FREQUENCY OF PRE-DIABETES IN PATIENTS OF CORONARY ARTERY DISEASE

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Abstract
Objective: *To determine the frequency of pre-diabetes in patients of coronary artery disease (CAD).*
Study Design: *Cross-sectional study.*
Setting: *Department of Medicine, Shifa International hospital Islamabad.*
Study Duration: *28-June-2024 to 27-December-2024.*
Materials and Methods: *A total of 190 patients who were admitted to the Department of Medicine for coronary angiography to determine CAD were included. Only patients with CAD who reported undergoing coronary angiography were included. After inclusion, venous blood samples were obtained from each patient and sent to the hospital laboratory for determination of HbA1c levels. Patients having HbA1c levels from 5.7% to 6.4% were labelled as having pre-diabetes.*
Results: *Mean age of patients included in this study was 51.07±7.93 years. On frequency of gender, 150 (78.95%) patients were male patients and 40 (21.05%) were female patients. There were 88 (46.32%) hypertensive patients. 74 (38.95%) patients were smokers. Out of 190 patients, pre-diabetes was diagnosed in 80 (42.11%) patients.*
Conclusion: *There is a high frequency of pre-diabetes in patients with coronary artery disease (CAD). In the present study, pre-diabetes was diagnosed in 80 (42.11%) patients presenting with CAD.*

INTRODUCTION

Ischemic Heart Disease (IHD) stands as the leading cause of mortality linked to cardiovascular conditions and diseases overall. Current estimates suggest that the prevalence of IHD is around 1,655 cases per 100,000 individuals, with projections indicating that this number could rise to over 1,845 by 2030.[1, 2] The likelihood of developing IHD tends to increase with age, and it is notably more common among males. Recent research highlights a significant rise in deaths attributed to IHD in Southeast Asia from 1990 to 2019, with cardiovascular disease (CVD) fatalities in the region escalating from 5.6 million to 10.8 million. During this period, the share of CVD-related deaths as a percentage of total deaths increased from 23% to 35%.[3] Moreover, individuals with risk factors such as diabetes mellitus are experiencing a higher incidence of IHD.[4, 5]

Diabetes mellitus (DM) encompasses a group of metabolic disorders characterized by high blood sugar levels. These heightened glucose levels result from either insufficient insulin production, ineffective insulin utilization, or a combination of both. Prediabetes is understood as a transitional phase on a spectrum that moves from normal blood sugar levels to progressively worsening glucose

regulation, eventually culminating in the onset of diabetes.[6]

Prediabetes is defined by the presence of diminished glucose tolerance and/or abnormal fasting glucose levels. The associated health risks of prediabetes include not only the potential progression to diabetes mellitus but also an increased risk of cardiovascular diseases related to atherosclerosis and higher mortality rates, even when considering other risk factors.[7] Research indicates that impaired glucose tolerance (IGT) within the general population correlates with a greater likelihood of widespread mortality, as well as an increased incidence of coronary heart disease and strokes.[8] According to a panel of experts from the American Diabetes Association, about 70% of individuals identified as having prediabetes may eventually develop diabetes over time. Nevertheless, there is still no consensus among scientists regarding whether treatment should be routinely recommended for patients with prediabetes.[9]

The aim of proposed study was to determine the frequency of pre-diabetes in patients of coronary artery disease.

METHODS:

This cross-sectional study involving 190 patients was conducted in the department of Medicine, Shifa International hospital Islamabad from 28-June-2024 to 27-December-2024. Patients with first time diagnosis of CAD on coronary angiography and age 30-70 years were included. While known cases of diabetes mellitus were included.

Data on baseline study variables, including age, gender, and co-morbidities like hypertension, diabetes, and smoking, was gathered for each participant patient.

Participants included in the study were solely those diagnosed with coronary artery disease (CAD) confirmed by coronary angiography. Following their inclusion, venous blood samples were collected from each patient and dispatched to the hospital laboratory for HbA1c analysis. Pre-diabetes is mainly diagnosed by assessing HbA1c levels. People with HbA1c results ranging from 5.7% to 6.4% are categorized as having pre-diabetes.

RESULTS:

The average age of participants in this study was 51.07±7.93 years. In terms of gender distribution, 150 (78.95%) were male and 40 (21.05%) were female. Regarding hypertension status, 88 (46.32%) patients were hypertensive, while 102 (53.68%) were non-hypertensive. As for smoking status, 74 (38.95%) were smokers, and 116 (61.05%) were non-smokers (Table 1).

Among 190 patients, 80 (42.11%) were diagnosed with pre-diabetes (Figure 1).

Table 1. Baseline Patient's Characteristics.

