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Maternal mortality trends in "Tropical Country"

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Abstract
Objective: To analyse the cause of maternal mortality at a tertiary health care centre.
Methods: Cross sectional analytical study of maternal mortality from January 2017 to December 2018.
Results: Over the study period total maternal deaths were 116 and 21545 live births. Direct cause of maternal death in majority were hypertensive disorders of pregnancy 26 (22.4%) and haemorrhage 20 (17.2%) and due to indirect cause was Anaemia (12.9%). Majority of patients were primigravida (48.3%), belonged to 21-25 years age group (55.1%), (82.8%) belong to middle class, majority expired within 24 hours (35.3%) and normal vaginal delivery was the commonest mode of delivery.
Conclusion: Majority of maternal mortality can be prevented by early referral, by making early diagnosis, and by providing timely and adequate care. Analysis of different causes of maternal mortality will be helpful in preventing several maternal deaths by providing early referral units, blood banks and competent working staff.

Keywords: Maternal Mortality Ratio, Maternal Mortality Rate, Direct causes, Indirect causes, Tertiary centre, Haemorrhage

Introduction
Maternal death is defined as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes" as per World Health Organization. Majority of women die worldwide from preventable causes related to pregnancy and childbirth. [1]Maternal mortality ratio is defined as proportion of maternal deaths per 1,00,000 live births reported under the sample registration system (SRS). Maternal mortality rate is defined as, maternal deaths to women in the ages 15-49 years per lakh of women in that age group. MMR provides a measure of safe deliveries and efficiency of maternal care and allows international comparison. The maternal mortality ratio is an important indicator of health care quality in a given society. According to sample registration system, maternal mortality ratio (MMR) of India is 130 per 100,000 live births, MMR of Haryana is 101 per 100,000 live births, MMR is maximum in Assam-(237) and minimum in Kerala- (46). Maternal mortality rate of India and Haryana is 8.8 and 8.2 per lakh female in reproductive age group respectively as per SRS. The lifetime risk of India and Haryana is 0.3%.[2]
Direct and indirect obstetric causes can lead to maternal collapse, systematic approach of the causes of collapse can helps to identify the cause of collapse in the hospital setting and, survival can be improved in the reversible causes of death. The deaths are caused by the 'Three Delays': delay in seeking care, delay in reaching care, delay in receiving care. While these delays are most common in the developing world they are not unknown in countries with developed health services. The common reversible causes of collapse in any woman are hypovolemia (can be due to antepartum haemorrhage, postpartum hemorrhage), hypoxia, hypo/hyperkalaemia and other electrolyte disturbances, eclampsia and pre-eclampsia, hypothermia due to sepsis, thromboembolism, toxicity, tension-pneumothorax, heart disease in pregnancy, and cardiac tamponade [1].
Maternal mortality and morbidity are key indicators of population health. The burden posed by maternal morbidity & mortality has long been overlooked and neglected despite its vital importance in improving population health.
The present study was conducted to analyse the maternal deaths at a tertiary care hospital of Haryana, India.

Material and methods

The present study was a cross sectional analytical study done to identify the maternal mortality rate, conducted in the Department of Obstetrics and Gynaecology in Pt. B.D. Sharma at PGIMS, Rohtak after approval from the institutional ethics committee. It is a tertiary care referral centre, which gets a large number of referrals from primary health centres, community health centres and maternity homes. The details of maternal deaths were collected and analysed for a period of two years from January 2017 to December 2018 with respect to following epidemiological parameters: - distribution of maternal deaths in relation to age, parity, literacy, residence, socioeconomic status, antenatal registration, mode of delivery, admission to death interval and cause of death, whether preventable or not. All accidental and incidental causes of death were excluded from the study.

Results

During the study period of two years, there were 116 maternal deaths and 21545 live births were evaluated. The maternal mortality ratio i.e. number of maternal deaths per one lac live births for the year 2017 and 2018 was 566 and 511 respectively as shown in Table 1. Majority of maternal deaths (n=64,55.1%) were seen in 21-25 years age group, less no. of deaths occurred in extremes of age 14 (12%) in less than 20 years and 11 (9.4%) in more than 30 years as depicted in figure1. Majority of patients were referred (n=91,78.4%) and the reason for referral were need for multidisciplinary team approach in case of medical complications, non-availability of intensive unit care, lack of adequate blood and blood products in case of obstetric haemorrhage. There were 56 (48.3%) primigravida and 60 (51.7%) were multigravida. Socioeconomically 96 women (82.8%) belong to middle class and 20 (17.2%) belong to lower class. Majority (95.7%) women were Hindu by religion and only 5 (4.3%) were Muslim. 98 (84.5%) women were residing in urban area. 91 (78.4%) women were unbooked and not availed any ANC care as a result maternal morbidity and mortality were increased in this group (Table 2).

