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Sex differences in nutritional status and associated risk factors among cardiovascular disease (CVD) patients in Lahore, Pakistan; a cross-sectional descriptive study

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Abstract

Objective: To explore sex differences in cardiovascular disease (CVD) related risk factors such as diabetes, hypertension, and demographic, anthropometric, biochemical, clinical, and nutritional differences among 40-60 years old Pakistani CVD patients.

Design: This was a cross-sectional, descriptive study.

Setting: The present study was conducted at the Mayo/King Edward Medical University (K.E.M.U) Hospital Cardiology Department (CCU-I & CCU-II), Lahore, from February 2020 to June 2020. A self-administered questionnaire was used for data collection.

Participants: A random sample of 300 cardiac patients was included in the study. Patient records, food frequency questionnaire and 24-hour dietary recall was used to solicit information about demographic, anthropometric, biochemical, and clinical measurements; dietary intake parameters; and CVD risk factors such as hypercholesterolemia, hypertension, diabetes, and smoking.

Results: Men CVD patients had higher BMI (33.43 kg/m^2 vs. 28.69 kg/m^2) and higher prevalence of hypertension (81.1% vs. 59%), hypercholesterolemia (82.4% vs. 54.5%) and smoked more cigarettes (72.6% vs. 9%) as compared to women while there was higher prevalence of diabetes among women as compared to men (59% vs. 29.4%). There were 85% women vs. 80% men consuming white bread, while half of the men reported using meat daily, as compared to only 16.6% women. There were 51.5% women and 17% men who reported consuming fruits and vegetables daily. There were 40% men and 16% women who reported consuming soft drinks.

Conclusion: The study showed significant sex differences in the nutritional status and risk factors of patients with CVD.

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Keywords: Cardiovascular Diseases, Sex differences, Pakistani, Dietary intake patterns

Introduction

Cardiovascular disease (CVD) is the leading cause of death, and approximately 80% to 86% of these deaths occur in low- and middle-income countries [1-6]. In developing countries, such as Pakistan, CVD is responsible for over 200,000 deaths per year. However, there is substantial variation in mortality rates according to sex, age, ethnicity, socioeconomic status (SES), and geographical location [5].

Thus, the role of diet in CVD prevention and treatment is indisputable. Numerous studies have emphasized the role of nutrients, foods, and dietary patterns in the prevention of CVD [7]. Due to urbanization, dietary patterns have shifted towards increased consumption of fat, added sugar, and animal foods with a decrease in the intake of fiber, thus increasing the incidence of non-communicable diseases, including CVDs, among South Asians [8]. The traditional Pakistani dietary pattern consists mainly of whole grains, rice, meat, and a variety of fruits and vegetables. Fish is not part of traditional dietary patterns, but is consumed largely in the coastal areas of Pakistan [9]. Lower rates of CVD mortality have been reported in people who consume whole grains, fruits, vegetables, and fish [7].

Previous studies have shown that unhealthy dietary patterns contribute to CVDs [10-12]. A Western diet, characterized by increased consumption of refined grains, sweets and desserts, sugary drinks, and deep-fried foods, has been associated with the development of CVD. Industrialization and urbanization in Pakistan

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have resulted in a lower intake of fruits, vegetables, and whole grains, and a higher intake of convenience foods, refined carbohydrates, and sugary drinks. The liberal use of saturated and trans fats in daily cooking, such as curry-based cuisines and extensive deep frying, along with lack of physical activity, is one of the profound features of Pakistani culture, thus leading to increased cholesterol levels [13]. In contrast, a Mediterranean dietary pattern that is rich in olive oil, fruits, vegetables, legumes, whole grains, and fish is considered healthy [12]. An adequate and balanced dietary intake can also reduce the occurrence of many risk factors for CVD, including hypertension, hypercholesterolemia, hyperlipidemia, obesity, and diabetes [14].

The concept of "risk factors for CVD was first coined by the Framingham Heart Study (FHS). The risk factors that can be controlled (modifiable) are high blood pressure, high blood cholesterol levels, smoking, diabetes, overweight or obesity, lack of physical activity, unhealthy diet, and stress. Those that cannot be controlled (conventional) are age (simply getting older increases risk), sex (men are generally at greater risk of coronary artery disease), family history, and race [15]. According to the Global Burden of Disease Report, 2013, 41% of the total Pakistani adult population are hypertensive, and 21% of them indulge in cigarette smoking [1]. According to National Health Survey of Pakistan, prevalence of central obesity is higher in women (42.2%) than men (14.7%). Obesity, hypertension, diabetes mellitus type 2 and hypercholesterolemia are important risk factors responsible for CVDs among the Pakistani population [16].

