International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Sarasjothi M et al. Int J Reprod Contracept Obstet Gynecol. 2022 Apr;11(4):1127-1132
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20220891

Original Research Article

Study of maternal mortality at a tertiary care centre

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Received: 24 January 2022
Revised: 23 February 2022
Accepted: 24 February 2022

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ABSTRACT

Background: Pregnancy is not a disease and so pregnancy related death is almost always preventable. High rates of maternal deaths still exist in places, particularly in underdeveloped communities. The objective was to identify the maternal mortality ratio in our tertiary care centre and to discuss about the causes for maternal deaths.
Methods: The present study is a prospective observational study on maternal mortality conducted in the department of Obstetrics and Gynecology, VDGMC, Latur, Maharashtra, India during the period of 18 months from January 2019 to June 2020.Results are expressed in frequencies and percentages.
Results: Maternal mortality ratio (MMR) in our present study is 335.85 per 1,00,000 live birth. Among direct obstetric causes of maternal deaths, there were 58% hypertensive disorder cases, 25% APH cases,25% puerperal sepsis cases, 8% embolism cases. Among indirect causes of maternal deaths, there were 61% anemic cases,39% liver disease cases,33% DIC cases, 11% heart disease.
Conclusions: Maternal mortality is widely accepted as a key indicator of health and socioeconomic development. Each stage should be a positive experience, ensuring women and their babies reach their full potential for health and well-being.

Keywords: Maternal mortality ratio, Direct causes, Indirect causes, Anemia, DIC

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'' by the World Health Organization (WHO).[1]

With new Sustainable Development Goal (SDG) to reduce maternal mortality ratio to 70 per 100,000 live births by the year 2030, India needs to move beyond the hospital-based approach in addressing the reproductive health issues. It is used as main indicator to assess the country's maternal and reproductive health status. MMR in India is reducing faster than the global target and the main aim of our government is to bring it down to 100 by 2020.[2]

METHODS

The study conducted at a tertiary care centre which gets a large number of referrals from maternity homes, primary health centres, community health centres and rural health centres. Our institute has 24 hours obstetric emergency services, antenatal outpatient department and also intensive care unit facility. The present study is a prospective observational study conducted in the department of Obstetrics and Gynecology during the period of 18 months from January 2019 to June 2020.

Inclusion criteria

All the maternal deaths that occurred during the period of pregnancy and till 42 days of postpartum as per WHO definition of maternal mortality.

Exclusion criteria

Maternal deaths that occurred incidentally and accidentally.

Data of all the maternal deaths occurred during the study period in our institute were collected as per the prescribed proforma from hospital records. Postmortem findings were collected from Forensic department and finalized the causes of deaths.

This study was carried out after approval from ethical committee of our institute. As this is an observational study, informed consent was not required.

Data were formulated as table in percentage and proportion with the help of Microsoft Excel.

RESULTS

During the study period of 18 months from January 2019 to June 2020 there were 11018 deliveries in our hospital and there were 10719 live births and 36 maternal deaths. Maternal mortality ratio of our hospital during the period of 18 months was 335.85 per 100000 live births. Influences of various factors on maternal death were enumerated in tabular column and done pictorial representation.

Table 1: causes in maternal mortality cases.

Causes	No. of maternal death N=36	%
Direct obstetric causes	1	61.11
Eclampsia	22	13.88
Sepsis	5	11.11
Abruptio placenta	4	11.11
PPH	4	8.33
Abortion related	3	8.33
Severe pre-eclampsia with HELLP syndrome	1	2.78
Pulmonary embolism	1	2.78
Amniotic fluid embolism	1	2.78
Indirect causes	14	38.89
Severe anemia	4	11.11
Heart disease	4	11.11
Aspiration pneumonitis	1	2.78
Intestinal volvulus	1	2.78
Acute liver failure	1	2.78

Out of 36 maternal deaths, 58% (21) were in age group of 20-24 years and followed by 30-34 years of age group constitutes 17%, less than 19 years of age group constitutes 14% and 25 to 29 years of age group constitutes 11%.

Out of 36 maternal deaths in our study, 31% (11) were illiterate, 27% had primary school education, 19% had high school and higher secondary education each and 4% were graduate.

Table 2: Maternal maternity ratio.

Studies	MMR (per 100,000 live births)
Vidyadhar et al[3]	302.9
Varsha et al[4]	477
Nair et al[5]	410
Bhaurao et al[6]	217.4
Present study	335.85

Table 3: Literacy status in maternal mortality cases.

