

## Modifiable Cardiovascular Risk Factors in Adults Less than 40 Years of Age

Zulfiqar Ali Laghari, Naseem Attar, Noman Sadiq, Farzana Gul Baloch

### ABSTRACT

**Objectives:** To determine the prevalence of modifiable cardiovascular risk factors in adults less than 40 years of age.

**Study Design and Setting:** A Cross-sectional study was carried out from 2018 to 2019 at University of Sindh, Jamshoro.

**Methodology:** After getting approval from ethical review board, 263 participants were included in the study using convenient sampling technique. Subjects over 40 years of age, with history of CVD, who was on medication, pregnant women, smokers, and drug addicts were excluded. A structured questionnaire was administered, and associated data was collected. Anthropometric and blood pressure measurements were made. Blood was drawn and analysed for total cholesterol, LDL, triglycerides, HDL, and blood sugar. The existence of modifiable risk variables is shown as percentages, and the difference between genders was evaluated using the chi-square test.

**Results:** Out of total subject, 76% had at least one risk factor present. The risk of Obesity was 29% and 30% for men and women respectively. Central obesity was higher in females (61%) as compared to males (35). Risk factors including hypertension, total triglycerides, and less-than-desired high-density lipoprotein were more prevalent in males as compared to females (p-value .0001). Whereas risk factors including total cholesterol and inactive lifestyle were more in females as compared to males (p-value 0.012 & .0007 respectively).

**Conclusion:** Three risk factors (Obesity, Central obesity, and Total Cholesterol) were found to be higher in females, while 4 risk factors (Hypertension, Increased TG, raised LDL, and hyperglycemia) were higher in males.

**Keywords:** Cardiovascular risk factors, Cholesterol, Hypertension, Obesity

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### INTRODUCTION:

Each year, 38 million people die from non-communicable diseases (NCDs). More than 17.9 million people die each year as a result of cardiovascular disease, which is the leading cause of non-communicable mortality. Cardiovascular disease was responsible for 14.4 million deaths in 1990; by 2005, that figure had risen to 17.5 million.<sup>1</sup> A projected 23.3 million individuals would die each year from cardiovascular disease (CVD) by 2030, according to the Centers for Disease Control

and Prevention. The South Asian area is predicted to witness the greatest rise in mortality from cardiovascular disease.<sup>2</sup>

Being a part of the Indian subcontinent, Pakistan suffers from a larger proportion of cardiovascular disease than other countries in the region. About one-third of Pakistan's population dies from heart disease, which is the leading cause of mortality. In addition, Pakistan was just named the world's ninth-most obese nation. Urban and rural Pakistani populations have significantly varying prevalence rates of main risk factors, as do Pakistanis from various socioeconomic strata. The prevalence of cardiovascular disease risk factors and CVDs is greater among those from higher socioeconomic levels than among those from lower socioeconomic classes.<sup>3</sup> Cardiovascular disease is expensive to treat. In addition to the costs of doctor's visits, hospital stays, and pharmaceuticals, workers may find that their performance at work suffers or perhaps disappears altogether.<sup>4</sup> As a result, taking the correct steps at the right time to avoid cardiovascular disease is advantageous to both people and the country's economy.<sup>5</sup>

From an early age, preventative measures should be taken to reduce the risk of cardiovascular disease and other risk factors. Cardiovascular disease-causing atherosclerosis does not appear out of nowhere. According to the studies,

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atherosclerosis may develop in healthy blood arteries at different stages of development, showing that it can occur even in the early years of life.<sup>6-7</sup>

Adults under the age of 60 account for 29% of all CVD-related fatalities worldwide, while people over the age of 70 accounts for over 50%. As a result, heart disease is not only a disease of the elderly or middle-aged, but also a major threat to the health of children and adolescents.<sup>6</sup>

Middle-aged and elderly persons are the primary source of current information regarding modifiable cardiovascular risk factors that might contribute to heart disease in the future or in the present. Adolescents and young adults are prime candidates for risk factor intervention, but the quantity of research conducted and the depth of information offered isn't sufficient.<sup>8</sup>

