PREVALENCE OF CARDIOVASCULAR DISEASES AND RISK-ASSESSMENT IN THE URBAN POPULATION OF PAKISTAN: A CROSS-SECTIONAL STUDY

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Abstract:
Background: Non-communicable diseases are on a rise, with a major shift of trend from communicable to non-communicable diseases, amongst which, cardiovascular diseases are noticed to be escalating.
Objective: To investigate the prevalence of cardiovascular disease in Pakistan, as well as to observe frequently found risks factors and their association with CVD.
Methods: Cross-sectional study including 150 participants. Data was obtained via a self-filled online questionnaire that included anthropometric measurements, past medical history, family history and personal history comprising of smoking and drug history, level of daily exercise, food preferences and stress levels.
Results: 68.7% of the study population was female while 31.3% was male with the mean age of study participants being 30.30±13.01 years. Among 2.7% of the study population cardiovascular diseases were prevalent. Association of various risk factors with heart disease was present. Smokers (p=0.001), smokeless tobacco smokers (p=0.001), people with family history of heart disease (p=0.001), hypertensive (p=0.027), hypercholesterolemics (p=0.001) and people with higher age were shown to have an increased risk for cardiovascular disease compared with participants without heart disease. In addition to that, cardiovascular diseases were more prevalent in females with higher waist circumference (p=0.025).
Conclusion: The study concluded that there was significant correlation between cardiovascular diseases and older age, positive family history and medical history like hypertension, high cholesterol levels, as well as an association with tobacco was present. This study not only observed the prevalence of cardiovascular diseases but it also looked into the risk factors commonly found and their correlation with cardiovascular diseases.
Keywords: Non-communicable diseases, communicable diseases, cardiovascular diseases, hypertension, hypercholesterolemics.

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INTRODUCTION:

Ever since the development of epidemiological studies, most studies and surveys have indicated that infectious diseases are the main reason of global mortality, especially in the developing and underdeveloped countries [1]. However, the latest studies have shown a drastic shift towards non-communicable diseases as the leading cause of mortality, particularly due to life style modification, urbanization and poor eating habits [2]. WHO has cited cardiovascular diseases (CVD) as the leading cause of death globally, representing 32% of all death in 2019 [3]. According to a research by E Jokinen, Cardiovascular diseases hold the same position for a health care worker now as infectious epidemics did in the past [4].

Cardiovascular diseases comprise of a group of disorders, including coronary heart diseases, cerebrovascular disease, peripheral heart diseases, Deep Vein Thrombosis (DVT), pulmonary thrombosis and congenital heart diseases [3]. Recent studies have shown an increase in the number of CVD patients in developing countries like Pakistan where a large percentage of population belongs to low social economic backgrounds [5] [6]. Where the entire world has seen a decline in global deaths by CVD, south Asian countries particularly have seen rise in them [7].

A number of factors have played a pivotal role in escalation of CVD patients across the country including cigarette smoking [8], family history, obesity [9], hypertension [10], hypercholesterolemia [11] and physical inactivity. This study primarily focuses on accessing these CVS associated risk factors and their prevalence across the country. However, the fact of prime importance is that cardiovascular diseases usually result from interplay of multiple factor rather than just one. World Health Organization and International Society of Hypertension have formulated risk prediction charts, which are designed according to the local burden, prevalence and associated risk factors of the population under study [12]. These charts act as a cost effective way of forewarning the patient of a serious threat, urging them change their lifestyle and taking prophylactic medication if necessary. They play a vital role in management of cardiovascular disorders without the help of any sophisticated technology.

This community-based study has been performed to analyze the interrelation between risk factors and cardiovascular disease in urban and rural population of different areas of Pakistan, which presents a better idea about the management and indication of any potential life-threatening risks among the general population, to authorities.