The control of CVD in Pakistan has had limited success, mainly due to insufficient research data available from studies conducted on the

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Pakistani population. Although sex is increasingly perceived as a key determinant of health and illness, sex-based studies in the field of nutrition are lacking. Moreover, data on sex differences of the CVD patients in relation to the nutrition needs can help in developing targeted interventions. So keeping this need in mind, we have conducted a study with an objective to explore sex differences regarding nutritional status and CVD related risk factors among CVD patients in Lahore, Pakistan.

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Methods

This study was conducted in King Edward Medical University (KEMU) alternatively known as Mayo Hospital which is located in the heart of Lahore and provides free treatment to almost all admitted patients as part of a government policy. In Pakistan, Lahore is the second largest city of Pakistan with advanced health care facilities.

This cross-sectional study was carried out at the cardiology department of the Mayo Hospital. Patients come from all over Punjab province to Mayo/KEMU Hospital due to its location. A sample of 300 patients with coronary heart disease was randomly selected, comprising of both men and women.

Data collection

Data was collected for a period of five months (February 2020 to June 2020). A self-administered questionnaire (ABCD) was used to collect data from patients with CVD admitted to the hospital. The questionnaire consisted of the following parts.

Demographic and socioeconomic status

Data regarding demographic and socioeconomic status, such as age, residence, occupation, marital status, education, family size, family type, monthly family income, and physical activity, were collected using a self-administered questionnaire.

Anthropometric assessment

For anthropometric assessment, weight and height were measured according to the recommended WHO anthropometric procedures. Body weight (kg) was measured using a weighing scale. Height was

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measured using a measuring tape in centimeters. BMI was calculated by dividing the body weight in kilograms by the height in meters squared (weight (kg) / height (m^2).

Biochemical assessment

For biochemical assessment, data were obtained from the patients' hospital files and laboratory report values. The lipid profile included total cholesterol (TC), triglycerides (TG), blood glucose, hemoglobin (Hb), blood pressure (BP), blood urea, and serum creatinine values.

Clinical assessment

For clinical assessment, participants were examined clinically for signs of malnutrition, such as skin, hair, nails, teeth, and gums. Responses were recorded using a questionnaire.

Dietary intake

Dietary intake was assessed by 24 hour dietary recall and the Food Frequency Questionnaire (FFQ). For dietary assessment, each patient was interviewed for the consumption of all foods and beverages using a routine 24-hour dietary recall in the hospital. A total of 42 food items were determined and organized into seven main food groups: (a) cereals and grain products, (b) meat and meat products, (c) milk and dairy products, (d) vegetables, (e) fruits, (f) confectionary, and (g) beverages and fats. For easier administration, items within each food group were further grouped into smaller categories, based on similar food types. Food consumption frequency of each item was evaluated using six categories: (a) never, (b) 1 time per week, (c) two times per week, (d) three times per week, and (e) daily (f) monthly. Each food item in the FFQ was

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assigned a portion size using local household units, such as plates, bowls, and tablespoons.

Risk factors

CVD risk factors (hypercholesterolemia, hypertriglyceridemia, hypertension, diabetes, smoking, family history, saturated fat intake, and physical activity) with yes/no options were obtained from patient hospital files.

Ethical approval

This study was conducted in accordance with the Declaration of Helsinki guidelines. The study was completely anonymous, and each person was informed personally about the background of the study and asked for verbal consent. According to laws and regulations for scientific approval of a study, verbal consent is required and sufficient from those involved if the study is anonymous [(17)]. Ethical approval was obtained from the Medical Ethics Review Committee of the University of South Asia. The study approval number is USA/FLHS/2020/459. The study was approved in January 2020.

Statistical analysis

Data were recorded, collected, assessed, and analyzed using SPSS version 23. Descriptive statistics, such as frequencies, means, standard deviations, and percentages, were used to analyze the prevalence of CVD and related risk factors and to measure the intake of dietary items. An independent samples t-test was applied to observe differences in nutritional status based on sex. The chi-squared test was used to observe differences in CVD risk factors,

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such as hypertension, hypercholesterolemia, and diabetes, based on sex.

