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Prospective Study of Adult Cases Presenting at the Cardiac Unit, University College Hospital, Ibadan 1968 and 1969*

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Summary. Two hundred and seventy-one consecutive patients with cardiac disease had a mean age on presentation of 37·2 years: but there were two modes, in the teens and fifties, more marked in the males whose mean age was 38·5 years. The females' mode was in the twenties and mean 35·5 years. The sex ratio was 1·46/1. All were Africans except for five Caucasoid patients.

The patients were assigned to one or other of sixteen predefined diagnostic categories on the basis of clinical evidence and, where available, that from phonocardiographic and haemodynamic study, operation and necropsy. The percentage frequencies were: hypertensive heart failure 28·0 (mean age 46·7 years); myocardial disease 14·0; rheumatic heart disease 13·3; endomyocardial fibrosis 8·5; mitral incompetence, undifferentiated 6·6; cor pulmonale 6·6; congenital heart disease 5·5; pericardial disease 5·5; anaemic heart failure 3·0; ischaemic heart disease 2·6; aortic disease with heart involvement 1·8; infective endocarditis 1·3; aortic incompetence, undifferentiated 1·1; arrhythmia without signs of an organic lesion 1·1; annular ventricular aneurysm 0·7.

The distribution resembles that in comparable series reported from Johannesburg, Cape Town, Kampala and Addis Ababa; except that in the present series, syphilitic heart disease is absent and endomyocardial fibrosis, as in the Kampala series alone, present.

Résumé. 271 cas consécutifs des maladies cardiaques avaient l'âge moyen de 37·2 ans â la consultation mais présentaient deux pointes, sur la courbe, situées dans l'âge des adolescents et dans la cinquantaine. Cette distribution d'âge était plus marqués chez les patients masculins où l'âge moyen étaít 38·5 ans. La pointe de la courbe chez les patients feminins était située dans la vingtaine et l'âge moyen était 35·2 ans. Le rapport males/feminins était 1·46/1. Tous, hormis 5 cas, étaient de la race noire.

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Ils étaient assignés à l'une ou l'autre des catégories des diagnostiques prédéterminés sur la base des données cliniques et, si disponible, sur les études hémodynamiques et phonocardiographiques aussi bien que sur les résultas d'opération et d'autopsie. Les pourcentages obtenues étaient:—Insuffisance cardiaque d'origine hypertensive 28·0 (âge moyen = 46·7); maladies du myocarde 4·0; valvopathie consécutive au rheumatisme chronique 3·3; fibrose éndomyocardique 8·5; insuffisance mitrale d'origine indéterminée 6·6; cor pulmonale 6·6; malformations cardiaques congenitales 5·5; maladies du péricarde 5·5; insuffisance cardiaque consécutive à l'anémie 3·0; maladies cardiaques consécutive à l'ischémie 2·6; maladies aortiques 1·8; éndocardite infectieuse 1·3; insuffisance aortique d'origine indéterminée 1·1; arythmie sans signes d'une lésion organique 1·1; aneurisme annulaire ventriculaire 0·7.

Cette distribution ressemble à celle, dans les séries comparables, des cas étudiés à Johannesburg, à Cape Town, à Kampala et à Addis Ababa avec l'exception que dans notre série il n'y a pas de maladies cardiaques d'origine syphilitique et qu'il éxiste, comme à Kampala, des cas de fibrose éndomyocardique.

INTRODUCTION

There are several reports of the distribution of cardiac cases, presenting at diagnostic centres in Africa, (Schwartz, Schamroth & Seftel, 1958; Schrire, 1964; D'Arbela, Kanyerezi & Tulloch, 1966; Parry & Gordon, 1968). These studies provide information about the relative incidence and geographic location of the various diseases and of the field work which would be required for the determination of absolute incidence in order to identify possible ethnic or enviromental factors.

Between 31 December 1967 and 1 January 1970 all cases of cardiac diseases presenting at the Cardiac Unit of the Department of Medicine, University College Hospital (UCH), Ibadan, were recorded.

