

ORIGINAL ARTICLE

MATERNAL MORTALITY: A TEN YEAR REVIEW IN A TERTIARY CARE SETUP

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Background: Maternal mortality ratio of a country is indicative of its health and development status. Information on maternal mortality is required to determine this status and to set priorities for policy making and programmatic and operation research strategies. This study was conducted to determine the causes of maternal mortality in a tertiary care hospital. **Methods:** This study was conducted in Department of Obstetrics & Gynaecology B Unit, Ayub Medical College, Abbottabad, from January 2002 to January 2012. Data of all the pregnant patients admitted to Obs/Gyn Unit 'B' Labour Room were retrospectively collected and reviewed for the causes of direct maternal deaths. **Results:** There were 21,120 deliveries during the study period. Out of these, there were 163 maternal deaths. The maternal mortality ratio was calculated as 772 per 100,000 live births. Direct maternal deaths constituted 143 (87.7%) and indirect deaths were responsible for 20 (12.3%) deaths. Haemorrhage was the leading cause of maternal death and was responsible for 43.55% of maternal deaths, while eclampsia was observed in 26.99% of maternal deaths. In 6.13% of patients rupture uterus was the cause of maternal death. **Conclusion:** Maternal mortality in our part of the world is high and most of the causes of maternal death remain haemorrhage and eclampsia. Haemorrhage which is the leading cause of maternal death is both predictable and preventable, if proper peripartum care is provided, maternal mortality can be reduced.

Keywords: Maternal mortality, Eclampsia, Septicaemia, Haemorrhage, Pulmonary embolism

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 pregnancy from any cause related to or aggravated by the pregnancy or its management, but not from accidental causes.¹ Pregnancy is a normal healthy state that most women aspire to at some point in their lives. Yet this normal life-affirming process carries with it serious risks of death and disability.² Maternal mortality ratio of a country is indicative of its health and development status. Information on maternal mortality is required to determine this status and to set priorities for policy making and programmatic and operation research strategies.

Data from around the world show that there is great disparity between the maternal mortality of the developing and developed countries.³ More than half a million women die each year due to pregnancy related complications.⁴ Globally and in Pakistan the major causes of maternal mortality are haemorrhage, hypertensive disorders, sepsis, obstructed labour, and un-safe abortions.^{5,6}

The World Health Organization (WHO) estimated that in 2005 there were 53,600 maternal deaths equivalent to one every minute of every day and that the global maternal mortality rate is now

400/1000,000 live births.⁷ Over 99% of deaths are in developing countries, and slightly more than half occurred in the Sub-Saharan Africa region alone, followed by south Asia.⁸ The life time risk of a woman dying of pregnancy related causes in developing countries is 1:40 compared to 1:3,600 in developed world.⁹

The causes of maternal mortality are multiple, inter-related and complex and almost preventable.¹⁰ The most common causes of maternal mortality are haemorrhage 21%, hypertensive disorder 18.6%, Sepsis 13.3%, abortion 11%, and other 36%.¹¹

The objective of this study was to determine the causes of maternal mortality in a tertiary care hospital in northern Pakistan.

MATERIAL AND METHODS

This cross-sectional study with data retrospectively collected was conducted in the Department of Obstetrics & Gynaecology Unit B, Ayub Medical College, Abbottabad, from 2002 to 2012. The data were collected from patients' record of maternal mortality. Age, parity, duration of pregnancy, and cause of death were noted. Patients who were brought in a critical condition to hospital, and those who expired before a diagnosis could be made, were also included in the study and grouped as patients with unknown cause. Patients dying of conditions related to

or aggravated by pregnancy were labelled as direct maternal deaths, while those due to incidental medical or surgical causes were grouped in indirect maternal deaths. Maternal mortality ratio was calculated as maternal deaths/100,000 live births.

RESULTS

From January 2002 to January 2012, there were 21,120 deliveries in Obs/Gyn B Unit, and there were 163 maternal deaths. The maternal mortality ratio (MMR) was calculated as 772/100,000 live births.

Out of 163 maternal deaths, direct maternal deaths constituted 143 (87.7%), and indirect maternal deaths were 20 (12.2%). Out of 163 maternal deaths 42 (25.76%) were multigravida, 23 (14.11%) were primigravida and 98 (60.12%) were grand-multigravida, thus there was higher number of maternal mortality in grand-multigravidas (Table-1).

