

THE RACIAL INCIDENCE OF HYPERTENSION, RHEUMATIC AND SYPHILITIC DISEASE OF THE HEART AT GROOTE SCHUUR HOSPITAL, CAPE TOWN, DURING THE 10-YEAR PERIOD 1952 - 1961

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The extremely low incidence of coronary vascular disease in the Bantu of Cape Town has previously been reported.^{1, 2} In Whites on the other hand the disease is common, whereas in the Cape Coloured the incidence lies between that of the other 2 racial groups. The population at risk in Cape Town, the distribution of the 3 racial groups, the attendance at Groote Schuur Hospital and the electrocardiographic facilities during the 10-year period under review have been analyzed in a previous paper.³ All 3 races have the same geographic and climatic environment but the socio-economic, dietary and genetic differences are considerable.

It is the purpose of this paper to report the relative incidence of hypertension, rheumatic and syphilitic disease

of the heart, obtained from ECG data in the 3 racial groups and to supplement this with findings from the Cardiac Clinic. Since a means test prevented the attendance of the wealthiest section of the general population, the hospital population is selected. This scarcely affected the non-Whites, but resulted in the partial exclusion of the more privileged Whites. The figures obtained in this survey may therefore, be a more accurate reflection of the Cape Coloured and Bantu than of the Whites.

MATERIAL AND METHODS

The material and methods have been described in detail elsewhere.^{3, 4} In brief, all inpatients and outpatients attending Groote Schuur Hospital and the 44 teaching beds of

the New Somerset Hospital were included in the ECG service of the Cardiac Clinic. Almost all (56,807) of the ECG tracings were interpreted by 2 members of the Cardiac Clinic, approximately 90% by me, so that errors in interpretation were constant in all racial groups. The same physicians and surgeons saw patients of all races, and equal facilities for obtaining ECG investigations were available for all groups. The majority of inpatient ECGs came from the medical wards, and almost all outpatient records from the Medical Outpatient Department. In all cases ECGs consisted of the 6 limb leads and 7 praecordial leads $V_1 - V_7$.

As shown elsewhere, the attendance of White and Cape Coloured outpatients and inpatients were approximately equal (Table III): The Bantu subjects, although significantly fewer in number than either of the other 2 groups, were generally well represented in the hospital population, particularly in the group of under 50 years in age.

1. Hypertension

The analysis was carried out in the same way as previously described.⁴ All patients were included in whom 1 or more casual blood-pressure readings showed a diastolic pressure of at least 100 mm.Hg irrespective of the systolic pressure (all pressures being expressed to the nearest 5 mm.). In a minority of patients the diastolic pressure was 90-95 mm.Hg with a systolic pressure of 170 mm.Hg or over.

In the second group all patients who had ECGs recorded solely for hypertension or hypertensive heart disease were studied. Analyses were made on ECG changes and on the height of the diastolic pressure. For practical purposes this meant excluding patients with coronary heart disease (approximately 1,300 Whites and 500 Cape Coloureds) because the ECG patterns were so altered by this disease that the degree of hypertensive change could not be graded. Although this meant that a certain number of patients with an elevated diastolic pressure was excluded, there was no particular racial association between hypertension and coronary disease. The percentage of Cape Coloured patients with coronary heart disease and hypertension was only slightly greater than that of the Whites. ECG patterns were graded into 3 degrees of severity. The first consisted of normal patterns. The second was slightly abnormal, showing left atrial hypertrophy or slight ST-segment or voltage change. Atrial fibrillation without QRST change was included. For left atrial hypertrophy the following criteria were used: a P-wave more than 3 mm. in height in any lead (usually lead 2) or more than 0.10 second in duration, or when bifid, more than 0.04 second between peaks.⁵ The criteria of Sokolow and Lyon⁶ for voltage changes were used, namely, the sum of the left ventricular potentials (R-wave in leads V_5 or V_6 and S-wave in V_1) totals 35 mm. or more; the voltage of R in leads V_5 or V_6 exceed 26 mm.; the voltage of R-wave in lead aVL in the horizontal heart exceeds 11 mm.; or the R-wave in lead aVF in the vertical heart exceeds 20 mm. ST-segment abnormality consisted of a minor depression without T-wave inversion or U-wave inversion alone. Where T-wave inversion or marked ST-segment depression, or prolongation of the intrinsicoid deflection over the left ventricle (ventricular activation time) of over 0.55 second, were present the records were put into the third group. Included also were intraventricular disturbances of conduction and non-specific abnormalities.

