



Risk of Coronary Heart Disease in Adult Patients in Manikganj, Bangladesh.

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Abstract

Background: Coronary heart disease is one of the leading causes of death worldwide. It can be present in people of all ages, but a higher incidence rate was observed in the male population compared to women. The incidence rates also increased greatly in the older population. It is influenced by many factors. Obesity is considered as one of the passive risk factors of CHD, but recent studies have determined that obesity plays a role both as a primary and secondary risk factor. Obesity is rapidly becoming a major problem for many diseases alongside CHD. **Aim of the study:** The aim of the study was to determine the relation between obesity and heart disease. **Methods:** This cross-sectional observational study was conducted at the Department of Cardiology, Colonel Malek Medical College, Manikganj, Dhaka during the period of January 2020 to December 2020. The study sample was determined as 150 participants, and a purposive sampling technique was used. SPSS software was used for data analysis. **Result:** The study sample was determined to be 150. 76% of the participants were male, and the male to female ratio was 19:6. 38% of the total participants were from the oldest age group of 65-74, and the youngest age group of 25-34 years had the lowest number of participants. 50% of the participants were from low-income families, and only 8% were from high-income families. The major risk factor of CHD was smoking, affecting 60% of patients. Obesity was a primary risk factor for 58% of the participants, and diabetes was present in 10% of the participants. **Conclusion:** The current study showed a clear relationship between obesity and CHD occurrences. The knowledge of obesity as a primary risk factor was lacking, and it was more commonly known as a secondary risk factor, causing diabetes, dyslipidemia, and hypertension, among other major risk factors of CHD.

Keywords: Obesity, Coronary Heart disease, Dyslipidaemia, Central obesity

INTRODUCTION

Coronary artery disease one of the most common disease of CHD. Coronary artery disease generally refers to the narrowing or blockage of the coronary arteries. This is caused by cholesterol plaque buildup in the arteries connected to the heart. It is one of the leading causes of mortality worldwide. Death as a cause of CHD peaked in the 1960s worldwide, and even though the rates have declined in the developed countries during the following decades, it is still a major cause of death in the rest of the world.^[1] The decline of CHD in the developed countries like the USA, Finland, Australia, etc. was a cause of celebration, which was possible through the advancing medical technology. But despite that, there were 7.3 million deaths worldwide just in the year 2001 as a result of CHD. And 3/4th of these death occurs in the developing and under-developed countries.^[2] The risk factors, however, vary greatly between the different countries. Although CHD has many risk factors, obesity is both a direct and indirect contributor to CHD. And even in those with no coronary artery disease, obesity can still cause heart failure.^[3] Obesity itself is a complex and increasingly prevalent disorder of the body, that can create a variety of medical, social, and psychological difficulties. Some of the common problems associated with obesity alongside coronary heart disease, diabetes, high blood pressure, stroke, sleep apnea, breathing problems, etc. All of these also contribute as risk factors for CHD. And even in developed countries, where heart disease rates have decreased greatly, obesity is becoming the next

big problem. Obesity is recognized as the leading cause of death in the USA, and even worldwide, it causes diabetes, heart disease, and even some forms of cancer. Obesity also leads to hypertension and poorer mental health. Even the Framingham study and other large studies have concluded that even minor amounts of obesity can greatly increase the risk of cardiovascular disease.^[4] The impact of obesity is much more apparent in the developed countries, as 79% of all 300 million adults affected by obesity are from developed countries.^[5] Among the major effects of obesity, diabetes is one of the more dangerous ones, and the USA is in the leading position in diabetes worldwide, with 2/3rd of all diabetes cases in 37 developed countries combined. While the exact cause of this high prevalence of diabetes is still not confirmed, unhealthy diet and reduced physical activity are recognized as major causes by many researchers.^[6] Obesity is currently the second leading cause of preventable death in the USA, with cigarette smoking being the first. ^[7,8] The current study was conducted to determine the risk of CHD in association with obesity and its effects on developing countries like ours.

