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Assessment of risk factors for the Cardiovascular Diseases in Individuals Visiting a Tertiary Care Hospital for Routine Medical Check-Up

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ABSTRACT

Background: Cardiovascular diseases (CVD) are a leading cause of morbidity and mortality globally. Identifying risk factors in individuals undergoing routine medical check-ups is vital for early intervention.

Objective: Objective: The aim of this study was to assess the risk of cardiovascular diseases using a validated Cardiovascular Risk Assessment Questionnaire (CVRAQ) among individuals visiting a tertiary care hospital for routine medical check-ups.

Methods: A non-probability convenient sampling technique was employed. The study design was cross-sectional observational. The study included 185 individuals, both male and female. Participants were selected from a Tertiary Care Hospital. The age range of individuals was from 30 years onwards. Undiagnosed individuals were recruited who visited OPD for routine medical checkup. Risk factors were assessed using CVRAQ. Individuals with total CVRAQ score in term of mean: of -88 to 100 was categorized as low risk, 101 to 220 as moderate risk, 221 to 350 as high risk, and > 350 as very high risk.

Results: Out of 185 individuals, males were 80 (28.8%) and females were 105(37.8%) with mean age of individuals was 51.71. CVRAQ mean value was greater than 350 (788.09 ±8.644) so individuals were categorized as very high risk of CVD. The frequency distribution of most common risk factors observed in the study population was: Poor lifestyle 150 (81.1%), High lipids 159 (85.9%), High stress level 162 (87.6%).

Conclusion: The study showed that individuals who visit the hospital for routine medical check- ups have very high risk of cardiovascular diseases which is commonly seen in individuals having a cardiac family history, smokers, and abnormal levels of various risk factors. Most common risk factors observed in the study population were poor lifestyle, high lipids and high stress level.

Keywords: Risk Factors, Cardiovascular Risk Assessment Questionnaire, Tertiary Care, Health Check-up, Preventive Medicine, Cardiovascular Disease, Coronary Heart Disease, Myocardial Infarction

INTRODUCTION

Cardiovascular diseases (CVDs) remain a leading cause of morbidity and mortality globally, despite advances in therapeutic interventions. The persistence of CVDs underscores the gaps in our understanding and control of these diseases, emphasizing the need for comprehensive approaches to prevention and management. Currently, there is no definitive cure for CVDs, which include coronary artery disease (CAD), myocardial infarction, and stroke, among others. However, ongoing research offers promising insights into the risk factors and pathophysiological mechanisms contributing to these conditions, and may ultimately inform more effective preventive and therapeutic strategies (1). Of particular concern is the role of smoking as a major, independent risk factor for CVD, significantly elevating the risk of mortality from heart disease. Smokers are more likely to die from heart disease than from respiratory illnesses or cancer, highlighting the urgency of addressing tobacco use in the context of cardiovascular risk (2). This association exists alongside other conventional risk factors, including diabetes, hypertension, and dyslipidemia, which collectively exacerbate cardiovascular risk (3).

Coronary heart disease (CHD), a primary component of CVD, has become increasingly prevalent, especially among individuals over the age of 60. Recent studies indicate that CHD risk is particularly significant for certain demographic groups, including women and younger patients, warranting the need for tailored risk estimation approaches to address the unique risk profiles within these populations (4). The classification of CVD risk factors into modifiable and non-modifiable categories has become a fundamental aspect of cardiovascular health management. Modifiable risk factors, such as smoking, obesity, poor dietary habits, diabetes, hypertension, and

hyperlipidemia, offer critical intervention points, whereas non-modifiable factors like age and family history demand an emphasis on early detection and preventive care (5). Hypercholesterolemia, often defined as a plasma cholesterol level above 240 mg/dL or necessitating pharmacological intervention, remains a prominent contributor to cardiovascular risk, underscoring the importance of lipid management in reducing CVD incidence (6).

