RETROSPECTIVE ANALYSIS OF MATERNAL MORTALITY AT A TERTIARY CARE HOSPITAL OF PESHAWAR, PAKISTAN

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ABSTRACT

OBJECTIVE: To determine the frequency of maternal mortality and identify causes with age groups in tertiary care hospital of Peshawar, Pakistan.

METHODOLOGY: A descriptive study conducted at Gynecology & Obstetrics units of Lady Reading Hospital, Peshawar, Pakistan. with retrospective review of validated records of hospital registers from January 1st January 2009 to 31st December 2011. Convenience sampling used to access the records. A self structured proforma designed to collect validated data on variables (age, cause of death, year of death, place of residence), that were analyzed in Excel- 2007 and trend analysis determined by Joinpoint Analysis Software.

RESULT: A total of 277 maternal deaths recorded from Lady Reading Hospital in three years. Hemorrhage remains the leading cause with 27.07% (CI= 0.66, SD= 5.65) followed by eclampsia 15.88 % (CI= 0.60, SD= 5.13), ruptured uterus 10.83% (CI= 0.51, SD= 4.35) and sepsis 10.10% (CI= 0.47, SD= 4.04). Maximum maternal deaths of 33.57 % reported in 26- 35 years, followed by 26.71 % in 15- 25 years, 23.10 % in 36- 45 years and 3.24 % in 45- 55 years and 6.13 % deaths reported from unknown age group as well. Post Partum hemorrhage was significant with P-value (0.002).

CONCLUSION: Maternal mortality remains high with leading causes as hemorrhage, eclampsia, ruptured uterus and sepsis in women of 26-35 years age groups. A strong need to improve the maternity care in tertiary care hospitals and community based education is emphasized for the awareness of the masses, to prevent these deaths.

KEY WORDS: Maternal Mortality, Childbearing age, Eclampsia, Postpartum Hemorrhage, Ruptured uterus.

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INTRODUCTION

Maternal Mortality (MM) defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental cause.[1] It is a leading public health issue that adversely affects the surviving children, entire family and community.[2] The risk of women dying due to pregnancy related causes is 1:40 in developing countries, as compared to the developed countries.[3] The Maternal Mortality Ratio (MMR) of a country is indicative of its health and development status. Fifth Millennium Development Goal (MDG-5) proposed by World Health Organization (WHO) for improvement of maternal health is targeted to reduce the world's maternal mortality ratio by 75%, by 2015. In 2013, an estimated 289000 mothers died during pregnancy and childbirth, across the globe.[4] MMR in 2013 was 16/100,000 live births in developed countries and 230/100,00 live births for developing countries. The major contribution of the global maternal deaths was from sub-Saharan Africa region alone (62%) followed by Southern Asia (24%).[5]

Although MMR of Pakistan has been reduced from 400 in 1990 to 230 in 20135, currently, Pakistan is off-track and lags behind the target (140) set for 2015.[6] Various local studies have shown variable figures for MMR from different parts of study.[7-12] Majority of maternal deaths are due to direct causes and hemorrhage is the most common cause.[13,14] Poor access to health care facilities, poverty, lack of trained primary health care providers and local tradition/preference of home deliveries are contributing towards higher mortalities in Pakistan.[15,16]

Many studies have been conducted on this issue in NWFP previously, most of them in the years 1998-2012, but studies done in Peshawar were till 2009.[8-11] No data on maternal deaths was available through the studies after 2009. More-

over trend analysis has been reported only once in KPK about the causes of maternal mortality, showing data till 2009 only.[8] This paved the way for this study, with an aim to have recent data, trend analysis of the causes and to rule out the major threats to the women of our society during their child bearing period and have true picture of this province.

METHODOLOGY

This descriptive study was conducted at Lady Reading Hospital, Peshawar, Pakistan; about 1700 bedded government tertiary care hospital. Validated hospital data was collected retrospectively from Gynecology & Obstetrics registers for the period i.e 1st January, 2009 to 31st December, 2011. The time during which the entire data collected was from October, 2012 - January, 2013.