41 patients (35.3%) in the present study died within 24 hours, and 8 (6.9%) patients died after 48 hours. 56 women (48.3%) died after 72 hours (Table 3 & Figure 2). Normal vaginal delivery was the commonest mode of delivery among them (n=75, 64.6%) and 30 (25.8%) underwent caesarean section and 11 (9.4%) expired undelivered (Table 4). Those who died undelivered mostly were due to acute maternal conditions like amniotic fluid embolism, heart disease, meningitis, swine flu, and pulmonary embolism. Direct causes led to 65 (56.03%) deaths. Figure 3 & Table 5, among the direct causes of death majority were due to hypertensive disorders 26 (22.4%) and haemorrhage 20 (17.2%) followed by sepsis 13 (11.2%). Maternal deaths due to indirect causes accounts for 51 cases (43.9%) (Figure 4 & Table 6). Anaemia, jaundice, heart disease, renal failure, respiratory failure accounted for 15 (12.9%), 13 (11.2%), 8 (6.89%), 7 (6.03%), 2 (1.72%) respectively. Epilepsy, meningitis, lymphoma, swine flu, SLE, tuberculosis each accounted for 0.86% of maternal deaths.

Table 1: Distribution of maternal mortality

Year	Maternal deaths	Live births	MMR (per one lac live births)
2017	60	10593	566.4
2018	56	10952	511.3

Table 2: Demographic distribution of maternal death

Characteristics	Number (Percentage)
Age group (Years)	
<20 years	14 (12%)
21-25	64 (55.1%)
26-30	27 (23.2%)
>30	11 (9.4%)
Parity	
Primi	56 (48.3%)
Multi	60 (51.7%)
Status	
Referred	91 (78.4%)
Direct	25 (21.5%)
ANC care	
Unbooked	91 (78.4%)
Booked	25 (21.5%)
Socioeconomic status	
Lower	20 (17.2%)
Middle	96 (82.8%)
Religion	
Hindu	111 (95.7%)
Muslim	5 (4.3%)
Residence	
Rural	18 (15.5%)
Urban	98 (84.5%)

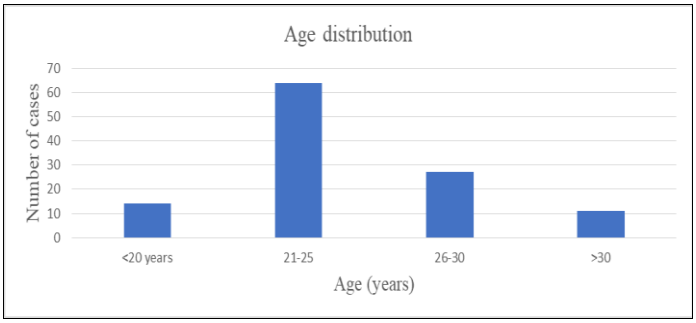

Fig 1: Age wise distribution of maternal deaths

Table 3: Admission-death interval

Admission-death interval (hours)	Maternal deaths (percentage)
<24	41 (35.3%)
24-48	11 (9.5%)
48-72	8 (6.9%)
>72	56 (48.3%)

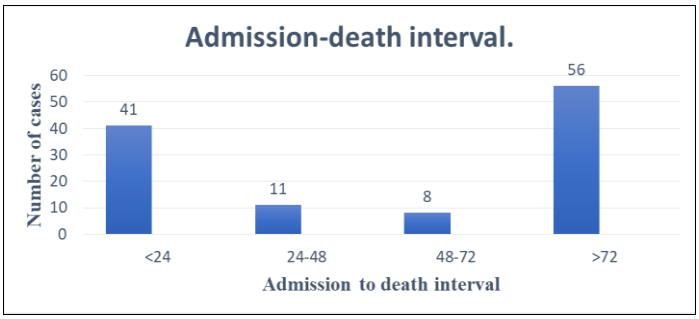

Fig 2: Admission-death interval.

Table 4: Mode of delivery

Mode of delivery	Number (Percentage)
Normal vaginal delivery	75 (64.6%)
Caesarean section	30 (25.8%)
Undelivered	11 (9.4%)

Table 5: Direct causes of maternal mortality

Causes	Number (Percentage)
Hypertensive disorders	26 (22.4%)
Haemorrhage	20 (17.2%)
Sepsis	13 (11.2%)
Rupture uterus	4 (3.44%)
Pulmonary embolism	2 (1.72%)