Literacy	Vidyadhar et al[3] (%)	Varsha et al[4] (%)	Bhaurao et al[6] (%)	Present study (%)
Illiterate	57.9	39.68	44.44	31
Primary education	21.05	26.98	22.22	27
Secondary education	21.05	20.63	14.81	19
Higher secondary	-	5.793	-	19
Gradua-tion	-	4.76	1.23	4

Table 4: Socioeconomic status in maternal mortality cases.

Socio-economic status	Vidyadhar et al[3] (%)	Varsha et al[4] (%)	Present study (%)
Lower	78.95	25.40	45
Upper lower	21.05	46.03	19
Lower middle	-	14.29	25
Upper middle	-	14.29	8
Upper	-	-	3

Out of 36 maternal deaths, 69% (25) maternal deaths were from rural area while the remaining 31% (11) from urban residents.Out of 36 maternal deaths, 70% (25) of maternal mortality cases were Hindus, followed by Muslims accounting for 22% of total deaths, and others constituted 8% of total maternal deaths.

Table 5: Booked status in maternal mortality cases.

ANC visits	Vidyadhar et al[3] (%)	Varsha et al[4] (%)	Bhaurao et al[6] (%)	Present study (%)
Booked	28.94	74.60	83.95	36
Unbooked	71.06	25.40	16.05	64

Table 6: Delivery to death interval in maternal mortality cases.

Inte-rval	Vidyadhar et al[3] (%)	Nair et al[5] (%)	Present study (%)
<24 hrs	39.47	44.90	27%
1-6 days	34.21	42.60	47%
>7 days	23.68	12.50	26%

Table 7: Pregnancy outcome in maternal mortality cases.

Outco-mes	Vidyadhar et al[3] (%)	Varsha et al[4] (%)	Bhaurao et al[6] (%)	Present study (%)
Deliver-ed	81.57	80.95	81.46	89
Undeliv-ered	15.78	17.46	18.57	3
Aborted	2.63	1.58	-	8

Table 8: Mode of delivery in maternal mortality cases.

Mode of delivery	Varsha et al[4] (%)	Clark et al[8] (%)	Present study (%)
Vaginal delivery	54.90	22.66	47
Cesarean section	45.09	77.33	53

Out of 36 cases, 45% (16) maternal deaths belonged to lower socioeconomic status, followed by lower middle socioeconomic group which comprises 25% of the total.

Upper lower socioeconomic status were 19% and upper middle socioeconomic status were 8% and the least, 3% were upper socioeconomic status. The modified Kuppusamy scale was used for socioeconomic status classification.

Out of 36 maternal deaths, 36% were booked and 64% of maternal deaths were unbooked and had no or inadequate antenatal care during this pregnancy.

Indian Government suggested that all pregnant woman must have at least three antenatal visits and that the first visit is preferably in the first trimester.[1] Booked women had atleast 3 antenatal visits in our study.

Table 9: Place of delivery in maternal mortality cases.

Place of delivery	Vidyadhar et al[3] (%)	Varsha et al[4] (%)	Bhaurao et al[6] (%)	Present study (%)
PHC	3.22	1.96	7.57	6
SDH	-	-	4.54	-
RH	-	-	7.57	9
Tertiary	64.51	68.62	59.09	72
Private	22.50	25.49	18.18	6
Home	9.67	1.96	3.03	3
Vehicle	-	1.96	-	3

Table 10: Causes of maternal mortality cases.

Direct obstetric causes	Vidyadhar et al[3] (%)	Nair et al[5] (%)	Present study (%)
Hemorrhage	21.05	43.38	19.44
Eclampsia	10.52	10.30	13.88
Sepsis	7.89	8.20	11.11
Embolism	10.52	2.90	5.56
Abortion related	-	Ruptured ectopic (0.70) Septic abortion (2.30)	8.33
HELLP syndrome	-	-	2.78
Severe anemia	2.63	14.70	11.11
Heart disease	13.15	2.90	11.11
ARDS	-	5.90	COVID 19 (2.78)
Liver disease	21.05	8.80	2.78
Renal failure	-	-	2.78
Aspiration pneumonitis	-	-	2.78
Pyrexia	Cerebral Malaria (7.89) Viral encephalitis (5.26)	-	Dengue (2.78)

Out of 36 maternal deaths, 39% (14) maternal deaths had gestational age of 37 to 40 weeks. This followed by 28%

(10) deaths had 32 to 37 weeks of gestational age. 5% of maternal deaths had pregnancy of >41 weeks of gestational age.

