PREVALENCE AND DISTRIBUTION OF CERTAIN CORONARY RISK FACTORS IN AIR FORCE PERSONNEL

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ABSTRACT

180 Airforce personnel selected by stratified random sampling technique were studied for coronary risk factors. Nearly 27% individuals had one, 21% had two and 15% had multiple risks. Tobacco smoking was found to be the commonest risk factor (54%) followed by physical inactivity (45%), hyper-cholesterolaemia (22.2%), obesity (20%), hypertension (15%) and positive family history (12.2%). The prevalence of smoking, physical inactivity, excessive intake of dietary cholesterol and serum cholesterol values were seen significantly rising with age. The mean cholesterol values in the age group of 30-39, 40 years and above were higher than the WHO recommended values. The findings of the study suggest a greater emphasis on health education of airmen on coronary heart disease and its positive association with certain risk factors.

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KEY WORDS : Coronary heart disease (CHD); Hypertension; Hypercholesterolaemia; Obesity; Physical inactivity; Tobacco smoking.

Introduction

Around the world, coronary heart disease (CHD) remains a leading cause of adult death in developed as well as developing societies [1]. Indian Armed Forces are no exception. CHD imposes considerable loss of trained manpower and weighs heavily on medical resources [2]. Although CHD mortality is rising in many populations, it is falling sharply in others [3]. Prospective studies have confirmed the role of hypercholesterolaemia, hypertension and smoking as independent risk factors for CHD [4]. Overweight, physical inactivity, diet rich in saturated fat, male sex and family history of CHD are also considered as important risk factors having strong independent correlation in development of CHD [5]. Various behavioural and social risk factors identified are powerful and modifiable at individual as well as community settings [6]. To conform to a

definite preventive strategy, it was felt necessary to determine the prevalence of various risk factors among the Air Force personnel and to ascertain their distribution according to age.

Material and Methods

The study was carried out in one of the Air Force stations in South India during Mar 92 to Feb 93. The names of all airmen were collected from various units and were listed as per their age and trade. There were a total of 1560 individuals of which 708 belonged to technical (i.e AF/Fit, Wks/Fit, Eng/Fit, MT/Fit, Elect/Fit) and 852 belonged to non-technical (i.e Eqpt/Asst, Cat/Asst, ACH/GD, Clk/EA, RTO, Clk/GD, Med/Asst) group. All known cases of IHD, hypertension, diabetes and ECG abnormalities were excluded.

A pilot survey was conducted among 30 randomly selected individuals to ascertain

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the prevalence of risk factors in the community under study. However, serum cholesterol estimation was not done during the pilot survey. 66.66% individuals were found to have one or more risk factors. Considering the estimated prevalence and the total population (1560), with the help of Cochran's formula [7], the sample size was calculated to be 180.

The study population was stratified into three age groups viz. 20-29, 30-39, 40 years and above and each age group was substratified into two trade group viz. technical and non-technical. Using a stratified random sampling method 30 subjects were selected from each group comprising a total 180 study units.

Each subject was interviewed using a pre-tested proforma. The questions included intake of various food items known to be rich in cholesterol and their quantities consumed during last 7 days to ascertain daily intake of dietary cholesterol [8]. Each individual was also asked regarding family history of CHD, smoking and the physical exercise undertaken with its duration and frequency.

Each individual was subjected to a clinical examination including measurement of weight, height and blood pressure. Serum cholesterol was estimated in three sub samples of 15 subjects each, selected by systematic random sampling from three different age groups. Following criteria were considered for determining the risk:-

- (a) Dietary cholesterol - daily intake 300 mg or more [8]
- (b) Cigarette/bidi smoking - Individuals were sub-divided into 3 groups viz. non-smoker, smoking upto 10/day and smoking more than 10/day.
- (c) Physical activity - Individuals were categorised into regular (under taking physical activity thrice a weeks or more), irregular (under taking physical activity less than thrice a week) and nil group, Running, jogging, cycling or aerobic exercise for 30 minutes at each session was considered as minimum criteria for

physical activity.

