



## **Dietary habits and life style association with cardiovascular risk factors among patients with the critical coronary artery disorders**

**Mehreen Lashari<sup>1</sup>, Asif Ali<sup>2</sup>, Mehtab Alam<sup>3</sup>, Najeeb Ullah Mandokhail<sup>4</sup>, Farmanullah<sup>5</sup>, Muhammad Tahir<sup>6</sup>, Hidayat Ullah<sup>7</sup>, Tariq Shahzad Chachar<sup>8</sup>, Hameed Ur Rehman<sup>9\*</sup>.**

<sup>1</sup>Department of Biochemistry Demonstrator, Bolan Medical College Al Khair Medical Complex Zargoon Road Quetta.

<sup>2</sup>Department of Zoology and Biology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan

<sup>3</sup>Department of Biochemistry, Azad Jammu and Azad Kashmir Medical College Muzaffarabad.

<sup>4</sup>Directorate of Agriculture Research Zhob, Quetta.

<sup>5</sup>Department of Medical Lab Technology Abasyn University Peshawar.

<sup>6</sup>Department of Biochemistry, Hazara University, Mansehra, KP, Pakistan.

<sup>7</sup>Department of Advanced Institute of Medical Science Dalian Medical University China.

<sup>8</sup>Senior Resident Invasive Cardiology-Mohammed Bin Khalifa Bin Sulman Alkhalifa Cardiac Centre Bahrain.

<sup>9</sup>Department of Health & Physical Education Gomal University Dera Ismail Khan, KP, Pakistan.

\*Physical Education Teacher Government High School Teri Karak, KP, Pakistan.

### **ABSTRACT**

*Cardiovascular diseases are one of the fast emerging diseases worldwide. Many risk factors are involved in the prevalence of these disorders. One of the major factor is consumption of the junk food and lifestyle. Current study focused to evaluate the association between the dietary products and risk factor of heart diseases. Hospital based cross sectional survey was conducted in which 150 respondent participate after obtaining the oral consent. A questioner was designed to collect information about the physical activity and dietary behavior. Result revealed that majority of our respondent were male (n=80) and the mean age of the participant were (59.5 ± 11.0). Commonly observed risk factors were smoking particularly in male, high consumption of high calories food, abnormal blood glucose level (135.5 ± 52.0) hypertension (44%), elevated triglyceride (192.0 ± 55.5) and cholesterol (204.0 ± 42.6). And majority (53.33%) of the participant were involved in low physical activity (males were dominated). Besides this high consumption of bakery products are strongly associated with the cardiovascular diseases with Odd Ratio of 2.65 [0.25 - 1.8] (p=0.036\*). From the current studies it was concluded that dietary intake and low physical activities has high association with the cardiovascular diseases. But these behaviors can be modified accordingly to prevent risk of cardiovascular diseases.*

**Keywords:** Risk factors, cardiovascular diseases, Dietary intake, Physical activity

Received 21.08.2020

Revised 21.09.2020

Accepted 18.10.2020

### **INTRODUCTION**

Due to different cardiac disease ratio of mortality and morbidity has increases worldwide. These cardiac infection is due to physical inactivity, unhealthy diet, high consumption of alcohol, obesity, smoking and hypertension. Besides this major risk factor is hyperlipidemia that causes cardiovascular disease (CVD) [1,2]. Due to these issue WHO (world health organization) conclude that approximately 2 million deaths occur annually due to CVD and it will increase double fold up to 2030. Preventions of these risk factor is now one of the major challenge nowadays [3,4]. Many studies have been carried out about the association between dietary habits and CVDs like Sareban Hassan abadi suggested modification in the lifestyle including dietary habits which will prevent or decrease the risk of the CVD [5]. Besides this Oguoma conclude that high consumption of the alcohol along with the unhealthy diet double the risk of the cardiovascular infections [6]. Furthermore, study conducted by the Afshin showed that limited intake of

the fruits and whole grains increase the mortality rate in 11 countries due to cardio-metabolic diseases (CMD) [7]. Clustering of two or more habits like smoking, inactivity and adverse effect of the psychosocial factors significantly increases the risk of the CVD [8,9]. These factors are very important to assess because all of these activity leads to low HDL, high TG and obesity [10] therefore current study aimed to assess life style and dietary habits of Peshawar general population and to evaluate the risk of the CVD.