Identifying risk factors is a well-known concept in both the public and clinical health care sectors. These risk variables are used as a basis for avoiding morbidity and death from cardiovascular disease and other NCDs. A person's risk of acquiring a certain disease is determined by a person's risk factors. Cardiovascular risk factors can be prevented and the overall quality of life improved by gaining a thorough understanding of, assessing, and taking preventative measures.<sup>9</sup> Atheroma can develop in the arteries when certain risk factors are present. Cardiovascular risk factors fall into two categories: those that can be modified and those that cannot. Risk factors that may be adjusted or prevented account for around 80% of cardiovascular disease cases. Obesity, high blood pressure, dyslipidemia, and hyperglycemia are all changeable risk factors that contribute to death from cardiovascular disease, which in turn affects other modifiable risk factors such as smoking and alcohol intake. Another collection of ACVD risk factors that cannot be prevented, managed, or adjusted is naturally fixed. Gender, Age, Ethnicity, and Genetics are all non-modifiable risk factors.<sup>10</sup>

Preventing future cardiovascular disease by gaining a better knowledge of cardiovascular risk factors and their causes in young adults is only one benefit of a more comprehensive understanding of these variables. The current study was conducted to find the frequency of modifiable risk factors in the adult population under the age of 40 in both genders.

#### **METHODOLOGY:**

This cross-sectional study was conducted at the Department of Physiology, the University of Sindh from 2016 to 2018 after getting approval from the institutional ethical review board via letter no Physiol/IRB/199. 297 healthy individuals of both genders were initially contacted via convenient purposive sampling. A total of 263 people gave consent and were included in the current study. Thirty-four people opted not to donate blood or provide any information. All included participants were 20-40-year-old, residents of Hyderabad with no history of smoking, drug addiction or any CVD.

A self-designed structured questionnaire was administered to all participants and associated data was collected. Anthropometric measurements and blood pressure of subjects were taken in a standardized way. The height of the individuals was measured by using a stadiometer while the waist circumference of the individuals was measured by using a non-stretchable measuring tape. Blood was collected and serum was obtained by centrifuging the samples at 2000 rpm for 5 minutes. Serum was then kept at -20 centigrade until analyzed. Samples were analyzed using autoanalyzer Microlab 300 by Merck for high-density lipoproteins, low-density lipoproteins, triglycerides, and total cholesterol. A glucometer was used to measure blood sugar (glucose) levels automatically using the capillary method (Easy max by Biotechnology corp.). Physical activity at work and in their spare time was documented using a questionnaire. Being physically active meant that the subject was walking for at least 30 minutes, four or five days a week for the express purpose of maintaining their physical fitness (exercise). Being physically active meant that the subject was walking for at least 30 minutes, four or five days a week for the express purpose of maintaining their physical fitness (exercise). Sitting for most time of the day (desk job) with little to no physical movement intended to burn calories was considered a little activity. Walking for at least 30 minutes 4-5 times a week was considered a physical activity of low to moderate intensity. Vigorous activity of 30-60 minutes duration, including jogging and sports, was considered as physical activity of Moderate to High intensity. Data were analyzed via SPSS version 21 and the presence of modifiable factors is presented as percentages while the difference in the occurrence of modifiable risk factors amid both genders was calculated by applying the chi-square test and a p-value of less than 0.05 was considered as significant.

#### **RESULTS:**

Out of a total of 263 subjects, 168 subjects were males and 95 subjects were females with a mean age of 28.03 years. A higher percentage of total subjects (76%) had at least one CVD risk factor. Only 24% of subjects were without any CVD risk factor. 2 risk factors were present in 24% of subjects, 3 risk factors were present in 11% of subjects, and as high as 18% of subjects had more than 3 risk factors. Overall Inactive lifestyle was the common risk factor, affecting as much as 74% of subjects, followed by increased waist circumference i.e., central obesity (>80cms in women and >90cm in men), which was prevalent in 44% of total subjects. Out of all risk factors increased LDL concentrations (normal level <130 mg/dl) were least prevalent, with 6% sufferers, followed by increased TC concentration (normal level <200mg/dl) and hyperglycemia (7%). The overall frequency of risk factors in all the study participants is shown in table I.

Female subjects had higher frequency of obesity both general (>25 BMI) and central as compared to male subjects.

