

Exploration of Qrisk3 As A Prognosticator of Cardiovascular Disease Events and Associated Comorbidities In Type-2 Diabetes Mellitus Patients

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KEYWORDS

Type-2 Diabetes Mellitus, Cardiovascular Disease, QRISK 3, Coronary Artery Disease

ABSTRACT

Cardiovascular disease (CVD) remains the leading cause of morbidity and mortality in patients with Type 2 Diabetes Mellitus (T2DM), significantly increasing the risk of myocardial infarction, stroke and heart failure. This study aims to assess the utility of QRISK3 in predicting cardiovascular events and associated comorbidities in T2DM patients and its potential role in guiding clinical decisions for preventive therapies, including statins, antihypertensive medications, and lifestyle modifications. **Materials & Methods:** A prospective observational study was conducted on T2DM patients with cardiovascular diseases. Demographic data, including age, gender, and comorbidities such as chronic kidney disease, asthma/chronic obstructive pulmonary disease, migraine, rheumatoid arthritis, and systemic lupus erythematosus were collected and analyzed statistically. **Results:** Among 124 participants, 45 had hypertension, 29 had coronary artery disease (CAD), 21 had cerebrovascular accidents, 3 had migraines, 17 had chronic kidney disease, 4 had arthritis, 1 had SLE, and 12 had asthma. Based on the QRISK3 chart, 11 participants (8.87%) were at low risk, 46 (37.09%) at moderate risk, and 67 (54.03%) at high risk. **Conclusion:** The study highlights the need for early diabetes detection, comprehensive risk assessment, and improved management strategies to reduce cardiovascular risk in T2DM patients. Health education, lifestyle modifications, and pharmacological interventions targeting both diabetes and cardiovascular risk factors are essential for better patient outcomes.

Introduction:

Diabetes is a significant contributor to cardiovascular disease, leading to disability and mortality in numerous individuals^[1]. The prevalence of type 2 diabetes mellitus (T2DM) and cardiovascular disease (CVD) is steadily rising. The International Diabetes Federation (IDF) reported that in 2022, around 537 million adults were diagnosed with diabetes, with projections indicating an increase to 642 million by 2040^[2]. Cardiovascular disease (CVD) constitutes a significant global health issue. Prospective studies indicate that diabetic patients exhibit a two- to four-fold increased risk of developing coronary artery disease (CAD) and myocardial infarction (MI), thereby establishing type 2 diabetes mellitus as an independent risk factor for stroke and heart disease^[3]. Classical cardiovascular risk factors, including dyslipidemia, hypertension, and obesity, can increase the risk of type 2 diabetes mellitus^[4]. Multifactorial intervention is necessary to mitigate the cardiovascular disease risk in patients with type 2 diabetes mellitus. This strategy encompasses lipid management, glycemic control, hypertension management, smoking cessation, weight reduction, and enhanced physical activity. Optimal lipid-lowering therapy significantly reduces cardiovascular disease risk. The Lipid Association of India (LAI) has proposed more stringent and well-structured treatment goals tailored to the individual cardiovascular disease risk of Indian patients^[5]. An earlier diagnosis of type 2 diabetes mellitus (T2DM) coupled with appropriate management will yield an increased number of cardiovascular event-free life years^[6]. Understanding the cardiovascular profile of patients with type 2 diabetes mellitus (T2DM) is essential, along with a risk prediction model to assess an individual's cardiovascular disease (CVD) risk^[7]. The National Institute for Health and Care Effectiveness (NICE) in England and Wales currently recommends the QRISK3 tool for predicting cardiovascular disease (CVD) risk^[8]. The QRISK3 model incorporated the following variables: age, ethnicity, deprivation, systolic blood pressure, body mass index, total cholesterol to high-density lipoprotein cholesterol ratio, smoking status, family history of coronary heart disease in a first-degree relative under 60 years, type 2 diabetes, treated hypertension, rheumatoid arthritis, atrial fibrillation, chronic kidney disease (stages 3, 4, or 5), systolic blood pressure, migraine, use of atypical antipsychotics, corticosteroids, systemic lupus erythematosus (SLE), severe mental illness, HIV/AIDS, and diagnosis or treatment.

This study investigates Q-RISK 3 as a predictor of cardiovascular disease events and associated comorbidities in patients with type 2 diabetes mellitus. The primary objective of the study was to determine the patient's level of cardiovascular risk based on factors such as age, gender, and comorbidities. Regularly assess blood pressure to detect hypertension, a prevalent risk factor for cardiovascular incidents. The Q3 risk calculator estimates a patient's risk level - low, moderate, or high for developing cardiovascular disease events within the next decade, thereby informing treatment decisions. Provide the patient with information regarding their cardiovascular disease and necessary lifestyle modifications ^[9].

