



---

## **Review of maternal mortality at tertiary care hospital in Vidarbha region of Maharashtra**

**Dr. Srividya Tadru<sup>1</sup>, Dr. Shyamkumar Sirsam<sup>2</sup>, Dr. Nitin Purohit<sup>3</sup>,**

<sup>1</sup> Senior Resident, Department of Obstetrics and Gynecology, Government Medical College, Akola, Maharashtra University of Health Sciences, Nashik, Maharashtra, India

<sup>2</sup> Professor, Department of Obstetrics and Gynecology, Government Medical College, Akola, Maharashtra University of Health Sciences, Nashik, Maharashtra, India

<sup>3</sup> Senior Resident, Department of Anesthesia, GMC, Akola, Maharashtra, India

---

### **Abstract**

**Background:** It is important to evaluate the spectrum of causes and contributory factors behind this large number of maternal mortality in India. Numerous studies have been conducted from time to time to fulfil this goal. However, the maternal mortality rate still remains very high. Hence the present study was conducted at tertiary care hospital at Government medical college, Akola, Maharashtra to review the maternal deaths and causes of maternal mortality.

**Materials & method:** It was an Observational (Retrospective) study. It was conducted in cases of maternal deaths who were admitted at tertiary care hospital from July 2013 to June 2018. Thorough analysis of the individual case record of all the cases of maternal mortality was undertaken with respect to factors like age, cause of death (direct/ indirect) and contributory factor.

**Results:** There were 16,493 live births and total number of maternal deaths were 155. Mean MMR in the study period was 940/100000 live births. Highest percentage 52.26% (81) of maternal deaths belong to age group 21-25 years. Deaths due to direct causes were 98 (63.22%) whereas 57 (36.77%) maternal deaths were due to indirect causes.

**Conclusion:** It has been noted that the most common cause of death in present study is hypertensive disorder (eclampsia) which is different from the common cause of death nationally and worldwide.

**Keywords:** maternal death, cause of death, eclampsia, haemorrhage

---

### **Introduction**

Each year in India, roughly 28 million women experience pregnancy and 26 million have a live birth. Of these, an estimated 67,000 maternal deaths and one million newborn deaths occur each year. In addition, millions of women and newborns suffer pregnancy and birth related ill-health. Thus, pregnancy-related mortality and morbidity continues to have a huge impact on the lives of Indian women and their newborns <sup>[1]</sup>.

MDR is one of the important interventions under the RCH Programme to reduce maternal mortality. Under the process, reporting and analysis of the maternal deaths provides an opportunity to identify the delays that contribute to maternal deaths at various levels and use the information to take corrective actions to overcome the systemic and programmatic gaps in service provision <sup>[2]</sup>.

Maternal deaths or maternal mortality is a definitive indicator of the quality of obstetric care delivered in a community thereby directly reflecting the utilization of health care services available. It differs from place to place, country to country and institute to institute reflecting the type of care provided and health status of the region <sup>[3]</sup>.

Maternal death has serious implications to the family, the society

and the nation. The loss of a mother shatters a family and threatens the well-being of surviving children. Evidence shows that infants whose mother die are more likely to die before reaching their second birthday than infants whose mother survive. It deprives the surviving infant of a mother's care. One of the most important goals of the MDGs is to reduce the maternal mortality <sup>[1]</sup>.

Hence, it is important to evaluate the spectrum of causes and contributory factors behind this large number of maternal mortality in India. Numerous studies have been conducted from time to time to fulfil this goal. However, the maternal mortality rate still remains very high. Hence the present study was conducted at tertiary care hospital to review the maternal deaths and causes of maternal mortality.

### **Materials & Method**

It was an Observational (Retrospective) study. It was conducted in cases of maternal deaths who were admitted at Government medical college, Akola, Maharashtra from July 2013 to June 2018.

Patients with maternal mortality as per definition and admitted to

tertiary care hospital were included in the study.

The data was collected in pre-designed proforma from the case papers of medical record section from the year July 2013 upto June 2018.

The most frequent causes were identified

Documentation of maternal death review was done.

**Study design:** Observational study (Retrospective)

**Selection of Patients**

**Inclusion Criteria**

All antepartum, intrapartum and postpartum deaths within 42 days of delivery admitted at tertiary care hospital.

**Exclusion Criteria**

Postpartum deaths after 42 days of delivery.

Maternal deaths at centres other than tertiary care hospital.