PATIENTS AND METHODS

Patients were referred from (1) the General Out-patients Department of UCH—42% (2) peripheral hospitals—30% (3) other units in the hospital—20% or (4) general medical practitioners—8%. Children under the age of 12 were not included since they were referred to the Paediatric Department.

Investigations carried out routinely on each patient included anamnesis and clinical examination (with special reference to the circulatory system), 13 lead scalar electrocardiography, chest radiography, full blood count and haemoglobin genotyping. In patients with abnormal chest radiographs on the first film, a barium swallow with lateral projection and, at times, postero-anterior (high penetration) projection was carried out.

The following data were also recorded in some patients; throat swab examination for haemolytic streptococci; serum antistreptolysin-O titre; VDRL test for syphilis; serum electrolytes, urea, creatinine and cholesterol; excretory pyelogram; radiographic screening by image intensifier for abnormal pulsation or calcification.

Phonocardiograms were available in eleven patients and haemodynamic studies (cardiac catheterization, often with angiography) in twenty-eight patients.

Nine were offered for closed cardiac surgery but one died. Of the total forty-two recorded deaths: there were twenty-nine necropsies in all.

The diagnostic categories adopted were influenced by the records of the Ibadan Cardiac Registry and the reports of previous workers (Lauckner, Rankin & Adi, 1961; Abrahams, 1962; Abrahams *et al.*, 1962; Parry & Ikeme, 1966; Cockshott, Saric & Ikeme, 1967a; Cockshott *et al.*, 1967b; Brockington, 1969).

The working classification is presented below but criteria were not strictly predefined, since all the variations shown by these entities in West Africa are still not fully appreciated.

(A) *Congenital heart disease* was given no special redefinition in this series.

(B) *Infective endocarditis* takes precedence as a diagnosis over any other and could be expected to include cases which would otherwise be grouped under the congenital or rheumatic categories.

(C) *Aortic incompetence* comprises undifferentiated cases which lack evidence clearly indicative of congenital, rheumatic or syphilitic aetiology. If an aortic aneurysm is present the case is classified under category H.

(D) *Rheumatic heart disease* was not given, as a diagnostic category, any special redefinition. Additional cases could be expected to appear, on extended follow-up, from those initially assigned to categories C and E ('aortic' and 'mitral incompetence, undifferentiated'). Acute rheumatic heart disease was to be included whether manifest as pericardial, myocardial or valvular lesions.

(E) '*Mitral incompetence*' has been recognized elsewhere (Abrahams, 1960; Abrahams & Brigden, 1961; Shillingford & Somers, 1961) to present in a similar clinical setting whether it is due to chronic rheumatic heart disease or to endomyocardial fibrosis. The differentiation is impossible initially in many instances. The differentiating features which are suggestive of rheumatic aetiology include a history strongly indicative of rheumatic fever or, on radiography, definite left atrial enlargement or valvular calcification. Those suggestive of causative endomyocardial fibrosis are concommitant indications of right-sided cardiac restriction or presence of intracardiac calcification on radiographic screening. Differentiation can, however, be made on the basis of angiography or necropsy findings and the case assigned to category D or F.

(F) *Endomyocardial fibrosis* is a diagnosis to be considered when endemic foci of the disease exist within the area served by the centre. Cases have been described here (Abrahams, 1962; Cockshott *et al.*, 1967a; Parry & Abrahams, 1965) ever since the first report of Abrahams (1959). The fibrotic process develops in the apical region of the ventricular cavities. It leads ultimately to incompetence of the atrio-ventricular valves (by traction on the chordae tendinae) and, on the right side particularly, reduction of the ventricular capacity.

There are the problems of differentiating the right ventricular form of endomyocardial fibrosis from constrictive pericarditis (Somers *et al.*, 1968; Brockington, 1969) and of differentiating the left ventricular form of endomyocardial fibrosis from rheumatic mitral incompetence, which was impossible in some cases.

