

# The effect of life threatening conditions of women on perinatal outcome

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## Abstract

**Introduction:** The aim of this study is to evaluate the differences in perinatal - neonatal -postneonatal deaths according to the life threatening conditions of women.

**Material and Methods:** A retrospective study was made of records of 14.968 pregnancies. Antenatal, neonatal, postneonatal deaths were recorded. Causes of perinatal-neonatal- postneonatal deaths were examined in accordance with the Tulip classification. Maternal deaths and maternal near-miss cases were detected according to the World Health Organization/International Classification of Diseases -10 definitions.

**Results:** Women had life threatening conditions in 60 of 583 perinatal-neonatal-postneonatal deaths. Frequencies of still birth, perinatal deaths, neonatal deaths and post neonatal deaths in women with life threatening

conditions were 14.6%, 22.3%, 8% and 0.38%, respectively, whereas in women without life threatening conditions were 1.68%, 3.1%, 1.7%, 0.16%. There was a significant difference between women with and without life threatening conditions in respect to the parity ( $p: 0.009$ ), the presence of a bad obstetric history ( $p: 0.014$ ), the presence of a systemic disease ( $p: 0.001$ ), the number of fetuses in utero ( $p: 0.024$ ), the types of delivery ( $p: 0.000$ ), premature birth ( $p: 0.028$ ), causes of deaths ( $p: 0.000$ ), and the presence of asphyxia ( $p: 0.001$ ).

**Conclusions:** Measures to be taken in preventing severe maternal complications will also reduce adverse perinatal and neonatal outcomes.

**Key words:** maternal mortality; maternal near-miss; neonatal mortality; perinatal outcome

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## Introduction

It is considered that there is about an equal number of neonatal deaths and still births in the world<sup>1</sup>. Still birth rates in developed countries range from 3 to 5 per 1,000, though in developing countries the rate is 5 to 10 times<sup>2</sup> more. Almost 75% of neonatal deaths occur in the first week of life<sup>1</sup>. The neonatal mortality rate in Sub-Saharan Africa (44/1,000) is

four times the rate in Europe and America<sup>1,3</sup>. The ratio of perinatal mortality in developing countries is 61/1,000 while in developed countries is 10/1,000<sup>4</sup>. Ratios of the intrapartum mortality range from 7 to 9 per 1,000 globally. It constitutes 10% of still births in developed countries<sup>2,5,6</sup>.

Maternal near-miss is defined as a woman who nearly died but eventually survived a complication

that occurred during pregnancy, child birth or within 42 days after termination of pregnancy<sup>7</sup>. Maternal complications have been associated with an increased risk of adverse fetal and neonatal outcomes<sup>4, 8, 9</sup>. There are few data on adverse perinatal and neonatal outcomes among women with near-miss<sup>7, 10, 11, 12, 13, 14, 15</sup>. Although these studies detected the risk factors for adverse perinatal outcomes in women with and without near-miss, none of them evaluated the differences in cases with adverse perinatal outcomes in accordance with the near-miss.

As we know, the present article is the first one that evaluated the differences in fetal - neonatal - postneonatal deaths according to the life threatening conditions (LTC; maternal deaths and maternal near-miss cases) of women.

### Materials and Methods

A retrospective study on records of 14,968 pregnancies was conducted. Fetuses and neonates who died after 20 weeks of pregnancy (birth weight  $\geq$  500 gram) and those who died within the first year of birth were determined. Cases were analyzed according to definitions which have been adopted by the World Health Assembly (resolutions WHA20.19 and WHA43.24) under Article 23 of the Constitution of the World Health Organization. Perinatal-neonatal-postneonatal mortalities were examined in accordance with the Tulip classification. Maternal deaths and maternal near-miss cases were examined in respect of World Health Organization/International Classification of Diseases-10 (WHO/ICD-10) definition. The flow chart recommended by Say et al. was used in the analysis of maternal near-miss cases<sup>7</sup>.

Statistical Package of the Social Sciences (SPSS) 17.0 software (SPSS Inc., Chicago, USA) was used for the statistical analysis. Data were expressed as  $n$  (%) and mean with standard deviation. Quantitative variables were tested for normal distribution (by Kolmogorov-Smirnov Test) and homogeneity (by One-Way Anova Test). For those variables not distributed normally, two groups were compared with Mann-Whitney U Test. Chi-square test for independence was

used for the analysis of categorical variables. A  $p$  value  $< 0.05$  was regarded as significant.

This study was approved by the institutional ethics committee of the Istanbul University, Cerrahpaşa School of Medicine. It complies with the World Medical Association Declaration of Helsinki regarding ethical conduct of research involving human subjects.