Blood pressures were graded into 3 groups. The first group consisted of cases in which the diastolic pressure was 110 mm.Hg or less, the second pressures over 110 and up to 130, and the third those over 130. The highest blood pressure recorded was always accepted.

2. Rheumatic Heart Disease

As previously reported⁴ the diagnosis of rheumatic heart disease was always made on the basis of cardiac murmurs,

systolic or diastolic in time, usually arising in the mitral valves. In the case of systolic murmurs it is recognized that difficulty may be experienced in differentiating the murmurs of aortic stenosis from those of arteriosclerosis, and those of mitral incompetence from functional or congenital murmurs. Diastolic murmurs, on the other hand, usually indicate rheumatic heart disease, with the exception of lone aortic valvar involvement. By far the majority of patients had mitral valvar involvement, alone or in combination with other valvar lesions and diastolic murmurs were frequent.

Bacterial endocarditis was included in rheumatic heart disease, but in the presence of severe hypertension, aortic incompetence was not necessarily regarded as valvular disease. However, admitting the occasional errors in diagnosis, whenever the clinical diagnosis was one of rheumatic valvular disease, it was accepted as such, since the errors would be consistent in all races. Rheumatic fever was diagnosed on the basis of the usual criteria of polyarthritides, chorea or some other well-recognized manifestation of the disease, these being no different in Cape Town than elsewhere.

Where the question of congenital heart disease arises it is the practice in this hospital to refer such patients to the Cardiac Clinic for diagnosis so that these patients were generally excluded. To check the figures an analysis was made of the racial distribution of valvular disease seen in the Cardiac Clinic during the same decade 1951-1961. Almost all these patients were examined by me; surgical confirmation of the diagnosis being obtained in approximately 500 patients.

3. Syphilitic Valve Disease and Aortic Aneurysm

In the presence of pure aortic incompetence, the differentiation of syphilitic from rheumatic disease may be difficult, and occasionally syphilis produces all the signs usually associated with stenosis and incompetence⁷ thereby increasing the difficulty of diagnosis. Aortic incompetence was previously separately diagnosed⁴ as follows:

Those patients in whom the clinical bias strongly favoured rheumatic valvular disease were regarded as such; those in whom it favoured syphilis, and those in whom aneurysm of the ascending or arch of the aorta had occurred (with or without aortic incompetence) were regarded as resulting from syphilis; but those patients in whom either diagnosis could be correct were regarded as unknown. Because positive serologic reactions for syphilis occur so frequently in the non-White groups without cardiovascular disease these tests could not be relied upon in differential diagnosis. In this analysis only those patients who were regarded as syphilitic were analyzed. To confirm these findings the racial breakdown of the patients with cardiovascular syphilis or suspected cardiovascular syphilis seen by me in the Cardiac Clinic during the same 10-year period was attempted.

ECG analysis is of no value in the assessment of the degree or type of valve deformity present, as previously pointed out.⁴ However, a racial analysis is of value, because almost all patients with valvular disease of the heart or rheumatic fever were referred for ECG investigation, irrespective of their age, sex or colour and certainly no racial selection was made.

RESULTS

During the 10-year period 1952-1961, the total number of patients on whom ECGs were performed was 39,408.* However, some patients had records taken repeatedly over the years so that the actual number of individual patients was less (32,300). The ratio of White to Cape Coloured to Bantu was 7.5 : 5.7 : 1. In patients over the age of 19 the ratio was 9 : 6 : 1. The figures used for the analyses refer to individual patients unless otherwise stated.

*At the beginning of each calendar year new punch cards are issued for every patient so that after 5 years, if annual ECGs were done, there would be 5 cards for a single patient. As far as possible each card was checked with the previous records in the files to avoid duplication. Patients who during one year presented, e.g., with hypertension, and in a subsequent year with cardiac infarction, would be counted twice. If, on the other hand, hypertension only was present on both occasions, the patient would be counted once only.

1. Hypertension

High blood pressure was encountered in at least one-third of all patients. Of the 13,432 patients with hypertension 52% were White, 43% Cape Coloured, and 5% Bantu. After excluding the patients with an elevated pressure complicating other forms of cardiac disease (principally coronary vascular disease) there were 9,242 individual patients with hypertension or hypertensive heart disease of whom 48% were White, 46% Cape Coloured and 6% Bantu (Table I).