(G) *Annular ventricular aneurysm* is the entity previously described as 'annular subvalvular ventricular aneurysm', by Abrahams *et al.* (1962) and by Cockshott *et al.* (1967b). In the fully developed form the annular multilocular sac encircles the left ventricular cavity and is quite distinct, morphologically, from the post-infarction aneurysm seen in other temperate countries. 'African ventricular aneurysm' might, in fact, be an acceptable title since the

disease appears to be virtually restricted to this race. The terms 'submitral' and 'subvalvular' have been omitted following the report of Chesler, Tucker & Barlow (1967) which draws attention to similar cases, but the aneurysm arises from the apex of the left ventricle.

(H) *Myocardial disease* is usually diagnosed in cases with the following features of myocardial failure namely: effort intolerance, dyspnoea, tachycardia, central venous hypertension, generalized cardiac enlargement on radiography and therapeutic responsiveness to digitalis. If the patient has not been observed throughout the evolution of the condition, some of these criteria may be missed. Generally any of the latter three are considered adequate by themselves though features suggestive of pericardial effusion would invalidate the radiographic criterion. Hepatomegaly, dependant oedema and serous effusions are confirmatory but not always present.

In the second place, non-myocardial causes exclude this diagnosis. Thus, ischaemic heart disease, hypertensive heart failure and valvular disease ought to be distinguished since they too may present as myocardial failure.

A history of recent influenza-like illness, sudden on onset, particularly in a previously healthy individual, coincidence of arrhythmias and gradual subsequent diminution of cardiomegaly were all considered as indicative factors but some misdiagnosis can be anticipated within this category since coronary artery disease, annular ventricular aneurysm or hypertension may go unrecognized. Many cases will be incompletely diagnosed in that a viral aetiology, for example, is often suspected but seldom proved.

The term 'myocardial disease' has been favoured by an earlier author (Mattingly, 1965) and seems preferable to 'cardiomyopathy' which, as usually defined (e.g. Goodwin *et al.*, 1961) involves uncertainty of causation, not necessarily valid, and includes disparate entities such as endomyocardial fibrosis and ventricular aneurysm.

It is concluded that in advance of a standardized, rigorous scheme of investigation, attempts to conceptually distinguish partially-diagnosed cases, referred to as 'idiopathic' or 'cryptogenic', from the rest are a source of much present confusion.

(I) *Ischaemic heart disease* is, though at present of small magnitude in West Africans, adequately recognizable by its description in the Caucasoid race.

(J) *Anaemic heart failure* was applied only to patients in heart failure whose packed cell volume was demonstrated to be or judged to have been less than 22% since this involves excessive cardiac output (Whitaker, 1956).

(K) *Hypertensive heart failure* was frequently diagnosed, in accordance with the high hospital incidence of hypertensive heart disease already noted in UCH, Ibadan by Lauckner *et al.* (1961) and Parry & Ikeme (1966). The word 'failure' was adopted by us in the interests of more precise definition.

The criteria employed include basal blood pressure readings (under the usual circumstances of repose) of at least 170 mmHg systolic or 100 mmHg diastolic, in the presence of myocardial failure as defined under category H. Generally these elevations are consistent and recorded repeatedly. Otherwise, confirmation is to be sought, i.e. sufficient evidence for diagnosis of an underlying condition, such as chronic nephritis or of other effects of hypertension. The latter would be provided by the finding of hypertensive retinopathy or of marked left ventricular of left atrial hypertrophy on the electrocardiogram in the absence of other causes.

(L) *Cor pulmonale* is a term which is applied to the cardiac complications of long-standing pulmonary disease (tuberculosis, chronic bronchitis, emphysema). The term also includes the

acute, usually recurrent, overloading of the right heart consequent upon pulmonary embolism.

(M) *Aortic disease* is often found, post-mortem, to be associated with granulomatous changes similar to those of Takayasu's disease (Abrahams & Cockshott, 1962). Involvement of the ascending aorta is responsible for incompetence of the valve and the appearance of cases in the series of cardiac disease.

(N) *Pericardial disease* is not unexpected in a region of high prevalence of tuberculosis. Endomyocardial fibrosis and rheumatic heart disease presenting initially as pericardial effusion were to be appropriately reclassified. However, they are not easily identified because special investigations are not always feasible. The difficulty of distinguishing endomyocardial fibrosis (group F) of the right ventricle from constrictive pericarditis has been considered as not unsurmountable.