### Results

The overall multiple pregnancy ratio was 3.63% (544/14,968) (3.35% twins, 0.26% triplets, and 0.02% quadruplets). 15,271 of 15,557 infants were born alive. Of live-born infants 14,424 were singletons, 993 were twins, 117 were triplets and 12 were quadruplets. The number of pregnancies resulted in at least one live-born infant was 14,682.

Women had LTC in 60 of 583 perinatal - neonatal - postneonatal deaths. These cases constituted 23% (60/260) of all women with LTC 9 of 260 cases resulted in maternal deaths, while 251 were maternal near-miss cases. Frequencies of still birth, perinatal deaths, neonatal deaths and postneonatal deaths in women with LTC were 14.6%, 22.3%, 8% and 0.38%, respectively, whereas in women without LTC were 1.68%, 3.1%, 1.7%, 0.16%.

Ratios of antenatal and perinatal mortality were 18.72/1,000 and 34.57/1,000, respectively. Rates of neonatal, early neonatal, late neonatal, postneonatal and infant mortality were, respectively as follows: 17.8/1,000, 15.84/1,000, 1.96/1,000, 1.63/1,000, 38.17/1,000. The mortality ratio during birth was 1.76/1,000.

Women with LTC constituted 10.3% of all cases, 13.5% of antenatal deaths, 11.1% of intrapartum deaths, 8.3% of early neonatal deaths, 3.3% of late neonatal deaths and 4% of postneonatal deaths. In those women hypertensive disorders of pregnancy constituted 65% and obstetric hemorrhage 21.7% of cases. Of cases, 10% were indirectly related to obstetric reasons, 1.7% were due to unexpected complications of pregnancy (magnesium toxicosis) and 1.7% were associated with an accident (one with a flame burn). Ratios of antenatal and perina-

**Table 1: The characteristics of cases according to the life threatening conditions of mothers**

Parameters	Total (n: 583)	With LTC (n: 60)	Without LTC (n: 523)
<b>Maternal age (year)</b>	28.36 ± 5.7	28.8 ± 5.6	28.3 ± 5.7
<b>Gravida (n)</b>	2.47 (1-10)	3.2 (1-9)	2.3 (1-10)
<b>Primigravid (%)</b>	38.8	30	39.8
<b>Multigravid (%)</b>	54.2	56.7	53.9
<b>Grandmultigravid (%)</b>	7	13.3	6.3
<b>Parity (n) *</b>	1.04 (0-7)	1.6 (0-5)	0.98 (0-7)
<b>Nulliparous (%)</b>	46.3	36.7	47.4
<b>Primiparous (%)</b>	25.6	16.7	26.6
<b>Multiparous (%)</b>	26.1	43.3	24.1
<b>Grandmultiparous (%)</b>	2.1	3.3	1.9
<b>Bad obstetric history (+) (%)*</b>	28.1	41.7	26.6
<b>Systemic disease (+) (%)*</b>	19.4	35	17.6
<b>Chronic hypertension (%)*</b>	6.7	15	5.7
<b>Diabetes mellitus (%)</b>	3.8	5	3.6
<b>Renal disease (%)</b>	1.4	1.7	1.3
<b>Anemia (%)</b>	2.9	6.7	2.5
<b>Type of conception</b>			
<b>Spontaneous (%)</b>	95.9	96.7	95.8
<b>ART (%)</b>	4.1	3.3	4.2
<b>Antenatal care (+) (%)</b>	59.2	50	60.2
<b>Smoking (+) (%)</b>	6.3	5	6.5
<b>Number of fetus in uterus (%)*</b>			
<b>Singleton (%)</b>	90.1	98.3	89.1
<b>Multiple (%)</b>	9.9	1.7	10.9
<b>Fetal gender</b>			
<b>Male (%)</b>	58.1	60	58.1
<b>Female (%)</b>	41.7	40	41.9
<b>Gestational age (week)</b>	30.9 ± 4.9	30.6 ± 4.06	30.9 ± 5
<b>20-28 (%)</b>	29.8	25	30.4
<b>28-31 (%)</b>	21.1	23.3	20.8
<b>31-34 (%)</b>	17.3	26.7	16.3
<b>34-37 (%)</b>	12.9	16.7	12.4
<b>37-42 (%)</b>	17.8	8.3	18.9
<b>≥42 (%)</b>	1	-	1.1
<b>Premature birth (week) (+) (%)*</b>	81.1	91.7	79.9
<b>Birth weight (gr)</b>	1,550 ± 943	1,457 ± 825	1,561 ± 956
<b>&lt; 1,000(%)</b>	37.7	38.3	37.7
<b>1,000-1,499 (%)</b>	20.9	25	20.5
<b>1,500-2,499 (%)</b>	24	23.3	24.1
<b>2,500-4,000 (%)</b>	16	11.7	16.4
<b>&gt; 4,000 (%)</b>	1.4	1.7	1.3
<b>Percentile</b>			
<b>SGA (below 10<sup>th</sup>) (%)</b>	32.1	33.3	31.9
<b>AGA (%)</b>	56.8	56.7	56.8
<b>LGA (upper 90<sup>th</sup>) (%)</b>	11.1	10	11.3
<b>Types of delivery *</b>			
<b>Vaginal (%)</b>	58.8	25	62.7
<b>Cesarean section (%)</b>	41.2	75	37.3
<b>Presence of asphyxia (%) *</b>	51.6	71.7	49.3
<b>Length of stay in hospital (day)</b>	6.37 (0-120)	4.09 (0-44)	6.5 (0-120)

