

The Common Causes of Death among Pregnant Women in Iran: A Study on Cadavers Referred to Legal Medicine Organization

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Abstract

Background: Maternal mortality remains now as an important leading cause of death for women of reproductive age whole of the world. However, our knowledge is very little of the main causes of death among our pregnant women needing more population-based assessments. Hence, the present study aimed to determine causes of maternal death in the cases referred to Legal Medicine.

Methods: In this cross-sectional study, all cadavers referred to Tehran Legal Medicine Organization for further assessment due to pregnancy death between 2009 and 2018 were included. All eligible cadavers were fully autopsied by a fixed forensic physician and pathological tests were also performed for all cadavers.

Results: A total of 49 cadavers were assessed. The mean gestational age of pregnant women was also 7.04 ± 2.49 weeks ranged 3 to 9 weeks. The most common cause of pregnancy death was hemorrhage (38.8%) followed by eclampsia (24.5%), and sepsis (12.2%), while the cause remained unknown in 8.2% of cadavers. There was no difference across the difference causes of pregnancy death in age, body mass index, or the type of baseline pathologies.

Conclusion: Hemorrhage, eclampsia, and sepsis remains as the three most common causes of death among pregnant women in our population and thus early recognition and treatment of these conditions with proper protocols can effectively reduce the likelihood of early death in pregnant women.

Keywords: Autopsy; Death; Forensic; Maternal mortality; Medicine

Introduction

Maternal mortality remains now as an important leading cause of death for women of reproductive age whole of the world especially in third world countries. Approximately 529,000 women die from pregnancy-related causes annually that 99% of these maternal deaths occur in developing nations [1]. The main determinants of high pregnancy-related death in these regions include lack of obstetrical caring standards and the absence of proper systems for registering and monitoring maternal deaths [2]. In other words, delay in reaching timely primary healthcare, delay in deciding to seek care, and delay in planning adequate treatment protocols are three main pillars increasing the likelihood of maternal death [3]. In return, development of maternal cares and public health efforts of surveillance led to considerably reducing maternal death in developed countries has made it as a rare event in those regions [2]. In different populations, various causes for maternal mortality have been identified that some factors such as eclampsia, sepsis, postpartum hemorrhage, heart disorders, severe anemia, unsafe abortions, generalized infections, emboli, and ectopic pregnancy are at the top of the table causes [4]. Thus, all developing countries now effort to reduce the rate of maternal mortality by identifying its determinants and improvement of maternal cares. In addition, because the risk factors for maternal death may occur at any time of pregnancy and childbirth in the absence of predisposing factors, access to qualified obstetrics preventive and curative services such as transfusions, antibiotics, and prophylactic interventions can effectively reduce the risk for maternal death. In this regard, Iran as a great developing country has not been exempted from reducing maternal death rate that could achieve a dramatic decline in the maternal mortality even comparably with developed nations [5]. However, our knowledge is very little of the main causes of death among our pregnant women needing more population-based assessments. Hence, the present study aimed to determine causes of maternal death in the cases referred to Legal Medicine.

Materials and Methods

In this cross-sectional study, all cadavers referred to Tehran Legal Medicine Organization for further assessment due to pregnancy death between 2009 and 2018 were included. The study protocol was approved by the Shahid Beheshti University of Medical Sciences. All eligible cadavers were fully autopsied by a fixed forensic physician and pathological tests were also performed for all cadavers. All tests were done in a single laboratory. Baseline characteristics were collected through interviewing by the relatives of the deceased and by reviewing the hospital recorded files. The baseline variables included into analysis were demographics, gestational age, body mass index (BMI), heart weight, free fluid, evidence of edema in pathology, lung or liver necrosis, and cause of death. The study endpoint was to determine the causes of pregnancy death according to baseline characteristics. Results were presented as mean ± standard deviation (SD) or mean ± SD for quantitative variables and were summarized by frequency (percentage) for categorical variables. Continuous variables were compared using ANOVA test or with Kruskal-Wallis test whenever the data did not appear to have normal distribution or when the assumption of equal variances was violated across the study groups. Categorical variables were, on the other hand, compared using chi-square test. For the statistical analysis, the statistical software SPSS version 16.0 for windows (SPSS Inc., Chicago, IL) was used. P values of 0.05 or less were considered statistically significant.