However statistical significance failed to reach. Total cholesterol was also higher in female subjects ( $p=.01$ ). Results for hypertension were similar to most studies done, with more men (40%) suffering from hypertension (systolic blood pressure > 140 mmHg) as compared to 22% of females with hypertension ( $p=0.0001$ ). In case of LDL concentrations significant difference were not reached, however still LDL was higher in male subjects. Triglyceride levels (normal level < 150 mg/dl) were much higher in male and results were significant (0.0001). Hyperglycemia (normal blood glucose 100-140mg/dl) was twice as high in males (8%) as females (4%) and the difference was statistically significant ( $p=0.01$ ). The difference in frequencies of modifiable risk factors among male and female study participants is shown in table II.

**DISCUSSION:**

Few studies have examined the prevalence of cardiovascular disease and its risk factors in young Pakistani adults. Most Pakistani studies have focused on people over 40; literature on those under 40 is scarce. Young and elderly people lack

research on cardiovascular risk factors. Comparing this study to others was challenging. This study focused on young adults (under 40) to determine risk factor prevalence. Male and female gender differences were also studied.

This study's results mostly agree with other research. Males had more risk factors, indicating they are more prone to CVDs. Saleheen D et al. studied total records of diagnosed myocardial infarction patients and found that 16.1% were under 40 years old. Patients were mostly male (93.1%). Males are more prone to CVDs, and the risk rises with age.<sup>11</sup>

Obesity causes CVD. Pakistan ranked 9th in world obesity. Obesity was a major CVD risk factor in this study. BMI found 30% of subjects overweight or obese. Males (29%) had a lower obesity rate than females (30%). The results of this study are similar to other Pakistani studies that found obesity in young adults to be between 25 and 35% and more prevalent in females than males with a small margin of difference.<sup>12</sup> Females had a larger waist circumference than males, and it increased with age. These results match Noor M et al research, who also found that female waist circumferences increase with age.<sup>13</sup>

Table1: Overall cardiovascular risk factors in study participants.

Individual risk factors	Number of individuals with risk factor (N = 263)	Frequency (%)
Obesity	78	30%
Central obesity	116	44%
Hypertension	89	34%
Increased TC	19	07%
Increased LDL	15	06%
Increased TG	92	35%
Hyperglycemia	18	07%
Less than required HDL	70	26%
Inactive lifestyle	195	74%

\*Central obesity: increased waist circumference. \* TC: Total cholesterol. \* LDL: Low density lipoproteins \* TG: Triglycerides. \*HDL: High density lipoproteins

Hypertension is a well-studied risk factor for CVDs. In their seventh report, the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure emphasized that systolic rather than diastolic Blood Pressure is linked to CVDs. Our study emphasized systolic blood pressure. Prehypertension and hypertension prevalence was 34%. Prevalence of HTN was higher in male than in female subjects, 22%; these results agreed with the study by Javed A et al. in Lahore.<sup>14</sup>

Dyslipidemia (high levels of at least one type of cholesterol/lipid) was present in 35% of subjects, with high triglycerides being the most common. Basit A et al found impaired triglyceride levels in 48.9% of subjects with dyslipidemia. Diabetes affects vascular and cardiovascular risk factors.<sup>15</sup> Khan Hu et al show that diabetics have higher Dyslipidemia levels than non-diabetics.<sup>16</sup> Hyperglycemia was 7% in total subjects, more common in men. The small sample size may explain why no diabetics were found.

Table 2: Comparison of individual risk factors among gender

Gender	Male Total (N = 168)	Female Total (N = 95)	P-value
<b>Individual risk factors</b>			
Obesity	49 (29%)	29 (30%)	0.71
Central obesity	58 (35%)	58 (61%)	0.07
Hypertension	68 (40%)	21 (22%)	0.0001
Increased TC	07 (4%)	12 (13%)	0.012
Increased LDL	11 (6%)	04 (4%)	0.76
Increased TG	78 (46%)	14 (14%)	0.0001
Hyperglycemia	14 (8%)	04 (4%)	0.016
Less than required HDL	45 (27%)	25 (26%)	0.0001
Inactive Lifestyle	113 (67%)	82 (86%)	0.0007

