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NUTRITIONAL STATUS ASSESSMENT AND DIETARY INTAKE OF THE CARDIOVASCULAR DISEASE PATIENTS

Rattan Kaur Chawla[1], Niamatullah[1] and Muhammad Arif[2]
[1]Khyber Pakhtunkhwa Agricultural University, Peshawar, Pakistan
[2]Pakistan Council of Scientific and Industrial Research Laboratories Complex, Peshawar, Pakistan
E-Mail: Rattan_chawla@yahoo.com

ABSTRACT

A study was designed to know the dietary management and to compare the actual intake of macronutrients with the recommended intake of the hospitalized cardiovascular disease patients at Rehman Medical Institute, Peshawar, Pakistan. A sample of 101 CVD hospitalized patients was selected by using convenient sampling method. Questionnaire regarding clinical, biochemical, dietary, family history, demographic and socioeconomic status was developed. Nutritional status was assessed by anthropometric measurements and by calculating BMI. Dietary intake was assessed by using 24-hour dietary recall method and food frequency questionnaire. Results presented that 74.3% of the patients were hypertensive, 37.6% were diabetic, and 41.6% with positive family history, 67.3% used saturated fats in routine life and 86.1% with sedentary life style. Mean age was found to be 52.7±16.5 years, BMI 24.2±5.3 was in normal range but at the edge of normal, and 43.6% of the patients were illiterate. Patients' actual intake was not fulfilling their recommended intake as they were consuming only 74.26% of the recommended carbohydrate, 26.3% of the recommended fats and 39.3% of the recommended protein intake. There was a significant gap between the macronutrients intake of the hospitalized patients.

Keywords: cardiovascular disease, nutritional status, sedentary life style, saturated fats, macronutrient.

INTRODUCTION

According to WHO, cardiovascular disease is defined as "A class of diseases that affect the heart and blood vessels (arteries and veins)". In the majority of cases, this is due to the progressive effects of atherosclerosis in the arteries. Today cardiovascular disease is the largest single contributor to global mortality and will continue to dominate mortality trends in the future. Globally mortality from cardiovascular disease mainly from coronary heart disease, stroke and rheumatic heart disease increased from 14.4 million to 17.5 million in 2005 where more than 80 percent of the deaths in low and middle income countries are from cardiovascular disease (WHO, 2009e). It was estimated that in Pakistan 154, 3383 deaths were due to cardiovascular disease and over 30% of population were at risk of cardiovascular disease. By 2010, CVD will be the leading cause of death in developing world if the incidence goes on unchecked (WHO, 2002).

The risk factors responsible for CVD are mostly established in childhood and adolescence. These include tobacco use, dietary and physical activity, overweight, obesity and diverse childhood experiences (Celermajor and Ayer, 2006; Strong, *et al*., 1999; Dong *et al*., 2004). Epidemiological evidence suggests that dietary changes associated with the nutritional transition, specifically the increase consumption of energy dense diets high in unhealthy fats, oils, sodium, and sugars, have contributed to an increase in CVD incidence in low and middle income countries (Hu, 2008). Excessive and harmful intake of alcohol clearly increases CVD risk (Lucas *et al*., 2005).

Genetic have a positive association with CVD. As from decades, family history of CVD is correlated with increased atherosclerotic risk of heart disease. Although, CVD has sometimes been considered as disease that predominantly affects man but globally it is the leading cause of death among both men and women (Jackson, 2008). Psychological factors such as depression, anxiety, anger, hostility, acute and chronic life stressors and lack of social support are associated with CVD (Everson-Rose and Lewis, 2005; Figueredo, 2009).

Around the world, diabetes is growing increasingly common and is a significant contributor to CVD risk. Diabetes in people results in more than two-fold greater risk of fatal and nonfatal CVD compared to non-diabetics (Asia Pacific Cohort Studies Collaboration, 2003). CVD in diabetics has been considered as the principle cause of morbidity and mortality (Thomas *et al*., 2003).

A recent review of the global burden of high blood pressure found that approximately 54 percent of stroke, 47 percent of IHD, 75 percent of hypertensive disease, and 25 percent of other CVDs were attributable to hypertension. This parallels to approximately 7.6 million deaths, or 13.5 percent of the total number of annual global deaths, attributable to high blood pressure (Lawes *et al*., 2008). The status of health systems in a country can also have a profound impact on CVD outcomes. Noteworthy difference in the health care infrastructure and access to health care contributes to CVD incidence and mortality (Yach *et al*., 2004).

Considering all the risk factors, the increasing global trends of CVD and the importance of human health the present study was conducted at the Cardiology Department of Rehman Medical Institute, Peshawar to know the dietary management and to compare the actual

intake of macronutrients with the recommended intake of the patients.

