

Epidemiology of Ischaemic Heart Disease amongst Indian Air Force personnel: an analysis of cases: 1969-75

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Abstract

In this study of 350 cases of IHD pertaining to Air Force personnel over a period of 1969-75, the records maintained at Central Diseases Registry of the Armed Forces Medical College, Pune, have been analysed. Compared to years 1964-68, the years 1971-75 have shown significant rise in the incidence of IHD especially amongst the officers. A comparison has been made between the officers and other ranks. Except for occupational activity status and overweight, the other parameters between the two groups are similar. Drinking, smoking and presence of uric acid levels higher than 3.5 mgm% have been found to have significance in all cases. Sedentary occupation and obesity stand out as particularly significant factors for the officers.

Introduction

The Ischaemic Heart Disease has been defined by a WHO Study Group, "Cardiac disability, acute or chronic, arising from reduction or arrest of blood supply to the heart muscle as a result of disease process in the coronary arteries"¹. Therefore under the heading of Ischaemic Heart Disease we include cases of myocardial infarction, and angina pectoris also besides cases of acute and sub-acute forms of ischaemic heart disease. Ischaemic heart disease is a world wide disease with local differences in incidence, severity and natural history. The incidence of IHD has been increasing over the last 30 to 40 years in almost all countries of the world. Various studies carried out in India indicate that the incidence of IHD ranges from 6 to 23 percent of all patients⁴. Study of 340 postmortem reports of Indian Armed Forces personnel during 1965-67 revealed

that 10 per cent of deaths of all the autopsies were due to IHD⁵. A study of 84 cases of sudden deaths conducted in the Indian Armed Forces during the period 1962-67 showed that 76 percent cases died of IHD². Perusal of annual health reports of the Indian Air Force showed that the incidence of IHD amongst the personnel of the Indian Air Force doubled amongst the officers and became 1.5 times amongst the airmen in 4 years period of 1971-75 as compared to the incidence during 1964-68 (Table I refers).

Materials and methods

To evaluate the various risk factors concerned with the aetiology of IHD a retrospective study was carried out in respect of cases of IHD which occurred amongst IAF personnel during 1969-75 and for whom completed proforma had been received at the Central Diseases Registry of the Armed Forces Medical College, Pune. In the Indian Armed Forces whenever a case of IHD is admitted in a hospital, a detailed proforma is completed in respect of each patient by the treating hospital. These proformae are sent to the Central Diseases Registry of the Armed Forces Medical College, Pune. A study of 350 such proformae in respect of Air Force patients was carried out. The data was tabulated and analysed according to the prevalence of various risk factors amongst these patients.

Results

The results of this analysis of documents relating to the period 1969-75 are given in Tables I-XIV.

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TABLE I
Incidence of IHD—IAF Personnel—1964-68 and 1971-75

Category	Rate per 1000 1964-68	Rate per 1000 1971-75
Officers	... 1.49	2.87
Other ranks	... 0.71	1.05
All personnel	... 0.81	1.20

TABLE II
IHD Cases: IAF Officers by Branches (1969-75)
n = 76

Trade	No.	Percentage	Percentage pro- portionate strength in the service	Index of Incidence
Flying	17	22.4	38.6	0.58
Ground	59	77.6	61.4	1.26

TABLE III
IHD Cases: IAF Airmen by Trades (1969-75)
n = 274

Trade	No	Percentage	Approximate pro- portionate strength in the service	Index of Incidence
Flying	—	—	0.4	—
Technical/ Mechanical	145	52.9	60.8	0.87
Admin	129	47.1	38.8	1.21

TABLE IV
Age Distribution of IHD Cases (1969-75)

Age Group (Years)	Rate per 1000 of AF Strength
20 — 30	0.4
30 — 40	2.1
40 — 50	12.3
50 — 60	29.5

TABLE V
Blood Cholesterol Level in IHD Cases
n = 293*

Blood Cholesterol level (mgm%)	Number of Cases	Percentage
1 — 150	22	7.5
151 — 250	209	71.3
Above 250	62	21.2
Total	293	100.0

* Out of 350 cases, data was not available for 57 cases.

TABLE VI
Blood Uric Acid Levels in IHD Cases
n = 202*

Blood Uric Acid Level (mgm%)	Number of cases	Percentage
1-2	10	5.0
2-3.5	79	39.1
Above 3.5	113	55.9
Total	202	100.00

* Out of 350 cases, data was not available for 148 cases.

