THE RACIAL INCIDENCE OF ISCHAEMIC HEART DISEASE AT GROOTE SCHUUR HOSPITAL, CAPE TOWN, DURING THE 10-YEAR PERIOD 1952-61

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A precise estimate of the incidence of ischaemic heart disease, by which is meant obstructive coronary atheroma and coronary thrombosis, is extremely difficult to obtain. National vital statistics depend upon accurate death certification and take no account of the incidence of the disease in the living. Clinical estimates suffer in that errors in diagnosis are not uncommon, since the manifestations of the disease are varied, including as it does such widely differing syndromes as angina pectoris, coronary thrombosis, congestive failure, heart block, arrhythmias, and sudden death. Moreover, it is now appreciated that not only is silent coronary atheroma almost universally present after middle age in Western races, but silent cardiac infarction is common.[1]

There is general agreement that a full electrocardiographic (ECG) investigation is most helpful in establishing the diagnosis of ischaemic heart disease. This applies particularly to recent cardiac infarction. It is less helpful in healed infarction and in angina pectoris. Certain changes are quite characteristic of the condition, but often the tracing is abnormal because of underlying ventricular hypertrophy or disturbances of conduction, which mask the diagnostic changes produced by ischaemia. Furthermore, unless rigid criteria are imposed, observer error may be great.[2]

To utilize the ECG as a measure of the incidence of ischaemic heart disease in different racial groups, certain standards must be fulfilled.[3] Firstly, the ECG investigation must be equally available to each group. Secondly, the physician and/or the patient must direct attention to the heart in the same way. Thirdly, the interpretation of the ECGs must be identical. That these criteria are fulfilled will become clear in the following report. Previous analyses have shown that, whereas ischaemic heart disease is very uncommon in the Bantu, it is frequently encountered in the White, with the Cape Coloured falling between the two extremes.[3-6] In this communication the incidence of the disease in the 10 years 1952-61 is recorded.

The Population at Risk in Cape Town

Any conclusions arising out of a study of this kind naturally depend on the nature of the population at risk. Ischaemic heart disease characteristically has a higher incidence in the elderly and in the male sex.[7] If one group consisted of a large number of middle-aged and elderly males, with a high incidence of diabetes mellitus, and the other of young females, a great difference in incidence of the disease would be found. It is therefore necessary to study the population and age distribution in the racial groups attending Groote Schuur Hospital (Tables I and II). In a previous study it was shown that approximately 90% of the hospital patients with cardiac infarction lived in the magisterial areas of Cape Town, Bellville, Simonstown and Wynberg.[5]

TABLE I. POPULATION FIGURES OF CAPE TOWN, BELLVILLE, SIMONSTOWN AND WYNBERG*

	Whites	*Cape Coloured*	*Bantu*	*Asiatics*
1951..	266,715	297,018	59,937	8,343
1960..	305,155	417,881	75,100	8,975

*Kindly supplied by the Bureau of Census and Statistics, Pretoria.

Taking into consideration that the usual incidence of cardiac ischaemia is over the age of 30, with a peak incidence between 50 and 69, there is a large White and Coloured population at risk. However, in the population

TABLE II. AGE DISTRIBUTION OF 3 RACIAL GROUPS, 1960*

Age group	Whites		Coloureds		Bantu	
	Males	Females	Males	Females	Males	Females
0–9 ..	29,400	28,555	63,603	63,927	7,153	7,835
10–19 ..	27,310	26,827	43,457	46,529	4,166	4,524
20–29 ..	22,893	23,805	35,425	40,456	11,543	4,951
30–39 ..	19,636	20,420	24,415	25,915	14,042	4,230
40–49 ..	18,716	20,440	15,325	18,567	7,866	2,486
50–59 ..	15,605	17,680	11,118	12,114	2,826	1,322
60–69 ..	8,251	11,426	4,523	6,223	1,017	486
70+ ..	5,293	8,828	2,143	3,715	305	428

* Based on sample tabulation (5% Bantu, 10% others).

at risk, the Whites outnumber the Coloured, especially in the older age groups. To offset this is the fact that the population attending the hospital is selected, because a means test prevents the attendance of the wealthier and more privileged members of the community. Most of the non-Whites are eligible, but only the less economically privileged Whites. It has generally been shown that ischaemic heart disease occurs in the more privileged section of the community.[9,10] This means, as has previously been shown,[4] that the prevalence of ischaemic heart disease in the Whites at large is underestimated by the figures obtained at our hospital.

