the need for timely medical intervention. Maternal mortality is a multi factorial challenge influenced by demographic, clinical and healthcare-related factors. This study highlights critical areas of concern that warrant targeted interventions to improve maternal outcomes.

Age and Maternal Mortality: The findings revealed that most maternal deaths occurred in the 20-24 age group (37.9%), followed by women under 20 years (20.7%). This aligns with global studies indicating that younger mothers are at higher risk due to biological immaturity, socio-economic factors and limited access to healthcare services. Conversely, advanced maternal age (>35 years) also contributed to a notable proportion of deaths (15.5%), reflecting the increased risk of complications in older mothers.

Gravida Status: Primigravida women accounted for the highest proportion of maternal deaths (43.1%). This is consistent with evidence suggesting that first pregnancies are associated with higher risks of complications such as preeclampsia and obstructed labour[5]. The decreasing frequency of maternal deaths with higher parity may reflect increased experience with pregnancy-related healthcare, although this group remains vulnerable to complications such as uterine rupture and haemorrhage[4].

Antenatal Care: The study found that nearly 77.6% of maternal deaths occurred among women with fewer than three antenatal visits. This underscores the critical role of antenatal care in identifying and managing high-risk pregnancies. The World Health Organization (WHO) recommends at least eight antenatal visits for optimal maternal and foetal outcomes[4]. Insufficient antenatal care often leads to delayed diagnosis of conditions such as anaemia, hypertension and gestational diabetes, increasing the risk of adverse outcomes.

Co-Existing Morbidities: Hypertension was the most prevalent co-morbidity (34.3%), followed by anaemia (28.4%) and heart disease (18.6%). These findings are consistent with global trends, where hypertensive disorders are a leading cause of maternal mortality[5]. The significant contribution of anaemia highlights the need for improved nutritional interventions and routine screening during pregnancy[6]. The impact of COVID-19 (18.6%) emphasizes the pandemic's role in exacerbating maternal health risks, particularly through respiratory complications and reduced access to healthcare during lock downs[7].

Causes of Death: Eclampsia (30.3%) and HELLP syndrome (14.7%) were the leading causes of maternal mortality in this study. These findings are in line with studies showing that hypertensive disorders remain a major contributor to maternal deaths globally[8]. Septicaemia (13.7%) and pulmonary oedema (8.8%) highlight the need for timely diagnosis and management of infections and cardiovascular complications. The contribution of COVID-19 (13.7%) as a direct cause of death underscores the importance of integrating pandemic preparedness into maternal healthcare strategies[9-11].

Limitations: This study was limited to a single tertiary care centre, which may not reflect the broader population. Additionally, the retrospective nature of the study could result in incomplete data capture for certain variables.

CONCLUSION

This study underscores the multifaceted nature of maternal mortality, with significant contributions from demographic, clinical and healthcare-related factors. The high prevalence of deaths among younger mothers and primigravida women highlights the need for targeted interventions to address vulnerable groups. Inadequate antenatal care, with most mothers receiving fewer than three visits, remains a critical gap, emphasizing the importance of routine and comprehensive prenatal monitoring. Hypertensive disorders, particularly eclampsia and HELLP syndrome, were the leading causes of maternal deaths, followed by infections such as septicaemia and complications like pulmonary oedema. The impact of co-existing morbidities, including hypertension, anaemia and COVID-19, reflects the importance of addressing both direct and indirect causes of maternal mortality. To reduce maternal deaths, healthcare systems must

prioritize early identification and management of high-risk pregnancies, strengthen antenatal care services and improve access to emergency obstetric care. Additionally, integrating pandemic preparedness into maternal health strategies is crucial for mitigating emerging health threats. By addressing these factors, we can move closer to achieving sustainable reductions in maternal mortality and improving maternal health outcomes.

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