TRENDS IN PERINATAL MORTALITY AT KING FAHD HOSPITAL OF THE UNIVERSITY, AL-KHOBAR, SAUDI ARABIA: A TEN YEARS STUDY

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Objective: The aim of the study is to identify the major causes of perinatal mortality and to determine the main maternal factors which affect perinatal mortality at the King Fahd Hospital of the University (KFHU), Al-Khobar, Saudi Arabia.

Methods: A retrospective study was conducted covering a period of ten years from January 1987 to December 1996. All 548 perinatal deaths, which occurred during that period, were analyzed according to Wigglesworth classification.

Results: The study revealed a perinatal mortality rate of 19.2:1,000 births. Lethal malformations accounted for 116 (21.1%) of fetal deaths. Of the remaining 432 deaths, 214 (49.5%) occurred antenatally, 71 (16.5%) in labour and 147 (34%) within the first week of delivery. Amongst the normally formed babies, low birth weight was the commonest cause of death (29%) followed by the consequences of maternal diseases (14.8%). The cause of death was unknown in 17.3% of mature babies who died. Unbooked patients were responsible for 72% of the total perinatal deaths.

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Conclusion: Reduction of the perinatal mortality rate is possible when all women begin to value preconception counselling and attendance at antenatal clinics.

Key Words: Perinatal mortality, Antenatal care

INTRODUCTION

A course but valid parameter for the assessment of antenatal care is perinatal mortality rate. It varies with the quality and degree of utilization of antenatal care and perinatal services. This is important for identifying problems in obstetric and early neonatal care. Though most perinatal mortality studies have been done in developed countries, a few published data from developing countries suggest that perinatal mortality rate (PMR) is still high in comparison to developed countries.1-3

Though improvements in antenatal and intrapartum care have reduced perinatal mortality worldwide, perinatal morality in Saudi Arabia remains high despite the vast improvement in the perinatal care over the past decade. No national statistics on perinatal mortality in Saudi Arabia are available but, those reported from hospitals in the various regions showed that the rate of decline in fetal mortality has slowed down in the last few years. Despite the substantial reductions, perinatal mortality in the Kingdom remains much higher than that in developed countries.4-6

The aim of this study is to identify the major causes of perinatal mortality and to determine the main maternal factors which affect it.

PATIENTS AND METHODS

This study included all perinatal deaths occurring at the King Fahd Hospital of the University, Al-Khobar, between January 1987 and December 1996. King Fahd Hospital of the University (KFHU) is a referral center in the Eastern Province of Saudi Arabia with an average delivery rate of 2500 to 3000 births per year. The majority of our patients 67% of whom have no antenatal care in the hospital are at high risk. The study included all stillbirths and all live babies who weighed 500 g or more and died in the first week of life. Information about each perinatal death was tabulated on a specially designed form.

Gestational age was calculated from the first day of the last menstrual period and rounded to the nearest week. Where the dates were doubtful, ultrasound, clinical findings and paediatric scores at birth using the Dubowitz method were employed for all live babies weighing 500 g and above. Both obstetricians and neonatologists attended all perinatal mortality meetings. Post mortem examination was not carried out on any infant, since no parental consent was given and routine autopsy is not permitted in Saudi Arabia. The causes of death were classified according to the Wigglesworth classification (Table 1).

The following definitions were used: Low birth weight babies, newborn weight less than 2500 g; dysmature baby: weight below 10th centile for gestational age; macrosomia birth: weight in excess of the 90th centile; preterm birth, newborn at less than 37 weeks of gestation; postmaturity: gestational age of 42 weeks or more.

RESULTS

During the period of study, there were 28,507 deliveries and 548 perinatal deaths. Of the deliveries, 28,186 were singleton births and 321 multiple pregnancies, including one set of quadruplets, eleven sets of triplets and 142 sets of twins. There were 512 perinatal deaths in the singletons and 36 in the multiple
Table 1: Classification of perinatal deaths – Wigglesworth classification

| Birthweight in grams | Normally formed, macerated | Congenital malformation | Conditions associated with immaturity (NDD) | Asphyxial conditions developing in labour | Other specific conditions e.g. abruption of placenta | Total |
|----------------------|-----------------------------|-------------------------|-------------------------------------------|------------------------------------------|-------------------------------------------------|-------|
|                      | SB                          | NND                     | SB                                        | NND                                      | SB     | NND   |
| 500-1000             | 46                          | 13                      | 1                                        | 63                                       | 5      | 1     | 26    | 7     | 162  |
| 1001-1500            | 24                          | 11                      | 18                                       | 26                                       | 7      | 4     | 9     | 7     | 106  |
| 1501-2000            | 23                          | 9                       | 12                                       | 5                                        | 1      | 6     | 9     | 2     | 67   |
| 2001-2500            | 23                          | 9                       | 13                                       | 1                                        | 1      | 3     | 6     | 3     | 55   |
| 2501 and over        | 74                          | 7                       | 29                                       | -                                        | 7      | 10    | 22    | 9     | 158  |
| TOTAL                | 192                         | 43                      | 73                                       | 95                                       | 21     | 24    | 72    | 28    | 548  |