## MATERIAL AND METHODS

Cross sectional study was conducted in the cardiology department of Lady Reading Hospital (LRH) Peshawar. After obtaining the oral consent, total of 150 patients diagnosed with CVD from both outpatient department and in patient department were included while those who don't have any CVD, pregnant and lactating women are excluded from the study. Questioner was designed to collect data from the subjects related to demographic status, medical history, tobacco use or smoking and anthropometric measurement like height, weight, Body mass index (BMI), waist circumference and Blood pressure. Besides other lifestyle like dietary intake and physical activities like poultry meat, fruits legumes, vegetables, fish and physical activity includes no physical activity, moderate or vigorous etc. using yale physical activity survey [11].

### Hematological analysis

**Sampling of the Blood:** Blood samples were collected from each individual (fasting from 12 to 14 hours) according to the standard protocols of venipuncture technique. After collection of the blood, these samples were transfer to the already distinctly labeled tubes that is for glucose analysis 2ml in sodium fluoride potassium oxalate tube while 6 ml gel tube for the lipid profile. Then these samples were carried to the laboratory in the icebox within 2 hours of the sampling.

**Laboratory procedure:** Tubes were centrifuge at 2500-3000 rpm for 15 minutes and then plasma and serum were separated from the sodium fluoride-potassium oxalate tubes by transferring into new sterile aliquots. Then the biochemical parameters were estimated by using analyzer Microlab 300. Further enzymatic method was used to evaluate the plasma blucoseconcent ratio, cholesterol, triglycerides, high density lipoprotein-cholesterol (HDL-C), and low density lipoprotein-cholesterol (LDL-C).

**Statistical analysis:** Findings were statistically examined using SPSS software version 21. Further descriptive analysis was used to analyze risk factors including life style and dietary intake. Variables that are continuous are mentioned as mean SD (standard deviation) while categorical variables are presented as percentage. To evaluate the factors among female and male chi-square and t-test was used. Multivariate binary logistic regression was used to assess the association among the physical activity and dietary intake with the cardiovascular diseases and odd ratio (OR). (Significance value  $p \leq 0.05$ ).

## RESULTS

Total of 150 subjects suffering from the cardiovascular diseases, were selected in which 80 were male and 70 were female. Age of the subjects were ranged in 30 to 85 years. 66.6% of subjects were married. Most (22.2%) of our subjects were intermediate pass while very few were metric pass. Majority (69.33%) of patients were from Khyber Pakhtunkhwa. Besides this most of the patient were suffering from the diabetes either diagnosed earlier (46%) or recently (45%). Further most (66%) of the patient were diagnosed with the hypertension previously. 49.33% of the subjects were not smokers and very few of them were passive smokers. Most (66.33%) of the patients were not using tobacco. Table 1 shows the detail of the patients.

Table 1: General information and medical history of the patients

Characteristics	Male	Female	Total	p-value
<b>Marital Status</b>				
Married	60	40	100 (66.6%)	
Single	10	15	25 (16.6%)	0.124
Widow/widower	12	13	25 (16.6%)	
<b>Education</b>				
Illiterate	15	15	30 (20%)	
Matric	13	15	28 (18.66%)	0.831
Intermediate	16	18	34 (22.66%)	
Undergraduate	15	10	25 (16.66%)	
Graduate	15	18	33 (22%)	
<b>Ethnicity</b>				
Punjabi's	2	8	10 (6.6%)	
Sindhi	1	2	3 (2%)	

