ORIGINAL RESEARCH

THE INCIDENCE OF LOW BIRTH WEIGHT IN 5000 LIVEBORN INFANTS AND THE ETIOLOGY OF FETAL RISK FACTORS

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ABSTRACT

Objective: To identify the low birth weight (LBW) incidence in 5000 live born babies in the Bakirkoy Maternity and Children Teaching Hospital.

Material and Methods: LBW was defined as infant weight below 2500g and these infants constituted the study group. Babies with normal birth weight (NBW) chosen randomly in equal numbers from 5000 live born babies formed the control group. Presentation, route of delivery, congenital anomaly, multiple births and the sex of the infants were also recorded.

Results: In the 5000 live born babies, incidence of LBW was 9.14%. The incidence of preterm and full term was 5.7% and 3.4%, respectively. Of the LBW infants, 62.8% were preterm, 37.2% were full term. The rate of multiple gestations was found to be 13.9% in LBW infants and 0.8% in NBW infants. Excluding multiple gestations, 46.4% of the babies in the LBW group were female, and 53.6% were male. In the NBW group, the rates were 46.3% and 53.7% respectively. Abdominal delivery was seen in 32.3% of the LBW infants and 21.6% in the NBW infants. The rate of breech presentation was higher in the LBW (5.1%) than in the NBW infants (1.3%). The incidence of congenital anomaly was 6.2% in the LBW group and 3.3% in the NBW group.

Conclusion: The sex of the infant did not have any influence on the birth weight; however, multiple gestation and congenital anomaly were important factors. Additionally, abdominal delivery and non-vertex presentations were observed more frequently in the LBW infants.

Keywords: Low birth weight, Incidence, Aetiology

5000 CANLI DOĞUMDA DÜŞÜK DOĞUM AĞIRLIKLI BEBEK ORANI VE ETYOLOJİDEKİ FETAL RİSK FAKTÖRLERİ

ÖZET

Amaç: Hastanemizde gerçekleşen 5000 canlı doğumdaki düşük doğum ağırlıklı (DDA) bebek oranını belirlemek amaçlandı.

Gereç ve Yöntem: Doğum ağırlığı 2500g altında olan bebekler düşük doğum ağırlıklı olarak tanımlandı ve çalışma grubunu oluşturdu. 5000 canlı doğum içinden basit rastgele yöntemle seçilen, DDA bebeklerle aynı sayıda normal doğum ağırlıklı (NDA) bebek alınarak kontrol grubu oluşturuldu. Tüm bebekler için cinsiyet, doğum şekli, çoğul gebelikler ve konjenital anomali varlığı öğrenildi.

Bulgular: Beşbin canlı doğumda DDA sıklığı %9.14, term ve preterm DDA bebeklerin sıklığı ise sırasıyla %5.7 ve %3.4 idi. DDA bebeklerin %62.8'i preterm, %37.2'si term bulundu. Çoğul gebelik sıklığının DDA bebeklerde %13.9 ve NDA bebeklerde %0.8 olduğu görüldü. Çoğul gebelikler dışlandıktan sonra iki grup karşılaştırıldı. DDA bebeklerin %46.4'i kız, %53.6'si erkek, NDA bebeklerin %46.3'ü kız ve %53.7'sı erkekti. Sezeryanla doğum DDA bebeklerde (%32.3), NDA bebeklerden (%21.6) daha fazlaydı. Benzer şekilde, makat doğum DDA bebeklerde daha sık görüldü (sırasıyla %5.1 ve %1.3). Konjenital anomali sıklığı DDA bebeklerde %6.2 iken, bu oran NDA bebeklere %3.3 olarak bulundu.

Sonuç: Bebeğin cinsiyetinin doğum ağırlığına etkisi görülmezken, çoğul gebelik ve konjenital anomali varlığı doğum ağırlığını etkilemekteydi. Ayrıca, DDA bebeklerde sezeryanla doğum ve baş geliş dışındaki prezentasyonlar daha sık görülmekteydi.

