

Maternal Mortality Rate in a Referral Center in Turkey; 1996-2001

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OBJECTIVE: To review the rate and causes of maternal mortality in a referral center.

STUDY DESIGN: A retrospective analysis was carried out on hospital records and patient files between 01.01.1996-31.12.2001. Patient files were reviewed for obstetric history and causes of death.

RESULTS: During the studied five years 124200 births and 44 maternal deaths occurred with a maternal mortality rate of 35.4/100000 live births. The most common causes of maternal mortality was pregnancy aggravated chronic hypertension, cardiac and pulmonary diseases (n=9, 20.4%) followed by preeclampsia, eclampsia and HELLP syndrome (n=8, 18%) and hemorrhage (n=8, 18%). Other causes were sepsis (n=6, 13.6%), cesarean section and anaesthesia related complications (n=4, 9%), amniotic fluid embolism (n=3, 7%), traffic accident (n=2, 4.5%), rupture of intracranial aneurysm (n=1, 2.2%), necrotizing pancreatitis (n=1, 2.2%). Twenty-four patients (54.5%) did not have antenatal care. Seven of the hemorrhage cases (87.5%) were delivered at home, could not admit to the hospital on time due to transportation problems or referred to our center at irreversible stages of hemorrhage.

CONCLUSION: Chronic hypertension, hemorrhage, cardiac and pulmonary diseases, which are the most common causes of maternal mortality, could be prevented with appropriate antenatal consultation and care.

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Key Words: Maternal mortality rate and Cause.

Maternal death has been regarded as a public health event and as an indicator of the quality of health services. Analysis of World Health Organisation (WHO) revealed that more than 500000 women die every year from causes related to pregnancy and childbirth.¹ A more striking data is that over 99% of all maternal deaths occur in developing countries.² Women in developing countries, experience 100 to 200 times higher maternal mortality than women in Europe or North America.³

During the last 15 years, maternal and child health has improved dramatically in Turkey.⁴ In Turkey, a more than 75% reduction in the maternal mortality ratio (MMR) was maintained in the last quarter of 20th century. During 1974-1975, MMR in Turkey was estimated to be 208 in 100000 live birth while it was 119 in Ankara. In 1981 the MMR was estimated to be 132 using Sisterhood Method.⁵ The maternal mortality rate decreased from 132/100000 live births in 1981 to 100/100000 in 1995. During the last 5 years, the proportion of women receiving prenatal care has increased from 43% to 63%.⁴ In a more recent study in 1996, analysis of 656446 birth revealed a MMR of 49.2 per 100000 live births.⁶

The infant mortality rate in the 1960s was approximately 200 per thousand, declining to 67 per thousand during the 1985-1990 period, and 53 per thousand for the period 1988-1993. It was 48 per thousand in 1995 and 42.2 per thousand in 1996, according to the State Planning organisation. The infant mortality rate has declined by 35 percent in the last ten years. The proportion of safe deliveries was 76 percent. Thirty-nine percent of all deliveries occur at home. The important point is that the proportion of unsafe deliveries assisted by traditional birth attendants is 24 percent. The total fertility rate has decreased from 200/1000 in the 1960s to 67/1000 in 1985-1990 and 42.2/1000 in 1996.⁴

In this study we aimed to review the rate and causes of the maternal mortality in a referral center.

Material and Methods

Hospital records and patient files were reviewed retrospectively between 01.01.1996-31.12.2001. Maternal deaths were defined as those deaths that occurred during a pregnancy or within 42 days of the end of a pregnancy.⁷

All maternal deaths that occurred in SSK Ankara Maternity and Women's Health Teaching Hospital or in other centers after referral from this hospital were included. Also, maternal deaths after direct admission to SSK General Hospital were included as this hospital also serves to the same patient population.