Balochi	1	0	1 (0.66%)	
Khyber Pakhtunkhwa	59	45	104 (69.33%)	
Muhajir	15	1	16 (10.66%)	
Others	12	4	16 (10.66%)	
<b>Incidence of Diabetes</b>				
Previously Diagnose	52	18	70 (46.66%)	
Recently Diagnose	54	14	68 (45.33%)	0.773
No history of Diabetes	12	0	12 (8%)	
<b>Incidence of Hypertension</b>				
Recently Diagnose	12	18	30 (20%)	0.698
Previously Diagnose	54	12	66 (44%)	
No history of HTN	50	4	54 (36%)	
<b>Smoking</b>				
Often	40	1	41 (27.33%)	
Passive Smokers	20	5	25 (16.66%)	
Ex-Smoker	10	0	10 (6.6%)	<0.001
No smoking	10	64	74 (49.33%)	
<b>Tobacco Chew</b>				
No	100	0	100 (66.66%)	<0.001
Yes	50	0	50 (33.33%)	

Further result of the cardiovascular risk factors revealed that high BMI was recorded that is majority of the subjects were more than 30kg/m<sup>3</sup>. Most of the subjects were with greater than greater than 80cm in female while few of the male were with greater than 90cm. besides this most of the patient were with high systolic blood pressure that is greater than 30mmHg. Reduced HDL concentration was recorded while high triglycerides were prevalent among most of the patients. Detail of the biochemical analysis of the blood and anthropometric measurement is given in the table 2 below.

Table 2: Blood analysis and anthropometric measurement of the patients

Risk Factors	Male	Female	Total	P-value
<b>Age</b>	(20.0 ± 11.0)	(58.0 ± 21.0)	(59.5 ± 11.0)	M: 0.452
31- 40 years	12	14	26	
41- 50 years	55	12	67	
51 - 60 years	16	18	34	F: 0.568
61 - 70 years	7	8	15	
71 - 80 years	2	6	8	
<b>Body Mass Index (BMI) (Kg / m<sup>2</sup>)</b>	30.0 ± 5.0	31.0 ± 8.0	30.5 ± 6.5	M: 0.29
> 30 Kg/m <sup>2</sup>	60	20	80	
< 30 Kg/m <sup>2</sup>	48	22	70	F: 0.156
<b>Waist Circumference (cm)</b>	104.5 ± 17.5	95.8 ± 19.6	99.1 ± 18.4	M: 0.002
> 90 cm in male &> 80 cm in female	20	60	80	F: 0.243
< 90 cm in male &< 80 cm in female	40	30	70	
<b>Systolic Blood Pressure (mmHg)</b>	160.0 ± 17.0	151.0 ± 21.5	155.5 ± 19.2	
> 130 mmHg	25	55	80	0.001
< 130 mmHg	40	35	70	0.035
<b>Diastolic Blood Pressure (mmHg)</b>	102.2 ± 7.6	106.1 ± 14.6	104.1 ± 11.1	
> 85 mmHg	50	30	80	0.314
< 85 mmHg	45	25	70	0.0185
<b>Fasting Blood Glucose (mg/dl)</b>	143.0 ± 41.0	128.0 ± 53.0	135.5 ± 52.0	
> 100 mg/dl	12	45	57	0.459
< 100 mg/dl	75	18	93	0.505
<b>Fasting Cholesterol (mg/dl)</b>	201.0 ± 39.3	209.0 ± 48.0	204.0 ± 42.6	
> 200 mg/dl	45	50	95	0.324
< 200 mg/dl	30	25	55	0.214
<b>Triglycerides (mg/dl)</b>	184.0 ± 52.0	202.0 ± 59.0	192.0 ± 55.5	
> 150 mg/dl	40	50	90	0.254
< 150 mg/dl	40	20	60	0.369
<b>HDL - C (mg/dl)</b>	30.7 ± 6.6	31.5 ± 6.4	31.1 ± 6.5	
> 40 mg/dl in male &> 50 mg/dl in female	40	15	55	0.235
< 40 mg/dl in male &< 50 mg/dl in female	35	60	95	0.365
<b>LDL - C (mg/dl)</b>	127.4 ± 37.0	130.0 ± 34.3	128.7 ± 35.6	
> 100 mg/dl	50	35	85	0.245
< 100 mg/dl	20	45	65	0.148

Very less amount of the subjects was involved in the vegetable consumption while most of the patient consume large amount of the farm chicken and red meat per week. besides this, different lifestyle behaviors like physical activity or dietary intake is depicted in the table 3 below.