Dietary habits also play a crucial role in CVD risk, as suboptimal nutrition contributes to obesity and associated cardiometabolic conditions. Research suggests that the majority of individuals fail to meet dietary standards conducive to cardiovascular health, which signals the need for enhanced nutritional education and public health strategies focusing on dietary improvements (7). Obesity, driven by an imbalance between caloric intake and expenditure, further compounds cardiovascular risk by promoting the development of conditions such as diabetes, hypertension, and hyperlipidemia. The global rise in obesity, linked to shifts toward high-calorie and readily accessible foods, has made obesity a pervasive non-communicable risk factor (8). Significantly, smoking cessation has been identified as one of the most impactful secondary preventive measures for reducing CVD mortality. This effect is particularly relevant, as the risk of heart disease is directly proportional to daily tobacco consumption, further reinforcing the critical role of tobacco control in CVD prevention (9).

In addition to individual lifestyle factors, diabetes and hypertension continue to be major contributors to the global burden of cardiovascular and metabolic diseases. The interplay between a sedentary lifestyle, poor diet, and addictive behaviors such as tobacco use compounds the risk, contributing to the development of ischemic heart disease and associated comorbidities (10, 11). The heightened need for lipid storage in obesity leads to hypertrophy, hyperplasia, and metabolic dysregulation, all of which contribute to chronic inflammation and hypoxia within adipose tissues, thereby exacerbating cardiovascular risk (12). The adoption of unhealthy dietary habits has become more prevalent, with a marked increase in the consumption of processed foods that are calorically dense but nutrient-poor, thereby aggravating cardiovascular health issues (13). Smoking, excessive alcohol intake, and exposure to environmental pollutants further contribute to atherogenesis, while recent findings highlight the risks associated with elevated triglycerides and low HDL levels, making lipid management crucial for CVD prevention (14).

The aim of the present study was to evaluate cardiovascular disease risk among individuals attending routine medical check-ups at a tertiary care hospital, utilizing a validated Cardiovascular Risk Assessment Questionnaire (CVRAQ) to determine prevalent risk factors and overall cardiovascular risk scores. Through the identification of significant risk factors within this population, the study aims to contribute valuable insights for the early detection and prevention of CVD, ultimately reducing the morbidity and mortality associated with these conditions. Early assessment and targeted intervention strategies, informed by the findings of this study, have the potential to mitigate the impact of cardiovascular risk factors and enhance the effectiveness of preventive measures within routine healthcare settings.

MATERIAL AND METHODS

This cross-sectional, observational study was conducted at tertiary care hospitals in Lahore, Pakistan, from February 2022 to July 2022. A total of 185 participants were recruited for this research through a non-probability convenience sampling technique, targeting individuals visiting outpatient departments (OPD) for routine medical check-ups. The study included both male and female participants aged 30 years and older who had not been previously diagnosed with cardiovascular diseases (CVDs). Individuals with a confirmed diagnosis of any cardiovascular disease were excluded from the study to ensure the assessment of risk factors in undiagnosed individuals. Prior to data collection, informed consent was obtained from each participant, and ethical approval was secured from the tertiary care hospital's institutional review board (REC-UOL-/18-08/2022) in accordance with the Declaration of Helsinki to ensure adherence to ethical principles (15).

Data collection was conducted using a validated Cardiovascular Risk Assessment Questionnaire (CVRAQ), a structured instrument designed to assess various CVD risk factors. The CVRAQ includes two sections: the first section was completed by patients, addressing aspects of lifestyle, family history, and perceived health; the second section was completed by healthcare practitioners, evaluating medical indicators and physiological measures relevant to CVD risk. Proper guidance on questionnaire completion was provided to all participants to encourage accuracy and completeness in responses. Risk factors assessed included lifestyle behaviors, stress levels, blood lipid profiles, blood pressure, sleep patterns, bowel toxicity, blood sugar levels, inflammation and pain, dietary habits, thyroid function, and weight management. Each participant's CVRAQ score was calculated, with total scores categorized as follows: -88 to 100 for low risk, 101 to 220 for moderate risk, 221 to 350 for high risk, and > 350 for very high risk (15).

