

## Original Research Article

# Acquired heart diseases in children in Gadarif pediatrics teaching hospital, Gadarif state, Eastern Sudan

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## ABSTRACT

**Background:** Acquired heart diseases (AHD) are heterogeneous diseases including rheumatic heart disease (RHD) and other affecting the heart and blood vessels after birth but usually appear clinically after 5 years of age. AHD considered as major cause of morbidity and mortality. The present study was designed to document the spectrum, the affected age and clinical characteristics of AHDs in children of Gadarif state, eastern Sudan.

**Methods:** This was a descriptive cross section study conducted in Gadarif pediatrics teaching hospital in period from June to Dec 2019.

**Results:** A total of 46 children from Gadarif pediatrics teaching hospital with confirmed AHD were enrolled in this study. The females were 27 (58.7%), with a male-to-female ratio of 1.4:1. The mean age was 10.6±3.9 years (age's ≤16 years old); the most common affected age group was 10-14 years accounted 18 (39.1) cases. RHD was the commonest AHD found in 38 (82.6%) patients, the commonest valvular lesion was mitral regurgitation 31 (73.9%).

**Conclusions:** RHD was the most common AHD in the children in the present study, there is need to improve the scope of intervention facilities in the Sudan particularly in rural areas to prevent the growing and spread of these diseases.

**Keywords:** Acquired heart disease, Children, Gadarif state, Sudan

## INTRODUCTION

Acquired heart diseases (AHD) are diseases of the cardiovascular system affecting the children after birth, as opposed to congenital heart disease, which is present at birth<sup>1</sup>. AHD represent major public health problems in the developing world in general and Africa in particular, cause mortality and morbidity in children.<sup>1-3</sup> The acquired cardiac diseases result in right and/or left heart overload

which leads to hypertrophy of one or more cardiac chambers (ventricles and atriums) and could be a cause for most of clinical presentation of the disease, e.g., the left ventricular hypertrophy, dilation and remodeling have been considered as markers and outcome assessment in acquired heart disease.<sup>4,5</sup> Types of AHDs, include RHD, Kawasaki disease, cardio-myopathies, pericarditis, and core pulmonale.<sup>6</sup> They are arising from damage to the heart and blood vessels by a variety of

processes including ischemic/hypoxic, metabolic, nutritional, inflammatory and infectious processes.<sup>7</sup> RF may lead to RHD, resulting in progressive and permanent cardiac valve damage.<sup>8</sup> RF is considered an autoimmune disease associated with group A  $\beta$ -hemolytic streptococcal infection in susceptible individuals who was having throat or skin infection, in the course of which the patient develops carditis, arthritis, chorea, subcutaneous nodules and erythema marginatum as major criteria. Rheumatic fever diagnosis based on the Jones criteria, that developed in 1944, and then revised twice by the American heart association (AHA), in 1992 and recently in 2015.<sup>9</sup> There is a geographic variation in the prevalence of the various types of AHDs even within similar geographic regions.<sup>10</sup> In developed countries Kawasaki disease (KD) is recognized as the leading cause of AHD whereas infectious causes such as RHDs, endomyocardial fibrosis (EMF), tuberculous pericarditis and other infections-related AHDs are prevalent in developing countries, in Africa dilated cardiomyopathy DCM is a major cause of heart failure.<sup>11,12</sup> However, there are no population-based data on the burden of the disease in Africa and most data come from hospital-based surveys. In Sudan, earlier hospital-based surveys show that these four diseases, hypertensive heart disease, rheumatic heart disease, ischemic heart disease and cardiomyopathy are the main cardiovascular causes for hospital admission, also found that cardiomyopathies constitute 4 to 6% of all cardiac admissions.<sup>13</sup> Patients were seen at the children's hospital-Khartoum, Sudan during 2007-2008 where cardiac evaluation was done. Six patients with endomyocardial fibrosis EMF, constituting 18% of all children with cardiomyopathy.<sup>14</sup> In cardiology unit at the Al Shaab teaching hospital in Khartoum, 12% of all admissions were due to idiopathic DCM. Many clinicians in Sudan believe that DCM is becoming more prevalent.<sup>15</sup> In Sudan the heart diseases has been noticed in increasing and RHD is the most common cause of acquired heart disease in children and young adults.<sup>16</sup> Most of the above-mentioned studies were conducted among patients living in Khartoum. There is no study on the AHDs among children within this study area; therefore, the present study was designed to document the spectrum, the affected age and clinical characteristics of AHDs in children of Gadarif state, Eastern Sudan.