Table 3: Dietary habits and other life style behaviors

Dietary Habits	Male	Female	Total	P-value
<b>Vegetables and Fruits per week</b>				
Rarely	20	20	40	0.125
Mostly	23	15	38	
No intake	56	16	72	
<b>Dairy Products per week</b>				
Rarely	20	30	50	0.697
Mostly	20	40	60	
No intake	20	20	40	
<b>Red Meat per week</b>				
Rarely	20	30	50	0.048
Mostly	36	25	61	
No intake	18	21	39	
<b>Farm Chicken per week</b>				
Rarely	20	25	45	0.469
Mostly	30	50	80	
No intake	23	2	25	
<b>Fish per week</b>				
Rarely	20	30	50	0.476
Mostly	24	45	69	
No intake	12	19	31	
<b>Nuts &amp; Legumes per week</b>				
Mostly	12	52	64	
Rarely	30	20	50	0.587
No intake	21	15	36	
<b>Fast Food per week</b>				
Rarely	50	20	70	0.617
Mostly	20	30	50	
No intake	12	18	30	
<b>Sweet Beverages per week</b>				
Rarely	50	20	70	0.24
Mostly	20	25	45	
No intake	10	25	35	
<b>Physical Activity Level</b>				
Low Physical Activity	45	35	80 (53.33%)	
Moderate Physical Activity	25	20	45	0.238
Vigorous Physical Activity	10	12	22	
Sedentary Lifestyle	3	0	3	

Regression analysis of the findings shows that bakery products are significantly involved in the increase WC (OR) besides this use of farm chicken was found lesser associated with the. All other detail is given in the table below.

Table 4: Regression Analysis (association between dietary products and CVD risk factors)

	OR [95% CI]	P-value	OR [95% CI]	P-value	OR [95% CI]	P-value
	<b>BMI &gt; 30 Kg/m<sup>2</sup></b>		<b>DBP &gt; 85 mmHg</b>		<b>Triglycerides &gt; 150 mg/dl</b>	
Vegetables & Fruits	1.13 [0.57 - 2.38]	0.763	2.13 [0.58 - 2.28]	0.863	0.23 [0.45 - 2.28]	0.753
Bakery Products	0.75 [0.32 - 1.4]	0.356	4.75 [0.42 - 1.5]	0.656	0.55 [0.45 - 1.5]	0.396
Red Meat	0.68 [0.28 - 1.55]	0.202	1.68 [0.38 - 1.25]	0.502	0.98 [0.39 - 1.25]	0.222
Chicken	0.89 [0.35 - 1.45]	0.713	0.99 [0.34 - 1.85]	0.413	0.49 [0.34 - 1.85]	0.743
Fish	0.92 [0.57 - 1.7]	0.826	0.82 [0.58 - 1.9]	0.626	0.92 [0.58 - 1.9]	0.876
Nuts & Legumes	1.34 [0.74 - 2.42]	0.306	0.34 [0.74 - 2.52]	0.406	1.44 [0.74 - 2.52]	0.366
Sedentary Lifestyle	0.91 [0.48 - 1.71]	0.787	4.91 [0.48 - 1.71]	0.687	0.91 [0.44 - 1.71]	0.777

