Asphyxia Neonatorum—Incidence in Cape Town

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SUMMARY

The over-all incidence of asphyxia neonatorum as well as that for the various complications of pregnancy and modes of delivery are reported for the non-Whites in Cape Town. The increased incidence in this population group can be partly accounted for by the frequency of certain complications of pregnancy and abnormal modes of delivery. Of additional significance is the association between both increasing maternal age and asphyxia neonatorum. The high incidence of infants with low birthweight also contributes considerably towards the prevalence of the condition.

S. Afr. Med. J., **48**, 2183 (1974).

Failure to establish regular respiration after birth remains a major cause of newborn mortality and morbidity. The long-term sequelae of such failure of adaptation to extra-uterine life can be very serious indeed. Prevention and prompt management of asphyxia neonatorum is the task of all concerned with the process of human reproduction. In order to achieve this, a study of the incidence and risk factors of asphyxia neonatorum was undertaken in the Groote Schuur Maternity Hospital.

PATIENTS AND METHODS

A prospective study was carried out on all infants delivered in the Groote Schuur Maternity Hospital from 1 April 1971 to 31 March 1972. All mothers in this maternity hospital were non-White, and full details of their pregnancies and deliveries were recorded. Asphyxia neonatorum (syn. birth asphyxia) was diagnosed if the 1-minute Apgar score[1] was 0 - 3, or if the infant needed artificial ventilation in the first 10 minutes of life.

RESULTS

Table I gives the comparative incidence of asphyxia neonatorum in the present study in the Mowbray Maternity Hospital (White mothers), and in 3 series reported in the literature. There is a substantially lower incidence among Cape Town White infants, and in the recent figures from Barcelona.[2]

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Date received: 10 July 1974.

TABLE I. INCIDENCE OF ASPHYXIA NEONATORUM

Source of information	Hospital deliveries	Period	Apgar score 0 - 3%	
			1 min	5 min
Groot Schuur Hospital	3 167	1971 - 1972	6,1	1,4
Mowbray Maternity Hospital	1 383	1971	2,7	—
Barcelona[2]	20 933	1966 - 1968	1,5	—
Sloan Hospital for Women[3]	15 384	1952 - 1956	7,9	—
Collaborative study[4]	17 221	1958 - 1964	6,7	1,8

The association between increasing maternal age and asphyxia neonatorum is shown in Fig. 1, becoming significant over 25 years of age. Increase in parity is also associated with an increased incidence of asphyxia (Fig. 2). No correlation was found between maternal age and birthweight.

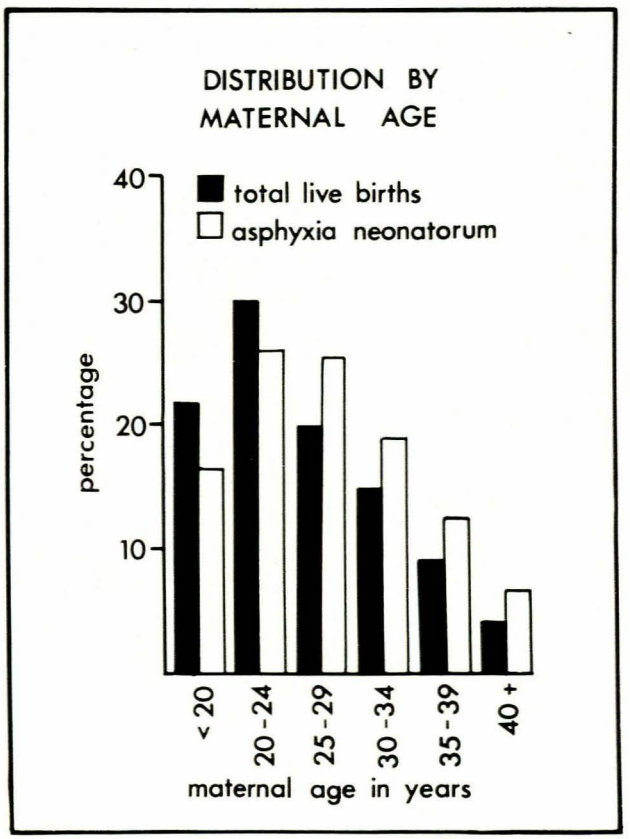

Fig. 1. Distribution of asphyxia neonatorum by maternal age.

