Original Article

PROFILE OF CONVENTIONAL RISK FACTORS IN PATIENTS PRESENTING FOR CORONARY ANGIOGRAPHY IN A TERTIARY CARE HOSPITAL

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ABSTRACT:

INTRODUCTION:

The conventional risk factors for coronary artery disease (CAD) include hypertension, diabetes mellitus, hyperlipidaemia and cigarette smoking(1). There is a large body of evidence, which implicates these factors in the causation of coronary artery disease.

OBJECTIVE:

To study the pattern of the above-mentioned as well as additional risk factors including age, gender, family history, obesity and hepatitis B and C seropositivity in the population of patients undergoing coronary angiography at our tertiary care hospital.

METHODOLOGY:

In this cross-sectional survey, 465 patients undergoing coronary angiography were studied using a questionnaire as well as clinical and laboratory data. The information obtained included age, sex, clinical presentation, past medical history, family history, the presence or absence of previous ischemic heart disease, diabetes, hypertension and a history of smoking. A history of duration of diabetes and hypertension, their treatment and the presence or absence of complications was also noted. A proportion of patients had their fasting blood lipid levels measured. Height, weight and waist circumference as well as HepBsAg and anti-HCV levels were also determined.

RESULTS:

The 465 patients studied included 383 males and 82 females. The mean age of all patients was 49.68 ± 0.464 years and the difference between genders was not significant. A past history of ischaemic heart disease was present in 31% of patients. Diabetes mellitus was present in 23% of males and 45% of females. A history of hypertension was present in 30.8% males and 70.7% of the females. Of the patients who could be studied, the mean LDL was 110.29 ± 1.706 mg/dL, the mean HDL was 41.01 ± 0.319 mg/dL

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and the mean TG was 189.67 ± 4.21 mg/dL. The difference in lipid profile values between male and female patients was not significant (p-value >0.05). Waist circumference was increased in 69.7% males and 93.9% females and here the difference between genders was significant ,HepBsAg alone was present in 3.9% patients and together with anti-HCV in 1.1% patients. Anti-HCV antibodies alone were present in 10.5% of patients. In all, almost 90% patients had at least one of the conventional risk factors .

CONCLUSION:

This study shows that conventional risk factors for ischaemic heart disease are present to a significant degree in our population of patients in whom coronary angiography is considered necessary, and should be targeted for prevention and control.

KEY WORDS:

Coronary heart disease, conventional risk factors, hypertension, diabetes, coronary angiography.

INTRODUCTION:

Coronary artery disease is assuming epidemic proportions among populations inhabiting the South Asian sub-continent (2).It is more frequent and severe as compared to Caucasians and a number of other ethnic groups that have been studied and occurs at a younger age (3). Risk factors for coronary artery disease include non-modifiable factors, such as increasing age, gender (males more susceptible as compared to pre-menopausal females in that age group) (4) and heredity (5), which includes racial origin. The well-established,'conventional'or major risk factors are hyperlipidaemia, hypertension, diabetes mellitus and the combination of factors known as the metabolic syndrome(6-9). The so-called 'life-style' risk factors include smoking(10,11), obesity(12,13), exercise(14), diet(15) and stress(16) and depression(17). The latter two groups of risk factors are modifiable to a greater or lesser degree. The emerging risk factors are relatively less well-characterized and include lipoprotein(a) levels, hepatitis B and C seropositivity, homocysteine levels, CRP levels, etc. and more than a hundred have been proposed (18). Their role in the causation of coronary atherosclerosis and ischaemic heart disease is currently being evaluated as to what extent they act independently, if at all, and to what extent they act through the conventional risk factors.

We aimed to study the presence of different conventional risk factors in our patients, whether it is different in some way from the Caucasian populations which have been commonly studied(19), or essentially the same risk factors but more frequently present (20,21). As far as we are aware no similar study has previously been carried out in the Cardiology Department of Mayo Hospital, Lahore. The main aim of this study is to arrive at conclusions that would help devise strategies for prevention as well as timely intervention for treatment. These interventions have been found to be beneficial in Caucasian populations(22).