The incidence of an elevated blood pressure and of hypertension, therefore, appears to be high in all 3 races. However, statistical analysis of these and subsequent data has not been possible because an absolute knowledge of the population from which the hospital subjects have been drawn is not available. That hypertension occurs commonly in all 3 racial groups appears to be a valid conclusion, and that there is little racial difference in incidence is probably correct, confirming previous studies.⁴

The severity of hypertension in the 3 racial groups is shown in Tables II and III using the ECG criteria described under *Material and Methods*. 45% of the Whites had normal ECGs, whereas only 37% of the Cape Coloured and 31% of the Bantu had such patterns. On the other hand 39% of the Cape Coloured and 45% of the Bantu showed the greatest abnormality, as compared with 29% of the Whites. This would suggest that hypertension is more severe in the Cape Coloured and Bantu than in the Whites.

When hypertension was graded according to the height of the diastolic pressure the difference was even more striking. Thus 60% of the Whites had a diastolic pressure of 110 mm.Hg or less, whereas only 45% of the Cape Coloured and 45% of the Bantu had pressures of this order. With diastolic pressures of over 130 mm.Hg the reverse was found, namely 27% of the Cape Coloured and 25% of the Bantu compared with only 14% of the Whites with pressures of this order.

The age and sex distribution of the patients with elevated blood pressure and hypertension is shown in Table IV. 'Elevated BP' refers to the total number of patients submitted to ECG investigation (new patients for a 9-year period) in

whom an elevated blood pressure was found. 'Hypertension' refers to the selected group of patients with an elevated blood pressure after coronary vascular disease and other major cardiovascular disease had been excluded for the same 9-year period.

Females outnumbered males in both the White and the Cape Coloured groups—this was seen particularly after the age of 50 in the former, and after the age of 30 in the latter. For reasons previously given,⁴ this cannot be attributed solely to a difference in attendance of the 2 sexes at Groote Schuur Hospital, nor to the age or sex distribution of the general population, nor to ECG selection. In the first place excluding the gynaecological department (from which very few ECGs are requested), there were more male than female hospital beds, and consequently the annual rate of admission for males was slightly higher than that for females. The annual female attendance of the Medical Outpatients Department (the source of almost all outpatient ECG requests), was slightly greater than male attendance, so that the total attendance of both sexes was approximately equal. In the second place, the age and sex distribution of the general population (Table IV) showed an approximately equal sex distribution up to the age of 60 after which there was a slight female predominance. ECGs were performed on 10,941 White males, 10,235 White females, 7,240 Cape Coloured males and 8,432 Cape Coloured females, so that ECG selection could not account for the sex difference in the incidence of hypertension. In the Bantu, however, the situation was completely different. Bantu males far outnumbered the females, in the local population under the age of 50 (Table II), and this was reflected by the attendance of the 2 sexes at the hospital, approximately one-third as many males as females attended the Medical Outpatients Department and were admitted to the wards, (excluding the gynaecology wards⁴). 1,557 ECGs were performed on Bantu males and 1,003 on Bantu females. Moreover, the age distribution in the Bantu (Table II), showed a rapid decline in numbers after the age of 49 as compared with that of the Whites and Cape Coloured. It is not surprising, therefore, that more hypertensive Bantu males than Bantu females were found.

TABLE I. THE RACIAL INCIDENCE OF ELEVATED BLOOD PRESSURE AND HYPERTENSION

Race	Racial distribution of ECGs		Racial distribution of an elevated BP*		Racial distribution of hypertensive ECGs	
	Number	% of Total	Number	% of Total	Number	% of Total
White	21,176	53	6,932	52	4,423	48
Coloured	15,672	40	5,837	43	4,285	46
Bantu	2,560	7	663	5	534	6
Total	39,408		13,432		9,242	

*90% New patients.

