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Original Research Article

Trends of maternal mortality at a tertiary health care centre in India

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ABSTRACT

Background: Maternal mortality is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of duration and site of pregnancy from any cause, related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Methods: A retrospective study was conducted by reviewing the hospital records to study the maternal deaths and complication leading to maternal death over the period of one year from January 2019 to December 2019 in the department of obstetrics and gynecology, LTMMC and Sion Hospital.

Results: The maternal mortality ratio in the present study 548/100000 live births and corrected MMR's 190/live births. There were 49 deaths of 8093 live birth during the study period. The majority of deaths occurred in the 20-30 age group. Hemorrhage (22.4%) and hypertensive disorder (14.2%) are two most common direct cause of maternal deaths. 46.9% of maternal deaths occurred after 72 hours of death. Indirect cause accounts for 73.5%. Of these deaths and DIC with sepsis was the leading indirect cause of maternal deaths.

Conclusions: Hemorrhage, hypertensive disorder, anemia and DIC with sepsis remain major cause of maternal deaths. Delay at primary level, by the patient and family contributed to higher maternal mortality. This requires more effort to educate, impart knowledge to recognize danger signs and seek urgent medical help and create awareness about the easy accessibility and availability of nearby health care facilities amongst the society.

Keywords: Hemorrhage, Maternal deaths, Maternal mortality, Tertiary centre

INTRODUCTION

Maternal health remains an overwhelming challenge, particularly in the developing world. Globally a woman dies from complications in childbirth every minute. The WHO defines maternal mortality "as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of duration and site of pregnancy from any cause, related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes."¹ Maternal mortality rate is defined as number of maternal deaths per one lakh livebirths.

The quality of healthcare in a community is reflected by its maternal mortality rate.⁸ India accounts for 20% of World's maternal deaths and globally about 800 women

die every day of preventable causes related to pregnancy and childbirth. Even though the maternal mortality rate has reduced from 167 in 1 lakh live birth from 2013-2014 to 130 per lakh live births in 2018, it is estimated that in India 44000 women die annually due to preventable causes.² Mother's in the lowest economic bracket have about two and half times higher mortality rate.

The Government of India has introduced various programs to help condense the MMR and these include Janani Suraksha yojana, maternal and child health program, National health policy, The National rural health mission and National family welfare program. Preventing maternal deaths remains one of the most important objectives of the National family welfare program.³ Most of the evidence for maternal mortality is

obtained through hospital data and community-based reports, both of which have limitations. By accessing the information that is available, it is possible to assess the magnitude and pattern of the health problem in the state.⁴ The government aims to reduce the MMR to less than 100 by 2020. There is a far-flung variation in MMR between different states in India, *MMR being lowest in Kerala which is 46 and highest in Assam which sums up to 237. Estimates derived for the major states suggest relatively high maternal mortality in the eastern and northern parts of the country.⁵ The great tragedy of maternal mortality is that the deaths are preventable as Indirect causes account for 22% of deaths while 50% of direct deaths are due to hemorrhage. Other direct causes include pregnancy induced hypertension, sepsis, obstructed labor, abortion, ectopic. The World Health Organization (WHO) released a consensus statement and complete strategy paper on ending preventable maternal mortality (EPMM). The EPMM target is to reduce the global maternal mortality ratio (MMR) by 2030 and is adopted as SDG target 3.1: i.e., to reduce global MMR to less than 70 per 100 000 live births by 2030.⁶

Adequate assessment of the pregnant women during the antenatal period plays an important role in prevention. Regular antenatal visits, early recognition of complications and prompt referrals to higher center help mitigate the preventable causes of maternal mortality.^{7,8}

The aim of this study was to analyse the trends in MMR in authors tertiary care center.

METHODS

This is a retrospective observational study conducted by reviewing the hospital records of maternal deaths over a period of 1 year from the year 2019 in department of obstetrics and gynecology of Lokmanya Tilak Municipal Medical College and Sion Hospital, a tertiary care hospital attached to a medical college, located in Central Mumbai, draining patients from the entire Mumbai Metropolitan region and referrals from far-away places like Raigad, Ratnagiri districts too. The hospital delivers approximately 10,000 patients every year. A total of 49 cases were obtained from medical records of 1 year.

Inclusion criteria

Maternal deaths within period of pregnancy or within 42 days postpartum.

