



## Original Research Article

### Causes of maternal and perinatal mortality: A retrospective study

Sara Azima<sup>1\*</sup>, Akram Ashrafizaveh<sup>2</sup>, Saeed Gholamzade<sup>3</sup>, Maasumeh Kaviani<sup>1</sup>,  
Samaneh Mousavi<sup>2</sup> and Hajar Rajaei Bakhshayesh<sup>2</sup>

<sup>1</sup>Department of Midwifery, School of Nursing and Midwifery, Shiraz University of Medical Sciences, Shiraz, Iran

<sup>2</sup>Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran

<sup>3</sup>Legal medicine research center, legal medicine organization, Tehran, Iran

\*Corresponding author

#### A B S T R A C T

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Despite tremendous progress of medical sciences in the field of obstetrics and gynecology, high rate of maternal and perinatal mortality continues to be one of the problems of this profession. This study aimed to investigate the causes of maternal and perinatal mortality. The present study was a retrospective, descriptive research which was conducted on 120 maternal and perinatal mortality cases. The information related to maternal and perinatal mortality was extracted from the records and analyzed using descriptive statistics in the SPSS statistical software. The most prevalent cause of maternal mortality was postpartum complications, such as hemorrhage, and intrapartum complications, such as uterine rupture. Besides, the most common perinatal mortality cause was respiratory distress and before birth asphyxia. The most prevalent reason for cerebral palsy among infants included delayed cesarean section and asphyxia. Precise control during and after labor and careful attention to fetal heart beat can be effective in reduction of maternal and perinatal mortality rates.

#### Introduction

Mothers are the core of families and guarantee other family members' health and success. Thus, their death causes irreparable damage to the family and society (Golyan-Tehrani *et al.*, 2004). It has been estimated that one woman per minute and 1,600 women per day die due to pregnancy complications in the world (De Souza *et al.*, 2002). In this developing world, the maternal mortality rates of several countries are at the extreme; i.e., 1000 women per 100,000

live births. Also, the statistics provided by World Health Organization (WHO) suggested that 25% of maternal deaths; i.e. over 100,000 deaths per year, were caused by postpartum hemorrhage. Postpartum hemorrhage occurs in about 4% of vaginal deliveries, which leads to substantial complications and includes 25% of all childbirth-related maternal deaths (AbouZahr, 1998). In the U.S., maternal mortality rate was about 7-10 women per

100,000 live births and almost 8% of these deaths were due to postpartum hemorrhage (Berg *et al.*, 1996). Maternal death refers to mother's death due to the complications of pregnancy, labor, or puerperium, incorrect treatments and interventions, and negligence (Cunningham *et al.*, 2010; Farrokh-Eslamloo *et al.*, 2006). Maternal Mortality Ratio (MMR) index is used to assess maternal death and is defined as the number of maternal deaths due to reproduction processes per 100,000 live births (Cunningham *et al.*, 2010). According to the United Nations Millennium Development Goals, maternal mortality rate will be reduced by 75% up to 2015 compared to the baseline (1990) (Goodburn and Campbell, 2001). In some countries, about 80% of maternal mortalities can be prevented by activities, such as risk management of prenatal care (Tena-Tamayo and Ahued-Ahued, 2003). Some of the common reasons of mortality are preventive, including septic abortion, uterine rupture, eclampsia, postpartum hemorrhage, sepsis after delivery, and amniotic fluid embolism (Andersson *et al.*, 2000; Kaupova *et al.*, 1998). On the other hand, perinatal mortality is one of the most challenging events for a couple (Wagner *et al.*, 1998). Perinatal mortality may lead to emotional problems during the grief period (Leonard *et al.*, 2000). Perinatal period includes the after-birth period which starts after the 20<sup>th</sup> week of pregnancy and ends 28 complete days after the delivery. Perinatal mortality rate is computed by the number of stillbirth cases plus the number of neonatal deaths per 1000 births (Cunningham *et al.*, 2010). About 38% of all deaths in the children less than 5 years old occur on the 28<sup>th</sup> day and 75% of all neonatal deaths occur within the first 7 days of birth (Lawn *et al.*, 2005; Murray *et al.*, 2007). Maternal mortality index indicates social and economic status of every society in addition to the adequacy of prenatal care

(Hosseini, 2006). In addition, neonatal mortality rate is applied as a standard index for development of health, education, and social care in each country (Yu, 2003). Undoubtedly, the first step in reducing mortality rate is to identify its causes and risk factors (Moss *et al.*, 2002).