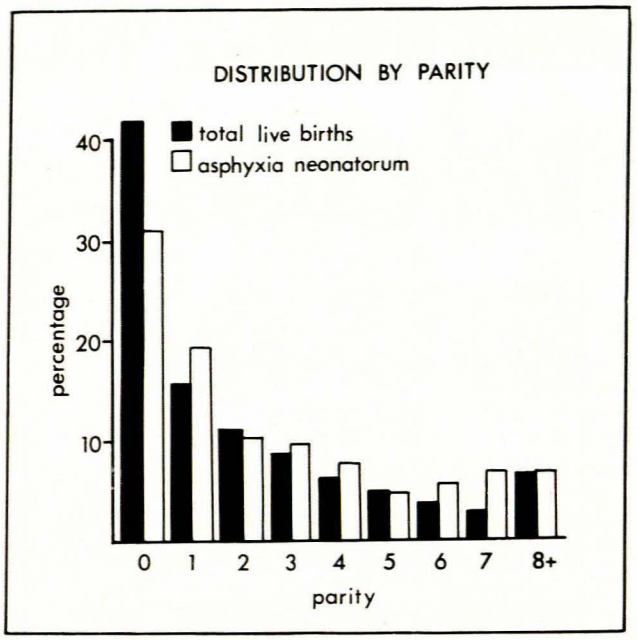

Fig. 2. Distribution of asphyxia neonatorum by parity.

Table II gives the incidence of asphyxia neonatorum as found in the various types of delivery. The incidence of 3,2% in spontaneous vertex deliveries increases to 8,8% in low birthweight infants (less than 2,5 kg). Both medical and surgical inductions are associated with an increased incidence. All other types of delivery were found to be associated with an increased incidence of asphyxia neonatorum, being particularly high in Caesarean section and breech deliveries. The figure rapidly increases in the very small infants. Surprisingly, when vacuum extraction was used, the incidence of asphyxia was only slightly higher than in spontaneous vertex deliveries. Of the 66 pairs of twins, 116 were born alive in hospital (in one case, a retained twin was born in hospital, the other having been delivered in the district). There were 5 stillbirths. Of the 18 with asphyxia neonatorum, 7 were first-born and 11 second-born twins. In one case both were asphyxiated, and in another the first was asphyxiated and the other stillborn.

TABLE II. INCIDENCE — METHOD OF DELIVERY

Delivery	Percentage of total deliveries	Percentage asphyxiated
Spontaneous vertex	74,3	3,2
Low birthweight	15,6	8,8
Medical inductions	7,0	7,8
Surgical inductions	5,0	16,5
Caesarean section	12,2	20,8
Low birthweight		35,0
Forceps	7,2	12,1
Vacuum extraction	2,6	4,7
Breech	3,7	30,0
Low birthweight		40,9
Twin	3,7	15,5

The influence of maternal diseases and complications of pregnancy on the frequency of asphyxia neonatorum are listed in Table III. The hypertensive conditions of pregnancy are significantly associated with asphyxia neonatorum.

TABLE III. INCIDENCE — DISEASES AND COMPLICATIONS OF PREGNANCY

Maternal condition	Percentage of pregnancies	Percentage asphyxiated
Pre-eclamptic toxaemia ...	9,0	17,6
Eclampsia	0,3	20,0
Hypertension	3,2	23,8
Cardiac disease	3,1	3,1
Anaemia	12,7	6,3
Diabetes	2,3	16,4
Placenta praevia	2,1	20,0
Abruptio placentae	2,0	17,7
APH (unclassified)	4,5	7,6
Clinical fetal distress	9,1	18,3

Maternal cardiac disease was associated with a remarkably low birth asphyxia rate, whereas maternal anaemia (diagnosed by recording a haemoglobin concentration of less than 10 g/100 ml during pregnancy) was complicated by asphyxia neonatorum in 6,3% of cases. Diabetes mellitus, diagnosed in mothers with an abnormal oral glucose tolerance test, was associated with a moderately increased rate.