The maternal deaths that occurred during this period were inspected closely for various aspects like age, parity, antenatal care, route of delivery, referral history, interval between admission to time of death and whether any delay was noted.

All the parameters were analysed using descriptive statistics i.e., percentages and proportions were calculated.

RESULTS

During the study period there were 49 maternal deaths out of 9074 deliveries and 8930 live birth giving an MMR of 548 per 1 lakh live births.

The data obtained from authors tertiary care center is tabulated as follows;

$$MMR = \frac{\text{No. of maternal deaths} \times 100000 \text{ live birth}}{\text{Total number of live births}} = 548$$

Total number of live births.

However, as maximum of these patients were referred and delivered outside Sion, their confinement does not add up in the total live births, hence the data accumulated is skewed.

Considering only the number of maternal deaths that delivered at authors tertiary care centre, that is 33, the indigenous or the corrected MMR adds up to corrected maternal mortality rate (indigenous) = 190/1 lakh live birth.

Table 1: Maternal deaths and age.

Age	No. of deaths	Percentage
<20	1	1.9
20-30	37	75.5
>30	11	22.4

As shown in the Table 1, out of 49 deaths there was only 1 (1.9%) patient whose age was less than 20-year-old, 37 (75.5%) were between the age group of 20-30 and 11 (22.4%) were above 30 years of age.

Table 2: Maternal death and parity.

Parity	Percentage
Primigravida	38.7
Multigravida	61.22

As shown in the Table 2, 19 (38.7%) of them were primigravida and 30 (61.22%) were multigravida.

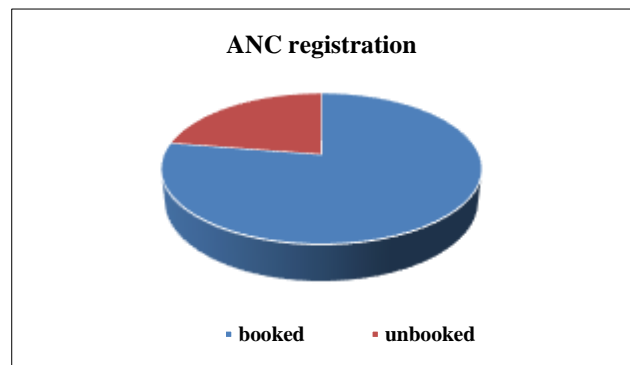


Figure 1: Maternal death and ANC care.

Of the 49 cases 38 (77.5%) were booked and 11 (22.4%) were un-booked.

Table 3: Maternal death and referrals.

Referrals	Number of patients	Percentage
PHC	19	38.7
Private	12	24.48
Directly from home	7	14.2
CHC	6	12.24
Sion registered	3	6
Referred from other tertiary hospital	2	4

Of the 49 deaths, 19 (38.7%) were referred to our tertiary care center from a primary health center and 6 (12.24%) were from a community health center. There were 12 (24.48) referrals from private hospitals, 2 (4%) were referred from other tertiary hospital, 7 (14.2%) directly came from home while only 3 (6%) were antenatally registered at LTMMC, LTMGH Sion.

Of the total 32 post-delivery maternal deaths, a total number of 17 (34.53%) cases delivered at Sion whereas 15 (30.47%) were referred from various referral centers in a post-delivered moribund state.

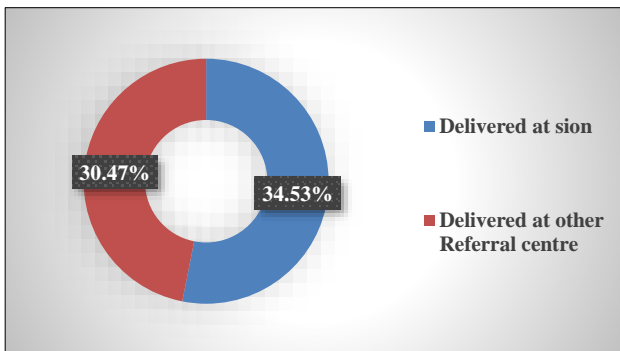


Figure 2: Numbers of delivery.

Table 4: Status of mother at time of death.