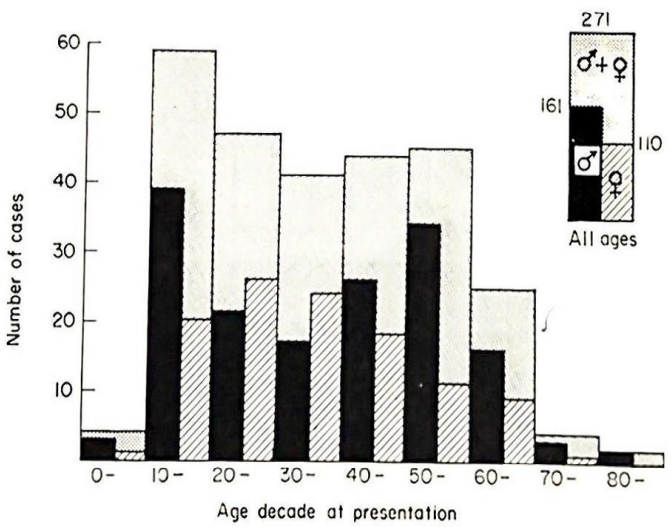

FIG. 1. Age distribution in decades of 272 cardiac cases for males, females and both sexes combined.

(O) *Arrhythmia* is a designation for cases where there is no apparent underlying organic disease. Most cases of palpitations in the absence of specific clinical findings occur in the higher socio-economic groups, whether Caucasoid or African. They were excluded if considered to be due to sinus tachycardia associated with anxiety.

(P) *Syphilitic heart disease* was included, to assist comparison with other African series, for any seropositive cases of aortic incompetence, ischaemic heart disease or ventricular aneurysm thought to be causally related to syphilis. The diagnosis would also be made by post-mortem histology.

Observer variation was limited because there was one clinician responsible for diagnosis throughout the period under review. His conclusions were reviewed by one or more other clinicians and, for the first half of the period at least, in the light of cardiac catheterization findings.

RESULTS

A total of 271 patients remained after excluding those ultimately considered to have shown no definite evidence of cardiac abnormality. The age and sex distribution are presented in Fig. 1. The percentage distribution between the sixteen diagnostic categories which were adopted is shown graphically in Fig. 2. Some features shown by each group are described.

