Available online at **www.ijmrhs.com**

ISSN No: 2319-5886

International Journal of Medical Research & Health Sciences, 2017, 6(4): 66-70

Causes of Maternal Mortality: Autopsy Results

Leila Neisani Samani[1], Tanaz Agha Jamali[1]*, Hamidreza Danesh Parvar[2], Zahra Behboudi Moghadam[3] and Fatameh Agha Hoseini[1]

[1] *Iran University of Medical Sciences, Tehran, Iran*

[2] *Faculty Member of Legal Medicine Organization of Tehran, Iran*

[3] *Faculty Member of Tehran University of Medical Sciences, Tehran, Iran*

**Corresponding e-mail: jamali.tannaz1367@gmail.com*

ABSTRACT

Background: *Mortality of pregnant mother is one of the most important indices for evaluation of socioeconomic development of a society and can show efficiency of health system of a country. Many causes of maternal mortality can be prevented or avoided. This study is conducted to specify the causes of maternal mortality.* ***Materials and methods:*** *This study is a descriptive-analytical research which has used retrospective method to investigate 165 records of maternal mortality in Legal Medicine Organization of Tehran during 2008-2013 and to provide the required information based on a researcher-made checklist from these records.* ***Results:*** *According to autopsy results, heart diseases with 34 cases (20.1%) have been the most important causes of mortality of pregnant mothers and after that, respiratory failures with 24 cases (14.5%) and obstetric complications (bleeding and infection after delivery) with 22 cases (13.3%) have been the most important causes of maternal mortality.* ***Conclusion:*** *Heart diseases, respiratory problems and bleeding have been the most important causes of maternal mortality and the importance of preventive measures for such health problems can be felt more than before. For the women with planning for pregnancy, the clinics should complete assessment of the cardiovascular and respiratory diseases fully and accurately in pre-pregnancy cares. Also, risk factors such as obesity, unhealthy diet and insufficient physical activity should be defined for them and required measures should be taken to meet these factors.*

Keywords: Mortality, pregnancy mothers, autopsy, pregnancy

INTRODUCTION

Pregnancy is a natural phenomenon that can cause production of generations. The phenomenon is an enjoyable waiting period that may happen in every marital life and is sometimes along with fear and suffer and even death and mortality. Maternal mortality can cause irreparable damages for the family and the society [1]. Maternal mortality during pregnancy or while delivery and to 42 days after termination of pregnancy for any reason, except for accidents, can be attributed to complications of pregnancy and delivery [2]. According to World Health Organization (WHO) in 2013, number of mortality of pregnant mothers during 2010 has been equal to 287000 deaths in world level [3]. In general, MMR index in developed countries is less than 10 (2 in Greece, 5 in Sweden, 5 in Denmark and 8 in Australia) and more than 500 in developing countries (530 in Kenya, 790 in Zimbabwe, 1200 in Somalia and 1400 in Afghanistan) out of 100.000 live childbirth [4]. Since 2000, reduction of maternal mortality to the 2015 was considered as one of the most important goals of Third Millennium Development. In Iran, on 1975, the index was rated to 274 and reaches to 150 in 1990, to 94 in 1995, to 38 in 2005 and reaches to 20.3 mortality cases out of 100.000 live childbirths on 2013. According to Iran's Fifth Development Plan, the value should be decreased to 15 case of death out of 100.000 childbirths in Iran [4]. Large number of maternal mortalities happen immediately after delivery and in early postpartum that are mainly because of bleeding [2]. In the reviews in world level, it has been found that bleeding is one of the main causes of maternal mortality and about 27% of mothers die for this reason. The hypertension disorders to 14% and infection to 10% have been 2 next causes. Abortion and emboli have also caused mortality of many mothers, so that a review showed that abortion can be the important cause of such mortality to 8%

and emboli to 3% in all ages [5]. In a study conducted in Japan, maternal mortality is investigated in the years between 2010 and 2015 and it has been found that 59% of mortalities are because of direct factors and 23% because of indirect factors [6]. In an overview conducted based on the WHO information on 2006, it was found that bleeding has been the main cause of mortality in Asia and Africa. In Africa, 33.9% and in Asia, 30.8% of maternal mortalities have been because of bleeding. In Latin America, the hypertension disorder (25.7%) has been the most important cause and after that, abortion (12%) has caused death of many mothers in this region [7].