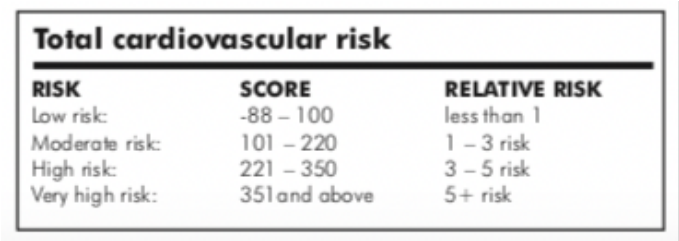
Statistical analysis was conducted using IBM SPSS software, version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic data and the distribution of CVD risk factors across different categories. Associations between risk factors and overall cardiovascular risk categories were analyzed to determine prevalent risk patterns among the study population.

RESULTS

The study included 185 participants with a mean age of 51.71 ± 14.08 years. Among the participants, 80 (28.8%) were male, and 105 (37.8%) were female. The cardiovascular risk score, assessed using the Cardiovascular Risk Assessment Questionnaire (CVRAQ), indicated a mean score of 788.09 ± 8.644, placing the majority of participants in the "very high risk" category for cardiovascular disease (CVD).

The study results revealed a high frequency of specific modifiable risk factors, with the majority of participants exhibiting unhealthy lifestyle behaviors and significant stress levels. In addition, elevated lipid profiles were prevalent among participants, suggesting a need for interventions targeting these modifiable factors to mitigate CVD risk in the population. These findings underscore the importance of early risk factor assessment and management for individuals attending routine medical check-ups.

Individuals with total CVRAQ score in term of mean: of -88 to 100 was categorized as low risk, 101 to 220 as moderate risk, 221 to 350 as high risk, and > 350 as very high risk. In the present study, CVRAQ mean value was greater than 350 (788.09 ±8.644) so individuals were categorized as very high risk of CVD. References values for total cardiovascular risk (CVRAQ Score) are shown in the table attached (15).



Total cardiovascular risk

RISK	SCORE	RELATIVE RISK
Low risk:	-88 – 100	less than 1
Moderate risk:	101 – 220	1 – 3 risk
High risk:	221 – 350	3 – 5 risk
Very high risk:	351 and above	5+ risk

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Table 1: Frequency and Percentages of Modifiable Risk Factors for CVD

Risk Factor	Low Risk (%)	Moderate Risk (%)	High Risk (%)
Cardiovascular History	16 (8.6%)	15 (8.1%)	154 (83.2%)
Lifestyle	27 (14.6%)	8 (4.3%)	150 (81.1%)
Stress	16 (8.6%)	7 (3.8%)	162 (87.6%)
Sleep	27 (14.6%)	44 (23.8%)	114 (61.6%)
Bowel Toxicity	46 (24.9%)	41 (22.2%)	98 (53.0%)
Blood Sugar	17 (9.2%)	81 (43.8%)	87 (47.0%)
Inflammation and Pain	60 (32.4%)	48 (25.9%)	77 (41.6%)
Diet	14 (7.6%)	76 (41.1%)	95 (51.4%)
Lipids	0 (0%)	26 (14.1%)	159 (85.9%)
Blood Pressure	48 (25.9%)	53 (28.6%)	84 (45.4%)
Thyroid Function	8 (4.3%)	40 (21.6%)	137 (74.1%)
Weight Management	31 (16.8%)	39 (21.1%)	115 (62.2%)

In Table 1, the distribution of modifiable risk factors among the study population is detailed. The most prevalent high-risk factors observed were stress (87.6%), high lipid levels (85.9%), and poor lifestyle choices (81.1%). Additionally, 83.2% of participants reported a significant cardiovascular history, and a notable portion had high-risk scores in blood sugar (47.0%) and blood pressure (45.4%).

