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Original Research Article

Analysis of causes of maternal mortality in tertiary care center, 11 years study

Vandana R. Saravade*, Munira Ansari, Ganesh Shinde

Department of Obstetrics and Gynecology, Topiwala National Medical College, Mumbai, Maharashtra, India

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***Correspondence:**
Dr. Vandana R. Saravade,
E-mail: vandanasaravade@gmail.com

ABSTRACT

Background: Objectives to study the causes of maternal mortality and the complications leading to maternal death.
Methods: A retrospective study of hospital records and death summaries of all maternal death over a period of 11 years from January 2008 to December 2018 was carried out at tertiary care hospital, Mumbai.
Results: There were a total of 459 maternal death out of 36930 live birth giving maternal mortality rate mean maternal mortality ratio (MMR) of 1242 per 100000 live births. Unregistered and late referral account for maternal death. The majority of women were in 21-30 years age group in 20 to less than 37 weeks of pregnancy. The commonest cause of death was due to hepatitis infection 129 (28.1%), sepsis 52 (11.32%), PIH including eclampsia 46 (10.02%), cardiovascular diseases 33 (7.18%), haemorrhage 31 (6.75%), Kochs 31 (6.75%) and respiratory diseases 22 (4.79%).
Conclusions: Maternal mortality can be reduced by identifying causes which are preventable and giving timely treatment.

Keywords: Maternal mortality, Tertiary care hospital, Direct causes, Indirect causes

INTRODUCTION

Death of women 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 pregnancy or its management but not from accidental or incidental causes. Direct obstetric death is due to obstetric complications in pregnant state. Indirect obstetric death is resulting from previous existing disease or which are aggravated by physiologic effect of pregnancy.[1]

United Nation on report on Millennium development goal-5 concluded that the progress shown by the South Asian countries including India which accounts for 25% of all maternal deaths in world is not impressive. The United Nations issued Millennium development goals (MDG-5); emphasized on reduction of MMR by 75% between 1990 and 2015.[2-4] For India, this implies that it should have achieved the target of reducing maternal deaths to 109, by 2015 and has an MMR of 167. The aim of study was determining the MMR in the tertiary care center and find out causes of maternal deaths.

Aims and objective

The aim and objective of the study to estimate the maternal mortality ratio at the tertiary care hospital for period of 11 years, to find out the causes leading to maternal death and to suggest prevention and control measures.

METHODS

The study was conducted in department of gynecology and obstetrics at BYL Nair hospital and T. N. medical college, Mumbai. This is a tertiary care centre catering district hospital, rural hospital and PHCs and private hospital in Thane and Palghar and adjoining states. This was a retrospective study conducted by reviewing the medical

records and facility based maternal death report review forms for deaths over a period from January 2008 to December 2018. The maternal death was analyzed in the monthly meeting in department by senior faculty members. Every maternal death was scrutinized from various aspect likely to be related to death, such as age, parity, locality of residence, antenatal care and cause of death. MMR estimated with the formula.

MMR= total no of maternal death×100000/Total no of live births.

As this is retrospective observational study, frequency and percentage calculations were used in statistical analysis.

Study is conducted after approval from ethical committee.

Inclusion criteria

All pregnant women irrespective of gestation age and postpartum within 42 days of delivery registered or unregistered who died due to direct or indirect causes in tertiary care hospital will be included in the study.

Death due to ectopic pregnancy.

Exclusion criteria

Coincidental maternal deaths like suicide and accidental deaths.

RESULTS

During study period, there were 459 maternal deaths out of 36930 live births giving a mean MMR of 1242 per 100000 live births. 48.58% of the death were in postnatal period. It was seen amongst the referral cases. They were transported late to Nair hospital. 108 ambulance services were strengthening from 2014 in Maharashtra. This facilitated early referral of the patients. As shown in Table 2, 8.93% were registered at our hospital. 84.53% were referred (at least 3 visits) and 6.54% unregistered. Most of the women were in prime reproductive age 21-30 years of age 75.38%. Most women were multiparous 64.05%.

Analysis of cause of death revealed that hepatitis was leading cause of death which is an indirect cause of maternal mortality. Out of total 459 maternal deaths, deaths due to hepatitis were 129 (28.10%), sepsis due to late referral 52 (11.32%), PIH with eclampsia 46 (10.02%), cardiac disease 33 (7.18%), Kochs 31 (6.75%), obstetric hemorrhage 31 (6.75%) [includes PPH 23 (5.01%), atonic PPH, 8 (1.74%), rupture uterus 5 (1.11%), LSCS complication with DIC 2 (0.44%), trauma 4 (0.87%), adherent placenta 1 (0.22%), APH 5 (1.11%), ruptured ectopic 2 (0.44%) vesicular mole 1 (0.21%)] and infections 24 (5.23%). Other causes were medical diseases involving respiratory, liver, renal and central nervous system.