- (d) Over weight - Individuals were sub-divided into within ideal range, within 10% in excess of ideal range and more than 10% in excess of ideal range of weight according to their height and age.
- (e) Blood pressure - Individuals were categorised as normotensive and hypertensive (basal BP more than 140/90 mm Hg on two determinations).
- (f) Serum cholesterol - Individuals with serum cholesterol 240 mg/dl or more were considered at risk [9]. The population was considered at risk when population level of cholesterol was 200 mg/dl or more [9].

Results

Out of the population of 1560 (Table 1), 180 subjects were studied including, 92 (51.1%) Airmen, 61 (33.9%) SNCOs and 27 (15%) Warranted ranks. 22 (12.2%) subjects presented a family history of CHD among their first degree relatives and only 4 (2.2%) individuals stated the same among their distant relatives.

TABLE 1
Distribution of population according to age and rank

Age (yrs)	Airmen	SNCOs	Warranted Ranks	Total
20-29	902	—	—	902 (57.8)
30-39	12	442	—	454 (29.1)
40 +	—	9	195	204 (13.1)
	914 (58.6)	451 (28.9)	195 (12.5)	1560 (100.0)

(Figures in the parenthesis () indicate percentages.)

Nearly 54% of the subjects were smokers as compared to 46% non-smokers (Table 2). Smoking was more prevalent in the elderly age group as compared to the younger lot and the difference is statistically significant.

36% of the subjects were found consuming

TABLE 2
Distribution of behavioural risk factors according to age

Risk factors	Age group (yrs)			Total (n = 180)	p Value
	20-29 (n = 60)	30-39 (n = 60)	40 + (n = 60)		
<i>Smoking</i>					
Non-Smoker	38 (63.3)	30 (50.0)	15 (25.0)	83 (46.1)	$X^2 = 19.09$ df : 4 p < 0.001
Smoker upto 10/day	12 (20.0)	19 (31.7)	30 (50.0)	61 (33.9)	
Smoker more than 10/day	10 (16.7)	11 (18.3)	15 (25.0)	36 (20.0)	
<i>Cholesterol Intake</i>					
Up to 300 mg/day	49 (81.7)	37 (61.7)	29 (48.3)	115 (63.9)	$X^2 = 14.59$ df : 2 p < 0.001
More than 300 mg/day	11 (18.3)	23 (38.3)	31 (51.7)	65 (36.1)	
<i>Physical Exercises</i>					
Thrice a week or more	27 (45.0)	17 (28.3)	10 (16.7)	54 (30.0)	$X^2 = 17.63$ df : 4 p < 0.05
Less than thrice a week	18 (30.0)	13 (21.7)	14 (23.3)	45 (25.0)	
Nil	15 (25.0)	30 (50.0)	36 (60.0)	81 (45.0)	

(Figures in the parenthesis () indicate percentages)

more than 300 mg cholesterol per day. A large percentage of elderly airmen were found consuming diet rich in cholesterol especially eggs, mutton, butter and clarified butter as compared to the younger generation. The difference is statistically significant. Altogether 55% of subjects were undertaking some kind of exercise which is a notable findings. The younger generation was found to be preponderantly participating in physical activity than the elderly lot and the difference is statistically significant.

Table 3 shows distribution of subjects according to certain physical risks. 20% of the population were overweight according to their height and age of which 6% were even more than 10% in excess of ideal range of weight. The prevalence of overweight was 16.7%, 15% and 28.3% in the age group of 20-29, 30-39, 40 years and above respectively.

15% of the individuals were hypertensive. Prevalence of hypertension was found to be 10%, 8.3% and 26.7% in the age group of 20-29, 30-39, 40 years and above respectively.