Table-1: Distribution of maternal deaths according to parity

| Parity | Number | Percentage |
|---------------------|--------|------------|
| Primigravidas | 23 | 14.11 |
| Multigravidas | 42 | 25.76 |
| Grand Multigravidas | 98 | 60.12 |

Age of the patients ranged from 17 to 47 with mean 29±6.2 years. Age range in which maximum maternal deaths occurred was 31–40 year in 89 (54.60%) patients. Five (3.06%) patients were under 20 year, 54 (33.13%) were between 21 and 30 year, while only 15 patients (9.20%) were above 40 years of age (Table-2).

Table-2: Distribution of maternal deaths in relation to age

| Age group (Yrs) | Patients | Percentage |
|-----------------|----------|------------|
| < 20 years | 5 | 3.06 |
| 21–30 years | 54 | 33.12 |
| 31–40 years | 89 | 54.6 |
| >40 years | 15 | 9.2 |

The leading cause of maternal mortality was haemorrhage, both antepartum and postpartum, responsible for 71 (43.55%) of maternal deaths. Eclampsia was responsible for 44 (26.99%) maternal deaths. Rupture uterus leading to haemorrhage and maternal deaths was observed in 10 (6.13%) patients. Septicaemia was observed in 20 (12.26%) patients while 14 (8.58%) patients expired on operating table probably due to anaesthesia complications. There were 6 (3.68%) patients who had severe blood transfusion reaction leading to maternal death. Seven (4.29%) patients died due to negligence of medical staff. Out of these, 3 were given wrong injection leading to immediate deaths and 4 patients had come with retained foreign body after C-section done at private hospitals. Seven (4.29%) patients had hepatic disease while 3 (1.84%) had cardiac disease leading to maternal death. Pulmonary embolism was

observed as a cause of maternal death in 5 (3.06%) patients. Nine (5.52%) patients had no obvious cause of maternal death. Some patients had more than one cause of death so the number exceeds actual total (Table-3).

Table-3: Causes of maternal mortality (n=163)

| Causes | Patients | Percentage |
|-------------------------------------|----------|------------|
| Haemorrhage | 71 | 43.55 |
| Eclampsia | 44 | 26.99 |
| Uterine rupture (Obstructed Labour) | 10 | 6.13 |
| Sepsis | 20 | 12.26 |
| Anaesthesia | 14 | 8.58 |
| Blood Transfusion | 6 | 3.68 |
| Iatrogenic | 7 | 4.29 |
| Hepatic | 7 | 4.29 |
| Cardiac | 3 | 1.84 |
| Pulmonary embolism | 5 | 3.06 |
| Unknown | 9 | 5.52 |

DISCUSSION

Maternal mortality ratio of a country is indicative of its health and development status. Information on maternal mortality is required to determine this status and to set priorities for policy making and programmatic and operation research strategies. This study shows a maternal mortality rate of 772/100,000 live births. These statistics indicate a high MMR when compared to a study conducted by Fikree¹² in which MMR was 433/100,000 live births. In Indian Punjab MMR was reported to be 1,002/100,000 live births.¹³ Siddiqui *et al*¹⁴ considered 260–490/100,000 live births as the worst maternal mortality rate in Pakistan. But our local results indicate that the situation is even worse than they have reported. One study conducted in Abbottabad in 2001 by Begum *et al*¹⁵ reported MMR to be 1,270/100,000 live births while another study conducted in Abbottabad in 2010 by Fawad *et al*¹⁶ reported MMR as 1,057/100,000 live births. Our study was also conducted in Abbottabad over a period of 10 years and it shows a slightly lower maternal mortality.

Maternal mortality in our study is much lower as compared to estimate of MMR in a study conducted in Larkana which reported MMR 4,740/100,000.¹⁷ Maternal mortality in our study is much higher as compared to estimate of MMR by United Nations which reports MMR in Asia 280/100,000. The global figures are estimated to be 400/100,000 live births. Highest MMR figure is 1,000 in Africa and lowest in Northern America 11/100,000.¹⁸ The worst maternal mortality was reported from Afghanistan.¹⁹

India, Pakistan and Bangladesh account for 28% of world births and 46% of maternal mortality.²⁰ It has been observed that there is wide variation in MMR even within Pakistan. Most of the currently available data on maternal mortality probably do not truly reflect the actual situation in the country. This is because there is no systematic mechanism of data collection. Most of our patients die before reaching the hospital and some of

them are brought dead. In our study 9 patients were brought dead so the exact cause of maternal mortality in these patients remains unclear.

