AN INVESTIGATION IN TO THE RISK FACTORS ASSOCIATED WITH CARDIOVASCULAR DISORDERS AMONG THE PAKHTUN POPULATION OF KHYBER PAKHTUNKHWA, PAKISTAN

Fazia Ghaffar[1✉], Asma Waheed[2]

[1✉] Department of Food & Nutrition Sciences, College of Home Economics, University of Peshawar, Pakistan
E-mail: faziaghaffar@upesh.edu.pk
[2] Nutrition Rehabilitation Unit; Khyber Teaching Hospital, Peshawar, Pakistan
E-mail: dieticianasma@yahoo.com

ABSTRACT

OBJECTIVE: To determine demographic, dietary and psychological factors leading to coronary heart disease in Khyber Pakhtunkhwa, Pakistan.

METHODS: This cross-sectional retrospective study was conducted at the cardiac unit of Hayatabad Medical Complex, Peshawar from September 2012 to December 2012. A random sample of 200 Pakhtun cardiac patients were thoroughly investigated for demographic parameters, anthropometric measurement, food frequency record, and "Depression Anxiety Stress Scales" was submitted for the prevalence of depression, anxiety and stress.

RESULTS: In factors assessed; rural background (75%), complex family structures (71%), illiteracy (68.5%), male smokers (64.75%), large families (9.84±2.57 members), low income (Rs. 8610±953) and less activity were identified as major risk factors. Being overweight (BMI = 31.2±5.58 males and 27.98±1.92 females) with low High-density lipoproteins (HDL) (16.85±5.6), higher blood cholesterol (325±13.5 mg/dl), high triglycerides levels (232±10.7), diabetes mellitus (45%) and hypertension (29.5%) were the major biological factors. Dietary intake revealed high beef intake per week (65.5%), milk (97%), carbohydrates mostly wheat as staple food (90.5%) and low consumption of fresh vegetables and fruits. Daily intake of saturated fat (Ghee) (92%), animal fat, while fried and bakery items were also frequently consumed. The study also found a greater percentage of patients having moderate to mild anxiety, depression and stress posing to be health risks in CVD.

CONCLUSION: Coronary heart disease follows a multidimensional scenario in KP which needs to be addressed to prevent people of this region from vicious cycle of disease.

KEY WORDS: Risk factors (Non-MeSH), demographic factor, dietary intake patterns, biological factors, DAAS psychological test.

INTRODUCTION

The dominance of chronic diseases is a major contributing factor in global mortality.[1] This global prevalence has increased from 14.4 million in 1990 to 17.5 million in 2005 due to higher prevalence of coronary heart diseases. About 80% of deaths occur in low and middle income countries.[2] The World Health Organization estimated 20 million cardiovascular diseases (CVD) related deaths globally.[3]

It is estimated that by 2030 non-communicable disease will account for three quarter of global deaths and CVD alone will be responsible for more deaths in low income countries than the existing scenario.[4] Thus CVD will dominate future mortality trends.[2]

A variety of risk factors are associated with CVD such as non-modifiable family history, ethnicity, age and modifiable factors such as tobacco exposure, hypertension, high cholesterol, obesity, physical activity, diabetes, unhealthy diets and harmful use of alcohol.[5]

Despite poor nutrition and infectious diseases a vast majority of Pakistani population is gripped with CVD and it is increasing to an epidemic proportion just like the other developing countries.[6] Hypertension, diabetes and related complications are 33% and 25% among the Pakistani population.[7] Urbanization, sedentary life styles and a shift in the dietary intake pattern contribute to the worsening of situation.[8] Further more smoking and psychological problems adds to prevalence and severity of the situation.[7]

The present study was designed to identify the key risk factors that are contributing to CVD among the Pakhtun population of KP. The study aimed at assessing the epidemiological factors, dietary intake patterns and depression anxiety and stress level of CVD patients with the objective to help governmental agencies and people of this region to prevent such disorders through modifiable risk factors.

METHODS

This cross sectional study was carried out at the cardiac care unit and cardiology

OPD of Hayatabad Medical Complex, Peshawar. A sample of 200 patients was selected randomly comprising both males and females for a period of three months (September 2012 to December 2012).

Exclusion Criteria:

Severely ill patients in the intensive care, patients in coma or paralyzed due to stroke, elderly (age>70 years) patients, and Afghans (in order to study the representative Pakistani i.e. Pakhtuns sample) were excluded.

