

Original Article

PREVALENCE AND CAUSES OF MATERNAL MORTALITY AT A TERTIARY CARE TEACHING HOSPITAL IN WESTERN INDIA

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Prevalence and Causes of Maternal Mortality at a Tertiary Care Teaching Hospital in Western India

ABSTRACT

Abstract:

Introduction: Maternal mortality is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy irrespective of the duration and site of the pregnancy from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. The death of a mother has profound consequences on social and economic health and also on the development of a family and a nation. The objective of the current study is to determine the proportion of maternal mortality at our tertiary care teaching hospital, to analyse the epidemiological parameters and causes of maternal mortality, to determine the importance of antenatal, intranatal and postnatal care in relation to maternal mortality and to suggest preventive measures to reduce maternal mortality.

Material and Methods: This retrospective observational study was carried out from 16th May 2018 to 15th December 2020 at a tertiary care teaching hospital.

Results: Out of 15,164 deliveries, there were 15,006 live births. During the study period, 29 maternal deaths were recorded. Hence, Maternal Mortality Ratio (MMR) was 193.2. Majority, 12(41.4%) patients were in the age group of 21-25 years. Inadequate antenatal care was taken by 14 (48.3%) patients and 11 (37.9%) patients had not taken any antenatal care. Maternal mortality occurred in 12(41.3%) and 17(58.7%) patients during antenatal and postnatal period respectively. In 19(65.5%) patients, maternal mortality occurred due to direct obstetric causes and in 10 (34.5%) maternal mortality occurred due to indirect causes. Majority of mortality occurred due to delay in women seeking help.

Conclusion: Majority of maternal mortality occurred due to delays at a community level in recognizing an emergency situation and/or delays in decision to seek care at a health facility. Community awareness regarding the importance of antenatal care, danger signs, high risk pregnancy, institutional deliveries, postnatal care and family planning can help in reducing maternal mortality by preventing delay at community level.

Key words: maternal mortality, hypertensive disorders, sepsis

Introduction:

WHO defines maternal death as the death of a woman while pregnant or within 42 days (that is, days 0-41) of termination of pregnancy irrespective of the duration and site of the pregnancy from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. ¹ As per WHO, every day, approximately 810 women die from preventable causes related to pregnancy and childbirth. 94% of all maternal deaths occur in low and lower-middle income countries. ² India has seen a dramatic fall in MMR by 61% between 2000 and 2017. India is still home to the higher number of women dying during childbirth across the world and many of these are due to preventable causes. ³ Thus, this study aims to determine various aspects of maternal mortality at our tertiary care teaching hospital.

The objectives of the present study were to determine the proportion of maternal mortality at our tertiary care teaching hospital, to analyse the epidemiological parameters, causes of maternal mortality, to determine the importance of antenatal, intranatal and postnatal care and to suggest preventive measures to reduce maternal mortality.

Material and Methods:

This was a retrospective observational study of maternal deaths over a period of 2 years and 7 months, from 16th May 2018 to 15th December 2020 at department of Obstetrics and Gynaecology of tertiary care hospital. The data was collected from the indoor case papers/reviewing records of maternal deaths and each maternal death was analysed in relation to epidemiological factors related to maternal mortality such as age, residence, socio-economic status, parity, antenatal care, admission-death interval, outcome of pregnancy, cause of death and type of delay.

Results:

During the study period, Out of 15,164 deliveries, there were 15,006 live births and there were 29 maternal deaths. Hence, Maternal Mortality Ratio (MMR) was 193.2.

Table I: Demographic Characteristics of Patients (N=29)

Demographic Characteristics	Number	Percentage
Age		
<20	4	13.8
21-25	12	41.4
26-30	8	27.6
31-35	4	13.8
36-40	1	3.4
Residence		
Urban	28	96.6
Rural	01	3.4
Socio-economic class		
Low	23	79.3
Middle	6	20.7
Type of Admission		
Unregistered	15	51.7

Registered	14	48.3
Gravida		
Primi	12	41.5
Second	5	17.2
Third	8	27.6
Fourth	3	10.3
Fifth	1	3.4
Antenatal Visits (Minimum 4 visits)		
Inadequate	14	48.3
Adequate	4	13.8
No	11	37.9

As shown in Table I, majority, 12 (41.4%) patients were in the age group of 21-25 years and 8(27.6%) patients were in the age group of 26-30 years. Hence, 20 (69%) patients were in the age group of 21-30 years. Majority of patients, 28 (96.6%) were from urban areas. Majority of patients, 23 (79.3%) were from low socio-economic class. Unregistered patients were 15 (51.7%). Majority, 12(41.5%) patients were primigravida. Only 4 (13.8%) patients had adequate antenatal visits whereas 14 (48.3%) patients had inadequate antenatal visits and 11 (37.9%) patients had not taken any antenatal visits.