\* p: &lt; 0.05

**Table 2: Periods and causes of deaths according to the life threatening conditions of mothers**

Parameters	Total (n: 583) (%)	With LTC (n: 60) (%)	Without LTC (n: 523) (%)
<b>Cause of death *</b>			
Congenital anomalies	19.7	5	21.4
Plasental factors	50.1	86.7	45.9
Infection	0.3	1.7	0.2
Prematurity	17.2	1.7	18.9
Other factors	5.1	5	5.2
Unsuufficient data	7.5	-	8.4
<b>Period of death</b>			
Antenatal	44.4	58.3	42.8
Intrapartum	4.6	5	4.6
Early neonatal	41.5	33.3	42.4
Late neonatal	5.1	1.7	5.5
Postneonatal	4.3	1.7	4.6

\*  $p < 0.05$ **Table 3: The causes of deaths in different periods according to the life threatening conditions of mothers**

Causes of deaths	Antenatal (44.4%)		Intrapartum (4.6%)		Early neonatal (41.5%)		Late neonatal (5.1%)		Postneonatal (4.3%)	
	LTC (-) (%)	LTC (+) (%)	LTC (-) (%)	LTC (+) (%)	LTC (-) (%)	LTC (+) (%)	LTC (-) (%)	LTC (+) (%)	LTC (-) (%)	LTC (+) (%)
Congenital anomalies	5.4	-	20.8	-	32.4	10	24.1	-	66.7	100
Plasental factors	71	91.4	54.2	100	26.1	80	20.7	100	16.7	-
Infection	-	-	-	-	0.5	5	-	-	-	-
Prematurity	0.9	-	20.8	-	32.4	5	55.2	-	16.7	-
Other factors	4	8.6	4.2	-	7.7	-	-	-	-	-
Unsuufficient data	18.8	-	-	-	0.9	-	-	-	-	-

**Table 4: Hypertensive diseases of pregnancy according to the life threatening conditions of mothers**

Parameters	Total (n:583) (%)	With LTC (n:60) (%)	Without LTC (n:523) (%)
<b>Hypertensive diseases of pregnancy *</b>			
Gestational hypertension	4.3	3.3	4.4
Chronic hypertension	2.4	3.3	2.3
Preeclampsia	18	48.3	14.5
Superimposed preeclampsia	4.3	11.7	3.4
<b>Complications of hypertension *</b>			
Eclampsia	2.7	16.7	1.1
HELLP syndrome	5.1	30	2.3

\*  $p < 0.05$

tal mortality were 165.9/1,000 and 255.6/1,000, respectively. Rates of neonatal, early neonatal, late neonatal, postneonatal and infant mortality were, respectively as follows: 94.1/1,000, 89.6/1,000, 4.48/1,000, 4.48/1,000, 98.6/1,000. In women with LTC antenatal mortality ratio increased 8.5-fold, perinatal mortality ratio increased 7.1-fold, neonatal mortality rate increased 5-fold, early neonatal mortality rate increased 5.4-fold, late neonatal mortality rate increased 2-fold, postneonatal mortality rate increased 2.6-fold and infant mortality rate increased 4.8-fold.