MATERIALS AND METHODS

The present study was conducted on a convenient sample of people in cardiology ward at Rehman Medical Institute Peshawar. Data was collected on the developed questionnaire. Information was collected from personal interview, hospital record and from patient's attendants.

Anthropometric assessment

Weight and height measurements were taken by following the recommended WHO anthropometric procedures (WHO, 1995). Body weight was measured with a weighing scale in kg. Height was taken with a measuring tape in centimeters. BMI was obtained by dividing body weight in kg by height in meter square (Wt (kg) / Ht (m) ^{2}. Nutritional status was assessed by Body Mass Index (BMI) classification of (WHO, 2005). Respondents having BMI <18.5 were considered as underweight, having BMI >18.5-24.9 as normal weight , having BMI 25-29.9 as overweight, having BMI > 30 as obese and having BMI > 40 as morbid obese.

Clinical assessment

For clinical assessment, each patient was interviewed for the physical examination by the consultants and the chief complaints and associated co-morbidities were recorded on the questionnaire.

Biochemical assessment

About 8 ml blood sample was taken from each patient for the determination of serum electrolytes (sodium, potassium, chloride, bicarbonate), cardiac profile (Troponin-1), kidney profile (blood urea and serum creatinine), plasma glucose and hemoglobin. The results were recorded in the questionnaire.

Demographic and socioeconomic data

Data regarding socioeconomic status like occupation, marital status, education, family size, family type, monthly family income and physical activity was collected by interviewing them. The responses were recorded in the questionnaire.

Dietary assessment

For dietary assessment, each patient was interviewed for the consumption of all foods and beverages using 24-hour dietary recall in hospital and food frequency questionnaire. The responses were recorded on the questionnaire. The portion sizes of foods consumed by each patient were converted into percent carbohydrates, fats, proteins and kcal by using USDA food composition Table.

Analysis of data

The data were compiled from the questionnaire and fed into the Microsoft excel version 2010. Data was then analyzed in SPSS-16 for frequencies, mean, standard deviation and percentage.

RESULTS AND DISCUSSIONS

A hospital based study was conducted on 101 hospitalized patients with cardiovascular diseases without any age limit. The cases included were those registered with Ischemic Heart disease, Myocardial Infarction, Atrial septal Defect, Ventricular Septal Defect, Valvular disease, Angina pectoris and Dilated Cardiomyopathy. Data regarding personal, socioeconomic, demographic, anthropometry, clinical, biochemical and dietary intake was collected from the respondents. Effect of age, anthropometry, dietary intake pattern, education, gender, hypertension, physical activity, smoking and diabetes were measured on the occurrence of cardiovascular disease.

Table-1 represents the distribution of cardiovascular disease among patients. Majority of the patients suffered from coronary artery disease or ischemic heart disease (66.34), myocardial infarction (26.73%) and angina pectoris (20.79%). Tetrology of fallot, infective endocarditis and dialated cardiomyopathy each was found among 0.9% of the patients. Valvular disease such as mitral stenosis, mitral regurgitation, atrial stenosis, atrial regurgitation, etc was found among 17.82% of the patients. 12.6% of the worldwide deaths were estimated to be the result of IHD (Beaglehole, 2004).

Table-1. Distribution of different CVDs among patients.

Types of CVD	**Frequency** (%)
Coronary artery disease (IHD)	67 (66.34)
Myocardial Infarction	27 (26.73)
Angina pectoris	21 (20.79)
Valvular disease	18 (17.82)
Ventricular septal defect	6 (5.94)
Congestive cardiac failure	6 (5.94)
Rheumatic heart disease	5 (4.95)
Acute coronary syndrome	4 (3.96)
Atrial septal defect	2 (1.98)
Stroke	2 (1.98)
Dialated cardiomyopathy	1 (0.9)
Tetrology of fallot	1 (0.9)
Infective endocarditis	1 (0.9)

The general characteristics and anthropometric measurements of all CVD patients are shown in Table-2. The table shows that the mean weight and height of the patients was 64.3 Kg and 162.1 cm, respectively. The mean BMI was 24.2 Kg/m^2 ± 5.3 which fall within the normal reference range according to WHO (1995) cutoff points. The value of BMI i.e., 24.2 Kg/m^2 although falling in normal range but shows that the patients are at risk of

being overweight and overweight has been regarded as a risk factor for hypertension and CVD as reported by Wilson *et al*., (2002).

Table-2. Anthropometric measurements of all CVD patients. (Mean ± SD).