TABLE VII
Fasting Blood Sugar Levels in IHD Cases
n = 209 *

Fasting Blood Sugar level (mgm/100)	No. of Cases	Percentage
69	19	9.1
70- 80	24	11.5
80- 90	68	32.6
90-100	54	25.8
100-110	19	9.1
110-120	13	6.2
120 and above	19	9.1
Total	209	100

* out of 350 cases, data was not available for 141 cases

TABLE VIII
Family History of IHD/Hypertension/Diabetes
amongst IHD Cases

Family history	No. of cases	Percentage
IHD	17	4.9
Hypertension	15	4.3
Diabetes	6	1.7
No history	312	89.1
Total	350	100

TABLE IX
History of Mental/Physical Stress Preceding
IHD Episode
(% figures within brackets)

Category	Mental	Physical	Absent	Total
Officers	8 (10.5)	8 (10.5)	60 (79.0)	76 (100)
Other ranks	17 (6.2)	22 (8.0)	235 (85.8)	274 (100)
Total	25 (7.1)	30 (8.6)	295 (84.3)	350 (100)

TABLE X
Past History of Hypertension/Diabetes Amongst
IHD Cases
(% figures within brackets)

Category	Past History		Total
	Present	Absent	
Officers	14 (18.4)	62 (81.6)	76 (100)
Other ranks	42 (15.3)	232 (84.7)	274 (100)
Total	56 (16.0)	294 (84.0)	350 (100)

TABLE XI
Prevalence of Alcohol Consumption amongst
IHD Cases
(% figures within brackets)

Category	Non-drinkers	Drinkers	Total
Officers	25 (32.9)	51 (67.1)	76 (100)
Other ranks	105 (38.3)	169 (61.7)	274 (100)
Total	130 (37.1)	220 (62.9)	350 (100)

TABLE XII
Prevalence of smoking Habit Amongst IHD Cases
(% figures within brackets)

Category	Non-smokers	Smokers	Total
Officers	41 (53.9)	35 (46.1)	74 (100)
Other ranks	112 (40.9)	162 (59.1)	274 (100)
Total	153 (43.7)	197 (56.3)	350 (100)

TABLE XIII
IHD in relation to Occupational activity Status
(% figures within brackets)

Category	Sedentary	Strenuous	Total
Officers	74 (97.4)	2 (2.6)	76 (100)
Other ranks	76 (27.7)	198 (72.3)	274 (100)

(Pooled values are not shown in view of the significant differences between the two groups)

TABLE XIV
Weight Record of IHD Cases
(% figures within brackets)

Category	Normal weight	Overweight*	Total
Officers	28 (36.8)	48 (63.2)	76 (100)
Other ranks	177 (64.6)	97 (35.4)	274 (100)

* Overweight denotes weight which is more than 10% of the normal weight for the height and age of the subjects. (Pooled values are not shown in view of the significant differences between the two groups).

Discussion

In this study, 350 cases of IHD were analysed without comparison of data with the non-IHD population. Hence the results brought out here should be interpreted keeping this in view. It will be seen from Table I that the incidence of IHD amongst Air Force personnel has markedly increased during the period 1964-75. The increase is more marked amongst officers during 1971-75 and was almost twice that for 1964-68. The incidence amongst other ranks has also increased from 0.71 to 1.05 per 1000 during the same period. The incidence of the disease amongst officers was 2.7 times that amongst the other

ranks. The incidence of IHD was further analysed branch/trade wise (Tables II and III). It will be seen from Table II that the index of incidence amongst aircrew was significantly lower than amongst the officers of ground branch ($p < 0.01$). This variation may be due to the fact that more number of aircrew belongs to the younger age group (below 40) than in the case of ground branches. As regards other ranks (Table III) it is seen that there was highly significant difference in the indices of incidence amongst different branches of the IAF ($p < 0.01$). Amongst administrative trades the incidence was higher in comparison to Technical/Mechanical trades. Amongst the Admin trades the incidence is seen to be higher. The index of incidence stated as 1.21 in this table is the result of pooled data. Individual Admin trade wise analysis (not shown separately) amongst catering assistants, Medical Assistants and Clerks the Index of Incidence has been 1.88, 1.84, 1.81 respectively. Other trades in Admin type of work amongst the airmen ranged from 0.90 to 1.11 in index of incidence. This might be due to the fact that these trades are more sedentary in nature involving less physical exertion than the other ground branches. It was further observed that there was no case of IHD amongst airmen aircrew.

Age Groups It is seen from Table IV that the incidence of IHD was more in the higher age groups but some cases occurred under the age of 30 also. The highest incidence was found to be between the age of 50 and 60 which is statistically highly significant ($p < 0.01$). Whilst working out these incidence rates proportionate strength of the whole of the Air Force in the various age groups was taken into consideration.

Blood Cholesterol level Studies in the various parts of the world have shown that the coronary attacks have a correlation with hypercholesterolaemia. Table V shows that amongst our series of 350 cases, raised blood cholesterol (above 250 mgm) was found in 21.2% of 293 cases in whom this parameter was recorded. However, it is seen that 71.3% of cases whose blood cholesterol was within normal range, also suffered. This shows that normal blood cholesterol levels in an individual are no guarantee against the occurrence of cardiac episode.

Blood uric acid level It is seen from Table VI that out of 350 cases, blood uric acid was not recorded in 148 cases. Out of the remaining 202 cases uric acid level of 3.5 mg and above was found in 113

cases giving a figure of 55.9% of the cases in whom this parameter was recorded.

Fasting blood sugar level From Table VII it is observed that out of 350 cases fasting blood sugar was not recorded in 141 cases. Out of the remaining 209 cases fasting blood sugar level of 100 mgm and above was found in 51 cases which forms 24.40% of the cases in whom this parameter was recorded. Statistically no significance can be attached to blood sugar levels perse in view of most of the cases having been within normal blood sugar ranges.

