RISK FACTORS OF BIRTH ASPHYXIA: A study at Prince Ali Ben Al-Hussein Hospital, Jordan

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ABSTRACT

Objective: The aim of this study was to determine the risk fators of birth asphyxia at the Prince Ali Ben Hussein Hospital, Jordan.

Patient and methods: This prospective study consist of 97 newborn infants (57 males and 40 females who were admitted to the neonatal care unit of Prince Ali Ben Alhussein Hospital from the first of April 2002 till the end of January 2004, who were delivered with low Apgar score. Detailed maternal history was taken, regarding their age, parity, gestational age, complications and sedation during labour. Chi-squared (x2) test was used to assess statistical significance.

Resutls: Total of 9602 live birth infants were born in Prince Ali Ben Alhussein Hospital from the first of April 2002 to the end of January 2004 and 124 newborn infants had Apgar scores < 7 at 5 minutes. The incidence of Apgar scores < 7 at 5 minutes was 12.9/1000 live born infants, Seizures occurred in 12 out of 97 newborn infants. There was no statistically significant relationship between birth asphyxia, severe asphyxia and birth weight, gestational age, parity of mothers and maternal disease. There was marked and significantly higher percentages of deliveries by emergency caesarean section among asphyxiated group compared to the control group.

Conclusion & Recommendation: Prematurity, intrauterine growth retardation, antepartum haemorrhage and maternal toxemia were associated with higher incidence of asphyxia. We suggest further investigations to be carried out using a large sample size and including additional risk factors as lack of antenatal care and midwife interference.

KEY WORDS: Risk factors, Birth asphyxia

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INTRODUCTION

Asphyxia is an insult to the fetus or newborn due to lack of oxygen or lack of perfusion to various organs[1]. It is associated with tissue hypoxia and acidosis. The abnormalities may occur with either the placenta or the lungs as the organs of respiration[1,2]. The biochemical definition of asphyxia is acidosis, hypoxia and hypercapnia. With modern obstetric care only a small percentage of newborn infants are not pink and vigorous by 1-2 minutes of age[2,3]. Approximately 70% of infants requiring resuscitation come from predictably high risk situation such as the delivery of preterm infant, or a term infant who manifested signs of asphyxia during the second stage of labour[2]. The incidence of birth asphyxia depends largely on the definition used to diagnose the condition as well as the gestational age of the infant[4]. The incidence of birth asphyxia ranges from 3.7/1000 to 9/1000 live birth infants[5]. There appears to have been a significant reduction in

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the incidence of birth asphyxia in recent years but only in mature newborn infants[5,6]. The aim of this study is to determine the incidence of birth asphyxia in Prince Ali Ben Alhussein Hospital and to assess selected prenatal risk factors that might be reliable predictors of birth asphyxia

PATIENTS AND METHODS

This prospective study consist of 97 newborn infants *(57* males and 40 females who were admitted to the neonatal care unit of Prince Ali Ben Alhussein Hospital, Jordan from the first of April 2002 till the end of January 2004, who were delivered with low Apgar score. The major criteria for diagnosis of birth asphyxia in our study was having an Apgar score of <7 at *5* minutes, with one or more of the following cretaria[6]:

1. Presence of meconium stained liquor.
2. Subsequent convulsions occurring within 48 hours of birth.
3. Need for assisted ventilation by facemask and oxygen or endotracheal intubatian.

Detailed maternal history was taken, regarding their age, parity, gestational age, complications and sedation during labour. Apgar score assessed neonates immediately after birth at 1,5 and 10 minutes. Their birth weights and their level of consciousness were also assessed. Out of 9602 live birth infants born during 10 months period at this hospital, 102 normal neonates with Apgar score > 7 at 5 minutes were selected randomly as a control group with detailed information taken as previously mentioned for birth asphyxia group. Severe asphyxia was detected according to the following criteria[4]:

1. Apgar score 0-3 at 10 minutes (other causes of depression have been excluded).
2. The infant remains hypotonic for at least several hours.
3. The presence of neonatal seizures.

