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Pattern of Maternal Mortality in a Rural Referral Hospital: A Six Year Retrospective Study

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ABSTRACT

Objective: To find the frequency and the causes of maternal death in a rural medical college hospital.

Method: Retrospective study of 72 maternal deaths over a period of 6 years from January 2007 to December 2012.

Results: Over the study period there were 25,174 live births and 72 maternal deaths, maternal mortality rate being 286/lakh live births. Out of which hemorrhage was the leading cause and anemia being the indirect cause of maternal death. Most of the women died within a period of 24 hours of admission and were between the age group of 20-30 years. Most cases were unregistered and referred from outside.

Conclusion: Maternal mortality rate in this study is 286. Out of which most of them could have been avoided if they had been registered and received proper antenatal care, with early diagnosis and timely intervention and early referral with well equipped transport facilities. Over all promotion of safe mother hood should be emphasized.

Keywords: *Maternal Mortality Rate, Hemorrhage, Anemia*

INTRODUCTION

Maternal mortality is one of the most important burning issues in our country. For every minute one mother is dying due to pregnancy & child birth related issues. A woman in developing country has 30 to 40 times greater risk of dying due to pregnancy and child birth than her counterpart in developed country.[1] In the developing world, "A pregnant woman has her one foot in the grave" as stated by Gwyneth Lewis in 'Beyond the number'.

Maternal mortality is defined as the death of any woman when pregnant or within 42 completed days following termination of pregnancy, irrespective of duration or site of pregnancy but not from accidental or incidental death. Maternal mortality ratio is defined internationally as the maternal mortality rate per one lakh live births.

Maternal mortality remains one of the most daunting public health problems in India. Even today 20% of global maternal deaths occur in India.[2] Globally 1 % of deaths occur in developed world while 99 % occur in developing countries.[3,4] The total maternal deaths in India are around 63,000 a year, approximating one death every minute

It is being estimated that half of all death from pregnancy could be prevented with better prenatal care, quality of care and life style habits. One of the six health related millennium development goals set by WHO is to reduce the maternal mortality ratio.[5] Most of the deaths occur within one week and it is 100 times likely to occur on the first day after birth of the child and within the hospital.

In India current MMR is 212 per lakh live births & that of Karnataka state is 178 per lakh live births (census of India sample registration system 2011).[6] Institutional mortality rates are 2-10 times higher as compared with field surveys because most of the seriously ill patients are referred to the nearest tertiary care centers.

Reduction of mortality of women is an area of concern for the Government across the globe. The millennium development goals (MDG) of UN have let the target of achieving 200 maternal deaths per lakh of live births by 2007 & 100 per lakh of live births by

2015.[5] Similar studies conducted on maternal mortality showed varying rates of maternal mortality. Study conducted by Salhan et al (2000) showed 3.92/lakh live births as the maternal mortality rate, Prasanta et al (2005) showed 6.25/lakh live births & Puri et al (2006) have observed 6.9/lakh live births.[7,8] The study conducted by Puri et al has high MMR which can be due to the fact that it is one of tertiary referral centre. A prospective study on obstetric near miss events in the Netherlands (BJOG, 2008 June; 115 (7): 842-50) has revealed that substandard care was found in the majority of assessed cases.[9] A retrospective study conducted by Smisha M P & Sridevi N S, for 1 year from March 2004 to February 2005 at the institute of MCH, Calicut medical college in Kerala revealed 21,495 deliveries & 338 cases were diagnosed as near miss cases with a frequency of 1,577/lakh deliveries. During this period there were 14 maternal deaths with the maternal mortality rate of 65/lakh live births.[10]

Maternal mortality is the tip of ice-berg, there is a large base of the severe acute maternal morbidity, the identification & analysis of which will tell the story of true complications. It can be reduced by adequate antenatal care & appropriate interventions at the right time.

Materials & Method

A retrospective analysis of 72 cases of maternal mortality over a period of 6 years from January 2007 to December 2012were analyzed with special emphasis on parity, cause of death, time interval from admission to death and antenatal care.

Result:

There were 72 maternal deaths during the period from January 2007 to December 2012 with 25,174 live births.