Placenta praevia referred to vaginal haemorrhage after 28 weeks' gestation, where a placenta was felt at vaginal examination or was seen to be in the lower segment at

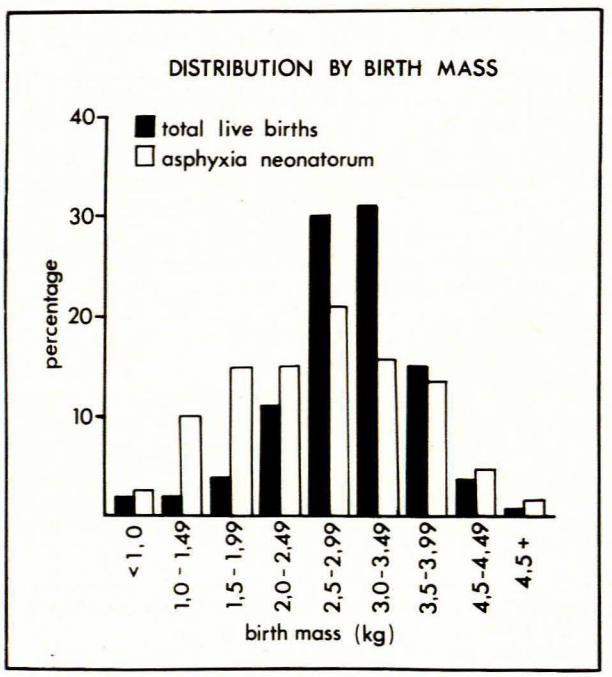

Fig. 3. Distribution of asphyxia neonatorum by birthweight.

Caesarean section. Abruptio placentae was diagnosed by finding significant retroplacental haemorrhage. Vaginal haemorrhage after 28 weeks' gestational age, not classified as placenta praevia or abruptio placentae, was termed unclassified antepartum haemorrhage.

Clinical fetal distress was diagnosed if there was meconium-stained liquor in a cephalic presentation, or if the fetal heart rate was more than 160/minute, less than 120/minute or was grossly irregular. Although this is a notoriously inaccurate measure of intra-uterine hypoxia, in this group 18,3% of cases resulted in birth asphyxia.

Figs 3 and 4 demonstrate the increased incidence of asphyxia neonatorum at the extremes of birthweight and gestational age. This applies particularly to low birthweight and preterm infants. There was a male preponderance of birth-asphyxiated infants of 57,2%.

