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**Dr. Surrender Mehta**  
Department of Forensic  
Medicine, Forensic Medicine  
and Toxicology Department,  
Patiala, Punjab, India

## Assessment of reasons of maternal deaths: An autopsy study

**Dr. Surrender Mehta**

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### Abstract

**Background:** The distinction between maternal death in pregnancy and pregnancy-related maternal death is not always easy. The present study was conducted to determine reasons of maternal deaths.

**Materials & Methods:** The present study was conducted in the department of forensic Medicine. It included 34 pregnancy related deaths. Demographic profile and histopathological findings were recorded. Reasons of deaths were recorded.

**Results:** Age group 16-20 years had 8 cases, 20-24 years had 10 cases, 24-28 years had 6 cases, 28-32 years had 4 cases and age >32 years had 6 cases. The difference was significant ( $P < 0.05$ ). Reasons for deaths was direct gestational in 21, indirect gestational in 8 and non-gestational in 5 cases.

**Conclusion:** Authors found that reasons for deaths was direct gestational, indirect gestational and non-gestational.

**Keywords:** Gestational, pregnancy, multiple trauma

### Introduction

Maternal deaths in pregnancy, in particular pregnancy related maternal deaths, are rare in the Western world <sup>[1]</sup>. According to the World Health Organization (WHO), 2008 MMR (maternal mortality ratio, maternal deaths per 100,000 live births per year) as a measurement of the quality of medical care for pregnant women was approximately 14 for Western industrial nations, which translates as approximately 1,700 deaths of pregnant women in 2008. Thus, of the world's 358,000 maternal deaths during pregnancy in 2008, approximately 99% occur in so-called "developing" countries. For the Federal Republic of Germany, the estimated MMR in 2008 was 7 (49 maternal deaths) <sup>[2]</sup>.

The distinction between maternal death in pregnancy and pregnancy-related maternal death is not always easy. If maternal death occurs during or within 42 days after the termination of pregnancy, the criterion of "gestational death" is met. However, actual "maternal deaths during pregnancy" are only those deaths that can be traced back directly to gestational circumstances, and non-natural causes of death of pregnant women are not counted among them. Maintenance of data on maternal deaths is crucial to the implementation of maternal health programs in the country <sup>[3]</sup>. Information provided by medical autopsies has played an important role in increasing the accuracy of cause-of-death reports and improving clinical practice in the developed world. We carried out this study to understand the magnitude of maternal mortality in this region and also to know the cause of death and to find out preventive factor <sup>[4]</sup>. The present study was conducted to determine reasons of maternal deaths.

### Material & Methods

The present study was conducted in the department of forensic Medicine. It included 34 pregnancy related deaths reported in our department. Ethical clearance was obtained before starting the study. General information such as gender, age, demographic profile and histopathological findings were recorded. Reasons of deaths were recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

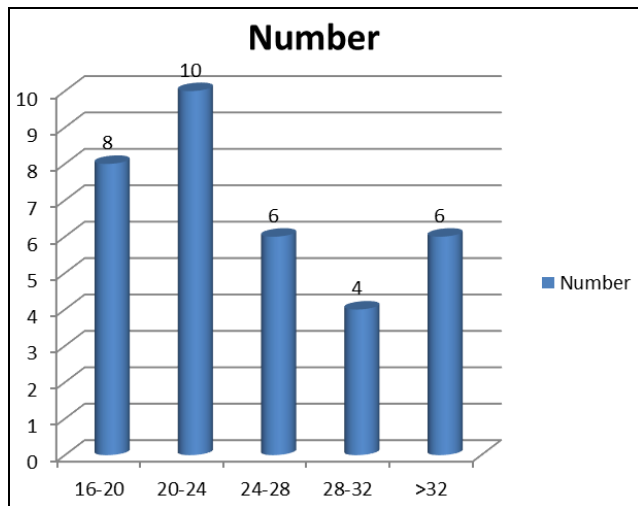
### Results

**Corresponding Author:**  
**Dr. Surrender Mehta**  
Department of Forensic  
Medicine, Forensic Medicine  
and Toxicology Department,  
Patiala, Punjab, India

**Table I:** Age wise distribution

Age group (years)	Number	P value
16-20	8	0.01
20-24	10	
24-28	6	
28-32	4	
>32	6	

Table I, group I shows that age group 16-20 years had 8 cases, 20-24 years had 10 cases, 24-28 years had 6 cases, 28-32 years had 4 cases and age >32 years had 6 cases. The difference was significant (P<0.05).

