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Patterns of Cardiovascular Disease in Sudan: Hospital Load and Recent Trends.

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ABSTRACT. Five hundred and thirty nine patients with cardiovascular disease (CVD) were admitted during the period of 1980-1983, representing 5.9% of admission to Khartoum North Hospital; 52.7% were females and 47.3% males. Hypertensive heart disease (HHD) contributed 33.8% of the cardiac admissions, while 26.5% were rheumatic heart disease (RHD) and 8.7% were due to acute rheumatic fever (RF). 17.8% were due to coronary artery disease (CAD). Congenital heart disease (CHD) constituted 3.9% and cardiomyopathies represented 5% of CVD admissions. 68.6% of the patients were from urban residence while 31.2% were from suburban locality. CAD admissions rate had a significant positive trend during the period of study. (X^2 trend =9.91, p = <0.001). The trend was negative and marginally significant for RHD. During the same period there was no change in the trend for HHD admission rates.

INTRODUCTION

The prevalence and incidence of cardiovascular disease in Sudan are not known. Some large scale and expensive national health projects undertaken during the last decade were based on hospital discharge records and outpatients statistics that might have been deficient and unreliable. However, personal impressions (so called experience) and judgement from research findings in some African and other developing countries indicate that CVDs are now important causes of morbidity and mortality[1,2,3]. Rheumatic fever, believed to be of infectious origin and its sequel RHD are thought at one time to be uncommon in developing countries. At present RHD is prevalent among adults of poor and crowded communities[4,5]. On the other hand CAD and HHD are have long been linked to urbanization, stress, dietary habits and lifestyle[6,7,8] . The risk factors of CAD are not uncommon in large cities of developing countries. However while there are appreciable efforts of control programs, health education and public awareness in the industrialized nations, little is being done in the poorer countries. During the last decade we witnessed some unfavorable rapid changes in the socioeconomic, political and population migratory dynamics in Sudan with great influx of male young adults into the urbanized centers of country, especially the capital city. With the present trends of urbanization and improvement in of life expectancy as a result of lower fatality rates from infectious diseases, we should expect a rise in the prevalence rates of CAD in Sudan. Population based surveys and well-designed investigation would have been the better choice for the evaluation of the magnitude of CVD and the association of certain risk factors with it. Short of that, improvements of the existing reporting system and the design of a special hospital record for CVD remain to be the only available alternative. The objective of this study is to provide information on the patterns of CVD at Khartoum North Hospital and to assess the magnitude of reporting

PATIENTS AND METHODS

Khartoum North Hospital serves the population of Khartoum province residing east of the Nile with a total population of 150,000. It is not the only source of health care for that population, as some patients report to private hospitals and clinics.. All patients admitted to Khartoum North Hospital during the period July 1980 to June 1983 were included in the study. A consultant physician examined patients admitted to the cardiac unit. Age, sex, occupation and residence were recorded. Clinical examination on admission and at discharge and daily

follow up examinations were carried out. Routine investigations included chest x-ray, electrocardiogram (ECG), ESR, WBC, and haemoglobin. Blood cultures were done to confirm or otherwise exclude infective endocarditis. Diagnosis was purely clinical but cardiac catheterization was performed on three cases only, a case of pulmonary hypertension and 2 cases of atrial septal defect. On all cases, a consultant physician checked discharge summary and final diagnosis. Only the primary admissions of patients were included in the analysis.

RESULTS

539 patients with CVD were admitted during the period of three years, representing 5.9% of the total hospital admissions (Table 1). Male to female ratio was 1:1.1. Hypertensive heart disease contributed 33.8% of the cardiac admissions, while 26.5% were due to RHD, rheumatic fever accounted for 8.7% and 17.8% were due to CAD. Congenital heart disease contributed 21 cases (3.9%) of which 6 cases were ventricular septal defect, 4 pulmonary stenosis and 4 cases were atrial septal defect and 2 cases for each of coarctation of aorta, patent ductus arteriosus and primary pulmonary hypertension. One patient presented with tetrology of Fallot. Cardiomyopathy represented 5% of the total cases.

