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Risk factors and behaviours for coronary artery disease (CAD) among ambulatory Pakistanis

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Risk Factors and Behaviours for Coronary Artery Disease (CAD) among Ambulatory Pakistanis

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Abstract

Objective: To determine the frequency and distribution of various risk factors and behaviours for coronary artery disease (CAD) among ambulatory Pakistanis.

Methods: It is a cross-sectional descriptive study carried out at the Aga Khan University Hospital, a teaching hospital in Karachi. All the subjects were adults (18-60 years) presenting at the general checkup clinic with no history or evidence of CAD by convenient sampling method. Demographic variables included risk factors and behaviors including diabetes, hypertension, dyslipidemia, family history of heart disease, obesity, smoking and sedentary lifestyle.

Results: Among 370 ambulatory Pakistanis, the proportions of major risk factors for CAD were: sedentary life style 72%, family history 42%, dyslipidemia 31%, obesity 24%, hypertension 19% and diabetes mellitus 15%. Diabetes, hypertension and dyslipidemia were poorly controlled in the study population. Proportions of the three major risk factors (smoking, hypertension and dyslipidemia) occurring singly, doubly and all three together in the study population were found to be 39%, 11% and 1%, respectively. Data were also analyzed for risk factors by comparing those with and without family history of CAD to eliminate any bias. The results were not statistically significant except for the sedentary life style (P=0.016).

Conclusion: There is a high prevalence of CAD risk factors in this study population. Modifiable risk factors like diabetes, hypertension and high cholesterol need better control. Preventive screening programs and healthy lifestyle behaviours need to be emphasized upon in the community (JPMA 54:261;2004).

Introduction

Cardiovascular diseases account for more than 15 million deaths every year in the world.[1] Many who die are under the age of 65 and given today's increased life span, these deaths are premature.

Diseases like hypertension and diabetes mellitus are well-known risk factors for coronary artery disease (CAD). Other risk factors and behaviours associated with CAD

have been identified e.g. cigarette smoking, sedentary habits, dyslipidemia, male gender, age, positive family history, obesity, elevated blood homocysteine and hypoestrogenemia.[2] Control of these risk factors has resulted in a substantial reduction in morbidity and mortality of coronary heart disease.[2]

In Pakistan, mortality from coronary heart disease is 410/100000.[3] According to the National Health Survey of Pakistan (NHSP), the prevalence of hypertension is 17.9% and that of diabetes is 10%.[4] The prevalence rates for obesity in an urban Pakistani population are 22% and 37% in males and females, respectively, while high blood cholesterol is prevalent in 13% of Pakistani adults.[4] Tobacco use has been documented in 29% of adult Pakistani men.[4] The increasing prevalence of these risk factors points to the fact that Pakistan shares the encroachment that non-communicable disease risk factors have been making in most developing countries.

Moreover, it is the urban population that is affected more than the rural population regarding prevalence of hypertension, obesity, hypercholestrolemia and cigarette smoking.[4] Therefore, the urban population of Pakistan constitutes the "high risk" group for CAD. The knowledge of these risk factors of CAD such as, hypertension, cholesterol, smoking and family history may help guide policymaking for its effective control in the urban community. Thus, risk assessment becomes quite important in the prevention and management of CAD.

The objective of this study was to estimate the proportions of CAD risk factors and behaviours among ambulatory Pakistanis in a teaching hospital.

Patients and Methods

This was a cross-sectional descriptive study conducted at the general preventive checkup clinics of the Aga Khan University Hospital, a tertiary care hospital in Karachi, a mega city of Pakistan. These are run by trained family physicians that provide services by offering a general checkup package, which includes complete history taking, and physical examination with basic laboratory investigations.

All adults (>18 years) presenting at the checkup clinic with no previous history of CAD and with a negative exercise tolerance test (ETT) were included in this study. ETT was chosen for CAD diagnosis because of its sensitivity and specficity.[5] Assuming the burden of CAD in the selected population to be 40% with 5% precision in a total population of 9.3 million[6], the sample size calculated was 369 at 95% confidence interval. Therefore, a total of 370 subjects who fulfilled the inclusion criteria were included in this study. CAD risk factors included in this study have been listed in Table 1.