Data Collection:

The subjects were thoroughly investigated for:

- Demographic information such as geographical and residential background, occupational status, educational and financial backgrounds, family size and meal patterns, smoking history and family history of CVD and activity record of the patients were collected.

- Anthropometric measurements: the sample was subjected to measurement of heights, weights, Mid Upper Arm Circumferences, and BMI calculations.

- Biochemical tests for blood High Density Lipoproteins (HDL), Cholesterol, triglycerides, glucose, creatinine, urea etc were carried out as per lab procedures.

- Clinical signs of nutritional status: The patients were examined clinically for signs of malnutrition.

- Dietary intake record for was collected through a self-constructed questionnaire and food frequency chart.

- Data regarding psychological states of depression, anxiety and stress was collected by *Depression Anxiety Stress Scales* (DAAS) test.[9]

Statistical Analysis:

The data collected was subjected to statistical tests for frequency, mean and standard deviation while ANOVA test was applied to find the significance of differences in the data of family size, income, anthropometric measurements, clinical signs of malnutrition, and test scores of DAAS by IBM SPSS version 19.

RESULTS

The data regarding areas to which the respondents belonged is presented in Figure 1 while occupational background of the sample is presented in Figure 2. As evident highest percentage of the patients belonged to the rural areas in the outskirts of district Peshawar (17%) followed by Charsada (8%), Mardan (5.5%) Swabi (4.5%), Waziristan (4.5%), district Bara and Hayatabad (4% each), Kohat, Malakand and Dir (3% each) respectively are indicating patients from diverse localities of KP province. In the present study majority of the patients had rural backgrounds (75%) as compared to urban areas (25%). This may be attributed to the preference of the families to government hospitals due to nominal charges. Of the occupational background most of the males were involved in physically less active jobs as per the nature of the job and activity / exercise profile such as office workers (low salaried group and clerical staff), teachers, retired government workers, house servants, and drivers some of whom were long route truck drivers as well. Of the female respondents 99.9% were house wives and only 1% were employed as school teachers.

Demographic information of the sample is presented in Table I. The sample comprised of married 122 males and 78 females. The most common family type noted was the extended or joint family (71%) with mean family size/number of family members being 9.84 ± 2.57 and mean income Rs.8610 ± 9.53. Illiteracy was the most striking parameter identified in the current study (68.5%) followed by 16% matriculates justifying the large majority of male population engaged in lower paid (14.5%) and stressful office jobs (10%). Smoking and/ or Naswar was a common feature among males with heavy smoking pattern along with that 3% of the sample consumed alcohol habitually. Physical activity/exercise record showed activity as part of occupation/job only (can be termed as moderate exercise) was the only common physical activity. Of the sample 71.5% never did any sort of exercise at least thrice a week for 30 minutes while 28.5% used to take time out for some type outdoor activity/ exercise. Irregular meals and skipping of meals was also a feature (43%).

Data regarding anthropometric record is presented in Table II. The sample had a mean age 49.82±1.34 for males and 50.72±1.60 for females. Average height in males was 65.7±4.22 inches and weight was 71.16±2.31kg. Whereas in females the average height was 63.4±3.49 inches and weight was 68.11±2.31kg. Body mass index (BMI) calculated was 31.2±5.58 for males and 27.98±2.05 for females.

Biochemical indices of the respondents are presented in Table III. The data showed lower mean HDL being 16.88±5.61 μ/L, raised Creatine Phophokinase (CPK) 275.3±19.62 μ/L, higher levels of cholesterol 325±13.5 mg/dl and triglycerides 232.62±10.7 mg/dl. However blood glucose, creatinine, and blood urea were within the normal ranges respectively.

Figure 3 represents the disease/complications associated with CVD among the respondents. The data showed that diabetes mellitus was the most prevalent feature (45%) followed by hypertension (29.5%), coronary heart disease (21.5%), myocardial infarction (21%), Acute Coronary Syndrome and Left ventricular Feature (10% each) while arterial septal defects, hepatitis C virus, arterial flutter, mitral valve prolapse, deep vein thrombosis, post coronary artery bypass graft were the types of complications that were found in less than 3% of the sample of the present study.