Table 1: Year wise maternal mortality ratio.

Years	Maternal deaths	Live births	MMR
2008	17	2063	824
2009	18	2551	705
2010	46	2854	1611
2011	46	3041	1512
2012	44	3495	1258
2013	30	4487	668
2014	55	3983	1380
2015	68	4000	1700
2016	51	3460	1473
2017	46	3454	1331
2018	38	3542	1072
	459	36930	1242

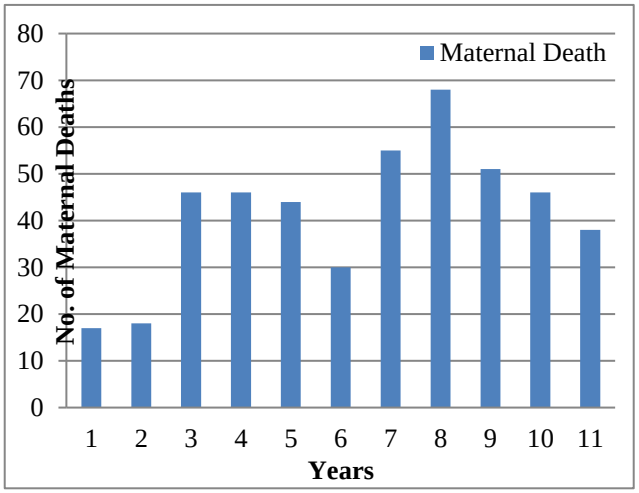

Figure 1: Maternal death.

Table 2: Socio demography distribution among maternal death.

Variables	Groups	Maternal death	%
Age (Years)	≤20	57	12.42
	21-30	346	75.38
	31-40	56	12.2
	≥41	0	0
Parity	Primi	165	35.95
	Multi	294	64.05
Antenatal care	Registered	41	8.93
	Referred	388	84.53
	Unregistered	30	6.54
Occupation	Unskilled	358	78
	Skilled	96	21
	Professional	5	1
Education	Illiterate	68	15
	Primary	212	46.2
	Secondary	134	29.2
	Graduate	45	10
Economic status	Low class	312	68
	Middle class	138	30
	High class	9	2

Table 3: Causes of maternal death, (n=459).

Causes	No.	Percentage (%)
Direct	164	35.76
Hemorrhage	31	6.75
Atonic	8	1.74
APH	5	1.11
Uterine rupture	5	1.11
Trauma cervix/perineum	4	0.87
Broad ligament hematoma	3	0.65
LSCS with DIC	3	0.65
Ruptured ectopic	2	0.44
Adherent placenta	1	0.22
Vesicular mole	1	0.22
Sepsis	52	11.32
PIH	46	10.02
Thrombo embolism	10	2.17
DIC	10	2.17
MTP	8	1.74
Pulmonary embolism	5	1.11
Amniotic embolism	2	0.44
Indirect causes	295	64
Hepatitis	129	28.10
Cardiovascular disease	33	7.18
Kochs	31	6.75
Infections	24	5.23
Respiratory disease	22	4.79
Anemia	12	2.61
Liver disease	11	2.39
Renal disease	8	1.74
Febrile illness	8	1.74
CNS disease	7	1.52
Hematological disease	3	0.65
Other causes	7	1.49

Table 4: Comparison with Indian statistic.

Causes of maternal mortality	Tertiary care center data 2008-2018 (%)	All over India 1997-2003 (%)
Direct causes	35.75	66
Hemorrhage	6.75	38
Sepsis	11.32	11
Hypertension	10.02	5
Obstructed labour	0.43	5
Abortion	7.19	8
Embolism	5.88	Not specified
Indirect causes	64.25	34

DISCUSSION

According to RGI-SRS report of 2013 MMR in India has registered a decline from 212 in the period 2007-2009 to 167 in 2011-2013. Hence the rate of decline between 2007-2009 and 2011-2013 was 5.7%. If MMR had declined with same pace, then India would have achieved an MMR of 140 per 100000 live births. However, based on world health statistics (WHS) 2016 the MMR of India is still 174/100000 live births. This accounts to losing 5 mothers every hour. India accounts for around 17% of the burden of global maternal deaths.

The MMR in present study was 1242 per 100000 live births, ranging from 824 in 2008 to 1072 in 2018 (Table 1). Most women were referred from peripheral hospital of Palghar district and nearby districts resulting in delayed intervention. Sundari et al tertiary care institution reported mortality rate of 559-802/100000 live birth due to large number of referral cases.[5] Similar to present study. Level 1 delay 30%, level 2 delay 40%, level 3 delay 4% and no delay 26%. We might have under estimated the levels of delay maternal mortality because death reporting was incomplete. Most deaths were observed in the 20 -30years age group in present study, this matches with study done by Pratima et al, Rajeshwari et al, Khandale et al and Murthy et al.[8] Postpartum death were 48.58% and ANC deaths were 44%. Young age group women were involved due to early marriage, poverty and nutritional deficiency.