TABLE II. THE SEVERITY OF HYPERTENSION AS ASSESSED ELECTROCARDIOGRAPHICALLY IN THE THREE RACIAL GROUPS

ECG grade of severity	White				Cape Coloured				Bantu			
	Male	%	Female	%	Male	%	Female	%	Male	%	Female	%
Normal	871	46	1,121	44	603	38	982	36.5	82	28	87	37
Grade 1	449	24	713	28	343	21	687	25	72	24	53	22
Grade 2	570	30	699	28	653	41	1,017	38.5	144	48	96	41
Total	1,890		2,533		1,599		2,686		298		236	
	4,423				4,285				534			

TABLE III. THE SEVERITY OF HYPERTENSION AS ASSESSED ON THE BASIS OF DIASTOLIC PRESSURES IN THE THREE RACIAL GROUPS

Blood pressure mm. Hg	White				Cape Coloured				Bantu			
	Male	%	Female	%	Male	%	Female	%	Male	%	Female	%
110 or Less	1,166	62	1,473	58	805	50	1,117	41.5	146	49	95	40
115-130	466	24	713	28	438	27	808	30	81	27	78	33
> 130	258	13	347	14	376	23	761	28.5	71	24	63	27
Total	1,890		2,533		1,599		2,686		298		236	
	4,423				4,285				534			

TABLE IV. SEX AND AGE OF PATIENTS WITH ELEVATED BP AND HYPERTENSION IN THE THREE RACIAL GROUPS — 9 YEARS (NEW PATIENTS)

Elevated BP	Decade	White		Cape Coloured		Bantu	
		M	F	M	F	M	F
Elevated BP	10—19	12	22	26	25	3	5
Hypertension	10—19	9	20	23	21	2	3
Elevated BP	20—29	45	44	75	71	21	19
Hypertension	20—29	40	36	59	69	18	14
Elevated BP	30—39	181	113	213	341	62	55
Hypertension	30—39	125	92	148	279	51	42
Elevated BP	40—49	510	447	463	792	101	74
Hypertension	40—49	288	341	299	650	71	59
Elevated BP	50—59	875	924	649	951	70	68
Hypertension	50—59	423	629	437	733	60	56
Elevated BP	60—69	811	1,002	422	620	47	36
Hypertension	60—69	417	652	290	461	41	34
Elevated BP	70+	541	685	305	257	30	10
Hypertension	70+	370	494	164	188	27	8

When the data shown in Table IV and Fig. 1 are analyzed, the following conclusions can be drawn. The incidence of an elevated blood pressure is more common in the White female than in the White male after the age of 50, whereas the Cape Coloured female far outstrips the Coloured male and this commences at least 2 decades earlier. The peak incidence of hypertension also occurs in the Cape Coloured female at least a decade earlier than in the White counterpart.

disease, 1,599 (38%) were White, 2,261 (53%) were Cape Coloured and 368 (9%) were Bantu (Table V). Rheumatic heart disease was thus common in all 3 racial groups, more common

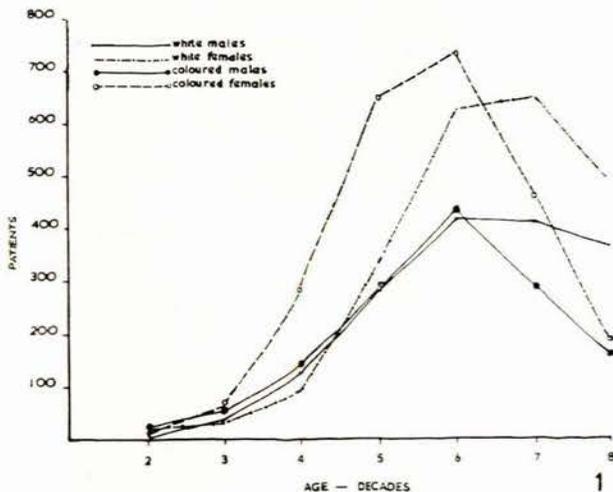


Fig. 1. The incidence (in decades) of hypertension according to sex and age in the 4,423 White and 4,285 Cape Coloured patients on whom ECGs were recorded. There were 1,890 White males, 2,533 White females, 1,599 Cape Coloured males and 2,686 Cape Coloured females. Hypertension was more common in the White female than in the White male after the fifth decade. In the Cape Coloured female the incidence was far higher than in the Cape Coloured male and the rest of the population, from the fourth to the sixth decades.

When the severity of hypertension is analyzed in the patients with hypertension alone, (uncomplicated by other forms of cardiac disease), according to race, age, and sex (Table IV, Figs. 2 and 3), the following results emerge. Using the criteria of ECG severity, (Fig. 2) the Cape Coloured males and White females were only slightly more severely affected than White males and the age distribution was similar. Cape Coloured females, however, far outnumbered all other groups, and their hypertension appeared at least a decade earlier. This is even more strikingly demonstrated when the criteria of diastolic pressure (Fig. 3) is used. The Bantu figures have not been included in this analysis because the sex distribution in the 'population at risk' is so unnatural.

