



## Research Article

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## Prevalence of Coronary Artery Disease in Asymptomatic Type II Diabetics

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### Abstract

**Background:** Diabetes Mellitus is a major leading cause of mortality & morbidity all over the world. Most of the diabetic patients have coronary artery disease (CAD) as cause of death which usually go unnoticed during their course of disease. Rose Angina questionnaire is standardised tool for detection of CAD. In present study we have analysed the prevalence of CAD & also correlated Rose Angina questionnaire with ECG changes in asymptomatic diabetics.

**Methodology:** A cross sectional study of 118 participants was conducted at Tertiary hospital, Thane. Pre-diagnosed diabetics with no cardiovascular symptoms were included as participants & other undiagnosed or pre-diagnosed symptomatic were excluded from the study. Rose Angina questionnaire was given to them & ECG was taken for all participants. Prevalence of various categories of ECG was calculated. Pearson's Correlation coefficient was calculated in between variables with the help of statistical software SPSS-20. **Result:** Out of 118 participants, 63 were female and 35 were male. The prevalence of Normal ECG is 78.81%, CAD ECG is 18.64% & Coincidental ECG is 2.54%. Correlation between Rose Angina Questionnaire & ECG reflected as weak positive correlation for Angina and ECG (Correlation coefficient 0.0210), weak uphill positive linear correlation for possible infarction and ECG (Correlation coefficient 0.2458) and weak downhill negative linear correlation for claudication and ECG (Correlation coefficient - 0.0275).

**Conclusion:** In present study, emphasis on significance of recording ECG even in asymptomatic diabetic patients during frequent intervals irrespective of the presence of symptoms related to CAD is established. It is observed that ECG changes usually do not match with clinical symptoms & silent CAD is common in diabetics. Weak positive correlation between Rose Angina questionnaire & ECG was observed which is suggestive of asymptomatic CAD.

**Keywords:** Asymptomatic diabetics, Rose Angina questionnaire, Coronary artery disease, ECG.

### INTRODUCTION

Diabetes Mellitus is a major leading cause of mortality & morbidity all over the world. Most of the diabetic patients have coronary artery disease (CAD) as cause of death which usually go unnoticed during their course of disease contributing to 65-85% of Diabetes related deaths [1]. The International Diabetes Federation estimated 415 million people are diabetics globally; out of which 91% are of Type II Diabetes. The prediction of number of patients of diabetes by International Diabetes Federation in 2040 is 642 million. The prevalence of diabetes is alarmingly rising over time [2]. It has been estimated that at least one fourth of patients with diabetes who experience CAD have unrecognised silent (devoid of angina or angina equivalent symptoms) or atypical events that are accompanied by symptoms that totally go unrecognised by patient as well as physician [3,4]. This can be due to different pain threshold of pain sensitivity or psychological denial, but cardiac autonomic neuropathy plays an important role, potentially involving dysfunction at varying levels from the pain receptors, afferent neurons or gating mechanism to the supratentorial translation of ischaemia into pain [5]. Once CAD becomes symptomatic in diabetics then prognosis of it in relation to morbidity as well as mortality is significantly affected in comparison to nondiabetic patients. Rose Angina questionnaire is non invasive, low priced, standardised screening tool for detection of probability of CAD. Rose suggested that specificity & sensitivity may vary from country to country [6]. In view of significant burden due to diabetes & associated CAD with poor outcomes present study have analysed the prevalence of CAD & also correlated Rose Angina questionnaire with ECG changes in asymptomatic diabetics.

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## Objectives:

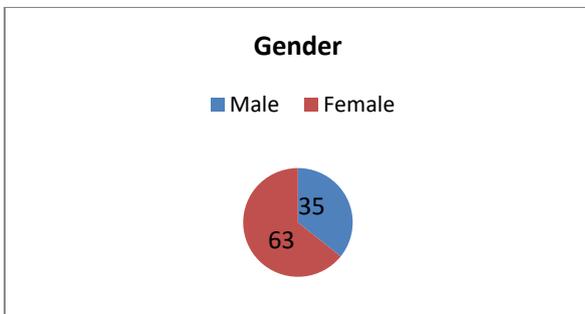
1. To assess the prevalence of CAD in asymptomatic adult diabetics
2. To assess the effectiveness of Rose Angina Questionnaire in diabetics without any symptoms suggestive of cardiac disease.

## METHODOLOGY

Institutional Ethics Committee permission was taken before commencing the study. Confidentiality of participants was maintained throughout the study. A cross sectional study of 118 participants of each sex was conducted at Tertiary hospital, Thane. Pre-diagnosed diabetics who were asymptomatic on detailed history were included as participants after taking written informed consent. Other undiagnosed or pre-diagnosed symptomatic diabetics, children & adolescent were excluded from the study. Diabetics whose alcohol intake more than 21 units/wk for male & 14 units/wk female and diabetics with coexistence of thyroid disease, chronic renal disease, Chronic Obstructive Pulmonary Diseases, Cerebrovascular Accidents and Hypertension were also excluded from the study as these are major confounding factor for presence of CAD [7,8] as well as nonspecific ECG changes. Patients with history of limited life expectancy due to cancer or end stage renal or liver disorders were excluded from the study. Detailed Medical history was taken for confirmation of symptoms & clinical examination was done. Rose Angina questionnaire was administered to them before recording resting 12-Lead ECG. Rose Angina questionnaire has self-assessed questions covering three components Angina, possible Infarction & Claudication [9]. Prevalence of various categories of ECG was calculated. Pearson's Correlation coefficient was calculated in between variables with the help of statistical software SPSS-20.