In our study, multipara comprised 64.05% of maternal mortality, reflecting the need of strengthening family planning services, so that every pregnancy is by own wish and planned. Repeated pregnancies with in short span of time along with poverty, poor hygiene and nutritional deficiency.

In our study hepatitis was leading cause of death. Nair hospital is a multi-specialty hospital is situated in Mumbai central caters to high-risk pregnancies. It is a referral center for BMC/private hospitals in Mumbai and neighboring districts. Jaundice patients in third trimester were transferred to our hospital for OT facility, ICU management and blood bank availability. Out of 459, hepatitis 129 (28.10%), sepsis 52 (11.32%), PIH with eclampsia 46 (1.02%), cardiac disease was 33 (7.18%), obstetric hemorrhage 31 (6.75%). In study done by Bhosale et al causes of maternal death were hemorrhage 24%, sepsis 20.2% and hepatitis 17.5%.[10] Also study done by Trivedi et al viral hepatitis 29.43%, sepsis 20.09%, anemia 10.74%, PIH 7.94% and hemorrhage 7.94% were majority cause of maternal death similar to our study. However, many studies showed hypertension, sepsis and hemorrhage as causes of maternal death.[5-8]

Hepatitis patients clinically presented with hepatic encephalopathy in 81, DIC in 22, fulminant hepatitis 14 and hepatic renal involvement in 12. There were antepartum 38 post abortion 5, postpartum 86 involving 2LSCS maternal death. Poor sanitation and elimination of

sewage and unclean water and unhealthy food lead to viral hepatitis. In year 2015 and 2016 increase in viral hepatitis cases were seen. Majority of maternal death were due to viral infection.

Women with sepsis and PIH complication were referred in serious condition to our center. They were managed in ICU. Thrombo embolism related death needs to be reduced by timely use of heparin.

In our study obstetric hemorrhage contributed to 6.75% cases much lower than other Indian studies Rajeshwari et al 35.5%, Murthy et al 26.66%, Montogomery et al 27%.[6-8] This is probably because our center runs blood bank facilities round the clock with availability of blood components and timely management. In spite of doing 6 obstetric hysterectomies out of 23 cases of PPH maternal death occurred.

Anemia was a significant co morbid factor in most of women and indirect cause of maternal mortality in 2.61% cases. This led to increased morbidity. Irregular antenatal coverage and unmet dietary requirements of women especially in poor socioeconomic status.

Globally, direct obstetric causes and indirect causes have been implicated in 73 and 27.5% respectively.[12]

In India, maternal death direct cause is 66% and indirect cause are 34%.[14]

Our study is different as causes are reversed direct 35.75% and indirect 64.25%.

There were large number of maternal death due to infection (Viral hepatitis 129, Kochs 31, HIV 7, malaria 8, dengue 7, H1N1 5 and leptospirosis 4, some cases had overlap of two infection), medical diseases and other causes.

Limitations

This study does not include data regarding the fact whether delivery happened at our hospital or at any other hospital.

Comparing this study to a national level-based data and report would be inappropriate due the smaller number of live births in our hospital in comparison to national data. Hence data of MMR cannot be extrapolated.

Large number of patients who died in the antenatal period falsely increase the MMR as they also falsely decrease the number of live births.

CONCLUSION

Most striking feature is that most of these deaths are preventable. Pre-existing medical condition and Infection gets aggravated by physiological effect of pregnancy complicating obstetric condition leading to maternal mortality. Increasing awareness of hygiene and different mode of transmission of various infections by rigorous health education. Enforcing basic obstetric care for all, strengthening referral linkage system with early transfer, emphasis on blood bank facilities and use of contraceptive measures will help in reducing maternal mortality. NRHM policies, Janani Suraksha Yojana and Janani Shishu Suraksha Yojana have increased focus on providing no expenses for delivery and transport. Pradhanmantri Mantri Matrutva Vandana is implemented to provide money in post-delivery period for wages loss. This will cause surge in institutional deliveries and prevent anemia and low birth weight baby. It is essential to identify problems in the system contributing to maternal death. District level maternal death review meetings will be a beneficial tool for planning health care.

LaQshya program was launched in 11th December 2017 to improve quality of care in labour room and maternity OT. Obstetric ICU should be started in medical college.

SUMAN (Surakshit Matrutva) yojana-Zero preventable maternal and new born death and high quality of maternity care delivered with dignity and respect.

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