The next factor requiring analysis is the attendance at Groote Schuur Hospital during the period under review. Groote Schuur Hospital was the main hospital serving the population of Cape Town and surrounding districts during the 10 years under review (1952 - 61). It provides about 900 beds, slightly more for Whites than for non-Whites, and serves as the main teaching hospital of the Faculty of Medicine of the University of Cape Town. The 44 teaching beds of the New Somerset Hospital, which serves the non-White population only, were included for most of the period in this study, thus equalizing the White and non-White bed state.

During the 10 years 1952 - 61 the number of patients attending the general medical outpatient department at Groote Schuur Hospital was 3,286,194. This figure includes all attendances and does not refer to individual patients. About one-third of the attendances were made by new patients. During the same period 211,793 patients were admitted to the wards. The proportion of White, Coloured and Bantu patients is shown in Table III, from which it is seen that attendances of Whites and Cape Coloured at the general outpatient department were not far from equal. If we add the Cape Coloured patients at the New Somerset Hospital to those at Groote Schuur Hospital, then the inpatient admissions were also nearly equal. The Bantu subjects, although much fewer than either of the other two groups, were well represented in the hospital population. As previously shown,[3] an adequate number of Bantu attended the hospital in the age groups usually affected by ischaemic heart disease.

ELECTROCARDIOGRAPHIC MEASUREMENT

The ECG service of the Cardiac Clinic of Groote Schuur Hospital was available to all inpatients and outpatients of the hospital and for the 44 inpatient teaching beds of the New Somerset Hospital. ECGs in all cases included the 6 limb leads and the praecordial leads V1 - V7. Since I myself interpreted at least 90% of all records, any errors in ECG interpretation were constant for all races. The same physicians and surgeons saw all patients of all races,

TABLE III. ATTENDANCE OF WHITE, CAPE COLOURED AND BANTU PATIENTS AT GROOTE SCHUUR HOSPITAL DURING 1952–61

OUTPATIENTS

	White	Coloured	Bantu
1952	147,299	137,844	25,829
1953	154,860	146,556	26,101
1954	122,065	131,981	21,419
1955	129,889	140,008	22,402
1956	135,889	144,047	25,147
1957	127,673	133,934	24,603
1958	137,038	153,444	27,411
1959	155,315	176,668	30,971
1960	167,370	194,871	32,509
1961	172,896	202,386	37,179
Total	1,450,884	1,561,739	273,571

INPATIENTS

	White	Coloured	Bantu
1952	9,646	8,316	1,770
1953	10,036	9,211	1,810
1954	10,656	9,326	1,789
1955	10,875	9,432	1,893
1956	10,976	10,140	2,067
1957	10,311	9,880	2,111
1958	10,017	9,449	2,191
1959	10,414	9,941	2,120
1960	10,586	10,246	2,370
1961	10,965	10,776	2,473
Total	104,482	96,717	20,594

and the facilities for obtaining ECG services were equal. The data obtained, therefore, should reflect a relative incidence of the disease as it occurs in this hospital.

Electrocardiographic Criteria

Rigid criteria were used in the diagnosis of *myocardial infarction*. Abnormal T-wave and ST-segment changes alone were not accepted. As previously described,[4] in anterior infarction wide or deep Q-waves in the praecordial leads (V1 - V7) or diminution of the R-waves across the praecordium with T-wave inversion or ST-segment changes were required. In diaphragmatic infarction a Q-wave of at least 0·04 sec. in width or deeper than 30% of the R-wave in aVF was accepted. In the presence of right bundle-branch block, a Q-wave of 0·04 sec. in aVF or abnormally wide Q-waves in the praecordial leads indicated infarction. Infarction was seldom diagnosed in the presence of left bundle-branch block, unless Q-waves or definite ST-segment depression over the left ventricle were present. The validity of the ECG criteria has previously been analysed and found to be in the order of at least 95%.[4]

It might be argued, however, that the pattern of 'through and through' infarction occurs only in the severer forms of ischaemic heart disease and that, if patients with a lesser degree of ECG change are excluded, a false idea of the true racial incidence would be obtained. The differing racial incidence might therefore be only one of degree. Less rigid ECG criteria were therefore also adopted. In these patients T-wave inversion without Q-waves over the anterolateral or diaphragmatic aspects of the left ventricle, or bundle-branch block without significant Q-waves or ST-segment shift, was accepted, pro-

vided there was a history of angina pectoris or cardiac infarction. ECG changes in themselves are not sufficiently distinctive for the diagnosis. As previously described, the diagnosis was found to be acceptable only if a good clinical history accompanied the abnormal ECG.[4] The greatest difficulties were experienced in differentiating the changes of left ventricular hypertrophy from those of ischaemia, particularly when the two conditions co-existed. Patients with normal tracings were not considered in this analysis, even though effort tests were positive.

