

TRENDS IN RATES OF DELIVERY OF EXTREMELY LOW BIRTH WEIGHT (ELBW) BABIES IN AFIF, SAUDI ARABIA

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Babies of birth weight less than 1000 g (ELBW) often pose a heavy burden on available facilities in neonatal intensive care units (NICU) the world over. Reports from various countries show that survival rates among this category of babies still remain relatively low.¹⁻⁴ In a previous report from Afif General Hospital, the 28-day survival rate among ELBW babies was 30%, but within this category, there was no survival among the subset of birth weight less than 750 g.⁵ Anecdotal evidence seems to suggest an increase in the proportion of these babies born in this hospital in recent times, and a cursory inspection appeared to show a higher incidence compared to data from an earlier audit by Al Faraidy et al.,⁶ pooled from other hospitals in Saudi Arabia. The authors, therefore, set out in this report to determine the circumstances related to the delivery of this group of babies in this hospital during the six-year period from January 1992 to December 1997, paying particular attention to possible trends and other time-related changes.

Subjects and Methods

The subjects consisted of mothers with newborn babies of birth weight 500 g and above, including stillbirths, during the six-year period. The focus of interest was the group of babies of birth weight less than 1000 g, who were selected as a subset. Data including birth weight, infant sex, month of delivery, outcome, maternal age, gravidity and parity were retrieved from the delivery records. For the comparative study, two groups of mothers were used—one consisting of mothers of singleton babies of birth weights ≥ 2500 g (normal birth weight), and the other of singleton babies of birth weights < 1000 g (ELBW babies). Two mothers were selected from the former group—that of the baby born immediately before and the other immediately after each ELBW baby. Twins, macerated stillbirths and grossly abnormal fetuses were excluded from the comparative study because of the possibility of their disproportionate contribution to low birth weight.

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The birth weight distribution in the Afif General Hospital dataset was first compared with that published in 1993 by Al Faraidy et al.,⁶ using Poisson probability test. An expected number of ELBW births and a ratio of observed to expected ELBW births, with their corresponding 95% confidence intervals, were derived while noting particularly the magnitude of the departure of the observed number of ELBW births from the expected number.

Statistical Analysis

Data were analyzed using the Software Statistical Package PEPI Version 2 (Computer Programs for Epidemiologic Analysis).⁷ The annual delivery rates of ELBW babies were tested for possible trends using Cox-Stuart method. Monthly rates of delivery of ELBW babies over the combined 12 months of the study period were tested for patterns of variations by Hewitt's rank sum test for seasonal peak. Column statistic was carried out on the ages of all the mothers, deriving the median, first and third quartiles for age, and the interquartile range (IQR). Subsequently, two target ages were delineated—values below the 1st and above the 3rd quartiles—for the comparative analysis. Mothers of ELBW and normal birth weight (NBW) babies were then compared, by employing first univariate analysis, and subsequently stratified method of Mantel-Haenszel, along the following variables: age < 21 years; age > 31 years; gravidity ≥ 3 ; parity ≥ 3 ;

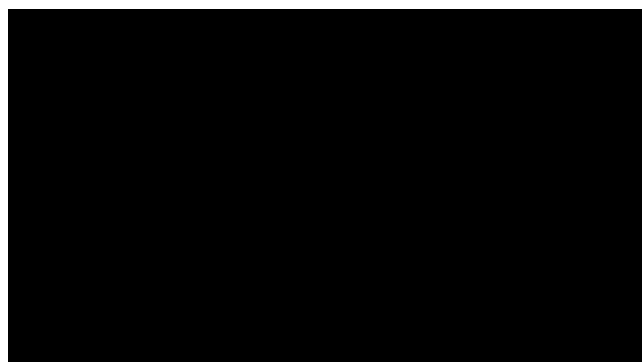


FIGURE 1. Cumulative monthly distribution of all births, normal birth weight (NBW) and extremely low birth weight (ELBW) births: January 1, 1992, to December 31, 1997.

TABLE 1. Comparison of birth weight distribution from two datasets: Afif General Hospital and Al Faraidy report of 1993.⁶

Birth weight groups	Afif General Hospital observed/expected # of births (%)	Al Faraidy report # of births (%)
ELBW	67/35.3 (0.66)	174 (0.35)
NBW	9211/9283.9 (91.0)	45,721 (91.69)
Other	847/805.7 (8.4)	3968 (8.0)
Total	10,125 (100)	49,863 (100)

ELBW=extremely low birth weight (<1000 g); NBW=normal birth weight (≥ 2500 g); observed # of ELBW births x expected # of ELBW births (Poisson distribution); exact $P=0.000001$; ratio (observed ELBW:expected ELBW)=1.898, 95%CI=1.471 to 2.418; 95% CI of observed # of ELBW births=51.92 to 85.09.

TABLE 2. Birth weight distribution by year of birth.

Year of observation	Total annual births	NBW babies (%)	ELBW babies (%)	ELBW:NBW
1992	1530	1371 (89.6)	5 (0.33)	0.36
1993	1594	1432 (89.8)	9 (0.63)	0.63
1994	1716	1568 (91.4)	14 (0.82)	0.89
1995	1750	1570 (89.7)	14 (0.80)	0.89
1996	1810	1641 (90.7)	14 (0.85)	0.79
1997	1725	1629 (94.4)	11 (0.64)	0.68
Total	10,125	9211 (91.0)	67 (0.66)	0.73

gravidity-parity-variance (GPV) ≥ 3 ; and infant sex. In this report, GPV was regarded as having occurred if parity was not equal to gravidity, in whatever combination, after the birth of the present baby. A $P < 0.05$ was regarded as statistically significant.