Maternal deaths during transportation from periphery to tertiary care hospital.

Thorough analysis of the individual case record of all the cases of maternal mortality was undertaken with respect to following factors:

**Age**

Cause of death: direct/ indirect

Contributory factor.

**Statistical Analysis**

Data was analyzed using software SPSS version 20. Being a retrospective observational study, frequency and percentage calculations were used in the statistical analysis.

Maternal mortality ratio calculated by using the formula:

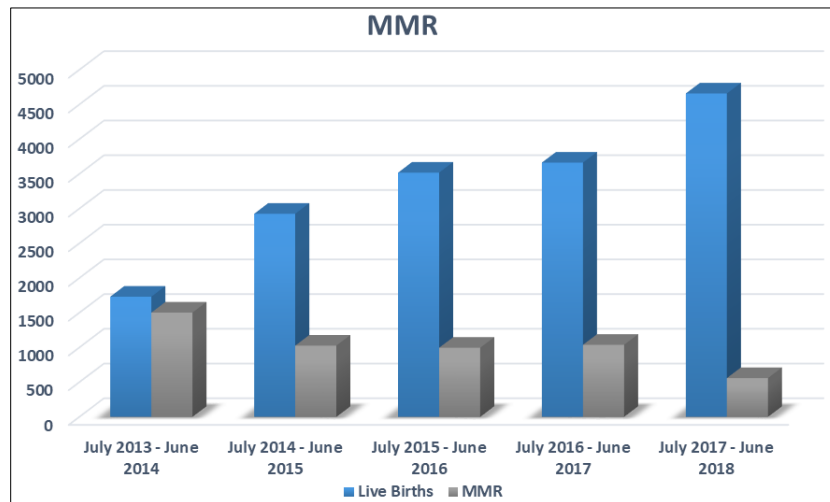
$$MMR = (\text{Total no of maternal deaths} / \text{Total no of livebirths}) \times 100000$$

**Results & Observations**

**Table 1:** Year wise Maternal Mortality Ratio observed in present study

Year	Maternal Deaths	Live Births	MMR
July 2013 - June 2014	26	1731	1502
July 2014 - June 2015	30	2925	1025
July 2015 - June 2016	35	3517	995
July 2016 - June 2017	38	3662	1037
July 2017 - June 2018	26	4658	558
Total	155	16493	940

There were 16,493 live births and total number of maternal deaths were 155. The MMR in the study period was ranging between 558 (July 2017 - June 2018) – 1502 (July 2013 - June 2014) with mean MMR of 940/100000 live births.



**Fig 1**

**Table 2:** Age distribution of patients

Age (in Years)	No. of Patients	Percentage (%)
< or = 20	24	15.48
21-25	81	52.26
26-30	40	25.81
31-35	7	4.51
>35	3	1.93
Total	155	100

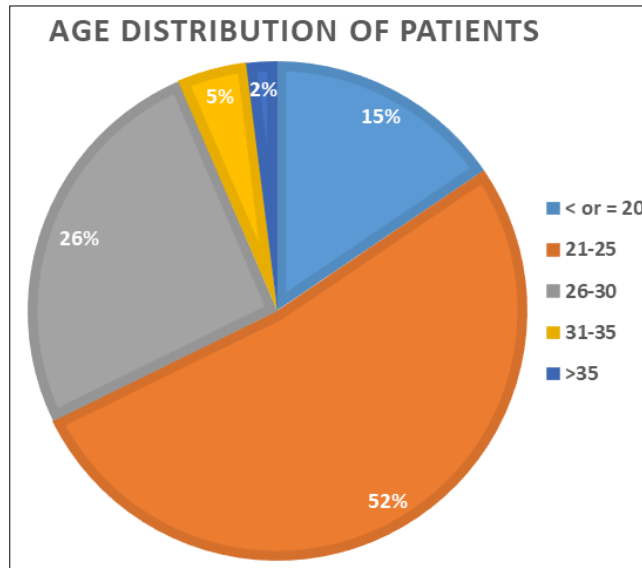


Fig 2

Highest percentage 52.26% (81) of maternal deaths belong to age group 21-25 years, followed by 25.81% (40) in age group of 26-30 years, 15.48% (24) maternal deaths were seen in age group

less than 20 years, 4.51% (7) maternal deaths were seen in age group 31- 35 years and 1.93% (3) maternal deaths were seen in age group greater than or equal to 35 years.

