The new face of rheumatic heart disease in South West Nigeria

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Purpose: To determine the current prevalence of rheumatic heart disease (RHD), clinical features, types of valvular lesions, complications and mortality, at Ladoke Akintola University of Technology (LAUTECH) Teaching Hospital, Osogbo, South West Nigeria.

Methods: We conducted a retrospective, descriptive study of all the cases of RHD seen in the medical outpatient clinics and wards of LAUTECH for 9 years, from January 2003 to December 2011. Statistical analysis of data obtained was done using SPSS 16.

Results: The total number of attendees of all the medical outpatient clinics during the 9-year period was 67,378, with a subset of 9423 attending the cardiology clinic. There were 11 cases of RHD, which translates to a prevalence of 0.16/1000 and 1.2/1000 for medical outpatient clinics and the cardiology clinic respectively. The mean age of the patients was 25.64 ± 9.65 years, age range 14–40 years and male to female ratio of 1:1.2. The most common valve affected was mitral (90.9%), followed by the aortic (36.4%), and the tricuspid (18.2%). Mitral and aortic lesions coexisted in 18.2% of the patients, and late presentation was common in all RHD cases. Heart failure was the most common complication (90.9%). Other complications were secondary pulmonary hypertension (36.4%), infective endocarditis (27.3%), atrial fibrillation (27.3%), cardioembolic cerebrovascular disease (18.2%), and atrial flutter (9.1%). Mortality was 9.1%, while only one patient (9.1%) had definitive surgery. Financial constraints precluded others from having definitive surgery.

Conclusion: The prevalence of RHD has declined considerably as a result of improvements in the primary health care delivery system, with widespread use of appropriate antibiotic therapy for sore throats resulting in the prevention of rheumatic fever and RHD. However, late presentation is still very common, hence we advocate a more aggressive drive to make the Drakensberg declaration on the control of rheumatic fever and rheumatic heart disease functional in our practice area.

Keywords: rheumatic fever, group A β-hemolytic streptococcal pharyngitis, valvular lesions, heart failure

Introduction
Rheumatic heart disease (RHD) is the most serious complication of rheumatic fever (RF), which follows a group A streptococcal infection of the tonsillo-pharynx, and leads to an inflammatory reaction that involves many organs including the heart, joints, and central nervous system.1 RHD predominantly affects the mitral valve.2–4 Heart failure is the most common cause of morbidity and mortality in RHD, followed by other complications such as native valve infective endocarditis (IE), systemic embolization, pulmonary hypertension, atrial arrhythmias, or complications related to valve surgery.5–7

RHD is still a major health problem in Africa especially among children and young adults.8,9 The World Health Organization (WHO) reported that acute rheumatic fever and
subsequent rheumatic heart disease affect about 15.6 million people worldwide.\textsuperscript{10,11} Acute RF is said to be in decline due to widespread use of antibiotics; however RHD remains a major health problem especially in developing countries.\textsuperscript{8,12}

In South Africa a very high incidence of 36% was reported for RHD in the Heart of Soweto Study;\textsuperscript{13} the converse is true in Nigeria as shown by different data emanating from different parts of the country. In the Nigerian Savannah, Sani et al reported a prevalence of 9.8% of RHD from echocardiography screening from mid-2002 to mid-2006, which is very much lower than that of South Africa.\textsuperscript{9} At the Federal Medical Center, Abeokuta, also in South West Nigeria, Ogah et al reported in an echocardiography study a 3.7% incidence of RHD out of the 1441 subjects studied.\textsuperscript{14} In our recently concluded 8-year prospective echocardiographic evaluation of 2501 patients presenting in Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, South West Nigeria, 3.1% of the patients had RHD.\textsuperscript{15} In view of these echocardiographic findings from other centers in Nigeria, this present study therefore embarked on a retrospective study to determine the prevalence of RHD, as well as its characteristics, at Ladoke Akintola University of Technology (LAUTECH) Teaching Hospital, Osogbo, South West Nigeria.