## **Subjects and Methods**

This cross-sectional, descriptive, retrospective study investigated 120 cases related to maternal, fetal, and neonatal death referred to Forensic Medical Center and Medical Council of Fars Province, Iran. The study data were collected using a researcher-made questionnaire designed based on these search objectives. The data were extracted from the cases' records. Then, the data were entered into the SPSS statistical software, v. 16 and analyzed using descriptive statistics. This study was performed after obtaining the approval of the Research Vice-chancellor of Shiraz University of Medical Sciences and receiving the ethics code from the Ethics Committee of the University. Declaration of Helsinki was observed at all stages of the research. Besides, in order to observe medical ethics and confidentiality of the cases, the records were studied anonymously.

## **Result and Discussion**

In this study, 120 maternal and perinatal death cases referred to Forensic Medical Center and Medical Council of Fars Province, Iran were examined. Among these cases, 70% were related to fetal and neonatal deaths, 25% were related to maternal deaths, and 5% were maternal and prenatal mortality cases. According to the results, the main cause of maternal deaths was postpartum complications, including postpartum hemorrhage, infection, disseminated intravenous coagulation,

hypertension, postpartum intra-abdominal hemorrhage, and embolism. Also, a high rate of maternal mortalities was related to intrapartum complications, including uterine rupture, placenta previa, damage during cesarean section, bladder rupture, infection, receiving high dose of magnesium sulfate, and in correct intubation during anesthesia, and late pregnancy complications, including bleeding due to mole, fulminant hepatic disorder, fatty liver of pregnancy, unexplained late maternal death, and sudden death (Table 1). The results also demonstrated that the most common cause of fetal death was fetal complications, including prenatal asphyxia and respiratory distress, meconium aspiration, anomaly, preterm labor, intrauterine death, and TORCH syndrome. In addition, late maternal complications included placental abruption, uterine rupture, maternal death, and mother's respiratory tract infection. Besides, puerperal complications were inaccessibility of physicians, lack of preparation of operation rooms, dystocia, and use of forceps. Also, unexplained fetal death was in the next place. Finally, umbilical cord complications, consisting of cervical cord, cord prolapse, and rupture of umbilical cord, were reported as the causes of fetal death (Table 2). According to the results of this study, the most common cause of cerebral palsy among infants was intrapartum complications, including delayed cesarean section, asphyxia, and hypoxia. Unclear cause, cerebral palsy with genetic background, and premature birth were in the next places (Table 3).

Causes of maternal death have been reported in different studies. In this study, the most common cause of maternal death was hemorrhage and then infection and high blood pressure were identified. The study conducted by Mansuri *et al.* (2005) aimed to investigate the causes of maternal mortality

and its effective factors; in this work, the most common cause of death was amniotic fluid embolism and hemorrhage. Hemorrhage, amniotic fluid embolism, eclampsia, infection, and other factors were determined as the cause of maternal death, respectively, which was similar to the results of the present study. In the study by Abdollahipour *et al.* (2011), hemorrhage was the most common cause of maternal death. In Gholami-Taramsari's (2008) work, hemorrhage was the most common cause of maternal death by 41%; similarly, the cross-sectional study of Jamshidpour *et al.* (2014) showed hemorrhage as the most common cause of death by 23.2%. Lack of timely access to specialists, shortage of blood products, and lack of timely referral were among the influential factors. Therefore, quick access to blood products, emergency obstetrics, and urgent referral to equipped specialized centers can be effective for saving lives of mothers and promoting basic health services. In the present study, maximum mortality occurred postpartum. In the study by Khajehian *et al.* (2009), labor- and pregnancy-related factors had maximum share in maternal mortality up to 24 h after delivery by 7.38 and 3.37%, respectively. In the present work, the most important cause of fetal death was prenatal asphyxia and respiratory distress, meconium aspiration, and placenta abruption, which accelerated the death trend of fetuses due to lack of access to physicians, misinterpretation of fetal distress symptoms, and late cesarean section. Sereshtehdari *et al.* (2011) aimed to investigate causes of neonatal mortality and its pertinent factors and found that neonatal mortality causes included respiratory distress syndrome, sepsis and its complications (40%), asphyxia, congenital cardiac abnormalities, and other causes, which were similar to the results of the present study. Holmboe *et al.* (2001) reported that many unfavorable events were related to