Table 3: Direct/ Indirect cause of death

Cause of death	No. of patients	Percentage
Direct	98	63.22
Indirect	57	36.77
Total	155	100

Deaths due to direct causes were 94 (59.35%) whereas 57 (37%)

maternal deaths were due to indirect causes.

Table 4: Causes of maternal deaths (according to ICD-10)

Group No.	Causes of maternal deaths		No. of patients	Percentage
	Group name			
1	Pregnancies with abortive outcome/ ectopic/ miscarriage (6.44%)	Ectopic	3	1.93
		Abortion	7	4.51
2	Hypertensive disorders in pregnancy, childbirth, and the puerperium (22.56%)	Preeclampsia	11	7.09
		Eclampsia	19	12.25
		HELLP	5	3.22
3	Obstetric haemorrhage (18.70%)		29	18.70
4	Pregnancy-related infection (9.67%)		15	9.67
5	Other obstetric complications (5.81%)	Amniotic fluid embolism	4	2.58
		Uterine inversion	2	1.29
		Peripartum cardiomyopathy	2	1.29
		ARDS with pulmonary embolism	1	0.65
6	Unanticipated complications of management (0%)		0	0
7	Indirect cause (36.77%)		57	36.77

Deaths due to direct cause were 98 (60.64%) which is divided into 6 groups, Group 1 included deaths due to abortion 7 (4.51%) and deaths due to ruptured ectopic 3 (1.93%). Group 2 included deaths due to preeclampsia 11(7.09%), eclampsia 19(12.25%) and HELLP syndrome 5(3.22%). Group 3 included deaths due to obstetric haemorrhage 29 (18.70%). Group 4 included deaths due to pregnancy related infection 15 (9.67%).

Group 5 contains deaths due to other obstetric complications like Amniotic fluid embolism 4 (2.58%), uterine inversion 2 (1.29%), peripartum cardiomyopathy 2 (1.29%) and ARDS with pulmonary embolism 1 (0.65%) and group 6 included unanticipated complications of management, no such death was found in this study. Group 7 included deaths due to indirect causes 57 (36.77%).

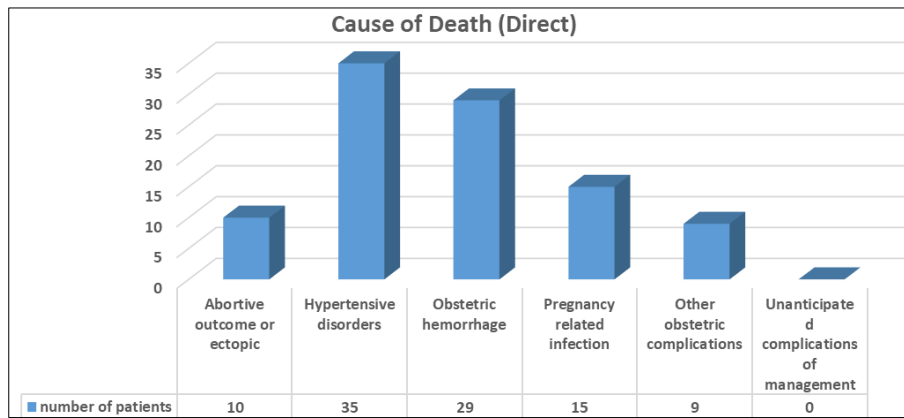


Fig 3

Table 5: Indirect causes of maternal deaths

Indirect cause	No of patients	% of patients
Respiratory conditions (except TB and H1N1)	12	7.74
Hepatitis	12	7.74
Central nervous system conditions	8	5.16
Cardiac disease	7	4.51
Septicaemia/ septic shock	6	3.87
H1N1	3	1.93
Anemia	2	1.29
TB	2	1.29
Dengue	1	0.65
Other	4	2.58
Total	57	36.77