SB=Stillbirth; NND=Neonatal death

Table 2: Comparative table for ten years

|                  | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|------------------|------|------|------|------|------|------|------|------|------|------|
| Total mothers delivered | 2380 | 2993 | 3128 | 3114 | 2514 | 2884 | 2713 | 2777 | 2677 | 2538 |
| Total infants born | 2855 | 3017 | 3154 | 3148 | 2549 | 2920 | 2740 | 2826 | 2718 | 2580 |
| Total perinatal deaths | 45   | 46   | 46   | 44   | 53   | 64   | 47   | 65   | 58   | 66   |
| Corrected perinatal deaths | 36   | 35   | 45   | 32   | 45   | 50   | 44   | 50   | 46   | 49   |
| Congenital malformations | 9    | 11   | 15   | 12   | 8    | 14   | 3    | 15   | 12   | 17   |
| Mortality rate (excluding malformation) | 12.6 | 11.6 | 14.2 | 10.1 | 17.6 | 17.1 | 16   | 17.6 | 16.9 | 18.9 |

Table 3: Perinatal mortality in relation to maternal age

| Maternal age | Perinatal deaths | Total mothers delivered | Perinatal mortality per 1000 total births |
|--------------|------------------|-------------------------|------------------------------------------|
| Leas than 20 | 65               | 3197                    | 21.8                                     |
| 20-24        | 106              | 6743                    | 14.7                                     |
| 25-29        | 118              | 7185                    | 15.7                                     |
| 30-34        | 98               | 5421                    | 17.8                                     |
| 35-40        | 78               | 3318                    | 29.0                                     |
| More than 40 | 47               | 2322                    | 28.5                                     |

Table 4: Perinatal mortality in relation to maternal parity

| Parity | Perinatal deaths | Total mothers delivered | Perinatal mortality per 1000 total births |
|--------|------------------|-------------------------|------------------------------------------|
| 0      | 98               | 4340                    | 24.0                                     |
| 1      | 76               | 4211                    | 17.9                                     |
| 2      | 68               | 4229                    | 14.8                                     |
| 3      | 59               | 4221                    | 11.5                                     |
| 4      | 54               | 4127                    | 10.0                                     |
| 5      | 56               | 3537                    | 14.0                                     |
| >5     | 101              | 3521                    | 35.7                                     |
pregnancies. During this period, the number of births at KFHU increased from 2,855 in 1987 to a peak of 3,154 births in 1989, but decreasing to 2,580 births in 1996. However, perinatal mortality rate fell from 12.6 per thousand in 1987 to a low of 10.1 per thousand in 1990, but again rose to a maximum level of 18.9 per thousand in 1996. The reduction in the number of deliveries was due to the restriction on the expatriates receiving antenatal care in KFHU. This resulted in a dramatic increase in the perinatal mortality rate during the last six years as compared with the first four years (Table 2).

The perinatal mortality rate was 19.2 per thousand total births, and 18.1 per thousand in singleton deliveries. Among the 548 perinatal deaths, 116 babies (21.1%) died from lethal malformations. The corrected perinatal mortality rate from the total births was 15.1 per thousand deliveries. Of the 432 babies who were normally formed, 214 (49.5%) died antepartum, 71 (16.5%) during labor and 147 (34%) after delivery. With regard to those who had no antenatal care, the perinatal mortality rate was 20.7 per thousand compared with 16 per thousand in booked patients. This means the former were responsible for 72% of the total perinatal deaths compared with 28% in the latter.

**Age and parity**
The effect of age on the perinatal mortality rate is shown in Table 3. Perinatal mortality was highest in maternal age groups less than 20 years and more than 35 years. Table 4 shows the effect of parity on the perinatal mortality. Low parity in particular primigravida and high parity, more than 5 gave the highest perinatal mortality.