Family history Table VIII shows that in 32 out of 350 cases there was no family history of IHD, Hypertension or Diabetes. Only 10.9% cases gave a family history of these diseases. In many cases however, the patients did not know the cause of death of their parents which was attributed to old age.

Mental and physical stress. Perusal of Table IX shows that in majority of cases (84.3%) there was history of mental and physical stress preceding the attack. Out of 350 cases only 55 cases gave such history. Categorywise analysis of history of mental physical stress also did not reveal any significant difference between the officers and other ranks ($p < 0.05$).

Past history of Hypertension/Diabetes. From Table X, it will be seen that past history of hypertension and diabetes was only present in 16.0%. In 294 out of 350 cases there was no such history. No significant difference was found between the officers and other ranks with respect to presence of history ($p < 0.05$).

Alcohol consumption. Table XI shows that there was a slightly more prevalence of drinkers officer patients (67.11%) than amongst other ranks (61.60%). The difference is statistically not significant ($p < 0.05$). However, these figures may not be of much significance, since the prevalence figures of drinkers amongst officers and other ranks who are not IHD patients are not known. The figures however do indicate that in the 350 cases of IHD habitual drinkers did form a major percentage.

Smoking habits. The prevalence of smoking is given in Table XII. It will be seen that 197 patients were smokers as against 153 non-smokers. About

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of the smokers (100 cases) were heavy smokers who smoked more than 20 cigarettes per day. 46.0% of the officer cases and 59.0% of the other rank cases were smokers. The difference is statistically not significant ($p<0.05$). In this study it is not possible to associate smoking with incidence of IHD.

Occupational activity status. Perusal of Table XIII shows that in the cases of officers of occupation, 97.37% cases were stated to be sedentary whilst in the case of other ranks only 27.74% were reported to be employed on sedentary occupation. The difference between the two categories is statistically highly significant ($p<0.01$).

It seems, however, that lot of subjective element has come in while recording the nature of work in the proforma.

Obesity. From Table XIV it is seen that amongst officer patients 63.2% were found to be overweight and in the case of other ranks, the incidence was 35.40%. The difference between the two categories is statistically highly significant ($p<0.01$).

Notwithstanding the findings in this study, despite the vast amount of world literature the exact aetiology of IHD is not yet known. It is believed that several factors (risk factors) are responsible for the causation of this disease. Studies carried out in the various parts of world have identified these factors as age, high blood pressure, raised serum cholesterol, obesity, diabetes mellitus, heredity, smoking, physical inactivity, mental stress etc. Out of these risk factors age, blood pressure and serum cholesterol are recognised to be the primary risk factors which can effectively be used to determine the coronary risk. There is a close association between physical inertia, obesity and consumption of diet rich in fats and sugar. In Framingham study elevated blood pressure was found associated with two fold increase in coronary heart disease in males, six fold in females. There is no clear cut proof that obesity per se is responsible for IHD but obesity pre-disposes to hypertension, diabetes and increases cholesterol level. Therefore indirectly obesity acts as a risk factor. As regards heredity it has been seen that there is a relatively high incidence of IHD, hypertension and diabetes in close relatives of patients with coronary disease. Diabetics suffer more often from atherosclerosis and more prematurely. The

abnormality of glucose tolerance is usually associated with the abnormal level of serum cholesterol, hypertension and overweight. Observations in Framingham's study have shown that cigarette smoking is associated with a higher death rate from IHD. In Albani study it was found that the combination of risk factors increases the risk of IHD many fold. With hypercholesterolaemia alone the risk of IHD was 1.9 times against 3.5 times with hypercholesterolaemia and hypertension and 10.6 times when smoking was added to these two factors.

Conclusions

The findings regarding the prevalence of risk factors in this study of IHD cases are tabulated below :

Parameter	Incidence as Percentage
Blood Cholesterol >250 mgm%	21.2
Blood uric acid >3.5 mgm%	55.9
Fasting Blood sugar >100 mgm%	24.4
Positive family history of Hypertension/IHD/Diabetes	10.9
Physical and Mental stress preceding the episode	15.7
Personal/past history of diabetes/hypertension	16.0
Prevalence of drinking Smokers	62.9
Sedentary occupation	56.3
(a) Officers	97.4
(b) Airmen (other ranks)	27.7
Overweight :	
(a) Officers	63.2
(b) Airmen (other ranks)	35.4

The pattern of prevalence of IHD amongst Indian Air Force personnel brought out by this study is as follows :

- (a) The incidence of IHD increased during the period 1971-75 compared to the period 1964-68 (approximately twice amongst officers and $1\frac{1}{2}$ times among other ranks).

- (b) The incidence was significantly higher amongst the officers than the other ranks.
- (c) The peak incidence was in the age group 50-60 years.
- (d) Amongst officers, the incidence in the case of aircrew was significantly lower than the officers of the ground branches.
- (e) In the case of other ranks the incidence amongst Administrative trades was significantly more than in Mechanical/Technical trades. There was no case amongst airmen/aircrew.

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