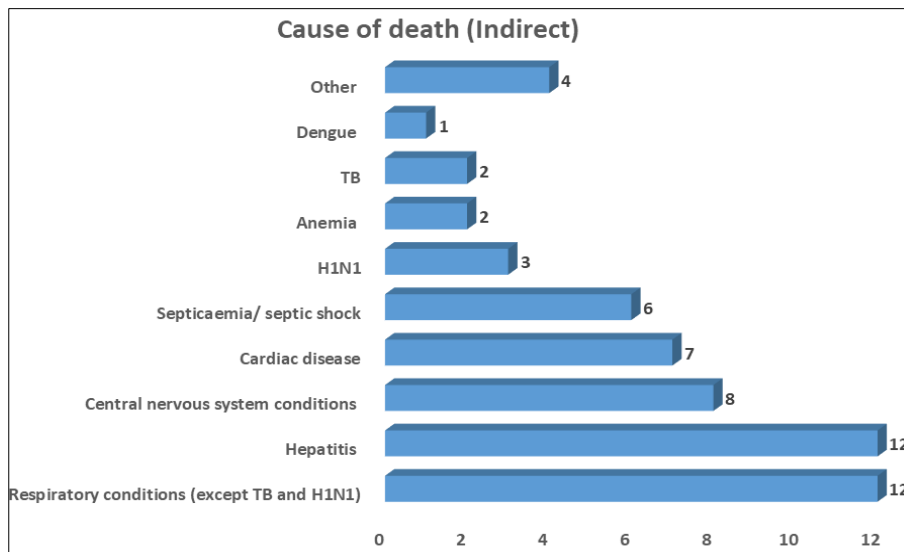


Fig 4

Figure 23: Maternal deaths due to indirect cause were 57 (36.77%). Majority of the deaths 12 (7.74%) were due to respiratory conditions (except TB and H1N1) and due to hepatitis 12 (7.74%). 8 (5.16%) deaths were due to central nervous system disorders, 7 (4.51%) due to cardiac disease, 6 (3.87%) due to septicaemia and septic shock, 3 (1.93%) due to H1N1, 2 (1.29%) deaths due to anemia, 2 (1.29%) deaths due to TB, 1 (0.65%) death due to dengue and 4 (2.58%) deaths due to other causes.

Table 6: Contributory factor

Contributory factor	No. of patients	Percentage
Anemia	62	40
Preclampsia	49	31.61
Jaundice	14	9.03
Heart disease	9	5.80
Thrombocytopenia	6	3.87
Retroviral disease	3	1.93
Twin pregnancy	2	1.29

Anemia 62 (40%) was the most common contributory factor for maternal deaths. Preclampsia was among 49 (31.61%) deaths, jaundice among 14 (9.03%) cases, heart disease among 9 (5.8%), thrombocytopenia among 6 (3.87%), retroviral disease among 3 (1.93%) and twin pregnancy was the contributory factor among 2 (1.29%).

### Discussion

Maternal mortality refers to deaths due to complications from pregnancy or childbirth. Pregnancy although being considered a physiological state, carries risk of serious maternal morbidity and at times death. This is due to various complications that may occur during pregnancy, labour or thereafter. Complete and accurate identification of all deaths associated with pregnancy is a critical first step in the prevention of such deaths. Reducing the maternal morbidity and mortality is the prime healthcare goal in developing countries. Only by having a clear understanding of the changing trends and the magnitude of pregnancy-related mortality can be comprehensive prevention strategies be formulated to prevent these unanticipated deaths among women.

### Maternal Mortality Ratio

In the present study of 5 years duration from July 2013 to June 2018 there were 16,493 live births and total number of maternal deaths were 155. The MMR in the study period was ranging between 558 (July 2017 - June 2018) – 1502 (July 2013 - June 2014) with mean MMR of 940/100000 live births which is higher than state and national average.

An estimated 303000 maternal deaths occurred globally in 2015, yielding an overall MMR of 216 maternal deaths per 100 000 live births. From 1990 to 2015, the global maternal mortality ratio declined by 44 per cent – from 385 deaths to 216 deaths per 100,000 live births<sup>[5]</sup>. The overall MMR in developing regions is 239, which is 20 times higher than that of developed regions, where it is just 12<sup>[4]</sup>.

Almost all maternal deaths (99%) occur in developing regions. Two regions, sub-Saharan Africa and South Asia, account for 88% of maternal deaths worldwide. Sub-Saharan Africans suffer from the highest maternal mortality ratio – 546 maternal deaths per 100,000 live births, or 201,000 maternal deaths a year. This is two thirds (66%) of all maternal deaths per year worldwide. South Asia follows, with a maternal mortality ratio of 182 or 66,000 maternal deaths a year, accounting for 22 per cent of the global total<sup>[4]</sup>.