OBJECTIVES:

General Objective:

- To understand the relation of weight and health risk

Specific Objective:

- To observe the relation between obesity and CHD

MATERIALS& METHODS

This cross-sectional observational study was conducted period of January 2020 to December 2020. The study sample was determined as 150 participants. The participants were selected using a purposive sampling technique, using set inclusion and exclusion criteria. All the participants were made aware of the study, and consent was collected from each individual and respected hospital authorities. The data were selected using a pre-determined questionnaire, and then combined with blood cholesterol levels to generate a deeper understanding. The combination of these data were then inputted in the SPSS software.

Inclusion Criteria:

- Patients aged older than 22 years
- Patients with above average BMI

Exclusion Criteria:

- Patients older than 75 years
- Patients unable to answer qualifying questions

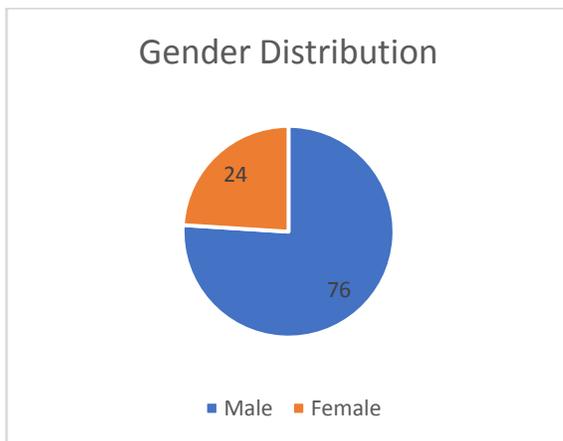


Figure I: Gender Distribution of participants (n=150)

Over 3/4th of the present study participants were male, and only 24% were female.

- Mentally sick or unstable patients

RESULTS

In this study, the study sample was determined to be 150. 76% of the participants were male, and the male to female ratio was 19:6. 38% of the total participants were from the oldest age group of 65-74, and the youngest age group of 25-34 had the lowest number of participants. 50% of the participants were from low-income families, and only 8% were from high-income families. The major risk factor of CHD was smoking, affecting 60% of patients. Obesity was a primary risk factor for 58% of the participants, and diabetes was present in 10% of the participants. High levels of triglyceride concentration and LDL concentration was observed in most of the study patients, mainly in the obese patients. Low levels of HDL was also observed in the obese participants of the study.

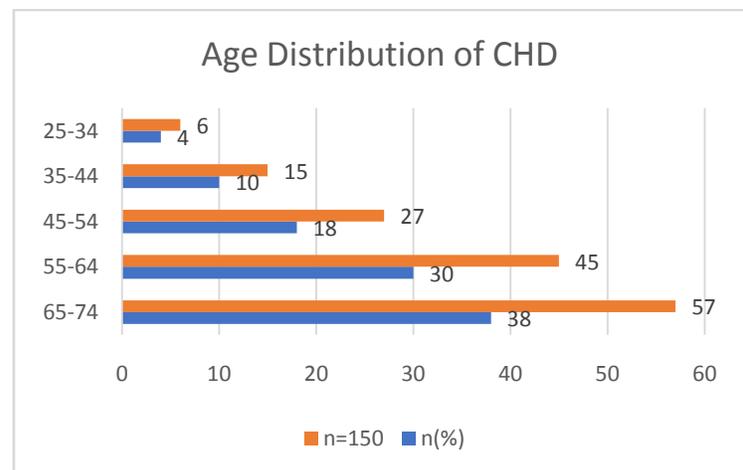


Figure II: Age distribution of participants (n=150)
 Over 1/3rd of the study participants (38%) was from the oldest age group of 65-74 years. 30% were from 55-64 years of age, 18% were from 45-54 of age group, 10% were from 35-44 years of age, and



the youngest age group of 25-34 had the lowest number of participants, only 4%.

Table I: Risk Factors of Study Participants (n=150)

Risk Factor	N(%)	n=150
Smoking	60	90
Obesity	58	87
Dyslipidaemia	54.67	82
Hypertension	38	57
Diabetes	10	15
Family History	5.33	8

Multiple risk factors were present in the study participants. Among the participants, the major risk factor was smoking, affecting 60% of the participants. 58% had obesity, being the close second risk factor. Dyslipidaemia was a primary risk factor in 54.67%, hypertension was present in 38%, diabetes was present in 10%, and family history was a risk factor for 5.33% of the participants.