Table II: Death in Relation to Stage of Pregnancy (N=29)

Death in Relation to Stage of Pregnancy		Number	Percentage (%)
Antenatal 12(41.3%)	1 st Trimester	1	3.4
	2 nd Trimester	1	3.4
	3 rd Trimester	10	34.5
Postnatal 17(58.3%)	Up to 24 hours	4	13.8
	24 hours-1 week	9	31.1
	>1 week- 42 days	4	13.8

As shown in Table II, 12(41.3%) and 17(58.7%) patients died during antenatal and postnatal period respectively. Hence, majority maternal mortalities occurred in the postnatal period. Antenatal deaths, in third trimester occurred in 10(34.5%) patients.

Table III: Outcome of Pregnancy (N=29)

Outcome of Pregnancy		Number	Percentage (%)
Ectopic pregnancy		1	3.4
Abortion		1	3.4
Antenatal (Undelivered)		10	34.5
Delivered	Vaginal Delivery	7	24.1
	LSCS	10	34.5

As shown in Table III, 1(3.4%) each patient had history of ectopic pregnancy and history of abortion. Undelivered and delivered patients were 10(34.5%) and 17(58.7%) respectively. Vaginal delivery occurred in 7(24.1%) and 10(34.5%) patients were delivered by LSCS. Out of 17 patients who were delivered either vaginally or by LSCS, in 16 patients delivery was conducted by doctor at hospital and in 1 patient delivery was conducted by unskilled birth attendant. Majority of deliveries 14(82.3%) were conducted at tertiary care centre, 2(11.8%) deliveries were conducted at private hospital and 1(5.9%) delivery conducted at home.

Table IV Cause of Maternal Mortality (N=29)

		Cause of Maternal Mortality	Number	Percentage
Direct 19 (65.5%)	Sepsis		8	27.6
	Hypertensive disorder of pregnancy		5	17.3
	Haemorrhage	APH	2	7
		PPH	1	3.4
	Amniotic Fluid Embolism		1	3.4
	Pulmonary Embolism		1	3.4
	Obstructed Labour		1	3.4
Indirect (34.5%)	10	Respiratory Tract Infection	5	17.3
		Dilated Cardiomyopathy	3	10.4
		Anaemia	1	3.4
		Dengue	1	3.4
Total			29	100

As shown in Table IV, 19(65.5%) patients died due to direct obstetric causes and 10 (34.5%) died due to indirect causes. The most common direct obstetric cause of maternal mortality was the classical triad of sepsis 8(27.6%), hypertensive disorder of pregnancy 5 (17.3%) and haemorrhage 3(10.4%). Indirect causes of maternal mortality were respiratory tract infection and dilated cardiomyopathy in 5(17.3%) and 3(10.4%) respectively. Anaemia and dengue lead to maternal mortality in 1(3.4%) each.

