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CARDIOVASCULAR RISK ASSESSMENT AMONG GENERAL POPULATION OF DISTRICT SIALKOT

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ABSTRACT:

INTRODUCTION: *Cardiovascular diseases (CVD) continue to be a predominant worldwide contributor to illness and death.*

AIMS & OBJECTIVE: *To determine cardiovascular risk assessment among general population of District Sialkot.*

MATERIAL & METHODS: *A descriptive cross-sectional study was conducted from May-October2024 among general population of District Sialkot. 384 participants from were recruited through non probability purposive sampling technique. A modified standardized tool "cardiovascular risk assessment questionnaire" was used. It has two parts. Part 1 for the respondent and part 2 for the practitioner. Data was collected after approval of institutional review board and written informed consent was obtained from each participant. SPSS version 26 was used to analyze the data. Frequency and percentages were calculated for the qualitative characteristics, such as gender, marital status, education level, employment status and total cardiovascular risk. Mean and standard deviation was used for the quantitative variables, such as age, income and BMI.*

RESULTS: *The mean age of the respondents was 41.7 +12 years and majority of them 76.8% were married. Only 24(6.3%) attendants were categorized as low risk for cardiovascular diseases. Majority of the participants 133(34.6%) were assessed as having moderate risk of cardiovascular diseases. High risk for cardiovascular diseases were labelled to a good number of participants 104(27.1%). Participants123(32.0%) were with very high risk.*

CONCLUSION: *Majority of the participants were assessed as having moderate risk of total cardiovascular risk assessment. High risk for cardiovascular diseases were labeled to a good number of participants. Less than half of participants were with very high risk.*

KEY WORDS: *Cardiovascular diseases, risk assessment, modifiable risk factor,general population*

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Author's Contribution: RM: Concept and design, data collection, data analysis, drafting, statistial expertise. **FL:** Analysis and iterpretation of data, critical revision, statistical expertise, final approval. **IA:** Collection and assembly, drafting the article, statistical expertise. **TI:** Collection and assembly, drafting the article, statistical experitse. **RZ:** Collection and assembly, critical revision. **IJ:** Collection and assembly, critical revision.

INTRODUCTION:

Cardiovascular diseases (CVD) continue to be a predominant worldwide contributor to illness and death, tallying 366 million disability-adjusted life years in 2017 and an estimated 17.6 million fatalities in 2016[1]. In recent years, the swift increase of non-communicable diseases (NCDs) such as cardiovascular has introduced major health and economic hurdles for societies. Chronic NCDs, encompassing cardiovascular disease, cancer, respiratory diseases, and diabetes mellitus, now stand as the primary reasons for mortality across the globe.CVD has become the leading cause of death in both advanced and developing nations at an alarming pace.27% of global deaths were caused by CVD.CVD led to over 20 million deaths in 2021, accounting for 31% of global deaths.The occurrence of CVD has more than doubled, rising from 257 million cases in 1990 to 550 million in 2019.The age standardized incidence of CVD in Pakistan was 918.18/100,000, and the age standardized death rate was 357.88/100,000.The impact, death rates, and prevalence of CVD differ across geographical areas.While developed countries have observed a reduction in CVD rates over the last twenty years, developing areas, including the Eastern Mediterranean, have seen a rising pattern[2].

The Framingham study, initiated in 1948 and involving 5,209 participants from Framingham, Massachusetts, USA, significantly advanced our understanding of cardiovascular risk factors. This landmark study identified key contributors to cardiovascular events, including tobacco use, lipid disorders, hypertension, electrocardiographic abnormalities, menopause, atrial fibrillation, and obesity. Protective factors, such as physical activity and high HDL-cholesterol levels, were also established. Among its notable outcomes are the risk calculators that help predict cardiovascular events. The study highlighted that a higher prevalence of risk factors such as hypertension, smoking, diabetes, or lipid disorders within a population result in a greater overall impact on cardiovascular health. The natural progression of cardiovascular disease, from a healthy artery to critical atherosclerosis and plaque rupture, is well-documented, offering several opportunities for intervention to alter the disease trajectory or even prevent its onset. By identifying the factors contributing to disease progression, it becomes possible to anticipate and mitigate the risk of CVD.[3]