The highest mean body weight (60.90 $\pm$ 3.92) and the highest mean SBP and DBP were observed among the airmen aged 40 years and above irrespective of the trade (Table 4). An upward trend of body weight and BP was observed with the increase in age.

Table 5 shows serum cholesterol values in the subsample of subjects in 3 different age groups. 10 (22.2%) individuals had serum cholesterol values more than 240 mg/dl. Mean cholesterol values were 168, 208.9 and 218.9 mg/dl in the group of 20-29, 30-39, 40 years and above respectively showing an upward trend with the increase in age and the same is statistically significant.

Table 6 shows the risk factor profile

TABLE 3
Distribution of subjects according to body weight, blood pressure and age

Risk factors	Age group (yrs)			Total (n = 180)	p Value
	20-29 (n = 60)	30-39 (n = 60)	40 + (n = 60)		
<i>Body weight</i>					
With-in ideal range	50 (83.3)	51 (85.0)	43 (71.7)	144 (80.0)	X ² = 3.94 df : 2, p > 0.05
With in 10% in excess of ideal range	5 (8.3)	5 (8.3)	15 (25.0)	25 (13.9)	
More than 10% in excess of ideal range	5 (8.3)	4 (6.7)	2 (3.3)	11 (6.1)	Last two rows are pooled
<i>Blood pressure</i>					
Up to 140/90 mm Hg	54 (90.0)	55 (91.7)	44 (73.3)	153 (85.0)	X ² = 9.66 df : 2, p < 0.05
More than 140/90 mm Hg	6 (10.0)	5 (8.3)	16 (26.7)	27 (15.0)	

(Figures in the parenthesis () indicate percentages)

TABLE 4
Mean, SD and range of body weight and blood pressure (BP) according to age

	Age group (yrs)		
	20-29 (n = 60)	30-39 (n = 60)	40 + (n = 60)
<i>Body weight (kg)</i>			
Mean	57.10	60.70	60.90
S D	3.66	3.68	3.92
Range	52-66	54-67.5	55.5-72.0
<i>Blood pressure (Systolic, mmHg)</i>			
Mean	120.40	129.50	133.8
S D	12.80	13.70	13.21
Range	110-162	110 - 164	120-160
<i>(Diastolic, mmHg)</i>			
Mean	78	80.55	83.95
S D	6.60	6.81	6.87
Range	68-96	70-96	78-100

according to the age group. Out of 180 individuals, 115 (63.9%) were having one or more risk factors. Of this, 48 (26.7%) had one, 38 (21.1%) had two and 29 (16.1) had multiple risk factors. 25% of subjects in the age group of 40 years and above were having multiple risks. The prevalence of risk increased with

TABLE 5
Distribution of serum cholesterol values according to age group

Age group (yrs)	No. of subjects (n)	Cholesterol (mg/dl)		
		Range	Mean	SD
20-29	15	97-240	168	± 40.6
30-39	15	182-242	208.9	± 20.0
40 and above	15	192-248	218.9	± 18.3

Computed F Ratio = 13.07, df 2, p = 0.01

TABLE 6
Risk factor profile according to age group

Risk factor profile	Age group (yrs)			Total
	20-29	30-39	40 +	
No risk	28 (15.6)	27 (15.0)	10 (5.6)	65 (36.1)
Single risk	15 (8.3)	11 (6.2)	22 (12.2)	48 (26.7)
Double risk	9 (5.0)	16 (8.8)	13 (7.2)	38 (21.1)
Multiple risk	8 (4.4)	6 (3.3)	15 (8.3)	29 (16.1)
Total	60 (33.3)	60 (33.3)	60 (33.3)	180 (100)

$X^2 = 19.88$, df 6, p < 0.01

(Figures in the parenthesis indicate percentages.)

the age and the same is statistically significant.