Results

A total of 49 cadavers were deeply assessed. The mean age was 31.06 ± 6.38 (median 32.00 years, ranged 16 to 45 years). Based on the mean BMI value, 40.8% were categorized to have normal weight (BMI < 25 kg/m²), 26.5% were overweight (BMI: 25 to 29.9 kg/m²) and 32.7% were obese (BMI ≥ 30 kg/m²). The mean heart weight was 375.00 ± 70.99 gr. The free fluid was revealed in 61.2%, edema in 65.3%, lung necrosis in 83.7%, and liver necrosis in 46.9%. Within the pregnancy, the mean heart rate of women was 102.58 ± 32.35/min (ranged 76 to 190/min) and the mean body temperature was also 36.44 ± 1.51 °C (ranged 32 to 37 °C). The mean gestational age of pregnant women was also 7.04 ± 2.49 weeks ranged 3 to 9 weeks. The most common cause of pregnancy death (Figure 1) was hemorrhage (38.8%) followed by eclampsia (24.5%), and sepsis (12.2%), while the cause remained unknown in 8.2% of cadavers. As shown in Table 1, there was no difference across the difference causes of pregnancy death in baseline variables including age, body mass index, or the evidences of edema at pathology, hemorrhage, eclampsia, lung necrosis and also liver necrosis.

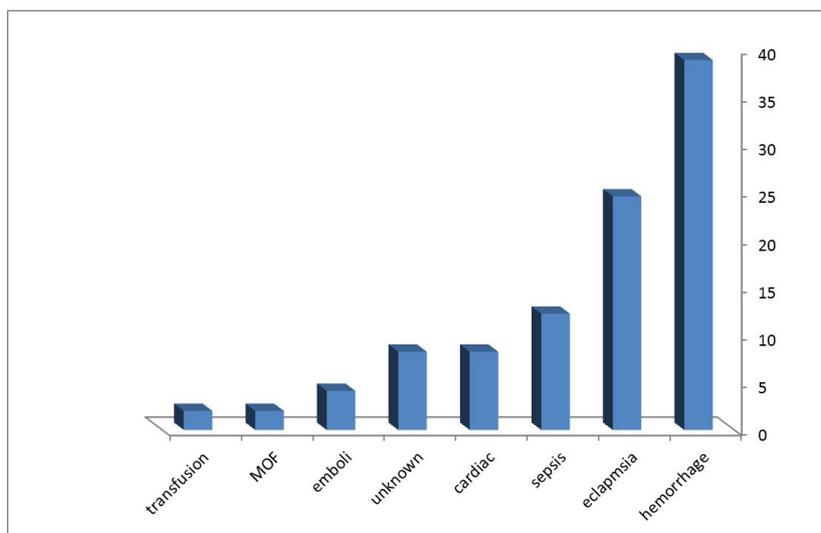


Figure 1: Different causes of pregnancy death

Item	Sepsis	Cardiac	Hemorrhage	Eclampsia	Unkown	Transfusion	Emboli	MOF
Mean age, year	34.00±4.69	34.00±9.13	31.47±6.57	31.17±4.30	22.00±6.06	31.00±0.00	28.50±7.78	34.00±0.00
Obesity (BMI≥30kg/m ²)	3 (50.0)	2 (50.0)	3 (15.8)	4 (33.3)	1 (25.0)	1 (100)	1 (50.0)	1 (100)
Free fluid, %	2 (33.3)	1 (25.0)	10 (52.6)	9 (75.0)	4 (100)	1 (100)	2 (100)	1 (100)
Edema, %	3 (50.0)	2 (50.0)	13 (68.4)	10 (83.3)	2 (50.0)	0 (0.0)	1 (50.0)	1 (100)
Lung necrosis, %	5 (83.3)	2 (50.0)	15 (78.9)	12 (100)	4 (100)	0 (0.0)	2 (100)	1 (100)
Liver necrosis, %	3 (50.0)	2 (50.0)	8 (42.1)	6 (50.0)	3 (75.0)	0 (0.0)	1 (50.0)	0 (0.0)