PATIENTS AND METHODS

This was a cross sectional study. Probability random sampling was used to collect the data.We studied the risk factors for coronary artery disease in a population of 465 patients undergoing coronary artery angiography in the Department of Cardiology, Mayo Hospital, Lahore, between March 2009 and July 2010.The anthropometric and demographic (age, gender) profile of a number of these patients has already been reported(23). We used a questionnaire as well as available clinical and laboratory data to establish the diagnosis, past medical history, family history, the presence or absence of previous ischemic heart disease, diabetes, hypertension and a history of smoking. We also obtained the history of duration of diabetes and hypertension , their treatment and the presence or absence of different complications. Height, weight and waist circumference were recorded. Blood levels of glucose, urea, creatinine, Na, and K were documented as well as HepBsAg and anti- HCV antibody levels by ELISA. Due to logistic problems, fasting lipid profile was not available in every case and we have included that as a sub-study. Serum uric acid levels were also obtainable in only a small proportion of patients.

DATA ANALYSIS TECHNIQUE:

Data was entered and was analyzed using SPSS 17 version. The quantitative data like age, anthropometric variables, lab investigations and duration of illness are presented in mean ± S.E. We used independent sample t-test (or Mann Whitney – U test where the assumptions were violated) to compare the means of these

quantitative data in male and female groups. Qualitative data like diagnosis, risk factors and family history is given in from of frequency and percentages. Chi-square test and Fisher exact test was used to compare these qualitative attributes in relation to gender. P-value less or equal to <0.05 was taken as significant.

RESULTS:

In this study the mean age of the patients was 49.68 ± 0.464 years. The median age in this study was 50 years (range: 19 to 75 years). There were 383 (82.4%) males and 82 (17.6%) females.The male to female ratio in this study was 4.12:1(p value < 0.05).The mean age of male patients was 49.72 ± 0.524 years and of female patients was 49.52 ± 0.963 years (p-value > 0.05).

The mean body mass index (BMI) of male and female patients was 22.41 ± 0.211 kg/m^2 and 22.67 ± 0.47 kg/m^2, respectively. But after categorizing BMI according to WHO criteria for South Asian populations(24), we found that 22 (4.7%) patients were underweight in which 18 (4.69% of the male population) were males and 4 (4.87% of the female population) were females, 319(68.6%) were of normal weight which included 267 males (69.7% of the male population) and 52 (63.4% of the female population) females. There were 102 (21.9%) patients who were overweight and in these overweight patients there were 80 (20.8% of the male population) males and 22 (26.83% of the female population) females. Twenty (4.3%) patients were obese, with 16 (4.17% of the male population) males and 4 females(4.87% of females). There was no statistical difference in BMI of male and females, p-value >0.05.

The waist circumference (WC) of male and female patients was 94.27 ± 0.74 and 97.15±1.83 respectively, with insignificant difference in WC of male and female patients.When WHO cutoff points of 90cm in males and 80 cm in females were applied, 69.7% of males and 93.9% of females had increased WC and then the difference between the sexes was significant.

Table – I: Descriptive Statistics of demographical, Anthropometric and LAB investigation of IHD patients

		Male n=383 (82.4%)	Female n=82 (17.6%)	Overall n=465 (100%)	p-value
	Age (years)	49.72±0.524	49.52 ± 0.963	49.68 ±0.464	0.875
Anthropometric Profile	*HT*	164.41 ± 0.49	152.19±0.833	162.26±0.48	0.000**
	WT	76.1±2.5	69.07±1.48	74.85±2.07	0.199
	BMI	22.41 ± 0.211	22.67 ± 0.47	22.46 ± 0.19	0.59
	WC	94.27±0.74	97.15±1.83	94.78±0.69	0.114
Lab Investigations	*LDL*	110.22±1.71	110.59±5.38	110.29±1.706	0.934
	HDL	41.07±0.351	40.76±0.765	41.01±0.319	0.717
	TG	189.38±4.9	191.0±7.16	189.67±4.21	0.883
	UA	6.12±0.90	5.78±1.9	6.08±0.08	0.053
	T CHOL	189.52±1.94	181.06±3.57	188.02±1.72	0.061
	Na	137.23±0.226	137.13±0.322	137.21±0.19	0.852
	K	3.99±0.023	3.86±0.05	3.97±0.22	0.027*