	WC > 90/80 cm in	FBS > 100 mg/dl	HDL<40/50 in
	male/female		male/female
Vegetables & Fruits	0.23 [0.65 - 2.48]	0.463	1.53 [0.58 - 2.28]
Bakery Products	2.65 [0.25 - 1.8]	0.036*	0.25 [0.32 - 1.5]
Red Meat	0.88 [0.35 - 1.45]	0.102	0.67 [0.78 - 1.25]
Chicken	0.79 [0.41 - 1.75]	0.513	0.86 [0.54 - 1.85]
Fish	1.72 [0.32 - 1.4]	0.426	0.94 [0.48 - 1.9]
Nuts & Legumes	1.44 [0.75 - 2.42]	0.606	1.34 [0.84 - 2.52]
Sedentary Lifestyle	0.94 [0.96 - 1.51]	0.487	0.93 [0.78 - 1.71]
	SBP > 130 mmHg	Cholesterol > 200 mg/dl	LDL > 100 mg/dl
Vegetables & Fruits	0.53 [0.48 - 5.28]	0.163	2.13 [1.58 - 5.28]
Bakery Products	2.65 [0.32 - 4.5]	0.256	1.35 [0.44 - 1.5]
Red Meat	1.58 [0.48 - 5.25]	0.102	1.58 [0.28 - 1.25]
Chicken	0.79 [0.44 - 0.85]	0.013*	3.19 [0.39 - 1.85]
Fish	1.81 [0.68 - 4.9]	0.425	1.22 [0.57 - 1.9]
Nuts & Legumes	0.54 [0.44 - 5.52]	0.246	2.34 [0.71 - 2.52]
Sedentary Lifestyle	1.93 [0.68 - 4.71]	0.487	2.91 [0.45 - 1.71]

## DISCUSSION

Cardiovascular diseases are most prevalent but non-communicable disease worldwide. It is mostly associated with the dietary habits and life style that is physical activity. But these can be modified accordingly to prevent these diseases. Current study focused to assess the lifestyle and dietary habits of the local general population of Peshawar Pakistan in association with CVDs. And finding revealed that most of the respondent were male and most of them are recently diagnosed with the hypertension. This result can be compared to the other studies carried out in area of Tamil and Iranians, where most of the patient suffered from the CVD is also suffered with the hypertensions and most of them are male [12,13]. Besides this in current studies it was found that patient diagnosed with the CVD most of them were smokers whereas males were more dominant as compared with the female. Many studies before were carried out which clearly indicate that smoking enhance the intensity of the CVD especially those who also use tobacco along with normal smoking. [14,15]. Patient with CVD was also suffering from slight obesity which is clearly indicated from the mean BMI found in current studies. Apart from this high waist circumference in male was  $104.8 \pm 17.5$  cm while in female it was  $(95.8 \pm 19.6)$  cm. Similar result was also found by the Baranwalet *al* [16]. Systolic blood pressure in current studies of the patient was significantly higher which is also comparable with the study carried out in Shenzhen City of China, in which author concluded that patients suffered from the CVD have high systolic blood pressure [17].

Furthermore, glucose, total cholesterol and serum high density lipoprotein – Cholesterol (HDL-C) level of the cardiovascular diseases patient was significantly higher. Similar result was also found by other researchers in which they clearly mention high value of the glucose, total cholesterol and serum high density lipoprotein – Cholesterol (HDL-C). [18, 19]. These parameters are also associated with obesity, means that every person with elevated values of glucose, total cholesterol and serum high density lipoprotein – Cholesterol (HDL-C) also suffered with obesity. Regarding this in Africa Tylor *et al* (2010) carried out study and conclude that obesity is significantly associated with high values of triglycerides and LDL – C in 55 – 74 years of age group (ranging from 35 – 74 years of age) [20].