Method

This study was a retrospective and descriptive study involving the review of all medical admission cases, all cases seen at the cardiology clinic, and all the medical outpatient/specialty clinics of LAUTECH Teaching Hospital (LTH), Osogbo, South West Nigeria, during the 9 years from January 2003 to December 2011. Demographic, clinical, investigation, treatment and follow-up data were retrieved from the case notes of patients identified at the final diagnosis to have RHD.

Statistical analysis was performed with the Statistical Package for Social Sciences (SPSS) Version 16 (IBM Corporation, Armonk, NY, USA). Results were presented in frequencies and percentages. We obtained ethical clearance from the ethical committee of LTH (Ethics number LTH/REC/04/13/11/06).

Results

We had a total of 67,378 patients attending our medical outpatient clinics during the 9 years from January 2003 to December 2011; 9423 patients attended the cardiology clinic. We found only 11 cases of RHD, giving a prevalence of 0.16/1000 and 1.2/1000 for all those attending medical outpatient clinics and the cardiology clinic respectively.

Table 1 shows demographic data and past medical history of patients with rheumatic heart disease (n = 11)

| Characteristics | Number of patients (%) |
|-----------------|------------------------|
| Age range (years) |                      |
| 11–20           | 4 (36.4)               |
| 21–30           | 5 (45.5)               |
| 31–40           | 2 (18.2)               |
| Sex             |                        |
| Male            | 5 (45.5)               |
| Female          | 6 (54.5)               |
| Occupation      |                        |
| Student         | 5 (46.5)               |
| Civil servant   | 2 (18.2)               |
| Artisan         | 3 (27.3)               |
| Unemployed      | 1 (9.1)                |
| Marital status  |                        |
| Single          | 8 (72.7)               |
| Married         | 2 (18.2)               |
| Divorced        | 1 (9.1)                |
| Father’s occupation \* |            |
| Trader          | 1 (9.1)                |
| Muslim cleric   | 1 (9.1)                |
| Recurrent sore throat |                |
| Yes             | 2 (18.2)               |
| No              | 9 (81.2)               |
| Previous RF |                        |
| Previous rF      |                        |
| Yes             | 2 (18.2)               |
| No              | 9 (81.8)               |
| Past skin sepsis |                        |
| Yes             | 1 (9.1)                |
| No              | 10 (90.9)              |
| Previous invasive procedure |          |
| Yes             | 0 (0)                  |
| No              | 11 (100)               |
| Past medical history |                    |
| Admitted for cough, fever, easy fatigability at the age of 7 years | 1 (9.1) |
| Hypertensive for 10 years | 1 (9.1) |
| Previous history of dyspnea | 1 (9.1) |
| No past history of any illness | 8 (72.7) |

Note: *For pediatric patients.
Abbreviation: RF, rheumatic fever.

Table 1 shows demographic data and past medical history of the patients. The age range of the patients was 14–40 years while the male to female ratio was 1:1.2. The mean age was 25.64 ± 9.65 years, with a median of 29.0 years and a mode of 15.0 years.

Table 2 shows clinical features of the patients: 90.9% of the patients had features of heart failure; two (18.2%) of the patients also presented with cardioembolic cerebrovascular disease (CCVD). Table 3 shows investigation results and valvular lesions seen in the patients. The patient with serial number 3 had IE with vegetations on the aortic valve and the anterior mitral valve leaflet. There was also anterior mitral valve leaflet perforation with mitral regurgitation and severe

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Table 2 Clinical features of patients with rheumatic heart disease