KEYWORDS:

HT (height cm), WT (weight kg), WC (Waist Circumference cm), LDL (Low Density Lipoprotein mg/dL), HDL (High Density Lipoprotein mg/dL), TG (Triglycerides mg/dL), UA (Uric Acid mg/dL), T CHOL (Total cholesterol mg/dL), Na (Sodium mEq/L), K (Potassium mEq/L).

Table –II: Distribution of diagnosis, risk factors and family history in relation to gender.

			Male 383(82.4%)	Female 82 (17.6%)	Overall	p-value
Diagnosis		*MI*	164(42.8%)	20(24.4%)	*184 (39.6%)*	*0.008**
		Angina	192(50.1%)	55(67.1%)	*247 (53.1%)*	
		Others	27(7%)	7(8.5%)	*34 (7.3%)*	
IHD Previous History		*Yes*	118 (30.8%)	26(31.7%)	*144 (31.0%)*	*0.873*
		No	265(69.2%)	56(68.3%)	*321 (69.0%)*	
Diabetes	Status	*Yes*	89(23.2%)	37(45.1%	*126 (27.1%)*	*0.000***
	Treatment	*OHG*	50 (13.1%)	20 (24.4%)	*70 (15.1%)*	*0.000***
		Insulin	10 (2.6%)	8 (9.8%)	*18 (3.9%)*	
	Complications	*Eye*	7(1.8%)	4(4.9%)	*11 (2.4%)*	*0.001**
		Neuro	0 (0%)	3 (3.7%)	*3 (0.6%)*	
		Renal	3 (0.8%)	0 (0%)	*3 (0.6%)*	
		Others	2 (0.5%)	0 (0%)	*2 (0.4%)*	
	Duration (n=114)	*Mean ± S.E (years)*	6.35 ± 0.67	7.58 ± 1.02	*6.72 ± 0.558*	*0.315*
Hypertension	Status	*Yes*	141 (36.8%)	58 (70.7%)	*199 (42.8%)*	*0.000***
	Treatment	*Yes*	105 (27.4%)	39 (47.6%)	*144 (31.0%)*	*0.000***
	Duration (n=171)	*Mean ± S.E (years)*	5.33 ± 0.46	6.72 ± 0.77	*5.74 ± 0.39*	*0.112*
	Complication (n=10)	*Renal*	2 (0.5%)	2 (2.4%)	*4 (0.9%)*	*0.007***
		Neuro	0 (0.0%)	2 (2.4%)	*2(0.4%)*	
		Eye	3 (0.8%)	1 (1.2%)	*4(0.9%)*	
		Others	1 (0.3%)	1 (1.2%)	*2(0.4%)*	
Smoking		*Yes*	190 (49.6%)	2 (2.4%)	*192(41.3%)*	*0.000***
		Ex-smoker	18 (4.7%)	0 (0%)	*18 (3.9%)*	
Hepatitis		*B*	18 (4.7%)	0 (0%)	*18 (3.9%)*	*0.049**
		C	36 (9.4%)	13 (15.9%)	*49 (10.5%)*	
		B + C	5 (1.3%)	0 (0%)	*5 (1.1%)*	
Family History		*IHD*	123 (66.8%)	30 (60%)	*153 (65.4%)*	*0.483*
		Diabetes Mellitus	34 (18.5%)	10 (20%)	*44 (18.8%)*	
		Hypertension	24 (13%)	10 (20%)	*34 (14.5%)*	
		Other major event	3 (1.6%)	0 (0%)	*3 (1.3%)*	