Data collection tool was a self structured proforma, on which required data was collected from the medical records. All the information was extracted from patient case sheets, labor registers and maternal mortality registers of the hospital. Variables used in the Performa were deceased mother's name, year of her death, reason for her death and age of the female who died. Only those females were included who succumbed death during and after delivery, rest all morbidity cases were excluded from the study. The patients who were rushed to casualty in emergency condition or the deaths due to delay in reaching hospital which resulted in complication/ death of the patient on the way were not included in the data.

Maternal death: is defined as "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 or incidental causes".[1]

Direct causes of death were eclampsia, postpartum hemorrhage (PPH), pulmonary embolism, ruptured uterus, obstructed labor, HELLP syndrome, ante-partum hemorrhage (APH), anesthesia complications and retained products of conception. Ante partum and post partum hemorrhage were united as hemorrhage. Sepsis and infections were united under the heading sepsis and diseases like anemia, hepatitis, cancer, cardiac arrest, tuberculosis and diabetes mellitus were included in indirect causes of maternal deaths.

Consent was taken from the following: Medical Superintendent (MS) of concerned hospital and Head of Department (HOD) of Gynecology/ Obstetrics ward. Confidentiality was ensured regarding the data collected that it was purely for research purposes and will not be shared with the third party.

Causes of maternal mortality were analyzed year wise in Excel- 2007 with computation of mean, standard deviation and confidence intervals for each of the cause. Age groups related maternal deaths were analyzed in Excel- 2007 with construction of graph.

JoinPoint Analysis software was used to determine the trend analysis of maternal mortality causes, by calculating annual percent change, test significance, confidence intervals and p-values of all the causes. Cutoff for p-value was set at 0.05.

Join point is statistical software using Join point models for the analysis of trends. The software takes trend data and fits the simplest Join point model that the data allow. The user supplies the minimum and maximum number of Join points. The program starts with the minimum number of Join point (e.g. 0 Join points, which is a straight line) and tests whether more join Points are statistically significant and must be added to the model (up to that maximum number). This enables the user to test that an apparent change in trend is statistically significant. The tests of significance use a Monte Carlo Permutation method. The models may incorporate estimated variation for each point (e.g. when the responses are age adjusted rates) or use a Poisson model of variation. In addition, the models may also be linear on the log of the response (e.g. for calculating annual percentage rate change). The software also allows viewing one graph for each Join Point model, from the model with the minimum number of Join points to the model with maximum number of join points.[17,18]

RESULTS

A total of 277 deaths were recorded in three years study period. Hemorrhage (APH & PPH) remained the leading cause of maternal mortality over the three year period, accounting for 27.07% deaths followed by eclampsia and ruptured uterus, accounting respectively for 15.88% and 10.83% deaths respectively. Sepsis lead to 10.10% maternal deaths and majority were due to septic abortions. 21.29 % of women died due to indirect causes which included cases of anemia, tuberculosis, diabetes mellitus, hepatitis, cancer and cardiac arrest. Table 1 shows the mean, standard deviation and confidence intervals of all the direct and indirect causes of maternal mortality. Graph 1 shows trend analysis of post partum hemorrhage in Joinpoint analysis software. PPH came out to be significant among all causes of maternal mortality, with annual percent change as 62.02 and p- value of 0.002. An increased risk of 33.57 % was observed among women aged 26-35 years, followed by 26.71% in 15-25 years and 23.10% in 36-45 years, 3.24% in 46-55 years and 6.13% in the unknown age groups respectively depicted in Graph 2.

TABLE 1: ANNUAL DISTRIBUTION OF MATERNAL MORTALITY CAUSES FROM 2009- 2011

Causes	2009	2010	2011	Total Maternal Deaths n (%)	Mean	Standard Deviation	Confidence Interval
Hemorrhage	17	25	33	75 (27.07)	25.00	8.00	24.05, 25.94
Eclampsia	9	16	19	44 (15.88)	14.66	5.13	14.06, 15.27
Ruptured Uterus	5	12	13	30 (10.83)	10.00	4.35	9.48, 10.51
Sepsis	7	14	7	28 (10.10)	9.33	4.04	8.85, 9.80
Pulmonary Embolism	3	4	8	15 (5.41)	5.00	2.64	4.68, 5.31
HELLP Syndrome	2	3	7	12 (4.33)	4.00	2.64	3.68, 4.31
Obstructed Labor	2	2	5	9 (3.24)	3.00	1.73	2.79, 3.20
Anesthesia Complications	0	3	0	3 (1.08)	1.00	1.73	0.79, 1.20
Retained Products of Conception	0	1	1	2(0.72)	0.66	0.57	0.59, 0.73
Indirect Causes	7	26	26	59 (21.29)	19.66	10.96	18.3720.95

