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FREQUENCY OF CARDIOVASCULAR DISEASE RISK FACTORS AMONG LOW INCOME GROUP

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ABSTRACT

Objectives: To find out frequency of risk factors for cardiovascular disease in low income group.

Methodology: This was a cross-sectional study of subjects from low income group recruited in Peshawar Heart Study (PHS) consisting of sweepers, orderlies, door attendants and cooks.

Results: A total of 195 subjects were interviewed. Mean age was 39.23 ± 10.49 years. Mean BMI was 24.92 ± 5.0. Mean systolic and diastolic BP was in pre-hypertension range (JNC 7), about 43% had systolic (130mmHg) and 37% had diastolic hypertension (90mmHg). Only a small number (5.64%) of subjects in this group had random blood sugar of more than 180mg/dl. Although the majority (n=117, 60%), of the subjects were not performing any regular exercise most of them (89.2%) had a roaming job. The majority of low income subjects (N=113, 57.9%) were working for a mean 12 hours. Daily traveling time for job was more than 40 minutes in at least 40% of cases. Current cigarette smokers were 49 (25%), while 59 (30%) were using Naswar and 3.1% were using Huqqqa for tobacco smoking. A small number (3.6%) were drinking alcohol. Mean Euro SCORE was 0.71 ± 1.26.

Conclusion: The physical inactivity, obesity, unhealthy eating, hypertension, smoking were more frequent but modifiable risk factors for CVD like hypercholesterolemia and diabetes were less frequent amongst low income group. The indicators of social stress were also more common like low educational status, more children, long working hours, long traveling time to and from job and limited financial resources.

Key Words: Peshawar Heart Study, Low income group, CVD risk factors, BMI, waist/Hip ratio, smoking, hypertension, calories, exercise

INTRODUCTION

Cardiovascular disease (CVD) associated morbidity and mortality is strongly linked to the modifiable risk factors.[1] The INTERHEART study found that risks of myocardial infarction(MI) are associated with modifiable risk factors like smoking, diabetes mellitus, dyslipidemia, central obesity, hypertension, imbalanced diet, physical inactivity, excessive alcohol consumption, and psychosocial factors.[2] The variation in the incidence and prevalence of these risk factors is quite marked in different races and ethnic communities across the globe[3,4].

The risk factors for CVD in Pakistan have been identified but attempts to limit these have not been very successful yet.[5] In developed countries large scale population awareness campaigns have resulted in significant decrease in the prevalence of smoking, hypertension, and cholesterol levels. South East Asian countries which contribute nearly 60% of the global cardiovascular disease burden[6,7], need a cost effective CVD prevention policy, to stratify high risk individuals for early intervention.[8] Peshawar Heart Study (PHS) has identified risk factors for CVD in various occupational groups which is more or less similar to the data of occupational groups from developed countries.[1]

This present study provides the insight of pattern of cardiovascular disease risk factors among low income group serving in Peshawar enrolled in PHS.

METHODOLOGY

This was a cross-sectional study involving subjects from low income group participating in PHS. Detailed materials and methods have been already published elsewhere. After an informed consent all subjects were interviewed in detail regarding current medical history, family history, past medical history, smoking history and history of medications. Daily and weekly diet was noted. Daily calorie intake was calculated with the help of Agriculture University of Peshawar Guidelines.[9] Personal habits, exercise pattern and working conditions were also explored along-with traveling time to and from work place. Religious practices were also noted for followers of different religions. Family history of CAD was considered to be positive if first degree relative had CAD at the age (for men < 50 years and for women < 60 years).Personal history and social history was explored in detail.

During physical examination pulse, blood pressure, BMI and waist/hip ratio measured. Blood pressure was measured using mercury sphygmomanometer in sitting position with supported left arm. A 12-Lead resting ECG was recorded using BTL-085 machine in supine position. Random blood sugar was checked using Abott Glucometer (Medisence Optium) by finger prick method. Serum random cholesterol was checked using Accutrend GC portable device (Roche) by finger prick method.

Hypertension was defined according to the JNC 7 Criteria.[10] Diabetes was defined according to WHO Criteria.[11] Hypercholesterolemia was defined according to ATPIII guidelines.[12] For this study purpose history of smoking was considered to be positive if 5 cigarettes were smoked per day for $\geq$6 Months. Naswar was considered as a part of tobacco use. Euro SCORE was calculated according to European Society of Cardiology Guidelines.[13]

Individual counseling about cardiovascular disease risk status was done. They were handed over written information booklet which contained details of their current medical parameters and also methods to avoid and reduce risk factors if present.