RMNCH+A goal for MMR was 100 per 100000 live births by 2017<sup>5</sup> and Millennium Development Goal was 109 per 100,000 live births by 2015<sup>[6]</sup>. Between 2016 and 2030, as part of the Sustainable Development Agenda, the target is to reduce the global maternal mortality ratio to less than 70 per 100000 live births<sup>[7]</sup>. The national MMR level has come down from 327 per 100,000 live births in 1999-2001 to 130 per 100,000 live births in 2014- 16. Maternal Mortality Ratio (MMR) of India has declined by 38.67% from 212 during 2007-09 to 130 during 2014-16<sup>[8]</sup>.

MMR of Maharashtra has declined from 104 in 2007-09 to 61 in 2014-2016, achieved target of MDG<sup>[8]</sup>.

In present study high maternal mortality can be due to the fact that the study was conducted in tertiary care referral centre, which gets complicated cases from rural areas. Admissions of moribund

cases referred from rural, subdistrict, district and peripheral hospital have inflated this mortality ratio, like other teaching institutions of India. In this tertiary care hospital there is decreasing trend of MMR from July 2013 to June 2018 which shows improvement in antenatal, intranatal and postnatal care with timely intervention of high risk cases.

**Table 7:** MMR observed in other retrospective studies conducted at tertiary care centre

Retrospective studies	MMR
Shobha Mukherji <i>et al</i> <sup>[9]</sup>	1180
Zaman S and Begum A <sup>[10]</sup>	709
Yadav K <i>et al</i> <sup>[11]</sup>	555.5
Jadhav CA <i>et al</i> <sup>[12]</sup>	395
Ashok V <i>et al</i> <sup>[13]</sup>	345.9
Vidhyadhar <i>et al</i> <sup>[14]</sup>	302
Priya N <i>et al</i> <sup>[15]</sup>	270
Present study	940

Many women were referred in moribund state and in irreversible shock and could not be saved even at our tertiary care hospital. Strengthening of the referral units with equipment, blood bank, and adequately competent staff for early detection of high risk and timely referral should be of prime importance.

### Age Distribution

In our study, it was observed that maximum number of maternal deaths 81 (52.26%) were in age group of 21- 25 years, followed by 40 (25.81%) in age group of 26- 30 years, followed by 24 (15.48%) maternal deaths in age less than or equal to 20 years. 7 (4.51%) maternal deaths were seen in age group 31- 35 years and 3 (1.93%) maternal deaths were seen in age group more than 35 years.

This finding is consistent with an earlier study Bardale and Dixit, 2010<sup>16</sup> where it was observed that (52.38%) maternal deaths were in the age group of 21- 25 years, followed by (38.09%) in the age group of 26-30 years and (9.52%) in the age group of 31- 35 years. Another study Mukherjee S *et al*.<sup>[9]</sup> showed similar finding of maternal deaths (10%) in the age group of 15- 20 years and 4% in the age group of 36- 40 years. The reduction in number of deaths in women age <20 years of age is partly due to liberalization of abortion law (MTP Act), as a result of which many young women seek help from specialist doctor for legal abortion, thus reducing number of death associated with criminal abortions and its complication.

### Causes of Maternal Deaths

Cause of death is divided according to the WHO application of ICD-10 to deaths during pregnancy, childbirth and the puerperium: ICD-MM<sup>[13]</sup> In present study, deaths due to direct causes were 98 (63.22%) which is divided in 6 major groups. Group 1 included death related to Pregnancies with abortive outcome /ectopic /miscarriage 7 (4.51%), Deaths due to direct cause were 98 (60.64%) which is divided into 6 groups, Group 1 included deaths due to abortion 7 (4.51%) and deaths due to ruptured ectopic 3 (1.93%). Group 2 included deaths due to preeclampsia 11(7.09%), due to eclampsia 19(12.25%) and deaths due to HELLP syndrome 5(3.22%). Group 3 included deaths due to obstetric haemorrhage 29 (18.70%). Group 4

included deaths due to pregnancy related infection 15 (9.67%). Group 5 contains deaths due to other obstetric complications like Amniotic fluid embolism 4 (2.58%), uterine inversion 2 (1.29%), peripartum cardiomyopathy 2 (1.29%) and ARDS with pulmonary embolism 1 (0.65%) and group 6 included unanticipated complications of management, no such death was found in this study. Group 7 include indirect causes 57 (36.77%). Maternal deaths due to indirect cause were 57 (36.77%). Majority of the deaths were due to respiratory conditions (except TB and H1N1) 12 (7.74%) and due to hepatitis 12 (7.74%). 8 (5.16%) deaths were due to central nervous system disorders, 7 (4.51%) due to cardiac disease, 6 (3.87%) due to septicaemia and septic shock, 3 (1.93%) due to H1N1, 2 (1.29%) deaths due to anemia, 2 (1.29%) deaths due to TB, 1 (0.65%) death due to dengue and 4 (2.58%) deaths due to other causes.