As maternal mortality is an unpleasant event for the family and the society and it can be prevented in many cases, regular check of cause of mortality in this group is clear to take adequate measures. This study has been conducted with the purpose of investigating the causes of mortality of pregnant mothers in Tehran during 2008-2013 on basis of the coroner records in Legal Medicine Organization, so that it can help the family and the authorities to progress their plans for maternal health through providing exact and comprehensive information.

MATERIALS AND METHODS

This study is a descriptive-analytical research, which has used retrospective method to investigate 165 records of maternal mortality in Legal Medicine Organization of Tehran during 2008-2013 and to provide the required information based on a researcher-made checklist from these records. The checklist included two parts. In first part, the information related to pregnancy of mother is available like pregnancy age (per week), mother's age, number of pregnancy (delivery) and type of delivery and in second part, the information related to maternal mortality are available based on autopsy results. The validity of checklist was tested using face and content validity and the reliability of the instrument was confirmed using regression method (correlation coefficient to 0.9). During the tests, all ethical issues have been observed. The collected data were analyzed using SPSS-20 and using scattering parameters such as mean value, frequency distribution, frequency percent, etc.

RESULTS

In this study, 165 records were studies and the desired variables were extracted and recorded. In some records, the information related to a variable couldn't be extracted favourably and hence, in some variables, missing data was observed. Out of 165 records, 17 cases (10.3%) were related to the year 2008; 36 cases (21.9%) to 2009; 32 cases (19.4%) to 2010; 33 cases (20%) to 2011; 27 cases (1.3%) to 2012 and 20 cases (12.1%) were related to the year 2013.

Mean age range of pregnant mothers while death was equal to 30.272 ± 5.762 years old and the youngest mother was 15 years old and the highest age of maternal death was 43 years old and median of age of mothers while death was equal to 30. In fact, the age 30 is the age that half of mothers were died before it and half of them were died after that and mode value is also equal to 35 years, which shows the age with most frequency. In this age, 15 cases of mortality were happened, which was the highest value compared to other ages. In next rank, the age 25 with 13 cases of maternal mortality was in rank 2 in terms of most frequency of mortality.

According to obtained results, mean value of pregnancy age in pregnant mothers while death was equal to 29 ± 10.906 and the lowest pregnancy age was equal to 4 weeks and the highest age was 43 weeks. However, in the case of 43 weeks, the maternal mortality has probably happened after delivery and the median of pregnancy age while death is reported to 34 weeks. In other words, half of mothers have been died before week 34 of pregnancy and half of them have been died after it and mode has been also reported to week 39. In week 39, 22 cases of mortality have been reported, which was the highest frequency compared to other weeks.

The results showed that majority of dead mothers were experiencing their first pregnancy, so that 590 cases (35.8%) of pregnant mothers were passing their first pregnancy and 31% (52 cases) were experiencing their second pregnancy. Mean value of numbers of pregnancy was equal to 2 ± 1.071 and the most pregnancies were experienced by a mother with 7 pregnancies.

Table 1 Scattering parameters of studied variables

Variable	Number	Min variable	Max variable	Mean	SD	Variance	Median	Mode
Age while death	165	15	43	30.272	5.762	33.212	30	35
Pregnancy age (week) while death	165	4	43	29	10.906	118.952	34	39
Number of pregnancies	165	1	7	2.03	1.071	1.15	2	1

According to autopsy results, heart diseases with 34 cases (20.1%) have been the most important causes of mortality of pregnant mothers and after that, respiratory disorders with 24 cases (14.5%) and obstetric complications (bleeding and infection after delivery) with 22 cases (13.3%) have been the most important causes of maternal mortality (Tables 1 and 2).

Table 2 Frequency distribution of mortality case based on autopsy results

Cause of death	Frequency	Frequency percent
Poisoning	1	0.6
Hematologic disorders	3	1.8
White autopsy	3	1.8
Medical interventions	3	1.8
Malignancy	3	1.8
Immune system disorders	3	1.8
Amniotic fluid embolism	4	2.4
Digestive disorders	9	5.5
Infectious disorders	18	10.9
Pregnancy-related hypertension	19	11.5
Neurological disorders	19	11.5
Respiratory disorders	24	14.54
Obstetric complications (bleeding and infection after delivery)	22	13.3
Heart diseases	34	20.6
Total	165	100

