YEAR-WISE TRENDS AND ANALYSIS OF MATERNAL MORTALITY IN AN OBSTETRIC UNIT OF A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: to review the trends and causes of maternal mortality in a tertiary care hospital in Peshawar.

Study design: A retrospective observational study.

Place of study: Obstetrics and Gynecology Department Khyber Teaching Hospital MTI Peshawar.

Duration of study: 5 years. From 1st January 2019 to 31st December 2023.

Materials and methods: This was a retrospective observational hospital-based study. Mothers who were admitted and died due to pregnancy-related causes were included in the study. Deaths due to accidental causes were excluded from the study. All the relevant information was extracted from the hospital records, labour registers, and maternal mortality register of the ward and was recorded on a pre-designed proforma. Descriptive statistics were used to calculate frequencies and percentages for different variables.

Results: Total numbers of live births during the study period were 19222 and total numbers of maternal deaths were 61. It gives the maternal mortality ratio of 317 per 100,000 live births. The majority of women (n=37-61%) were in the age groups of 31—40 years. Number of patients with great grand multiparty was 22(36%). All patients were un-booked with no proper ante-natal care received during pregnancy. Common causes of maternal mortality in descending order of frequency were eclampsia, post-partum hemorrhage, and ante-partum hemorrhage, all being preventable causes of death. Direct causes of death were seen in 50(82%) patients while 11 (18%) died due to indirect causes.

Conclusions: The maternal mortality ratio of 317 per 100,000 live births is quite high. The top 3 causes in our study are all preventable. We all have to work hard to reduce the maternal mortality ratio.

Keywords: Maternal mortality ratio, eclampsia, post-partum hemorrhage.

INTRODUCTION

Worldwide nations are going through difficult times due to various challenges they are facing. Economy, financial crisis, wars, terrorism, health care crisis, poverty and lack of education are few of them.[1] To have a good quality of life, access to clean water and food, education and health care facilities are the basic human rights and every human being should be provided with these basic rights.

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In order to achieve it, Millennium Development Goals were passed in September 2000. The goals to achieve were to reduce poverty, hunger, promote gender equality, women empowerment, to combat communicable diseases and to reduce maternal and child mortality by three fourth.[2] Target time was decided to be 2015. This program was later on merged with Sustainable Development Goals and time extended by 2015-2030. Even extension of time failed to control the high maternal mortality ratio, more specifically in developing countries including Pakistan. Maternal mortality ratio is highest for Asia and Africa. Latest statistics show that globally 295000 women die annually. And it is so sad to know that 94% of these deaths occur in under developed countries. Pakistan is one of them.[3]

Maternal mortality ratio of Pakistan is 186 deaths per 100,000 live births according to a recent survey “Pakistan Maternal Mortality Survey 2019” conducted by National Institute of Population studies funded by USAIDS.[4] In

addition to the lack of education, poverty, malnutrition, lack of infrastructure for health system, lack of one to one health care facility, population explosion faced by all under-developed countries, political instabilities in our country also plays an important role in failure to achieve reduction in maternal mortality ratio. Child marriages and violence against women are other worth mentioning causes.[5, 6]

Common causes of maternal mortality are post-partum hemorrhage, hypertensive disorders of pregnancies, sepsis and thrombo-embolic events.[7] all of these causes are preventable. Early recognition and prompt treatment of these causes may lead to dramatic decrease in maternal deaths. Strong infrastructure of health system and ready access to health facility in face of emergency results in good outcome.[8] Examples are our neighboring countries who have invested in health care system and now their maternal mortality is less as compared to us.[9]

The objective of our study is to review the trends and causes of the maternal mortality in our unit. Rationale of our study is that its results will be used to add evidence to the existing statistics and will help policy makers to form/re-evaluate the strategies to control maternal deaths.