2. Rheumatic Heart Disease

The incidence of rheumatic heart disease (including rheumatic fever) in 39,408 patients submitted to ECG investigation was at least 10%. Of the 4,228 patients with rheumatic heart

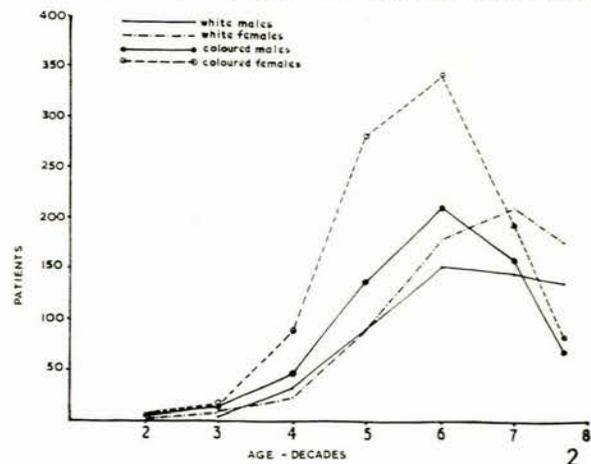


Fig. 2. The incidence (in decades) of Grade 2 ECG changes, according to sex and age in the 570 White males, 699 White females, 653 Cape Coloured males and 1,007 Cape Coloured females. The ECG changes were found more commonly in the Cape Coloured males than in the White males, even though the total of hypertensive White males (1,890) is greater than that of hypertensive Cape Coloured males (1,599). Cape Coloured females were affected more than all other groups and severe ECG changes appeared at least a decade earlier.

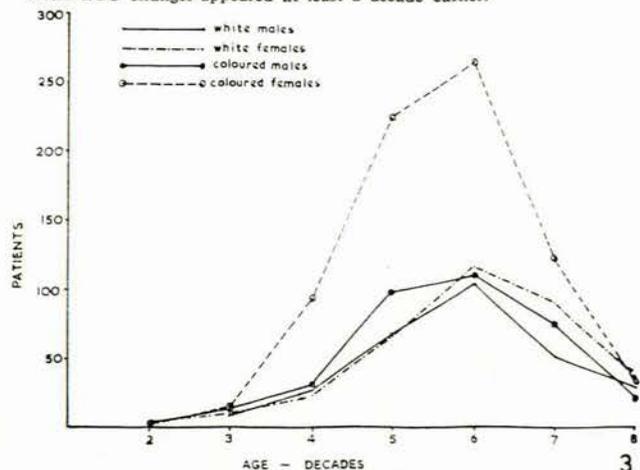


Fig. 3. The incidence (in decades) of diastolic pressures over 130 mm.Hg according to sex and age in 258 White males, 347 White females, 376 Cape Coloured males and 761 Cape Coloured females. The striking increase in incidence among the Cape Coloured female is well shown. Cape Coloured females were affected more than any other group and severe diastolic hypertension occurred at least a decade earlier.

in the Cape Coloured than in the Whites and at least as common in the Bantu as in the Whites. Analysis of the 2,066 patients with rheumatic heart disease seen in the Cardiac Clinic (Table V) provided comparable results.

The incidence of rheumatic heart disease and rheumatic fever according to age and sex, is shown in Table VI. In the White and Cape Coloured the condition was more common in the female than in the male (4:3 and 12:7 respectively). A similar trend up to the age of 30 was noted in the Bantu but after this age males outnumbered females, presumably because of the abnormal sex distribution of the Bantu population previously described. With advancing age, the Whites outnumbered the Cape Coloureds and after the sixth decade the disease was relatively uncommon in the Cape Coloured and rare in the Bantu.

3. Syphilitic Heart Disease

The incidence of syphilitic heart disease in 39,408 patients submitted to ECG investigation was approximately 0.5%. Of the 188 patients, 29 (15%) were White, 119 (64%) were Cape Coloured and 40 (21%) were Bantu (Table VII). Syphilitic heart disease was thus far commoner in the Cape Coloured and the Bantu than in the White as previously recorded,⁴ but was relatively rare in all 3. Analysis of 134 patients with luetic heart disease seen in the Cardiac Clinic (Table VII) provided comparable results. Most of the patients with aortic incompetence of unknown origin were presumably syphilitic.