Results

Table 1 describes socio demographic data, wherein CVD prevalence was higher in men than women (78% vs. 22%). In the present study majority of CVD patients had urban backgrounds (87%) as compared to rural areas (13%). Among the occupational backgrounds, most of the CVD patients were involved in physically less active jobs (29.7% business, 25.3% government, 17% jobless). Among 300 CVD patients majority were (27.3%) illiterate, 8.7%, 23%, 7.7%, and 25% belong to primary, middle, matriculate, and secondary education. Only 7.3% of the patients were graduated, and 1% were post graduate. The mean family size/number of family members was 7.10 ±2.71. The mean monthly income of the families visiting this hospital was PKR 24,363 ±13,763.

Sex-based differences in anthropometric assessments of CVD patients are presented in Table 2. Regarding sex, significant differences were found in age. Mean age at MI (Myocardial Infarction) incidence in women was higher than men (54.56 vs. 51.11, p = 0.000). Sex differences in height and weight were also highly significant. Women tend to have lower height and weight as compared to men. A significant difference was found in the BMI between men and women. Men tended to have higher BMI than women (33.43 kg/m2 vs. 28.69 kg/m2).

Table 3 regarding sex differences in blood indices showed that total cholesterol (TC) was found significantly lower in women than men (195.49±63.17 vs. 237.84±55.95). Plasma triglycerides (TG) levels were also found to be lower in women as compared to men

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(195.10±53.31 vs. 220.61±79.69). The mean Hb level was lower in women than men (11.47±1.77 vs. 14.91±9.52) and majority of women were anemic (below 12g/dl). BP (Diastolic, Systolic) were found significantly lower in women than men (respectively; $p<0.005$). Blood Glucose was significantly higher in women than men (168.31±9.43 vs. 136.53±4.05 $p=0.000$).

Sex-based differences in clinical assessments of CVD patients are presented in Table 4. More men tended to be obese (66% vs. 43.9%) as compared to women. However, a significant difference was observed in the skin, hair, and nails between women and men. A higher percentage of women had dry, dull and pale complexion (69.6% vs. 35.4%), easily plucked hair (78.7% vs. 57.6%), and spoon shape (Koilonychia) nails (30.3% vs. 28.2%) as compared to men. Significantly higher percentage of men had bleeding, sponginess, pale gums than women (64.1% vs. 37.8%).

Sex-based differences in the dietary intake of CVD patients is presented in Table 5. They had similar fat intake, with no significant difference. However, carbohydrate and protein intake was significantly lower in women than in men. Women tended to consume less calories on average than men. The fluid intake was significantly lower in women than in men (5.15±1.47 verses 6.03 ±1.29, $p=0.000$).

Sex differences in the type of food consumed among CVD patients is presented in Table 6. No differences were found between the types of food consumed by women and men. The majority of patients consumed whole-grain flour, white bread, and whole-fat milk as shown in Table 6. Moreover, 24.3% of patients were consuming meat on daily basis. Regarding milk and milk products, 27% of the patients consumed whole milk daily. Wheat intake as a staple grain

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was 85.3% daily. Approximately 24.7% of patients were consuming fruits and vegetables on daily basis. In the dietary fat group, 46.3% patients reported ghee intake daily. Surprisingly, cooking in animal fat on daily basis was also used by some respondents (24.3%). The justification given by the patients was the flavor and taste to which they had been accustomed since childhood. Paratha intake on daily basis was very high (43 %), and oil was consumed by 40.3% patients daily. A high percentage of respondents were in a habit of consuming soft drinks (27.7%) and halwa puri (22.7%) on daily basis. Tikka (3.3%), pakora/samosa (3.7%) and cakes and pastries (3%) intake was low on daily basis and were consumed as snack item**.** Samosa/pakora is a deep-fried savory product that is quite popular in Pakistani dietary culture.

Table 7 shows the frequency of food consumption among women. There were 75.5% women consuming cereals and grains on daily basis. The was high intake of ghee (47%), paratha (42.4%), and oil (33.3%) among women. In addition 34% women reported consuming fruits and vegetables daily. The meat intake was very low in women whereas only 16.6% women were consuming meat on daily basis.