RESULTS

During the 10-year period 1952-61, 56,807 ECGs were performed on 38,439 patients. The ratio of White to Coloured to Bantu was 8:6:1. Since for practical purposes coronary disease does not occur under the age of 19, exclusion of the under-19s renders comparison of the population at risk more valid. Thus, only patients of 20 years and over were analysed. There were 34,938 patients, the ratio of White to Cape Coloured to Bantu being 9:6:1 (Tables IV and V). Only new patients were included in the analyses. Many patients with ischaemic heart disease had repeated ECGs taken over the years. Such patients were only included once in the analyses. (However, if, for example, a patient had a tracing taken for hypertension previously and subsequently cardiac infarction developed, this was counted as a new patient.)

Of the 34,938 patients 2,277 showed the classical pattern of myocardial infarction. Of these, 1,710 (75·1%) were

TABLE IV. RACIAL INCIDENCE OF MYOCARDIAL INFARCTION DETERMINED BY ECG (RIGID CRITERIA) IN 2,277 PATIENTS OVER 19 (NEW CASES)

Race	Racial distribution of ECGs		Racial distribution of infarct patterns		Percentage of races in 2,277 infarcts	Percentage of ECGs showing infarcts
	Number	Ratio	Number	Ratio		
White ..	19,291	9	1,710	240	75·1	9
Coloured ..	13,424	6	560	80	24·5	4
Bantu ..	2,223	1	7	1	0·3	0·3
Total ..	34,938		2,277		99·9	

Whites, and 560 (24·5%) Cape Coloured (Table IV). There were 7 Bantu patients (0·03%) showing infarction patterns.

Of the 2,590 patients with a history of angina pectoris or cardiac infarction and an abnormal ECG, there were 1,811 Whites, 767 Coloured and 12 Bantu. The total number of ECGs indicating ischaemic heart disease, therefore, was 4,867, of which 3,521 were found in White, 1,327 Coloured and 19 Bantu patients (Table V).

TABLE V. RACIAL INCIDENCE OF ISCHAEMIC HEART DISEASE DETERMINED BY ECG IN 4,867 PATIENTS OVER 19 (NEW CASES)

Race	Racial distribution of ECGs		Racial distribution of abnormal patterns		Percentage of races in 4,867 patients	Percentage of abnormal ECGs
	Number	Ratio	Number	Ratio		
White ..	19,291	9	3,521	185	72·3	18
Coloured ..	13,424	6	1,327	70	27·3	10
Bantu ..	2,223	1	19	1	0·4	0·9
Total ..	34,938		4,867		100	

COMMENT

The difference in the incidence of ischaemic heart disease among the three racial groups in Cape Town has again been confirmed. More ECGs were requested for White patients than for Cape Coloured (19,291 : 13,424), although the hospital and general population were about equal. This suggests that attention is drawn to the heart more often in White patients than in Cape Coloured, and the chief reason for this is the greater incidence of coronary vascular disease in the Whites.

Using the data obtained from strict ECG criteria of cardiac infarction, 3 times as many cases occurred in the Whites as in the Cape Coloured (1,710 : 560). Previous work has indicated that these diagnostic criteria are valid.[4] Almost the same incidence was obtained when the ECG criteria for the diagnosis of ischaemic heart disease were less rigid (3,521 : 1,327). With the Bantu the figures are even more striking; thus 9 times as many ECGs were requested for the Whites as for the Bantu, although the White hospital population was only 5 - 6 times that of the Bantu. The incidence of infarction with strict ECG criteria was 244 : 1 (1,710 : 7), and with less rigid criteria it was 185 : 1 (3,521 : 19).

A possible explanation for the difference is that more ECGs were taken in Whites than in non-Whites (19,291 : 15,647). However, by expressing the number of infarctions as a percentage of the total number of ECGs taken in each racial group, the actual difference is well shown (Tables IV and V). Thus, 100 ECGs in Whites included 9 infarcts (rigid criteria), or 18 with less rigid criteria; 100 ECGs in the Cape Coloured showed 4 and 10 respectively, and 100 ECGs in the Bantu showed 0·3 and 0·9 respectively.

