A Five Year Study on Maternal Mortality in The Maternity Ward of Government General Hospital, Siddhartha Medical College, Vijayawada

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Abstract	Original Research Article

Introduction: Maternal health is important for the development of any country in terms of increasing equity and reducing poverty and is important in their own right and is central to solving economic, social and developmental challenges. Hence, maternal mortality is the key indicator of health and socio economic status and development of a community and the whole national system. *Aim:* To study the factors responsible for maternal mortality and to analyse the causes and trends in maternal mortality. *Materials and Methods*: A retrospective study on maternal deaths that occurred in the maternity ward of Government General Hospital, Siddhartha Medical College, Vijayawada during the period of five years from January 2017 to December 2021. Covid related deaths excluded. *Results*: Total 137 maternal deaths occurred during the study period. 121 maternal deaths (88.32%) were unbooked cases, 16 (11.67%) were booked cases. 58 women (42.33%) were primiparous, 76 (55.47%) were multiparous and 3 (2.18%) were grand multiparous. 76 women (55.47%) were of 20-24 years age, 38 women (27.73%)were of 25-29 years age. Maternal deaths due to direct causes were 89 (65.92%) and due to indirect causes were 47 (34.07%). Hypertensive disorders complicating pregnancy was the leading cause of death followed by hemorrhage in pregnancy. 105 (76.64%) maternal deaths occurred after delivery, 14 deaths (10.21%) during 3rd trimester of gestation. Type 1 delay (20.74%), type 2 delay (57.7%) type 3 (21.48%) delays contributed to the maternal deaths. *Conclusion:* Health education regarding adolescent health, pregnancy, abortion and contraception. Regular antenatal checkup, early identification of risk factors, awareness, timely intervention and referral to higher institute, proper intra natal and post natal care, multispecial team management in high risk cases are needed to reduce the maternal mortality.
Keywords: Maternal mortality, Health education and awareness, Hypertension in pregnancy, post partum hemorrhage, comprehensive abortion care.

INTRODUCTION

According to WHO International Classification of Diseases 10th revision, "Maternal death is defined as death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the 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, 2]. Direct maternal deaths are caused by complication of pregnancy, labour and puerperium [3]. Indirect maternal deaths are caused by previous existing diseases or diseases that developed or increased during pregnancy. Late maternal death is the death of a woman from direct or indirect obstetric cause after 42 days but less than 1 year after termination of pregnancy. Maternal mortality rate is the number of maternal deaths in a given period per 1 lakh women in reproductive age group (15-49 years) of the same period. Maternal mortality ratio (MMR) is the number of maternal deaths during a given period per one lakh live births and is used as a measure of quality of health care system [4]. These deaths are preventable and depend on social factors, economic status, literacy, patient care, hospital infra structure facilities and referral system.

As per the sample registration system report by the Registrar General of India for the last three years, MMR of India has reduced from 130/1,00,000 live

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births in the 2014-16 to 122 per one lakh live births in 2015-17 to 113 per one lakh live births in 2016-18 [5].

About 23,800 deaths occurred in 2020 with an MMR of 99 per one lakh live births, most occurring in poorer states (6.3%) and in women aged 20-29 years age (58%). In India, Assam has highest MMR 215 [6], least in Kerala 43, Andhra Pradesh has 65 per 1 lakh live births as SRS 2016-18 by Registrar General of India.

Maternal deaths review process was initiated by the Government of India in 2010 by analysing and identifying the lacunae in the health care system to improve the quality of obstetric services. As per NHP-national Health Policy 2017, the target for MMR is 100/1,00,000 live births by 2020. As per Sustainable Development Goals SDG 3.1, India has aimed to reducing MMR to less than 70/1,00,000 livebirths by 2030 [7].

Direct causes of maternal mortality worldwide are postpartum hemorrhage (27%), obstructed labour (18%), sepsis (16%), anemia (15%), toxaemia (8%), unsafe abortions (9%). Indirect causes of maternal death are anemia, malaria, heart disease (27.5%), infection (10.7%), ectopic pregnancy, embolism (3.2%) and anesthesia complications. In developing countries, MMR has been attributed to three delays; type 1 – delay in deciding to seek care, type 2 – delay in time take to reach the health facility, type 3 – delay in receiving care at health facility [8].