Figure 1: Causes of Maternal Mortality

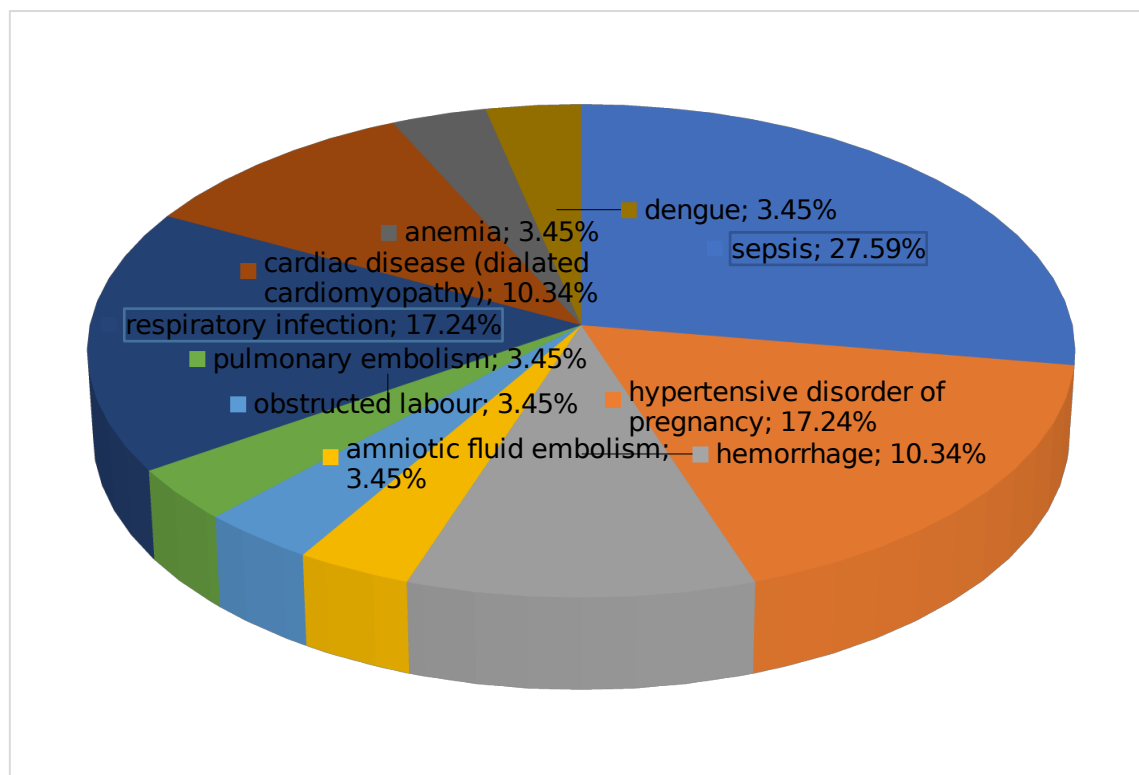


table V: Admission – Death Interval (N=29)

Interval in Hours	Number	Percentage
<24	12	41.4
25-48	4	13.8
49-72	1	3.4
>72	12	41.4

As shown in Table V, 12 (41.4%) patients died within 24 hours and 12 (41.4%) patients died after 72 hours of admission.

Discussion:

Maternal mortality is an index of reproductive health of the society. As per Registrar General of India, MMR of Gujarat for the period of 2016-18 was 75 and MMR of India for the period of 2016-18 was 113.⁴ MMR of present study was 193.2 which was higher as our institute being a tertiary care centre, majority of patients were admitted as emergency patients with some life threatening complications and lack of /inadequate antenatal care. With accelerated efforts and infrastructural expansion to reduce maternal death, complicated pregnancies and deliveries are referred early to the higher centres. There is a wide variation in MMR across different regions of India with Ratan Das et al ⁵, Ashraf Ali M et al ⁶, Varsha N Patil et al ⁷, Lamba A et al ⁸, Barsode S et al ⁹, Zaman S et al ¹⁰, Biradar SV et al ¹¹, K,V.S.M Sandhya Devi et al ¹², Boro RC et al ¹³, Sundari KPM et al ¹⁴ reporting an MMR of 518.48, 215, 477, 627.79, 185.1, 709.35, 57, 863, 463.9 and 802 respectively.

In present study, the majority, 69% patients were in the age group of 21-30 years. Studies conducted by Sanju Kumari et al ¹⁵, Jani SP et al ¹⁶, Parmar M et al ¹⁷, Soni M et al ¹⁸ have reported 73.1 % , 85.3% , 80% , 54.2% patients in same age group respectively.

In present study, majority of patients, 96.6% were from urban areas as our hospital is located in the city area. Studies conducted by Varsha N Patil et al ⁷ and Parmar M et al ¹⁷ have reported 61.9% and 43.3% patients were from urban area.

In present study, a majority 79.3% patients were from low socio-economic class. Studies conducted by Asharaf Ali M et al ⁶ and Varsha N Patil et al ⁷ have reported 90 % and 71.4% patients were in lower socio-economic class respectively. Women from lower socio-economic class are likely to be less privileged in the field of education, nutrition, hygiene, empowerment and health care.

In present study, 15 (51.7%) patients were emergency admissions and 14(48.3%) were registered patients. Studies conducted by Ratan Das et al ⁵ and Lamba A et al ⁸ have reported 89.8% and 75.6% emergency admissions respectively. Risk of maternal death increases in the emergency group of patients due to delay in deciding to seek care and delay in reaching appropriate care.