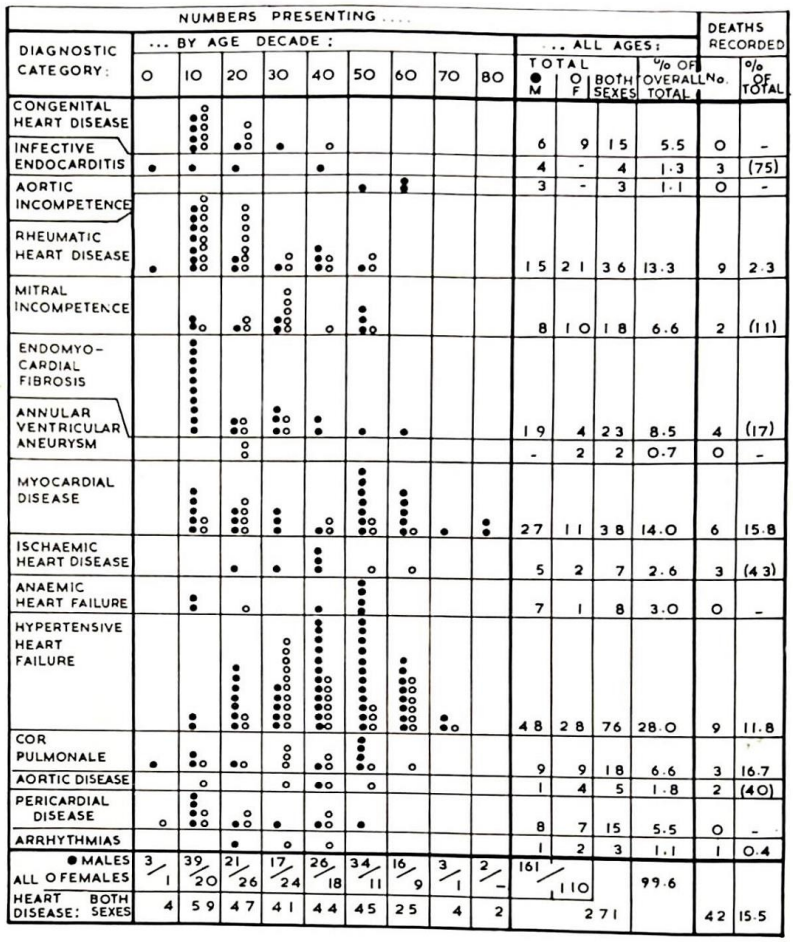

FIG. 2. Two hundred and seventy-two cardiac cases distributed according to diagnostic groups, age (in decades) and sex.

(A) *Congenital heart disease*

The fifteen cases so diagnosed are made up of ventricular septal defect in nine; patent ductus arteriosus in two (both successfully treated surgically); and one each atrial septal defect, pulmonary artery dilatation and coronary artery fistula.

No deaths were recorded. A case of situs inversus totalis is described under group B. He

died from a probably unrelated cause at the age of 43. Of the fifteen cases included the eldest, aged 48 (diagnosed ventricular septal defect with heart failure) was lost to follow-up but is unlikely to have survived very long. Apart from another case of ventricular defect who was largely asymptomatic and aged 36, the remainder in the group were under 30. The one Caucasoid, a girl of 13, had suffered cyanotic attacks until the age of 11 but is now free of symptoms or signs. Presumably she had had a defect of the muscular portion of the interventricular septum which later closed spontaneously.

(B) *Infective endocarditis*

Four cases, with three deaths, were diagnosed. The lesions were (i) mitral and aortic incompetence, presumed rheumatic, and death with subsequent necropsy; (ii) mitral incompetence, probably rheumatic with isolation of staphylococcus and eventual response to treatment despite initial heart failure; (iii) rheumatic aortic and mitral incompetence, with perforation of the posterior aortic cusp in a case of situs inversus totalis and (iv) rheumatic aortic and mitral incompetence with infection of the former valve and isolation of *Proteus* sp. from an ante-mortem blood specimen.

(C) *Aortic incompetence*

There were only three patients who have still defied further diagnosis. They were all seronegative for syphilis, had no detectable valvular calcification or significantly raised antistreptolysin-O titre. In one patient the ascending aorta was somewhat dilated. There were no deaths although it was at necropsy that a fourth case, dying of unremittent heart failure, was found to be rheumatic in origin and this recategorized.

(D) *Rheumatic heart disease*

In the thirty-six patients, the recognized lesions were distributed as follows: combined mitral disease in nineteen, with in addition aortic incompetence in four, aortic stenosis in one and tricuspid stenosis in one; mitral incompetence in eight, with in addition aortic stenosis in one; mitral and aortic incompetence in five, with in addition tricuspid incompetence in three (two confirmed by necropsy); mitral stenosis without incompetence in three, with in addition aortic incompetence in one; aortic stenosis as the sole lesion in one; quadruple valvular disease, combined mitral and combined aortic, in two.

At least seven were in the active phase of rheumatic carditis, as judged by temperature, high sedimentation rate, rising ASO titre or, in two, necropsy findings. There were nine known deaths, with necropsy in all patients.

(E) *Mitral incompetence*

The eighteen cases without further diagnosis include two fatal ones, both, necessarily, without necropsy. In fact there are, as yet, no instances of mitral incompetence in which the cause was only found at necropsy.

(F) *Endomyocardial fibrosis*

Of the twenty-three cases diagnosed as endomyocardial fibrosis, fourteen had features suggesting biventricular involvement. There were only three of the right ventricular and two of the left ventricular type. Certain features of the disease as observed in these cases have been reported in previous series, especially from Kampala (Shillingford & Somers, 1961;

Hutt *et al.*, 1965; Somers *et al.*, 1968), and Ibadan (Abrahams, 1962; Cockshott *et al.* 1967a; Hutt *et al.*, 1965). There were only four known deaths.