Table 1: Different causes of pregnancy death according to baseline characteristics

Discussion

According to the findings of our study and in comparable with the previous reports, hemorrhage, eclampsia, and sepsis were shown as the most frequent etiologies for pregnancy death among our population. In this line, the various reasons for death were not associated with baseline characteristics or pathological and histological evidences discovered within cadavers' assessment. The majority of deaths

occurred at the gestational ages earlier than 9 weeks and thus factors leading pregnancy death were mostly specified to these times. As pointed previously, delay in early identification of the factors predisposing death and also delay in diagnosis of life-threatening events within pregnancy are the main causes for early death in pregnant women. It is a global agreement that for preventing maternal death, it should be focused on address or treat postpartum hemorrhage and severe infection at health-care facilities by providing oxytocics and antibiotics, manual removal of the placenta, and blood transfusion, however in some severe cases, hysterectomy may be considered for saving patient's life [6]. Also, controlling eclampsia should be considered by providing anticonvulsants. These protocols can be very vital in developing nations with common delivering at home.

According to the findings, hemorrhage is the most common cause of death. Bleeding is still a major cause of death in many parts of the world; it is one, however, that responds to treatment. Antepartum hemorrhage can be due to placenta previa or to separation or abruption of the normally sited placenta leading early pregnancy death. The next cause of death is eclampsia and its related toxemia and thus the real management of eclampsia and preeclampsia should be followed by its early treatment along with hospitalization and bed rest [7-9]. Another important cause of death is sepsis that is unfortunately remained as a main reason for antepartum death. It has been shown the upward trend of death from sepsis mainly attributed to an increase in some bacterial species subtypes such as invasive group A of streptococcal infections. Susceptibility to infection may be complicated by modulation of maternal immune response and increasing rates of risk factors such as obesity [10]. Failure to recognize severity of infection is a major universal risk factor. Thus, early diagnosis of infection and its severity is potentially vital.

Overall, along with common causes of death (including hemorrhage, eclampsia, and sepsis) that contributes to 75.5% of all pregnancy deaths, other causes including emboli, cardiovascular disorders or multi-organ failure were less common etiologies for death. Of course, the causes for death are naturally varied in different geographical situations especially in different hygienic conditions. As reported by the World Health organization [11], although hemorrhage, sepsis, and eclampsia account for a vast majority of deaths whole of the world, indirect causes such as anemia; malaria; HIV/AIDS; diseases of the heart, lung, liver, or kidneys; and ectopic pregnancies account for 20 to 25 percent of maternal deaths and are attributable to illnesses aggravated by pregnancy [12-15]. Unfortunately, nutritional deficit remains as the main cause of death in African nations and thus the affected pregnant women are unprepared to cope with the extra physiological demands of pregnancy [16]. In fact, the nutritional deficit leading macro- or micronutrient deficiency can predispose these women to anemia and even sepsis. Also, in eastern and southern Africa, about one-third of 20 pregnant women are infected with HIV responsible for at least 18 percent of pregnancy deaths [17,18]. Thus, HIV infection and its related consequences during pregnancy should not be ignored in such regions.

Conclusion

In conclusion, similar to previous reports in other developing nations, hemorrhage, eclampsia, and sepsis remains as the three most common causes of death among pregnant women in our population and thus early recognition and treatment of these conditions with proper protocols can effectively reduce the likelihood of early death in pregnant women.

Acknowledgment

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Ethical Statement

The study protocol was approved by the Shahid Beheshti University of Medical Sciences. All eligible cadavers were fully autopsied by a fixed forensic physician and pathological tests were also performed for all cadavers.

Conflict of Interest

Hereby, the authors declare that there is no conflict of interest regarding the present work.

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Authors' contribution

All authors devised the work, the main conceptual ideas, proof outline and interpretation of the data. Also, all authors discussed the cases and commented on the manuscript.

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