Status	No. of patients	Percentage
Antenatal	15	30.6
Post abortion	2	4.08
Intrapartum	0	0
Postpartum	32	65.3

Of the 49 deaths, 2 (4.08%) patients were post-abortion, 15 (30.6%) were antenatal, while 32 (65.3%) died in their post-partum period.

Of the 49 patients, 17 (34.6%) died within 24 hours of admission while 5 (10.2%) patient died within 24-48 hours, 3 (6.1%) patients died between 48-72 hours and 23 (46.9%) patients died after 72 hours while 1 patient was brought dead.

Table 5: Time interval between admission and death.

Time interval	No. of patients	Percentage
Within 24 hours	17	34.6
24-48 hours	5	10.2
48-72 hours	3	6.1
After 72 hours	23	46.9
Brought dead	1	2

Table 6: Maternal death in relation to route of delivery.

Route of delivery	No. of patients	Percentage
Vaginal	26	53
LSCS	6	12
Antenatal	15	30.06
Post abortion	2	4

As shown in the Table 6, 26 (53%) patients had delivered vaginally while 6 patients had undergone LSCS and 15 (30.06%) were antenatal while 2 (4%) patients were post-abortion.

Table 7: Cause of death.

Cause of death	Percentage
Direct	26.5
Indirect	73.5

Of the 49 deaths 36 (73.5%) were indirect and 13 (26.5%) were direct.

Of 49 deaths, 10 deaths were due to post-partum hemorrhage and 1 died due to antepartum hemorrhage.

Preeclampsia, eclampsia, HELLP accounted for 7 cases, 1 patient died of chronic hypertension, 1 patient succumbed to amniotic fluid embolism while 8 were due to DIC and sepsis.

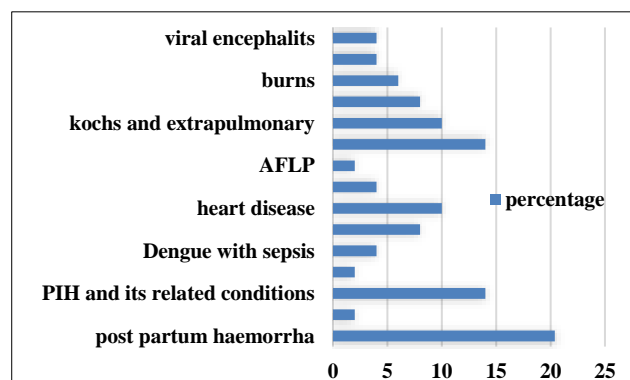


Figure 3: Causes of maternal mortality.

Only 1 death was due to ARDS and sepsis while 2 deaths were due to dengue and sepsis, pulmonary or extrapulmonary Koch's accounted for 5 cases.

A total 5 patients died due to heart disease, 2 patients died due to hepatitis and 1 patient died due to AFLP.

A total 7 patients died due to pneumonia with ARDS and 4 patients died of severe anemia, 3 patients died due to burns, two patients died due to surgical sepsis, 2 were due to viral encephalitis.

Table 8: Type of delay and maternal death.

Type of delay	Percentage
1	38.7
2	30
3	4
Both 1 and 2	4
Nil	22

In this study it was noted that the delay was primarily by patient and the family in 19 cases (38.7%) and it was noted that 15 (30%) patients had delay at the level of 1st referral center while only 2 (4.08%) patients had delayed at the tertiary care center.

No delay was noted in 11 cases while in 2 (4.08%) cases it was noted that the delay was both at the level of patient and the referral center.

DISCUSSION

It is famously said that “if you to know how strong a country’s health system is, look at the wellbeing of its mothers”-Hilary Clinton.

MMR is taken as the surrogate for the functioning of the health system. Losing a mother takes a moment but its impact lies for a long time on the family, society and country. A high MMR denotes poor illiteracy, low socioeconomic status, late referral.

The MMR in the present retrospective study was found to be 548 per 1 lakh live births and the corrected MMR was 190/lakh live birth. 79% of these were referred from other hospitals of which 50% were from PHC and CHC. It was noted that most of these patients were referred when the complications had already set in and were not given the necessary medical intervention at the earliest, as a result nothing much could have been done to save the patient. In this study it was noted that 30% of the patients had delay at the level of first referral centre. Hence early detection of complication and prompt referral aid in reducing the MMR.⁸

Present studies are comparable to studies done by Pathak et al who reported MMR of 428 to 869.6 per 1 lakh live birth due to large number of referral cases.⁹

In this study maximum deaths that is 75.5% occurred in the age group of 20-30 years which is similar to studies done by Ashok et al in 2008.¹⁰

This study was compared to Rai et al which showed that 61% of the deaths were seen in multigravida.