| Clinical features                  | Number of patients (%) |
|-----------------------------------|------------------------|
| Fever                             | 1 (9.1)                |
| Dyspnea                           | 1 (9.1)                |
| Jaundice                          | 1 (9.1)                |
| Bilateral pitting pedal edema     | 4 (36.4)               |
| Central cyanosis                  | 1 (9.1)                |
| Stunted growth                    | 1 (9.1)                |
| Pulse rate:                       |                        |
| <60                               | 0 (0)                  |
| 60–100                            | 5 (45.5)               |
| >100                              | 6 (54.5)               |
| SBP                              |                        |
| <90                               | 8 (72.7)               |
| ≥90                               | 3 (27.3)               |
| ↑JVP                              | 4 (36.4)               |
| Cardiomegaly                      | 8 (72.7)               |
| LPSH                              | 8 (72.7)               |
| Murmur                            |                        |
| MS                                | 1 (9.1)                |
| MR                                | 10 (90.9)              |
| S₂                                | 9 (81.8)               |
| Chest                             |                        |
| Fine bibasal creps                | 3 (27.3)               |
| Wd coarse creps                   | 1 (9.1)                |
| Normal BVS                        | 5 (45.5)               |
| BB + bilateral creps              | 1 (9.1)                |
| Creps LUZ                         | 1 (9.1)                |
| ABD                               |                        |
| DSAV                              | 1 (9.1)                |
| Tender hepatomegaly               | 9 (81.8)               |
| Splenomegaly                      | 4 (36.4)               |
| Ascites                           | 4 [1 massive] (36.4)   |
| CNS                               |                        |
| R hemispheric cardio-embolic CVD  | 1 (9.1)                |
| L hemispheric cardio-embolic CVD  | 1 (9.1)                |

Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; ↑JVP, elevated jugular venous pressure; LPSH, left parasternal heave; MS, mitral stenosis; MR, mitral regurgitation; S₂, third heart sound; Creps, crepitations; Wd, widespread; BVS, bronchovesicular breath sounds; BB, bronchial breath sound; LUZ, left upper zone; ABD, abdomen; DSAV, distended superficial abdominal veins; CNS, central nervous system; R, right; L, left; CVD, cerebrovascular disease.

Discussion

The prevalence of 0.16/1000 for RHD in attendees of our medical outpatient clinics, and 1.2/1000 in attendees of cardiology clinic, shows remarkable reduction in the burden of this serious disease. Previous studies in other centers in Nigeria have shown higher figures. Abengowe in 1979 while studying cardiovascular diseases in northern Nigeria reported a prevalence of 14.4%.16 Karaye and Sani in 2008 reported a lower prevalence of 7.8% from the same zone.17 Ansa et al also reported a prevalence of 6.0% out of the 558 patients admitted on account of cardiovascular diseases.18 Another study of all cases of heart failure in South Nigeria showed that RHD accounted for 4.26% of these.19 Recent echocardiographic studies across Nigeria have shown a prevalence rate of 3.1%–9.8%.14,15 Most of these quoted studies analyzed a subset of medical or cardiac patients and not the total number of cardiology or medical patients seen over a period of time, hence the wide variations in prevalence rates which make comparison of the figures difficult. However all of these prevalence rates/ranges still fall within the estimated prevalence rate of 0.3%–18.6% for developing countries reported by a WHO study group in 1988.20 Our current study however sought for RHD among all medical patients and all cardiology patients seen over the period of study, therefore giving a hospital-based prevalence of RHD in our center. One thing that is clear from all these quoted studies is that the prevalence of RHD is decreasing, and we are of the opinion that improved primary health care delivery, with prompt diagnosis and antibiotic...
Table 3 Investigations of patients with rheumatic heart disease