p-value:
*significant
**highly significant

Table –III: No. of risk factors (F) involved

No of Risk factors	Risks Involved	F	%
0	No	50	10.8
1	Diabetes	16	3.4
	FH	21	4.5
	HBV	4	.9
	HCV	12	2.6
	HTN	41	8.8
	Smoking	69	14.8
2	Diabetes + FH	10	2.2
	Diabetes + HTN	26	5.6
	Diabetes + HBV	1	0.2
	Diabetes + HCV	1	0.2
	HBV + FH	2	0.4
	HBV + HCV	1	0.2
	HCV + FH	2	0.4
	HTN + FH	24	5.2
	HTN + HBV	3	0.6
	HTN + HCV	8	1.7
	HTN + Smoking	5	1.1
	Smoking + Diabetes	15	3.2
	Smoking + FH	36	7.7
	Smoking + HBV	4	0.9
	Smoking + HCV	9	1.9
	Smoking + HTN	23	4.9
3	Diabetes + HBV + FH	1	0.2
	Diabetes + HTN + FH	18	3.9
	Diabetes + HTN + HBV	1	0.2
	Diabetes + HTN + HCV	7	1.5
	Diabetes + HTN + Smoking	15	3.2
	Diabetes + Smoking + FH	6	1.3
	Diabetes + Smoking + HBV	1	0.2
	HBV + HCV + FH	2	0.4
	HTN + HCV + FH	3	0.6
	HTN + Smoking + FH	15	3.2
	HTN + Smoking + HCV	2	0.4
	Smoking + HBV + HCV	1	0.2
4	Diabetes + HTN + HCV + FH	2	0.4
	Diabetes + HTN + Smoking + FH	3	0.6
	Diabetes + Smoking + HBV + FH	1	0.2
	HTN + Smoking + HCV + FH	2	0.4
5	Diabetes + HTN + Smoking + HBV + HCV	1	0.2
	Diabetes + HTN + Smoking + HCV + FH	1	0.2
Total		465	100.0

DISCUSSION:

As the search for emerging factors goes on, the conventional and well – established risk factors for coronary heart disease, which have been implicated as a result of large clinical trials including the Framingham Study, appear to lose emphasis. Our study shows that these risk factors were present in the overwhelming majority of patients who underwent coronary angiography at our tertiary care hospital and strategies for their prevention and control must be developed if we are to prevent and contain coronary heart disease in our population.

The mean age of our patients undergoing coronary angiography did not differ significantly between males and females, although women develop symptoms of coronary artery disease at a later age than men and have a higher expression of cardiovascular risk factors (25,26).

Among male patients, nearly 43% presented with myocardial infarction,50% with angina (unstable or stable) and 7% had other presentations including silent ischaemia, breathlessness, etc. Only 24% of the female patients had myocardial infarction as their presentation, 67% had angina and 8.5% had other presentations.

Heart disease is under-recognized in women and differences in clinical presentations from men may be the cause of less aggressive treatment strategies including coronary angiography and a lower representation in clinical trials (26).

Nearly the same proportion of male patients (30.8%) and female patients (31.7%) gave a past medical history of ischaemic heart disease including angina or myocardial infarction. More than two-thirds of patients did not have a previous history of ischaemic heart disease before the event necessitating their coronary angiography.

A family history of ischaemic heart disease was present in 65.4% of all patients, 66.8% of the men and 60% of the women.A family history of diabetes mellitus was present in 18.8% of patients, 18.5% among the male and 20% among the females. A family history of hypertension was present in 14.5% of all the patients; 13% of males and 20% of females gave a family history of hypertension.The difference between males and females did not reach statistical significance.

Overall 27.1% patients had diabetes mellitus as a risk factor. Although the mean age of male and female patients was not statistically significantly different in our group of patients,45% of the women were diabetic as compared to only 23% men and this difference was highly statistically significant. Mean duration of diabetes was 7.58±1.02 years for women and 6.35±0.67 years for men (p value=0.315) which difference was statistically insignificant. Women were significantly more likely to be on treatment as compared to men which could be a reflection of diabetes severity. Neurological and eye complications predominated in women while renal complications were slightly more common in men but this difference was not statistically significant. The generally low level of complications may reflect lack of awareness on the part of patients of early changes and selection bias in that more severely affected patients were unlikely to undergo coronary angiography. The prevalence of diabetes in the Pakistani population has been estimated as 7.6-11% with variation according to age, sex, location and urbanization(27).A recent study from Rawalpindi in Northern Punjab showed a prevalence of diabetes of 15.4% among males and 12.3% among females(28).