The present study has been conducted in the maternity department of Government General Hospital, Siddhartha Medical College, Vijayawada for a 5 year period of maternal deaths that occurred from January 2017 to December 2021 with an aim to reduce preventable deaths.

AIM
To analyse the direct and indirect causes of maternal mortality and to take the preventive measures to reduce the maternal mortality.

OBJECTIVES
1. To analyse the causes of maternal mortality in the Government General Hospital, Vijayawada.
2. To identify the factors responsible for maternal deaths in this institute

3. To analyse the trends in maternal mortality in this institute.
4. To identify the requirements and deficiencies in the management of preventable deaths.

MATERIAL AND METHODS
Study Method: Retrospective Study.

Study Setting: Department of Obstetrics and Gynecology, Government General Hospital, Siddhartha Medical College, Vijayawada.

Study Period: From 01-01-2017 to 31-12-2021.

Study Population: Maternal deaths recorded during the five years, from 01-01-2017 to 31-12-2021. Total number of deliveries conducted during this study period were 44,786, including normal deliveries, assisted vaginal and abnormal deliveries and caesarean deliveries. These deliveries resulted in 43,735 live births and 137 maternal deaths.

Exclusion Criteria: Covid positive deliveries and deaths excluded from the study.

METHODOLOGY
Data was collected from the cases admitted in the Department of Obstetrics and Gynecology, Government General Hospital, Siddhartha Medical College, Vijayawada and were followed and studied. Analysis was done in the Department of Obstetrics and Gynecology under the professors, associate professors, assistant professors is association with anesthetist and the physician. All cases were followed and analysed on demographic, social, obstetric and therapeutic factors and analysis of specific causes and leading cause of death and level of delay was done. Data was subsequently recorded on Microsoft Excel 2013 and analysed using descriptive statistics.

RESULTS
In the maternity ward of government general hospital, Siddhartha Medical College Vijayawada, total 44,786 deliveries were conducted from 01-01-2017 to 31-12-2021 which resulted in 43,735 live births and 137 maternal deaths with MMR of 313.25 per 1,00,000 live births. Year wise distribution of maternal deaths and MMR shown in Table 1. It has decreased from 480.54 in 2017 to 290.57 in 2021.

Table 1: Maternal deaths and MMR

S. No	Year	No.of deliveries	No.of live births	Maternal deaths	MMR
1	2017	8624	8532	41	480.54
2	2018	8468	8192	25	305.17
3	2019	8653	8454	24	283.89
4	2020	9157	8921	19	212.98
5	2021	9944	9636	28	290.57
Total	5 Years	44,786	43,735	137	313.25

According to Kuppuswamy scale of socio-economic classification basing on education, occupation and income, the socio-economic status of women was categorised. 87.5% belonged to class V and 12.2% belonged to class IV. Majority of the cases 121 (88.33%) were unbooked, 16 cases (11.67%) were booked. Unbooked cases were referred from the nearby district hospitals, area hospitals, community health centres, primary health centres and local private hospitals in moribund stage.

Table 2: Booked Vs Unbooked cases

B/UB	2017	2018	2019	2020	2021	Total	%
Booked	6	3	3	2	2	16	11.67
Unbooked	35	22	21	17	26	121	88.33
Total	41	25	24	19	28	137	100

Most of the deaths occurred 103 (75.18%) were 24hours after admission into the hospital.