Out of 36 maternal deaths, 36% (13) of maternal deaths were primigravidas, 34% (12) of maternal deaths were 2nd gravidas, 22% (6) of maternal deaths were 4th gravidas and 8% (3) of maternal deaths were 3rd gravidas.

Out of 36 maternal deaths, 26% (9) of maternal deaths had admission to death interval of more than 7 days. 19% (7) of maternal deaths had admission to death interval less than 6 hrs. 19% (7) of maternal deaths had admission to death interval from 25 to 48 hrs of interval.14% (5) of maternal deaths had admission to death interval from 49 to 72 hrs.14% (5) of maternal deaths had admission to death interval from 3 to 7 days. Only 8% (3) of maternal deaths had admission to death interval of 7 to 24 hrs.

Out of 36 maternal deaths 1 was undelivered and rest 35 maternal deaths include both abortion and delivered case. 26% (9) of maternal deaths had delivery to death interval of >7 days. 24% (8) of maternal deaths had delivery to death interval of within 6 hours. 14% (5) of maternal deaths had delivery to death interval from 7 to 24 hrs and 14% (5) of maternal deaths had delivery to death interval from 49 to 72 hrs. 11% (4) of maternal deaths had delivery to death interval from 25 to 48 hours and also in 3 to 7 days each.

Out of 36 maternal deaths, 53% (19) were not referred and 47% (17) were referred from nearby PHC, RH, private hospitals. This shows that many patients were being at the home and came late for admission once complications had started.

Out of 17 referred maternal deaths, 41% from Rural Health Centre, 35% from Primary Health Centre and 24% from Private Hospital.

While considering pregnancy outcome and maternal death, 89% (32) of maternal deaths delivered, 8% (3) of maternal deaths had abortion and remaining 3% (1) of maternal deaths were undelivered.

Out of 32 delivered maternal deaths, 54% (17) of maternal deaths were delivered by LSCS and 46% (15) had vaginal delivery.

Out of 36 maternal deaths, 32 were delivered. Out of 32 delivered maternal deaths. 72% (23) of maternal deaths were from this institute, 9% (3) of maternal deaths were delivered in RH, 6% (2) of maternal deaths were delivered in PHC and also in private hospital each, 3% (1) of maternal deaths delivered at home and in vehicle during transport each. Out of 33 babies of maternal deaths, 13 babies were alive and well. Among still birth, one was twin gestation and both babies were fresh still birth. There were 6 fresh sill births, 5 were macerated still births, 9 were early neonatal deaths which occurred during the course of NICU admission. Poor perinatal outcomes were related to mother's condition on admission like those had abruptio placenta with delayed approach to hospitals, antepartum eclampsia, placenta previa with active bleeding at the time of admission with unstable vitals.

Out of 36 maternal deaths, 61.11% (19) of maternal deaths were due to direct obstetric causes and 38.89% (17) of maternal deaths were due to indirect causes. Among the direct obstetric causes, 13.88% of maternal deaths by eclampsia and 11.11% of maternal deaths by sepsis, 11.11% of deaths by abruptio placenta and 8.33% by PPH. Three maternal deaths each due to severe Preeclampsia with HELLP syndrome, pulmonary embolism, amniotic fluid embolism were found as cause of maternal deaths. Amniotic fluid embolism was confirmed by autopsy. There were 8.33% of maternal deaths had abortion related complications like patient with previous cesarean section presented in hypovolemic shock due to ruptured uterus followed by MTP pills consumption without consulting medical practitioner, 2nd a case of uterine perforation while doing MTP dilatation and currettage in a case of previous 3 cesarean section and 3rd a case of irreversible hypovolemic shock due to ruptured ectopic pregnancy.

Among the indirect causes of maternal deaths, 11.11% of maternal deaths were due to severe anemia (HB <7 gm/dl) and the same 11.11% due to heart disease. Each cases of aspiration pneumonitis, intestinal volvulus in post cesarean section done patient, Dengue, Cytokine storm due to COVID 19 infection were reported as indirect cause of maternal deaths. Liver failure was seen in 1 maternal death and acute renal failure was seen in 1 maternal death.

DISCUSSION

Maternal death is an irreversible loss and it has severe impact on the family, community and also for the nation. There are changing trend in maternal mortality ratio among place to place and day by day. Reduction of maternal mortality is the objective of MDGs. MMR in a tertiary care centre in out study is 335.85 per 100000 live births.