(G) *Annular ventricular aneurysm*

Two cases were diagnosed, one from the lateral chest radiograph during investigation of a cardiomegaly which appeared on a routine postero-anterior film; the other on left ventricular angiography during investigation of heart failure with apparent mitral incompetence. The latter case has since become asymptomatic, presumably as a result of clot formation in the sac.

(H) *Myocardial disease*

There were thirty-eight patients who were diagnosed as having myocardial disease. It was, in a large proportion, an admission of diagnostic ignorance. Occasionally the cause was apparent and of a definite 'primary myocardial' nature. In a 40-year-old female, myocarditis occurred as a complication of mumps. In general, and in the absence of full haemodynamic study, we could not firmly exclude such conditions as ischaemic heart disease without residual ECG changes, annular ventricular aneurysm without distortion of X-ray silhouette or hypertensive heart disease following remission of the hypertension.

The recorded mortality of six represents 15·8% of the group and is close to the overall mortality of 15·5%.

The findings in the four autopsied patients were of generalized cardiac dilatation and of non-specific fibrotic infiltration of the myocardium.

(I) *Ischaemic heart disease*

The seven patients included three of the five Caucasoids in the series. The two fatal cases, however, were in Africans. One was a young professional Nigerian who smoked heavily but although well studied clinically before and after a major infarct, showed none other of the five disposing factors identified in the population of Framingham, U.S.A. (Dawber *et al.*, 1966).

(J) *Anaemic heart failure*

There were eight non-fatal cases, as the condition was treated in time. The initial packed cell volumes recorded were 12, 9, 12, 22, and 18% respectively.

The severe degree of anaemia was diagnosed in retrospect in the remaining three cases, treatment having produced remission before confirmation was obtained.

Hookworm infestation was the chief aetiological factor. Following treatment, dramatic diminution of heart size on radiography over the course of a few weeks was the rule in accordance with previous reports (Somers, 1959).

(K) *Hypertensive heart failure*

Seventy-six cases showed an average recorded mortality of 11·8%, since there are nine known deaths to date. Although the fatal event was nearly always pulmonary oedema, this was part of a picture of end-stage renal failure following upon progressive uraemia. Otherwise the pulmonary oedema at onset of heart failure, which often leads to admission of this group of patients is, by contrast, readily treatable.

As judged by the high incidence of spontaneous remission (Carlisle, 1971) this disease in the West African has an outstandingly good prognosis if renal failure does not precede heart failure. A current study (Carlisle & Jayesimi, 1970) aims to determine whether the recovery process is more effectively hastened by control of heart failure or by control of blood pressure but in this series the two therapeutic processes were employed simultaneously.

(L) *Cor pulmonale*

Ten were classified as chronic with longstanding chest infection. There were, in the two coming to necropsy, one case each of healed tuberculosis and of bronchiectasis.

Seven were acute cor pulmonale. Except in the one case known to have died, there was evidence of pulmonary embolism in all. The remaining case was classified 'acute on chronic'. The group as a whole showed a higher-than-average mortality of 16·7%.

(M) *Aortic disease*

Aortic disease with heart involvement accounted for five cases, two were fatal. In the latter, necropsy showed dissecting aneurysm and non-leutic aortitis respectively.

(N) *Pericardial disease*

There were fifteen cases (with no recorded mortality) but pericardial effusions were also present in at least ten of the cases included either under right-sided endomyocardial fibrosis or rheumatic heart disease.

(O) *Arrhythmias*

Three cases, two with multiple ectopic beats, occurred in the absence of other evidence of heart disease. The third was a case of complete A–V block ending fatally in Stokes-Adams attack; the organic basis was unknown because autopsy was refused.

(P) *Syphilitic heart disease*

No case was diagnosed despite numerous serological tests. All cases of 'aortic incompetence; undifferentiated' were seronegative as were all tested cases of 'aortic disease' (at least three out of five, one of the remainder being established as non-syphilitic on post-mortem necropsy).