## METHODS

This was a descriptive cross-sectional hospital-based study that was conducted in Gadarif pediatrics teaching hospital in period from Jun-2019 to Dec-2019 to determining the pattern of AHDs among children in Gadarif pediatrics teaching hospital, eastern Sudan. The study included a total of 46 children (ages  $\leq 16$  years old) diagnosed clinically with AHD and confirmed by echocardiography. Children with echocardiographic diagnoses were included in the study. Patients had no echocardiographic diagnoses and children with congenital heart diseases were excluded

## Ethical considerations

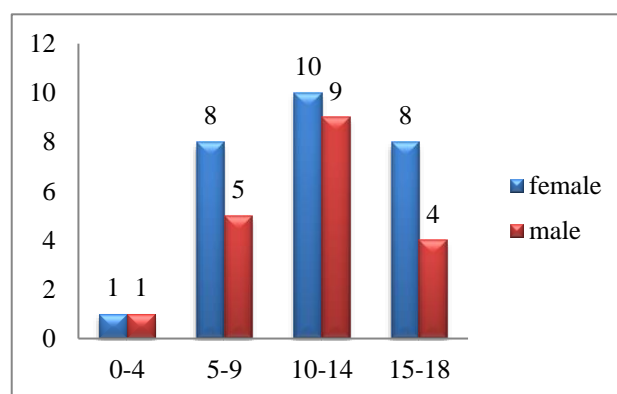
The study was approved by the Health Research and Ethical Committee of the Ministry of Health of Gadarif State, Sudan. An informed consent was obtained from parents before data collection.

## Data analysis

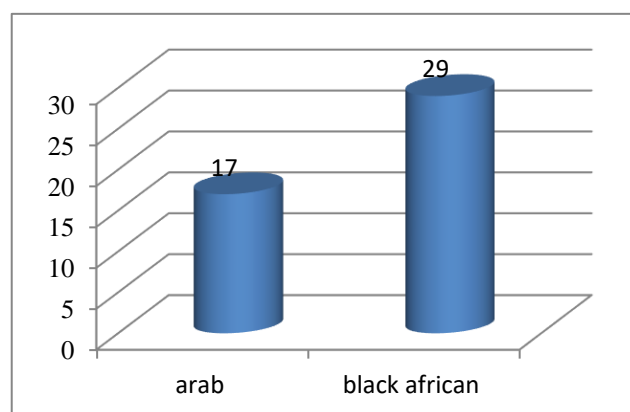
A structured closed-ended questionnaire was used to collect data from the patients and their caregivers. Data analyzed using statistical package for social sciences version 20.

## RESULTS

A total of 46 children from Gadarif pediatrics teaching hospital with confirmed AHD were enrolled in this study, of them 27 (58.7%) were female and 19 (41.3%) were male, with a male-to-female ratio of 1.4:1. The children age was  $\leq 16$  years old, with the mean age  $10.6 \pm 3.9$  year, the most common affected age group was aged between 10-14 years 19 (41.3%) (Figure1).



**Figure 1: Distribution of acquired heart diseases by age group and gender.**



**Figure 2: The distribution of acquired heart disease cases by ethnicity.**

Most of the children with acquired heart diseases were from rural area 26 (57%) and 20 (43%) were from urban

areas of high-density population. Majority of the children were black Africans represent 29 (63%) cases (Figure 2).