Table 1: Maternal mortality rate in the six year period

Year	Live births	Maternal deaths	Maternal mortality rate
2007	2979	10	335.68
2008	3938	11	279.32
2009	4277	11	257.18
2010	4717	15	317.99
2011	4767	17	356.61
2012	4496	8	177.93
Total	20678	72	348.19

Table 2: Distribution of clinical cause of maternal death

Cause of death	Number	Percentage	ICD classification
Direct Causes			
• Hemorrhage	24	33.33	O67, 072
• Severe Pre-eclampsia	12	16.66	O14.1
• Septicemia	13	18.05	O85
• Abortion	1	1.38	O08
• CVT (secondary to Eclampsia)	4	5.55	I63.3
Subtotal (direct causes)	54	75.00	
Indirect causes			
• Anemia	10	13.88	O99.0
• Acute renal failure	1	1.38	N17.9
• Cardiac failure	1	1.38	I05.1
• Malaria	1	1.38	B50.0
Subtotal (indirect causes)	13	18.05	
Unrelated causes			
• ARDS	5	6.94	J80

Haemorrhage was the leading cause of maternal death accounting for 33.33% (24) followed by sepsis 18.05% (13). Pre-eclampsia contributed to 16.66% (12) of maternal death, anemia, ARDS & CVT contributed to 13.88% (10), 6.94% (5) & 5.55% (4), respectively. Abortion, acute renal failure, cardiac failure & malaria contributed 1.38% (1) each.

Table 3: Age distribution of maternal deaths

Age group (years)	Number of maternal deaths	Percentage
< 20	15	20.83
21-30	53	73.61
>31	4	
Total	72	

The age group in which most (73.61%) maternal deaths occurred was 21-25 years group. This was followed by <20 years (20.83%) and >30 years age groups (5.55%).

Table 4: Parity distribution of maternal deaths

Parity	Number	Percentage
Primi	30	41.66
Multipara (2-4)	41	56.94
Grand Multipara (>4)	1	1.38
Total	72	

When the parity of the women was compared, it was seen that most maternal deaths was in multi-para

accounting for more than half the maternal deaths (56.94%). The maternal death rate decreased as the parity of the women increased as the frequency of women with higher parity is in the decreasing trend.

Table 5: Maternal deaths according to outcome of pregnancy

Outcome of pregnant women	Number of women	Percentage
Vaginal delivery	45	
Cesarean section	17	
Abortion	1	
Undelivered	9	
Total	72	

The most common method of delivery among women who died was vaginal route (62.5%), followed by cesarean section (23.61%). Out of the 72 maternal deaths, 1 death (1.38%) was due to abortion and 9 (12.5%) women died without delivering in the hospital.

Table 6: Place of delivery

Place of delivery	Number	Percentage
Medical college	34	47.22
District/Government hospital	9	12.5
PHC	8	11.11
Private nursing home	10	13.88
Home delivery	2	2.77
Undelivered	9	12.5
Total	72	

The women who came to our hospital, most of them were referred. Of these, 29 women were delivered outside accounting for 40.27% and 34 (47.22%) were delivered in our hospital.

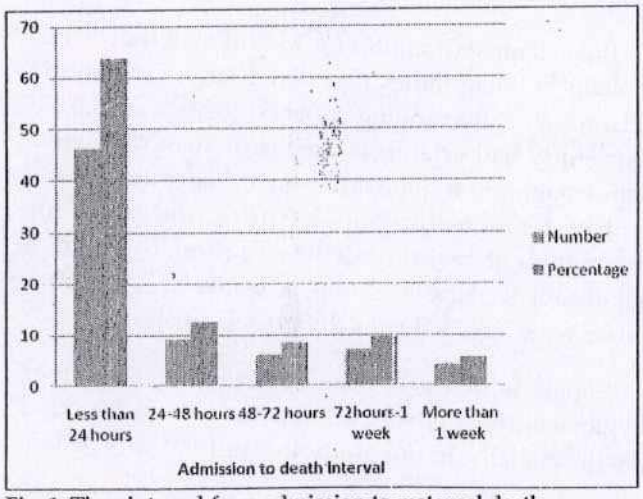

Fig. 1. Time interval from admission to maternal death

Most of the women (62.5 %) died within 24 hours of admission followed by many women dying in the next 24-48 hours being 12.5%. Few women died after 48 hours accounting for 24.99 %.