DISCUSSION

In clinical series such as this all patients have to be assigned to one or other of the available categories. Difficult diagnostic problems have sometimes to be shelved by provisional choice of the category which seems most appropriate, even if only by a small margin of 'probability'. This was so for several cases of heart failure of obscure cause which have been provisionally included under the term 'myocardial disease' although subsequent evidence may well assign them to a different group. 'Mitral incompetence' is an admittedly provisional diagnosis. In this way we were able to avoid the use of 'undiagnosed' as a category and lack of precision in our definition of the groups is, we believe, more than compensated by the advantages of a flexible approach. It is important for the individual diagnosis, as well as for the mental categories of the clinician, to allow for revision in the light of further data.

Several cases which, strictly considered, belong to two or more groups (e.g. infective

endocarditis complicating rheumatic heart disease or endomyocardial fibrosis with pericardial effusion) have been allocated to one only on the basis of practical priorities.

The age distribution for the whole series (Fig. 1) shows two departures from the 'age pyramid' anticipated in the type of community studied. Firstly, owing to exclusion of paediatric cases, the first decade is not represented and the second decade is under-represented. Secondly, there is a subsidiary peak in the fourth and fifth decades for which the males are responsible. The bimodality of the male distribution is marked and in contrast to that of the females. The reason for this difference is probably the effect of childbearing in precipitating symptoms among female cardiac sufferers. This is reflected in the reversed sex ratio for rheumatic heart disease of the third decade in particular (Fig. 2)—otherwise the females too might share the bimodality. The peak in the fourth and fifth decades is due (Fig. 2) to the high incidence of presentation with hypertensive heart failure, the commonest group of the series, affecting both sexes in a ratio characteristic of the entire hospital medical admissions (Lauckner *et al.*, 1961).

A similar bimodality limited to males is evident in the age distribution of the cardiac cases reported by Parry & Gordon (1968), contrasting with their control group of subjects reporting for mass miniature X-ray.

A striking departure of sex ratio from the average is to be seen in endomyocardial fibrosis of the second decade. It will be interesting to see whether this observation, based on ten cases only, is later confirmed.

The other diagnostic groups show only slight, and predictable, departures from the expected age and sex distribution of the population from which cases are drawn. Myocardial disease shows a tendency to bimodality which could be explained in terms of the admixture of undiagnosed cause of hypertensive heart disease; following the demonstration, in a previous paper (Carlisle, 1971), that in this population hypertensive disease undergoes remission in an expectedly high number of cases although heart failure, thought to be the crucial factor, may persist. The disease can then become indistinguishable from intrinsic, or primary, myocardial disease. In terms of their recorded blood pressure, patients at Ibadan form a continuous spectrum bridging these two entities (Brockington, 1968) and retinopathy cannot be used as a regular differentiating feature (Akinkugbe, 1968).

In a retrospective study of heart disease in Lagos, 80 miles from Ibadan, the diagnosis of 'heart muscle disease' clearly dominated presentations in heart failure for the older age groups (Okuwobi, 1968). However, hypertension formed only 19% (twenty-six cases in 137) of this series of cases in heart failure and perhaps was not recognized in the heart muscle disease group. We have intentionally avoided the designation 'heart muscle disease', though it has been applied previously to cases in Ibadan (Hutt *et al.*, 1965; Parry & Ikeme, 1966; Cockshott *et al.*, 1967c). Its use implies that many, if not all, patients with myocardial failure have a specific myocardial disease. Attention is thus diverted from the role of hypertension as a primary factor in cases of heart failure (Brockington, 1968).

Parry & Gordon (1968) collected most of the earlier work on relative frequencies of clinical groupings in cardiac disease. We have confined attention to the four reports which appear compatible, in terms of case selection and manner of study and classification, to allow maximum meaningful comparison (Table 1).