MATERIALS AND METHODS

This was a retrospective observational hospital based study. It was carried out in Gynae C Unit of Khyber Teaching Hospital Peshawar from 1st January 2019 to 31st December 2023. Ethical approval from Institutional Research and Ethical Review Board was taken before starting this study.

It is pertinent to know about different types of maternal deaths. Direct maternal death is defined as 'death of a woman while pregnant or within 42 days of the end of pregnancy (includes giving birth, ectopic pregnancy, miscarriage or termination of pregnancy) from any cause related to or aggravated by the pregnancy or its management, but not from the accidental or incidental causes. Accidental causes of maternal deaths are deaths due to motor vehicle accidents, substance overdoses, homicides, and suicides. Indirect maternal death is the one 'resulting from previous existing disease or disease that developed during pregnancy and not due to direct obstetric causes but were aggravated by the physiologic effects of pregnancy'.

After obtaining ethical approval record keeping department of the hospital was approached. The mothers who died were identified from the medical record. All the relevant information were extracted from the patient's case notes, labour register and maternal mortality register maintained in the ward. There were no missed cases as all maternal deaths are documented in the department record.

Patients who were admitted to the hospital for delivery/ health care from 1st January 2019—31st December 2023 and who died due to causes related to pregnancy were included in the study. Deaths due to accidental causes were excluded from study. Total number of live births during study period were also noted.

The demographic details, chief complaints, age, parity, ante-natal booking status (whether patient received any ante-natal care during pregnancy or not), cause of death and time interval between arrival of the patient and death all were noted on a pre-designed proforma. All the data was entered in SPSS version 22 and descriptive statistics were used to calculate frequency and percentages of different variables.

RESULTS

Total number of live births during this time period were 19222 and total number of maternal deaths were 61. It gives the cumulative maternal mortality ratio of 317 per 100,000 live births. Year wise live births and maternal mortality ratio is shown in table 1. More than half (n=37-61%) of the patients fell in age range of 31-40 years. Great grand multiparas were 22(36%). Age and parity is tabulated in table no 2. All patients were un-booked. They did not receive any sort of care during pregnancy.

Our study showed eclampsia as a most common cause of maternal mortality followed by postpartum hemorrhage and ante-partum hemorrhage. 50 (82%) deaths were due to direct causes and 11 (18%) were due to indirect causes. In them 5 patients had cardiac disease, 4 patients had liver disease, 1 patient had chorio-carcinoma, 1 patient had intestinal obstruction. Whole of the small intestine was gangrenous.

Time interval between arrival and death was 12 hours in 13(21%) patients, whereas it was 24 hours in 22(36%). Rest of the patients (n=26, 43%) stayed in hospital for more than 24 hours.

Table 1: Year wise maternal mortality ratio.

Year	2019	2020	2021	2022	2023
Total number of maternal deaths.	14	10	9	12	16
Total number of live births.	5286	4229	4567	5140	5538
Maternal mortality ratio	265	236	197	233	289

Table 2: Age distribution of patients.

Age	Frequency	Percentage.
20---30 years	11	18%
31—40 years	37	61%
Above 40	13	21%

Table 3: Booking status of patients. N=61

Booking status of patients.	**Frequency**	**Percentage**
Booked.	**0**	**0%**
Unbooked.	**61**	**100%**

Table 4: Parity of the patients.

Parity.	Frequency	Percentage
P1	21	34.5%
P2---P4	18	29.5%
P5 and above	22	36%

Table 5: Causes of maternal mortality.

Causes.	2019	2020	2021	2022	2023	Total
Eclampsia.	5	4	2	2	3	16
Post-partum hemorrhage.	2	1	3	4	2	12
Ante-partum hemorrhage.	1	2	1	2	1	7
Cardiac diseases.	3	-	1	-	1	5
Thrombo-embolism	1	-	-	-	2	3
Abortion complications.	2	1	-	-	-	3
Liver diseases.	-	1	-	1	2	4
Shoulder dystocia.	-	-	3	-	-	3
Hypertensive disorders.	-	-	-	2	-	2
Sepsis.	1	-	-	-	-	1
Ruptured ectopic pregnancy.	-	1	-	-	-	1
Other causes.				1. Pregnancy with choriocarcinoma.	1. Obstructed labour. 2. Twin gestation with severe anemia. 3. Pregnancy with intestinal obstruction.	