Projections suggest that South Asian countries will bear over half of the global CVD burden in the coming years.[4] In Pakistan, where CVD accounts for 29% of deaths, there is limited research on complex modeling of disease risk. Numerous studies and predictive models have investigated the role of various risk factors in CVD. Modifiable risk factors such as smoking, alcohol consumption, poor sleep patterns, stress, unhealthy diets, and physical inactivity are empirically linked to CVD outcomes. Additionally, metabolic abnormalities like elevated fasting glucose, dyslipidemia, hypertension, and obesity are strongly associated with adverse cardiovascular outcomes.[5]

The growing mortality associated with NCDs is anticipated to increase further due to poorly managed and undertreated metabolic risk factors, particularly hypertension, diabetes mellitus, and high cholesterol. Effective public health initiatives targeting these risk factors are critical to reversing this trend.[6]

Although hypertension alone is a significant risk factor for CVD, it rarely occurs in isolation. Individuals with hypertension frequently have other associated cardiovascular risk factors,

such as dyslipidemia or diabetes, which significantly amplify the risk in hypertensive patients. Modifiable contributors to hypertension's high prevalence include excessive body weight, poor dietary habits (e.g., high sodium and low potassium intake), physical inactivity, smoking, and alcohol consumption.[7]

Given the increasing prevalence of CVD in developing countries and its emergence among younger populations, estimating cardiovascular risk in the general population has become imperative.

OBJECTIVE:

To determine cardiovascular risk assessment among general population of District Sialkot.

MATERIAL AND METHODS:

A descriptive cross-sectional study was conducted from 2nd May- 31 October2024 among general population of District Sialkot. Non probability purposive sampling technique was used. A sample of 384 participants were calculated using WHO "S size" calculator where anticipated population proportion was 50% and margin of error 5%. Attendants age 18-60 years were included in the study and those with diagnosed cardiovascular diseases, other metabolic diseases and individuals with congenital abnormalities of heart and circulatory system were excluded. A modified standardized tool "cardiovascular risk assessment questionnaire" developed by Metagenics Merridycasson using WHO Hearts guidelines8 was used 9. It has two parts. Part 1 for the respondent for which he/she must answer every question. It contains 10 domains as age, cardiovascular history, family history, lifestyle, stress, sleep, blood sugar and lastly diet. Each domain has multiple questions and answer to a question carries a score. At the end of this part, a total score was obtained by adding the scores of all domains.

Part 2 of the tool is for the practitioner. It comprises of 8 domains including lipid profile, blood pressure monitoring, stress, thyroid function, blood sugar and weight management. Each domain has multiple questions and answer to each question carries a score. A total score was obtained by adding scores of each domain. Scores of both part 1 and part 2 were added for each category to calculate the total cardiovascular risk.

Participants having total score of 88-100 are categorized as low risk, those with total score of 101-220 as moderate risk, having 221-350 as high risk and with 351 & above as very high risk.

After approval of institutional review board and written informed consent was obtained from each participan, data was collected from 4 Tehsils of district Sialkot, ensuring the equal representation from each Tehsil. Sociodemographic characteristics age, gender, marital status, education level, employment status, monthly income and BMI of the respondents were also recorded. IBM-SPSS version 26 was used to analyze the data. Frequency and percentages were calculated for the qualitative characteristics, such as gender, marital status, education, employment status and total cardiovascular risk score. Mean and standard deviation was used for the quantitative variables, such as age, monthly income, per capita income and BMI.