Discussion

The study revealed that 12.2% subjects presented a positive family history for CHD. A recent study among the Gujaratis in Delhi has documented positive family history for CHD in 27.3% patients of CHD, in 23% patients of asymptomatic CHD and in 9.6% subjects of control group [10]. Family history of CHD is a risk indicator. Its independent contribution, when adjusted for other risk factors may not be very powerful in group analysis, but this does not reduce its importance to the individual and families involved [1].

54% of the subjects were smokers and smoking was significantly prevalent among the elderly age group. In USA, the prevalence of smoking was used to be 54.4% during 1965 which has dropped to 35% in 1983 [11]. Cigarette smoking is considered the most important of all the known modifiable risk factors for CHD in USA. Major cohort studies in different countries have shown that smokers as a group experience excess CHD mortality [11].

36% of the subjects were found consuming diet rich in cholesterol. US department of Health and Human services presented a National Dietary goal for reduction of mass hyperlipidaemia which recommends cholesterol intake should not exceed 300 mg/day [1].

It was pertinent to note that 55% of the subjects were undertaking some form of physical exercise. Habit of regular physical activities was found significantly preponderant among the young. Folsom [12] documented that only 34% of American males expend more than 2000 K'Cal/week on leisure time physical activities. In a multivariate analytical study, after adjustment for the contribution of other important risk factors, Paffenbarger [13] has shown that the risk of coronary event is twice as high in the least active than in the most active individuals.

20% of the study subjects were overweight.

The highest prevalence of obesity was in the age group of 40 years and above. Millar and Stephens [14] documented an obesity prevalence rate of 19-47% in advanced countries like Britain, Canada and USA. Multivariate analysis adjusted for confounding variables related to obesity shows no consistent relationship of obesity to incidence of CHD. On the other hand MRFIT documented that weight loss is crucial to sustain significant reduction in serum cholesterol and triglycerides [1]. It is understandable that obesity is involved with metabolic maladaptation related to diabetes, hypertension, blood lipids and probably atherogenesis and these maladaptations are amenable to correction by weight loss.

Overall 15% of the individuals were hypertensive and the highest prevalence (26.7%) was found in the age group of 40 years and above. Marmot [15] reported that as much as 25% of adult in industrialised countries are hypertensive. Hypertension is a strong and independent risk factor for CHD and contributes to more than half of adult deaths in USA [4].

10 (22.2%) out of a randomised and mixed subsample of 45 individuals had serum cholesterol values 240 mg/dl or more indicating a definite risk. Mean cholesterol values were 168, 208.9 and 218.9 mg/dl in the age group of 20-29, 30-39, 40 years and above respectively showing a statistically significant upward trend. Abraham *et al* [9] reported a strong correlation between the serum cholesterol value and cholesterol composition of habitual diet of population. In the present study, a significant proportion of elderly airmen were found consuming diet rich in cholesterol which may possibly be the reason for high mean cholesterol values in the same age group. Ancel Keys [16] documented a strong and consistent association between population mean of total cholesterol values, atherosclerosis and measured CHD incidences.

Overall 63.9% individuals were having one or more risk factors of which 26.7% had

one, nearly 21% had two and 15% had multiple risks. The prevalence is lower as compared to the findings of similar study from abroad. The USA pooling project study [17] reported as much as 80% of the subjects were at risk with 40% having more than one risk factors.

The study revealed that large number of subjects in the study population are at potential risk, therefore indicating a need for concerted and coordinated preventive effort both at individual and community level. The population strategy should include identification of various risk factors in the community, educating the people regarding the same and thus motivating them to adopt healthy life style. The individual approach for those at high risk should be energetic education, advice, treatment and after care.

It is a descriptive study and the sample size was calculated on the basis of prevalence of one or more risk factors in community. It is pertinent to mention that the same sample will be inadequate for studying individual risk factors. However the information generated by studying this small sample is useful for planning preventive strategies and future epidemiological research. It is prudent to conduct more such studies on similar populations in different Air Force stations.

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