Table II: Income level of Study Participants (n=150)

Income Level	N(%)	n=150
Low	50	75
Middle	42	63
High	8	12

Half the study participants belonged to the low-income group. 42% had a middle-income level, and only 8% of the participants were from the high-income level.

Table III: Age-wise distribution of triglyceride concentration between the groups (n=150)

Age (Yrs.)	Triglyceride Levels (n=150)
24-40	167.13 ± 26.83
41-55	210.71 ± 42.17
>55	152.56 ± 34.64

For a better generalisation of the cholesterol levels, the participants were divided into 3 large groups

based on their age. In the age group of 24-40 years, the Mean ± SD of triglyceride was 167.13 ± 26.83 (mg/dL). In the age group of 41-55 years, the Mean ± SD was 210.71 ± 42.17 (mg/dL), and in participants aged older than 55 years, the Mean ± SD was 152.56 ± 34.64 (mg/dL). High levels of triglyceride, anything greater than 200 mg/dL is considered a major risk for heart problems and stroke. And even borderline levels of triglyceride (150-200 mg/dL) has its own risk.

Table IV: Age wise distribution of HDL concentration between the groups (n=150)

Age (Yrs.)	Case (n=150)
24-40	40.52 ± 5.77
41-55	47.44 ± 5.91
>55	43.73 ± 8.93

In the age group of 24-40 years, the Mean ± SD of HDL was 40.52 ± 5.77 (mg/dL). In the age group of 41-55 years, the Mean ± SD was 47.44 ± 5.91 (mg/dL), and in participants aged older than 55 years, the Mean ± SD was 43.73 ± 8.93 (mg/dL). Low levels of HDL, anything less than 40 mg/dL is considered a major risk for heart problems and stroke. And even borderline levels of HDL (60-40 mg/dL) has its own risk.

Table V: Age wise distribution of LDL concentration between the groups (n=150)

Age (Yrs.)	Case (n=150)
24-40	99.88 ± 20.73
41-55	104.71 ± 21.95
>55	107.66 ± 22.74

In the age group of 24-40 years, the Mean ± SD of LDL was 99.88 ± 20.73 (mg/dL). In the age group of 41-55 years, the Mean ± SD was 104.71 ± 21.95 (mg/dL), and in participants aged older than 55 years, the Mean ± SD was 107.66 ± 22.74 (mg/dL). In case of LDL levels, anything greater than 100 mg/dL is considered a risk for heart problems and stroke.



DISCUSSION

Coronary heart disease is one of the leading causes of death worldwide. Coronary artery disease is one of the most common diseases of CHD. It generally refers to the narrowing of heart arteries caused by the blockage of plaques. Heart disease is globally recognized as a major cause of global death. Even though the number of deaths as a cause of CHD has been decreasing in the developed countries, the US alone had a mortality record of 163.6 deaths per 100,000 population as of 2018.^[9] There are many risk factors for CHD, but currently one of the more apparent and upcoming ones is obesity. Obesity, along with it, brings a lot of adverse risk factors. As a result, it is often associated with the increasing occurrence of CHD morbidity and mortality.^[4,10] In New Jersey alone, 68% of the adults were obese, and a similar rise in obesity has been observed in many other developed countries as well. Many epidemiology studies have been conducted that support this theory, but such studies are often imprecise and can suffer from misclassification bias. Although, angiographic and post-mortem studies have shown a clear correlation between central obesity, or central body fat distribution.^[10] This is supported by a study with a 12-year follow-up period, where independent of BMI, the subscapular skinfold thickness (SSF) showed clear signs that centrally obese individuals are at a much higher risk of CHD.^[11] The study showed that those in the middle tertile of SSF faced a 70% increase of definitive CHD. This increase more than doubled in the highest tertile. As the study prioritized SSF over BMI levels as a definitive risk factor, obesity is