The data regarding the assessment

TABLE I: DEMOGRAPHIC PROFILE OF THE RESPONDENTS

Parameters		Frequency (n=200)	Percentage	P. Value
Gender	Males	122	61%	>0.05
	Females	78	39	
Residence	Rural	150	75	>0.05
	Urban	50	25	
Type of Family	Joint Family	142	71	>0.05
	Nuclear family	58	29	
Education Background	Elementary	01	0.5	>0.05
	Matric	32	16	
	F.A	12	06	
	B.A	16	08	
	Postgraduate	02	01	
	Illiterate	137	68.5	
Family history of cardiovascular diseases	Yes	82	41	>0.05
	No	118	59	
Smoking/Naswar# (male) (N=122)	Yes	79	64.75	>0.05
	No	43	35.25	
No. of cigarette daily	10	41	51.8	>0.05
	20	22	27.8	
	40	16	20.2	
Activity Level (Exercise 3 times and 30 min per week)	Yes	143	71.5	>0.05
	No	57	28.5	
Alcohol intake		6	03	>0.05
Meal Pattern	Regular	114	57	>0.05
	Skipping/Irregular	86	43	
Family Size		9.84 ± 2.57		>0.05
Family Income		Rs. 8610 ± 9.53		>0.05

#Some respondents were smokers and other were naswaris, they were taken under the same category

TABLE II: ANTHROPOMETRIC PROFILE OF THE SAMPLE

Parameters		Mean ± SD	P-value
Males	Age (Years)	49.82 ± 1.34	0.91
	Height (Inches)	65.7 ± 4.22	0.62
	Weight (Kg)	71.16 ± 1.023	0.01*
	MUAC# (inches)	16.25 ± 1.811	0.03*
	Body Mass Index	31.2 ± 5.58	0.07
Females	Age (Years)	50.72 ± 1.60	0.213
	Height (Inches)	63.4 ± 3.49	0.084
	Weight (Kg)	68.11 ± 2.31	0.025*
	MUAC# (inches)	15.86 ± 2.65	0.081
	Body Mass Index	27.98 ± 1.92	0.017*

*variable are different at P= < 0.05; # MUAC: Mid-Upper Arm Circumference

TABLE III: BIOCHEMICAL PROFILE OF THE RESPONDENTS

Blood Indices	Range	Mean ± SD	Normal Ranges
High-density lipoproteins	16.0 – 41.71μ/L	16.88 ± 5.61μ/L	Up to 49 μ/L
Creatine phosphokinase	30.0 – 841.0μ/L	275.3 ± 19.62μ/L	24 – 195 μ/L
Cholesterol	112.0 – 702.0 mg/dl	325 ± 13.5 mg/dl	200 mg/dl
Triglycerides	54.0 – 460.0 mg/dl	232 ± 10.7 mg/dl	200 mg/dl
Blood glucose	57.0 – 460.0 mg/dl	131.35 ± 6.32 mg/dl	80-120 mg/dl
Creatinine	0.10 – 3.20 mg/dl	0.98 ± 5.74 mg/dl	0.6 – 11.5 mg/dl
Blood Urea	10.0 – 196.0 mg/dl	38.67 ± 28.18 mg/dl	10 - 45 mg/dl

TABLE IV: CLINICAL SIGNS OF MALNUTRITION IN THE SAMPLE

	Signs	Percent	P-value (2-Way ANNO-VA)
Weight	• Normal weight for age	40	0.032
	• Under Weight	25	
	• Over Weight	31	
	• Obese	3.5	
Skin	• Pinkish, Moist, Fresh	18.5	0.037
	• Dry, Dull, Pale	81.0	
Hair	• Lustrous, Shiny	15	0.04
	• Dry, easily plucked	85	
Teeth and gums	• Well formed, teeth, Pink gum, strong	42	0.091
	• Bleeding, Spongy, Pale gum	58.5	
Nails	• Well formed, Pinkish	17	0.71
	• Pale, Spoon shaped (koilonychia)	83	

TABLE V: FOOD FREQUENCY/WEEK RECORD OF THE SAMPLE

Food Items		Daily	3 times/ week	2 times/ week	1/week	Never
Meat & Meat products	• Beef	3	21	65.5	11	—
	• Eggs	46	8	6	32	—
	• Muttons	1.5	18	59.9	10	—
	• Chicken	8	8	61	23	—
	• Fish	0	1.5	3.5	—	95
	• Organ meats	0	2.5	5	10	82.5
Milk a Milk product	• Whole Milk	97	3	—	—	—
	• Skimmed Milk	4.5			1	94
	• Yogurt/Lassi	55.5	—		1	
	• Ice Cream	—	12.5	30	1	89.5
	• Kheer	4.5	12.5	37	1	90
	• Custard	1.5	15	23	1	59.5
	• Cream	13	7.5	7	1	71.5
Cereals & Grains	• Rice	30	4.5	62	3.5	—
	• Wheat Rotie	90.5	4.5	4	1.0	—
	• Maize Rotie	15.5	2.5	11	1.0	70
	• Porridge	2.5	1.0	1.5	1.0	94.0
	• Beans/dhaals	2.5	16	63	37.5	10.0
Vegetables & Fruits	• Cooked Seasonal vegetable	7.5	15	50	36	4.5
	• Potatoes	4	4.5	55.5	30	5
	• Salads	3.5	6.0	39	27	7.5
	• Seasonal fruit	5.5	2.5	15	—	24
	• Apple	28	3.5	50.5	01	17
	• Banana	12.5	8	68.5	—	7.0

