Early Identification Of Diabetes Mellitus And Risk Factors Among Relatives Of Patient Admitted With Coronary Artery Disease In Tertiary Care Hospital

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Abstract

Background : *Diabetes mellitus is a metabolic condition in which there is an inappropriate elevation of blood glucose level. Some risk factors are highlighted which can increase the development of coronary artery disease. It has been identified that first degree relatives of coronary artery disease patients were in high risk of developing coronary artery disease, diabetic mellitus and hypertension. Fasting blood glucose test has been preferred method to identify the status of diabetes mellitus.*

Material and method: *In this study, cross sectional study was carried out, a total of 225 participants were selected by using non – probability purposive sampling technique who fulfilled inclusion criteria. Data were collected with the help of Pre- Diabetes risk assessment tool and Fasting Blood Glucose level after obtaining necessary permission. The reliability of tools was calculated by using Cronbach's Alpha method is 0.735 respectively.*

Results: *In this study, results showed that 32.9% of first degree relatives had pre – diabetes and 13.8% had diabetic status. This study identified the risk factors were son of patient with coronary artery disease with the age group 18 – 40 years, overweight, obese, non – vegetarian who consumed red meat, smoking, alcohol consumption and altered sleep pattern. There was significant correlation between pre –diabetes and its risk factors with significant value of (< 0.005) which shows fasting blood glucose level and Body mass Index, smoking and sleep.*

Conclusion: *This research provides valuable insights that there was high risk of pre-diabetic and diabetic status among first degree relative of patients with coronary artery disease. It highlights the prevalence of diabetes and its association with certain risk factors, such as BMI, sleep and smoking. If early assessment of diabetic status and risk factors will be implemented to early phase, then potential*
risk factors of coronary artery disease can be prevented.

Keywords: *Diabetes Mellitus, Coronary Artery Disease, Risk Factors, Pre - diabetes*

I. INTRODUCTION

Diabetes Mellitus is a metabolic condition in which there is an inappropriate elevation of blood glucose level.[1] According to WHO, about 422 million people worldwide have diabetes among low and middle income countries.[2] An estimation over 74 million Indians were diagnosed with diabetes in 2021.[3] There are numerous risk factors are associated with developing diabetes mellitus in first degree of relatives of coronary artery disease patient, many people are not aware of these risk factors.[4] Due to faulty lifestyle of today era there is a rapid increase in diabetes mellitus prevalence in the general population and it is predicted that by 2045 approximately 783 million, will be having diabetes by International Diabetes Federation which may result in developing higher chances of cardiovascular disasese.[5] For detection of pre – diabetes fasting blood glucose level test has been done with the range of 100 – 125mg/dL[6] Pre – diabetes was associated with an increased risk of all causes of mortality with the composite of cardiovascular disease such as coronary artery disease and stroke.[7] Some other risk factors which can contribute to the development of diabetes mellitus are gestational diabetic women who can further develop diabetes in their children.[8]

Many studies highlighted that various risk factors contributes in developing pre diabetes were first degree of relatives of individuals with type 2 diabetes mellitus and having history of family history.[9] It is also observed in previous studies that prevalence of diabetes and pre diabetes is greater than comparison to those without a family history of diabetes higher in male with the age group of 40 years old with the $< 25 kg/m^2$ of body mass index.[10] Another studies was done which highlighted that there was association of body mass index

with the high risk of incident type 2 diabetes and cardiovascular disease with the mean age participants was 52 years and female and had BMI >25kg/m^2 .[11]

Some studies have done which shows fasting plasma glucose as initial screening for pre diabetes which resulted that prevalence of undiagnosed diabetes was 1.8%, impaired fasting glucose was 7.1% and impaired glucose tolerance was 2.9%.[12] Some similar studies shows that diabetes and pre diabetes prevalence among young and middle aged adults in India, which resulted that 49.90% were males, overall prevalence of diabetes was 6.65% and that of pre diabetes was 5.57%, some tools were used Socioeconomic, demographic, and anthropometric characteristics of the study participants by diabetes status- National Family Health Survey-4, 2015-16, Current status of diabetes and hypertension, Distribution of education, body mass index, and hypertension by place of residence, India National Family Health Survey-4, 2015-2016, A positive association was seen with urban residence, geographic region, sex, age, body mass index, socioeconomic status, and hypertension, South India showed a higher prevalence of diabetes (prevalence ratio, 2.01; p<0.001) than northern India.[13] Another studies have done that shows prevalence of diabetes and pre diabetes in 15 states of India which resulted 7.3% prevalence in which bihar 4·3% and Punjab 10·0% was the higher prevalence in urban area Age, male sex, obesity, hypertension, and family history of diabetes were independent risk factors for diabetes in both urban and rural areas, the outcome of the study shows an epidemiological transition, with a higher prevalence in low socioeconomic status groups in urban.[14]

Keeping all in view this study was carried out with purpose for **e**arly identification of diabetes mellitus and its risk factors among relatives of patient admitted with coronary artery disease in tertiary care hospital.

II.   MATERIAL AND METHOD

This cross sectional study was carried out on relatives of admitted patients with coronary artery disease in a tertiary care hospital of Lucknow, U.P. This study was carried out between January to March 2023. A total of 225 participants of aged ≥ 18 years were selected by purposive sampling technique who met the inclusion criteria. Inclusion criteria**:** First - degree of relatives of patients who are diagnosed with Coronary Artery Disease and admitted to the Department of cardiology, in tertiary care hospital. Relatives who are in the age of 18 - > 65 years. Exclusion criteria **:** Relatives who give a history of having diabetes. Relatives who had undergone pancreatic surgery. Relatives who are taking any salicylates, diuretics, anti - convulsant drugs, or any steroids. Women had gestational diabetes mellitus & and treatment.