Table 6:Time spent in the hospital.

Time interval between arrival and death.	Frequency.	Percentage.
Within 12 hours	13	21%
Within 24 hours	22	36%
➢ 24 hours	26	43%

DISCUSSION

In this study we analyzed the maternal mortality of our unit for the last 5 years from 2019 to 2023. The cumulative maternal mortality ratio for the above period was317 per 100,000 live births. Average maternal mortality ratio was 244 per 100,000 live births. The highest maternal mortality ratio was seen in the year 2023 (289 per 100,000 live births) and lowest was observed in the year 2021 (197 per 100,000 live births). It compares favorably with various national and international studies. A study conducted by Noreen Rasul in Lahore showed an MMR of 228 per 100,000 live births .[10]Another study by Fauzia et al in Peshawar reported an MMR of 409 per 100,000 live births.[1] There was a striking difference in MMR in developing and developed countries. Report published by WHO in 2015 showed an MMR of 239 per 100,000 for developing countries in comparison to the very low MMR of 12 per 100,000 live births for developed countries. [12] There are various studies reported in literature where MMR was analyzed for lower and middle income countries. Banserman M et al published a study in reproductive health 2020. In this he analyzed from pregnant women in NICHD global network for womens' children health research from 2010--2018 in low and middle income countries. He reported a highest MMR of 327 per 100,000 for Pakistan. [13]An analysis by Aziz et al for Pakistan from 2010—2018 reported MMR of 319. [14] While globally there is a significant decrease in MMR and IFR, the above mentioned figures show a very disappointing state for our country.

We observed more than half (37—61%) of maternal deaths occurred in age group of 31—40. While Noreen et al showed majority of deaths in age range of 21—30 years.[1] Our study demonstrated that majority (22—36%) women were great grand multiparas. This may be due to increased risk of hemorrhage associated with increased gravidity and parity. With increase in age there was increase in the risk of medical disorders. Increase in number of parturition make uterine muscles less efficient. Their contractions are not strong in third stage of labour and amount of bleeding is not stopped efficiently by uterine contraction. Das et al reported similar trend.[15] Pasha et al also found significant association between increasing parity and increasing MMR for Pakistan. [16]

Antenatal care is an important pillar of safe motherhood. Good ante-natal care during pregnancy translates into good pregnancy outcome. In our study total of 61 patients died in last 5 years. And all of them were un booked and received no proper ante natal care during their pregnancy. ~~Pakistan is the~~ 5th most populous country of the world with more than 70% of the population living in rural area. Poverty and lack of health care facilities make them vulnerable to poor pregnancy outcome. Our health budget for the last year was 24.25 billion making up 2.8 % of the total development budget and 0.05 % of GDP.[17]With this meagre amount, what investment can be done in health sector? End result is majority of population having no access to health care facility. The preventive aspects of health system is totally neglected. As we have already discussed that proper ante natal care during pregnancy can dramatically reduce maternal morbidity and mortality. We need to increase our health budget for preventive health services. Developed countries invest huge amount of money in health sector and more so in preventive medicine. Whereas developing countries have no proper health infra-structure, preventive health and no ante-natal care. This is one of the main reason for high maternal mortality ratio. Gelato A et al also reported that lack of ante-natal care is an important factor in increased MMR.[18]