METHODOLOGY:

The research is based on a study that was conducted in Pakistan, a country located in South Asia. It is a cross-sectional descriptive study that was conducted from 21st February 2021 to 27th June 2021. The study was carried out in all 5 provinces of the country, namely: Punjab, Sindh, Khyber Pakhtun Khawa (KPK), Balochistan, Gilgit Baltistan (GB), as well as the region of Azad Kashmir and the state's capital Islamabad. Based on Raosoft sample size calculator formula, a sample size of 150 was calculated with 95% confidence interval and 5% margin of error. The study was conducted anonymously and only after the approval by Ethical Review Committee of CMH Lahore Medical College. The study population included people at and above the age of 15 years and a double stage cluster random sampling was employed. Data was collected via online forms made on Google Forms, distributed as links among general population in reach and after taking their written informed consent. The participants recorded their blood pressure and anthropometry (i.e. height, weight & waist circumference) and entered values into the forms. Medical details including preexisting heart conditions, hypertension crises and diabetes, use of cigarettes and other drugs having potential to damage CVS system of the body as well as family history of heart disease were specifically asked. Moreover, the food preferences of the participants as well as their daily routine were questioned in particular with special mention of the amount of daily exercise they do. In order to take the impact of psychological state, the stress status of participants was inquired. People who were willing to quit were given the liberty to withdraw and those who had ambiguities were catered properly. Data analysis was done using SPSS version 24. The quantitative data was presented as mean and standard deviation whereas qualitative data was employed as frequency and percentage. The Chi-square test was employed to assess the association between different variables at significance level (p value) of 0.05.

RESULTS:

There were total 150 study participants. Out of these, females were 103 (68.7%) and males 47 (31.3%). The mean age of study participants was 30.30 ± 13.01 years with maximum being 64 years and minimum being 15 years. Majority of study participants (80.7%) were 39 years or below while only 18.7%

were 50 and above. Most of the study participants (88%) were living in urban areas and only 25 in rural areas. 90% of the subjects had a qualification of Intermediate and above. The prevalence of CVD was found in only 2.7% of the study population. The CVD risk factors are shown in Table 1. Nine (6%) participants were cigarette smokers and 6 (2.7%) were using smokeless tobacco. Family history of heart diseases was present in 95 (63.3%) participants. Thirteen (8.7%) were shown to be hypertensive. About 20 (13.3%) among the study population were suffering from hypercholesterolemia, while 77 (51.3%) study subjects were found to be physically inactive. Twenty-seven (8%) individuals had a higher waist circumference. Out of these, 23 (22.3%) were females and 4 (8.5%) were males. Forty-one (27.3%)

study participants were overweight; while 22 (14.7%) were obese.

Association of various risk factors of heart disease is shown in Table 2. Smokers (p=0.001), smokeless tobacco smokers (p=0.001), people with family history of heart disease (p=0.001), hypertensive (p=0.027), hypercholesterolemics (p=0.001) and people with higher age have been shown to have an increased risk for CVD compared with participants without heart disease. Furthermore, CVD was more prevalent in females with higher waist circumference (p=0.025). However, living status (p=0.675), gender (p=0.574), province (p=0.99), marital status (p=0.88), education (p=0.776) and socio-economic status (p=0.776) were not to be found significantly associated with CVD.

Table-1
Proportion of risk factors for CHD in study population (n=150)

Risk Factors	Frequency	Percent
Hypertension	13	8.7
Diabetes mellitus	9	6
Family history of heart disease	66	44
Smoking status (smokers)	9	6
Hypercholesterolemia	20	13-3
BMI		
18.5-24.9 (Normal weight)	73	48.7
25-29.9 (overweight)	41	27.3
≥30 (obese)	22	14.7
Regular Exercise	73	48.7

Table 2: Association of CHD risk factors with CHD (n = 150)

Variables		N = 4 With CHD	N = 146 Without CHD	P-value (Chi-square test)
Cigarette smoking	Yes	1	8	0.001
	No	3	136	
Smokeless tobacco	Yes	0	4	0.001
	No	4	140	
Family history of heart disease	Yes	2	64	0.001
	No	2	80	
Hypertensive	Yes	2	11	0.027
	No	2	133	
WC (inches) Females	<35	0	80	0.025
	≥35	2	21	
Age (years)	39 & below	1	120	0.044
	40-49	0	1	
	50-59	3	18	
	≥60	0	7	
Hypercholesterolemia	Yes	3	17	0.001
	No	1	128	

DISCUSSION:

Non-communicable diseases are on a rise, with a major shift of trend from communicable to non-communicable diseases. [13] While these diseases result in a significant percentage of mortality worldwide, they cause a significant burden on the medical services and loss of finances as well, especially in underdeveloped countries like Pakistan, leading to further exhaustion of resources.