Rahim *et al*²¹ reported direct maternal mortality rate as 86.17% and indirect maternal deaths as 13.82%. This closely resembles our study. In Begum *et al* study¹⁵ the maternal mortality was 69% in grand-multiparavida, 19.2% in multiparavida and 11.5% in primigravida. We found slightly less MMR in grand-multiparavida, but slightly higher MMR in multi- and primigravida compared to them. The reason may be a longer duration of our study period.

The maternal mortality reflects a women risk of dying each time she becomes pregnant. The lifetime risk of maternal deaths is 40 time higher in developing countries than developed world.²²

Rahim *et al*²¹ reported lower MMR in extremes of ages and a higher MMR in the middle reproductive age. Our study is in conformity with this.

This study analyses causes of maternal deaths as well. We noted that haemorrhage was the leading cause of maternal deaths. This includes antepartum, postpartum haemorrhage and also haemorrhage due to uterine rupture. In the study by Fikree¹² haemorrhage was responsible for 52.9% maternal deaths. Ruiz-Rosas²³, Begum *et al*¹⁵ and Fawad *et al*¹⁶ reported haemorrhage as a cause of maternal mortality in 65.6%, 34.6% and 19.23% cases respectively. Rahim *et al*²¹ reported haemorrhage to be responsible for 42.16% deaths followed by hypertensive disorders of pregnancy in 24.62% of cases, ruptured uterus in 10.44% while sepsis was observed in 9.7% of cases.

The second leading cause of maternal mortality in our study was eclampsia. A study conducted in Peshawar²⁴ has shown eclampsia to be responsible for 48% of maternal mortality, and eclampsia was reported as the leading cause of maternal deaths at a study conducted in Lahore.²⁵ Shah *et al* from Karachi²⁶ reported hypertensive disorders to be responsible for 15.3% of maternal mortality. Deaths from hypertensive disorders can be prevented by careful monitoring during pregnancy and by the use of anticonvulsants like magnesium sulphate in cases of eclampsia.

In our study 6.13% patients had ruptured uterus due to obstructed labour leading to maternal mortality. All of these patients underwent emergency peripartum hysterectomies. Seven were unscarred uteruses and three were scarred uteruses. According to UNICEF and NCMH (National committee for maternal health) ruptured uterus contributed to 10% of maternal deaths in Pakistan.²⁷

Sepsis also contributed to 12.26% of maternal mortality in our study. All of these were due to unsafe, unhygienic septic induced abortions. Begum *et al*¹⁵ also reported that 19.2% of maternal deaths were due to

septic abortion. In UK abortion was responsible for 6.21% of maternal deaths.²⁸

Anaesthesia related complications contributed to 8.58% maternal deaths. Most of these were high risk patients. The national figure for complications of anaesthesia resulting in maternal deaths are 8%.²⁷ Anaesthesia complications can be avoided by the improvement in per-operative care of patient and vigilant monitoring.

There were 3.68% maternal deaths due to blood transfusion reaction in our study. A comprehensive knowledge of the blood grouping system and compatibility and the ability to recognise, respond to, and report reaction is also necessary to optimise patients' safety.²⁹

Maternal mortality after emergency peripartum hysterectomy was observed in 23 patients which is consistent with a previous study conducted in the same area from 2000 to 2010.³⁰

In our study 4.29% of maternal deaths were due to hepatic disease, 1.84% due to cardiac disease, 3.06% due to pulmonary embolism while 5.5% due to unknown cause. Nine patients (5.5%) were allotted unknown group because they were brought dead to hospital.

CONCLUSION

Maternal mortality in our part of the world is high and most of the causes of maternal death remain the same like haemorrhage and eclampsia in poor countries. Haemorrhage which is the leading cause of maternal death is both predictable and preventable; if proper peripartum care is provided, maternal mortality can be reduced.

REFERENCES

1. Maternal mortality in 2000, Estimates developed by WHO, UNICEF and UNFPA, Geneva, Switzerland. WHO: 2004. Available at: <http://whqlibdoc.who.int/publications/2004/9241562706.pdf>
2. Berg C. Strategies to reduce pregnancy related deaths: from identification and review control and prevention, 2001. Available at: <http://dcd.gov/reproductive health/02-pub-elec.htm>
3. Zahr CA, Royston E. Compilers Maternal Mortality –a global fact book. Geneva: WHO; 1991.
4. Jaffery SN. Review of maternal mortality over 10 year period at JPMC Karachi. J Pak Med Assoc 1972;22(3):71–61.
5. Mother-Baby Package: Implementing safe motherhood in countries. World Health Organization, Geneva, 1994. Available at: http://www.who.int/maternal_child_adolescent/documents/who_dhe_msm_9411/en/
6. Tinker AG. Improving women's Health in Pakistan, Human Development Network, Band, 1998.
7. World Health Organization. Maternal Mortality in 2005. Estimates developed by WHO, UNICEF, UNFPA and the World Bank. Geneva: WHO; 2007.
8. Khan YP, Bhutta SZ, Munim S, Bhutta ZA. Maternal health and survival in Pakistan: issue and optimus. J Obstet Gynaecol Can 2009;31:920–9.