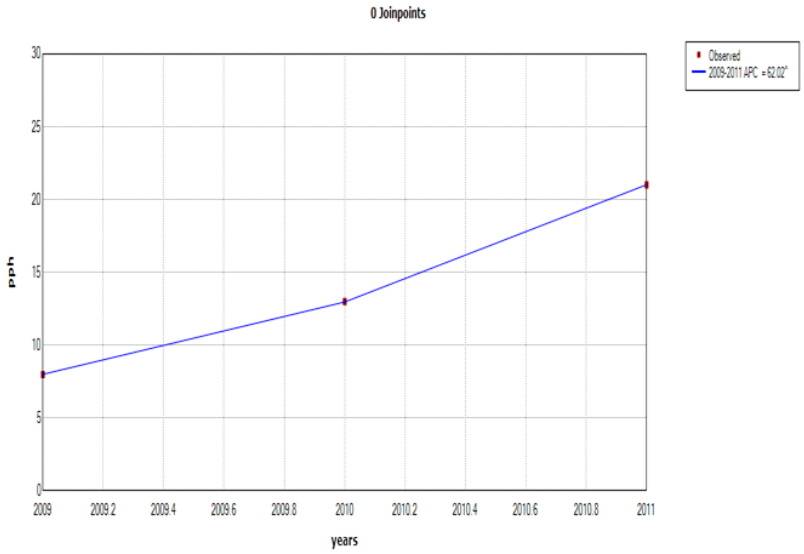

Figure 1: Joinpoint regression analysis of post-partum hemorrhage from 2009-2011

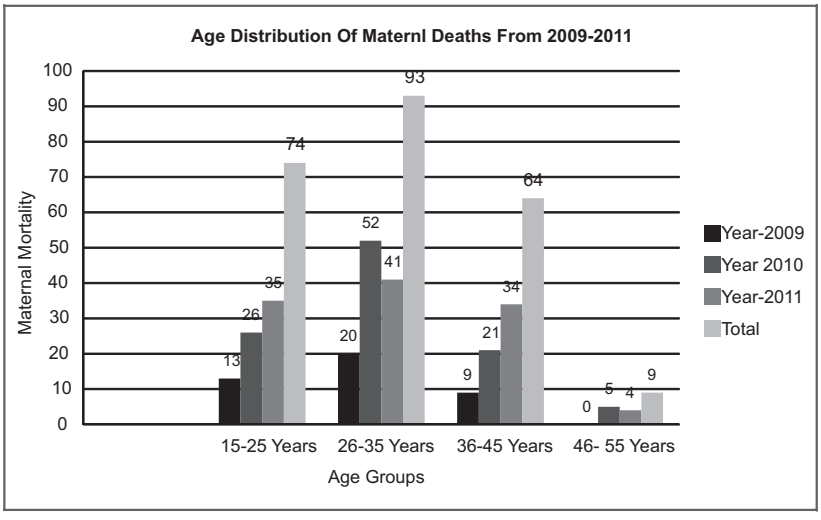

Figure 2: Distribution of maternal deaths in age groups from 2009-2011
Note; Unknown age groups were not added in the above graph

DISCUSSION

This study was a retrospective review of the records which gave us direct and indirect causes of maternal mortality for three years. Leading direct causes of the deaths were hemorrhage, eclampsia, ruptured uterus and sepsis. Maternal deaths were more in ages 26 to 35 years, but still some deaths reported in other age groups as well. Explanation for this cannot be figured out that why these patterns in ages are seen and why the deaths reach to the peak in this age. This can be because of the factor that most of the wedding occurs in this age group according to our present traditions, so this can be a reason for most deliveries in this age group and most of the death that are occurring. Trend analysis of maternal mortality causes showed only postpartum hemorrhage as consistently higher over three years and significant as well as compared to other causes.