**Congenital Malformations**
Lethal fetal malformations accounted for 116 of the perinatal deaths (21.1%). The types of anomalies are listed in Table 5. Of the deformities, 43.1% were of the central nervous system, and multiple deformities were present in 35.3% of the babies that died. The perinatal mortality rate due to fetal anomalies was 4:1000 singleton births.

**Table 5: Perinatal deaths due to fetal malformations**

| Malformation               | Total deaths (%) |
|----------------------------|------------------|
| Anencephaly                | 30 (25.8)        |
| Hydrocephaly               | 20 (17.3)        |
| Multiple deformities       | 41 (35.3)        |
| Potter’s syndrome          | 8 (6.9)          |
| Achondroplasia             | 1 (0.8)          |
| Trisomies                  | 3 (2.6)          |
| Polycystic kidney          | 4 (3.5)          |
| Congenital Heart disease   | 7 (6)            |
| Diaphragmatic hernia       | 2 (1.8)          |
| **Total**                  | **116**          |

**Low birth weight**
A total of 159 perinatal deaths (29%) were due to low birth weight of less than 2500 g among the normally formed babies. Of these, 64 (40%) were stillbirths, 48 died antepartum and 16 died intrapartum. Of the 48 stillbirths who died antepartum, 28 had severe growth retardation. Of the total 159 low birth weight babies, 95 (60%) were neonatal deaths. The causes of death for 48 were respiratory distress syndrome, 22 had intrapartum asphyxia, 8 had pneumonia and septicemia, hemolytic disease accounted for nine and pneumothorax -eight.

**Pre-eclampsia**
Maternal pre-eclampsia was the cause of deaths in 14 perinatal deaths (2.5%) and 11 stillbirths, 8 of which were antepartum and 3 intrapartum deaths. Unbooked mothers accounted for 10 of the stillbirths; 8 of which were associated with abruptio placentae. Of the 14 deaths due to pre-eclampsia, 10 were delivered spontaneously and 4 had forceps deliveries.
Antepartum hemorrhage
Fifty-two perinatal deaths occurred as a result of antepartum hemorrhage (9.5%), 5 from placenta previa and 47 were caused by placenta abruption. Forty-three of the babies were stillborn and the other 9 died within 24 hours of birth as a result of the effects of severe hypoxia. Of the 52 perinatal deaths, 38 occurred in grand multiparae, 32 of whom had no antenatal care.

Maternal diseases
Maternal disease was the predisposing factor in 81 perinatal deaths (14.8%). Seventy-eight were stillbirths and 3 were neonatal deaths. Diabetes mellitus was responsible for 64 of them, 61 of whom had never had antenatal care. In 42 mothers, the gestational age was calculated as 40-43 weeks when they were admitted in labour.

Essential hypertension with superimposed pre-eclamptic toxemia resulted in 8 stillbirths at 36-48 weeks. Two of the 3 neonatal deaths were due to neonatal hypoglycemia and the third one was due to renal hypertension. Of the remaining stillbirths, 2 were due to renal hypertension; 2 to idiopathic thrombocytopenic purpura and 3 were due to severe asthmatic attacks.

Mechanical causes
Mechanical factors accounted for 32 of the perinatal deaths (5.8%) among the normally formed babies, 15 stillbirths and 17 neonatal deaths. Of the stillbirths, 5 of the mothers had a prolapsed non-pulsating umbilical cord on admission. Three patients underwent caesarian section for cord prolapse but the fetuses were dead by the time they were delivered. Of the remaining 7 stillbirths 3 resulted from a delay in extracting the head of the fetuses of breech delivery, 2 from difficult shoulder dystocia and 2 were due to a delay in the delivery of the abdomen due to fetal abdominal ascites. Among neonatal deaths, 7 occurred after breech deliveries, 5 following caesarean section, 3 after forceps delivery and 2 after vacuum extraction.

Normal birth weight babies with no maternal complications
Ninety-four perinatal deaths (17.3%) occurred in normally formed babies with no maternal complications. All the babies in this group weighed over 2500 g, the largest being 4100 g. Eighty-two were stillbirths and 12 died in the first week of life. No specific cause of death was discovered, and there was no congenital malformation in any of them. The mothers of 60 babies of these babies had had no antenatal care, and it was difficult to find out if there was any antenatal cause of death.