Data Collection Method: Informed consent was obtained from all the subjects prior to the interview. Interview was conducted in urdu before his/her visit with the physician. Questionnaire was also administered in urdu. Laboratory and clinical data were obtained from the medical record of the subject. The study had the approval of the Ethical Committee of the institution.

Analysis: Data were entered and analyzed in the Statistical Package of Social Sciences (SPSS) program. Demographic data and frequency of risk factors are reported by giving their percentages and in addition, assuming random sampling, 95 % confidence interval were also calculated for

Table 1. Definitions of CAD risk factors.

- Family History: Defined as death of a first-degree male relative (grandfather, father or brother) before the age of 55 years or first-degree female relative (grandmother, mother or sister) before the age of 65 years[7]

- Dyslipidemia: Total serum cholesterol levels were classified according to NCEP II guidelines[8,9]

- Hypertension: According to JNC VI, defined as systolic blood pressure (SBP) of 140 mm Hg or greater, diastolic blood pressure (DBP) of 90 mm Hg or greater or taking antihypertensive medication[10,11]

- Physical inactivity: We were primarily interested in those patients who had sedentary life style.[12,13] i.e. people who had not taken part in any sports or recreational physical activities in the four weeks they were interviewed.

- Cigarette smoking: Current regular smoker is defined as a person who smokes one or more cigarette per day, everyday[14,15]

- Diabetes mellitus: Fasting blood sugar ≥126 or any patient with two fasting plasma glucose levels of 126 mg per dl (7.0 mmol per L) or greater is considered to have diabetes mellitus. Also includes patients who are on oral hypoglycemic drugs and or taking Insulin.[16]

- Obesity: Body mass index (BMI = weight {kg}/height {in squared meters) greater than or equal to 30 for men and women.[17] The term healthy weight is defined as BMI 20-25[17]

CAD risk factors using this formula. P (hat) ± 1.96 Ö{P (hat) (1- P (hat)/n}

Results

Demographic Variables: The demographic and clinical data of the sample population are shown in Table 2. The mean ± SD age of the entire group was 45 ± 9.7 years. Majority (66%) of the study participants were fully employed and half (50%) of the employed population was working in managerial capacities or ran their own business. Our study group was mostly well educated with 72% (n=268) being graduates and post-graduates.

Table 2. Demographics and clinical characteristics of study subjects.

Variables	Frequency	Percent	Means ± SD
Gender			
Male	294	79.5	
Female	76	20.5	
Marital status			
Married	326	88.1	
Single	27	7.3	
Divorced/separated/ widowed	17	4.6	
Mother tongue			
Urdu	176	47.6	
Sindhi	56	15.1	
Punjabi	86	23.2	
Pushto	24	6.5	
Baluchi	13	3.5	
Other	15	4.1	
Employment			
Full time	247	66.8	
Part time	6	1.6	
Retired	37	10.0	
Household person	71	19.2	
Unemployed/student	6	1.6	
Age (years)			45±9.6 (range 18-60)
Cholesterol (mg/dl)			209±179
HDL (mg/dl)			40±8
LDL (mg/dl)			125±54
Triglycerides (mg/dl)			166±150

CAD risk factors: The CAD risk factors proportions are shown in Table 3. There were 57 (15%) diabetics and only 11 patients had their diabetes under control.

Seventy (19%) patients (49 males and 21 females)

Table 3. Proportion of risk factors for CAD in study population.

Risk factors	Frequency	Percent
Diabetes mellitus		
Yes	57	15.4
No	298	80.5
Impaired glucose tolerance	15	4.1
Hypertension		
Yes	70	18.9
No	300	81.1
Family history of heart disease		
Yes	154	41.6
No	209	56.5
Don't know	7	1.9
BMI		
<25	109	29.5
25-26.9	84	22.7
27-29.9	87	23.5
30-34.9	65	17.6
35 and above	25	6.8
Serum cholesterol (mg/dl)		
<200	254	68.6
200-239	78	21.1
240 and above	38	10.3
HDL levels (mg/dl)		
<130	211	57.0
130-159	109	29.5
160 and above	50	13.5
Smoking status		
Never smoked	240	64.9
Former smoker	33	8.9
Regular smoker	79	21.4
Occasional smoker	14	3.8
Regular pipe/cigar smoker	3	0.9
Refused	1	0.1
Regular exercise		
Yes	103	27.8
No	267	72.2

Table 4. Number of risk factors (smoking, dyslipidemia and hypertension) in the study population.