Table 8 shows the frequency of food consumption among men with CVD. A large number of men (88%) were consuming cereals and grains on daily basis. There was high intake of ghee (46.1%), paratha (43.1%), oil (42.3%), and animal fat (40.5%). Almost half of the men were consuming soft drinks and halwa puri on daily basis. Vegetable and fruit intake was very low in menas only 17 % consumed vegetables and fruits on daily basis.

Table 9 shows sex differences in relation to CVD risk factors. There was no significant difference in hypertriglyceridemia, family history

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of CVD and intake of saturated fat intake. However, significant difference was noted in hypertension, hypercholesterolemia and smoking. Significantly higher percentage of men had hypertension (81.1% vs. 59%), hypercholesterolemia (82.4% vs. 54.5%) as compared to women. Moreover smoking was more common among men as compared to women (72.6% vs. 9%). Significantly higher percentage of women were diabetic (59% vs. 29.4%) and were involved in physical activity as household works (68.1% vs. 20.9%) as compared to men.

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Discussion

The aim of the present study was to explore sex differences in CVD-related risk factors such as diabetes, hypertension, and demographic, anthropometric, biochemical, clinical, and nutritional differences among 40-60 years old Pakistani patients with CVD. The current study revealed that the incidence of myocardial infarction (MI) was higher in men as compared to women, which is similar to the findings of Fazia and Asma [18] who reported that the 61% men and 39% women experienced MI in Khyber Pakhtunkhwa, Pakistan. The higher percentage of urban background was contrary to the findings of Akhtar and Asghar [19] who reported that higher number of of CVD patients (73.0%) belonged to rural backgrounds, as the present study was conducted in urban area. The results were in agreement with the findings of a study by Fazia and Asma [18], who reported that the majority of patients with CVD were involved in physically less active jobs according to the nature of the job and activity. The higher percentage of illiteracy was similar to the findings of Akhtar and Asghar [19] who reported 57.7% illiterate CVD patients in a study consucted in Swat, Pakistan. The mean family size in our study was less than that of Nazli [20] which was 7 instead of 8. The mean income in our study was higher than the findings of previous studies, which reported a mean income of Rs. 8610 [19,20]. The findings of marital status, family type, and meal pattern were identical to the findings of Fazia and Asma [18] who reported that majority of CVD patients were married (61%), belonged to the extended or joint family (71%), and had a regular meal pattern (57%).

Results of sex differences in anthropometric assessment were in agreement with the findings of Fazia and Asma [18] who reported

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that women with CVD tend to have a higher mean age for MI incidence than men and lower height, weight, and BMI than men. Parallel findings regarding hypertension have also been reported in previous studies [21, 22], where the values of hypertension (systolic and diastolic) were higher in men than in women which is in accordance with our study. The findings of sex differences in plasma cholesterol and triglyceride levels were in accordance with the findings of Ishili [23] that the values of triglyceride and cholesterol were higher in men than in women. The present study showed low Hb levels in women, supported by the previous studies [24, 25] which showed that women had mean Hb levels approximately 12% lower than men. A similar finding comes from an Italian study [22] in which women were found to have higher blood glucose levels than men. The present study revealed that a higher percentage of women CVD patients had dry, dull pale complexion, easily plucked hair, and spoon-shaped nails as compared to men, depicting a stronger evidence of macronutrient (protein) and micronutrient deficiencies, most importantly of dietary iron in women. As evident from the biochemical assessment, the mean Hb level in female was 11.4 (below the normal range), and they were anemic. Previous studies [26] have shown that signs of anemia include loss of normal color of the skin, lips, tongue, and nails. Even after the implementation of different programs for controlling iron deficiency anemia, the magnitude of the problem is still higher in women than in men. It has been estimated that approximately one-third of the adult male global population smokes. The present statistics showed that a higher percentage of male patients had bleeding, sponginess, and pale gums than women due to smoking. Clinical and epidemiological studies support the concept that tobacco use is an

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important variable affecting the prevalence and progression of periodontal disease [27, 28].

Additionally, the present study provides more evidence on sex disparities with respect to energy and macronutrient intake. The findings were consistent with the results of the latest (2020) study [29] that men consumed more dietary energy, protein, carbohydrates, and fluids than women ($p < 0.001$). The results regarding fluid intake were also identical to those of the previous studies. Our analysis demonstrated significant differences in food consumption between men and women with CVD, as evident from previous studies [30, 31] that a higher proportion of men reported eating meat and certain types of poultry compared to women, whereas a higher proportion of women ate fruits and vegetables.