DISCUSSION

Pregnancy is a natural process in life of every woman, which can be ended by childbirth and coming of a new member to family; although different destiny may be waited for women in some pregnancies and can be ended with maternal mortality that is an unpleasant event [8]. Although pregnancy is a physiologic process, some problems may happen during pregnancy or while delivery and after that and if the problems are not met on right time, they can result in mother's death (maternal mortality) [8]. By 2010, about 300.000 maternal mortality cases were reported across the world and the most cases were happened in poor countries or with low revenue [9]. High percentage of the mortalities is preventable and avoidable. This study has been conducted to investigate the causes of maternal mortality based on autopsy results of the bodies referred to Tehran Legal Medicine Centre and laboratory diagnosis. The results obtained from this study showed that mean age range of mothers while death has been equal to 30.272 ± 5.762 years old and the youngest woman has been 15 years old and the age 43 has been highest age of maternal mortality and median of mothers' age while death is rated to 30 years old. Jamshidpour, et al. have also studied the amount and the causes of maternal mortality in Kermanshah (2001-2012) and found that the majority of mothers were in age group of 18 to 35 years old (46.6%) while death, urban citizens (66.7%) and in high risk pregnancy group (65.3%) [2]. A study was conducted by Safizadeh, et al. under the title of "epidemiologic study of maternal mortality causes in the population under coverage of Kerman University of medical Sciences in 2009-2011". They found that mean age range of dead mothers has been equal to 28.25 ± 7.03 years old [8]. In a systematic review with the purpose of investigating causes of mortality in adolescent pregnant women across the world, it was found that the causes of mortality of adolescent mothers are not different from other mothers and that bleeding, infection, abortion and hypertension disorders have been the main causes of mortality in this age group [10]. In a study conducted in America, it was found that although the women over 35 years old form less than 15% of pregnant women, about 27.4% of maternal mortality cases have happened in this age group [11].

In this study, it is found that age of pregnant mothers while death is high compared to previous works and the cause of this issue can be this issue that marriage age has risen over the years and the women mostly experience their pregnancy in high ages. Moreover, the studied population in the present study is population of Capital of Iran (Tehran) with special social features compared to other regions such as high marriage age compared to other points (villages and small cities).

Mean pregnancy age of mothers while death has been equal to 29 ± 10.906 and lowest pregnancy age has been equal to 4 weeks and highest age has been equal to 43 weeks and median of pregnancy age has been equal to 34 weeks. In other words, half of mothers have been died after week 34 of pregnancy and mode value is obtained to 39 weeks.

In week 39, 22 cases of maternal mortality have happened with the highest frequency compared to other pregnancy weeks.

Moreover, study of Safizadeh showed that death of 23 mothers (82.1%) was after delivery and majority of them have been died in the post-delivery stage. Maharlooyi, et al. reported post-delivery mortality in Fars Province to 71% [8]. In a study conducted in America, it was found that increased age of pregnancy has led to increased risk of maternal mortality [11]. An important point of these results is that end of pregnancy and post-natal care as well as while delivery care measures can be vital for life of mother and these measures are usually neglected.

The results obtained from the present study have also revealed that majority of pregnant mothers were experiencing their first pregnancy, so that 60 cases (35.5%) of dead mothers were spending their first pregnancy. These results show importance of care measures in first pregnancy. In first pregnancy, because of low information and knowledge of mother about this process, they may experience high risk pregnancy compared to second and third pregnancies. On the other hand, the results can be because of this issue that majority of mothers in big cities experience usually one or two pregnancies and number of mothers with experience of more than 3 pregnancies in less than mothers with one or two experiences and this can be the cause for increased mortality index in this group.

According to autopsy results, heart diseases with 34 cases (20.1%) have been the most important causes of mortality of pregnant mothers and after that, respiratory failures with 24 cases (14.5%) and obstetric complications (bleeding and infection after delivery) with 22 cases (13.3%) have been the most important causes of maternal mortality.

In study of Eslamloo, et al. on epidemiological study of maternal mortality in West Azerbaijan province (2001-2005), it was found that the most common cause of maternal mortality as a result of pregnancy and delivery complications have been respectively as follows: bleeding, pregnancy poisoning, indirect factors, abortion, improper anaesthesiology care and infection after delivery and pulmonary embolism. Moreover, they reported that the ratio of unsafe delivery has been significantly decreased statistically during 2001-2005 and the most important cause of maternal mortality can be the human resources supplying health services [9].

