Original Article

Pattern of heart disease at AlShab Teaching Hospital; a decade into the new millennium.

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SUMMARY

Background

Cardiovascular diseases (CVD) are a major cause of morbidity and mortality in Sudan and worldwide with the prevalence increasing in developing countries due to urbanization and changes in lifestyle. Due to lack of epidemiological surveys, hospital–based surveys are conducted to study changing pattern of CVD.

Methods

This is a retrospective cross-sectional descriptive hospital-based study of all patients admitted to the Cardiology department at the AlShab Teaching Hospital from June to December 2009. Age, gender, indication for admission, etiological diagnosis and

Abstract

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Methods

This is a retrospective cross-sectional descriptive hospital-based study of all patients admitted to the Cardiology department at the AlShab Teaching Hospital from June to December 2009. Age, gender, indication for admission, etiological diagnosis and
in-hospital mortality were studied. Each patient can have more than one indication for admission or etiological diagnosis.

Results
Total admissions were 1461. Four hundred eighty eight in the CCU and 973 in the wards. 57.3% were males and 42.7% were females. In the CCU, M:F ratio was 1.4:1 and in the wards 1.3:1. Indications for admissions were ADHF (acute decompensated heart failure) 73%, ACS (acute coronary syndromes) 47%, Arrhythmia 20%, IE (infective endocarditis) 3%, and others 3%.

Etiological diagnoses given to patients were IHD (ischemic heart disease) 65%, HHD (hypertensive heart disease) 28%, NIDCM (non-ischemic dilated cardiomyopathy) 11%, RHD (rheumatic heart disease) 7%, pericardial disease 4(%), Others (2%).

RHD admissions peaked in the 21-30 years old age group, NIDCM in 41-50 years old, HHD and IHD in 51-60 years old. Total hospital mortality rate was 3.5%.IHD was responsible for 48% of total mortality, NIDCM 27%, RHD 24% and HHD 1%.

Conclusion
The main indications for admission in decreasing order were ADHF, ACS and arrhythmias. The tetrads of IHD, HHD, NIDCM and RHD in decreasing order constitute the bulk of cardiovascular diseases at AlShab Teaching Hospital. Distinct age distribution was noticed according to etiology of disease. RHD peaked in the young-age, in the third decade of life. NIDCM peaked in middle-age, in the fifth decade of life. IHD and HHD peaked in late middle-aged, in the sixth and seventh decade of life. IHD was responsible for almost half of in-hospital death followed by NIDCM and RHD, while HHD accounted for only a very small minority.

Keywords: heart disease, acute coronary syndromes, acute heart failure, ischemic heart disease, rheumatic heart disease, dilated cardiomyopathy, hypertensive heart disease

Introduction
Cardiovascular diseases (CVD) are a major cause of morbidity and mortality worldwide, being responsible for 30% of all deaths and 10% of DALYs (disability adjusted life years)(1). In Sudan, the recent Sudan household survey of 2006 showed the prevalence of heart disease to be 2.5%(2) and according to the Federal Ministry of Health, Annual Health Statistical Report of 2008, heart disease ranked fourth in the leading causes of in-hospital deaths(3).

Several studies have looked into the pattern of heart disease in Sudan(4,5), some dating back to the first half of last century. However, no recent work has looked into this issue especially with the significant social, demographic and economic changes that happened over the last three to four decades. In this article, we intend to give a contemporary look into heart diseases in Sudan by studying their pattern of clinical presentation and etiology in the oldest and one of the major cardiac centers in the country.

Patients and methods
This is a retrospective cross-sectional descriptive hospital-based-study of all patients admitted to the Cardiology department at the AlShab Teaching Hospital from June to December 2009.

Al Shaab Teaching Hospital is a tertiary public hospital located in the center of Khartoum. It has a dedicated emergency room and receives referrals from all over Sudan. It has 280 total beds with 74 dedicated to cardiology; 6 CCU (coronary care unit) and 68 ward beds including the HDU (high dependency unit).

All cardiology patients during the study period were included. All patient charts were reviewed by the main author and a member of the Quality Management Department at AlShab Teaching Hospital. Data were
obtained by age, gender, clinical presentation (indication for admission) and etiological diagnosis on discharge. Each patient could carry more than one clinical presentation or etiological diagnosis. Mortality data was obtained from patient charts and verified using nurse's report. Data were entered using Microsoft Excel software. No statistical tests of significance were performed in this study.

**Results**

Total admissions to the cardiology department were 1461 (488 in the CCU and 973 in the wards). 57.3% were males and 42.7% were females. In the CCU M:F ratio was 1.4:1 and in the wards 1.3:1. Age distribution of all patients are shown in Table 1.