Table 2: Descriptive Statistics of Total Cardiovascular Risk Score (CVRAQ Score)

Parameter	N	Mean	Standard Deviation
CVRAQ Score	185	788.09	8.644

DISCUSSION

The This study underscores a high prevalence of cardiovascular disease (CVD) risk factors among individuals attending routine medical check-ups at a tertiary care hospital, with a majority categorized as very high risk according to the Cardiovascular Risk Assessment Questionnaire (CVRAQ). These findings are consistent with prior studies indicating that lifestyle-related behaviors, including high-stress levels and poor dietary habits, as well as modifiable clinical factors such as lipid levels and blood pressure, play a significant role in increasing CVD risk among diverse populations (Hajar 2017; Erhardt 2009). Notably, in the present study, high lipid levels, stress, and unhealthy lifestyle choices were the most prevalent high-risk factors, aligning with previous research indicating these as primary contributors to CVD (2, 3).

The gender distribution within the study population revealed a slightly higher proportion of females, who were also observed to have elevated stress and lifestyle-related risk factors, corroborating findings from past research that highlighted the importance of addressing these modifiable risk factors specifically in women to mitigate CVD risk (7). Interestingly, while previous studies have often reported a higher incidence of CVD among males, the findings in this population suggest that females are at a comparably high risk, potentially due to lifestyle and stress factors, which may vary based on sociocultural context and daily routines (4, 18). This result emphasizes the need for gender-sensitive cardiovascular risk interventions, especially focusing on stress management and lifestyle modifications tailored for women.

A strength of this study was its focus on a tertiary care hospital setting, where individuals without a known CVD diagnosis were screened, allowing for an assessment of cardiovascular risk in a generally underrepresented group – those who may not perceive themselves as at risk. This approach provides valuable insights into the often-overlooked population who attend

routine check-ups, as it highlights that a substantial number of individuals without a history of CVD may still exhibit high or very high risk. By utilizing a validated tool like CVRAQ, this study was able to standardize risk assessment across several key factors, contributing to the reliability of the findings and offering a holistic view of cardiovascular risk beyond clinical measurements alone (15).

Nevertheless, the study has limitations that should be considered in interpreting the results. The non-probability convenience sampling method may limit the generalizability of findings to other populations, as it may not accurately represent broader demographics or regions beyond the hospital setting. Moreover, the cross-sectional design precludes causal conclusions regarding the relationship between specific risk factors and CVD risk; longitudinal studies would be beneficial in confirming and expanding upon these associations. Another limitation was the lack of biochemical assessments beyond self-reported lifestyle and clinical risk factors, which could provide a more comprehensive understanding of participants' health status.

Recommendations based on these findings include the integration of regular CVD risk screenings within routine medical check-ups, especially in tertiary care settings where at-risk individuals may otherwise go undetected. Additionally, targeted interventions focusing on stress reduction, lifestyle improvements, and lipid management are essential, as these were identified as prominent modifiable risk factors in this population. Future studies could benefit from a multicenter approach to increase sample diversity, as well as the inclusion of biomarker analysis for more precise risk stratification. Strengthening public health initiatives around smoking cessation, diet, and physical activity, particularly tailored to the socio-economic conditions of the population, may also mitigate CVD risks effectively over time (7, 8).

CONCLUSION

The study showed that individuals who visit the hospital for routine medical check-ups have very high risk of cardiovascular diseases which is commonly seen in individuals having a cardiac family history, smokers, and abnormal levels of various risk factors such as high intake of lipids, stress, sleep, bowel toxicity, diet, blood pressure thyroid function and high weight. Most common risk factors observed in the study population were poor lifestyle, high lipids and high stress level. By focusing on modifiable risk factors, healthcare providers can improve patient outcomes and contribute to reducing the overall burden of cardiovascular disease, reinforcing the importance of preventive care as a cornerstone of human healthcare.

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