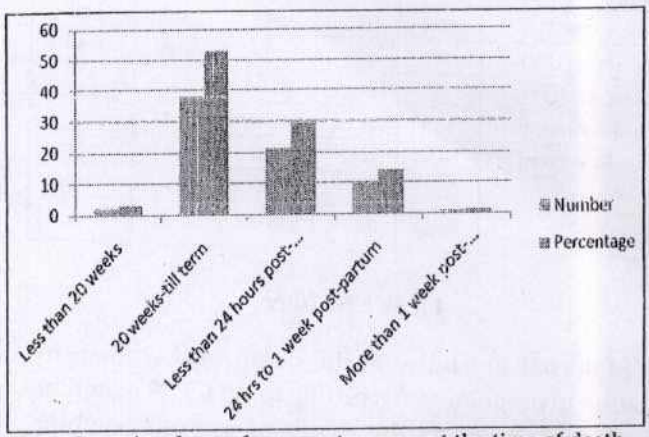

Fig. 2. Gestational age of pregnant women at the time of death

Most of the maternal deaths (52.77%) were in the gestational age from 20 weeks to term. The maternal deaths less than 20 weeks were 2 (2.7%) and within 24 hours after delivery were 16 (25%). The maternal deaths more than 24 hours following delivery were 8 (10.81%).

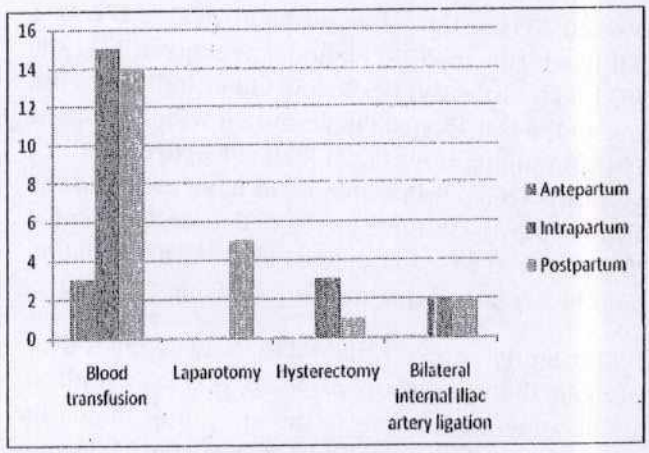

Fig. 3. Intervention done to women before death

As hemorrhage was the main cause of maternal deaths most of the women required blood transfusions. Laparotomy was performed in 5 women in the post-partum period, in which one was due to perforation caused during MTP. Peri-partum hysterectomy was performed in 4 women and bilateral internal iliac artery ligation was performed in 4 women. Post-mortem Cesarean section was performed in 2 women.

Table 7: Comparative Analysis

Name MMR (Year)	PIH (%)	Hm (%)	Sepsis (%)	Anemia (%)	Hepatitis (%)	Early pregnancy deaths (%)	Other indirect causes (%)	Direct obstetric causes (%)	Indirect obstetric cause (%)	Unrelated causes (%)	per 1,000
Sharma S (1994)	17.2	27.5	20.6	10.3	3.4			72.2	27.4	0.4	16.5
Bichli L (1994)	39.6	11.1	29.6		14.8			80.4	17.2	2.4	13.68
Kulkarni S (1996)	24.2	23.7	20.7	17.98	11.98			68.7	30	1.3	17.21
Khosla AH (1999)	35	19.35	32.26	6.45							6.05
Salhan S (2000)	16.3	18.18	14.54	27.27				60	40		3.92
Prasanta R (2005)	50.56	9.72	18.17	4.8	1.84						6.25
Puri A (2011)	18	12	24	13	14	5	14	55.38	40	4.61	6.9
Present study	16.66	33.33	18.05	13.88		1.38		65.27	16.66	6.94	2.86

DISCUSSION

Maternal mortality is the death of a woman in relation to pregnancy. According to WHO "A maternal death 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 pregnancy, from any cause related or aggravated by pregnancy or its management (ICD-10)".

Revised guidelines for death audit: Target MMR for 2017 is 41 per lakh live births and the audit is conducted within five days of death.

During the study period of 6 year the MMR ranged between 335.68/1lakh live births in 2007 & 177.93/1 lakh live births in 2012. National average of MMR is 540/1 lakh births (NFHS 98-99). Other Indian studies done in the last 15 years have shown wide variations in MMR ranging from 172/1 lakh (1996) to 625/1 lakh live births (2005).[11] Prasanta et. al have observed the MMR of 625/1 lakh live births & that of Salhan et al (2000) showed 392/1 lakh live births.[7,8] This variation could be explained due to many variables.

