

## Incidence of Congenital Heart Disease in Nigerian Children

B. GUPTA AND A. U. ANTIA

*From the Departments of Pædiatrics, Adeoyo and University College Hospitals, Ibadan, W. Nigeria*

This is an extended study of an investigation of congenital malformations in Nigerian children. Little is known about the incidence and types of congenital heart disease in African children, and there appear to be no detailed reports available either on clinical or necropsy records, except a paper by Caddell and Connor (1966). It is not easy to select a sample of the population that would provide this information. Even in the European series most reports deal with the incidence of congenital heart disease as found at necropsy or at cardiac clinics (Abbott, 1936; Wood, 1950) or in schoolchildren, which obviously excludes cases of severe cardiac malformations dying in infancy (Rauh, 1939; Robinsons, Aggeler, and Daniloff, 1948; Stuckey, 1956). The incidences reported by MacMahon, McKeown, and Record (1953), Carlgren (1959), and Hay (1966) are the most informative.

### SUBJECTS AND METHODS

The present investigation is a survey on the incidence of congenital heart disease in 4220 infants of consecutive births in a large general hospital at Ibadan, Western Nigeria. All children born at Adeoyo hospital between February 1 and July 31, 1964, were included. During the six-month period, 4066 mothers delivered a total of 4220 children. All live births were examined within 24 hours and children in whom congenital heart disease was suspected but not confirmed were followed up. There were 339 deaths (stillbirths 166 and neonatal deaths 173). Necropsy was performed in 327, including all stillbirths and most neonatal deaths. Detailed case histories of the mothers were not available as most of these mothers came from lower socio-economic groups without any set standard of education.

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### FINDINGS

Congenital heart disease occurred in 15 children, an incidence of 3.5 per 1000 births. The incidence of all congenital malformations was 3 per cent and malformations of the heart formed one-eighth of the total malformations. There were 29 children among the 4054 live births who had a systolic murmur at birth and who have been kept under observation to decide whether it was significant of a cardiac malformation or not. At 2 years of age, 6 of them still had a loud systolic murmur that certainly indicated a cardiac malformation; 14 had no systolic murmur and no malformation of the heart at the age of 18 months; and of the remaining 9, the systolic murmur was only faint in 1 of 3 followed for 3 months and in 2 of the 6 followed for six months.

The specific diagnosis of the 6 children who had a constant systolic murmur after 2 years was made by clinical, radiological, and electrocardiographic examinations, without catheterization or angiocardiology. With experience, the diagnosis of congenital heart disease can be reasonably reliable even without these special investigations. Two had patent ductus arteriosus, 2 ventricular septal defect, and 2 pulmonary stenosis (Table I).

Specific diagnosis was made at necropsy in 9 of the 15 affected children. Of the stillbirths, 5 had congenital heart disease—coarctation of aorta (1), patent ductus arteriosus (1), atrial septal defect (1), ventricular septal defect (1), and cor triloculare (1).

Of the neonatal deaths, 4 had congenital heart disease—transposition of the great vessels (2), patent ductus arteriosus (1), and atrial septal defect (1).

In the present series only 4 were found to have congenital malformations of other systems. These

TABLE I  
TYPES OF MALFORMATIONS OF THE HEART

Cardiac malformation	Living children	Still-births	Neonatal deaths	Total	Sex		Associated malformations
					M	F	
Patent ductus arteriosus	2	1	1	4	2	2	—
Ventricular septal defect	2	1	—	3	1	2	Polydactyly
Pulmonary stenosis	2	—	—	2	2	0	—
Transposition of great vessels	—	—	2	2	2	0	—
Atrial septal defect	—	1	1	2	1	1	Bilobed R. lung
Coarctation of aorta	—	1	—	1	1	0	Bilobed R. lung
Cor triloculare	—	1	—	1	1	0	Micrognathos
Total	6	5	4	15	10	5	4 of 15

TABLE II  
MATERNAL AGE AT BIRTH OF 2572 NORMAL AND THE AFFECTED CHILDREN

Age (yr.)	Normal children	Affected children
15-19	485	3
20-24	913	5
25-29	784	5
30-34	219	2
35-39	152	0
40-44	19	0
Total	2572	15

TABLE III  
BIRTH RANKS OF AFFECTED AND NORMAL CHILDREN OF 3865 MOTHERS

Birth ranks	No. of normal children	No. of affected children
First parity	894	2(0.22%)
Second parity	933	4(0.43%)
Third parity	879	5(0.57%)
Fourth parity	559	2(0.36%)
Fifth parity	600	2(0.33%)
Total	3865	15

were bilobed right lungs (2), polydactyly (1), and micrognathos (1) (Table I).