Patient files were reviewed for obstetrics history and cause of death. The deaths were classified as "direct obstetric causes" if they result due to ectopic pregnancy, pulmonary embolism, abruptio placentae, HELLP (hemolysis elevated liver enzymes and low platelets) syndrome, puerperal complication like sepsis, pulmonary thromboembolism, adult res-

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Table 1. The numbers and ratios of maternal deaths per 100000 live births by classification and year

Classification	1996	1997	1998	1999	2000	2001
Direct obstetric causes	5	5	7	6	5	3
Indirect obstetric causes	2	1	3	1	1	1
Non-obstetric or unknown causes	1	2	-	-	-	1
Total	8	8	10	7	6	5
Maternal Mortality Ratio	41	41	47	33	27	20

piratory distress syndrome (ARDS) or anaesthesia complications after cesarean delivery. Indirect obstetric causes of death were, systemic diseases that were aggravated by pregnancy and rupture of an intracranial aneurysm. Non-obstetric causes were traffic accidents.

All causes were diagnosed due to clinical data and no autopsy permission could be obtained. Most possibly due to this, cause of death could not be identified in two cases.

Maternal mortality rate (MMR) was calculated as maternal death in 100000 live births.

Results

During the study period 124200 live births and 44 maternal deaths were identified. The numbers and ratios of maternal deaths per 100000 live births by classification and year are presented in Table I. The MMR declined from 41 to 20 during the study period. This is probably due to the increased proportion of women receiving antenatal care during this period.

The most common causes of maternal mortality were pregnancy aggravated chronic systemic diseases (chronic hypertension, cardiac and pulmonary diseases) (n=9; 20.4%). Second most common cause of the maternal mortality were preeclampsia, eclampsia and HELLP syndrome (n=8; 18%) and hemorrhage (n=8; 18%). The causes of hemorrhage was ectopic pregnancy in one case, postpartum hemorrhage in two cases and abruptio placenta in five cases. Seven of the hemorrhage cases (87.5%) were delivered at home, could not reach at the hospital on time due to transportation problems or referred to our center at irreversible stages of hemorrhage. Of the seventeen cases with pregnancy aggravated medical problems, preeclampsia, eclampsia and HELLP syndrome eleven cases (64.7%) did not have any antenatal care.

Less common cause of maternal mortality was sepsis (n=6; 13.6%). Four of the cases who had sepsis (66.6%) had delivered at home or had aborted outside the hospital. Other causes of the maternal mortality were cesarean section related (n= 2) (postoperative pulmonary thromboembolism) or anaesthesia related complications (n=2) (cardiac arrest, adult respiratory distress syndrome) in four cases (9%), amniotic fluid embolism (n=2; 4.5%), traffic accident (n=2; 4.5%), rupture of intracranial aneurysm (n=1; 2.2%), necrotizing pancreatitis (n=1; 2.2%). In two cases (4.5%), death occurred before the diagnosis of the underlying disease.

Maternal death occurred during the first trimester in two cases (4.5%), during the second trimester in seven cases (15.9%), during the third trimester and puerperium in the remaining 36 cases (71.8%). Mode of delivery, maternal characteristics and perinatal outcome are presented in Table 2. Neonatal survival is maintained in 29 cases (65.9%).

Table 2. Maternal characteristics, mode of delivery and perinatal outcome

VARIABLE	N	%
Maternal age group		
18-24	12	(27.2)
25-29	13	(29.5)
30-34	9v	(20.4)
35+	10	(22.7)
Parity		
Nulliparous	11	(25)
Multiparous(1-5)	32	(72.7)
Grandmultiparous(≥6)	1	(2.2)
Mode of delivery		
Vaginal	25	(56.8)
Abdominal	17	(38.6)
Undelivered	2	(4.5)
Fetal Outcome		
Alive and healthy	29	(65.9)
Intrauterine fetal death	9	(20.4)
Postpartum fetal death	4	(9)
Abortion	2	(4.5)

During the study period, 5960 patients were diagnosed to have hypertensive disorders. Disease specific death rates were 3.2% for HELLP syndrome (5/152), 1.1% for eclampsia (2/167) and 0.06% for preeclampsia (3/4610).

Cesarean delivery rate was calculated to be 22% during the study period. Cesarean delivery related deaths including anaesthesia complications were observed one in every 6839 abdominal delivery.

Discussion

Despite the improvement achieved in decreasing maternal mortality rate, our figures remains to be twice the figures of developed countries, which is 12-22/100000 live births.⁷⁻¹⁰ What makes a maternal death tragedy in 40 to 64% of the cases in the literature⁹⁻¹¹ and in 43% of the cases in this study were that the deaths were preventable.