Risk Factors	Frequency	Percent
None of the three	132	35.7
One	143	38.6
Two	40	10.8
All Three	3	0.8
Total	318	85.9*

*14% (52) of subjects were completely free from any risk factor.

were known hypertensives. When hypertension was matched with gender the results were statistically significant (p=0.03). Non-pharmacological measures for hypertension control e.g. salt reduction in diet, exercise and weight

Table 5. Proportion of risk factors for CAD in two groups of study population- with and without family history of heart disease.

Risk factors	Family History of Heart Disease**		P-value*
	+ve (n=154)	-ve (n=209)	
	Frequency (%)	Frequency (%)	
Hypertension	37 (24)	31 (14.8)	0.07
Diabetes Mellitus	17 (11)	37 (17.7)	0.06
Serum Cholesterol (>200 mg/dl)	53 (34.4)	61 (29.1)	0.29
Smoking	27 (17.5)	52 (24.9)	0.30
Sedentary Life style (no exercise	99 (64.3)	163 (78)	0.016
BMI			
<25	40 (25.9)	65 (31.1)	
25-26.9	38 (24.6)	38 (18.1)	
27-29.9	38 (24.6)	55 (26.3)	
30-34.9	28 (18.1)	37 (17.7)	0.77
35 and above	10 (6.4)	14 (6.6	

* P-value compares proportions in +ve and -ve groups using $\chi 2$

** Seven subjects did not know their Family History of CAD

weight control were advised to 39 hypertensive patients. Despite all pharmacological and non-pharmacological therapies, only 40% (n=28) had their blood pressures adequately controlled. About 30% (n=116) of the study population were dyslipidemic. Good lipid control was achieved in only 11 dyslipidemic patients. Smoking was more prevalent among males as compared to females as 79 (97%) regular smokers were males. Among the regular cigarette smokers, 32 (41%) smoked 1-10 cigarettes per day and an equal number smoked 11-25 cigarettes per day. Fifteen (19%) regular smokers consumed 26 or more cigarettes per day. When cigarette smoking was matched for age intervals it was interestingly seen that 30 (38%) regular cigarette smokers were in the age group of 41-50 years (p=0.01) and 20 (25%) smokers were above 50 years of age (p=0.01).

Regular exercise was a routine for about 28% of the study group, out of which brisk walking was the most common form. When matched for gender and body mass index (BMI), it was seen that 24% (n=70) and 21% (n=16) of the male and female participants were overweight, respectively. Twenty-two percent (n=65) of the male population and 33% (n=25) of the female population came under the category of obesity i.e., BMI of 30 and above (p=0.04).

Multiple Risk Factors: We also looked at the number of risk factors in totality of the study group. Selecting the three major risk factors for CAD, which include regular cigarette smoking, dyslipidemia and hypertension, we grouped them into categories of one, two and three risk factors. The results are shown in Table 4. It is noteworthy that only 52 (14%) participants of the study were free from any one of the above-mentioned risk factors.

In order to eliminate the bias of positive family history of CAD in the study population, the data were analyzed for the proportions of CAD risk factors in two groups -one with family history of heart disease and the other one with no family history of this disease. Table 5 shows the proportions of risk factors for CAD in groups of study population with and without family history of heart disease.

Although the proportion of hypertension in those with family history of heart disease +ve group) was higher compared to those with no family history of this disease (24% vs 14.8%), yet the proportions were not significantly different. Similarly, no significant differences were observed between the two groups when proportions of diabetes mellitus, dislipidemia, smoking and BMI were compared by test of associations using $\chi 2$. The most notable difference, however, was observed in the sedentary life style, and those with positive family history of heart disease were relatively more engaged in exercise compared to those with no family history of this disease.

Discussion

The age and sex distribution of this study population is not comparable to the overall population of Pakistan[6] because there have been fewer females in the study. This is probably due to the fact that males have greater access to health care or lack on the part of the female population about participating in screening programs.