Data was analyzed through SPSS version 16. Mean, mode and median were determined. Frequency was determined as percentage.

RESULTS

Data of 195 subjects was analyzed. Table 1 shows the baseline characteristics. Mean age was 39.23 ± 10.49 years. Males were 142 and females were 53.This group consisted of sweepers, orderlies, doormen and cooks. The duration of job varied between one and twenty years. More than 57% were working for more than 12 hours daily. The majority (89.2%) of subjects had roaming job. The salary ranged between Rs 7000 to Rs 15000 per month .Regarding educational status, 65% of the subjects was illiterate and the rest were educated from class 5 to FA class. Married population was 83%. The number of children varied from one per family to 13 per family. More than three children were noted in 74% of subjects.

Known hypertensive were 6.2%, while 3.6% were known diabetic and 0.5% had past history of CAD (Table 2). Family history of CAD, hypertension, diabetes and stroke were also frequent.

Active cigarette and huqqa smokers were 37 (22.1%), naswar was being used by 30.3 %, About 30% of this group were both cigarette smokers and naswar users .About 3.6% of the subjects (non Muslims) were drinking alcohol on occasional basis .Since this group contained both Muslims and non-Muslims the religious practices were also noted. 47.7% were regular in their prayers and 41.5% were irregular while 10.8% were not praying at all. Recitation from Holy Quran was done regularly for 15-30 minutes by 21.5%; for more than 30 minutes by 1.5%, and occasionally by 1%.

Socioeconomic factors causing stress were also documented (Table 3). Most of these factors compound or aggravate the conditions predisposing to CVD.

The obesity parameters (Table 4) showed that about 50% of the low income group subjects were obese. Mean BMI of

Table 1: Baseline Characteristics (n= 195)

Gender	Male	142	72.8%
	Females	53	27.2%
Age (mean)		39.23±10.49	
Marital status	Unmarried	21(10.8%)	
	Married	162 (83,1%)	
	Widowed	12(6.2%)	
Number of children	3 or more children	69.74%	
	6 or more children	29.0%	
Physical Parameters		mean	SD
Blood pressure	Systolic(mm of Hg)	123.54	16.34
	Diastolic(mm of Hg)	81.77	10.77
Pulse	(beats per min)	78.72	8.82
Random cholesterol	mg/dl	167.38	20.35
Random sugar	mg/dl	107.69	52.10
BMI		24.92	5.0
W:H ratio		0.91	0.11
Euro score		0.71	1.26

Table 2: Medical History

Disease	Past medical history	Family history
CAD	0.5%	11.2%
HTN	6.2%	21%
DM	3.6%	24.2%
Stroke	0	11.8%
Sudden death	-	4.5%
None	88.2 %	-

49.73% subjects was 25 or more. The W: H ratio of more than 60% was above 0.90, making them a visibly obese group.

Food pattern analysis (Table 5) showed that subjects were taking three major meals per day. Breakfast and supper were taken at home at home while lunch at workplace. Weekly vegetable intake was 1185±434 grams, beef intake was 289±251grams, mutton intake was 36±81 grams, fish was 20±49 grams, chicken was 118±123 grams, and fruit intake was 520±411 grams. The most frequent drink was black tea with milk and sugar followed by a combination of green tea with sugar.61% of subjects were taking snacks during office hours. Alcohol was being taken by 3.6% of the non- Muslims .Mean calorie intake was 3111± 523 kcal/day (range=1920-4697kcal /day).The most frequent item in daily food was "roti"- the wheat loaf. Each roti weighs about 200 grams (contributing 200 k/cal per roti) and at least three roti per day make 600kcal/day. The home cooked roti weighs more than 500 grams (eaten with home cooked meals) and is likely to add more than 500 kcal/roti. This increases the calorie intake per day.

The calorie intake per 24 hours ranged between 1920-4697kcal.About 40% were taking up to 3000kcal/day, 42.0% were taking between 3000-4000kcal/day, and 7.7% were taking more than 4000kcal/day.

Regarding exercise, only 40% were performing regular physical exercise daily and this included daily walking to and from work place, as well as traveling on bicycle. The remaining 60% did not have time for exercise while 25% were doing exercise for 30 minutes daily.