Table 1. Cardiovascular disease admissions to Khartoum North Hospital in 1981-1983.

Cardiac disease	Males	Females	Total	%
HHD	75	107	182	33.7
RHD	62	81	143	26.5
CAD	56	40	96	17.8
RF	21	25	47	8.7
CM	23	03	26	4.8
CHD	12	09	21	3.9
ANEM.	03	09	12	2.2
C.PUL	03	00	03	0.6
ENDOC.	00	02	02	0.4
THYRO.	00	07	07	1.3
CVD AD	255	284	539	100
H.AD.	4737	4404	9141	

CM=CARDIOMYOPATHY. ANEM=ANAEMIA, C.PUL= COR PULMONALE.
ENDOC=ENDOCARDITIS. H=HOSPITAL
THYRO=THYROTOXICOSIS. AD=ADMISSIONS

The age distributions of the major CVD admissions reflects large variations (Table 2) in the age of patients with RF, from 4-38 years with a mean of 13.19(± 7.7). RHD patients were mostly young adults, mean age 30(± 13.8) years. HHD patients ranged from 20-70 years with a mean age of 52(± 15.4) and peaking at 65. RHD had 2 modes, with the major peak occurring at age 25 and a second smaller peak at age 55.

Significantly fewer males were admitted with HHD and RHD relative to females Table 3. Male admissions were 30% less for HHD (RR =0.7; 95% ,CI = 0.5-0.9) and 30% less for RHD (RR=0.7; 95% CI = 0.5-1.0). On the other hand admissions of males were 30% more for CAD (RR+1.3; 95% CI=0.9-1.9).

Table 2. Age distribution of major cardiovascular disease admissions 1981 - 1983.

AGE	RHD	RF	CAD	HHD
0 - 9	8	18	-	3
10-19	28	21	1	3
20-29	57	7	8	5
30-39	24	1	8	26
40-49	5	-	13	36
50-59	10	-	19	50
60-69	9	-	31	39
70+	2	-	15	20
Total	143	47	96	182
Mean	29.9	13.1	55.5	52.2
STD	13.8	7.7	15.4	15.1

Table 3. Sex distribution of CVD admissions 1981- 1983

Disease	M(R*)	F (R*)	Total	95%CI
HHD	75	107	182	0.5-0.9
RHD	62	81	143	0.5-1.0
CAD	56	40	96	0.9-1.9
RF	21	26	47	0.7-1.0
T.A	4737	4404	9141	

R*=Rates. T.A= Total admissions

Urban residence constituted 68.8% of CVD admissions while 31.2 were of suburban locality (Table 4).

Table 4. Admissions of Cardiovascular disease according to residence.

Disease	Urban %	Suburban %	Missing cases	Total N. cases
RF	46.8	53.2	-	47
RHD	59.4	40.6	20	143
CAD	69.5	30.5	01	96
HHD	80.7	19.3	01	182

80.7% of the HHD patients were urban, 69.5 of the CAD and 59.4% of RHD were urban. Less than half the patients with RF were urban (46.8%). CAD admission rate had a significant positive trend during the period 1981-1983. (X^2 trend 9.91, $p < 0.001$). The trend was negative and marginally significant for RHD. During the same period there was no change in the trend of HHD admission rate, Table 5.

Table 5. Trend analysis of cardiovascular admissions 1981-1983.

Year	CAD	RHD	HHD	Total
1981	18	48	57	2821
1982	30	52	56	3026

1983	48	43	69	3294
Total	96	143	182	9141

X^2 tren	9.91	1.64	0.06	----
p-value	0.001	0.1	0.41	----

Table 7. Sudan National Statistics of CVD admissions during the calendar year 1982.

CVD	*Males*			*Female*			*Total*	
	Cases	*%CVD*	*R/1000*	*Cases*	*%CVD*	*R/1000*	*%CV*	*R/1000*
HHD	1546	28.0	9.9	1540	34.3	8.6	31.3	9.2
RHD	1970	36.7	12.7	1522	33.9	8.5	35.4	10.4
CAD	1027	19.1	6.6	872	19.4	4.9	19.3	5.7
Others	824	16.2	5.3	552	12.4	3.1	14.0	4.1
All CVD	5367	100	34.5	4486	100	25.1	100	29.4
All Admi	155645			179804				

Mitral lesions were predominant in patients with RHD. Of 143 admissions 24.5% had mitral regurgitation, 22.4% had mitral stenosis and 22.4% had both mitral stenosis and regurgitation.. The distribution of valvular lesions in RHD admissions is shown in Table 6.