sometimes considered a minor CHD risk factor. But while obesity works as a primary risk factor for CHD, it also works as a secondary risk factor as well. Hypertension, dyslipidemia, diabetes are some of the other major risk factors of CHD, all of which are greatly affected by obesity. Many cardiac rehabilitation programs suggest weight loss as a broadly effective risk factor intervention, despite not having any specific programs targeted for weight loss.^[12] Obesity was classified as a major risk for CHD in 1998 by the American Heart Association. They also described how obesity research is still in its infancy, and compared it to a serious risk factor on par with smoking, high cholesterol levels, and physical inactivity.^[13] As the research on obesity is still in its infancy, any clear solutions or treatments are still unavailable. Although in the past 2 decades, the incidence of morbidity and mortality from cardiovascular diseases have been decreasing, deaths as a result of heart failure has been increasing rising rapidly, with about 550,000 cases diagnosed per year on average, and a death rate of 300,000 per year.^[14] Obesity is more commonly known as a risk factor for type-II diabetes and hypertension, but very few studies have been conducted on the effects of obesity on coronary heart diseases.^[15,16] The primary reason for the link between obesity and diabetes is recognized as insulin resistance, but some studies have shown that obese and overweight people can be insulin sensitive as well.^[17] The current study was conducted to focus on the correlation between obesity and CHD. The study was conducted with 150 patients who had a history of angina or surviving myocardial infarction. Among the study participants, 76% were male and only 24% were female. This is common in several



other studies as well, as CHD and CAD are more prone to develop in the male population.^[18,19,20] While the average age of heart attack or heart failure in males is 65, in women it is 72. The higher-aged population are at an increased risk of CHD, which was supported by our study findings. In the current study, the highest number of patients (n=57) were from the age group of 65-74 years. Only 4% of the study participants were from the youngest age group. This is similar to findings from other studies, where the majority of the study participants belonged to the highest age group, and very few belonged to the lowest age group.^[22] Some observational studies have been conducted to find the relation of high BMI in early adult life and its effects on CHD risk in later years. These studies found a clear relation between patients who had high BMI occurring in early adult life and their relative increase of risk in CHD, as compared to low-BMI participants.^[22] This provided a better understanding of patient behavior in our study, where 28% of the total participants reported that they had above average weight in early life. The current study focused on the primary risk factors of coronary heart disease in patients, and the biggest risk factor was determined as smoking. Smoking is recognized as a major risk factor for heart diseases worldwide,^[23] and even passive smoking is recognized as a high-risk factor.^[24,25] The second biggest risk factor was obesity, affecting 58% of the participants. Some of the other risk factors included hypertension (38%), dyslipidemia (54.67%), and diabetes (10%), all of which are directly influenced by overweight.^[11,14] There are different types of obesity, but all of the present study participants had central obesity, which is recognized as the primary type of obesity as a risk factor for heart

disease.^[14] The present study showed obesity as a major primary risk factor, but obesity also affected patients as a secondary risk factor as well. Hypertension and dyslipidemia are two of the major problems resulting from high BMI^[26,27] and one of the major risk factors for diabetes is globally recognized as obesity.^[17] Obesity has also been connected with high levels of triglyceride and LDL levels, and a low level of HDL level, which are risk factors for creating heart diseases and stroke. The present study observed higher levels of LDL and triglyceride levels in most of the participants, which was above the optimal cholesterol levels. This increased cholesterol level was observed to occur more in the obese patients of the study. Low levels of HDL is another risk factor for heart diseases, and below 60 mg/dL level of HDL was observed in all the participants of this study, while some of the obese participants had HDL levels less than 40 mg/dL. Obesity also leads to the deterioration of mental health, leading to an unhealthy lifestyle in people of all ages and gender. But the depression was much more prominent in young females and males compared to the older population.^[28,29] The study also included the income levels of the participants. Half the participants were from low-income levels, and very few were from high-income families. This is mostly because of the average income level of our country, and the institution of the study also played a definitive role in this. These findings were somewhat different from the findings of studies conducted in developed countries, where the average income is much higher. In conclusion, obesity plays a major role as a risk factor for coronary heart diseases, both as a primary and a secondary risk factor.



CONCLUSION

The current study showed a clear relationship between obesity and CHD occurrences. The knowledge of obesity as a primary risk factor was lacking, and it was more commonly known as a secondary risk factor, causing diabetes, dyslipidemia, and hypertension, among other major risk factors of CHD. The occurrence of CHD was much higher in the

male population, and the cases of CHD increased with age.

RECOMMENDATIONS

The study was conducted with small sample size. A purposive sampling technique was used, so selection bias might be present. This was a single-center study, and a multi-center study with a wider demographic is necessary to reach a much clear image.

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