| Patients/age | CXR       | ECG                   | ECHO                                      | BC                        | VL                      |
|--------------|-----------|-----------------------|-------------------------------------------|---------------------------|-------------------------|
| 1<sup>*</sup> 24 years | Not done | 1° AVB, LVH           | MS, LVH, dilated LA, PHT                  | No bacterial growth after 7 days | MS, HHD                 |
| 14 years     | Cardiomegaly | AFT with varying degrees of block, Nonspecific IVCD | Thicken MVL, with slight restriction of the motion of anterior MVL, post MVL tethered, Dilated LA and LV, Depressed systolic function | No bacterial growth | MR                      |
| 30 years     | NA        | NA                    | AV endocarditis with severe AR, AMVL endocarditis with perforation of AMVL | NA                        | MR                      |
| 4<sup>°</sup> 40 years | NA        | NA                    | Severe MS, MR, moderate PHT               | NA                        | Ms, MR                  |
| 5 40 years   | Cardiomegaly | AF                   | Severe MS, moderate MR, Severe AS, moderate AR, no intramural clot | Moderate growth of S. aureus | Severe MS and AR         |
| 6<sup>°</sup> 16 years | NA        | NA                    | MR, congenital discrete sub-aortic stenosis, severe PHT | NA                        | MR (clinical)            |
| 7 29 years   | Cardiomegaly, aneurismal dilatation of RA, features of CCF | NA | MR, congenital discrete sub-aortic stenosis, severe PHT | NA | MR (clinical)            |
| 8 29 years   | NA        | AF, RVH               | Critical MS, AS, TS and TR               | NA                        | MS, AS, TS and TR        |
| 9 30 years   | NA        | Sinus tachycardia, LVH with myocardial strain, AF | NA | NA | MR                      |
| 10           | NA        | NA                    | Moderately severe AR, severe PHT         | NA | AR                      |
| 11 15 years  | Features of CCF | LAE, RVH, nonspecific IVCD | MR, TR, PS                              | NA                        | MR, TR, PS               |
| 15 years     | NA        | NA                    |                                           |                           |                         |

**Notes:** *Also hypertensive; **Clinical evidence of infective endocarditis.*

**Abbreviations:** CXR, chest X-ray; ECG, electrocardiography; ECHO, echocardiography; BC, blood culture; VL, valvular lesions; 1° AVB, 1st degree atrio-ventricular block; LVH, left ventricular hypertrophy; MS, mitral stenosis; LA, left atrium; PHT, pulmonary hypertension; HHD, hypertensive heart disease; CCF, congestive cardiac failure; AFT, atrial flutter; IVCD, intraventricular conduction defects; MVL, mitral valve leaflets; LV, left ventricle; MR, mitral regurgitation; NA, not available; AV, aortic valve; AR, aortic regurgitation; AMVL, anterior mitral valve leaflets; AF, atrial fibrillation; AS, aortic stenosis; RVH, right ventricular hypertrophy; TS, tricuspid stenosis; TR, tricuspid regurgitation; LAE, left atrial enlargement; PS, pulmonary stenosis.

Table 4 Treatment, outcome and affected valves in patients with rheumatic heart disease

| Characteristics                          | Number of patients (%) |
|------------------------------------------|------------------------|
| Treatment                                |                         |
| Medical                                  | 11 (100)               |
| Definitive surgery<sup>°</sup>           | 1 (9.1)                |
| Outcome                                  |                         |
| Alive                                    | 7 (63.6)               |
| Dead                                     | 1 (9.1)                |
| Lost to follow up                        | 3 (27.3)               |
| Affected valves                          |                         |
| Mitral                                   | 10 (90.9)              |
| Alone                                    | 6 (54.5)               |
| With aortic                              | 2 (18.2)               |
| With tric and pulm                       | 1 (9.1)                |
| With aortic and tric                     | 1 (9.1)                |
| Aortic                                   | 4 (36.4)               |
| Alone                                    | 1 (9.1)                |
| Tricuspid                                | 2 (18.2)               |
| Pulmonary                                | 1 (9.1)                |

**Note:** °Mitral valve prosthesis.

therapy for sore throat and skin sepsis, has had this tremendous impact on the decline of RHD in our practice area. The late Minister of Health Olikoye Ransome-Kuti served during the early/mid 1980s and made primary health care the bedrock of Nigeria’s health care. The bases of this included providing primary health centers in all rural areas, training community

Table 5 Complications of rheumatic heart disease

| Characteristics                          | Number of patients (%) |
|------------------------------------------|------------------------|
| CCF                                      | 9 (81.8)               |
| LHF                                      | 1 (9.1)                |
| AF                                       | 3 (27.3)               |
| AFT                                      | 1 (9.1)                |
| CCVD                                     | 2 (18.2)               |
| IE                                       | 3 (27.3)               |
| PHT                                      | 4 (36.4)               |