Variables	Mean ± standard deviation
Age	52.7 ± 16.5
Height	162.1 ± 11.97
Weight	64.3± 16.4
BMI	24.2 ± 5.3

Gender based distribution of cardiovascular disease patients is presented in Table-3 and Figure-1. As evident from the Table there were 65 males and 36 females reported with CVD. The male CVD patients' percent was 64.4% and that of female CVD patient's was 35.6%. The result was found to be consistent with Lowler *et al*. (2001) who reported that CVD prevalence, incidence, and mortality rates are found to be greater for males than for females. The difference in gender difference was because of the protective effect of estrogen on the development of CVD risk factors such as hypertension and dyslipidemia (Regitz-Zagrosek, 2006).

Table-3. Gender base distribution of CVD patients.

Gender	Frequency	Percentage (%)
Male	65	64.4
Female	36	35.6
Total	101	100

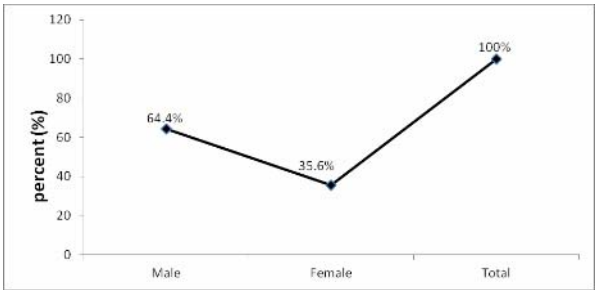

Figure-1. Gender base distribution of CVD patients.

Table-4 shows risk factors of CVD among cardiovascular disease patients. Hypertension was found in 74.3%, diabetes in 37.6% and genetic factor in 41.6% of the patients. 67.3% of the patients were using saturated fat in the form of ghee. 86.1% of the patients were physically inactive and 10.9% of the patients were found to be smokers. Hypertension has been found to be a major risk factor for cardiovascular diseases as it causes vascular injury and stress to myocardium. (Castelli, 1984; Nelms, 2003). Vascular disease is typically increased twofold in diabetic men and threefold in diabetic women (Wilson, 1998). Family history has also been regarded as a strong risk factor for CVD. (Nelms, 2003). Many epidemiological studies have shown that low physical activity is a strong and independent risk factor for both cardiovascular disease (CVD) and all-cause mortality (Andersen, 2000).

Table-4. Risk factors of CVD.

Risk factors	Yes (%)	No (%)
Hypertension	74.3	25.7
Diabetes	37.6	62.4
Smoking	10.9	89.1
Genetic factor	41.6	58.4
Saturated fat (ghee)	67.3	23.7
Physical activity	13.9	86.1

Educational status of CVD patients is presented in Table-5, Figure-2. It is clear from the table that there is positive association between education and health. Among 101 patients 43.6% were illiterate, 7-9%, 13.9%, 7.9% and 13.9% belong to primary, middle, matriculate and higher level of education. Only 18.8% of the patients were graduated. Similar results were demonstrated by Catherine and Chia-ling (1995) who concluded that high educational attainment improves health directly, and it improves health indirectly through work and economic conditions, social-psychological resources, and health lifestyle.

Table-5. Education level of the clients.

Education level	Percentage (%)
Illiterate	43.6
Primary	7.9
Middle	13.9
Matriculated	7.9
Secondary	9.9
Graduate	8.9
Post-Graduate	7.9

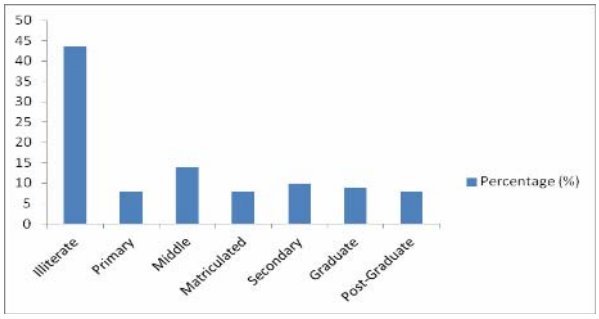

Figure-2. Educational status of CVD patients.

The general pattern of consumption and recommended intake of carbohydrates, fats, protein and energy of the patients has been shown in Table-6. It shows the difference in the actual intake of the patient and the recommended intake for the patient. The daily mean caloric intake was 879.7±431.3Kcal/day while mean recommended caloric requirement was 1641.2±287 Kcal/ day. It means patients were consuming only 53.6 % of the recommended caloric intake. The daily carbohydrate intake was 152.4±74.4 g/day while the recommended intake is 205.2±35.9 g/day. It means they were consuming 74.26% of the recommended carbohydrate. The fat intake was 14.4±11.5 g/day while the recommended fat intake was 54.7±9.6 g/day. So they were taking only 26.3% of the recommended fat intake. Their recommended protein intake was 82.1±14.4 g/day and their consumption of protein was 32.3±20.9 g/day that is only 39.3% of recommended protein.