Table 2 shows fluctuating trends among the studies in tertiary care centre for last 10 years. MMR in present study is 335.85 which is near to the study conducted by Vidhyadhar et al at 2011.[3] There were reported MMR above 400 per 100000 live births in the studies conducted by Varsha et al and Nair et al.[4,5] There was a study reported During 2016 by Bhaurao et al with MMR as 217.4 per 100000live births.[6]

Table 3 depicts the importance of literacy in reduction of maternal death. There were 57.9% in Vidyadhar et al, 39.68% in Varsha et al, 44.44% in Bhaurao et al and 31% in present study were illiterate.[3,4,6] In above reference studies most of maternal deaths were reported among the lower socio-economic status proved that low socioeconomic status group are more susceptible as there

are lack of awareness and facilities. Lower socio-economic status constituted 78.95% of maternal deaths in Vidyadhar et al and 45% of maternal deaths in present study. 46.03% of maternal deaths were in upper lower socio-economic group in a study by Varsha et al.[3,4]

ANC visit is essential to diagnosis the high-risk pregnancy before complication develops. More maternal deaths were reported from unbooked ANC cases in Vidyadhar et al 3 (71.06%) and present study (64%).

Delivery to death interval was <24 hours in 39.47% by Vidyadhar et al and 44.90% by Nair et al.[3,5] Delivery to death interval was 1-6 days reported 47% in the present study.

Most of maternal deaths were after delivery contributed 81.57% in Vidyadhar et al, 80.95% in Varsha et al 81.46% in Bhaurao et al studies and 89% in present studies.[3,4,6] Hence concluded that most of complications occurring during postpartum period. There are also reported abortion related maternal deaths as 2.63% in a study by Vidyadhar et al, 31.58% in a study by Varsha et al and 8% in the present study.[4]

In our study 47% of maternal deaths had vaginal delivery and 53% of maternal deaths had caesarean section. Study by Varsha et al reported 54.9% of maternal deaths had vaginal delivery and rest 45.09% had caesarean section.[4] Study by Clark et al reported 22.66% of maternal deaths had vaginal delivery and rest 77.33% were undergone caesarean section.[8]

As depicted, most of high-risk pregnancy cases are getting admitted in tertiary care centre and hence most of maternal deaths delivered in tertiary care centre as 64.51% in Vidyadhar et al, 68.62% in Varsha et al4, 59.09% in Bhaurao et al and 72% in present study.[3,6]

Regarding direct obstetric causes of maternal deaths, hemorrhage means both antepartum and postpartum contributed major proportions followed by eclampsia and followed by sepsis in all the reference studies as similarly in our present study. Vidyadhar et at reported 21.05% hemorrhage cases, 10.52 % eclampsia cases and 7.88% sepsis cases of maternal deaths.[3] Nair et al reported 43.38% hemorrhage cases, 10.30 % eclampsia cases and 11.11% sepsis cases of maternal deaths.[5] The present study reported 19.44% hemorrhage cases, 13.88 % eclampsia cases and 11.11% sepsis cases of maternal deaths.

Among the indirect cause of maternal deaths, Vidyadhar et al reported 21.05% liver disease cases and 13.15 % heart disease cases of maternal deaths.[3] Nair et al reported 14.70% anemia cases of maternal death.[5] Present study reported 11.11% of anemia and heart disease cases of maternal deaths each.

CONCLUSION

Every pregnancy and birth are unique. Ending preventable maternal death must remain at the top of the global agenda. Access to health care in terms of maternal health should be given to all women. This encompasses a wide spectrum of interventions include educating and empowering women with regard to maternal health; family planning initiatives; addressing inequities in access to and quality of sexual, reproductive, and maternal health care; and enhanced mobilization of individual and communities. A good starting point would be to learn from past experiences through a thorough review of existing demand-side interventions. In order to reduce the maternal mortality, basic knowledge regarding antenatal care should be provided to the reproductive age women. Better nutrition and calorie deficit should be corrected and encourage to take hematinics regularly. Early registration of antenatal cases and regular ANC follow up, categories based on risk factors, rapidly diagnosis and timely provide treatment so that we can prevent complications. High risk pregnancy should be managed at tertiary care centre. Hence timely referral from periphery is more important. Providing transport in order to reach health facility earlier. Blood bank should be provided with available stock of blood products. Access to safe abortion services and Family planning education to all reproductive couples through local media.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sarasjothi M, Lad SU, Shinde MA. Study of maternal mortality at a tertiary care centre. Int J Reprod Contracept Obstet Gynecol 2022;11:1127-32.