**Abbreviations:** CCF, congestive cardiac failure; LHF, left sided heart failure; AF, atrial fibrillation; AFT, atrial flutter; CCVD, cardioembolic cerebrovascular disease; IE, infective endocarditis; PHT, pulmonary hypertension.
extension workers to run these centers, and making essential drugs available, including the penicillin group of antibiotics. Treatment also became free at such centers as well as at secondary health care facilities, with the free health care services run by various state and local governments across the country. Housing conditions have also improved to some extent, however limited. The hospital-based prevalence rate in this study compares favorably with that of Bangladesh which is 1.2/1000,21 and India with a prevalence rate of 1.0–5.4/1000.22 The mean age of 25.64 ± 9.65 years is similar to 24.02 ± 12.75 and 29.34 ± 11.57 years obtained in studies from the north and southeast of Nigeria respectively2,8 thus confirming that it is a disease of children and young adults.8,9

Our study shows a male to female ratio of 1:1.2, while previous Nigerian studies showed ratios of 1:1.75 and 1:223 thus demonstrating a female preponderance. This finding is supported by other studies from developing countries, such as Egypt and South Africa.24,25

Poverty is endemic in Nigeria, due amongst other things to mass corruption and misplaced priorities by our leaders; this has led to elimination of the middle class, hence all the study patients were from a poor socioeconomic background. RHD and RF are related to poverty, overcrowding, poor housing, and shortage of health care resources.26 Other evidence of poverty was shown by the inability of the patients to get all the investigations completed, as shown in Table 3, and also the inability to complete definitive surgery.

Childhood history of recurrent sore throat and RF were both present in 18.2% of the patients, while skin sepsis occurred in only 9.1% of the patients. Three percent of patients with untreated group A β-hemolytic streptococcus (GAS) pharyngitis developed RF27 and subsequent or recurrent GAS pharyngitis increases the risk of RF from 3% to 75%.28 A study in Benin City, Nigeria, showed a streptococcal throat colonization prevalence rate of 9.7% from groups C, G, B, and F, and not colonization with GAS.29 However no study in Africa has linked this non-GAS to RF and RHD.30 GAS skin infection (pyoderma) in the Australian aborigines has been linked to RF, but no such link has been found in Africans.31

The prevalence of hypertension is very high in Nigeria; its current prevalence in a semi-urban community in the same state (Osun State) as this study center is 36.6% (calculated using the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure guidelines VII BP threshold of 140/90 mmHg,21 [13.3% using BP threshold of 160/95 mmHg]33 hence it is not surprising that 27.3% of the patients had concomitant systemic hypertension (as shown in Table 2). All the patients had conservative medical treatment and only one of them could afford definitive surgery outside Nigeria. This surgery took place in India. Only two centers in Nigeria currently undertake open heart surgery; the service is expensive, and still not well established. The few patients who choose surgery usually source funds from philanthropists, religious organizations, multinational companies, and other public spirited Nigerians through the various media channels.

Mortality was 9.1% and this occurred in the patient with serial number 5 in Table 3 who had CCVD, S. aureus IE, cardiomegaly, and AF. This mortality was due to late presentation with multiple complications. Also 27.3% of the patients were lost to follow up. Patients do not usually do well without definitive surgery and so patients and their relations become discouraged and frustrated after spending so much money without getting better; hence they abandon medical treatment and seek help from spiritualists, or resign themselves to fate and die at home.

Heart failure is the most common complication of RHD, and it occurred in 90.9% of the patients as shown in Table 4. Previous studies also support this finding.5–7 CCVD occurred in 18.2% of the patients, although transthoracic echocardiogram did not detect intramural thrombus; facilities for the more sensitive transesophageal echocardiogram were not available. The two patients with CCVD also had infective endocarditis but one of them had vegetations on the mitral and aortic valves and perforation of the anterior mitral valve leaflet. Seeding of the vegetation into the cerebral arteries could also have resulted in the CCVD, as could dislodgement of portions of an intramural thrombus into one of the cerebral arteries.

Pulmonary hypertension was the most common complication after heart failure, occurring in 36.4% of the patients, followed by atrial fibrillation occurring in 27.3% of patients, IE in 27.3%, and AFT in 9.1%.