Results

There were 10,048 mothers with 10,125 babies. NBW and ELBW subsets were 9211 and 67, respectively. The rate of delivery of ELBW babies was thus 0.7%. There were 76 sets of twins, including four of ELBW and one set of triplets. Also among the ELBW babies were six stillbirths, including one case of anencephaly and two macerated fetuses. The four sets of twins, two macerated fetuses and one anencephalic were excluded, leaving 56 ELBW singleton babies for the comparative analysis. The median age (IQR) of all the mothers was 26 (21-31) years, while the age range was 15 to 49 years. The median age (IQR) of the mothers of the 56 ELBW babies was 24.9 (19.5 to 30) years, while the age range was 15 to 42 years. The median age (IQR) of the 112 control mothers was 27.5 (22-35) years, while the age range was 17 to 48 years.

The proportion of ELBW deliveries was about double that reported in the Kingdom in 1993.⁶ This difference was statistically significant (exact $P=0.000001$). Further details on the comparison are shown in Table 1. The proportionate distribution of the other birth weight categories is identical in both reports. As shown in Table 2, there was an increase in the proportion of ELBW births from 1992 to 1996, followed by a drop, though the rate in

1997 was still higher than the baseline value of 1992. The overall trend was not statistically significant (Cox-Stuart test for trend; two-tailed $P=1.000$). In Figure 1, the monthly and annual distribution of the 10,125 deliveries are shown—the entries on the Y and Z axes are plotted on different scales because of the relatively fewer numbers of ELBW births. As shown, high amplitudes of fluctuation were observed in the rates of ELBW deliveries, but not so in rates of total and NBW births. There was an outstanding peak in ELBW births in the month of June, and the highest seasonal peak over six months (June to November) was statistically significant (rank sum=56, $P=0.025$). In the comparative analysis, some factors were significantly associated with delivery of ELBW babies; 22 of 56 mothers of ELBW babies (39.3%) were under 21 years of age, compared to 19 of 112 mothers of NBW babies (17%) (2-tailed $P=0.0028$, Yates-corrected). Eleven of 56 mothers of ELBW babies (19.6%) had GPV ≥ 3 , compared to 2 of 112 of mothers of NBW babies (1.18%) (exact $P=0.0001$). The two groups of mothers did not differ significantly in the other factors. In the stratified analysis, the results were age < 21 /GPV ≥ 3 (Mantel-Haenszel weighted OR=4.42, 95% confidence interval [CI] = 2.26 to 8.77, M-H summary $\chi^2 = 21.88$, $P=0.000003$) and age > 31 /gravidity ≥ 3 (M-H weighted OR=0.49, 95% CI = 0.29 to 0.86, M-H summary $\chi^2 = 6.38$, $P=0.01$).

Discussion

There was a relatively high proportion of extremely low birth weight babies delivered in Afif General Hospital during the period covered by the report. This rate was about double that in other hospitals in the Kingdom. This was the focus of this report. The authors were aware of time/spatial differences between the two datasets, but the wide base of the Al Faraidy report covering 147 hospitals in 11 regions of the Kingdom gives it some credence as a standard. The reason for the relatively higher incidence of ELBW births in Afif General Hospital is not immediately apparent, and cannot be readily found within the scope of this report. There was an initial increase in rates of delivery of ELBW babies, followed by a decline, though the level at the end of the observation period was still higher than the baseline value. A likely explanation here is an expected inverse relationship between increasing use of hospital facilities on the one hand and a decreasing proportion of ELBW births on the other. The increased utilization rate could be indirectly deduced from the increasing annual delivery rates from 1992 to 1996. In addition, the time-related changes could be due to some hidden self-adjusting mechanisms, which are not apparent in the present report. The peak in June of ELBW delivery stands out distinctly against the backdrop of the other monthly rates and the observed distribution pattern was significantly skewed towards the latter half of the year. Again there are no ready explanations at the moment for

the observed peak and variation pattern, but the major observations constitute good grounds for a prospective investigation with a much wider database. Of interest here is the direct relationship between some maternal biological and obstetrical variables, singly and in combination, and ELBW births. This finding reinforces previous reports on the subject.⁸⁻¹²

Very low birth weight babies often pose various social, medical and other problems which are out of proportion to their relatively small numbers.^{3,13-16} The authors consider it rather premature to discuss means of preventing ELBW deliveries in this report, but for now it is prudent to aim at improving facilities for care of ELBW babies in the hospital. In this respect the authors agree with the selective approach recently advocated by Jelly et al.,¹⁷ consisting of aggressively caring for ELBW babies likely to survive. The experience in Afif General Hospital has shown that a major contributor to the high mortality rate among ELBW babies is in fact respiratory distress syndrome (RDS).⁵ Therefore, the provision of more intensive care, including the judicious use of artificial surfactant on selected patients, those of birth weights above 750 g, could improve their survival beyond the neonatal period. No doubt an important deciding factor in this respect is one of prioritization of needs within a much wider context in the whole country.

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