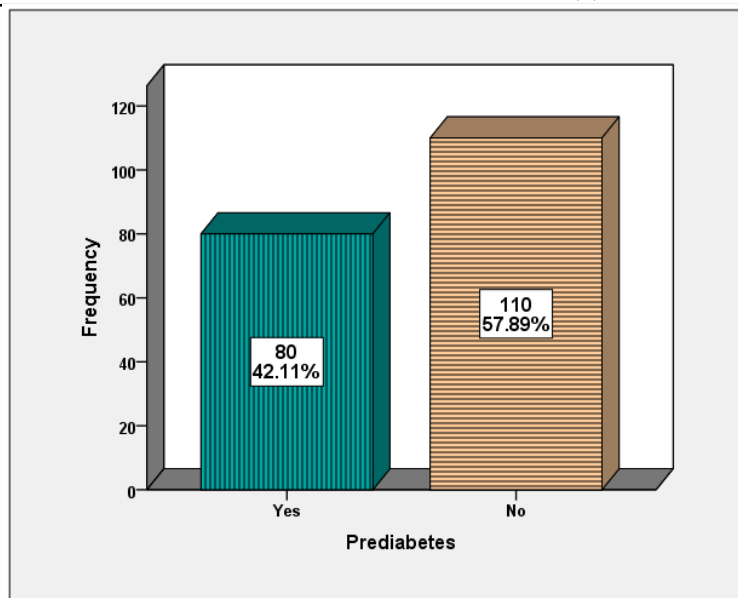| Age (Years)	51.07±7.93
Gender (%)	
Male	150 (78.95%)
Female	40 (21.05%)
Hypertension	88 (46.32%)
Smoking	74 (38.95%)

Figure 1. Frequency of Prediabetes.

DISCUSSION:

The prevalence of diabetes and pre-diabetes has surged to alarming levels, posing a considerable public health crisis. Recent estimates indicate that about 7.8% of the U.S. population—approximately 23.6 million people—are affected by diabetes. Of these individuals, 17.9 million have been formally diagnosed, while around 5.7 million remain unaware of their condition. Furthermore, an astounding 57 million Americans are estimated to have pre-diabetes, a state characterized by elevated blood sugar levels that do not yet meet the threshold for diabetes.[10] Data from 2005 to 2006 showed that the diabetes prevalence among adults aged 20 and over was 12.9%, with nearly 40% of these cases undiagnosed. Additionally, about 29.5% of adults were estimated to have pre-diabetes during that period. In the United Kingdom, the situation is similar, as diabetes affects roughly 9.1% of the population, with approximately 1.7% of cases still undiagnosed. At that time, it was noted that 18.5% of diagnosed diabetes cases were previously undetected.[11]

Looking toward the future, projections suggest a disturbing trend: global diabetes rates could potentially double by 2030. In 2007, it was estimated that 308 million people worldwide, specifically aged between 20 and 79, were living with pre-diabetes. This figure is expected to rise significantly, reaching 418 million by 2025. These statistics emphasize the critical need for heightened awareness, preventive measures, and effective management strategies for diabetes and pre-diabetes globally.[12]

In present study we determined the frequency of prediabetes in patients of coronary artery disease. In our study, pre-diabetes was diagnosed in 80 (42.11%) patients.

Cueva-Recalde et al. conducted a study on frequency of pre-diabetes in patients of CAD and reported pre-diabetes in 40.2% patients.[13]

While a study by Drobek et al. reported pre-diabetes in 72.3% patients.[14]

Previous research has demonstrated a correlation between prediabetes and an elevated risk of death and cardiovascular diseases in both the general population and patients with chronic conditions. Researchers are investigating whether early treatment during the prediabetic phase might be a viable option, considering that the transition from intermediate hyperglycemia to diabetes often goes unrecognized and untreated for significant periods. Experts unanimously emphasize the importance of lifestyle modifications, particularly engaging in regular exercise and maintaining a balanced diet. However, there is a lack of comprehensive studies to determine whether interventions for prediabetes are more beneficial than harmful.[15] Research from the Diabetes Prevention Program indicates that lifestyle

modifications can lower the risk of developing diabetes mellitus (DM) by 58% in individuals with prediabetes. Additionally, consistent use of metformin at a dosage of 2 × 850 mg can decrease this risk by 31% over a follow-up period of 2.8 years. Future research should incorporate more cardiovascular outcomes rather than focusing exclusively on blood sugar levels to effectively evaluate the treatment's potential benefits for individuals with dysglycemia. In summary, early detection and effective management of prediabetes may play a significant role in preventing cardiovascular diseases.[16]

Many patients with cardiovascular disease (CVD) exhibit a significant incidence of glucose metabolism disorders, particularly those with certain risk factors. This prevalence supports the case for implementing specialized diabetic screening methods, which could potentially diminish the long-term complications associated with these diseases and decrease mortality rates. Enhanced screening processes would enable individuals with prediabetes to achieve better glycemic control and assist in preventing or postponing the onset of diabetes, especially among those who are obese or have experienced an acute coronary event.[17, 18]

The present study is limited by a small sample size. Larger studies are needed in Pakistan to determine the true frequency of undiagnosed pre-diabetes presenting with CAD population.

CONCLUSION:

There is a high frequency of pre-diabetes in patients of coronary artery disease (CAD). In present study, pre-diabetes was diagnosed in 80 (42.11%) patients presenting with CAD.

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