Chi-squared (x^2) test was used to assess statistical significance. p-value was considered significant if less than 0.05.

RESULTS

A total of 9602 live birth infants were born in Prince Ali Ben Alhussein Hospital from the first of April 2002 to the end of January 2004 and 124 newborn infants had Apgar scores <7 at 5 minutes. Clinical signs of severe asphyxia were present in 23 newborn infants. The incidence of Apgar scores < 7 at 5 minutes was 12.9/1000 live born infants and the incidence rates of birth asphyxia and server asphyxia were 10.1/1000 and 2.4/1000 live born infants respectively. Seizures occurred in 12 out of 97 newborn infants, beginning in 9 cases within 12 hours of birth. Asphyxial death occurred in 22 out of 97 newborn infants. The relationship between perinatal risk factor, birth asphyxia and severe asphyxia were also studied. There was no statistically significant relationship between birth asphyxia, severe asphyxia and birth weight (p>0.05) Table-I. Similarly there was no significant relationship between birth asphyxia and gestational age (p<0.05), however, gestatioal age was significantly associated with severe asphyxia (p<0.05) Table-II. There was no significant association between birth asphyxia (including severe asphyxia) and parity of mothers (p> 0.05) Table-III. There was marked and significantly higher percentages of deliveries by emergency caesarean section

Table-I: Birth asphyxia and severe asphyxia by birth weight

Birth weight kg	*No. of birth asphyxia cases and percentage (%)*	*No. of severe asphyxia cases and percentage (%)*	*No. of control group and percentage (%)*
1 - 2.5	12(12.4)	6(26.1)	12(11.6)
2.6 - 3	36(37.1)	11(47.8)	41(40.3)
>3	49(50.5)	6(26.1)	49(48.1)
TOTAL	97(100)	23(100)	102(100)

among asphyxiated group compared to the control group (33% of asphyxiated group and 39.1% of severely asphyxiated groups in comparison with 6.8% of control group) Table-IV. There was no significant relationship between the occurrence of birth asphyxia including severe type) and maternal disease (p>0.05) Table-V.

Table-II: Birth asphyxia and severe asphyxia by gestational age

Gestational age (weeks)	*No. of birth asphyxia cases and percentage (%)*	*No. of severe asphyxia cases and percentage (%)*	*No. of control group and percentage (%)*
28-37	18 (18.5)	6(26.1)	12(11.8)
38-41	57(58.8)	10(43.5)	76(74.5)
>41	22(22.7)	7(30.4)	14(13.7)
TOTAL	97(100)	23(100)	102(100)

Table-III: Birth asphyxia and severe asphyxia parity of mothers

Parity	*No. of birth asphyxia cases and percentage (%)*	*No. of sever asphyxia cases and percentage (%)*	*No. of control group and percentage (%)*
1	34(35.1)	10(43.5)	32(31.4)
2	17(17.5)	5(21.7)	19(18.6)
>3	46(57.4)	8(34.8)	51(50.0)
TOTAL	97(100)	23(100)	102(100)

Table-IV: Birth asphyxia and severe asphyxia by mode of delivary

Mode of delivery	*No. of birth asphyxia cases and percentage (%)*	*No. of severe asphyxia cases and percentage (%)*	*No. of control group and percentage (%)*
Normal vaginal delivary	42(43.3)	9(39.1)	75(73.5)
Emergency cesarean section	32(33.0)	9(39.1)	7(6.90)
Others	23(23.7)	5(21.8)	20(19.6)
TOTAL	97(100)	23(100)	102(100)

Table-V: Birth asphyxia and severe asphyxia by maternal disease during preganacy

Maternal disease	*No. of birth asphyxia cases and percentage (%)*	*No. of severe asphyxia cases and percentage (%)*	*No. of control group and percentage (%)*
No maternal disease	72(74.2)	17(73.9)	88(86.3)
Maternal disease: antepartum hemorrhage, preeclamsia, chorioaminitis, dm	25(25.8)	6(26.1)	14(13.7)
TOTAL	97(100)	23(100)	102(100)