*Maternal Age.* The maternal age at the time of birth of 2572 normal children and 15 affected children during the same period is given in Table II. The accuracy of these cannot be guaranteed in view of the poor histories. No conclusion can be made in regard to influence of maternal age on the incidence of congenital heart disease, though the majority fall between the ages of 15 and 30 years.

*Birth Rank.* The birth ranks of 3865 normal and 15 affected children were available. Children born to mothers of third parity were most affected in this study (Table III).

*Sex Ratios.* There were 10 boys and 5 girls in the affected group compared with 2184 boys and 2021 girls in the control series. The sex ratio of boys to girls is 2:1, but the numbers are too small to have real statistical value.

DISCUSSION

An attempt has been made to record cases of congenital heart disease in 4220 consecutive births of Nigerian children. Diagnosis was confirmed by clinical examination and at necropsy. In compari-

son with the European series the numbers are too small, but since few surveys have been made in children of African origin, the following observations are worth recording.

The incidence of congenital heart disease in this study is 3.5 per 1000 of all births. Holoubek, Holoubek, and Baker (1947) reported 4.8 per cent in 294 deaths in American Negroes; Schwartz, Schamroth, and Seftel (1958) reported 1.1 per cent in a hospital admission of 275 in Africans of Johannesburg; and Tulloch (1958) noted 2.8 per cent in Jamaicans in 1258 necropsies. These figures, of course, do not represent the incidence of congenital heart disease of African origin as they are not drawn from children alone.

MacMahon *et al.* (1953) concluded that estimates of the incidence at necropsy (reported by Leech, 1935; Potter, 1940, among many others) and in patients admitted to hospital (Roberts, 1937; Thordarson, 1947) vary widely and are equally unsatisfactory as indices of incidence in all births. They found 3.2 per 1000 of live births. Gardiner and Keith (1951) reported 2.2 per 1000 between birth and 15 years. Richards *et al.* (1955) found it to be 7.6 per 1000 but they included many minor malformations; if these are excluded the figure becomes 2.5 per 1000. Carlgren (1959) noted 6.4 per 1000 of live births. Recently Campbell (1965)

confirmed the incidence of heart malformations as 6 per 1000, based on the reports by McKeown and Record (1960) and Carter (1961).

The frequency of the individual lesion is difficult to determine accurately. Most figures depend on whether one considers living or necropsy material, and each author's series in terms of age or type of the disease. The present series is small and no conclusion can be made concerning the incidence of specific malformations. The commonest finding was patent ductus arteriosus (4). MacMahon *et al.* (1953), Carlgren (1959), Campbell (1965), and Hay (1966) all report that ventricular septal defect is the commonest. This was the second most common in this study.

MacMahon *et al.* (1953), Lamy, de Grouchy, and Schweisguth (1957), and Campbell (1965) noted that the non-cardiac malformations occurred much more often than would be expected by chance. In this series 4 of the affected children had malformations of other systems and those were not of much significance (Table I).

MacMahon (1952) thought that the third born children were more liable to cardiac malformations, but Campbell (1965) reported that the birth order alone had no influence on the production of malformations of heart. Our figures are not informative as the number involved is small, but they do show that third born children are slightly more often affected and first born children rather less.

In the series of MacMahon (1952) there was some preponderance of affected children in the higher age-groups. In our series the relation of maternal age to malformations is not significant.

There is general agreement that persistent ductus arteriosus is more common in girls than in boys, but that all malformations of the heart taken together are rather more common in boys. Our numbers are very small but are shown in Table I.

The incidence of congenital heart disease in stillbirths is probably higher than all births (MacMahon, 1952), and Jacobius and Moore (1938) recorded a much higher incidence, but Potter (1938) stated that congenital heart disease was not a common cause of stillbirth. There were 3 cases of congenital heart disease per 1000 of stillbirths in this series. Except for the case of cor triloculare and two cases of transposition of the great vessels, cardiac malformations were not the cause of stillbirths.

The history of maternal illness during pregnancy was so poor that no attempt was made to draw any conclusion and the scanty family history of the cases throws no light on the influence of heredity.

#### SUMMARY

A survey has been made to find out the incidence

of congenital heart disease in a series of consecutive births of 4220 in Nigerian children. The incidence is 3.5 per 1000, but the figure is provisional as the numbers are small. More detailed study will be required to establish the types of congenital heart disease and the influence of maternal age, parity, illnesses, and genetic factors on congenital heart disease in African children. Our findings are compared with those of the European series.

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