In present study, 12 (41.4%) patients were primigravida and 17 (58.5%) were gravida 2 or more. Studies conducted by Sanju Kumari et al ¹⁵, Garg P et al ¹⁹ and Lamba A et al ⁸ have reported 67.1% ,49% and 73.3% multigravida patients respectively. In present study, out of 17 patients who were second gravida or more, maternal mortality occurred due to hypertensive disorder of pregnancy(4), respiratory tract infection(4), dilated cardiomyopathy(2), septicaemia(3), obstructed labour(1), haemorrhage(1), COVID-19 pneumonitis(1) and dengue(1). In gravida 2 or more because of less spacing between childbirth, their health status is not restored. They are at higher risk of obstetric complications like pre-eclampsia-eclampsia, anaemia, sepsis, and labour abnormalities. Hence, information and awareness on available family planning methods and myths regarding various methods of contraception must be cleared in patients and in addition the community must be made aware of various complications that occur in multigravida. Family planning has important implications for maternal health. [Contraceptive use reduces the number of high-risk and high-parity births](#), thereby reducing maternal mortality. Access to contraceptives also helps to prevent unwanted pregnancies, some of which result in [unsafe abortions one of the leading causes of global maternal death](#).²⁰

In present study, 14 (48.3%) patients had inadequate antenatal visits and 11 (37.9%) had not taken any antenatal visits. Studies conducted by Khandale SN et al ²¹ and Zaman S et al ¹⁰ have reported 9% and 55.2% patients had not taken any antenatal visits respectively. Many health problems in pregnant women can be prevented, detected and treated during antenatal visits. Antenatal counselling has been demonstrated to increase markedly the proportion of women who deliver at health facilities.²²

In present study, 12(41.3%) and 17(58.7%) patients died during antenatal and postnatal period respectively. Antenatal deaths beyond 20 weeks of gestation occurred in 10 (34.5%) patients, 1(3.4%) each patient had history of ectopic pregnancy and history of abortion. Majority maternal mortalities occurred in the postnatal period. Studies conducted by Lamba A et al ⁸ and Khandale SN et al ²¹ have reported 8.8% and 24.3%, patients expired during antenatal period while 77.8% and 53.9% patients expired during postpartum period respectively. Most of the complication leading to maternal death in postpartum period had its relation to complications developed during antenatal period. Hence, early recognition of complication and timely intervention is necessary. High number of deaths in puerperium indicates need for continuous vigilance in postpartum period and prompt action if problem arises. Institutional delivery and timely management of complications along with replacement of lost blood volume can reduce deaths in postpartum period.²²

In present study, out of 17 delivered patients, 7(24.1%) had vaginal delivery and 10(34.5%) were delivered by LSCS. Studies conducted by Parmar M et al ¹⁷, Sundari KPM et al ¹⁴ have reported 41.7% and 34% patients delivered vaginally while 45.9% and 62% delivered by LSCS respectively. Out of 17 patients who were delivered by either vaginally or by LSCS, in 16 patients delivery was conducted by doctor at hospital and in 1 patient delivery was conducted by unskilled birth attendant. Majority of deliveries 14(82.3%) were conducted at tertiary care centre, 2(11.8%) deliveries were conducted at private hospital and 1(5.9%) delivery conducted at home. Study conducted by Sundari KPM at el ¹⁴ have reported 94% of institutional delivery and 6% of home delivery. Home delivered patient have higher morbidity and mortality due to unattended delivery or deliveries conducted by untrained unskilled birth attendants. Hence, regular antenatal care and institutional delivery has shown to markedly reduce PPH, anaemia and other causes of maternal mortality.²²

In present study, the most common direct obstetric cause of maternal mortality was the classical triad of sepsis 8(27.6%), hypertensive disorder of pregnancy 5(17.3%) and haemorrhage 3(10.4%). As per WHO systematic analysis, between 2003 and 2009, haemorrhage, hypertensive disorders, and sepsis were responsible for more than half of maternal deaths worldwide. More than a quarter of deaths were attributable to indirect causes.⁶ Studies conducted by Varsha N Patil et al ⁷, Asharaf Ali M et al ⁶ and Sanjukumari et al ¹⁵ have reported haemorrhage, hypertensive disorder of pregnancy and sepsis as the most common direct obstetric cause of death. Sundari KPM et al ¹⁴ have reported 26.8%, 17.9% and 12.5% maternal mortality due to hypertensive disorder of pregnancy, haemorrhage and sepsis respectively. Lamba A et al ⁸ have reported 37.8%, 15.6% and 11.1% maternal mortality due to haemorrhage, eclampsia and sepsis respectively.