RESULTS:

A total of 384 participants were included in the study after fulfilling the inclusion and exclusion criteria. The mean age of the respondents was 41.7 +12 years and majority of them 76.8% were married. Only 7% of the participants were illiterate. The mean monthly income(rupees) of the respondents was 95489.58 + 73018.36 whereas the mean per capita income(rupees) was 19340.85 + 18918.99.(Table 1) Among modifiable risk factors, majority of the respondents 279(72.7%) have low risk in category of cardiovascular history. A large number of participants 289(75.3%) was in medium risk category of lipid profile. Similarly, 182(47.4%) participants were again in medium risk category of blood pressure. (Table 2)

Only 24(6.3%) attendants were categorized as low risk for cardiovascular diseases. Majority of the participants 133(34.6%) were assessed as having moderate risk of cardiovascular diseases. High risk for cardiovascular diseases were labelled to a good number of participants 104(27.1%). Participants123(32.0%) were

Table1: Sociodemographic characteristics of the respondents.		
Sr.	**Sociodemographic**	**Frequency (percentage) n (%)**
1	Gender male female	 197(51.3%) 187(48.7%)
2	Marital status married unmarried	 295(76.8%) 89(23.2)
3	Education illiterate high school graduation professional degree	 27(7%) 65(16.9%) 216(56.3%) 76(19.8%)
4	Employment status employed unemployed	 244(63.5%) 140(36.5%)
5	BMI normal weight pre obese obese	 181(47.1%) 125(32.6%) 78(20.3%)

Table 2: Cardiovascular risk assessment categories (modifiable risk factors)		
Category	**Risk based on total score**	**Frequency n(%)**
Cardiovascular history	Low Medium High	279(72.7) 1(0.3) 104(27)
Lifestyle	Low Medium High	44(11) 174(46) 166(43)
Stress	Low Medium High	120(31.3) 93(24.2) 171(44.5)
Sleep	Low Medium High	174(46) 173(45) 37(9)
Blood sugar	Low Medium High	178(46.4) 101(26.3) 105(27.3)
Diet	Low Medium High	303(78.9) 60(15.6) 21(5.5)
Lipids	Low Medium High	27(7) 289(75.3) 68(17.7)
Blood pressure	Low Medium High	164(42.7) 182(47.4) 38(9.9)
Thyroid function	Low Medium High	344(89.6) 5(1.3) 35(9.1)
Weight management	Low Medium High	284(74) 3(0.8) 97(25.3)

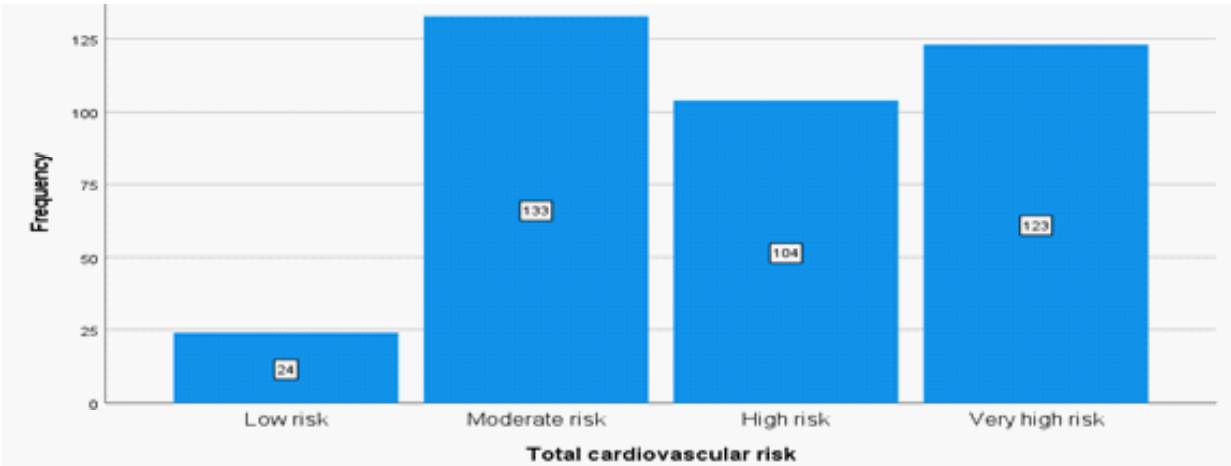

Figure1: Total cardiovascular risk among participants

with very high risk. (Fig 1)

DISCUSSION:

Early intervention through lifestyle modifications and medical treatment significantly reduces morbidity and mortality associated with cardiovascular diseases. The impact of modifiable risk factors on cardiovascular diseases underscores the importance of preventive strategies in managing these risks.