Table 3: Time distribution

Year	0-6hrs	7-12hrs	18-24hrs	>24hrs
2017	3	1	2	35
2018	4	2	2	17
2019	4	-	4	16
2020	2	1	2	14
2021	5	-	2	21
Total	18	4	12	103
Percentage	13.13	2.98	8.7	75.18

These deaths occurred because of delay at three levels

Table 4: Distribution of Type of delay

Type 1	28	20.74%
Type 2	78	57.77%
Type 3	29	21.48%

Type 2 delay contributed for 78 (57.77%) maternal deaths followed by Type 3 delay and type 1 delay each 21.48% and 20.74%

Table 5: Age distribution

S. No	Age in years	2017	2018	2019	2020	2021	Total	%
1	15-19	-	02	-	-	-	2	1.45
2	20-24	26	10	11	10	19	76	55.47
3	25-29	12	10	09	03	04	38	29.73
4	30-34	01	02	04	03	05	15	10.94
5	35-40	02	01	-	03	-	06	4.37

76 women (55.47%) were between 20-24 years of age
38 women (29.73%) were between 25-29 years of age
15 women (10.94%) were between 30-34 years of age
6 women (4.37%) were between 35-40 years of age
2 women (1.45%) were between 15-19 years of age

Table 6: Parity distribution

Parity	2017	2018	2019	2020	2021	Total	%
Primi	23	5	10	8	12	58	42.38
Multi (2-4)	18	18	13	11	16	76	55.47
Grand multi >4	-	2	1	-	-	3	2.18

58 women (42.33%) were primiparous, 76 women (55.47%) were multiparous and 3 women (2.1%) were Grand multiparous.

Table 7: Distribution of delivery status and Duration of gestation

Status	2017	2018	2019	2020	2021	Total	%
ANTEPARTUM							
Ist trimester	-	1	1	-	3	5	3.65
IInd trimester	-	3	-	-	2	5	3.65
IIIrd trimester	3	3	1	3	4	14	10.21
POSTPARTUM	34	17	21	16	17	105	76.64
ABORTION	4	1	1	-	2	8	5.8

Total 105 deaths (76.64%) occurred after delivery
14 deaths (10.21%) occurred during IIIrd trimester
5 deaths (3.65%) occurred during Ist and IInd trimesters each
4 deaths (5.8%) occurred after abortion

Table 8: Distribution of deaths on Cause of death (Direct causes)

	Cause	2017	2018	2019	2020	2021	Total	%
1	**Haemorrhage**	3	2	2	2	5	14	10.21
	Early weeks	-	-	1	1	-	2	
	APH	-	-	-	-	1	1	
	PPH	1	1	1	1	2	6	
2	**Sepsis**	14	6	7	3	14	44	32.11
3	**Hypertension**	14	8	9	4	4	39	28.47
	Eclampsia	4	2	4	-	2	12	
	Pre-eclampsia	7	6	5	4	2	24	
	HELLP syndrome	3	-	-	-	-	3	
4	**Labour complications**						25	18.24
	Pulmonary embolism	4	6	6	4	2	22	16.05
	Anaesthetic	-	-	1	-	-	1	
	Post-operative	-	-	1	-	-	1	
	Obstructed labour	-	-	-	1	-	1	
5	**Unsafe abortion**	4	1	1	-	2	8	5.83

Table 9: Indirect causes of death distribution

Cause	2017	2018	2019	2020	2021	Total	%
Anaemia	7	7	1	4	4	23	16.78
Heart disease	5	2	5	4	2	18	13.13
Jaundice	1	1	-	1	1	4	2.9
Status asthmaticus	-	-	1	1	-	2	1.45
Blood reaction	1	-	-	-	1	2	1.45
Fever	2	-	2	1	-	5	3.64
Dengue	-	-	1	-	2	3	
Malaria	1	1	2	-	-	2	
Viral	-	-	1	-	-	1	
TB meningitis	-	1	-	-	-	1	0.73
Sickle cell anemia	-	-	1	-	-	1	0.73
Epilepsy	1	-	1	-	-	2	1.45
Acute immune/AMSAN	-	-	1	-	-	1	0.73
Renal failure	10	4	5	1	7	27	19.70

Distribution of deaths depending upon the causes depicted in the table no.8, Hypertension is the leading cause (28.47%), followed by haemorrhage (10.21%). Postpartum haemorrhage contributed to 6 maternal deaths, where the medical problems jaundice and preeclampsia were the associated factors. Sepsis contributed to 32.11% of maternal deaths. It was mainly due to the associated factors in the later stages of disease where multiorgan dysfunction has occurred.