TABLE VI: FREQUENCY INTAKE OF FATS, SUGARS AND FRIED FOOD ITEMS BY THE SAMPLE

Items	Daily	3 times/ week	2 times/ week	1/week	Never
Ghee	93	2.5	1	—	3.5
Oil	9	1.0	0.5	—	89.5
Animal fat	8.5	—	8.5	—	83
Chappal Kabab	10.5	2.0	23	—	64.5
Meat Karahi	2.5	2.5	21	—	72.5
Tikkas	27.5	—	8	—	64.5
Soft drinks	27.5	2.0	22	—	67.5
Paratha	8	1.0	8.0	1.5	8
Halwa/Puri	89.5	—	1.8	—	79.5
Pakora/Samosa	24.5	1.5	26.5	—	47.5
Cakes/Pastries	24.5	5.0	17.5	24	20

TABLE VII: SUMMARY STATISTICS OF THE DEPRESSION ANXIETY STRESS SCALES (DASS) SCORES OF THE RESPONDENTS

Parameters	Mean ± SD	Normal	Mild	Moderate	Severe
Anxiety score	8.45 ± 3.52	73 (36.5)	78 (39)	39 (19.5)	10 (05)
p-value	4.67 ± 7.23	0.15*	0.2	0.05*	0.01*
Depression score	13.21 ± 14.18	100 (50)	57 (28.5)	43 (21.5)	0
p-value		0.21	0.1	0.02*	—
Stress score		54 (27)	109 (54.5)	28 (14.3)	9 (4.2)
p-value		0.15	0.04*	0.06	0.035*

of the patients for the presence of nutritional deficiencies showed significant variations in the clinical signs for nutritional status (Table IV). About 31.5% of the sample was over weight (BMI 25-30), 25% under weight (BMI <18.5), and 3.5% obese (BMI 30 & above). Significantly (P = 0.037) higher percent of the patients had pale dull complexion (81%), dry easily plucked hair (85%), pale bleeding gums (58.5%), while 83% had pale spoon shaped nails (koilonychia) depicting a stronger evidence of micro nutrient deficiencies most importantly of the dietary iron, Vitamin C and vitamin B complex.

Food frequency record of the sample (Table V) showed beef intake twice a week, daily intake of eggs (46%), once week intake of mutton (59.9) and chicken (61%) and minimal intake of fish. As far milk and milk products daily intake of whole milk (67%) in the form of tea was very common. A good percentage of respondents were in the habit of consuming desserts and milk cream. Wheat intake as a staple grain (91.5% daily) and one to three times intake of beans and dhal was also common. Cooked seasonal vegetables two times a week (50%), po-
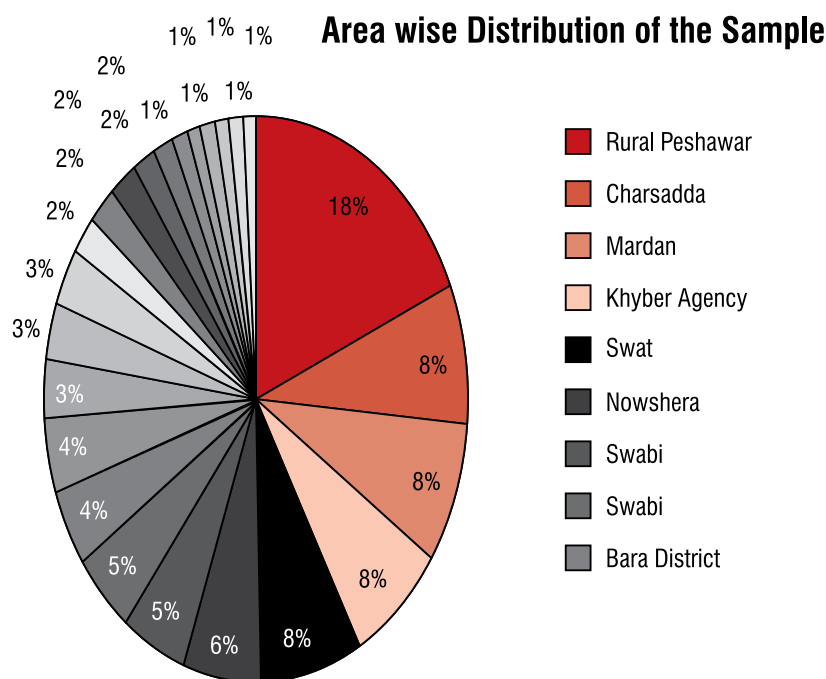