RHD is the most common predisposing factor to IE in Africa. Retrospective/prospective hospital-based epidemiologic studies conducted in Nigeria, Morocco, and South Africa on patients with IE showed that 66.0%, 63.0%, and 76.6% respectively had RHD as the underlying cause of cardiac lesions.5,34,35 Data collected in two studies from echocardiographic units of different tertiary centers in Nigeria reported that 8.7% and 8.5% of RHD patients had IE.22,36 AF was found in 12.9% of the patients in one series,22 and in 10.1% in another series.8
The Heart of Soweto study also found AF in 10.0% of their patients with newly diagnosed RHD. It was not surprising that AF was found in only one (9.1%) patient because AF is an unstable arrhythmia that rapidly turns to AF. Pulmonary hypertension was found to be the commonest complication of RHD in the echocardiographic study of RHD patients, affecting 72.1% of the patients.

Some parameters and complications of RHD in hospital-based epidemiologic studies are not comparable to studies solely based on echocardiography, as particular investigations included in the former will not have been encompassed in the latter. This fact may account for the variations in the frequencies of these complications.

The mitral valve was affected in 90.9% of our study patients as shown in Table 5, which is in keeping with the study done in Zaria, Nigeria, by Danbauchi et al, in which the mitral valve was involved in 97.0% of the patients in their series. Other studies also support this finding. The next most common valve involved was the aortic, which was affected in 36.4% of the patients. This finding is comparable with the study done in Port Harcourt, Niger Delta, in which 40.9% of the patients had aortic valve involvement. Next frequent were the tricuspid valve with 18.2% involvement and the pulmonary with 9.1% involvement. Tricuspid valve lesion occurred either as stenosis or regurgitation in combination with mitral, aortic, or pulmonary valve, but not alone, as shown in Table 3. The tricuspid valve involvement of 24.1% that was recorded by Essien et al is in agreement with the 18.2% found in this study. The pulmonary stenosis found in combination with other valvular lesions could be a coincidental congenital lesion, as the pulmonary valve is rarely affected. It is also worth noting the case of congenital discrete subaortic stenosis coexisting with mitral regurgitation in the patient with serial number 7; hence it is not uncommon to find congenital lesions coexisting with RHD. The mitral and aortic valves were both affected in 18.2% of the patients. The Port Harcourt study reported twice this percentage (36.6%). Similarly, Essien et al reported 33.3%. The involvement of more than two valves was also noticed, as shown in Table 5.

Conclusion
The very low prevalence of 0.16/1000 for medical outpatient clinics and 1.2/1000 for cardiology clinic attendees showed a decline which must be sustained; at the same time we must focus on complete eradication as our goal. Late presentation worsen the chances of these patients who are still active and in their financially productive years. Two of the United Nations’ Millennium Development Goals to tackle, in order to eradicate this disease, are poverty and infections. Sub-Saharan Africa is bedeviled by many communicable diseases coupled with various economic constraints; prevention is the preferable option for the region.

The principles of the Drakensberg declaration of 2005 on the control of rheumatic fever and rheumatic heart disease in Africa continue to gain support through the spirited effort of the highly motivated Pan African Society of Cardiology in collaboration with WHO and the World Heart Federation. More support for health care workers is needed to ensure the eradication of RF and RHD from the African continent. If the developed countries achieved this goal more than 50 years ago, we can do the same.

The retrospective nature of the study was a limitation as information, investigation results, and other parameters were not available for a more comprehensive assessment of the new trend in morbidity and mortality of RHD.

Acknowledgments
We sincerely appreciate the efforts of Mr Oyetunde Gabriel Asa from the hospital’s medical records department, who helped to retrieve case notes and all other information necessary to generate the data. We are also grateful for the assistance with statistical analysis of the data provided by Dr Esther Olufunmilayo Asekun-Olarinmoye and Dr Wasiu Olalekan Adebimpe of the Department of Community Medicine, College of Health Sciences, Osun State University, Osogbo, Nigeria. Finally we are grateful to the cardiology unit house officers for assisting with the data collection. The authors funded the study.

Disclosure
The authors have no conflicts of interest to declare in this study.

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