Sample size calculation - Sample size was calculated based on previous study. In this study Cochrane formula was used **n = Z^2 P (1 – P) / d^2** Where :n = sample size Z = Statistic for a level of confidence (1.96) P = Prevalence of Pre - diabetes Mellitus (15%, P=0.15) d = Absolute precision (if 5%, d=0.05). Hence, n = 204. Where 10 % is added then n=224.5 So, the required sample size is n =225 participants.

Procedure Methodology : After obtaining Institutional Ethical clearance and administrative permission from the department, data collection was initiated. A written consent was taken prior to data collection. Participants were informed to be nil per mouth at night at least for 8 hours. Next day Fasting blood glucose was checked by glucometer (contour plus) and diabetic risk was assessed by Pre diabetic risk assessment tool. This tool included age, gender, family history of diabetes, polycystic ovarian syndrome history, fatty liver disease history, pancreatic disease history, gestational diabetes history, BMI,physical activities, eating habits, waist and hip circumference, cigarette smoking, alcohol, and sleeping hours. The total time taken for data collection with the help of tools on one participants was approximately 10 min. After data collection, the raw data were tabulated and computed.

Statistical analysis : Data were analyzed by using SPSS version 16. The descriptive statistical analysis is frequencies, percentage, mean, and standard deviation were used to analyze the data. The Chi – Square test was also used for correlation with p value < 0.05.

III.   RESULTS

This study highlighted many risk factors among relatives of patients with coronary artery disease. The findings were in majority of males (86.2%), had relationship as sons (72%), with the age group of 18 to 40 years (77.3%). It also identified that majority of relatives had no history of family history of diabetes mellitus (56.4%), fatty liver (98.2%), pancreatic disease (86.7%). In female participants (13.8%) it was found that, they had no history of polycystic syndrome (91.6%) and gestational diabetes mellitus (100%). It also identified that 43.6% were overweight 13.8% obese, which was calculated as per BMI, high risk for pre diabetic was also highlighted in the study with waist circumference 15.6%. there were 64.4% who did not have any planned exercise. The risk factors associated with diet where the majority were vegetarian (50.2%), and non vegetarian (49.8%) which consumed red meat which is in high ratio (6.3%). The other risk factors also found that with

lifestyle with the high consumption of smoking (79.1%), alcohol (15.1%) and with sleep disturbance < 6 hours (6.2%) and > 8hours (15.6%).

Table no 1 : Distribution of Diabetic Status
n=225

Diabetes Status	frequency (f)	percentage (%)
Fasting blood Sugar		
Normal (<= 99)	120	53.3
Pre - diabetes (100 - 125)	74	32.9
Diabetes (>125)	31	13.8

The above table showed that (32.9%) had pre - diabetes, and (13.8%) had diabetes which was identified during this study.

This study also correlated the risk factors with diabetic status which highlighted that there was strong correlation between Fasting Blood Glucose and obesity (p value 0.003), exercise   (p value 0.002), lifestyle (smoking p value 0.019 and sleep disturbance p value 0.019) where It was also found that there was no correlation between fasting blood glucose level and age, gender, family history of diabetes, relation with diabetic family member, co morbidities, waist circumference, exercise, diet and alcohol.

IV. SUMMARY, DISCUSSION, CONCLUSION

This study identified the risk factors were son of coronary artery disease patient with the age group 18 – 40 years, overweight, obese, non – vegetarian who consumed red meat, smoking, alcohol consumption and altered sleep pattern. This study identified early diabetic status that 32.9% had pre diabetes and 13.8% who were diagnosed during this study. The correlation between diabetes mellitus status and risk factors were also found with obesity, smoking, sleep disturbance.

Similar study was done to identify diabetes in first degree family members which resulted 14.5% were having diabetes in which 19 were men and their BMI was greater this study reports that first degree family member with diabetes have a greater prevalence than without diabetes.[15]

Another study was done to identify association between first degree family history of diabetes and metabolic syndrome which resulted the prevalence of majority in first degree relatives, there was significant correlation shown in first degree family history of diabetes with metabolic syndrome with the risk factors of gender, age, lifestyle habits.[16]

Some similar studies shows that there is a link between sleep duration, obesity and diabetes mellitus which resulted that there is a relationship between changes in sleep duration and obesity participants with short sleep duration with the greater increase in BMI, fat mass and waist circumference which shows Short sleep duration is an independent risk factor for the development of obesity and Type 2 diabetes mellitus.[17]

Some similar studies shows that there is an association of smoking and nicotine dependence with pre – diabetes in young and healthy adults resulted that median age 37 years (23.3% had pre-diabetes. prevalence of pre-diabetes. Individuals with a smoking exposure for pre-diabetes. Smoking is strongly associated with pre-diabetes in young adults Nicotine dependence could be a potential mechanism of this relationship.[18]

Some similar studies shows that diabetes and pre diabetes prevalence among young and middle aged adults in India, which resulted that were males, overall prevalence of diabetes and that of pre diabetes. A positive association was seen with urban residence, geographic region, sex, age, body mass index, socioeconomic status, and hypertension, South India showed a higher prevalence of diabetes than northern India.[19]

V. CONCLUSION

This study revealed that the first degree relatives of coronary artery disease patient having major risk factors for diabetes mellitus. By assessing risk factors and fasting blood glucose among first degree relatives helped to early identify the pre diabetic status. If early identification of pre diabetic is done it will help to reduce the complication of developing diabetes mellitus , coronary artery disease and other disease. So this study recommends that fasting blood glucose should be checked for individuals who is having family history of coronary artery disease and diabetes mellitus etc.

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