High blood pressure is an independent risk factor for cardiovascular disease[18] and can increase the risk by 2-3 fold.[18] Hypertension, was a risk factor, was present in 18.9% which matches well with the NHSP[4]data where overall prevalence was 17.9%. Hypertension was under control in 40% of subjects because not enough stress is placed on the need for good compliance with medications as well as lifestyle modifications. Health care providers need to inform patients on the risks of CAD with presence of hypertension.

The association between elevated blood cholesterol and heart disease has long been known. Results from long-term population studies such as the Framingham study have validated the association.[19] Twenty-one percent patients had fasting cholesterol between 200-239 and 10.3% had greater than 240mg/dl while only 3-10% had cholesterol levels higher than 200 mg/dl in NHSP.[4] However, Samad et al[3] reported that 31% adults with total cholesterol above 200 mg/dl. Studies conducted on healthy Pakistanis living

abroad also demonstrated high cholesterol and LDL levels and low HDL levels.[20] However, even those with acceptable serum total cholesterol concentrations have been shown to develop CAD, suggesting that the acceptable cut-off concentration for total cholesterol may actually be too high for Pakistani population. A national epidemiological study is required on this subject. This target screening may be helpful for establishment of national cut offs and subsequently successful public health campaigns. Furthermore, the importance of stressing on lifestyle modifications cannot be overlooked and needs to be incorporated in media campaigns.

Regular cigarette smoking was seen in 21% of this group, which is similar to the NHSP[4] figure of 34% and also comparable to the study by Samad et al[3], which reports 21% smoking in total population. Results of this study suggest that efforts to combat smoking in the society should be intensified.

The frequency of 28% of regular exercise in this group is comparable with another report of 23%.[21] However it is felt that this may be an overestimate because our population was well educated and are liable to be more aware of the benefits of regular exercise. Nonetheless, the need for avoidance of sedentary lifestyle habits needs emphasis despite the fast and modern living of today.

It is desirable to maintain a healthy BMI in the range of 20-25 for both men and women.[17] A BMI of 30 and above was found in 24% but again it is presumed that this may be an overestimate due to predominantly high socioeconomic status in the study group. Nonetheless, for a developing country like Pakistan undergoing economic transition the incidence of obesity is expected to rise. Data from the long-term Framingham study[19] show that the degree of overweight is proportional to the rate of development of cardiovascular disease.

The hallmark of cardiovascular disease risk is the synergistic effect of more than one risk factor on overall cardiovascular disease risk. Even moderate elevations in more than one risk factor increase cardiovascular disease risk.[22] This study population shows that 38% had at least one risk factor but we did not include sedentary lifestyle was not included, which would have increased this figure further.

It is hypothesized that prevalence and awareness of risk factors varies with socioeconomic status. People with a lower level of education (a proxy measure of socioeconomic status) are more likely to have risk factors for cardiovascular diseases yet are less likely to identify these as risk factors. Lower socioeconomic groups are less aware than upper socioeconomic groups of high blood pressure and elevated blood cholesterol as risk factors.

Limitations

A convenience sampling was used, focusing on mostly high socio-economic class. It is known from previous data available, that risk factors of heart disease are more common in higher socio economic class, (early adopters) followed by low socio economic class (late adopters).[23] This study has targeted the upper class, which may not be truly representative of the general population of Pakistan but it will provide some baseline data regarding burden of CAD risk factors. Furthermore, this hospital-based data is applicable for the general population. This cross sectional study cannot make a temporal relationship between the risk factors and CAD. However with this data it can be postulated that the true burden would be much greater.

Conclusion

The results show that the proportion of CAD risk factors is quite dominant in this study, therefore, community wide surveys to detect the actual burden of CAD and its risk factors, continuous medical education for practicing doctors who treat almost 90% of diseases in the community for effective control of chronic illnesses like hypertension, diabetes mellitus and high cholesterol and media campaigns for preventive health measures like screening for CAD risk factors, maintaining healthy lifestyle and anti-tobacco laws need to be implemented with the help of local governmental and non-governmental organizations.

Acknowledgement

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