For comparison purposes we summarized the national health statistic of CVD for the year 1982 in Table 7.[9]

RHD and HHD contributed almost one third each among CVD admissions for males and females nationwide. 19.0% of CVD were CAD in type. Of all hospital admissions 29.4/1000 were CVD of which RHD headed the list followed by HHD. This reflected a lower national rate of CVD admissions compared to our results from Khartoum North Teaching Hospital.

Table 6. Distribution of valvular lesions in patients with RHD.

Lesions	Cases	%
MR	35	24.5
MS	32	22.4
MS+MR	32	22.4
MS+MR+AR	10	7.0
MS+MR+AR+AS	15	10.5
AS	10	7.0
TR	2	1.4
OTHERS	7	4.9
TOTAL	143	100

M=MITRAL, A=AORTIC, T=TRICUSPID, R=REGURGITATION, S=STENOSIS.

DISCUSSION

This study has obvious limitations and should be considered as a preliminary investigation of CVD in urban Sudan. Nevertheless, in the absence of any other reliable literature about the occurrence of CVD or its load on the general health services in this country, the findings are informative. Hospital data are generally biased in that it might not represent the population distribution of disease, especially where access to health facilities is affected by socioeconomic factors, proximity and cultural values of health and sickness. Even more so is the clinical picture of the disease itself whereby fever due to a self-limiting viral infection may warrant reporting to the clinic rather than a more serious chronic cough of congestive heart failure. Another major limitation of this data is due to non-reporting of CVD patients who were served by private hospitals and clinics. At least this deficiency results in underestimation of the weight of CVD in the population. The results may be confounded if CAD and HHD are more common among the upper and middle class population as these classes have a greater tendency to utilize such private services. Nonetheless, there is no reason to believe any source of differential bias among the patients with CVD who reported to Khartoum North Hospital according to the type of disease, age or gender.

The overall hospital load of CVD (5.9% of admissions) is about twice the Sudanese national average (2.9%) as reported by the Ministry of Health for the year 1982. In Tanzania 2% of all hospital admissions are due to CVD[10]. Although some of the excess would be due to reporting of patients from other towns to this urban centre, we might be observing a true increase in CVD risk among city dwellers. This is further suggested by the distribution of the specific cardiovascular diseases. While HHD is the most common type in Khartoum North Hospital, followed by RHD, the sequence is reversed in the national statistics that included the rural hospitals' admissions.Our results suggest that there is a modest decline in hospital admissions of RHD over the three years period. However, this could due to random variation. Much fewer cases of RF are reported compared to cases of RHD, implying that the majority of RF patients (usually children) are missed until they present with valvular lesions or cardiac manifestations Padmavati (1978)[11] reported that about 1/1000 population in Sudan are admitted to hospitals with RF. Our estimate are comparable to RHD and RF admissions in other similar developing countries. In Padmavati's report. Egypt had a prevalence of 9.8/1000 for

RHD and a similar high prevalence was shown in several African countries. RF and RHD together constituted 35.2% of all CVD admissions in our series in contrast to 33-55% estimated for the developing countries[5,12]. This also compares well with previous studies, Halim (1961)[13]. The slight female preponderance and the early age of valvular involvement are consistent with reports from other countries[4]. Loss of life and ability to work or school absence for young adults and school children due to RF and RHD is unjustified. Unlike many diseases in developing countries, RF and RHD are preventable at a modest cost, in the short term, through proper treatment of primary attacks of streptococcal infections. It is also feasible in the long term by proper prophylactic measures to prevent recurrence of RF in children[5]. Naturally improvement in the socioeconomic standards, housing and general well being of the community will help in the decline of CVD resulting from infectious origin[14]. Upgrading of the awareness and capability of the health care providers and health care systems are crucial for early detection and management of RF and RHD nationwide.