DISCUSSION

In this case-control study, the incidence rates of birth asphyxia and severe asphyxia were 10.1/1000 and 2.4/1000 live born infants, respectively. These rates are relatively high if compared with those reported by a study done in Goteborg from 1985 to 1991 for estimating the incidence of birth asphyxia in Swedish population[7]. In fact, the real incidence of birth asphyxia in our population may be higher than the obtained figure (10.1/1000) because the present study included only hospital deliveries in the city of Karak. However, the relatively high figure (10.1/1000) can be explained by the fact that 53.6% of mothers do not have regular antenatal care and there was delay in seeking hospital care, as many pregnant mothers attend to hospital late with midwife interference and signs of fetal distress were already present. In addition to shortage in availability of facilities important for early detection of fetal distress blood sampling for pH estimation, this study showed that the neonatal form asphyxia was much higher (2.3/1000) in comparison to the Swedish study (0.3/1000)[7], and this may be explained by the high incidence of severe asphyxia and shortage in availability of some facilities like ventilators for those who need it. This study also assessed the influence of selected perinatal risk factors in the etiology of birth asphyxia and the relative importance of these factors in determining the risk of asphyxiated infants to develop severe asphyxia. The study showed that there was no statistically significant relationship between birth asphyxia (including severe type) and birth weight, as the distribution of birth weight was almost similar in both asphyxiated and control groups (table-I) and these results are different from that obtained in a Nigerian study[8], which was done over three years period and showed that infants with low birth weight (intrauterine growth retardation) plays a significant role in occurrence of severe type of asphyxia. The study showed that there was no significant relationship between birth asphyxia and gestational age (table-II). But this parameter (gestational, age) was statistically significant risk factor for severe asphyxia (table-II), about 26.1% of cases below 37 weeks in comparison with 11.8% of control group. These results are comparable with results of study done at Pittsburgh University whereby about 46.2% of cases were below 37 weeks of gestation[9]. Therefore this study supports the previously reported increase in the incidence of asphyxia with decreasing gestational age. Regarding parity, there was no significant association between birth asphyxia (including severe type) and parity of mothers (table-III) and these results are similar to that of Pittsburgh study[9], but different from that obtained in an Indian study[10], which shows that primigravidity carried high risk for birth asphyxia. The results in our study may be explained by a high antenatal and labour care given to primigravid mothers. Regarding the mode of delivery, this study showed that a significantly higher proportions of cases than controls were delivered by emergency caesarean section, 33% of asphyxiated group and 39.1% of severe group (table-IV) in comparison with 6.9% of the control group, however, when we consider a section as a low risk category according to primary indications[9] (cephalo—pelvic disproportion, failure to progress, malpresentation, elderly primi) and high risk category (fetal distress, prolapsed cord, abruptio placentae, IUGR, maternal toxemia, maternal diabetes, prolonged rupture of membrane) we found that only the high risk category, which represented 70.3% of total cases, delivered by caesarean section, was associated with a significant increase in incidence of asphyxia. This indicates that the section itself is not an important factor in producing asphyxia, and this fact, is more appreciated when we know that all cases (9 cases) of severe asphyxia delivered by caesarean section belong to high risk category. This result is identical to Pittsburgh study result[9]. Also this study, showed no significant relationship between occurrence of asphyxia and maternal disease during pregnancy (table-V) and these results are different from that obtained in an Indian study[10] results in which antepartum

haernorrhage and pregnancy induced hypertension carried high risk for birth asphyxia, probably the number of patients play a role to explain this finding.

CONCLUSION

The incidences of birth asphyxia 10.1/1000 live birth infants and sever asphyxia 2.4/1000 live born infants were relatively high due to absence of regular antenatal care in high proportion of pregnant mothers (5 3.6%), delayed seeking a hospital care during labour and shortage in availability of facilities important for early detection of fetal distress fetal blood sampling for pH estimation. Multivariate analysis of high risk factors associated with increased risk of asphyxia showed that prematurity and delivery by caesarean section were associated with higher incidence of asphyxia. We suggest further investigations to be carried out using a large sample size and including additional risk factors as lack of antenatal care and midwife interference.

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