DISCUSSION
Perinatal mortality has been used as a monitor of perinatal care and the health services. In developed countries, it has a major influence in outlining areas of deficiency and stimulating efforts toward its reduction. Data on perinatal mortality and maternal risk factors in Saudi Arabia have appeared in literature, but unfortunately, with the varying definitions of perinatal mortality from different authors, there is the occasional discrepancy in the figures presented from the same institution. This study identifies the major causes of perinatal mortality in King Fahd Hospital of the University in the Eastern Province of Saudi Arabia. This may be representative of the causes of perinatal deaths in the region. In recent years there has been a marked reduction in perinatal mortality in babies of all weight groups with the exception of the lowest (500-999 g) and babies with lethal malformations. The reduction in overall perinatal mortality in this hospital from 20.5 per 1000 in 1985 (El-Zibdeh et al, 1988) to 10.1 per
1000 total births in 1990 (Al-Najashi 1991) is mainly due to antenatal attendance, in addition to better facilities for antepartum and intrapartum fetal monitoring of high risk pregnancies and improved neonatal care. Stillbirth accounted for two-thirds of the perinatal deaths in this study. Patients who did not have antenatal care were responsible for 72% of the total perinatal deaths compared with 28% in patients who had had antenatal care.\textsuperscript{11,12}

The major clinical causes of perinatal mortality found in this study were congenital fetal malformations, low birth weight, maternal disease, particularly diabetes mellitus and antepartum hemorrhage in normal birth weight babies.

Fetal malformations accounted for 21.1% of all perinatal deaths, an incidence of 4 per 1000 total births. The high rate in the present study could be explained by the high incidence of consanguineous marriages among Saudis. A similar high incidence of congenital anomalies had been reported from Riyadh (Mesleh 1985)\textsuperscript{13} and from Bahrain (El Shafei et al 1986)\textsuperscript{14} where 25% of the patients attending antenatal clinics of the Armed Forces Hospital, were married to their first cousins. Consanguinity was 27% among our patients. However, the overall rate of major fetal anomalies among our population was more or less similar to that reported in several studies from other regions in Saudi Arabia.\textsuperscript{15-17} Early detection of major fetal malformations is pointless in this country since abortion is illegal. The alternative means of prevention of these malformations is through the reduction of consanguineous marriages. This may be achieved by a nationwide publicity and the education of the girls in high school on the risks of such marriages and also the importance of a balanced diet. It has been shown that periconceptional folic acid and multivitamin supplements reduce the recurrence of neural tube defect and other congenital anomalies in women who have previously had an affected baby. Periconceptional prophylactic folic acid and multivitamin supplements in all women with a history of fetal anomalies, especially neural tube defects and in women with low serum folate levels, estimated before conception may be worthwhile.\textsuperscript{18-20}

Low birth weight babies accounted for 29% of the perinatal deaths. Of the total 159 low birth weight babies, 95 (60%) were neonatal deaths and 64 (40%) were stillbirths. Among the factors contributing to perinatal death, immaturity and antepartum or intrapartum deaths due to asphyxia accounted for about two-thirds of the cases. This finding is similar to the findings from a study in Riyadh. The improvement in prenatal and obstetric care as well as the provision of more neonatal intensive care would significantly reduce mortality associated with these factors.\textsuperscript{21,22}

Sixty-four perinatal deaths (11.6%) occurred with mothers who had diabetes mellitus. The incidence of diabetes mellitus in the pregnant population of the hospital was estimated as 3.6%, gestational diabetes constituting 72% of this. Sixty-one of these mothers had never had antenatal care. Preconception counselling, adherence to the advice of the physician regarding regular antenatal attendance, diet control, insulin regimen and timely admission to hospital for delivery are necessary if perinatal deaths resulting from this are to be reduced.

Nearly one-fifth of normal birth weight babies, who died, had no obvious maternal or fetal complications. Perinatal autopsy is proscribed in Saudi Arabia for social and religious reasons. Had this been possible, the exact cause of death could have been determined in most of these cases.

Much needs to be done to achieve a rate comparable with those quoted for developed countries. Three factors seem to be significant with regard to this high rate of perinatal
deaths: congenital malformations, lack of adequate antenatal care, and a high percentage of low birth weight babies. However, the overall rate of perinatal mortality among the population under study was comparable to that reported in several studies from other regions in the Kingdom of Saudi Arabia. Reduction of the perinatal mortality rate will only be possible when all women begin to value preconception counseling and attendance at antenatal clinics. This is possible with a well-planned mass-media campaign by the health authorities on the importance of antenatal care. With the availability of skilled obstetric care of high-risk patients and more skilled neonatal care to cope with very low birth weight babies, it is hoped that this objective would be achieved.

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