Sedentary or inactive lifestyles cause obesity and risk factors.<sup>17-18</sup> 74% of subjects had this risk factor. Hayes L et al compared the activity levels of Indians, Pakistanis, and Bangladeshis to those of Europeans. 52% of European men don't get enough exercise, compared to 71% of Indians, 88% of Pakistanis, and 87% of Bangladeshis. Women had similar findings. European men and women participated in more moderate to intense sports and exercise than Pakistanis and Indians. Lack of exercise and improper diet (high fat, high carb, high calorie) are causing Pakistan's obesity epidemic (and subsequent risk factors).<sup>19-20</sup> Less active than men, women may consider household chores as exercise and believe that working at home keeps them physically active, which is not true on biological grounds. 1 hour of

housework uses less energy than 30 minutes of intense walking or 15 minutes of jogging. This may be why women are generally and physically more obese. Cultural inhibitions and ignorance prevent women from using jogging tracks and gyms. Men are allowed to go out, so more men are jogging, swimming, playing sports, and working out.

There are certain limitations of this study. The sample size used in this study should have been bigger. But due to limited resources available sample size couldn't be increased above the current size. Furthermore, despite the increased prevalence of diabetes in Pakistan, not even a single diabetic was detected in this study. The possible reason for this again could be the sample size. With a smaller-scale study such as this, the magnitude of difference between the two young adult categories needed to be much larger in order to identify more factors that may have been subtly different.

More studies should be done on individual risk factors as well as on a combined group of risk factors. As cardiovascular events are nowadays occurring in adults as well it is important to stratify risk factors in adults and preventive measures should be taken into account. It is important for educational institutions to raise awareness and educate students about the risk factors for the cardiovascular disease since these risk factors not only contribute to the development of heart disease but also have an effect on a person's quality of life.

## CONCLUSION

76% of research participants had at least one risk factor. High cardiovascular risk factors in young individuals are alarming. These risk factors will eventually lead to cardiovascular diseases and a poor quality of life. Three risk factors (Obesity, Central obesity, and Total Cholesterol) were more prevalent in females, while 4 risk factors (Hypertension, Increased TG, raised LDL, and hyperglycemia) were higher in males, making the male population slightly more at risk for developing CVDs at a young age.