The most common AHD was rheumatic heart disease found in 39 (83%) patients (Table 1) 20 (52.6%) of them were females, the second type was infective endocarditis was observed in 8 (17%) patients. The commonest valvular lesion was mitral regurgitation 31 (73.9%), followed by combined mitral and aortic regurgitation in 14 (32.6%) patients and severe MR, AR and TR were found in 1 (3.1%).

**Table 1: Types of acquired heart diseases present in studied subjects.**

Acquired heart diseases	Frequency	Percent (%)
<b>Rheumatic heart disease</b>	39	83
<b>Infective endocarditis</b>	8	17
<b>Total</b>	47	100

The most clinical feature was cardiac murmur, sore throat, chorea and arthritis (Table 2). Comorbid disease was present in 29 (61.7%) patients, including cardiac failure 12 (25.5%), anemia 5 (10.6%), pneumonia 7 (14.9%), and tonsillitis in 3 (6.4%) patients, glomerulonephritis in 2 (4.3%) patients.

**Table 2: Clinical features.**

Clinical features	Frequency	Percent (%)
<b>Fever</b>	13	27.7
<b>Sore throat</b>	8	17
<b>Arthritis</b>	5	10.6
<b>Chorea</b>	2	4.3
<b>Cardiomegaly</b>	1	2.1
<b>cardiac murmur</b>	18	38.3
<b>Total</b>	47	100

## DISCUSSION

In the present study female was preponderance than the male this was consistent with the previous findings; that found more girls than boys with AHD.<sup>10,17,18</sup> Unlike congenital heart diseases that usually appear after birth, acquired heart lesions often come to light later in life.<sup>19</sup> This was observed in the present study where more than 95.5% of the patients were older than 5-year. This finding is agreed with the previous studies that revealed majorities of patients were over 5 years of age.<sup>6,7,18</sup> Some studies found that this age at highest risk of group A streptococcal pharyngitis and rheumatic fever.<sup>19,20</sup> Regarding the ethnicity of cases, majority of the children were pure-African, this is in line with previous study conducting in Khartoum reported that most patients residing in Khartoum are originally coming from Darfur and Kordofan.<sup>21</sup>

There are differences in the distribution of AHD globally.<sup>7</sup> In Sudan, RHD constitutes one of the major

causes of heart disease in children and young adults.<sup>15</sup> In this study the commonest AHD was RHD found in 39 (83%) followed by infective endocarditis, this finding similar to the previous studies. In Sudan, the prevalence of AHD in North Kordofan was found to be double that were detected in Niyala campus of internally displaced people which were found to be 33 per 1000 and in Khartoum inner city represent 0.3 per 1000.<sup>22</sup> In North Western Nigeria and Cameroon, RHD was most common AHD.<sup>18,19</sup> The current result in contrast to other study conducted in South Western Nigeria reported that pericardial effusion was the most predominant type, followed by RHD; Wilson et al found RHD was the second type followed by pericarditis.<sup>7,23</sup> In the current study RHD was the most common cause of heart failure in 11 (91.7%) cases from rural background, this finding was similar to that reported in previous study carried out by Tantchou et al found that RHD was the most common cause of heart failure in children in a rural area in Cameroon.<sup>24</sup> Mitral regurgitation (MR) was also the predominant valve lesion in children of this study; this was in line with the previous observations in Fiji, where 91% of the patients had mitral valve involvement.<sup>25</sup>

## Limitations

The biggest limitation was that our sample size didn't represent the whole population; it was just based on the patients of hospital. Our study opens the discussion and should be continued in more modified and advanced status.

## CONCLUSION

The current study in Gadarif state documented that RHD was a leading cause of AHD and mostly affected children  $\geq 5$  year.

## Recommendations

To prevent AHD, there should be a focus on RHD prevention and increased assessment of cardiac health care of affected children, particularly in rural area where the rate of disease was highest, health programs should be established such as awareness and education of parents of primary prevention of RHD. Comprehensive school health program should be activating as most affected patients between the ages of 5-16 years are school age children.

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