Systolic BP of more than 130 mmHg was present in 42.98% while 37.94% had diastolic BP of more than 90 mm Hg

Table 3: Socioeconomic Stress Factors (n=195)

Marital Status (Married)	Unmarried	10.8%
	Married	83.1%
	Widowed	6.2%
Educational Status	Illiterate	65.6%
	5th class-FA class	34.4%
Number of Children	Minimum	0
	Mean	3
	Maximum	13
Working Hours	6 hours	3.1%
	8 hours	21.5%
	12 hours	57.9%
Job Category	Sweepers	52.8%
	Orderlies	44%
	Cooks	1%
	Others	2.2%
Salary Per Month	Minimum	Rs 7000
	Maximum	Rs 15000
Lack of Exercise (Not enough time)	N=117	60%
Daily Travelling	Minimum	3 Minutes
Time to Work Place	Mean	40 Minutes
	maximum	150 Minutes
Means of Travel to Workplace	Public Transport	60.5%
	Walking	30.8%
	Bicycle	7.7%
Job Status	Permanent Job (long term)	81.5%
	Contract Job (short term)	18.5%

Table 4: Frequency of Obesity Parameters

Parameter	Value	% (percentage)
BMI	$\leq$24	50.25
	25-30	35.38
	31-41	14.35
W:H Ratio	0.62-0.89	39.88
	0.90-0.99	48.71
	1.00-1.65	11.79

.Random blood sugar of more than 180 mg /dl was found in 6.6% and blood cholesterol more than 180 mg/dl was found in 21.51%.

The ECG analysis (Table 6) that 84% had normal ECG while the rest had ST/T changes, RBBB, LVH and old MI with decreasing frequency. The mean Euro SCORE was 0.27±1.27.

Table 5: Weekly Food Consumption

Variables	Nill	$\leq$500 gm	$\leq$1000gm	$\geq$1000gm	Mean	SD
Beef	14.9%	63.4%	19.7%	1.0%	289.23gm	251.79
Mutton	75.9%	20%	4%	_	36.79gm	81.43
Chicken	33.8%	_	_	_	118.46gm	123.28
Fish	83.6%	_	_	_	20.38gm	49.78
Vegetables	1.5%	43.6%	44.6%	10.2%	1185.64gm	434.82
Fruit	12.3%	65.1%	_	22.6%	520.51gm	411.29

Table 6: ECG Findings (n=195)

Normal	84.6%
ST/T Changes	7.2%
RBBB	4.6%
LVH	1.5%
Inferior MI	1.0%
Sinus Tachycardia	0.5%
Sinus Bradycardia	0.5%

DISCUSSION

Coronary artery disease is not only the leading cause of death in South East Asian countries but also in the developed countries. The major modifiable risk factors for coronary artery disease include hypercholesterolemia, hypertension, glucose intolerance, obesity, smoking, psychosocial factors, consumption of too few fruits and vegetables and lack of regular exercise.[14,15]

Population based long-term follow-up studies in Europe and America have shown a strong association between the levels of risk factors and incidence rates of CVD.[16,17] The present population based study evaluated the frequency of risk factors for CVD among the low income group of PHS. There is no local study evaluating risk factors of CVD in such a group.

Tobacco use has been a major problem in chronic disease prevention developing countries.[15] In the present study there was a high frequency of tobacco use (both cigarette smoking and naswar) and this finding is similar to other groups of PHS like prisoners[18] and doctors[19] while it was less than teachers[20] and nurses.[21]

Though the mean systolic and diastolic BP was in pre-hypertension range (JNC 7), about 43% had systolic (130mmHg) and 37% had diastolic hypertension (90mmHg). Fawad et al have also reported a high frequency of hypertension in journalist[22] while a lower frequency has been reported in doctors of PHS. The global prevalence of hypertension previously has been reported to be 26.4% overall (26.6% male and 26.1% female).[23]

A major modifiable risk factors of cardiovascular disease is hypercholesterolemia.[12] About 7.17% of our study subjects had a random cholesterol of more 200mg/dl which is low as compared Iqbal et al[24] who reported hypercholesterolemia in 31% subjects of Karachi and 37% frequency reported by Ishaq et al.[25] Other subgroup studies of PHS have reported a cholesterol of more than 180 mg/dl in 21.15% doctors[19] and 37.95% in prisoners.[19] The low frequency of hyper-cholesterolemia in this group (11% had family history of CAD) is probably due to younger age, and possible variation in sampling time .