Table 3. Percentage of pregnancy-related maternal deaths by cause.

	United States (1987-1990)	Hacettepe University Hospital (1968-1992)	Zübeyde Hanım Maternity Hospital (1983-1992)	SSK Ankara Maternity And Women's Health Teaching Hospital (*) (1996-2001)
Causes of death				
Hemorrhage	%21	%8.5	%41.2	%18
Pulmonary embolism	%23	-	%35.2	%4.5
Pregnancy hypertension	%24	-	%11.7	%18
Puerperal infection	%12	%59.8	%5.9	%13.6
Chronic systemic diseases (**)	%6	%8.5	%5.9	%20.4
Anesthesia	%3	-	-	%4.5
Other	%11	-	-	%21

(*) : The present study's results.

(**): Chronic hypertension, cardiac and pulmonary diseases

A comparison of maternal mortality's causes between the rates in the United States,¹² in different referral centers in Turkey^{13,14} and in this study is given in Table 3.

Hemorrhage accounts for the 30-52% of maternal deaths in developing and underdeveloped countries.^{15,16} Several studies conducted in Turkey demonstrated that 30-41% of maternal death are due to hemorrhage.^{6,11} Although hemorrhage was one of the leading cause of death (18%) in our center, most of the cases (87.5%) were delivered at home, could not admit to the hospital on time due to transportation problems or referred to our center at irreversible stages of hemorrhage.

Indirect obstetric deaths due to cardiac, lung diseases and cerebrovascular accidents were one of the leading causes of death (27.5%) in this survey. This subgroup is the least preventable and hard to modify cause of maternal mortality (7.8%). They constitute 11-21% of all maternal deaths in the world^{9,15,16} and 15% of maternal deaths in Turkey.⁶ Although preconceptional counselling may be an option, 66% of the cases in this study did not even have any antenatal care.

Sepsis is another preventable cause of maternal mortality in 8-16% of the cases.^{9,15,16} The 15% rate of sepsis in this report is higher than the national figures of 10%.⁶ Four of the sepsis cases (66%) delivered at home or aborted outside the hospital. One of the remaining cases did not take the prescribed antibiotics for treatment of postpartum endometritis and the other had septic shock after cesarean delivery due the preterm premature rupture of the membranes.

Pregnancy induced hypertention, which includes preeclampsia, eclampsia and HELLP syndrome, is an unpreventable cause.¹⁰ It constitutes 15% of causes of maternal mortality in this study which is similar to the rates reported in the literature (14-18%).^{6,16,17} Eclampsia is defined as cerebral involvement, resulting in convulsions with preeclampsia.

Cause specific mortality rate was 1.1% for eclampsia in this study which was reported to be 1.8% in United Kingdom in 1992.¹⁸ Of the two cases who died due to eclampsia,

the cause was intracranial hemorrhage in one case and cavernous sinus thrombosis in the other. Maternal deaths associated with HELLP syndrome that was 4-24% in 1980's dropped to 1.1% during the last decade.^{19,20} Our data revealed that 3.2% of the maternal deaths were associated with HELLP syndrome; three cases due to cerebral hemorrhage, one disseminated intravascular coagulopathy and one hypoxic ischemic encephalopathy. These causes were also reported to be the most common events associated with HELLP syndrome in another study.²¹

Several reports attributed 5-12.5% of maternal deaths to anaesthesia.^{9,22} We report that 4.5% of all maternal deaths were due to complications related to anaesthesia. The mortality rate for all women delivered by cesarean section was one in every 6839 abdominal delivery while the rate of mortality attributable to cesarean section itself was one in every 13678 abdominal delivery. These figures are one in every 4484 and one in 17241 abdominal delivery respectively in the literature.²³

We conclude that the most common causes of maternal mortality in our center such as, chronic systemic diseases, pregnancy induced hypertension, hemorrhage and sepsis could be prevented with appropriate preconceptional counselling, antenatal and postpartum care. It is important to note that more than half of the women who died, did not have any antenatal care. Our results show that patient demand for hospital care should be increased and appropriate transportation system should be built for emergent cases.

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