In the present study, 65.3% women died in the post-partum period which is comparable to study done by Khumanthem et al who reported post-partum deaths accounting 70 % of maternal deaths.³

Authors found that 26.5% were direct causes of death, hemorrhage being the major cause constituting 84% of direct deaths which was found to be consistent with Konar et al.

About 4 patients underwent obstetric hysterectomy for post-partum hemorrhage.

In this study 14% of maternal deaths had hypertensive disorders thus it is important to detect and treat pregnancy induced hypertension with utmost care so as to prevent complications like eclampsia, HELLP syndrome and subsequently prevent associated maternal morbidity and mortality.

Amongst the indirect causes 16% succumbed to DIC and sepsis.

Heart disease were responsible for 10 % of total maternal deaths and liver disorders constituted of about 6% of total maternal deaths which have been reported in other studies.¹¹

In this study anemia constituted 8% of the deaths as pre-existing anemia acts as a major co-morbid factor and hampers maternal ability to resist infection to cope up with hemorrhage.¹² Thus, antenatal supplementation of iron plays key role in prevention of anemia and its consequences and complications. The risks from severe haemorrhage, and consequently the need for blood transfusions, would be reduced if anaemia detection and management is done in early pregnancy or preconception.¹³

In this study 10% of deaths were due to acute febrile illness and sepsis of which 60% were due to leptospirosis

Only 1 death was due to amniotic fluid embolism.

CONCLUSION

The present study included 49 cases of maternal deaths due to direct and indirect obstetric causes from January 2019 to December 2019 at the department of obstetrics and gynecology of a tertiary care center in a metropolitan city. The study was aimed at evaluating direct and indirect causes of maternal deaths. Each case was studied carefully and analysed according to the specified parameters. All the observations were meticulously scrutinized and presented in a tabular and graphic form. These results were then analysed and compared with previous well-established similar studies.

As observed, most of the maternal deaths are preventable and active participation of the community, medical staff, government is of prime importance. Maximum deaths in the study were among multigravidas (61.22%) i.e., 30 of the 49 deaths. Closely spaced pregnancies in nutritionally poor patients leads to increased morbidity and hence mortality in these patients. The fact that obstetric hemorrhage is still one of the leading cause of direct maternal deaths warranting the need for blood transfusions and hence the need for blood transfusion facilities at first referral unit level has to be over-emphasized. High risk patients who are prone to antepartum hemorrhage and post-partum hemorrhage like grand multipara, polyhydramnios, macrosomia etc should be identified and active management of third stage of labor should be practiced. In the present study, 65.03% died during postnatal period, 30.6% died during antenatal period. There is a need for good quality supervision, vigilance and monitoring during post-natal period for early detection and management of complications and to avoid preventable causes of maternal deaths. As it was seen that MMR is lowest in Kerala which also has the highest literacy rate (93.91%).¹⁴ It is quite understandable that educating and motivating the community about nutrition, hygiene, seeking medical help at the earliest, early ANC registrations, regular ANC visits and complying with the treatment given, will help to reduce MMR. The medical staff, ASHA workers and training of skilled birth attendants in emergency obstetric services has to be emphasized at the PHC and CHC levels.

Study shows maximum maternal deaths in cases where the patient was referred from other hospitals. As our hospital is a tertiary care center and teaching institute with facilities for emergency obstetric care, it shares maximum burden of referred cases in critical condition with delayed reference. Multiple delays are the major contributing factor for maternal mortality. It is of utmost importance, that a patient with high risk factor be motivated to attend a tertiary care center in the first trimester of pregnancy, for early diagnosis, admission and management of the complications.

Sustained reductions in the number of maternal mortality rates will only be possible if modern high-quality obstetric care is made available to all women through a system of professional midwifery and referral hospital care in the context of political commitment and accountability of health provider.¹⁵ Also, emergency transport to the referral center plays an important role in delaying administration of life saving measures and thus a fast track intervention at every level can alleviate the complication of high-risk pregnancy further leading to reduction in maternal mortality rate overall.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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