Methodology: A prospective observational study was conducted at Government General Hospital, Ananthapuramu. The study was conducted from September 2023 to February 2024 following the necessary approvals from the Institutional Ethics Committee [IEC]. Individuals aged 18 and above, both in-patients and out-patients, diagnosed with type-2 diabetes mellitus were included in our study. Individuals under 18 years, pregnant women, and those with psychiatric conditions were not included in the study. A comprehensive data collection form was created in collaboration with physicians, utilizing guidance and referencing relevant journals, articles, and standard textbooks. The data collection form encompasses demographic information of participants, including name, age, gender, history of present illness, past medical and medication history, comorbidities, smoking habits, alcohol consumption, diabetic status, history of angina or heart attack, chronic kidney disease, migraine, rheumatoid arthritis, gouty arthritis, osteoarthritis, systemic lupus erythematosus, and asthma. The analysis of demographic and clinical variables involved calculating standard deviation, mean, conducting student t-tests, chi-square tests, and determining p-values. The Coronary RISK-3 (Q-RISK3) calculator was utilized to assess the patient's risk level low, moderate, or high for developing cardiovascular disease events over the next decade, thereby aiding in treatment decision-making.

Results: The study enrolled a total of 124 participants, with a significant proportion being individuals aged over 60 years (42.74%). The analysis of age distribution indicated that 30.64% of the participants fell within the 46–60 year range, with 19.35% in the 31–45 year group and a mere 7.25% in the 18–30 year category. The distribution by gender revealed that males made up the larger portion of the study population at 57% (n=71), whereas females represented 43% (n=53) shown in fig:1.

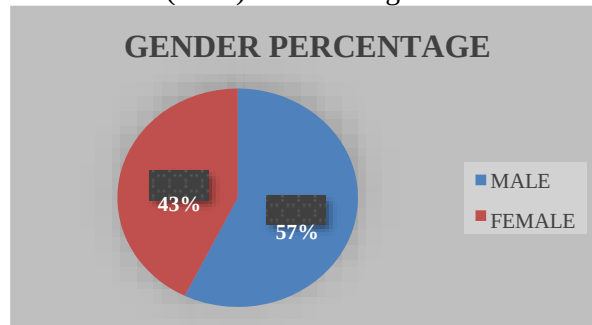


Fig 1: Percentages of gender in the study.

In terms of social history, 42.74% (n=53) of the participants identified as smokers, while 57.25% (n=71) were categorized as non-smokers. In a similar, 38.70% (n=48) indicated that they consumed alcohol, whereas 61.29% (n=76) identified as non-alcoholic. The P-value of 0.02 suggests a statistically significant relationship between smoking and alcohol consumption within the study population.

Regarding comorbidities, hypertension emerged as the most common condition, impacting 36.29% of participants (n=45). This was followed by cardiovascular (CVS) events at 23.38% (n=29), stroke at 16.93% (n=21), chronic kidney disease (CKD) at 13.70% (n=17) and asthma at 9.67% (n=12). Comorbidities that were observed less frequently comprised migraine (2.41%, n=3), arthritis (3.22%, n=4), and systemic lupus erythematosus (SLE) (0.80%, n=1) shown in fig: 2.

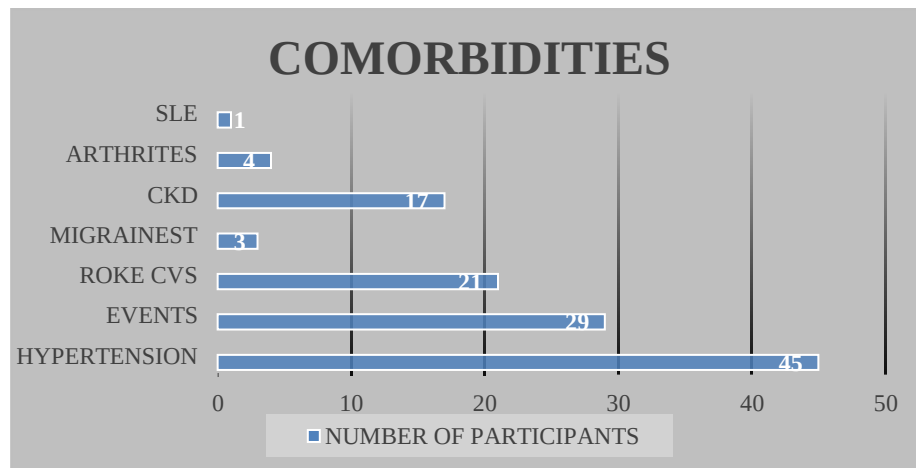


Fig 2: Comorbidities

The examination of cardiovascular risk stratification utilizing the QRISK3 chart revealed that 8.87% of participants (n=11) fell into the low-risk category, whereas 37.09% (n=46) were identified as moderate risk, and a notable 54.03% (n=67) were classified as high risk. (Table:1)

Table:1 Cardiovascular Risk Based on QRISK3 chart related to Age and Separated Gender

AGE IN YEAR	LOW RISK		MODERATE RISK		HIGH RISK		P-VALUE
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	
18 – 30	03	02	02	01	01	00	0.002*
31 – 45	01	01	05	03	09	05	
46 – 60	01	02	08	06	12	09	
>60	01	00	12	09	16	15	
RISK%	11 (8.87%)		46 (37.09)		67 (54.03)		