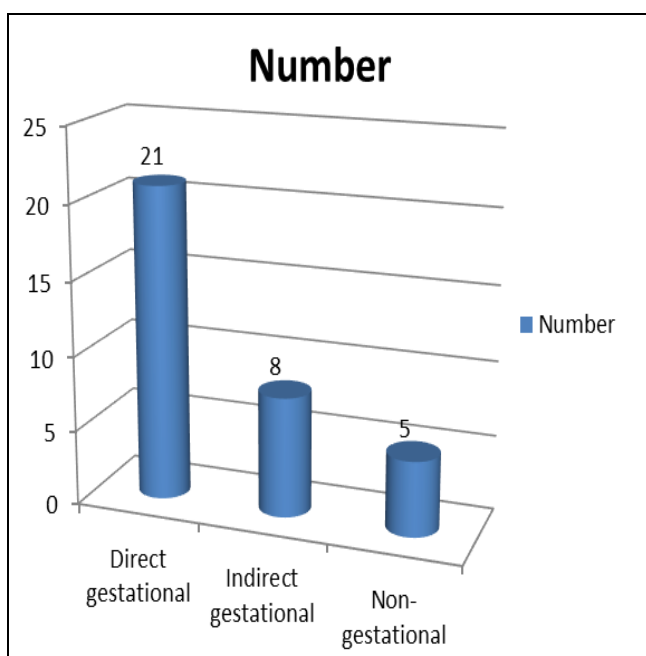


**Graph I:** Age wise distribution

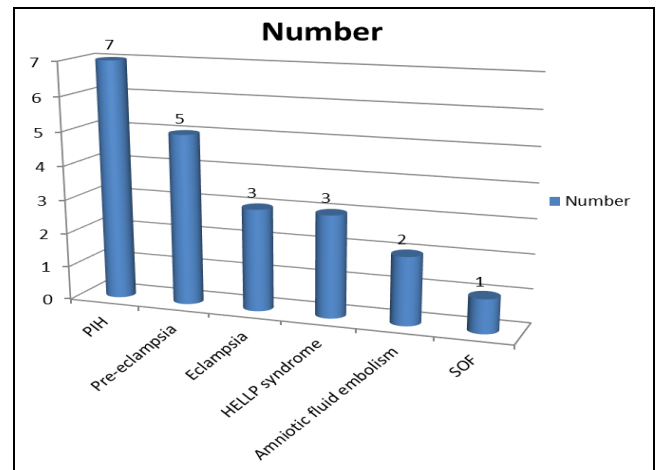
**Table II:** Reasons of deaths

Reasons	Number	P value
Direct gestational	21	0.01
Indirect gestational	8	
Non- gestational	5	

Table II, graph II shows that reasons for deaths was direct gestational in 21, indirect gestational in 8 and non-gestational in 5 cases.

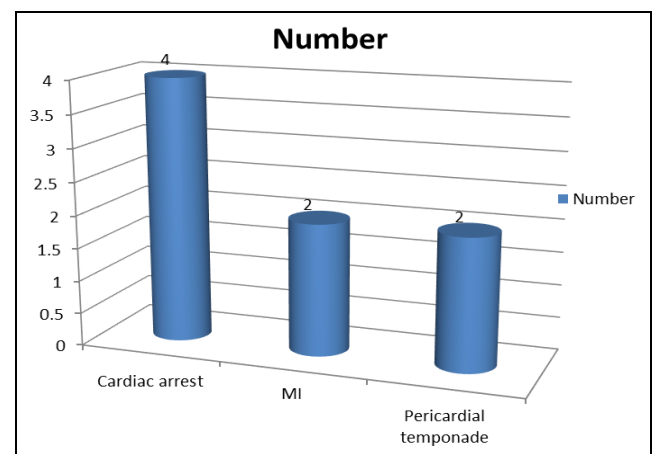


**Graph II:** Reasons of deaths



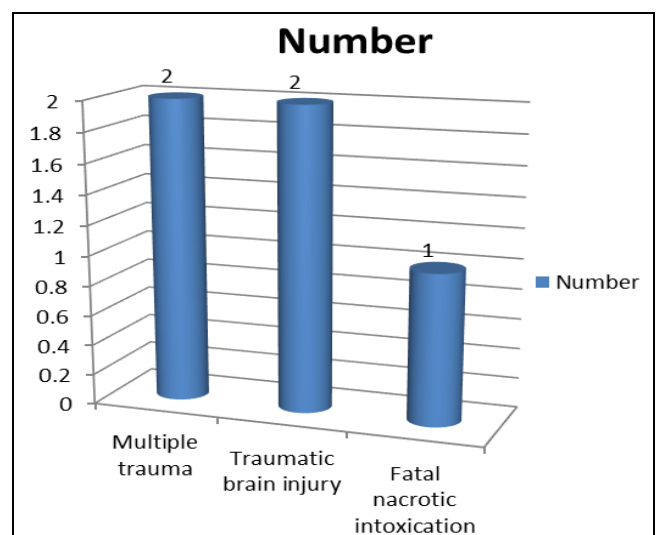
**Graph III:** Direct gestational causes