From the present Ibadan series, the five non-Africans are excluded. Cases under 'mitral incompetence' have been equally divided, on the the simplest assumption, between rheumatic heart disease and endomyocardial fibrosis and the figure for 'aortic incompetence' also

TABLE 1. Diagnostic groupings and percentages for comparable series of cardiac cases presenting at diagnostic centres in Africa

Johannesburg (Schwartz *et al.*, 1958)	Cape Town (Schrire, 1964)	Kampala (D'Arbela *et al.*, 1966)	Addis Ababa (Perry & Gordon, 1968)	Ibadan (Carlisle & Ogunlesi, 1971)
Africans—275 cases	Bantu—1952 cases	Africans—449 cases	Ethiopians—558 cases	West Africans—267 cases
Over 10 years	All ages	No neonates	All ages	Generally over 10 years
Admissions to one medical unit	In- and out-patients mostly medical	First admissions to medical and paediatric wards	First seen at cardiovascular clinic	First seen, cardiac clinic or wards
Prospective 1957	Prospective 1952–61	Prospective 1962–63	Prospective 1966–68	Prospective 1968–69
M/F = 1·2/1	M/F = 1·6/1	M/F = 1·1/1;	M/F = 1·5/1	M/F = 1·5/1
Necropsy rate?	Necropsy rate?	0·2% necropsies	Necropsy rate?	1·1% necropsies
Congenital heart disease—1·1%	Congenital heart disease—5%	Congenital heart disease—8·0%	—	Congenital heart disease—(5·3%)
Subacute bacterial endocarditis—1·8%	—	Endocarditis—(2·5%)	—	Infective endocarditis—(1·5%)
Chronic rheumatic heart disease—(23·6%)	Rheumatic heart disease—19%	Rheumatic heart disease—(24·7%)	Rheumatic carditis—34·8%	Rheumatic heart disease—(18·1%)
—	—	Endomyocardial fibrosis—11·1%	—	Endomyocardial fibrosis—(12·1%)
Crytogenic heart disease—37·5%	Beri beri and cardiomyopathy—5%	Idiopathic cardiomyopathy—13·5%	Cardiomyopathy—13·6%	Myocardial disease—(13·9%)
Myocardial infarction—(0·4%)	Coronary vascular disease—1%	Coronary heart disease—0·7%	—	Ischaemic heart disease—(1·5%)
—	—	Severe anaemia with heart failure—5·5%	—	Anaemic heart failure—(3·0%)
Hypertensive heart disease—19·6%	Hypertension—34%	Hypertension with heart failure—19·5%	Hypertension—16·3%	Hypertensive heart failure—(28·5%)
Cor pulmonale—10·9%	Pulmonary heart disease—2%	Cor pulmonale—5·0%	Cor pulmonale—1·6%	Cor pulmonale—6·8%
Tuberculous pericarditis—4·0%	Non-rheumatic pericarditis—12%	Pericardial disease—3·5%	Tuberculous pericarditis—10·8%	Pericardial disease—6·0% disease—6·0%
—	Isolated arrhythmia + heart block—0·9%	—	—	Arrhythmias—(1·1%)
Syphilitic aortitis—1·1%	Syphilitic heart disease—2%	Syphilitic heart disease—6·2%	Syphilitic heart disease—16·8%	—
—	Remainder—19·1%	Miscellaneous—3·1%	Miscellaneous—6·1%	Aortic disease—(2·7%)
Total 100·0%	100·0%	100·3%	100·0%	100·5%

Bracketed percentages have been recalculated.

added to that of rheumatic heart disease. In the Johannesburg series, the figures for acute and chronic rheumatic heart disease have been combined; and from the Kampala figure the six cases of infective endocarditis have been subtracted and added to the rheumatic category so as to bring it into line with other series. Endomyocardial fibrosis appears in the Kampala and Ibadan series only: due to populations with high incidence within the drainage area of both centres. The fact that the percentages are so similar can only be fortuitous. Syphilitic aortitis reaches 17% in Addis Ababa (Parry & Gordon, 1968), and is high in Kampala (D'Arbela *et al.*, 1966) while the South Africans report a few percent (Schwartz *et al.*, 1958; Schrire, 1964) and we observed none. In the case of Ibadan, it is probable that the endemicity of yaws—now eradicated—has protected against syphilis.

Apart from this, however, the similarities are more striking than the differences and closer analysis is indicated to separate the real from the apparent differences.

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