### Authors Contribution:

**Zulfiqar Ali Laghari:** Concept design, Overall Supervision

**Naseem Attar:** Data Collection

**Noman Sadiq:** Writeup, final drafting

**Farzana Gul Baloch:** Data Collection

## REFERENCES:

- World Health Organization. Cardiovascular diseases. (2017). Accessed: August 15, 2018: <http://www.who.int/mediacentre/factsheets/fs317/en/index.html>.
- World Health Organization. Cardiovascular diseases. (2021). Accessed: June 11, 2021: [https://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)).
- Shahid SU, Sarwar S. The abnormal lipid profile in obesity and coronary heart disease (CHD) in Pakistani subjects. *Lipids Health Dis.* 2020; 19(1): 1-7. DOI: <https://doi.org/10.1186/s12944-020-01248-0>.
- Aminde LN, Dzudie A, Mapoure YN, Tantchou JC, Veerman JL. Estimation and determinants of direct medical costs of ischaemic heart disease, stroke and hypertensive heart disease: evidence from two major hospitals in Cameroon. *BMC Health Serv Res.* 2021; 21(1): 1-3. DOI: <https://doi.org/10.1186/s12913-021-06146-4>.
- Pahin B, Ýlgün G. Risk factors of deaths related to cardiovascular diseases in World Health Organization (WHO) member countries. *Health Soc Care Community.* 2022; 30(1): 73-80. DOI: <https://doi.org/10.1111/hsc.13156>.
- Drozd D, Alvarez-Pitti J, Wójcik M, Borghi C, Gabbianelli R, Mazur A, Herczeg-Èavrak V, Lopez-Valcarcel BG, Brzeziński M, Lurbe E, Wühl È. Obesity and cardiometabolic risk factors: From childhood to adulthood. *Nutrients.* 2021; 13(11): 4176-84. DOI: <https://doi.org/10.3390/nu13114176>.
- Pahin B, Akþan ÝO, Önal BS, Hopoðlu E, Karabekiroðlu K. Evaluation of carotid intima media thickness as an early marker of atherosclerosis in children and adolescents with autism spectrum disorder: a case-control study. *Int J Dev Disabil.* 2021; 30: 1-0.
- Drogalis-Kim D, Cheifetz I, Robbins N. Early nutritional influences of cardiovascular health. *Expert Rev Cardiovasc Ther.* 2021; 19:12: 1063-73. DOI: <https://doi.org/10.1080/14779072.2021.2021070>.
- Francula-Zaninovic S, Nola IA. Management of measurable variable cardiovascular disease/risk factors. *Curr Cardiol Rev.* 2018; 1;14(3): 153-63. DOI: <https://doi.org/10.2174/1573403X14666180222102312>.
- Yusuf S, Joseph P, Rangarajan S, Islam S, Mentè A, Hystad P, Brauer M, Kutty VR, Gupta R, Wielgosz A, AlHabib KF. Modifiable risk factors, cardiovascular disease, and mortality in 155 722 individuals from 21 high-income, middle-income, and low-income countries (PURE): a prospective cohort study. *The Lancet.* 2020; 395(10226): 795-808. DOI: [https://doi.org/10.1016/S0140-6736\(19\)32008-2](https://doi.org/10.1016/S0140-6736(19)32008-2).
- Saleheen D, Frossard P. CAD risk factors and acute myocardial infarction in Pakistan. *Acta Cardiol.* 2004; 59(4): 417-24. DOI: <https://doi.org/10.2143/AC.59.4.2005208>.
- Nanan DJ. The obesity pandemic--implications for Pakistan. *J Pak Med Assoc.* 2002; 52(8): 342-46.
- Noor M, Raza UA, Zeeshan MF, Mohammad W. Frequency of abnormal waist circumference and associated risk factors in healthy adults. *J Pak Med Assoc.* 2007; 21(4): 248-255.
- Javed A, Saleem S, Saeed M, Raza H, Shahid B, Islam K. Influence of Socio-demographic Variables on Prevalence of Hypertension in Lahore Division, Pakistan. *American Academic Scientific Research Journal for Engineering, Technology, and Sciences.* 2021; 81(1): 186-91.
- Dal Canto E, Ceriello A, Rydén L, Ferrini M, Hansen TB, Schnell O et al. Diabetes as a cardiovascular risk factor: an overview of global trends of macro and microvascular complications. *Eur J Prev Cardiol.* 2019; 26(2): 25-32. DOI: <https://doi.org/10.1177/2047487319878371>.
- Khan HU, Khan I, Khan AA, Rahman AU, Khan Z, Khan RU. Lipid profile in type 2 diabetics versus non-diabetic controls in adult population of district Bannu, Pakistan. *Gomal j. med. sci.* 2022; 20(1): 17-23.

17. Barnett TA, Kelly AS, Young DR, Perry CK, Pratt CA, Edwards NM et al. American Heart Association Obesity Committee of the Council on Lifestyle and Cardiometabolic Health; Council on Cardiovascular Disease in the Young; and Stroke Council. Sedentary behaviors in today's youth: approaches to the prevention and management of childhood obesity: a scientific statement from the American Heart Association. *Circulation*. 2018;138(11): e142-59. DOI: <https://doi.org/10.1161/CIR.0000000000000591>.
18. Mainous III AG, Tanner RJ, Rahmanian KP, Jo A, Carek PJ. Effect of sedentary lifestyle on cardiovascular disease risk among healthy adults with body mass indexes 18.5 to 29.9 kg/m<sup>2</sup>. *Am J Cardiol*. 2019; 123(5): 764-68. DOI: <https://doi.org/10.1016/j.amjcard.2018.11.043>.
19. Hayes L, White M, Unwin N, Bhopal R, Fischbacher C, Harland J, Alberti KG. Patterns of physical activity and relationship with risk markers for cardiovascular disease and diabetes in Indian, Pakistani, Bangladeshi and European adults in a UK population. *J Public Health*. 2002; 24(3): 170-8. DOI: <https://doi.org/10.1093/pubmed/24.3.170>.
20. Irfan M, Jabbar M, Hameed S. Dietary Habits and Prevalence of Underweight/ Obesity in Students of University of Gujrat, Pakistan. *J Liaquat Uni Med Health Sci*. 2019;18(02):175-80. DOI: <https://doi.org/10.22442/jlumhs.191820623>.