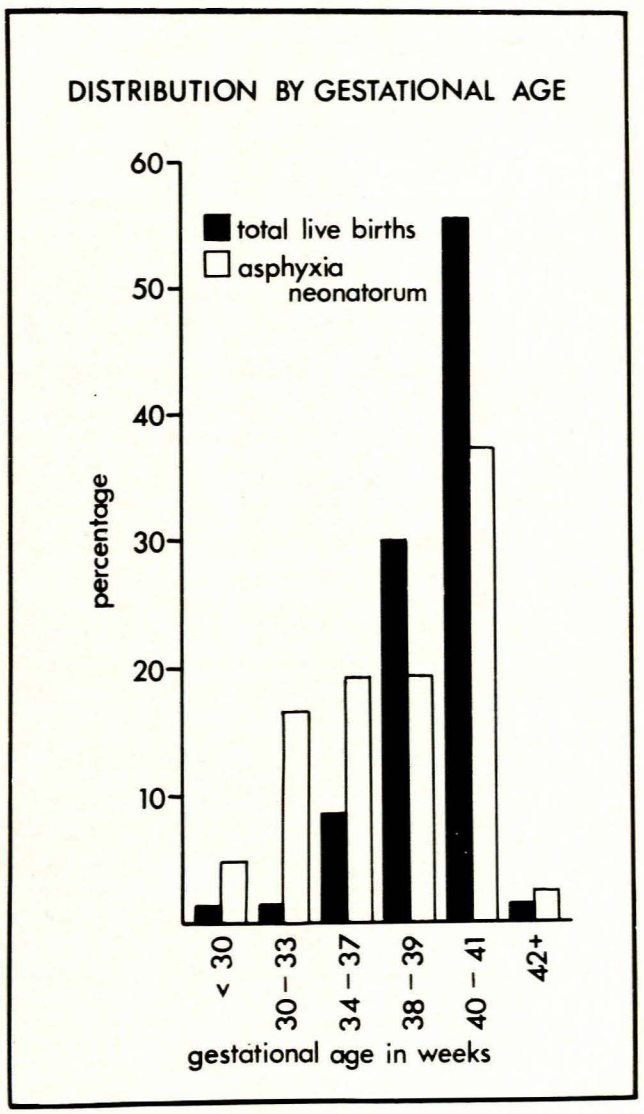

Fig. 4. Distribution of asphyxia neonatorum by gestational age.

DISCUSSION

The trend towards a decrease in the incidence of asphyxia neonatorum apparent in Western countries is reflected in our White infants. The situation among the non-Whites, however, is similar to that in the USA in the 1950s and early 1960s.[3,4] There is a high rate of low birthweight infants in the non-White population, and this agrees with Yerushalmy's figures for the USA (6,7% in Whites and 13,7% in non-Whites),[5] and with those in the collaborative perinatal study (7,1% in Whites and 13,4% in non-Whites).[6] The number of asphyxiated infants increases markedly in low birthweight Caesarean sections and breech deliveries.

Labour was induced in 12% of pregnancies, which is a comparable figure with that given in the perinatal mortality survey in Britain.[7] When considering the increased frequency of birth asphyxia, particularly in surgically induced infants, one must take into account the indication for the procedure.

Caesarean sections were performed in 12,2% of pregnancies. In a study in New South Wales reported in 1967, the incidence was 4,5% of all deliveries, rising to 7,1% in teaching hospitals.[8] Factors contributing to asphyxia neonatorum in Caesarean sections include the indication for the operation as well as the effect of the anaesthetic on the infant. In the present series most of the Caesarean sections were performed under general anaesthesia with nitrous oxide.

Whereas forceps deliveries were associated with an increased rate of asphyxia neonatorum, this was not the case with vacuum extraction. Vacuum extraction, therefore, as carried out in the Groote Schuur Maternity Hospital, is a safe procedure when judged by the incidence of asphyxia neonatorum.

The incidence of breech deliveries compares with that reported in the literature.[9] The high rate of asphyxia neonatorum stresses the danger of this method of delivery, and the fact that the incidence rises dramatically in low birthweight infants emphasises the importance of the asphyxial aspects in addition to the purely traumatic ones.

The incidence of hypertensive disorders of pregnancy is difficult to assess. The figure quoted in the collaborative perinatal study in the USA for non-Whites was 12,7%.[10] In our series 12,2% of the mothers had pregnancies complicated by hypertension, with a high incidence of asphyxia neonatorum.

The incidence of both maternal cardiac disease and diabetes mellitus recorded here is higher than usual because such cases are concentrated in this hospital. Of interest is the low rate of asphyxia neonatorum in infants of mothers with cardiac disease compared with those of diabetic mothers.

The incidence of antepartum haemorrhage was slightly higher than that reported by Niswander *et al.*[11] for non-Whites in the USA (accidental haemorrhage 1,17% and placenta praevia 0,548%). Abruptio placentae is associated with an exceptionally high perinatal mortality, mainly resulting from stillbirths. The incidence of asphyxia neonatorum is only moderately increased. The high rate of depressed infants in placenta praevia is accounted for

partly by the underlying condition and partly by their delivery by Caesarean section and the increased frequency of low birthweight infants in this group.

Since there was no significant correlation between maternal age and birthweight in the series, two groups of patients emerge. Firstly, the infants born to elderly multiparas, and secondly, the low birthweight infants. These groups probably contribute significantly to the increased incidence of asphyxia neonatorum in the non-Whites of the Western Cape. Improving birth control would undoubtedly reduce the numbers in the first group. The second group, which has been studied by Moodie *et al.*,[12] requires to be approached on a broader front, since nutritional and socio-economic factors play a large part in their occurrence.

Cases which must be considered of high risk, therefore, are those with a maternal age greater than 25 years, a fetus of low weight or gestational age, breech deliveries and inductions, and forceps or Caesarean section deliveries for complications of pregnancy.

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