Table-6. Dietary measurements of CVD patients.

Nutrients	**Actual intake** (Mean ± SD)	**Recommended intake** (Mean ± SD)	**% Recommended intake**
CHO(g)	152.4±74.4	205.2±35.9	74.26%
Protein(g)	32.3±20.9	82.1±14.4	39.3%
Fats(g)	14.4±11.5	54.7±9.6	26.3%
Energy(Kcal)	879.7±431.3	1641.2±287	53.6%

Frequency of variables using food frequency questionnaire is presented in Table-7. Food frequency questionnaire represents the long term dietary intake pattern of an individual. The food intake in the table represents the number of times patients ate a particular food. Maximum patients consume certain food daily which include fruits (86), vegetables (74), Nan (88) and Chapatti (46). Fish and desserts are mostly consumed on monthly basis. Beef, bakery, milk and paratha are also consumed mostly on daily basis. While the frequency of other food items vary greatly.

Table-7. Food frequency questionnaire.

Variables	**1 time/week**	**2 time/week**	**3 time/week**	**Daily**	**Monthly**	**Never**
Milk	2	11	7	29	1	43
Legumes	18	34	15	7	4	7
Rice	19	12	18	16	5	18
Beef	13	11	11	24	1	33
Mutton	14	21	15	11	8	30
Chicken	24	25	19	8	3	9
Fish	13	12	0	1	44	28
Chapatti	0	0	3	46	0	52
Paratha	2	1	4	26	2	63
Nan	0	0	0	88	0	12
Vegetables	4	7	6	74	1	2
Fruits	1	0	4	86	0	0
Bakery	8	12	17	28	6	20
Desserts	38	7	0	0	37	19
Yoghurt	3	9	10	48	1	18

The relationship between CVD and diet is one of the most studied relationships in epidemiology. Fung *et al*., (2009) supported that traditional Mediterranean dietary pattern is protective against CVD which is characterized by an abundance of fruits, vegetables, whole grain cereals, nuts, and legumes; olive oil as the principal source of fat; moderate consumption of fish and lower consumption of red meat (beef and mutton). From the table it is clear that most of the patients consume fruits and vegetables on daily basis which is advised for heart health. Not only a

single factor but a combination of food factors is responsible for causing CVD such as beef and mutton having high content of saturated fats, paratha made of saturated fat, bakery and desserts which are sugar and fat sources are restricted from the diet of CVD patients. While fish advised twice a week as a good source of omega-3 fatty acids but patients are not consuming it on weekly basis. (Nelms, 2003).

Table-8 shows that biochemical and clinical status of the patients shows that the level of serum electrolytes such as sodium, potassium, chloride and bicarbonate fall within the normal range. Mean hemoglobin level of the male patient was 11.56 ± 2.48 which is well below the normal range while that of females was slightly lower than the normal. Fasting blood glucose and pulse rate were normal. The diastolic blood pressure (78.6±14.37) was normal while systolic blood pressure (130.88 ± 24.00) was higher than the normal range.

Table-8. Biochemical and clinical status.

Parameters		**Mean ± SD**	**Normal levels**
Hemoglobin (g/dl)	**Male**	11.56 ± 2.48	14-18
	Female	11.78 ± 1.85	12-16
Sodium (mmol/l)		126.52 ± 37.71	135-147
Potassium (mmol/l)		3.75 ± 1.19	3.5-5
Chloride (mmol/l)		94.07 ± 28.10	95-105
Bicarbonate (mmol/l)		22.09 ± 7.57	22-30
Fasting blood glucose (mg/dl)		110.5 ± 81.74	90-130
Pulse rate (bpm)		93.04 ± 21.087	60-100
BP diastolic (mmHg)		78.6 ± 14.374	60-79
BP systolic (mmHg)		130.88 ± 24.00	90-119

CONCLUSIONS

The study concludes that the prevalence of diabetes and hypertension was higher among the patients which increased the risk for the occurrence of CVD. CVD was more prevalent among males than females. Most of the patients were at risk of overweight. Maximum of the patients had sedentary lifestyle. The consumption of the saturated fats was also high and CVD was found to be more common in people with positive family history of CVD. The study also concluded that there was a significant gap between the macronutrient intakes of the patient at RMI so, immediate measures must be taken to fill the gap.

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