Several authors have identified direct and indirect causes of maternal mortality rates in Government and Private tertiary care hospitals.[8-11,14,19,20] In our study, hemorrhage (27.07 %), eclampsia (15.88%) and ruptured uterus (10.83%) were the commonest causes. According to Pakistan Demographic and Health Survey (2006-2007), PPH (27%), puerperal sepsis (13.7%) and eclampsia (10.4%)

the commonest causes of maternal mortality in Pakistan.[13] Other studies have shown hemorrhage, eclampsia and sepsis as commonest causes of maternal deaths. Overall, hemorrhage has been reported as the most common cause of MM.[7-12,14,19-22]

In our study, indirect causes were observed in 21.29% cases. PDHS showed indirect causes responsible for 13% maternal deaths in Pakistan. Soomro S, et al, observed indirect causes of maternal deaths like cardiomyopathy (14%), hepatic encephalopathy (12%), and pulmonary embolism (6%). [23]

In our study, an increased risk of maternal mortality was observed among women aged 26-35 years (33.57%), followed by 15-25 years age group (26.71%). Shah RJ, et al reported greater risk of dying in mothers of 30-35 year age group.[24] Butt MA et al, showed majority of maternal deaths (61.5%) in >30 years age group.[15] In study by Iftikhar R, the mean age of mothers dying due to pregnancy related causes was 30±5.5 years.[25] Global Burden of Disease Study 2013,[26] showed that MMR was highest in the oldest age groups and lowest in women aged <19 years in both 1990 and 2013. Despite much higher rates of mortality in older age groups, the total number of deaths is roughly equal before and after the age of 30 years. The MMR in mothers aged 15–19 years in 2013 was 1•5 times higher than that in women aged 20-24 years, and 1•4 times higher than in those aged 25-29 years. In 2013, the MMR was 9•5 times higher for a woman aged 45-49 years, not in accordance to our results where we found mortality more in 26-35 years, 15-25 years and above. This systemic review from 1990-2013 concluded that total annual number of maternal deaths decreased from 376034 (95% CI; 343483– 407574) in 1990, to 292982 (95% CI; 261017–327792) in 2013. The reduction accelerated steadily from 1990 to 2013, with corresponding decreases in MMR. Between 2003 and 2013, the annual rate of change in MMR was greater than –1%, reaching –3•3% for 2012–13. As live births were not taken in our study so we were unable to calculate MMR.

An Indian study[27] in 2014 estimated that rural areas of poorer states had the highest MMR (397, 95%CI 385–410) compared to the lowest MMR in urban areas of richer states (115, 95%CI 85–146). Majority of deaths were due to obstetric hemorrhage (38%) followed by sepsis (11%), obstetric labor (5%) and hypertensive disorders (5%). Similar findings were from our study as well indicating maternal deaths attributed to hemorrhage as leading cause, but geographical distribution was not mentioned in our study.

LIMITATION OF STUDY

Limitation of our study was that only three years for trend analysis of maternal mortality causes. It should have been more like 10-20 years to give actual trend over time. Future research must focus on this issue. We took only one tertiary care hospital, due to which results cannot be generalized. Another limitation was that we did not take into account parity and live births so could not establish association between parity and maternal death and were unable to calculate maternal mortality ratio.

CONCLUSION & RECOMMENDATION

Maternal Mortality remains high with leading causes as hemorrhage, eclampsia, ruptured uterus and sepsis among women of child bearing ages of our area. Maternal deaths are more prevalent in age groups 26- 35 years and 15- 25 years.

These causes are predictable and preventable as well. Maternal mortality is crucial, important and preventable; it can be reduced by provision of skilled care, timely management of complications, proper training of LHV's & TBA's and community awareness. Focus on special groups of pregnant women with targeted programs such as training, monitoring, and supervision of birth attendants for provision of oxytocics, will go a long way in decreasing maternal deaths attributed to direct, available causes.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

FRM: Concept, study design, drafting the manuscript, critical analysis, final approval of the version to be published

AAS & SA: Acquisition and analyses of data, drafting the manuscript, final approval of the version to be published

AH, SIS, SUS, RA & MA: Acquisition of data, final approval of the version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declare no conflict of interest

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