According to SRS, leading causes of maternal death in India have been hemorrhage (38%), sepsis (11%), abortion (8%).<sup>73</sup> According to WHO, about 73% (1 771 000 of 2 443 000) of all maternal deaths between 2003 and 2009 were due to direct obstetric causes and deaths due to indirect causes accounted for 27.5% (672 000) of all deaths. Haemorrhage accounted for 27.1% (661 000), hypertensive disorders 14.0% (343 000), and sepsis 10.7% (261 000) of maternal deaths. The rest of deaths were due to abortion (7.9% [193 000]), embolism (3.2% [78 000]), and all other direct causes of death (9.6% [235 000]).<sup>17</sup>

**Table 8:** Comparison of causes of maternal death according various studies

Retrospective study	Obstetric haemorrhage	Hypertensive disorders	Sepsis
Mundkar and Rai <sup>[18]</sup>	20.00%	03.20%	17.70%
Bangal VB <i>et al</i> <sup>[14]</sup>	21.05%	10.52%	10.52%
Ashok V <i>et al</i> <sup>[13]</sup>	21.80%	20.00%	21.60%
Yadav K <i>et al</i> <sup>[11]</sup>	31.90%	24.20%	07.24%
Jadhav CA <i>et al</i> <sup>[12]</sup>	27.84%	10.75%	03.16%
Fernandes S <i>et al</i> <sup>[19]</sup>	26.20%	21.43%	14.30%
Madhuri Badrinath <i>et al</i> <sup>[20]</sup>	26.66%	26.66%	18.33%
Present study	18.70%	22.56%	9.67%

Our findings are consistent with the study by Mundkar and Rai <sup>[18]</sup> who observed that 60% maternal deaths were due to direct causes and 40 % maternal deaths due to indirect causes. Out of 62 maternal deaths 13 (20%) were due to postpartum haemorrhage, 11 (17.7%) were due to sepsis with multi-organ dysfunction, 02 (3.2%) were due to preeclampsia, eclampsia, and HELLP syndrome, 04 (6.4%) were due to acute fatty liver of pregnancy, 02 (3.2%) were due to ectopic pregnancy, 02 (3.2%) were due to suspected amniotic fluid embolism. 08(12.9%) were due to Heart disease, 08 (12.9%) were due to H1N1 pneumonia, 01 (1.6%) due to hepatic failure with HIV-positive status, 01 (1.6%) due to brain stem infarct, 01 (1.6%) due to hepatitis E with fulminant hepatic failure, 02 (3.2%) due to dengue shock syndrome, 01 (1.6%) were due to malaria, 03 (4.8%) due to cortical vein thrombosis, 01 (1.6%) due to placental site trophoblastic tumor.

Madhuri Badrinath *et al* <sup>[20]</sup>. observed that 72.5% of maternal deaths were due to direct causes like Haemorrhage (26.66%), Eclampsia (26.66%), and Sepsis (18.33%). Bangal VB *et al* <sup>[14]</sup> observed that 50% maternal deaths were due to direct and 50%

maternal deaths were due to indirect causes. 21% deaths due to hemorrhage, 10.5% were due to eclampsia, 10.5% were due to embolism, 7.8% were due to sepsis, 21% were due to Hepatitis, 13% were due to Heart disease, 7.8% were due to cerebral malaria, 5.25% were due to Viral encephalitis and 2.6% were due to anemia. Zaman S and Begum A <sup>[10]</sup> found eclampsia to be the most common cause of death (28.76%) in their study. PPH was responsible for 4.11% of maternal death while septicemia for 9.58% of maternal mortality. Other studies by Khandale SN <sup>[21]</sup> *et al* and Rajeswari *et al* <sup>[22]</sup> also found eclampsia to be the most common cause of death.

### Contributory Factor

Anemia 62 (40%) was the most common contributory factor for maternal deaths. Preclampsia was among 49 (31.61%) deaths, jaundice among 14 (9.03%) cases, heart disease among 9 (5.8%), thrombocytopenia among 6 (3.87%), retroviral disease among 3 (1.93%) and twins was the contributory factor among 2 (1.29%). Shobha Mukherjee *et al* <sup>[9]</sup> observed that anemia was contributory in 63% cases, hepatitis in 4% cases.