Embolism contributed to 16.05% of maternal deaths. Unsafe abortion contributed to 8 maternal deaths (5.83%). Among the indirect causes, anaemia was noticed in 23 deaths (16.78%), followed by heart disease (13.13%). Renal failure was seen in 27 maternal deaths (19.70%). It was a late sequelae of the complication leading to maternal death.

DISCUSSION

A total of 137 maternal deaths occurred during the study period. Majority were unbooked cases (88.32%) referred in late stages after complications had occurred. Most of the deaths (87.5%) occurred in low socio-economic group [9], contributing to the type-2(57.75%), type-3(21.48%), type 1(20.74%) delays in causing maternal deaths.

Majority of the deaths occurred in the mothers of age group 20-24yrs (55.47%), and 25-29 years (10.94%). In the national representative survey between 2001-2003 by the registrar general of India, half of the deaths were in the age group of 20-29 years, with a median age group of 26 years [10]. This is similar to the observation made in the study. Younger age group being vulnerable to hypertension during pregnancy and unsafe abortion. 58 women were primi (42.33%), 76 women (55.47%) were multiparous. Most of the deaths occurred after delivery, that too after caesarean section because of various comorbidities in a moribund stage, 76.64% of deaths were after delivery, 10.21% deaths occurred during 2nd trimester. Hypertensive disorders complicating the pregnancy were the leading cause of maternal mortality (28.47%) amomg which, eclampsia was present in 12 women, severe pre-eclampsia in 24 women, HELLP syndrome in 3 women. It's because of the lack of proper antenatal care and intranatal care, emphasising effective antenatal care, intranatal care and postnatal care. Early identification of risk factors and timely management and referral to higher centres is the primary step in preventing these deaths. Complications of labour contributed to 25 maternal deaths among which embolism including both amniotic fluid embolism and pulmonary embolism, anaesthetic postoperative complications, insisting on proper intranatal and postnatal care.

Postpartum haemorrhage is the leading cause of maternal death worldwide, but in the study it contributed to 6 maternal deaths(4.37%). It is because of connection of risk factors like anaemia, active management of 3rd stage of labour and encouraging the usage of Misoprostol tablets after delivery even at the primary health centre level. Unsafe abortion contributed to 8 maternal deaths insisting on health education and comprehensive abortion care in reducing these deaths. Anaemia contributed to 23 deaths (16.28%) and still is the leading indirect cause of maternal deaths, next is heart disease complicating pregnancy. The other disorders epilepsy and jaundice in pregnancy, bronchial asthmawere identified. Fever complicating pregnancy was in the raising trend associated with increased mortality. Among which viral fever and dengue fever were noticed.

Steps to be taken to reduce MMR are:
- Health education and awareness starting from adolescence regarding pregnancy, abortion and contraception.
- Effective antenatal, intranatal and postnatal care.
- Early identification of the high risk factors and early referral to tertiary care centre.
- Prevention and control of anaemia under the National iron plus initiative.
- Effective treatment of the pregnant ladies complicated by medical disorders by the concerned specialist doctors with utmost care and follow up at tertiary care centre.
- Encouraging institutional deliveries.

Government of India has provided number of schemes to improve maternal health in the form of PMSMA, JSSY for drugs, blood, transportation, and early identification of risk factors for direct and indirect causes of maternal mortality at PHC and CHC hospitals for better care of antenatal mother [11]. Government of India has also provided infrastructure, obstetric ICU, emergency obstetric units and medical personnel at tertiary level to reduce maternal morbidity and mortality.

CONCLUSION

The present study was aimed to analyse the risk factors contributing to maternal mortality. Hypertensive disorders of pregnancy is the most common factor associated with maternal mortality.

Regular antenatal checkup, early identification of risk factors, awareness, timely intervention and referral to higher institute, proper intra and post natal care, multispecial team management in high risk cases are needed to reduce the maternal mortality.

Health education regarding adolescent health, pregnancy, abortion and contraception should be started at an early age to reduce maternal mortality.

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