Diabetes and impaired glucose tolerance (IGT) are important risk factors for coronary artery disease (CAD).[26] In this study 5.64% subjects had a random blood sugar more than 180 mg /dl and 3.6% were known diabetics and more than 24% had a positive family history of diabetes. A normal sugar has been reported by Qureshi et al[19],Ali et al[20] and Fawad et al[22] for other subgroups PHS.

One large scale survey in Pakistan showed that 25.0% of the population was either overweight or obese according to the

Asian-specific BMI cutoff value of 23 kg/m^2 and 10.3% to be obese according to the BMI cutoff value of 27 kg/m^2.[27] In the current study we observed that 35.38% subjects were between 25-30 kg/m^2 and 14.35% were between 31-41 kg/m^2, which is more than the national survey. These findings are similar to other groups reported previously by Hafizullah et al[18], Ali et al[20] and Fawad et al[22] and Qureshi[19] et al. Similarly high W: H ratio has also been linked to high CVD incidence and prevalence[28] .More than 60% of our study population had a ratio of more than 0.9. These findings reflect lack of regular exercise and high calorie intake.

The mean calorie intake was 3111 kcal/day. The extra calories are added by eating snacks, sweet tea, other drinks along with eating high calorie-"roti" with all three major meals of the day. Roti increases satiety and makes the major bulk of the local food. The minimum weight of roti is 200 grams providing 200kcal/roti.The home cooked roti weighs more 500 grams thus yielding at least 500 kcal /roti. For 3 such roties 1500kcal per day are added to daily intake ie 50% of daily mean intake are roti derived calories .As is evident from food chart that meat ,vegetables and fruit contribute much less calories per day. The home meal cooked in low quality cheap fats, combined with plenty of roties leads over months to gross obesity or excess body fat. The high BMI and W: H ratio is a witness to low quality diet intake combined with poor exercise.

Obesity is a well documented risk factor for CVD and associated with high morbidity and mortality.[29, 30] According to definitions of International Obesity Task Force and International Association for Study of Obesity[31] the BMI of (overweight=23.0 – 24.9, obese= 25 or more) most of the low income group subjects were either overweight or obese. Similar findings have been described in doctors previously.[19]

Regular exercise has been known to reduce weight, produces a positive sense of well being .It has a positive impact in the reduction of complications of CVD. Only a small 40% of subjects were doing regular exercise. Such a high frequency (71.7%) of lack of exercise was reported by Hafizullah et al[18] in prisoners in Peshawar Heart study.

The ECG changes in general population have previously been described by F Abbas[32] et al and the frequency in our subjects was more or less similar to their findings.

The religious practices (including prayers and recitation) in this group are less than doctors[19] previously reported suggesting a lower rate of religious attachment in low income group.

During the analysis of this group we came across a number of unique factors or conditions predisposing to or amplifying the already present risk factors (Table 3).Most of these factors revolve around poverty ie, a low job status, a large family to look after, long working hours, poor quality diet, obesity, tobacco use, and the stress involved in traveling on local public transport in the highly volatile city of Peshawar. This city probably has become the most targeted area in the war against terrorism and this state of uncertainty is reflected in the lives of these residents who are more worried about survival than the quality of life. A careless attitude towards healthy living is reflected in the variety of CVD risk factors present in this group.

Euro SCORE has been devised in Europe for CAD risk assessment of subjects.[13] Mean Euro SCORE was low in this group which probably has resulted from inclusion of a relatively low number of diabetics, low mean cholesterol, younger age group, and almost no previous history of CAD in majority. So the Euro SCORE appears not to be a useful tool in Pakistani population but it may become more sensitive and specific with addition of factors like BMI, W: H ratio, social stress-related factors and dietary factors.

LIMITATIONS

Limitations of the study are inclusion of low income group only, predominantly male subjects, and a small sample size. Variation in the time of blood sampling may have affected the glucose and cholesterol levels. Majority of the subjects belonged to one institute creating a sampling bias.

CONCLUSION

The poorly educated get a stressful low income job, look after large families, work for long hours, have little time for exercise, use tobacco excessively, frequently suffer from hypertension and eat a poor quality diet with lots of un-used calories making them obese and prone to CVD.

RECOMMENDATIONS

Health awareness programs should be designed and conducted in all strata of the community as CVD risk factors are frequently multiple and diverse. Guidelines should include special provision for this low income, socially deprived group of people.

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