When the age distribution of these patients seen in the Cardiac Clinic is considered, 25 (19%) were under 40, and 77 (57%) between 40 and 60 years of age. Males far outnumbered females in Whites, Cape Coloured and Bantu by 5:1, 3:1 and 6:1 respectively.

CONCLUSIONS

The incidence of hypertension in the White and non-White races has been summarized and discussed elsewhere.⁴ The

condition is common in all racial groups particularly in the non-White races.⁸

The data obtained in the present study confirms and amplifies the findings previously reported.⁴ ECGs were performed on 39,408 patients and an elevated blood pressure was noted in approximately one-third of these. There was no disproportionate increase in the incidence among the Whites as compared with the Cape Coloured and the Bantu which is in striking contrast to the findings in coronary vascular disease.³

When ECGs requested for hypertension alone, unassociated with other forms of heart disease, were analyzed, the following features emerged, confirming previous findings.⁴ Hypertensive disease as assessed by ECG criteria for severity and by the height of the diastolic pressure was more severe in the Cape Coloured and Bantu than in the Whites. Hypertensive disease occurred at an earlier age in the non-White races than in the Whites. Females were affected more frequently than males and Cape Coloured females in particular developed hypertension at an earlier age than all others, the hypertension being far severer in degree.

Rheumatic heart disease occurred in at least 10% of all patients. It was commoner in the Cape Coloured than in the Whites, and at least as common in the Bantu, as in the Whites. Females were affected more commonly than males, and the majority of patients appeared under the age of 50. The disease appeared to be more severe in the Cape Coloured and Bantu than in the White, since after the age of 40 far fewer cases were found in the Cape

TABLE V. RACIAL INCIDENCE OF RHEUMATIC HEART DISEASE AND RHEUMATIC FEVER — ELECTROCARDIOGRAPHICALLY AND AS SEEN IN THE CARDIAC CLINIC

Race	Racial distribution of ECGs		Racial distribution of 4,228 patients with ECGs for Rheumatic H.D. and rheumatic fever		Racial distribution of 2,066 patients with Rheumatic H.D. seen in the Cardiac Clinic	
	Number	% of Total	Number	% of Total	Number	% of Total
White	21,176	53	1,599	38	781	38
Coloured	15,672	40	2,261	53	1,018	49
Bantu	2,560	7	368	9	267	13
Total	39,408		4,228		2,066	

TABLE VI. SEX AND AGE OF PATIENTS WITH RHEUMATIC HEART DISEASE AND RHEUMATIC FEVER IN THE THREE RACIAL GROUPS

Age	White		Cape Coloured		Bantu		Totals
	Male	Female	Male	Female	Male	Female	
0—9	38	35	71	72	6	6	228
10—19	125	116	230	305	27	48	851
20—29	87	140	170	431	28	60	916
30—39	99	151	147	261	58	52	768
40—49	111	176	89	147	28	21	572
50—59	104	115	82	101	15	9	426
60—69	81	103	43	70	7	3	308
70+	46	71	22	20			159
Total	691	908	854	1,407	169	199	4,228

TABLE VII. RACIAL INCIDENCE OF SYPHILITIC HEART DISEASE—ELECTROCARDIOGRAPHICALLY AND AS SEEN IN THE CARDIAC CLINIC

Race	Racial distribution of ECGs		Racial distribution of 188 patients according to ECGs		Racial distribution of 134 patients seen in the Cardiac Clinic		Racial distribution of 17 cases of unknown origin seen in the Cardiac Clinic	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
White	21,176	53	29	15	18	14	2	12
Coloured	15,672	40	119	64	89	66	9	53
Bantu	2,560	7	40	21	27	20	6	35
Total	39,408		188		134		17	

Coloured and Bantu than in the Whites.

Syphilitic heart disease though relatively rare was far commoner in the non-White races than in the Whites and males were affected several times more frequently than females. The peak incidence was between the ages of 40 and 60 years. The ECG data were compared with clinical experience in the Cardiac Clinic. The findings confirm those of previous studies.^{4, 9} Their significance has been previously discussed and correlated with the findings in Africa and other countries.

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