Table 1: Age distribution of total admissions, CCU admissions and ward admissions

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Total Admissions (%)</th>
<th>CCU Admissions (%)</th>
<th>Ward admissions (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20</td>
<td>46 (3.1)</td>
<td>8 (1.6)</td>
<td>38 (4%)</td>
</tr>
<tr>
<td>21-30</td>
<td>85 (5.8)</td>
<td>22 (4.5)</td>
<td>63 (6.4)</td>
</tr>
<tr>
<td>31-40</td>
<td>136 (3.9)</td>
<td>50 (10)</td>
<td>86 (9)</td>
</tr>
<tr>
<td>41-50</td>
<td>285 (19.5)</td>
<td>78 (16)</td>
<td>207 (21)</td>
</tr>
<tr>
<td>51-60</td>
<td>320 (21.9)</td>
<td>112 (23)</td>
<td>208 (23)</td>
</tr>
<tr>
<td>61-70</td>
<td>333 (22.8)</td>
<td>110 (22)</td>
<td>223 (22)</td>
</tr>
<tr>
<td>71-80</td>
<td>202 (13.8)</td>
<td>94 (19)</td>
<td>108 (11)</td>
</tr>
<tr>
<td>90-81</td>
<td>55 (3.8)</td>
<td>3 (14)</td>
<td>41 (4.2)</td>
</tr>
<tr>
<td>Total</td>
<td>1468 (100)</td>
<td>488 (100)</td>
<td>973 (100)</td>
</tr>
</tbody>
</table>

Clinical presentation of the total study population, CCU patients and ward patients are shown in Figure 1.

![Fig 1: Clinical presentation of total admissions, CCU patients and ward patients.](image)

ACS (acute coronary syndrome); ADHF (acute decompensated heart failure); IE (infective endocarditis). Others include acute pulmonary embolism, deep venous thrombosis, stroke etc. % represents percentage of patients in total admissions, CCU and ward labeled with the diagnosis.

The different etiological diagnoses of the total admissions, CCU admissions and ward admissions are summarized in Fig 2.
Fig 2: Etiological diagnosis of total admissions, CCU admissions and ward admissions

IHD (ischemic Heart Disease); HHD (hypertensive heart disease); NIDCM (non-ischemic dilated cardiomyopathy); RHD (rheumatic heart disease); Pericardial (Pericardial disease); CCU (coronary care unit). Others include venous thromboembolic disease, pneumonia, peripheral arterial disease, cerebrovascular disease, etc. % represents percentage of patients in total admissions, CCU and ward labeled with the diagnosis.

Age distribution of cases by etiology is shown in Figure 3.

Fig 3: Age distribution of patients with IHD, HHD, RHD and NIDCM

Contributions of different diseases to total mortality are shown in Figure 4.

Fig 4: Total mortality by etiology.

IHD (ischemic heart disease); HHD (hypertensive heart disease); NIDCM (non-ischemic dilated cardiomyopathy); RHD (rheumatic heart disease).

Discussion

A total number of 1461 patients for a total of 74 beds, make the average stay in hospital 9.1 days. This is long compared to Western standards where the average stay for cardiac patients in the United States for example is 4.6 days. Patients at all age groups were admitted to Al Shaab Teaching Hospital with most patients being in their fifth, sixth and seventh decade of life with slight predominance of males over females.

In this study, we separated the clinical presentation which was the indication for admission from the etiological diagnosis given to the patient on discharge in order to study not only the diseases responsible for cardiac illness but also pattern of presentation. The most common clinical presentation for
the total population was acute heart failure, followed by acute coronary syndromes and arrhythmias as the other main clinical presentations. As for the CCU, acute coronary syndrome was the commonest cause of admission followed by acute heart failure and arrhythmias. This is comparable to data in industrialized countries. In the United States, circulatory disorders as a group were the commonest cause of hospital admissions accounting for 26.3% of all admissions. After pneumonia which was the leading disease entity, the most common heart-related conditions were CHF (Congestive heart failure) followed by chest pain as the second and third causes of hospital admissions. Stroke and irregular heart beat ranked seventh and eighth, respectively\(^7\,^8\). In the Heart of Soweto study which was a study of the spectrum of heart disease and risk factors in a black urban population in South Africa\(^9\), heart failure constituted 52% of all new cases diagnosed with cardiovascular disease. However, 73% of all admissions labeled with heart failure remains very high and may reflect over diagnosis due to lack of conformity in diagnosis or possibly late presentation of patients with heart failure being a common endpoint for most cardiovascular disease.

IHD was the commonest etiological diagnosis given to total cohort as well as the CCU and ward patients. This more evident in the CCU and is expected as most of the cases of ACS are admitted there. This was followed by HHD with NIDCM and RHD in third and fourth place respectively. Earlier studies into pattern of heart disease in hospitalized patients showed a different pattern. In 1937, an analysis was made of 100 consecutive cases of heart disease admitted to Khartoum Hospital. Eighty had cardiovascular syphilis, followed by rheumatic heart disease. There was no mention of ischemic heart disease. In 1961, the same author Dr Halim analysed 958 consecutive cardiac cases admitted to the same hospital. HTN and RHD were the commonest two diagnoses at 44.4% and 25.4% of the sample respectively. Ischemic heart disease was 12.6 % and syphilitic heart disease regressed to 6.0%\(^4\). Another study conducted by Khalil et al looking into pattern of cardiovascular disease in Sudan was conducted in Khartoum North Hospital, which is a general hospital, and included 539 patients from 1980-1983. The cardiac disease and percentage in descending order in this study were HHD 33.7%, RHD 26.5%, IHD 17.8%, and cardiomyopathy 4.8%\(^5\).