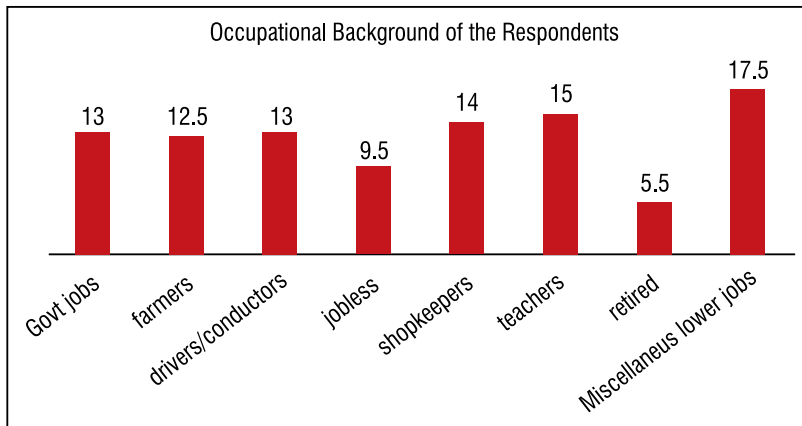Figure 1: Geographic Distribution of the Respondents

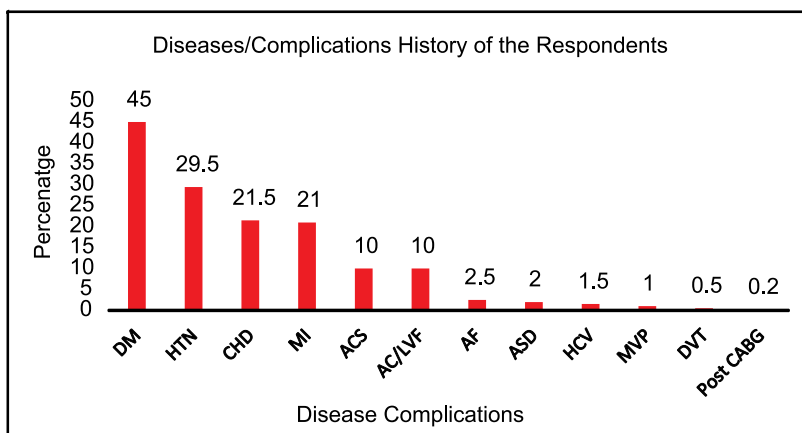Figure 2: Occupational Background of the Sample

Figure 3: Diseases and Complications among the Respondents

tatoes (55.5%) and raw salads (39%) was common. Among the fruits banana twice a week was most commonly consumed (68.5%) followed by apple (50.5%). The intake of seasonal fruits was less common and that was only one time per week (15%).

Intake of fats, sugar and fried items showed (Table VI) ghee intake to be the most prevalent dietary fat. Surprisingly cooking in animal fat on daily basis was also used by some respondents. The justification given by the patients was the flavour and taste to which they were accustomed to since childhood. Paratha intake on daily basis was very high (89.5%), and 10.5% used to consumed Kababs. Tikka intake was also common (27.5% daily), pakora/samosa intake (24.5%) and cakes and pastries (24.5%) were among the items highly consumed as snack items.

The relationship of dietary intake with blood lipid indices (data not shown here) showed highly significant correlation between total fat intake, saturated fats, dietary cholesterol, caloric intake through fiber intake showed insignificant correlation with blood levels of triglycerides, HDL, and cholesterol indicating major role of diet intake with blood lipid.

As far the prevalence of anxiety, depression and stress and its potential contribution to cardiovascular disorder the data indicated (Table VIII) mean score for anxiety on DAAS was 8.45, depression 4.67 and stress 13.21. About 39% patients had mild anxiety scores, 28.5% mild depression and 54.5% had mild stress. Test scores for moderate anxiety 19.5% depression 21.5% and stress 14.3% were also common. About 5% had border line stress while none among the respondents had very severe

depression. Individual test scores of the respondents on test items showed significant variation on different responses on the scale.

