

Prevalence of congenital heart disease among schoolchildren of Sahafa Town, Sudan

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معدل انتشار أمراض القلب بين تلاميذ المدارس في مدينة الصحافة بالسودان
صديق إبراهيم خليل وخالد غريب ومحمد الحاج ومحمد خليل وسوزان حكيم

خلاصة : تمت دراسة معدل انتشار أمراض القلب الخلقية بين تلاميذ المدارس الذين تتراوح أعمارهم بين خمس سنوات وخمس عشرة سنة وذلك كجزء من المرحلة الأولى في برنامج الوقاية من أمراض القلب الروماتيزمية في السودان الذي يجري في إطار البرنامج العالمي للحصن الروماتيزمية بمنظمة الصحة العالمية . ولقد تم فحص 13322 تلميذا بمدينة الصحافة بالخرطوم فيما بين سنة 1986 وسنة 1990 . ويمثل هذا العدد 70% من مجموع الجمهرة المستهدفة . وتم اكتشاف 27 حالة من أمراض القلب الخلقية ، أي بمعدل انتشار قدره 2.0 لكل 1000 . أما ثقب الحاجز البطيني وثقب الحاجز الأذيني والقناة الشريانية السالكة ورباعي فالو فكانت تمثل 85% من الحالات . وكانت حالات القناة الشريانية السالكة وثقب الحاجز الأذيني تبلغ بين الإناث ضمني عددهما بين الذكور . يستخلص من ذلك أن معدل انتشار هذه الحالات مشابه لما في البلدان الأفريقية المماثلة ولكنه أقل من المعدلات السائدة في أوروبا وأمريكا الشمالية .

ABSTRACT The prevalence of congenital heart disease among schoolchildren aged 5–15 years was studied as part of Phase 1 of the WHO Global Rheumatic Fever/Rheumatic Heart Disease Prevention Programme in Sudan. A total of 13 322 schoolchildren in Sahafa Town, Khartoum, was examined from 1986 to 1990 representing 70% of the total target population. There were 27 cases of congenital heart disease giving a prevalence rate of 2.0 per 1000. Ventricular septal defect, atrial septal defect (ASD), patent ductus arteriosus (PDA) and tetralogy of Fallot made up 85% of the cases. PDA and ASD were twice as common in females as in males. The prevalence rate is comparable to that of similar African countries but lower than European and north American rates.

Prévalence des cardiopathies congénitales chez des écoliers de la ville de Sahafa au Soudan

RESUME La prévalence des cardiopathies congénitales chez des écoliers âgés de 5 à 15 ans a été étudiée dans le cadre de la phase 1 du Programme mondial OMS de prévention du rhumatisme articulaire aigu et des cardiopathies rhumatismales au Soudan. Au total, 13 322 écoliers de Sahafa, Khartoum, ont été examinés de 1986 à 1990, représentant 70% de la population cible totale. Il y avait 27 cas de cardiopathies congénitales, ce qui donne un taux de prévalence de 2.0 pour 1000. La communication interventriculaire, la communication interauriculaire, la persistance du canal artériel et la tétralogie de Fallot comptaient pour 85% des cas. La persistance du canal artériel et la communication interauriculaire étaient deux fois plus fréquentes chez les filles que chez les garçons. Le taux de prévalence est comparable aux taux de pays africains similaires mais inférieur aux taux des pays européens et d'Amérique du Nord.

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Introduction

Congenital heart disease has been reported to account for 3.9% of the total hospital admissions for cardiovascular disease in Sudan [1]. There has been no population-based study on congenital heart disease and all available data have been extracted from hospital records, which do not give accurate information on the prevalence of the disease.

The objectives of this study were to conduct a case-finding prevalence survey of congenital heart disease among schoolchildren of Sahafa Town, Khartoum, and to study the types and frequency of individual congenital defects.

The study was part of Phase I of the World Health Organization Global Rheumatic Fever/Rheumatic Heart Disease (RF/RHD) Prevention Programme in Sudan. The specific objectives of this programme were to carry out a case-finding prevalence survey to determine the prevalence of rheumatic fever and rheumatic heart disease among schoolchildren aged 5–15 years in Sahafa Town, and to initiate and maintain a programme of regular secondary prophylaxis [2].

Sahafa Town was built in the mid 1960s on the southern outskirts of Khartoum, and by 1986 it had a population of at least 300 000, 30% of whom were under the age of 15 years. Its population consists of two fairly distinct groups: the original inhabitants, who have been living in the inner town area since the town was founded; and the newer inhabitants who came to settle in the outer town areas following the drought that affected the country in the early 1980s. The majority of the original inhabitants are skilled workers, although a small middle class exists; most of the newer inhabitants are unskilled workers living in poor housing conditions [2].

Methods

The study was conducted in Sahafa Town, Khartoum and arrangements were made to examine all children aged 5–15 years registered by the town council authority. The target population of 18 977 was derived from population estimates provided by Sahafa Town Council.