In different studies conducted in Iran to investigate causes of maternal mortality, bleeding, hypertension disorders and infection have been main causes of maternal mortality [2,12,13]. In a study to investigate caused of maternal mortality in 2006-2010 in America, it was found that bleeding (11.4%), embolism (14.9%), hypertension disorders (9.4%) and infection (13.6%) have been main causes of maternal mortality [11]. In a systematic review based on reports of WHO, it was found that during 2003-2009, bleeding, hypertension disorders and infections have been main factors of maternal mortality across the world, so that half of mortality cases have been caused by the 3 factors. More than one fourth of mortality cases have been for indirect causes. In fact, 27.1% of maternal mortality cases in years 2003-2009 have been caused by indirect factors [14]. Comparison of the results obtained from this study with other relevant works shows that heart diseases and bleeding are the most important causes of maternal mortality in Iran. The results reveal that in the pre-pregnancy period and while pregnancy, it is very important to care after pregnant mothers with heart diseases and this issue should not be neglected. On the other hand, bleeding has been another main cause of mortality, which has been highly depended on human resource and the medical services supplied for mothers and many cases of mortality can be prevented through promoting this sector. According to the results obtained from this study, Caesarean (43.2%) has possessed most interventions to terminate pregnancy and his could be associated with bleeding and other consequences like maternal mortality, which needs further investigations.

CONCLUSION

In Iran, cardiovascular diseases are the main causes of mortality and have possessed rank 1. According to the findings of this study, the diseases can be also the main causes of mortality in pregnant women. The necessity of implementing preventive plans of cardiovascular diseases and paying more attention to these diseases in pre-pregnancy and in-pregnancy care measures is an important issue. In this study and similar works, bleeding has been diagnosed as an important factor for maternal mortality and this can be caused by weakness of servicing system to manage this factor. Therefore, strengthening health and medical system, especially medical and maternity hospital staff and system of transfer to hospital should be considered. According to the investigations and the instructions in this field, it could be found that the problem is mostly related to the process of implementation and commitment of health and medical system to the instructions, and the effects of this factor can be also adjusted with the effort of authorities of this sector with emphasizing more supervision, explanation and training personnel more than before.

CONFLICT OF INTERESTS

No conflict of interests is reported by the authors in this study.

REFERENCES

[1] Abbasi, Mohammad Jalal, et al. "Revolution, war and modernization: Population policy and fertility change in Iran." *Journal of Population Research* 19.1 (2002): 25-46.

[2] Jamshidpour, Mehrangiz, et al. "Maternal mortality rate and causes in Kermanshah province (2001-2012)." *Journal of Kermanshah University of Medical Sciences (J Kermanshah Univ Med Sci)* 18.7 (2014): 409-415.

[3] World Health Organization. *World health statistics 2010*. World Health Organization, 2010.

[4] Ahmadi, Ali, et al. "Root cause analysis (RCA) of a maternal death in markazi province: A methodological research in clinical epidemiology." *Journal of Health* 5.1 (2014): 18-28.

[5] Storm, Frederikke, et al. "Indirect causes of maternal death." *The Lancet Global Health* 2.10 (2014): e566.

[6] Hasegawa, Junichi, et al. "Recommendations for saving mothers' lives in Japan: Report from the Maternal Death Exploratory Committee (2010-2014)." *Journal of Obstetrics and Gynaecology Research* 42.12 (2016): 1637-1643.

[7] Khan, Khalid S., et al. "WHO analysis of causes of maternal death: A systematic review." *The lancet* 367.9516 (2006): 1066-1074.

[8] Safizadeh, Mansoureh, Batool Damady, and Hossein Safizadeh. "An epidemiologic study of maternal deaths in the population covered by kerman university of medical sciences, 2010-2012." (2015): 114-123.

[9] Eslamlo, H., et al. Epidemiological survey of maternal deaths in West Azerbaijan province. *Urmia medical journal* 17.1 (2006): 9-15.

[10] Montgomery, Ann L., et al. "Maternal mortality in India: causes and healthcare service use based on a nationally representative survey." *PLoS One* 9.1 (2014): e83331.

[11] Creanga, Andreea A., et al. "Pregnancy-related mortality in the United States, 2006–2010." *Obstetrics & Gynecology* 125.1 (2015): 5-12.

[12] Azemikhah, A., et al. "National maternal mortality surveillance system in Iran." *Iran J Public Health* 38.Suppl 1 (2009): 90-92.

[13] Mohammadi, Nia N., et al. "Prevalence and risk factors of maternal mortality in Sistan-Bluchestan province (2002-2009) (Persian)". *The Iranian Journal of Obstetrics, Gynecology and Infertility* 16.44 (2013):28-34.

[14] Say, Lale, et al. "Global causes of maternal death: A WHO systematic analysis." *The Lancet Global Health* 2.6 (2014): e323-e333.