Our study showed that 73.61 % of women died between the age group 21 & 30 years, as highest number of women belong to this age group. Similarly, multigravidas contribute 56.94 % of maternal deaths. Admission death interval of our study revealed that 62.5 % of women died within 24 hours of admission, probably due to poor general condition of women at the time of admission & late referrals. Thirty four percent of these women died within 6 hours of admission as they were in moribund or comatose condition. More than half (86 %) of the maternal deaths occurred in post partum period and included 62.5 % after vaginal delivery and 23.6 % after cesarean delivery. Antenatal women contributed 12.5 % for the maternal deaths and 1.38 % was due to abortion.

The analysis revealed that 16.66 % death was due to indirect obstetrical causes, 65.27 % due to direct cause & 6.94 % due to unrelated causes. Other studies have shown variations in direct obstetrical death from 60-80 %. Our figure of 65.27 % is closer with Kulkarni et al. at 68.7 % and Salhan et al. (2000) at 60 %. Percentage variation of indirect obstetric death ranges from 17.2 % to 40 % and 16.66 % in our study (2012).[12]

Direct obstetric deaths accounted for 65.27 % of all deaths in our study that included hemorrhage 33.33 %, severe pre-eclampsia 16.66 %, sepsis 18.05 %, abortion 1.38 % & CVT 5.55 %. Hemorrhage especially during post partum is sudden, unpredictable & more dangerous when woman has pre-existing anemia. Globally 25 % of all maternal deaths are due to hemorrhage.[2] Other studies show variation between 9.72 % & 27.5 %. In our study the rate of deaths due to hemorrhage was 33.33 %. This is due to lack of proper antenatal care, poor nutritional status, home deliveries & late referrals.

Pre-eclampsia accounts for 13 % of maternal deaths globally.[2] Other studies revealed a large variation in eclampsia deaths ranging between 50.56 % & 16.3 %.[8] Our study had eclampsia deaths of 16.66 %. Active use of magnesium sulphate regimen, better monitoring and better investigation facilities and vigorous management techniques have failed to cause a significant decrease in eclampsia deaths & CVT deaths. There were 5.55 % deaths due to eclampsia.

Sepsis which is a direct consequence of poor hygiene during delivery, account for 15 % of maternal deaths globally. In our study it was 18.05 % which is

closer to the global figure. This is due to the increasing trend of women delivering in the hospitals under aseptic precautions. Unwanted abortions are terminated with pills & awareness regarding hygiene is maintained.

Globally, indirect cause of maternal deaths account for 20 % of all maternal deaths, particularly from anemia, malaria, HIV, etc. Other studies show their range between 17.2% and 40 %. In our study it was 16.66 % and included deaths due to anemia 13.88 %, ARF 1.38 %, cardiac failure 1.38 % & malaria deaths 1.38 %.[7]

Other studies show anemia death range from 4.8 to 27.27 %, while our study it was 13.88 %. The percentage of deaths due to anemia is a grossly undetermined figure because of pre-existing anemia is major contributing failure of direct obstetric deaths due to post partum hemorrhage & sepsis. Unrelated causes contribute 6.94 % of all maternal deaths due to ARDS.

CONCLUSION

The maternal mortality rate at referral hospitals in India is very high. It varies from highest in Uttar Pradesh to lowest in Kerala.

WHO estimates show that out of the 529,000 maternal deaths globally each year, 36,000 are contributed by India, the highest by a single country.[13]

Accurate estimation of maternal mortality depends mainly on a sound vital registration system and proper reporting of maternal death. Solutions of the issues comprises of 3Ds: Delay in diagnosis, immediate treatment and decision to transfer, delay in transport for reaching to proper hospital and delayed therapy.

Audit of all maternal deaths and near-deaths with periodic reports of recommendations as to their prevention as has been done by the UK confidential enquiry.

The classical triad of maternal mortality causes in our study remained hemorrhage, eclampsia & sepsis. According to WHO report (2005) 'make every mother & child count' hemorrhage is the cause of death. Hemorrhage & sepsis deaths are considered one of the potentially preventable cause of maternal death.

Maternal mortality in this study is 286 per lakh live births. Out of which most could have been avoided, if they had registered and received proper antenatal care, early diagnosis, timely intervention and early referral with a well equipped transport facilities. An attempt has been made in the present study to throw light upon some of the community factors which had contributed to maternal deaths in this tertiary level health center so that steps can be taken to prevent such type of maternal deaths in future. Over all promotion of safe motherhood should be emphasized.

A woman's place is precious in the family.... Her well-being is our priority.

Conflicts of Interest: None Declared.

Source of funding: Self

Ethical Clearance has been obtained from our institute.

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