About a third of all CVD admissions were due to HHD in these results and in the national admissions. While HHD accounted for 20/1000 hospital admissions in Khartoum North, it accounted for 9/1000 admissions nationwide with more female patients in either case. There is no change in the trend for the three year period. El Hassan and Wasfi (1972)[15] reported that 43% and 23.9% of CVD admissions to Khartoum Hospital are due to hypertensive in the low income and high income group respectively. They reported that 13.5% of CVD's detected among autopsies were due to HHD.

The age distribution of our patients is comparable with national and international reports. Hypertension is very common in developing countries. Ikeme et al[3] reported 13.1% of the population aged 15-64 surveyed in Ghana to be hypertensive and Cruz-Coke (1985)[16] reported a population prevalence of hypertension as high as 16.4% in Chile. In Tanzania HHD accounted for 20% of all CVD admissions[10]. Blood pressure clinics in urban centres in Sudan helped in the detection and early management of hypertensive patients[17]. However, there seems to be a continuing shortage of such services in the suburbs and smaller towns. In our results 80% of all HHD patients were urban residents.

CAD contributed 17.8%of CVD admissions and 10.5/1000 of all hospital admissions in Khartoum North. Nationally, CAD comprised less than 6/1000 of all admissions. In our series there was 30% excess risk of admissions of CAD for males compared to females which was marginally significant. Also there was a significant positive trend of CAD admissions during the three years period, from 6.4/1000 in 1981 to 14.6 in 1983. This could be explained by random variation on account of the short period of the study. The observed trend may also be a true change from the norms in this urban centre. In most reports from developing countries, CAD followed RHD and HHD in frequency among hospital admissions. While CAD was suggested to be rather uncommon in some African countries[3,10], it headed the list of mortality causes in the industrialized world [2,7,14]. It is suggested that with the gradual change in life-style, increased life expectancy and "westernization" of several developing countries a rise in the trend of CAD will occur. Many of the risk factors blamed for the high occurrence of CAD in industrialized nations are not uncommon in urban cities in the Third World although the rate of urbanization is disturbingly increasing. A decline of CAD in the industrialized world was observed, because of public awareness and control programs. By contrast refined food with high cholesterol, smoking, sedentary life-style and overweight are emerging risk factors among the socio-economically-privileged groups in the developing countries. In Khartoum, CAD is more common among the high -income group compared to the low-income groups[15]. Environmental factors discourage people from walking and exercise, smoking is common in public places and there is no objective health education program directed towards reducing the prevalence of CAD or CVD at large.

At present CVD's are not considered a major health concern nationwide. They are not among the eight major causes of morbidity and mortality in Sudan[18]. This was based on unreliable hospital data from the early 1970s and needs to be reviewed. First, CVD is now the second cause of death among city dwellers next to road traffic accidents. It is likely that approximately 40% of our population will be living in cities before the end of this century. Secondly absolute number and rates are not enough to set priorities in health care, as a patient with CVD will cost hundred times more than a patient with malaria. In a country, which offers free medicine to its citizens the cost of treatment, is an important variable in priority setting. Thirdly, compared to the commoner tropical diseases and other health problems. CVD prevention program cost far less, relative to treatment, than do other diseases. Fourthly, CVD in general afflicts young adults and prime life citizens who are most productive in the community. We propose reassessment of the national health priorities with due consideration for urbanization projections, cost of treatment, economic loss due to sickness and the ratios of prevention to treatment costs. Furthermore, the framework of the health services in urban centers in Sudan provide a good basic structure for primary and perhaps secondary prevention programs of CVD's at low additional costs. W propose strengthening of the school health programs and in-service training of health workers (all levels) to detect and appropriately manage RF and hypertension.

Standardized management procedures in primary heath care may prove to be very useful and the routine use of the sphygmomanometer will not be a great burden[19].

Finally, population based studies are needed to assess the magnitude of CVD in the different communities and to evaluate the prevalence of risk factors. There is an urgent need for epidemiological studies to design preventive programs against CVD risk factors.

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