DISCUSSION

The current study revealed a high proportion of risk factors that might contribute to CVD in this region. The higher percentage of illiteracy and rural backgrounds are similar to the findings of Akhtar and Asghar[10] who reported 57.7% illiterate and 73.0% patients belonging to rural backgrounds. Sarwar et al.[11] reported a similar trend of family history of CVD among the studied group. Results of the mean family size are higher than that of Nazli et al.[12] and similar pattern of occupational and financial background is reported. The results are in agreement to the findings of a study by Adil et al.[13] for occupational backgrounds. Anthropometric measurements showed higher percent prevalence of overweight among the sample also reported by Adil et al.[13] for mean age and 22% obese, 38% over weight and 34% normal mean weights.

Lopez et al.[14] reported similar results by summarizing hypertension, high cholesterol, overweight and obesity, smoking low fruit and vegetable intake and physical inactivity as the leading contributory factors to Ischemic Heart Disease (IHD) worldwide. Yusuf et al.[15] also found abnormal blood lipids, tobacco, abdominal obesity, psychological factors, hypertension and diabetes as the leading predisposing factors to CVD which are similar to the results of the present study. Abbas et al.[16] reported similar risk factors for rural population in Pakistan being high blood pressure, high blood cholesterol, over weight and obesity of type 2 diabetes as the major biological factors. Similarly unhealthy diets, high consumption of saturated fats, salt, refined carbohydrates and low consumption of vegetables and fruits tends to cluster with rest of the risks leading to increased global CVD burden.[17] Hyper-

tension is highly prevalent in Pakistan and about 50% of over 50 years of population is estimated to be hypertensive.[18] Similarly dyslipidemias accounts for 4.4 million deaths annually adding to 2.8% of global disease burden and 7.9% global deaths.[19] Cigarette smoking as found in the current study alone can be the most important risk factor and is reported being the leading preventable cause of deaths[17] as found in the current study that 20 or more cigarettes daily increase CVD two fold to three folds. In addition as stated in a study by Yusuf et al.[15] the risk of CVD is directly proportional to the number of cigarettes consumed daily. The future rise of diabetes mellitus would be more in the developing countries as expected more than 6 million people will be suffering by the year 2007.[18] Pakistan is among the 10 countries worldwide with the highest prevalence and fastest increase in diabetics.[15] The data of the present study further confirm the role of diabetes in incidence of CVD. The current study also found the other associated risk factors as reported elsewhere such as obesity and overweight are found as the leading causes of CVD. Despite gross under nutrition 11.6% males and 18.93% females were found overweight or obese as presented by WHO.[1] Low fruits and vegetables intake has been estimated to cause 31% of IHD, 11% strokes and 19% gastro intestinal cancers.[19,20] Similarly physical inactivity contribute to 22% IHD, 11% ischemic strokes, 14% type 2 diabetes, 10% of breast cancers and 16% of colon cancer globally in addition to depression and anxiety.[21] Results of our study confirms the aforementioned trend in the Pakhtun population in KP.

The findings of the current study support evidences of positive correlation between depression, anxiety and overall negative states with hypertension.[22] The relationship of depression and anxiety with CVD is complex and multidimensional and are reported as independent risk factors for CAD.[23] Dogar et al.[24] reported high prevalence of major de-pressive disorder and generalized anxiety disorders in cardiac patients in Pakistan in females. Studies conducted by Smith et al.,[25] Staple Beig et al.,[26] Lane et al.,[27] Nekoui et al.,[28] Leon et al.,[29] Cramer[30] and Harlan[31] revealed evidences of de-pression, anxiety and stress as the major etiological risks for CHD.

CONCLUSION

This study dealt with the determina-tion of risk factors: demographic, dietary, and psychological, in the etiology and prognosis of CHD. The findings showed a multifactorial, multidimensional matrix of contributory factors which are inter related, intra related and are independent for this disease. The study suggests the dire need for educational interventions and increased awareness about CHD in the KP region to promote population health in the future.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

FG: Concept & study design, acquisition, analysis & interpretation of data; Drafting the manuscript, final approval of the version to be published

AW: Acquisition, analysis & interpretation of data; Drafting the manuscript, final approval of the version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

KMUJ web address: www.kmuj.kmu.edu.pk
Email address: kmuj@kmu.edu.pk