Anahtar Kelimeler: Düşük doğum ağırlığı, Sıklık, Etyoloji

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INTRODUCTION

Low birth weight (LBW) is responsible for 60% of the infant mortality in the first year of life and it carries a 40-fold increase in the risk of neonatal mortality during the first month [1-4]. Since birth weight has a strong correlation with infant survival, attentions have been given to strategies that will reduce the proportion of infants with LBW. With recent advances in modern obstetric and neonatal care and technological development, high risk neonates have a greater chance of survival in the newly formed intensive care units. This also causes an increase in the rate of LBW infants, and subsequently an increased rate of long-term neurological sequelae.

The World Health Organization has estimated that annually 24 million LBW infants are born in developing countries. As the prevalence of LBW infants is around 5% in many industrialized countries, it changes between 5-30% in underdeveloped or developing countries [3,5-12]. If we take into account that, millions of LBW infants are born annually in the World, we need to begin researching the health of neonates starting with birth weight. In this prospective study, we aimed to identify the LBW incidence in 5000 live born babies in our hospital and the associated risk factors of LBW related to the infant. We also aimed to evaluate the rate of infants who were small for gestational age (SGA), rate of preterm delivery, their sex distribution, route of delivery, presentation, incidence of multiple gestations and congenital anomalies.

METHODS

In this prospective cross-sectional study, 5000 live born babies were evaluated randomly between October 2000-May 2001 in the Bakirköy Maternity and Children's Hospital in Istanbul. Aborted babies and stillbirths were excluded because of difficulties in accurately defining gestational age. The infants were weighed on an electronic metric scale in the delivery room immediately after birth.

LBW was defined as infant weight below 2500g and these infants constituted the study group. Since the accurate date of the last menstrual period was not known in about one third of the mother and due to failing routines in the maternity ward, the gestational age was estimated by Ballard scoring performed in the first 24 hours after delivery. Babies born before 37 completed gestational weeks were defined as preterm. The neonates were examined and all anthropometric measurements were obtained at the same time. A baby was classified as SGA if the birth weight fell below the 10th percentile for gestational age, based on Lubchencho curves. The sex of the infants, presentation, route of delivery, congenital anomaly and multiple births were recorded on prepared forms. A history of congenital anomaly in the family was also obtained. Babies with normal birth weight (NBW) (≥2500g) chosen randomly in equal numbers from 5000 live born babies formed the control group and the same parameters were evaluated for this group.

We used Chi Square and Mantel-Haenszel tests for statistical analysis. Statistical significance in this study was defined as $p<0,05$.

RESULTS

Of the 5000 live born babies, 457 were LBW infants. The overall incidence of the LBW was 9.14% and 62.8% of the LBW infants were preterm, 37.2% were full term. The incidence of preterm delivery and full term SGA was 5.7% and 3.4%, respectively. The preterm SGA incidence was 1.1%. NBW infants chosen randomly in equal numbers were 457 in number and incidence of preterm delivery was 2.4%. The mean gestational age and birth weight of the infants in two groups were shown in Table I. The birth weight of 3.3% of the LBW infants was less than 1000g, 10.7% weighed between 1001-1500g, 22.3% weighed between 1501-2000g and 63.7% were between 2001-2500g.

There were 410 mothers in the LBW group and 456 mothers in the NBW group. The rate of multiple gestations was found to be 13.9% in the LBW infants and 0.8% in the NBW infants (Table I). There was a statistically significant difference between the two groups ($x^2=52.01$, $p=0.000$). Multiple gestations were found to be an important risk factor in the aetiology of LBW.

To evaluate the other risk factors related to the birthweight, we excluded the multiple gestations.Excluding multiple gestations, there were 353 infants in the LBW group and 453 infants in the NBW group.

In the LBW group, 46.4% were female, 53.6% were male and in the NBW group 46.3% were female, 53.7% were male (Table I). No

statistically significant difference was found when comparing the sex of the babies in the two groups (x^2=0.01, p=0.97).

Mode of delivery was compared between the two groups. Delivery by way of caesarean section was seen in 32.3% of the LBW group and this rate was 21.6% in the NBW group (Table I). The difference was statistically significant (x^2=11.63, p=0.001). The indications for abdominal delivery are in Table II. Elective abdominal deliveries were more frequent in the NBW infants but the preference for caeserean section was based more commonly on perinatal problems among the LBW births.