An analysis focused on age and gender revealed that most high-risk participants were over 60 years old, comprising 16 males and 15 females in this group. P-value of 0.002 indicates a statistically significant correlation between age and cardiovascular risk shown in fig: 3

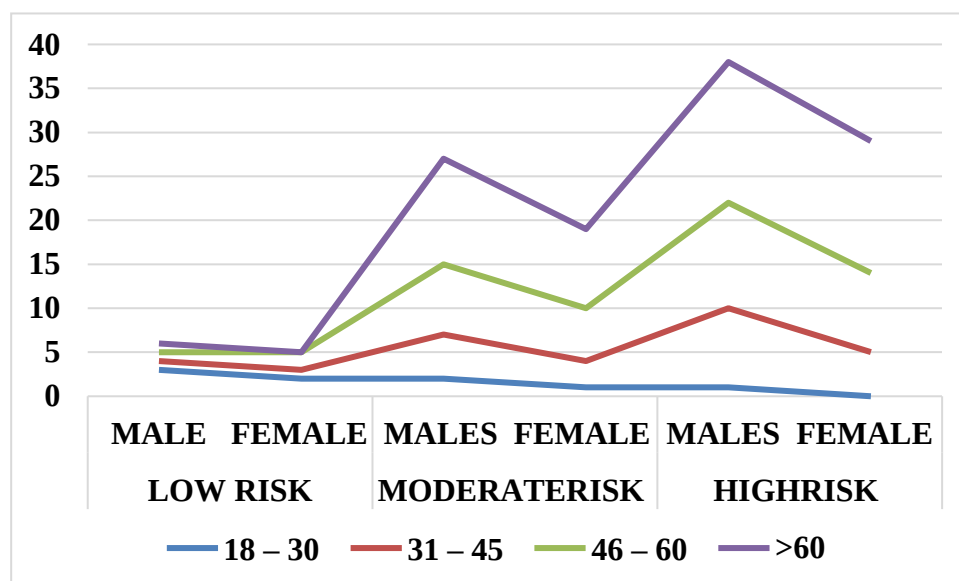


Fig 3 : Cardiovascular risk based on QRISK3

Discussion:

In our present study there were 124 participants of which the age group between 18- >60 years were admitted during the period of study. The majority of the participants were male sex which was high as 71 (57%). The females accounted for around 53(43%). Another study conducted among a large Mediterranean sample of type 2 diabetes patients using European High-Risk Chart (ESC) found majority of the males with T2DM had very high risk for CVD events compared to females (53.4% vs 50.7%).^[10] Out of 124 T2DM men and women enrolled in this study 12(9.67%) were between age of 18-30 years, 23(18.54%) were between age 31-45, 38(30.64%) were between age of 46-60 years, 53(42.74%) were between age of >60 years. In our study majority of participants were >60 years age group. These percentages were similar to the study conducted by Alonso-Moran.^[11] However, Age is the most definite risk factor for having cardiovascular disease.^[12] Of all participants, 53 (42.74%) were smokers and it was higher among the male population. Tobacco use is one of the major risk factors for CVD events and for onset of DM in this population. Compared to developed countries, use of chewing/smokeless tobacco is higher among the Indian population.^[13] Studies have shown tobacco contains a higher amount of nicotine compared to cigarettes and is one of the contributors to insulin resistance^[14]. There is a need to educate the community on the harmful effects of using tobacco^[15]. The alcoholic status distribution resulted that majority of the participants were non-alcoholic with 76 (61.29%) The alcoholic accounted for around 48 (38.70%). This confirmed that these percentages are contrast to the previous study by Rimm EB et al^[16]. In the present study the comorbidities- 79(63.70%) Patients were suffering with Hypertension, 63 (50.80%) patients were suffering with coronary artery disease(CAD), our study is also similar with the previous study by Kristy Iglay et al., which have (82.1%)hypertension and (67%)cardiovascular disease are the major comorbidities^[17]. In our study Cardiovascular risk based on QRISK3 chart related to age and separated for gender in that (8.87%) at low risk, (37.09%) at moderate risk, (54.03%) at high risk. Our study was similar with previous study by van Staa T-P et al.,^[18].

Conclusion: Our investigation revealed that most participants with type 2 diabetes mellitus exhibited increased cardiovascular risk, with a higher prevalence observed in males compared to females. Furthermore, the risk was significantly heightened among smokers, individuals with obesity, and those suffering from hypertension. Based on the findings, we determined that it is essential to tackle the identified cardiovascular risk factors and enhance the overall cardiovascular health of this population. Timely identification and management of diabetes, availability of health education and awareness regarding lifestyle changes, and suitable pharmacological treatments that tackle both diabetes control and the identification of cardiovascular risks. Healthcare providers, mass media, and various voluntary organizations can play a crucial role in raising awareness and facilitating screening for diabetic comorbidities. This effort is essential to reduce cardiovascular risk among patients with diabetes and ultimately enhance cardiovascular outcomes.

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