The results of our study showed that there was higher prevalence of hypertension among men as compared to women and these sex disparities in hypertension status were already evident among men and women from study by Bethany and Anna [32] that women were far less likely to be hypertensive compared to men. Hypercholesterolemia is more prevalent in men with CVD than in women with CVD, as is evident from previous researches [23]. Diabetes mellitus was more prevalent among women than men (8.3% vs. 7.2%). Type II diabetes mellitus imparts a greater risk of CVD in women than in men and is not explained by differences in risk factors but rather by the more favorable survival rate of women (than men) without diabetes mellitus [33]. Generally, men tend to use all tobacco products at higher rates than women do. In 2015, 16.7 percent of adult men and 13.6 percent of adult women smoked cigarettes, supporting the present statistics of smoking among patients [34, 35]. Recent studies have concluded that domestic physical activity accounts for 35.6% of the reported moderate to vigorous

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physical activity (MVPA), and women reported higher levels of domestic MVPA than their male counterparts. Thus, this evidence supports the findings of the present study regarding physical activity [36].

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Limitations

One of the limitations of this study is that the dietary assessment was self-reported by the patients and attendants. Recall bias may be an issue. It may be a food preference rather than what they actually ate on the days before the interview. Forgetting, deliberate misreporting, and the need for a trained observer were limitations of this study.

Another limitation is the sample size and selection bias, as there were more men than women in this study.

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Conclusion

Our study showed that there are significant sex differences regarding CVD related risk differs and dietary intake between Pakistani women and men. These differences were also manifested in anthropometric assessment, blood indices and clinical manifestations. There was a high prevalence of CVD related risk factors, such as hypertension and hypercholesterolemia, among men as compared to women, while women had a higher prevalence of diabetes than men. Women generally had healthier dietary patterns such as increased intake of fruits and vegetables as compared to men, while men had a higher intake of trans fat as compared to women.

Recommendations

Future research can focus on defining and adding sex-related indicators to the current risk assessment and management strategies. Evidence-based practices regarding sex differences should be used to recommend nutritional interventions at both the population and individual levels to reduce CVD risk. This knowledge should be translated into policies that promote healthy diets and discourage unhealthy diets in CVD patients**.** This requires coordinated action at the level of governments, international organizations, civil society, and responsible sections of the food industry.

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Competing interests:

The authors declare that they have no conflict of interest. The authors have no financial or non-financial interests related to the publication of this study.

Authors contributions:

AF conceptualized this study. AF, QR, RB, and UF carried out data collection and analysis, helped in developing the questionnaire, and wrote the paper. SI gave his intellectual input into the conceptualization of the paper, data collection, and data analysis, and commented on the paper during all stages. All authors have read and approved the final manuscript.

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Table 1: Socio-demographic characteristics of CVD patients

Parameters		Frequency (n=300)	Percentage (%)
Sex	Women	66	22
	Men	234	78
Residence	Rural	39	13
	Urban	261	87
Occupation	Jobless	51	17
	Skilled/Unskilled Laborers	50	16.7
	Business	89	29.7
	Government	76	25.3
	Private	34	11.3
Marital Status	Married	287	95.7
	Single	13	4.3
Education	Illiterate	82	27.3
	Primary	26	8.7
	Middle	69	23
	Matriculated	23	7.7
	Secondary	75	25
	Graduate	22	7.3
	Post-Graduate	3	1
Family Type	Joint	156	52
	Nuclear	144	48
Meal Pattern	Irregular	30	10
	Skipping	144	48
	Regular	156	52
		Mean ± SD	
Family Size		7.10 ±2.71	
Monthly Family Income		Rs.24, 363 ±13,763	

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Table 2: Sex difference in age and anthropometric assessment of CVD patients

Parameters	Mean ± Standard Deviation (SD)		T-Test (P-value)
	Women	Men	
Age (years)	54.56±6.00	51.11±6.30	3.96(0.000)
Height (inches)	61.2±0.31	67.2±0.28	-11.89 (0.000)
Weight (kg)	73.56±10.95	80.20±10.96	-4.34 (0.000)
BMI (kg/m^2)	28.69±3.94	33.43±19.58	1.95 (0.05)

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Table 3: Sex difference in biochemical assessment of CVD patients