Table I: Characteristics of LBW and NBW infants

	LBW	NBW
The mean gestational age (w)	35.8 ±2.5	38.1 ± 0.6
The mean birth weight (g)	2037.7 ± 430.6	3352.1 ± 401.8
Multiple gestation (%)	13.9	0.8
Female (%)	46.4	46.3
Male (%)	53.6	53.7
Caesarean section (%)	32.3	21.6
Non-vertex presentation (%)	6.5	1.3
Congenital anomalies (%)	6.2	3.3

Table II: The indications for abdominal delivery in LBW and NBW infants

Indications	LBW		NBW	
	n:353	%	n:453	%
Fetal distress	31	8	31	7
Elective C/S	28	8	47	10
IUGR/LGA	12	3	4	1
Preeclampsia	11	3	2	0.4
Abruptio placenta	7	2	4	1
Oligohydroamniosis	9	2	-	-
Non-vertex presentation	6	2	2	2
Placenta previa	2	1	4	1
Premature rupture of membranes	5	1	1	0.2
Cord presentation	1	0.3	2	0.4
Fetal anomaly	2	0.5	1	0.2
Maternal hyperthyroidism	-	-	1	0.2

The rate of breech presentation was higher in the LBW (5.1%) than in the NBW infants (1.3%). 1.4% of the LBW infants were born by incomplete breech presentation, but there were no babies born by incomplete breech presentation among the NBW infants (Table I). LBW was associated with increased rate of non-vertex presentations (x^2=16.46, p=0.000).

In this study, congenital anomalies of the study and the control groups were evaluated (Table III). The incidence was 6.2% in the LBW group and 3.3% in the NBW group (Table I). The difference between the two groups was important (x^2=3.86, p=0.04). Among the LBW newborns having isolated or multiple congenital malformations, 2.5% were SGA and 3.7% were premature. The incidence of congenital malformations in all SGA babies was 5.8%. In our preterm population, the malformation incidence was 6.5%, but 54% of the preterm infants with congenital anomalies were preterm SGA babies. 72% of the LBW infants with congenital anomalies were full term or preterm SGA. A family history of congenital anomalies was seen in 2.8% of the LBW infants and in 2.4% of the NBW babies. There was no important difference statistically (x^2=0.12, p=0.72). Also, the effect of consanguinity between parents on birth weight was evaluated. 7.5% of the cases had first-degree consanguinity between the mother and father in the LBW group and this rate was 7.8% in the NBW group. Second or higher degrees of consanguinity rates were 7% and 5%, respectively in both groups. This result did not create a statistically significant importance (x^2=0.05, p=0.81). and consanguinity between parents was not found to be a risk factor in the aetiology of LBW.

Table III: Congenital anomalies of LBW and NBW infants

	LBW	NBW
Isolated defects		
Congenital hip dislocation	6	2
(+ Pes equinovarus)	3	-
Sacral sinus	2	4
Myeloschisis	1	-
Hypospadias	3	1
Cryptorchidism	1	1
Inguinal hernia	-	1
Ambiguous genitale	2	-
Anal atresia/small intestine stenosis	1	1
Cleft lip and palate	2	-
Extremity anomalies	3	-
Others (diastasis recti, hypotelorism, cleft uvula, penile mass)	1	4
Multiple anomalies		
Down's Syndrome	-	1
Ambiguous genitalia, hydrocephaly, vaginal atresia, anal atresia	1	-
Myelomeningocele, hydrocephaly, extremity anomaly	1	-
Atypical face, cyanotic congenital heart disease, limb anomaly	1	-
Cleft lip and palate, microcephaly, atypical face, syndactylism	1	-

DISCUSSION

In this study, incidence of LBW infants was 9.14% and this was similar to the literature [13]. Previous studies have reported similar results, for example, the LBW rates in two different studies in Turkey were 8.7% and 10%, respectively [14,15]. In many developed countries, LBW rates are around 5% [12]. The rate of LBW in our study was similar to rates reported in developed countries. The similarity to developed countries can be based upon the contribution of only live born neonates. The perinatal mortality (34.9‰) is very high in our country and a great number of LBW and very LBW infants are lost during parturition [4]. So this leads to misinterpretation of the outcome.