Result of the dietary habits in current studies revealed that most of the patients were involved in the high consumption of the chicken, red meat and fatty food stuff. In both type of respondent that is male and female, all food doesn't have significant association with the cardiovascular infection except for those which are good source of the fat. One of the researcher sun *et al* proposed four type of food models that is "traditional food pattern" which comprises fruits, rice vegetables pork's meat and fishes. Second model of the food is "fast food and processed food "contains synthetic sugar and sweets. 3<sup>rd</sup> model of the food is "soybean, grain, and flour food pattern" or dairy, animal liver, and other animal food pattern" many research has been carried out with these pattern of food and result revealed that consumption of the traditional food significantly reduces the cholesterol, decrease the blood pressure, fasting blood glucose level hence decrease the risk of cardiovascular diseases [21]

Low physical activity among the subjects were more frequent as compared to any other followed by moderate and vigorous while few have sedentary life style particularly in male. On the other hands female were found active and shows vigorous activities. Same result was found byBrugnara*et al* in which he concluded that females are more active as compared to male. And those who are diagnosed with diabetes or at risk of diabetes shows lesser activity as compared to other healthy person [22]. Furthermore, the

regression analysis shows that use of bakery products are significantly associated with the heart diseases. Verma et al reported that consumption of the sweet dishes and junk foods from the bakery products increases the risk of the CVD [23,24].

## CONCLUSION

From the current findings it was concluded that dietary products are significantly associated with the cardiovascular diseases particularly those diets which are high in calories. Besides this consumption of the chickens are weekly associated with the cardiovascular diseases. Apart from this it is important to evaluate the association of the vegetables with the CVD. Besides this it is very necessary to develop an appropriate and healthy eating pattern, in order to reduce risk of CVD in general population.