Blood Indices	Mean ± Standard Deviation (SD)		T-Test (P-value)	Normal ranges
	Women	Men		
Total Cholesterol (TC) (mg/dl)	195.49±63.17	237.84±55.95	-5.28 (0.000)	Up to 200 mg/dl
Triglycerides (TG) (mg/dl)	195.10±53.31	220.61±79.69	-3.05 (0.003)	Up to 150 mg/dl
Pulse Rate (bpm)	84.01±14.24	83.86±13.78	0.78 (0.93)	60-100 bpm
Blood Glucose (mg/dl)	168.31±9.43	136.53±4.05	3.58 (0.000)	74-140mg/dl
Hemoglobin (g/dl)	11.47±1.77	14.91±9.52	-2.91 (0.004)	F-12.0-15.5 g/dl M-13.5-17.5 g/dl
Blood Urea (mg/dl)	35.54±26.7	32.11±12.62	1.47 (0.14)	10-50 mg/dl
Serum Creatinine (mg/dl)	1.36±2.25	1.09±0.82	1.45 (0.14)	0.6-1.4 mg/dl

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BP Diastolic (mmHg)	**86.16±16.90**	**94.02 ±18.35**	**-3.12 (0.002)**	**60-80 mmHg**
BP Systolic (mmHg)	**143.60 ±24.52**	**155.22±25.77**	**-3.26 (0.001)**	**90-120 mmHg**

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Table 4: Sex difference in clinical assessment of CVD patients

Clinical Signs		Women N (%)	Men N (%)	X2 (P-value)
Weight	Normal Weight	5 (7.5%)	44 (10%)	12.6 (0.006)
	Under Weight	2 (3%)	3 (1.2%)	
	Over Weight	83 (45.4%)	15 (22.7%)	
	Obese	29 (43.9%)	155 (66%)	
Skin	Pinkish, Moist, Fresh	20 (30.3%)	151(64.5%)	24.6 (0.000)
	Dry, Dull, Pale	46 (69.6%)	83 (35.45%)	
Hair	Lustrous, Shiny	14 (21.25%)	99 (42.3%)	9.7 (0.002)
	Dry, Easily Plucked	52 (78.7%)	135 (57.6%)	
Teeth (Gums)	Well Formed, Teeth, Pinkish	41 (62.1%)	84 (35.8%)	14.5 (0.000)

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	Bleeding, Spongy Gums	**25 (37.8%)**	**150 (64.1%)**	
Nails	**Well Formed, Pinkish**	**20 (69.6%)**	**168 (71.7%)**	**37.8 (0.000)**
	Pale, Spoon Shape (Koilonychia)	**46 (30.3%)**	**66 (28.2%)**	

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Table 5: Sex difference in dietary intake of CVD patients

Nutrients	Mean ± Standard Deviation (SD)		T-Test (P-value)
	Women	Men	
CHO (g)	187.28± 79.06	233.52±120.7	-2.93 (0.004)
Protein (g)	55.51±15.07	71.21±32.73	-5.54 (0.000)
Fats (g)	65.81±33.50	72.10 ±31.8	1.40 (0.16)
Total Calories (Kcal)	1320.01±509.54	1536.83±522.42	-2.99 (0.003)
Fluid Intake (Glasses)	5.15±1.47	6.03 ±1.29	-4.74 (0.000)

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Table 6: Sex difference in type of food consumed among CVD patients

Type of food consumed				
Men	**Type of Flour**	**Whole Grain**	**White Flour**	**Mix Flour**
		138 (59%)	73 (31%)	23 (9.8%)
	Type of Bread	**White Bread**	**Bran Bread**	
		188 (80%)	46 (19.6%)	
	Type of Milk	**Whole Fat Milk**	**Low Fat Milk**	**Skimmed Milk**
		184 (78.9%)	36 (15.3%)	14 (1.7%)
Women	**Type of Flour**	**Whole Grain**	**White Flour**	**Mix Flour**
		42 (64%)	18 (27.2%)	6 (9%)
	Type of Bread	**White Bread**	**Bran Bread**	
		56 (85%)	10 (15%)	
	Type of Milk	**Whole Fat Milk**	**Low Fat Milk**	**Skimmed Milk**
		48 (73%)	15 (22.7%)	3 (4.5%)

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Table 7: Frequency of dietary intake based on food groups among women CVD patients