Again, it might be argued that the difference in incidence can be attributed to an age factor. Although we do not possess a detailed knowledge of the nature of the population attending the hospital, this does not appear to be the case. Tables VI and VII show the age and sex

TABLE VI. AGE AND SEX DISTRIBUTION OF CARDIAC INFARCTION IN 2,277 PATIENTS, WHITE, COLOURED AND BANTU (NEW PATIENTS ONLY)

Age	White				Coloured				Bantu		Grand total
	Male	Female	M/F Ratio	Total	Male	Female	M/F Ratio	Total	Male	Female	
Under 30	4	1	4/1	5	8	0		8	—	—	13
30–39 ..	57	12	5/1	69	35	3	12/1	38	2	0	109
40–49 ..	235	41	6/1	276	118	22	6/1	140	—	—	416
50–59 ..	395	136	3/1	531	142	38	4/1	180	2	1	714
60–69 ..	328	157	2/1	485	103	39	5/2	142	2	0	628
70+ ..	209	135	3/2	344	28	24	1/1	52	—	—	386
Total ..	1,228	482	5/2	1,710	434	126	7/2	560	6	1	2,277

TABLE VII. AGE AND SEX DISTRIBUTION OF CARDIAC ISCHAEMIA IN 4,867 PATIENTS, WHITE, COLOURED AND BANTU (NEW CASES ONLY)

Age	*White*				*Coloured*				*Bantu*		*Grand total*
	Male	*Female*	*M/F Ratio*	*Total*	*Male*	*Female*	*M/F Ratio*	*Total*	*Male*	*Female*	
Under 30	9	4	2/1	13	9	0		9			22
30–39 ..	103	30	3/1	133	49	17	3/1	66	4	0	203
40–49 ..	376	135	3/1	511	222	115	2/1	337	3	1	852
50–59 ..	624	386	2/1	1,010	259	178	1·5/1	437	4	3	1,454
60–69 ..	593	460	1·3/1	1,053	212	140	1·5/1	352	3	0	1,408
70+ ..	424	377	1·1/1	801	63	63	1/1	126	1	0	928
Total ..	2,129	1,392	1·5/1	3,521	814	513	1·6/1	1,327	15	4	4,867

distribution of cardiac infarction (rigid criteria) and cardiac ischaemia (total of all patients with ischaemic heart disease), respectively. The maximum incidence in Whites was after the age of 50 and in the Cape Coloured between 40 and 69. The peak decade in both groups for cardiac infarction was 50 - 59. This is in keeping with general experience, the peak incidence reported being in the sixth or seventh decades. That cardiac infarction does occur in the younger age groups is now freely recognized and numerous reports of it are available in the literature. About 4·3% of the White cases and 8% of the Cape Coloured were in persons under the age of 40. There were 13 patients with cardiac infarction under the age of 30, the youngest being 9; the number of cases under 30 with cardiac ischaemia was 22.

The effect of sex on the incidence of cardiac infarction is again confirmed in Tables VI and VII. During the reproductive years of women (20 - 49) males outnumber females by 4:1 (rigid criteria) and 2·5:1 when all cases are considered. This difference in sex ratio is shown in all races. With advancing age the incidence in females increases, ultimately tending to catch up with the males, as reported by others.[11-13] Our experience has shown (Tables VI and VII) that after the age of 70 the incidence in the two sexes is about the same.

The results obtained in this study confirm the existence of considerable differences in ischaemic heart disease among the three racial groups. The disease is far more frequent in the Whites than in the Bantu, and the Cape Coloured fall between the two groups. The rarity of ischaemic heart disease in the Bantu has been adequately documented from all reliable sources;[14-17] the literature has been reviewed elsewhere.[4,18]

Comparison of the year-by-year incidence of cardiac infarction is shown in Table VIII. There has been a slight increase in the total number of patients with cardiac infarction seen annually, but this has been due to an increase in the total number of patients receiving ECG investigation. There has been little real change in the relative incidence in the three racial groups.

It can be confidently concluded that a considerable difference in the incidence of coronary vascular disease exists between the three racial groups in Cape Town. The factors responsible are as yet unknown.

TABLE VIII. NUMBER OF NEW PATIENTS WITH INFARCTS DETERMINED BY ECG (RIGID CRITERIA) IN THE 3 RACIAL GROUPS DURING THE 10 YEARS 1952–61

	1952-56	*1957*	*1958*	*1959*	*1960*	*1961*	*1957-61*
White ..	760	161	152	209	223	205	950
Coloured ..	228	53	46	78	62	93	332
Bantu ..	3	0	2	1	0	1	4

SUMMARY

1. Almost 35,000 electrocardiograms of adults over the age of 19 attending Groote Schuur Hospital, Cape Town, during the 10 years 1952 - 61 were analysed to determine the racial incidence of ischaemic heart disease.

2. ECG evidence of ischaemic heart disease is very uncommon in the Bantu. Only 7 patients had a pattern of infarction and in 12 there was a history of angina pectoris or cardiac infarction associated with an abnormal tracing.

3. ECG evidence of ischaemic heart disease was far commoner in Whites than the Cape Coloured, in both of whom the disease was common.

4. The age and sex incidence was the same as that found in most other countries, the maximum incidence being between the ages of 50 and 69, with males outnumbering females up to the seventh decade.

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