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EVALUATING EARLY CARDIOVASCULAR DISEASE RISK: THE ROLE OF AGE AND GENDER IN CORONARY ARTERY CALCIUM SCORES

Cardiology

Dr. Siddharth Ragupathi	M.B.B.S.
Dr. Senthil Velmurugan*	M.D (radiodiagnosis) professor and HOD, Department of Radiodiagnosis, K.A.P. Viswanatham Medical College, Trichy, Tamil Nadu. *Corresponding Author
Dr. Rohit	MD (radiodiagnosis).
Dr. Ashwin Ragupathi	M.B.B.S.
Dr. Alekhya Madarapu Rao	M.B.B.S.

ABSTRACT

Cardiovascular disease (CVD) continues to be a leading cause of death globally, stressing the importance of early risk evaluation and prevention methods. In this research, we explore the relation between Coronary Artery Calcium (CAC) scores, age, and gender in assessing CVD risk. We examined information from 76 patients (54 males, 23 females) who had undergone a coronary CT angiography for evaluation of typical/atypical angina. Our results show a significant association between CAC scores, age, and gender. It was observed that men consistently displayed higher CAC scores in all age groups, with both genders experiencing a noticeable increase in scores after reaching 45 years old. These findings emphasize the potential of CAC scoring as a valuable tool for early detection of CVD risk and emphasize the significance of calcium scoring in preventive cardiology.

KEYWORDS

Coronary Artery Calcium (CAC) score, cardiovascular disease, risk assessment, age, gender

INTRODUCTION

Cardiovascular diseases continue to pose a significant global health challenge, necessitating improved methods for early risk identification and cost-effective ways of detecting CVD early rather than waiting until the patient develops Acute coronary syndrome, The Coronary Artery Calcium (CAC) score, derived from non-invasive CT scans, has emerged as a promising metric for assessing cardiovascular risk by quantifying calcified plaque in coronary arteries [1].

While previous studies have explored the utility of CAC scores in predicting cardiovascular events [2,3], the relation between CAC scores, age, and gender remains an area of active research that was well established in the western population but still lacks sufficient data from the south Asian and Indian populations. This study aims to address this gap by examining the relationships between these factors and their implications for CVD risk assessment in the Indian population. The primary objectives of this study are to Evaluate the efficacy of CAC scores in predicting CVD risk across different demographic groups. Analyze the correlation between CAC scores and age for both males and females. Determine the age of onset for significant coronary calcification in both genders.

Coronary calcification is a strong and independent predictor of coronary heart disease, also in the elderly. Coronary calcification improves the prediction of coronary events based on cardiovascular risk factors. Risk stratification by assessment of coronary calcification may have an important role in the primary prevention of coronary heart disease events in the elderly.[7]

MATERIALS AND METHODS

Study Population

Our study included 77 patients who underwent coronary CT angiography. The cohort comprised 54 males and 23 females, ranging in age from 19 to 73 years.

CAC Score Measurement

CAC scores were obtained using a 64-slice CT scanner. The scanning protocol involved non-contrast cardiac CT with ECG gating. CAC was quantified using the Agatston method, which considers both the area and density of calcified plaques [4].

Inclusion And Exclusion Criteria:

we included patients of age more than 30 years with typical chest pain who underwent coronary CT angiogram for the evaluation of coronary artery disease, excluded patients who had established diagnosis of CAD, post CABG/ PCI, and people on statin therapy.

RESULTS

Analysis:

Males exhibited a more gradual increase in CAC scores across age groups. Females showed a sharp increase in CAC scores after age 65. For both genders, the 66-75 age group contributed most significantly to high CAC scores.

Age-related Progression of CAC Scores:

The clear progression of CAC scores with age observed in our study correlates well with previous research further strengthening the notion that coronary artery calcification is an age-related process [5]. However, our findings highlight that this progression is not uniform across genders. The negligible CAC scores in the 0-30 age group suggest that significant coronary calcification is rare in young adults. However, the moderate increase in CAC scores observed in the 46-55 age group, particularly in men, indicates that coronary calcification can begin early in life. This underscores the potential value of CAC scoring as a tool for early risk assessment, even in young individuals.

Table – 1 Average Calcium Score For Males By Age Group

Age Group	Number of Patients	Average Calcium Score
0-15	0	0
16-30	0	0
31-45	11	6.45
46-60	31	124.13
61-75	912	467.25

Table – 2 Average Calcium Score For Females By Age Group

Age Group	Number of Patients	Average Calcium Score
0-15	0	0
16-30	1	0
31-45	5	0
46-60	7	123.43
61-75	10	217.5

Gender Differences in CAC Scores:

The consistently higher CAC scores observed in males across all age groups suggest that men may be at higher risk for coronary artery calcification and, by extension, cardiovascular disease. This aligns

with epidemiological data showing higher rates of CVD in men compared to women, particularly in younger age groups [6]. The sharp increase in CAC scores for females after age 65 is noteworthy and may be related to post-menopausal changes in cardiovascular risk factors. This finding highlights the importance of increased cardiovascular screening for women in this age group.

CONCLUSIONS:

Our study of 77 patients (54 males, 23 females) demonstrates significant relationships between Coronary Artery Calcium (CAC) scores, age, and gender, with important implications for cardiovascular risk assessment. The results revealed a strong positive correlation between age and CAC scores for both genders, with the most dramatic increases occurring after age 45. The 61-75 age group exhibited the highest scores, with males averaging 467.25 and females averaging 217.5.

Consistent gender differences were observed, with males generally showing higher CAC scores than females, particularly in older age categories. Plaque buildup which is the final stage in atherosclerosis is evident from the age group of patients over 45 suggesting underlying atherosclerosis starting from a much younger age in our population. It strongly encouraged that CAC scoring be a routine component of monitoring heart health, particularly for patients over 45. Taking the patient's gender into account, men may need screening considerably earlier than women. Additionally, early diagnosis may facilitate the beginning of necessary medications like statins, which are a far more cost-effective means of slowing the course of CVD in patients who are not receiving treatment than PCI/CABG.

Our study has limits like a small number of people involved and not looking at lifestyle or genetics risks. Future research should focus on larger, longitudinal studies that integrate additional cardiovascular risk factors.

In conclusion, our study reinforces the value of CAC scoring as a tool for CVD risk assessment and highlights the need for age-appropriate and gender-specific screening for cardiovascular disease management.

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