Graph III shows that most common direct gestational causes were pregnancy induced hypertension seen in 7 followed by pre-eclampsia in 5, amniotic fluid embolism in 2, eclampsia in 3, HELLP syndrome in 3 and septic organ failure in 1. The difference was significant (P<0.05).



**Graph IV:** Indirect gestational causes

Graph IV shows indirect gestational causes were as cardiac arrest seen in 4, myocardial infarction in 2 and pericardial tamponade due to ruptured aortic aneurysm in 2. The difference was significant (P<0.05).



**Graph V:** Non-gestational cause

Graph V shows that non gestational causes were multiple trauma in 2 cases, traumatic brain injury in 2 and fatal narcotic intoxication in 1.

### Discussion

According to the World Health Organization, 55% of maternal deaths occur in Asia, 40% occur in Africa, and only 1% occurs in developed countries. Actual "maternal deaths during pregnancy" are only those deaths that can be traced back directly to gestational circumstances, and non-natural causes of death of pregnant women (i.e., accidents, suicides or other, non-pregnancy-associated fatal events) are not counted among them. Furthermore, "maternal deaths" can again be divided into two subcategories: "direct gestational deaths" are causally due to complications of gestation (pregnancy, delivery and postpartum) or by gestation related medical interventions, omissions and improper handling, (i.e., fatal gestational hypertension or fatal delivery complications) [5]. "Indirect gestational deaths" are caused by pre-existing cardiovascular diseases of non-obstetric origin which decompensate due to the physiological effects of pregnancy, birth and postpartum; the heart rate increases by 10-30 bpm, and the cardiac output up to the 32nd week of gestation by 30-50%; there is vasodilatation, an increased coagulation tendency, an increase of serum lipids and a reversible increase of the size of the heart of up to 30%. Systolic blood pressure drops toward the middle of pregnancy and returns toward baseline at the end of pregnancy. Maternal oxygen consumption increases up to threefold during vaginal delivery, and systolic pressure spikes up to 200 mmHg are possible factors [6].

In present study, We found that age group 16-20 years had 8 cases, 20-24 years had 10 cases, 24-28 years had 6 cases, 28-32 years had 4 cases and age >32 years had 6 cases. This is similar to Robertson *et al.* [7]

We found that reasons for deaths was direct gestational in 21, indirect gestational in 8 and non-gestational in 5 cases. PIH may manifest itself in various degrees of severity; in the 9 pregnancy-related deaths, PIH was diagnosed in 5 cases (55.6%) [8]. It was the direct cause of death three times and was diagnosed as a secondary finding twice. One case presented a fulminant HELLP (hemolysis, elevated liver enzymes, low platelets) syndrome and in the four other cases, preliminary stages of PIH (pre-eclampsia/eclampsia) were diagnosed. In all five cases macroscopic autopsy findings yielded no distinct cause of death, and the final diagnosis of the cause of death was based on the results of histological examinations [9].

We observed that most common direct gestational causes were pregnancy induced hypertension seen in 7 followed by pre-eclampsia in 5, amniotic fluid embolism in 2, eclampsia in 3, HELLP syndrome in 3 and septic organ failure in 1. Indirect gestational causes were cardiac arrest seen in 4, myocardial infarction in 2 and pericardial tamponade due to ruptured aortic aneurysm in 2.

Non gestational causes were multiple trauma in 2 cases, traumatic brain injury in 2 and fatal narcotic intoxication in 1.

Prahlow *et al.* [10] found that in their study found that eight (61.5%) women died in-hospital, four (30.8%) at home, and one woman died in public. Three cases (23.1%) were "non-gestational deaths," and one case (7.7%) remained unclear nine cases, six cases (46.5%) were "direct gestational

deaths," and two cases (15.4%) were "indirect gestational deaths." One case (7.7%) was not to be defined as "late maternal death," but the cause of death seemed to be directly related to previous gestation "very late maternal death."

### Conclusion

Authors found that reasons for deaths was direct gestational, indirect gestational and non-gestational.

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