In present study, maternal mortality occurred in 10(34.5%) patients due to indirect obstetric causes. Respiratory tract infection 5(17.3%) and dilated cardiomyopathy 3(10.4%) were the most common indirect obstetric cause of maternal mortality. Out of five patients having respiratory tract infection, one patient had military tuberculosis and four patients had pneumonia, of these two patients were COVID positive. In era of COVID-19 pandemic, pregnant women must be advised to adhere to guidelines for prevention of COVID-19 such as hand hygiene, mask and social distancing in addition to vaccination. Antenatal women must be advised to immediately contact the doctor in case of symptoms like fever, running nose, sore throat, headache, diarrhoea and body ache etc. Early diagnosis and proper management of COVID-19 infection would be best for pregnant women's health and her fetus.²³ Maternal mortality occurred 3(10.4%) patients due to dilated cardiomyopathy. Preconceptional counselling regarding optimum time to become pregnant, effect of heart condition on pregnancy and effect of pregnancy on heart condition, early registration at tertiary care hospital and family planning can diagnose cardiac diseases and can save lives.²²

In present study, maternal mortality solely due to anaemia in 1 (3.4%) patient who was delivered by unskilled birth attendant at home. Regular antenatal care and institutional delivery could have prevented this mortality. In present study, 21 (72.4%) patients were anaemic along with other obstetric complications. As per National Family Health Survey-5 (NFHS-5), prevalence of anaemia among pregnant women is higher (53.7%). Anaemia increases the risk of infection, preeclampsia, cardiac failure, PPH, puerperal sepsis, subinvolution, failing lactation, chronic ill health and increase maternal and perinatal mortality. Regular antenatal care can help in prevention of anaemia through nutritional advice, IFA tablets and control of worm infestation.²⁴ Maternal mortality due to dengue occurred in 1(3.4%) patient. Pregnant women must be advised to take precautions to empty standing water from containers, use mosquito nets and repellents to prevent mosquito borne diseases like dengue and malaria.

In present study, 12 (41.4%) patients died within 24 hours and 12 (41.4%) died after 72 hours of admission. Varsha N Patil et al ⁷ and Jani SP et al ¹⁶ have reported 46% and 46.3% patients died within 24 hours of admission respectively. Most of the patients admitted in moribund and late terminal stages from where chances of survival were remote. Hence, recognition of danger signs and symptoms and seeking prompt health care can prevent morbidity and mortality. In present study, maternal mortality occurred in 24 (82.7%) patients due to Type I delay of community level due to delay in women seeking help. Dikid et al ²⁵ have also reported poor outcomes at tertiary care are due to delay I in two third of patients. Parmar M et al ¹⁷ have concluded that Type I delay as the most common among maternal deaths, most of the referred patients came very late referral to higher centres to decrease the chances of recovery. Hence, community awareness and education regarding the importance of antenatal care, early registration of danger signs, management of high risk pregnancy, institutional delivery and postnatal care can prevent maternal mortality due to Delay I.

Conclusion:

Maternal mortality is an index of reproductive health of the society. Maternal mortality ratio of present study was higher compared to national and state data because being a tertiary care centre, majority of patients were admitted as emergency patients with some life-threatening complications and lack of /inadequate antenatal care. Majority of patients died in post-partum period and most of the complications had its relation to the complications developed during antenatal period. Majority of patients were multigravida. Three major direct causes of maternal mortality were sepsis, hypertensive disorders of pregnancy and haemorrhage. Major indirect causes of maternal mortality were respiratory tract infection and dilated cardiomyopathy. Regular antenatal care, diagnosis and prompt management of complications at early stage and early transfer to tertiary care hospital for multidisciplinary management can prevent morbidity and mortality due to preventable direct and indirect causes. Prevention of dengue, anaemia and COVID-19 infection can also help to reduce maternal mortality due to such indirect causes. Information and awareness on available family planning methods and myths regarding various methods of contraception must be cleared in patients and in addition community must be made aware of various complications that occur in multigravida.

Majority of maternal mortality occurred due to delays at a community level in recognizing an emergency situation and/or delays in decision to seek care at health facility. Community awareness and education regarding importance of antenatal care, early registration and regular follow up, danger signs, high risk pregnancy, institutional deliveries, postnatal care and family planning can help in reducing maternal mortality by preventing delay at community level.

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