Although multiple gestations represented only 2.09% of the live births, they account for a disproportionately large share of adverse pregnancy outcomes. With the development of obstetrical approaches, the incidence of multiple gestations began to increase. The risk of giving birth to a LBW infant increased significantly in multiple gestations in our study and 80% of multiple gestations resulted in preterm birth.

Studies dealing with the aetiology of LBW have shown us that, female sex is an important risk factor and this is attributed to the predisposition of the female sex to the other risk factors [6,16,17]. In our study, the rate of male and female sex among LBW infants was similar and this led us to conclude that the sex of the infant did not affect the weight of the baby.

Other important results were the significant differences in the method of delivery and the presentations of neonates between the LBW and NBW groups. The rate of caesarean section was much higher in the LBW births (32.3%) than in the NBW births (21.6%). Delivery by way of caesarean section was seen more frequently in LBW infants and this indicated once more that LBW infants were more prone to morbidity and mortality.

The rate of cephalic presentation was 93.5% in the LBW group, but 98.7% in the NBW group. When compared with cephalic presentation, breech births were associated with an increased rate of LBW. Whereas, the overall incidence of breech presentation in deliveries is only 3% to 4%, for infants weighing less than 2500g at birth, the incidence may be 30% or greater. As compared with the NBW infants, birth trauma and umbilical cord prolapsus are seen more commonly in LBW and/or breech births. During labour, the umbilical cord passes the cervix before the head, so the umbilical cord is entrapped in between the cervix and head. After the beginning of compression, delay in labour increases hypoxia. With a LBW infant, the size of the head is even greater in relation to that of the buttocks and the chance of entrapment is markedly increased. This condition results in increased hypoxia and because it needs traction, it can cause trauma to the spinal cord and skeletal system. Goldenberg and Nelson found that, during labour, the premature fetus in breech presentation was 16 times more likely to die than the premature fetus in vertex presentation [18]. For these reasons, in LBW neonatesthe most rational method of delivery is caesarean section [19]. In view of this information it may be said that, identification of high-risk pregnancies and choice of appropriate method of delivery have been successfully achieved in our hospital parallel to the literature.

Intrauterine growth retardation (IUGR) is a frequently reported outcome among infants with congenital malformations. The presence of IUGR may indicate an underlying structural abnormality or aetiologically it may predispose to defects rather than vice versa [20]. The rate of congenital malformations was 6.2% in the LBW group, 3.3% in the NBW group indicating a strong association between LBW and malformations. Among the LBW neonates with isolated or multiple congenital malformations, 2.5% were SGA and 3.7% were premature. However, the incidence of congenital malformations in all SGA babies, was 5.8%. In our preterm population, malformation incidence was 6.5%, but 54% of the preterm infants with congenital anomalies were preterm SGA babies. If we take full term and preterm SGA infants into consideration together, 72% of LBW infants with congenital anomalies were SGA. In a study reported in our hospital in 1999, congenital malformations was the fourth leading cause of death (11.4%) in perinatal mortality cases[4]. The significant role of congenital malformation in the aetiology of the LBW, especially for IUGR, causing an increase from 3.3% to 8% in the risk of LBW indicates a need to check for malformations by performing antenatal ultrasonography more strictly in IUGR fetuses.Furthermore, it emphasızes the need for a higher number of more developed genetic laboratories.

There was a limitation in this study. Because our study was performed in a maternity ward, if there were no symptoms or sings reflecting congenital infections, we did not check for congenital

infections because of high cost. So we did not include the incidence of congenital infections in the aetiology of LBW.

In summary, improving the community health should start with improving baby health, and developing new strategies to decrease the incidence of LBW infants should be the one of our first goals. A history of a LBW infant should be an indication to seek recurrent cases of low birth weight and to ensure that close monitoring of fetal growth is implemented in subsequent pregnancies.

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