### Conclusion

The MMR in the study period was 940/100000 live births which is higher than state and national average. It was observed that maximum mortality rate occurred in the age group of 21- 25 years. It has been noted that the most common cause of death in present study is hypertensive disorder (eclampsia) which is different from the common cause of death nationally and worldwide.

### References

1. Pathak D, Chakraborty B, Goswami S, Adhikari S. Changing Trends of Maternal Mortality: A Comparative Study. The Journal of Obstetrics and Gynecology of India March / April, 2011, 161-165)
2. Millennium Development Goals India Country Report Social Statistics Division Ministry of Statistics and Programme Implementation Government of India [www.mospi.nic.in](http://www.mospi.nic.in) I M, 2014.
3. Juneja Y, Rai U. A five years review of maternal mortality. J Obstet Gynecol India. 1993; 43:944-9
4. World Health Organization (WHO), UNICEF, UNFPA, and The World Bank, Trends in maternal mortality: 1990 to. Estimates Developed by WHO, UNICEF, UNFPA, the World Bank and the United Nations Population Division, 2015.
5. Govt. of India. For Healthy Mother and Child, A Strategic Approach to Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A) in India, January 2013, Ministry of Health and Family Welfare, New Delhi, 2013.
6. United Nations, Millennium Development Goals Indicators: The official United Nations site for the MDG indicators, <<http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm>>, accessed 1 August 2008.
7. Maternal Mortality. Fact sheet N°348. Updated November, 2015. <http://www.who.int/mediacentre/factsheets/fs348/en/>
8. National Institution for Transforming India (NITI Aayog), Government of India. <http://niti.gov.in/content/maternal-mortality-ratio-mmr-100000-live-births>

9. Mukherjee S, Mukherjee S, Sarkar R. Six year retrospective study of maternal mortality at a tertiary teaching institute in Uttarpradesh. *International Journal of Medical Science and Public Health*. 2014; 3(3).
10. Zaman S, Begum A. Maternal mortality at a rural medical college of Assam: a retrospective study. *Journal of Obstetrics and Gynecology Barpeta*. March. 2014; 1(1):46-51.
11. Yadav K, Namdeo A, Bhargava M. A retrospective and prospective study of maternal mortality in a rural tertiary care hospital of Central India. *Indian Journal of community health*. 2013; 25(1):16-21.
12. Jadhav CA, Prabhakar G, Shinde MA, Tirankar VR. Maternal mortality: five year experience in tertiary care centre. *Indian J Basic Appl Med Res*. 2013; 7(2):702-9.
13. Ashok V, Santosh M, Anupa S. A study on maternal mortality. *J Obstet Gynecol*. 2008; 58:226-9.
14. Bangal VB, Giri PA, Garg R. Maternal mortality at a tertiary care teaching hospital of rural India: a retrospective study. *Int J Biol Med Res*. 2011; 2(4):1043-6.
15. Priya N, Ashok V, Suresh V. Maternal mortality: ten years retrospective study. *JK Science*. 2010; 12(3):134.
16. Bardale RV, Dixit PG. Pregnancy-related deaths: A Three-year retrospective study. *Journal of Indian academy of forensic medicine*. 2010; 32(1):15-8.
17. Say L, Chou D, Gemmill A, Tunçalp O, Moller AB, Jane Daniels. Global causes of maternal death: a WHO systematic analysis *The Lancet Global Health*. 2014; 2(6):323-333.
18. Mundkur A, Rai L. Prepare and prevent rather than repair and repent: Study of maternal mortality in tertiary care hospital. *International Journal of Medicine and Public Health*. 2013; 3(3):163-7.
19. Fernandes S, Prathima P, D'Cunha P. Maternal mortality at a tertiary care teaching hospital in South India: 10 year retrospective study. *International Journal of Medical and Health Sciences*. 2015; 4(3):327-31.
20. Badrinath M, Karekal SA. Maternal mortality: a retrospective study. *Sepsis*. 2015; 5:11-11.
21. Khandale SN, Kedar K. Analysis of maternal mortality: a retrospective study at tertiary care centre. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2017; 6(4):1610-3.
22. Rajeshwari Shobha. Maternal mortality in an urban tertiary care hospital of south India. *Indian J Obstet Gynaecol Res*. 2016; 3(1):32-7.