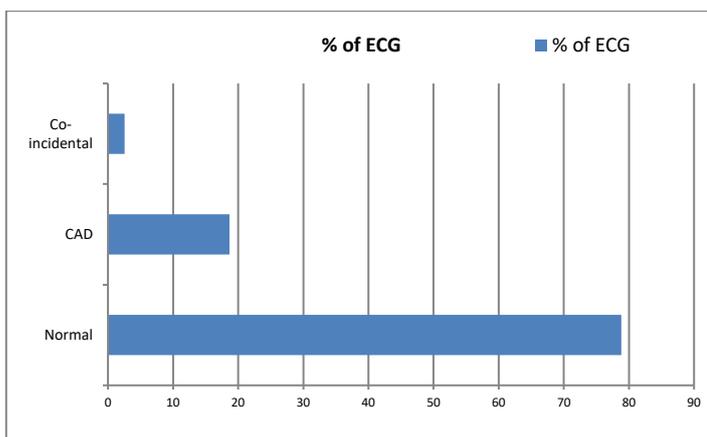
## RESULT

Out of 118 participants, 63 were female and 35 were male. The range of age was 21 to 75years whereas mean age is 47.8.



The prevalence of Normal ECG 78.81%, CAD changes in ECG 18.64% & Coincidental ECG changes 2.54% were present. Coincidental ECG changes included P pulmonale & ventricular ectopics.

### Prevalence of different ECG



Correlation between Rose Angina Questionnaire & ECG reflected as weak positive correlation for Angina and ECG (Correlation coefficient 0.0210), weak uphill positive linear correlation for possible infarction and ECG (Correlation coefficient 0.2458) and weak downhill negative linear correlation for claudication and ECG (Correlation coefficient - 0.0275).

## DISCUSSION

CAD is very common prima facia cause of mortality & morbidity in diabetic patients [1-3]. Though associated hyperglycaemia increases the risk of CAD tremendously but normal levels of it does not exclude the risk of CAD. Its silent nature and myocardial infarction is known first manifestation in diabetics. The mechanism behind it is complex and not very well understood at cellular & molecular levels [10]. Macrovasculature & microvasculature changes are common mechanisms for the same. Macrovasculature change is mainly atherosclerosis caused by associated dyslipidaemia. Microvasculature changes are caused by alteration in autonomic control. Diabetic autonomic microvasculopathy alters vascular blood flow via local mechanisms & changes in endothelium. Such patients are more prone for sudden & silent CAD due to less cardiac reserve and unavailability of NO which is strong vasodilator. Hyperglycaemia reduces NO production whereas insufficient insulin reduces its bioavailability. Further to add this, underlying hypercoagulability, inflammation & oxidative stress with poor control affects cardiac functioning [10]. Hyperglycaemia induced oxidative stress & glycosylation leads to dysfunction & death of neurons. General inflammation & high release of cytokines are associated with cardiac autonomic neuropathy. Parasympathetic nerves gets affected before sympathetic. Also nerve dysfunction is length dependent, hence vagus nerve is usually first to affect. The cardiac autonomic neuropathy along with peripheral neuropathy is most common underlying cause for the asymptomatic nature in long standing cases than recently diagnosed [11].

Rose Angina questionnaire has variable sensitivity & specificity from country to country [6]. To predict the risk of CAD Rose angina questionnaire is good tool. Rose Angina Questionnaire can be used very effectively for screening of the patients of CAD whereas ECG is simple & cost effective test to evaluate CAD in asymptomatic patients. Both of them can be used as baseline investigations for diabetics as they have strong associated cardiovascular morbidity & mortality rate. This can give idea about who, when & which test to screen asymptomatic diabetic patients to have effective management of CAD. In present study, pre diagnosed diabetic patient who were asymptomatic on detailed history, was given Rose Angina Questionnaire. Weak positive correlation was observed between Rose Angina Questionnaire & ECG. This shows that even patients on asking detailed history may miss some related history of angina. While giving questionnaire in addition to detailed history may reveal CAD related symptoms sometimes. This observation in asymptomatic patients could be simply due to questionnaire biases like recall, or respondent's subconscious reactions. Rose Angina Questionnaire is effective, cheap, non-invasive and easy to administer hence can be used in such patients very frequently as a screening tool for deciding other investigations which are costly. Rose Angina Questionnaire may be offered to Diabetic patient either quarterly or yearly during their follow up to enable early diagnosis of CAD. In our study patients with major confounding factors were excluded. We recommend screening the patients more frequently when comorbidities are present. This will improve the quality of health care by early detection, management and prevention of complications due to CAD.

Limitations of study: Stress test & 2D Echo of those patients who showed ECG changes should have been done to establish the CAD. This would have added value to the Rose Angina Questionnaire. Hyperlipidaemia should have been excluded as it is strong confounding factor for CAD. Patients with minor ECG changes were also included in

the study and these changes can be seen in other conditions like food ingestion, anxiety, postural change etc.

## CONCLUSION

ECG changes usually do not match with clinical symptoms & silent CAD is common in diabetics. Weak positive correlation between Rose Angina questionnaire & ECG was observed which is suggestive of asymptomatic CAD. Our study emphasis on significance of recording ECG even in asymptomatic diabetic patients during frequent intervals and also incorporating Rose Angina Questionnaire even more frequently than ECG . This will help in diagnosing CAD irrespective of the presence of symptoms related to CAD.

## Conflicts of Interest

There was no conflict of interest in the study.

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