We also analyzed the time interval between arrival of the patient and her death. The analysis showed that 13 (21%) of the patients died within 12 hours and 22 (36%) of the patients died within 24 hours. It shows that majority of the patient reached hospital quite late when patients condition has already gone into an irreversible state. This fact is best explained by the 3 Delay Model. First delay is the delay in making decision to seek medical advice. Second delay is delay in reaching to the health care. ~~Third~~ delay is the delay in receiving the care. Women are individuals in their own. She can take an independent decision for herself and her child. But unfortunately in our

society they are deprived of their basic rights. Mahmoud Fathalla (late), former president of the Royal College of Obstetricians and Gynecologist was once asked what women most needed for their health, Fathalla answered , " Power. Powerlessness of women is a serious health hazard, and particularly in maternal health."[19] Our analysis showed 29(47.5%) patients were referred from periphery. All of them were poor and reached to hospital with great difficulty, delaying the treatment. The health facilities are not up to the mark even in large public sector hospital. Limited number of doctors for a huge number of patients with long duty hours. Obviously quality of care is compromised in these situations. In our country doctor to patient ratio is 1:1300 less than 1:1000 recommended by WHO.[20] If we compare it to developed countries, it is 3.56:1000 with Austria having the highest value 5.36:1000. It is not so that our youth is not talented and they cannot study medicines. Enough number of students get admission in public and private sector medical colleges annually. But due to lack of job security, threats, uncontrolled price hike and substandard living conditions force them to leave their homeland and settle abroad. Brain drain is now another emergent issue compromising quality of care in our country. Similar study was conducted in our unit by Madeeha et al. similar trend is shown by Noreen Rasul in Pakistan and Ratan Das et al in India.[10,21.]

Our study showed that the top 3 common causes of maternal mortality in all 5 years were eclampsia, post-partum hemorrhage and ante-partum hemorrhage followed by thrombo-embolism and abortion complications. Various studies across the literature show common causes as eclampsia, hemorrhage, thrombo-embolism in varying degrees of chronological order. Creanga AA et al showed leading causes of MMR in USA to be indirect causes of maternal deaths due to cardiovascular diseases followed by hemorrhage , hypertensive disorders and sepsis.[22] Study by Fauzia et al showed hemorrhage, hypertensive disorders of pregnancies and thrombo-embolism to be the most common causes of maternal deaths in descending chronological order.[11] Abida Riaz et al also reported hemorrhage to be the most common cause of MMR .[23] Similar pattern was reported by Begum et all.[24]

The pattern of causes of maternal mortality is different in developed and developing countries. Due to strong health infra-structure, antenatal care, protocols, prevention and proper referral system, deaths due to hemorrhage and eclampsia are rare in developed countries. Deaths due to cardiac diseases is more common there. Whereas hemorrhage and eclampsia are common causes of deaths in developing countries.

Our study showed 50(82%) deaths due to direct causes and 11(18%) deaths were due to indirect causes. Cardiac disease was seen in 5 patients and hepatic disease was seen in 4 patients. One patient presented with pregnancy with chorio-carcinoma. One patient was referred from Kohat. She presented with pain abdomen. On laparotomy whole of small intestine was gangrenous. In a study from Karachi, indirect deaths were 27%.[25] Most common indirect cause of maternal death in our study was cardiac disease (5—8.1%). It is similar to the above mentioned study whereas cardiac disease related death in USA is 26%.[26]

CONCLUSION

The maternal mortality ratio of 317 per 100,000 live births in our setup is quite high. We are far way behind in achieving the Sustainable Development Goals. Top 3 Common causes of maternal mortality in our hospital were eclampsia, post-partum hemorrhage and ante - partum hemorrhage. The saddening aspect of this analysis is that all these 3 causes are preventable.

RECOMMENDATIONS

1. To invest more in health sector to strengthen the infrastructure and preventive side.
2. To make policies to eradicate poverty and increase the health awareness and education.
3. To make laws to empower women and eliminate gender discrimination.
4. To make every possible efforts to stop brain drain.

AUTHORS' CONTRIBUTIONS

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Conflicts of interest: None

Funding: None

Acknowledgment: none

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