## REFERENCES

1. Lee I, Kim S, Kang H. (2019). Lifestyle Risk Factors and All-Cause and Cardiovascular Disease Mortality: Data from the Korean Longitudinal Study of Aging. *Int J Environ Res Public Health* ;16(17):3040.
2. Lacombe J, Armstrong ME, Wright FL, Foster C. (2019). The impact of physical activity and an additional behavioural risk factor on cardiovascular disease, cancer and all-cause mortality: a systematic review. *BMC Public Health*;19(1):900.
3. Bennett JE, Stevens GA, Mathers CD, Bonita R, Rehm J, Kruk ME, et al. (2018). NCD Countdown 2030: worldwide trends in non-communicable disease mortality and progress towards Sustainable Development Goal target 3.4. *Lancet*;392(10152):1072-88.
4. Chakma JK, Gupta S. (2017). Lifestyle practice and associated risk factors of noncommunicable diseases among the students of Delhi University. *Int J Health Allied Sci* ;6(1):20 5.
5. Sarebanhassanabadi M, Mirhosseini SJ, Mirzaei M, Namayandeh SM, Soltani MH, Pedarzadeh A, et al. (2019). Association between dietary habits and changes in cardiometabolic risk factors in patients with metabolic syndrome: a 10-year follow-up study. *Prog Nutr* ;21:348-58.
6. Oguoma VM, Nwose EU, Skinner TC, Richards RS, Bwititi PT. (2018). Diet and lifestyle habits: Association with cardiovascular disease indices in a Nigerian sub-population. *Diabetes Metab Syndr*;12(5):653-9.
7. Afshin A, Micha R, Khatibzadeh S, Fahimi S, Shi P, Powles J, Singh G, et al. (2015). The impact of dietary habits and metabolic risk factors on cardiovascular and diabetes mortality in countries of the Middle East and North Africa in 2010: a comparative risk assessment analysis. *BMJ Open* ;5(5).
8. Mehta S, Dhawan V. (2020). Lifestyle-Related Health Behaviors Associated with Cardiovascular Health in Adolescents: A Stairway to Healthy Future. *EC Cardiology*;7:40-4.
9. Khoramdad M, Vahedian\_ azimi A, Karimi L, Rahimi\_Bashar F, Amini H, Sahebkar A. Association between passive smoking and cardiovascular disease: A systematic review and meta\_ analysis. *IUBMB Life* 2020;72(4):677-86.
10. Silva DA, Malta DC, Souza MD, Naghavi M. (2018). Burden of ischemic heart disease mortality attributable to physical inactivity in Brazil. *Rev. Saúde Pública*;52:72.
11. Dipietro L, Caspersen CJ, Ostfeld AM, Nadel ER. (1993). A survey for assessing physical activity among older adults. *Med Sci Sports Exerc*;25(5):628-42.
12. Raja T, Muthukumar T, Mohan P. (2017). A cross sectional study on prevalence of hypertension and its associated risk factors among rural adults in Kanchipuram district, Tamil Nadu. *Int J Community Med Public Health*;5(1):249-53.
13. Esteghamati A, Etamad K, Koohpayehzadeh J, Abbasi M, Meysamie A, Khajeh E, et al. (2016). Awareness, treatment and control of pre-hypertension and hypertension among adults in Iran. *Arch Iran Med* ;19(7):456-64.
14. Duncan MS, Freiberg MS, Greevy RA, Kundu S, Vasan RS, Tindle HA. (2019). Association of smoking cessation with subsequent risk of cardiovascular disease. *JAMA* ;322(7):642-50.
15. Pericot-Valverde I, Elliott RJ, Priest JS, Barret T, Yoon JH, Miller III CC, Okoli CT, Haliwa I, Ades PA, (2019). Gaalema DE. Patterns of tobacco use among smokers prior to hospitalization for an acute cardiac event: Use of combusted and non-combusted products. *Prevent Med*;128:105757.
16. Baranwal JK, Maskey R, Sherchand O, Chaudhari RK. (2018). Prevalence of obesity and its association with cvd risk factors in nepalese patients with type 2 diabetes. *Eur J Biomed*; 5(4):724-8.
17. Ni W, Weng R, Yuan X, Lv D, Song J, Chi H, et al. (2019). Clustering of cardiovascular disease biological risk factors among older adults in Shenzhen City, China: a cross-sectional study. *BMJ Open*; 9(3):e024336.
18. Bancks MP, Carson AP, Lewis CE, Gunderson EP, Reis JP, Schreiner PJ, et al. (2019). Fasting glucose variability in young adulthood and incident diabetes, cardiovascular disease and all-cause mortality. *Diabetologia*;62(8):1366-74.
19. Wang H, Peng DQ. (2011). New insights into the mechanism of low high-density lipoprotein cholesterol in obesity. *Lipids Health Dis* ;10(1):1-0.
20. Taylor Jr HA, Akyzbekova EL, Garrison RJ, Sarpong D, Joe J, Walker E, et al. (2009). Dyslipidemia and the treatment of lipid disorders in African Americans. *Am J Med*;122(5):454-63.
21. Sun J, Buys NJ, Shen SY. (2013). Dietary patterns and cardiovascular disease-related risks in Chinese older adults. *Front Public Health* 1:48.
22. Brugnara L, Murillo S, Novials A, Rojo-Martínez G, Soriguer F, Goday A, et al. (2016). Low physical activity and its association with diabetes and other cardiovascular risk factors: a nationwide, population-based study. *PLoS One* ;11(8):e0160959.

23. Borhanuddin B, MohdNawi A, Shah SA, Abdullah N, Syed Zakaria SZ, Kamaruddin MA, Velu CS, Ismail N, Abdullah MS, Ahmad Kamat S, Awang A. (2018). 10-year cardiovascular disease risk estimation based on lipid profile-based and BMI-based Framingham risk scores across multiple sociodemographic characteristics: the Malaysian cohort project. *Sci World J*; e2979206.
24. Khetan A, Zullo M, Hejjaji V, Barbhaya D, Agarwal S, Gupta R, *et al.* (2017). Prevalence and pattern of cardiovascular risk factors in a population in India. *Heart Asia* ;9(2):e010931.

#### CITATION OF THIS ARTICLE

M Lashari, A Ali, M Alam, N Ullah Mandokhail, Farmanullah, M Tahir, H Ullah, T S Chachar, H Ur Rehman. Dietary habits and life style association with cardiovascular risk factors among patients with the critical coronary artery disorders . *Bull. Env. Pharmacol. Life Sci.*, Vol 9[11] October 2020 : 28-34