The mean age of the participants was 41.7 +12 years in our study which was lower than a study conducted in multinational South Asia cohort where median age was 48.4 +10.3 years.[10] Contrary to our study the mean age of the respondents was 61.4 +10.4 in a study completed outside Western Europe.[11] In our study less than half of the respondents had BMI in normal range and 20% were categorized as obese. Similar findings were reported in a study where 21% men and 33% women had normal weight and less than 50% were obese in both male and female groups.[1,12]

A population-based study conducted in Southern Iran reported that majority of the study population was married and employed which are in accordance with our study.[2] Majority of the respondents were males in our study and this was similar to a study conducted in Pakistan.[13]

Modifiable risk factors largely contribute towards risk of cardiovascular diseases. Among modifiable risk factors, stress depicted high risk for cardiovascular diseases whereas life style, blood pressure determined medium risk and blood sugar, diet and weight management showed low risk for cardiovascular diseases in our study. Contrary to our study, a PURE sub study carried out in China showed that hypertension was high risk for cardiovascular diseases and diabetes and depression moderate risk but low risk for obesity, lifestyle and diet.[14] This difference may be due to difference in economy, political and financial stability of the two countries i.e. Lower and middle income country and high middle income country respectively. A citizen of lower- and middle-income country may experience much stress to meet his both ends efficiently.

Tracking of the blood pressure at the early stages of life is an eminent preventive strategy to control high blood pressure at the latter stages of life. Similarly, a study on risk factors and cardiovascular disease was conducted in South America which showed hypertension was high risk for cardiovascular diseases and diabetes and hypertension moderate risk but low risk for obesity and lifestyle.[15] A study on comparison of cardiovascular disease risk factors, assessment and management showed that less than 50% of males and females showed moderate risk for physical activity which is similar to our study.[1]

In our study, majority of the respondents have moderate risk for total cardiovascular risk assessment whereas only 6.3% have

low risk and high risk for cardiovascular risk assessment were determined in 27.1%. Although 32.0% were with very high risk. A study conducted on Australian population depicted that majority of the study participants showed a low primary risk for cardiovascular diseases whereas 6.6% women and 15.4% men had high risk for primary cardiovascular diseases.[1]

A study, the challenge of multiple cardiovascular risk factor control outside Western Europe depicted that 38.2% respondents were at high risk and 61.8% were at very high risk of cardiovascular risk assessment whereas in our study 32% were at very high risk and only 27.1% were at high risk for cardiovascular diseases.[11]

CONCLUSION:

In conclusion, among modifiable risk factors for cardiovascular diseases stress was considered high risk factor whereas lifestyle, lipids profile and blood pressure were medium risk contributors for cardiovascular risk assessment and sleep, blood sugar, diet, thyroid function and weight management were low risk modifiable risk factors. Majority of the participants were assessed as having moderate risk of total cardiovascular risk assessment. High risk for cardiovascular diseases were labelled to a good number of participants. Less than half of participants were with very high risk.

RECOMMENDATIONS:

Highly effective promotive and preventive strategies such as health education, behavioral and life style modifications must be implemented to lower the risk of cardiovascular diseases. Cardiovascular diseases show the iceberg phenomenon of disease. A precise and valid screening programme should be there for high-risk population to minimize the risk of cardiovascular diseases.

LIMITATIONS:

The main limitation of our study was cross sectional study design. Due to resource constrains, our sample size was small and was not true representative of the population so the study results could not be generalized to the whole population of district Sialkot.

Our questionnaire comprised of two parts. There were chances of misinformation, under reporting or over reporting of certain modifiable risk factors like lifestyle, sleep, diet and thyroid function. Biases like memory bias occurrence was more common. Social stigma was also observed during the reporting of certain modifiable risk factors like stress and weight management.

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