The children were examined by a group of physicians headed by a cardiologist and consisting of six physicians and four auxiliary staff, all trained at Shaab Teaching Hospital. Teachers and children were given talks to inform them of the aim of the study.

Each child was given general and cardiovascular examinations by a physician. Any children showing an abnormal heart condition such as central cyanosis, cardiac murmur, cardiomegaly, arrhythmia or those with non-cardiac congenital abnormality were examined later in hospital by a cardiologist and given a 12-lead electrocardiogram and chest X-ray.

Echocardiography examination was conducted using M-mode and 2-D echocardiogram. The left parasternal, short axis, suprasternal, apical and subcostal views were all scrutinized. A normal saline contrast-echocardiogram was performed to define any interatrial or interventricular septal defects.

Only five children had a history of prior cardiac catheterization and two had had cardiac surgery before the beginning of the study. Cardiac catheterization was not available as an investigative procedure at the time of this study.

The clinical findings and confirmed diagnoses were recorded, together with data on other diagnosed congenital abnormalities, age at onset of symptoms and age of the mother.

Table 1 Prevalence of CHD and RF/RHD in the programme area

Area	Target population	Number screened	CHD PR/1000	RF/RHD PR/1000
Sahafa inner town	111 77	8 263	2.5	15
Sahafa outer town	7 800	5 059	1.1	4

CHD = congenital heart disease

RF/RHD = rheumatic fever/rheumatic heart disease

PR = prevalence rate

Results

A total of 13 322 children on the school register, 7892 boys and 5430 girls, were examined at school. The children screened represented only 70% of the target population; the other 30% were children who were unable to attend school for various reasons.

Out of 536 children referred to hospital for re-evaluation, 146 were diagnosed as confirmed RF/RHD and 27 were diagnosed as congenital heart disease (16 girls and 11 boys). In 351 cases, neither RF/RHD nor congenital heart disease could be confirmed. These cases were classed as suspected RF/RHD as they did not fulfil Jones criteria for diagnosis of rheumatic fever but all investigations excluded congenital heart disease. Only 12 of the children referred to hospital were found to have a normal cardiovascular system.

Of the five children who had undergone cardiac catheterization, three were found to have patent ductus arteriosus (PDA), atrial septal defect (ASD) and ventricular septal defect (VSD) and two had tetralogy of Fallot. Two children required surgery: ligation of PDA and correction of the tetralogy of Fallot.

Table 1 shows the prevalence rate of congenital heart disease and that of rheumatic fever and rheumatic heart disease in

the programme area. Table 2 shows the frequency of individual congenital defects found during the survey. PDA and ASD were twice as common in girls as in boys but all other defects showed equal male to female distribution. VSD, ASD, PDA and tetralogy of Fallot were the most common congenital defects and accounted for 85% of all cases.

All mothers were under 40 years of age (mean 21 years) at the time of delivery of the affected child. Apart from one case of Marfan syndrome presenting with ASD, no other associated congenital abnormalities were found. Of the 27 children with congenital heart disease, only five were aware of their condition prior to the study.

Table 2 Frequency of individual congenital heart defects in the programme area

Congenital heart defect	Percentage (n = 27)
Ventricular septal defect	44.4
Atrial septal defect	18.5
Tetralogy of Fallot	11.1
Patent ductus arteriosus	11.1
Aortic stenosis	7.5
Pulmonary stenosis	3.7
Dextrocardia	3.7

Discussion

The study showed that the prevalence of congenital heart disease among children aged 5–15 years was 2.0 per 1000; however, this represented only those who had survived until the age of five years. Children under 5 years of age were not represented in this study.

The prevalence rate is comparable to that reported from other African countries such as Uganda (3 per 1000) [3] and Nigeria (3.6 per 1000) [4,5]. The prevalence rate is, however, much lower than that reported in the United States of America (8 per 1000) [6], and the United Kingdom (6.6 per 1000) [7]. This could be attributed to different genetic and environmental factors. It is possible that mothers in Sudan and other similar developing countries are less exposed to potential teratogens capable of causing cardiac malformations. Examples of such agents are: lithium, cocaine, excess vitamin intake, ionizing radiation, alcohol and food preservatives. It is believed that exposure to such agents is higher in industrialized communities [8–10]. Another factor may be the age of the mother; the mean age in this study was 21 years.

The offspring of parents with certain types of congenital heart disease are at a greater risk (8.8%) of having significant cardiac defects [11]. None of the mothers involved in this study suffered any form of congenital heart disease. PDA is also reported to occur as a consequence of intra-uterine rubella [12], but there was no history of rubella among mothers of affected children.

The prevalence rate of both congenital heart disease and RF/RHD was higher among inner town inhabitants (Table 1). This could be explained by inner town overcrowding in the case of RF and RHD, but environmental conditions of the inner town may be the most likely predisposing factor for congenital heart disease.

Conclusion

The prevalence rate of congenital heart disease in Sahafa Town, Sudan, was found to be 2.0 per 1000. The rate is low compared to European and North American rates. Efforts should be made to prevent any increase in the prevalence rate by improving public awareness of environmental factors conducive to congenital heart disease.

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