Table 1 shows characteristics of cases according to the LTC of mothers. Table 2 shows causes and periods of deaths according to the LTC of mothers. There was not a significant difference between women with and without LTC in respect of to the maternal age ( $p: 0.9$ ), gravidity ( $p: 0.07$ ), the presence of an antenatal care ( $p: 0.127$ ), smoking ( $p: 0.651$ ), type of conception ( $p: 0.747$ ), fetus gender ( $p: 0.78$ ), gestational age at birth ( $p: 0.114$ ), birth weight of the fetus ( $p: 0.851$ ), birth percentile of the fetus ( $p: 0.945$ ), length of fetal hospitalization ( $p: 0.284$ ) and period of death ( $p: 0.155$ ). A significant difference was detected in respect of the parity ( $p: 0.009$ ), the presence of a bad obstetric history ( $p: 0.014$ ), the presence of a systemic disease ( $p: 0.001$ ), the presence of hypertensive diseases of pregnancy ( $p: 0.000$ ), number of fetus in uterus ( $p: 0.024$ ), types of delivery ( $p: 0.000$ ), premature birth ( $p: 0.028$ ), causes of deaths ( $p: 0.000$ ) and the presence of asphyxia ( $p: 0.001$ ).

Nulliparity and multiple gestations were more common in women without LTC, whereas multiparity and singleton gestations were in other group. Systemic diseases (especially the chronic hypertension) and bad obstetric history were more common in women with LTC. Percentage of caesarean births to total births was higher in this group as it was expected. Although placental factors were the most common causes of deaths in women without LTC, proportion of congenital anomalies and prematurity were higher than those of women with LTC. Table 3 shows causes of deaths in different periods according to the LTC of mothers. Percentage of placental

risk factors in cases with LTC was higher in all periods of deaths except postneonatal period than those in without LTC. As a clinical result asphyxia was also more commonly seen in women with LTC. Table 4 shows hypertensive diseases of pregnancy and its complications according to the LTC of mothers. They were all significantly higher in women with LTC.

## Discussion

Although the rates of still birth, perinatal mortality and neonatal mortality were lower than global rates, they were higher than those of developed countries. This was an expected situation because our clinic serves as a referral center for high-risk pregnancies.

The frequencies of stillbirths (14.6%), perinatal deaths (22.3%) and neonatal deaths (8%) were significantly higher among women with LTC, which were consistent with the preliminary results (3.6 - 19.5% for stillbirths; 6.7% - 29.2% for perinatal deaths; 3.2% - 7.7% for neonatal births)<sup>10, 11, 12, 14, 15</sup>. The frequency of postneonatal deaths (0.38%) was also higher among women with LTC as interpreted by Filippi et al.<sup>13</sup>. However, there were some differences between two studies. Their study was a prospective cohort which included babies after discharge, whereas our study is a retrospective one including babies with previous health problems. So we didn't know the outcomes of healthy babies after discharge.

Some authors concluded that there were increased incidences of premature birth and low birth weight in maternal near-miss cases<sup>11, 12, 14, 16</sup>. The current study enrolled only fetal - neonatal - postneonatal deaths and investigated the effects of LTC on those cases. In this group of cases LTC had no significant effect either on birth weight or on birth percentile. However, in concordance with the studies mentioned above, premature birth was significantly higher in cases with LTC. It was probably due to the iatrogenic deliveries for maternal and also fetal reasons caused by similar pathophysiological processes leading to development of abnormalities. Caesarian delivery was the main route of pregnancy termination for cases with LTC, with a frequency of 75%.

In this study, the Tulip classification investigating the pathophysiology that leads to death was used. Unlike other studies, asphyxia wasn't regarded as the leading cause of perinatal mortality but considered as a clinical condition occurring at the end of the process triggering mortality<sup>17</sup>. However, whatever the underlying pathophysiology, all patients were also evaluated in term of asphyxia. Babies of women with LTC had comparably higher proportion of asphyxia (71.7% vs 49.3%  $p: 0.001$ ) which even higher than that found by Adeoye et al. (22.2% vs 6.0%  $p < 0.001$ )<sup>16</sup>. Because this study included only fatal cases, it was not surprising to detect higher ratios of asphyxia in both groups. Although placental factors were the most common causes of deaths in both groups, their incidences were significantly higher in cases with LTC. Pathologies related to placenta (hypertensive diseases of pregnancy (65%), obstetric hemorrhages (21.7) etc.) were the leading causes of LTC.

The protective effect of antenatal care on maternal near-miss cases has been well known<sup>14,16</sup>. This study showed that the absence of an antenatal care continuous to be an important problem in our region. Though antenatal care wasn't significantly different between groups, the absence of antenatal care was more prominent in ones with LCT (50%).

As a retrospective one, this study was limited by the medical records of patients. Because healthy babies were not followed up after discharge, postneonatal deaths might be underestimated.

## Conclusions

Adverse perinatal and neonatal outcomes increase in women whose lives are at risk. Measures to be taken in preventing severe maternal complications will also reduce adverse perinatal and neonatal outcomes. ■

## Conflict of interest

The author declares no conflict of interest.

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