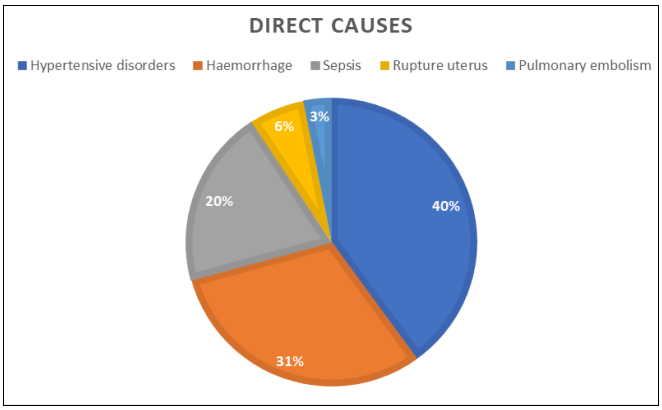

Fig 3: Direct causes of maternal mortality

Table 6: Indirect causes of maternal mortality

Causes	Number (Percentage)
Anaemia	15 (12.9%)
Jaundice	13 (11.2%)
Heart disease	8 (6.89%)
Renal failure	7 (6.03%)
Respiratory failure	2 (1.72%)
Epilepsy	1 (0.86%)
Meningitis	1 (0.86%)
Lymphoma	1 (0.86%)
SLE	1 (0.86%)
Swine flu	1 (0.86%)
Tuberculosis	1 (0.86%)

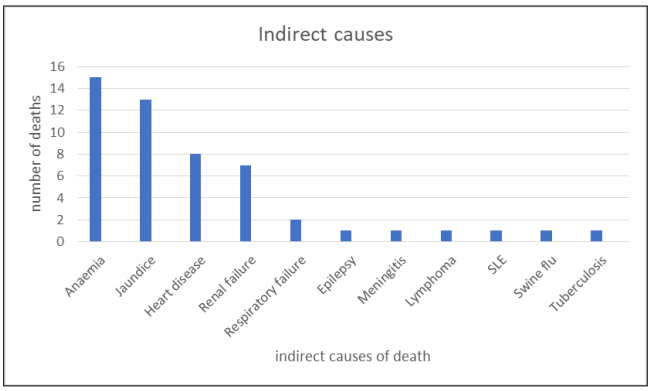

Fig 4: Indirect causes of maternal mortality

Discussion

Maternal mortality is a measure of reproductive health of the society. Poor quality of health care, delayed referrals services and low socioeconomic status of the community leads to an increase in maternal mortality and morbidity. Accurate diagnosis and early intervention of pregnancy related morbidity is an imperative step in the prevention of matenal death.[3]

During the study period of two years MMR ranged between 566 and 511/1,00,000 births. Other Indian studies conducted in the last 15 years have shown wide variations in MMR ranging from 172/100,000 (1996) to 625/100,000 births (2005). In the study conducted by Prasanta *et al* [4]. have observed the MMR of 625/100000 births. Other studies have been conducted before 1999 which shows higher MMR ranging between 130[5], 160[6], and 170/100000[7] births. MMR of 392/100,000 births was reported by Salhan *et al*. (2000) [6]. These MMR variation could be explained due to many variables like poor nutritional status, lack of antenatal care, unawareness of warning signs of pregnancy, unsupervised/dai- handled deliveries, social bias toward blood donation, and late referrals. This study has high MMR which can be due to the fact that it is one of the tertiary care referral hospital that gets referral from neighbouring hospital as well.

Maximum number of maternal deaths occurred in 21-25 year age group. Similar observation is seen in studies from Salem and Maharashtra, but study conducted by Khandale SN *et al*. showed maximum deaths in 25-29 years age group [8–10]. Majority of the cases (78.4%) were referred from first referral units after identification of complications same also observed on other studies [8-10–12].

There were no grand multipara and primigravida comprises (48.3%) similar observation seen in other studies. Maternal deaths due to indirect causes accounts for 51 cases (43.9%). Anaemia, jaundice, heart disease, renal failure, respiratory failure accounted for 15 (12.9%), 13 (11.2%), 8 (6.89%), 7

(6.03%), 2(1.72%) respectively. Epilepsy, meningitis, lymphoma, swine flu, SLE, tuberculosis each accounted for 0.86% of maternal deaths these cases were managed by multidisciplinary approach which is available at our tertiary centre. Direct causes led to 65 (56.03%) deaths. Among the direct causes of death majority were due to hypertensive disorders (which includes severe preeclampsia, HELLP syndrome, eclampsia) 26 (22.4%) and due to haemorrhage (postpartum haemorrhage) were 20 (17.2%) followed by sepsis 13 (11.2%). In the present study 41 patients (35.3%) in the present study died within 24 hours, and 8 (6.9%) patients died after 48 hours. 56 women (48.3%) died after 72 hours.

Conclusion

Majority of maternal mortality can be prevented by early referral, by making early diagnosis, and by providing timely and adequate care. Analysis of different causes of maternal mortality will be helpful in preventing several maternal deaths by providing early referral units, blood banks and competent working staff.

In the present study following are the major contributing factors leading to poor maternal prognosis or that are the major reason behind high MMR: lack of antenatal care, unawareness of warning signs of pregnancy, unsupervised/dai- handled deliveries, non-availability of blood and blood products, and late referrals. The present study have shown that maternal morbidity and mortality can be prevented by improving health care and transport facilities, by registering every antenatal patient, increasing institutional deliveries, early identification and referral of high risk pregnancies to a tertiary centre.

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