Hypertension was present in 36.8% of men out of which 27.4% were taking treatment.70.7% of women had a diagnosis of hypertension and 47.6% were on treatment. The difference between the number of hypertensive males and females and their treatment status was highly significant. The mean duration of known hypertension was 5.33±0.46 years in men and 6.72±0.77 years in women and this difference did not reach statistical significance. As with diabetes, the complication level in male and female hypertensives was quite low. According to the National Health Survey of Pakistan (NHSP)(1990-1994) the age-standardized prevalence of hypertension in Pakistanis aged 15 years or over among different ethnic groups was 16%-25% in men and 10%-41% in women. Among the Punjabi ethnic group to which most of our patients belonged it was 17.3% in men and 16.4% in women (29).

Nearly half (49.6%) of the men were current smokers and only 4.7% classed themselves as ex-smokers. From among the women only 2.4% smoked and these were all current smokers. The population based, cross-sectional, National Health Survey of Pakistan 1990-1994 showed that the overall prevalence of smoking in Pakistan was

28.6% in men and 3.4% in women. In men aged 40-49 years, the prevalence was 40.9 %(30).

Body Mass Index (BMI) utilizing South Asian population criteria showed that nearly 21% of the males and 27% of the females were overweight and 4.2% of the males and 4.9% of the females were obese. Women had a greater prevalence of abdominal obesity if we take into account the recommended waist circumference cutoff points for South Asians i.e., men (<90cm) and women (<80cm) (1). In this study increased WC in male and female patients was 69.7% and 93.9 % respectively, with significantly increased WC in female patients.

We could only obtain fasting lipid profiles on 61-66% of our patients due to logistical reasons. The patient's treatment status was not ascertained in detail; some of these patients were on cholesterol lowering medication for various lengths of time with variable compliance.The number of patients who could give a past or family history of hyperlipidaemia was negligible. It would need a separate study to resolve the issue of what their untreated cholesterol profiles would be.

According to the National Cholesterol Education Program(ATP III criteria)(31) for fasting lipid profile, LDL should be <100 mg/dL to be considered 'Optimal'. The mean LDL level (110 mg/dL) in both men and women, fell in the 'Near Optimal/Above Optimal' range. The mean HDL level (41 mg/dl) was in the 'borderline low' range in both men and women. The mean Total Cholesterol level (<200 mg/dL) was in the 'desirable' range in both sexes.The mean TG levels (190 mg/dL) met the criterion for metabolic syndrome (≥ 150 mg/dl) in both males and females in our patients. There was no significant difference in fasting lipid levels between the sexes.Studies in South Asian populations show this lipid pattern of raised LDL-C and triglycerides and low HDL-C(32).

HepBsAg seropositivity was present in 4.7% of men only and1.3% of the men had both HepBsAg and anti-HCV seropositivity.None of the women were HepBsAg seropositive. Anti-HCV antibody alone was present in 9.4% men and 15.9% women.

Out of a total of 465 patients, 50 patients(10.75%) did not have any history of diabetes mellitus, hypertension,a family history of ischaemic heart disease, hepatitis B or C seropositivity or a history of smoking.Of these patients, 22 had fasting lipid profiles and each showed an abnormality in at least one of the components according to NCEP (ATP III) criteria.

Uric acid levels were obtained in 29.46% patients only and the mean values were 6.12 ± 0.9 mg/dl for males and 5.78 ± 1.9 mg/dl for females and the difference between males and females did not reach statistical significance.

In conclusion, almost 90% of our patients had conventional risk factors for coronary heart disease (33).Whether there were other risk factors also present which modulated their disease and its presentation and were also operative in patients without conventional risk factors will need further study.

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