The strong predominance of IHD in our study being responsible for 65% of the cardiac load at Alshab Teaching Hospital can be explained by two main factors. First is the increasing prevalence of IHD being the principal component of cardiovascular diseases and is the leading cause of death in all regions of the world except Sub-Saharan Africa\(^10\). In the United States for example, IHD accounts for more than half all cardiovascular events in men and women below the age 75\(^11\). Developing countries and Sudan is no exception, has entered a period of epidemiological transition. Greater urbanization and economic development led to a shift in the major causes of death and disability from infectious diseases to chronic non-communicable diseases such as coronary artery disease and cancer\(^12\). IHD risk factors are relatively prevalent in urban communities in Sudan\(^13\).

This second factor might be referral bias as IHD patients would traditionally refer themselves to AlShab Teaching Hospital being a tertiary cardiac referral center known for caring of patients with IHD rather than a general hospital where HHD might be expected to be more prevalent. Hypertensive heart disease is second place and is not surprising given the relatively high
prevalence in the community and poor control\textsuperscript{(14,15)}. The study by Khalil et al showed that HHD was the commonest cardiac disease. Whether IHD truly supersedes HHD or this reflects referral bias discussed above cannot be can be determined from this study and epidemiological surveys are required.

Interestingly NIDCM surpasses RHD. Dilated cardiomyopathy is now recognized as a major CVD in Africa\textsuperscript{(16,17)}. The contribution of NIDCM to heart disease especially heart failure in Sub-Saharan Africa has been clearly demonstrated in the THESUS-HF\textsuperscript{(18)} study where it accounted for 19.5\% of all cases of heart failure coming in second place after HHD. THESUS-HF study is the largest population-based study on the epidemiology of heart failure in Sub-Saharan Africa conducted in 12 African countries, including Sudan at AlShab Teaching Hospital. Such incidence of NIDCM is not fully understood. This can be explained by better recognition due to wider availability of echocardiography; however, it may also reflect increase in this condition especially post viral myocarditis cardiomyopathy.

Rheumatic heart disease in our study trails IHD, HHD and NIDCM and this can be explained by a number of factors including the predominance of non-communicable disease over infectious disease and regression of RHD especially in the state of Khartoum after the implementation of WHO Global Rheumatic Fever/Rheumatic Heart Disease Prevention Program in Sudan.

The age distribution of different cardiovascular disease shown in Fig 3, shows three distinct peaks. RHD peaked in the 21-30 aged group. This is expected as the usual peak of RHD is in the second decade of life, however, these would be usually seen in the children hospitals and those above 18 years of age would be seen in the adult cardiology section\textsuperscript{(19)}. NIDCM on the other hand, peaked in the 41-50 years of age, while internationally it peaks in the third and fourth decades of life\textsuperscript{(20)}. IHD and HHD both almost overlap and peaked in the 51-60 and to a lesser extent in the 61-70 age group. This earlier peaks of IHD compared to the Western world\textsuperscript{(8)} is seen in other Third world countries e.g. India and Pakistan\textsuperscript{(21,22)}. An alarming trend with potential significant economic and social implications.

In our study, IHD was responsible for half in-hospital death. A figure similar to the Western world\textsuperscript{(8)} where in the United states it is responsible for 49.9\% of Cardiovascular deaths. In our study, NIDCM and RHD accounted for 27\% and 24 \% of in-hospital deaths while they account for only 11\% and 7\% of all admissions signifying the worse prognosis of such conditions in hospital. HHD accounted for only 1\% of hospital mortality while in Western World accounts for about 7\%\textsuperscript{(7)}.

In conclusion, the Cardiology department at AlShab Teaching Hospital receives patients of all age groups with slight male predominance. The main indications for admission in decreasing order were ADHF, ACS and arrhythmias with ACS being the main indication for admission to the CCU and ADHF to the wards.

IHD, HHD, NIDCM and RHD constitute the tetrad for the majority of admissions in decreasing frequency. IHD dominated both CCU and ward admissions. NIDCM is a major disease entity superseding RHD.

A distinct age pattern was recognized in relation to etiology of disease. RHD peaked in the young in the third decade of life,, NIDCM peaking in middle-aged in the fifth decade of life , IHD and HHD in late middle age in the sixth and seventh decade of life.

IHD was responsible for 50\% of in-hospital death followed by NIDCM and RHD while HHD accounted for only a very small minority.

Limitations

There are many limitations to this study. This remains a retrospective, hospital based study
in a tertiary referral center and no predefined criteria for diagnosis were set but rather diagnoses given by the attending physicians were used.

References