the misinterpretation of fetal distress symptoms and excessively delayed cesarean section, which was similar to the results of the present study. In the cross sectional-descriptive study by Mohaghighi *et al.* (2013), sepsis by 78%, staining with amniotic fluid, and low birth weight were the most common factors accompanying mortality rate of infants, respectively. The study conducted by Zamani *et al.* (2013) with the aim of determining the frequency causes of perinatal mortality during one year was conducted on 55 cases of fetal and neonatal mortality cases from the 22<sup>nd</sup> week of pregnancy until 28 days after the birth. Findings showed that the most common causes of perinatal mortality were prematurity, respiratory distress syndrome, intrauterine fetal death (IUFD), and chromosomal abnormalities. In another investigation, labor records of more than 5 cases, pregnancy records of more than 5 cases, lack of prenatal care, education degree of under high school diploma, twin or multiple pregnancy, congenital anomalies in infants, and Apgar values of below 4 on the first and fifth minutes were accompanied by increased mortality risk (Shirvani and Khosroshahi, 1998). Rezaeian *et al.* (2013) found that some maternal (such as chronic

diseases and history of drug use) and neonatal (neonatal manifestations like crying, breathing, cyanosis, etc. along with records of rehabilitation, hydrops, and ascites) factors can influence mortality of preterm infants. Considering these factors can be effective to identify the infants at the risk of mortality and provide mortality reducing factors. In another study, neonatal mortality increased by 5.7 times in the group of pregnant mothers inflicted with hypertensive (Fallahian and Emadolsadaty, 2001). However, in another work, maternal preeclampsia was reported to have a preventive effect on death of very low birth weight infants (Bacaket *al.*, 2005). Terzik *et al.* (2012) determined gestational age, birth weight, Apgar score, respiratory distress syndrome, and hemodynamic stability during birth as the influential factors of mortality in premature infants. In the present study, one of the mortality causes was fetal anomaly, which was similar to another study that considered congenital anomalies among the top causes of death in premature infants (Chanvitan *et al.* 2010). Limitations of this study were in the existence of some incomplete cases with the information which was not applicable.

**Table.1** Etiology of maternal death

	frequency	percent
Complications of postpartum	24	66/7
Complications during Delivery	6	16/8
Complications during pragnancy	3	8/4
unknown	2	5/6
Sudden death	1	2/8
sum	36	100

**Table.2** Etiology of fetal and neonatal death

	frequency	percent
Fetal complications	41	46/5
Maternal complications	20	22/8
Delivery complications	11	12/4
Cord complications	7	7/9
unknown	9	10/2
sum	88	100

**Table.3** Etiology of neonatal cerebral palsy

	frequency	percent
Complications During Delivery	21	63/7
Genetic	3	9/1
Preterm labor	1	3
Unknown	8	24/2
Sum	33	100

According to the results of this study, it seems that solutions such as equipping hospitals of small cities, providing adequate blood, training midwives and residents for timely informing specialists and attendants responsible for the ward, taking measures for the presence of specialists at night shifts, and very precise postpartum control will result in the reduction of mortality cases and complications due to the critical nature of this stage. By knowing the effective factors for perinatal mortality and increasing awareness level of pregnant women in terms of considering the importance of healthcare during pregnancy, the number of such death can be considerably reduced.

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