9. Drife J. Maternal Mortality: National and international perspectives. In: Gjorgov AN, (Ed). The year book of Obstetrics and Gynaecology. Vol. 8. California: Karger; 2000.p. 91.
10. Maternal mortality. World Health Statistics. WHO Bull 1996;29(2).
11. Family and reproductive health coverage of maternity Care. Society of Obstetrician and Gynecologists Pakistan. SOGP Survey 1989-90 Pakistan. WHO 1997.
12. Fikree FF, Midhet F, Sadruddin S, Berendes HW. Maternal mortality in different Pakistani sites: ratios, clinical causes and determinants. Acta Obstet Gynecol Scand 1997;76:637-45.
13. Sarin AR, Singla P, Kaur H. Maternal mortality-aetiological factors: analytic study from a teaching hospital of Punjab. Indian J Matern Child Health 1992;3(3):69-73.
14. Siddiqui GK, Hussein R, Dorman JC. Dying to give birth: the Pakistan Liaison Committee's strategies to improve maternal health in Pakistan. BJOG 2011;118(Suppl 2):96-9.
15. Begum S, Aziz-un-Nisa, Begum I. Analysis of maternal mortality in tertiary care hospital to determine causes and preventive factors. J Ayub Med Coll Abbottabad 2003;15:49-52.
16. Fawad A, Naz H, Islam A, Zafar S, Abbasi A. Maternal Mortality in a tertiary care hospital. J Ayub Med Coll Abbottabad 2011;23(1):92-5.
17. Baloch R. Prevalence of maternal mortality: a critical problem in rural population. Pak J Obstet Gynaecol 1997;10:6-9.
18. World Health Organization. Summary of maternal mortality estimates. Geneva: WHO, 2002. Available at: www.who.reproductive-health
19. WHO/UNICEF/UNFP Maternal Mortality Report in 2000. Geneva: WHO; 2000.
20. Motashaw, Nergesh D. Root causes of maternal mortality: Infancy to mother hood. J Family Welfare 1997;43(2):4-7.
21. Rahim R, Shafqat T, Faiz NR. An analysis of direct causes of maternal mortality. J Postgrad Med Inst 2006; 20:86-91.
22. Safe Motherhood, Fact Sheet. Revised 1990 estimates of maternal mortality. A new approach by WHO and UNICEF Geneva: World Health Organization; 1996.
23. Rviz-Rosas RA, Rocio Cruz-Cruz P, Torres-Arreola L. Obstetrical hemorrhage as a maternal death cause in the Instituto Mexicano del Seguro Social during 2011. Rev Med Inst Mex Seguro Soc 2012;50(6):65-4.
24. Shaheen B, Hassan L, Obaid M. Eclampsia a major cause of maternal mortality: A prospective analysis at a tertiary care hospital of Peshawar. J Pak Med Assoc 2003;53:346-50.
25. Lodhi SK, Khanum Z. Maternal mortality at Lady Willington Hospital, Lahore. Ann King Edward Med Uni 2002;8:286-8.
26. Shah N, Hossain N, Shoaib R, Hussain A, Gillani R, Khan NH. Socio-demographic characteristics and the three delays of maternal mortality. J Coll Physicians Surg Pak 2009;19(20):95-8.
27. Jafarey S, Ahsan A, Kamal I. Manual for emergency obstetrics care. UNICEF/National Committee for Maternal health 2000:4-10.
28. Hibbard MB, Anderson MM, Drife JO. Report on confidential inquiries into maternal deaths in UK (1988-90) UK: Her Majesty Stationary Office; 1994. p. 15-8.
29. Higgins D, Jones D. Ensuring patient safety blood Transfusion. Nurs Times 2013;109(4):22-3.
30. Khan B, Khan B, Sultan R, Bashir R, Deeba F. A Ten Year review of emergency peripartum hysterectomy in a tertiary care hospital. J Ayub Med Coll Abbottabad 2012;24(1):14-7.

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