The commonest non-communicable diseases in Pakistan include cardiovascular diseases, cancers, respiratory diseases, diabetes, and mental disorders, and injuries. [14] While others are common too, cardiovascular diseases are on a rise. [15] The common cardiovascular diseases comprise of coronary artery diseases: including angina, myocardial infarction and heart failure, strokes and transient ischemic attacks, peripheral arterial disease, and aortic diseases. The risk factors can be categorized into modifiable and non-modifiable. The modifiable ones consist of high BP, high blood cholesterol levels, smoking, diabetes, obesity, lack of physical activity, unhealthy diet and stress. The non-modifiable risk factors are age, sex (mainly male), family history and race. [16] While the latter ones cannot be prevented, the modifiable risk factors should always be taken into consideration and lifestyle modification should be carried out. Control of blood pressure with anti-hypertensive drugs, management of cholesterol levels by avoidance of fatty foods and cholesterol lowering medications, abstinence from smoking, regulation of blood sugar levels; either with diet or medication and inculcating a habit to regularly work out and actively lose weight is pertinent to counteract against the rising epidemic of cardiovascular diseases. [17]

In this study, family history was found to be a prominent cause of CHD among both rural and urban population (about 44% of the total non-modifiable factors). Premature coronary artery diseases primarily depend on the inherited conditions such as familial high cholesterol levels in blood or increased BMI due to genetic conditions [18]. A number of researches have indicated strong evidence between CHD and clustering of risk factor in individuals who have genetic predisposition to these conditions. [19] [20]. While this remains a non-modifiable risk factor, appropriate and timely screening tests of conditions such as heritably high BMI and increased blood cholesterol levels can help with risk assessment and aid in propagating a disease prevention approach in such patients. Early detection can help us slow down the process of atherosclerosis, modify the diet of the patient in order to decrease the risk of acute coronary syndrome or even provide prophylactic treatment where needed. [21]

From the observation of this research, smoking was also found to be a potent risk factor of CVD, which undeniably is a modifiable factor. Cigarette smoking and smokeless tobacco contain nicotine which is known to alert hemodynamic profile and lipid metabolism leading to enhanced risk of forming atherosclerotic plaques. [8] Prevention of tobacco use, both in the form of cigarette and smokeless tobacco, should be promoted. Patient counseling can help them effectively retire from this habit and lower the risk of cardiovascular diseases.

In our study, hypercholesterolemia showed a strong positive association with CVD. Abnormalities in lipid profile, such as high LDL and cholesterol levels along with low HDL values, and coronary heart diseases have a strong interrelation. [22] Another study conducted in Pakistan also showed similar results where patients with deranged lipid profiles were shown to have an increased risk of CHD. [23] Several other risk factors are indicted to coexist with hypercholesterolemia such as diabetes and increased waist circumference and they all exacerbate the possibility of patients suffering from CHD. [24] [25]

Another crucial factor here is the conjoint effect of multiple risk factors. Most of the time risk factors do not exist independently and there are almost always a number of factors that play in part in development of CHD. WHO and International Society of Hypertension charts help assess multiple associated risk factors at once and give a reliable prediction of the threat. [26] These charts can help physicians guide high-risk patients on how to control the risk factors within acceptable ranges such as blood sugar, blood pressure, lipid profiles and waist circumference. Risk scores and prediction charts can also provide early detection and prompt risk management in hospitals that do not possess modern technology. [12]

CONCLUSION:

In conclusion, this study helped the authors to assess the prevalence of cardiovascular disease in Pakistan, as well as observe the most commonly found risk factors that can ultimately lead the individuals to acquire the disease. The association of the risk factors with CVD was also noted.

Benefits and Limitations

This study proved to beneficial in regards to the fact that it aimed to analyze the prevalence of disease as well as of the risk factors for cardiovascular diseases present among the population of Pakistan. However, since the language of our questionnaire was English and there is non-availability of Internet along with lack of usage of digital platform in many parts of country, it may have contributed to sampling bias. Moreover, most of our study population was young; therefore the prevalence found was low. Keeping in view all the limitations, further studies should be conducted including all age groups, particularly focusing on older age groups, as well as all socioeconomic classes and all the limitations should be minimized for better results in future.

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