Food Items	1 Time/Week	2 Time/Week	3 Time/Week	Daily	Monthly	Never
Meat and Meat products	14	15	26	11 (16.6%)	0	_
Milk and Milk products	11	15	18	21 (31.8%)	1	_
Cereals and Grains	0	2	14	50 (75.7%)	_	_
Vegetables and Fruits	3	17	26	34 (51.5%)	0	_
Ghee	11	5	10	31 (47%)	8	1
Oil	3	14	14	22 (33.3%)	13	0
Animal Fat	21	7	11	18 (27.2%)	9	_

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Chappal Kabab	**26**	**13**	**1**	**3 (4.5%)**	**19**	**4**
Meat Karahi	**18**	**8**	**5**	**1 (1.5%)**	**30**	**4**
Tikka	**18**	**13**	**12**	**4 (6%)**	**13**	**6**
Soft Drinks	**16**	**13**	**6**	**16 (24.2%)**	**13**	**2**
Paratha	**7**	**9**	**15**	**28 (42.4%)**	**6**	**1**
Halwa Puri	**19**	**2**	**3**	**10 (15%)**	**27**	**5**
Samosa / Pakora	**18**	**2**	**6**	**19 (28.7%)**	**16**	**5**
Cakes/ Pasteries	**16**	**8**	**9**	**2 (3%)**	**21**	**10**

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Table 8: Frequency of dietary intake based on food groups among men CVD patients

Food Items	1 Time/Week	2 Time/Week	3 Time/Week	Daily	Monthly	Never
Meat and Meat products	27	16	64	119 (50.8%)	8	_
Milk and Milk products	34	71	65	60 (25.6%)	2	2
Cereals and Grains	1	4	23	206 (88%)	_	_
Vegetables and Fruits	19	77	83	40 (17%)	15	_
Ghee	17	15	34	108 (46.1%)	58	2
Oil	24	35	32	99 (42.3%)	41	3
Animal Fat	22	32	33	95 (40.5%)	51	1

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Chappal Kabab	**79**	**50**	**32**	**4 (1.7%)**	**64**	**5**
Meat Karahi	**88**	**36**	**22**	**5 (2.1%)**	**83**	**_**
Tikka	**75**	**62**	**46**	**6 (2.5%)**	**42**	**3**
Soft Drinks	**37**	**42**	**18**	**67 (41.5%)**	**33**	**7**
Paratha	**27**	**43**	**51**	**101 (43.1%)**	**10**	**2**
Halwa Puri	**36**	**12**	**14**	**108 (46.1%)**	**58**	**6**
Samosa / Pakora	**71**	**72**	**30**	**9 (3.8%)**	**47**	**5**
Cakes/ Pasteries	**68**	**59**	**27**	**7 (2.9%)**	**51**	**22**

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Table 9: Sex difference in relation to CVD risk factors among CVD patients in Lahore

CVD risk factors		Women N (%)	Men N (%)	X2 (P-value)
Hypertension	Present	39 (59%)	190 (81.1%)	13.9 (0.000)
	Absent	27 (40.9%)	44 (18.8%)	
Hypercholesterolemia	Present	36 (54.5%)	193 (82.4%)	22.2 (0.000)
	Absent	30 (45.4%)	41 (17.5%)	
Hypertriglyceridemia	Present	56 (84.8%)	194 (82.9%)	0.14 (0.7)
	Absent	10 (15.1%)	40 (17%)	
Diabetes	Present	39 (59%)	69 (29.4%)	19.5 (0.000)
	Absent	27 (40.9%)	165 (70.5%)	
Smoking	Present	6 (9%)	170 (72.6%)	85.7 (0.000)

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	Absent	**60 (90.9%)**	**64 (27.3%)**	
Family History	**Present**	**44 (66.6 %)**	**164 (70%)**	**0.28 (0.59)**
	Absent	**22 (33.3%)**	**70 (29.9%)**	
Saturated Fat	**Present**	**39 (59%)**	**131 (55.9%)**	**0.1 (0.7)**
	Absent	**27 (40.9%)**	**101 (43.1%)**	
Physical Activity	**Present**	**45 (68.1%)**	**49 (20.9%)**	**53.3 (0.000)**
	Absent	**21 (31.8%)**	**185 (79%)**	

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List of abbreviations

Sr. No.	Abbreviations	Descriptions
1.	CVD	Cardiovascular Disease
2.	FHS	Framingham Heart Study
3.	WHO	World Health Organization
4.	FFQ	Food Frequency Questionnaire