



Premature CAD in young women: A follow-up comparative analysis

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Abstract

Background: Coronary artery disease (CAD), typically associated with the elderly, is increasingly reported among young individuals, with unique clinical characteristics and risk factors in women. This study aimed to identify specific risk factors in young women with premature CAD and compare long-term outcomes to a control group without significant stenosis.

Key words: Women; Risk factors; Treadmill test; Thrombolysis

1. Introduction

Coronary artery disease (CAD) remains a leading cause of morbidity and mortality worldwide, with growing recognition of its occurrence in younger populations, including women under 45 years of age. Historically perceived as a disease affecting older adults, premature CAD in young women is increasingly being reported, often characterized by atypical presentations and a high burden of traditional metabolic risk factors such as diabetes mellitus, hypertension, and dyslipidemia [1]. In the Indian population, obstructive CAD in women younger than 45 years has been documented, with single-vessel disease being the most common angiographic pattern and traditional risk factors prevalent even in these younger age groups [2]. Despite this evidence, comprehensive characterization of functional assessments (e.g., echocardiography, treadmill testing), thrombolytic therapy patterns, and detailed intervention outcomes has been limited. Our previously reported full year 2024 cohort provided initial insights into the demographic, risk factor, and angiographic profiles of young women with CAD. However, the addition of functional and management parameters was lacking. The aim of this study was to evaluate the clinical profile, risk factor patterns, angiographic characteristics, functional status, and management outcomes of women under 45 years with CAD, and to validate and extend the findings from the 2024 cohort, providing a comprehensive understanding of premature CAD in this population. By incorporating echocardiographic assessment, treadmill test findings, thrombolysis status, and detailed procedural interventions, this study seeks to identify consistent clinical trends and inform early detection and management strategies for this vulnerable group.

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2. Result

A retrospective observational audit was conducted at Kauvery heart city, Trichy, evaluating female patients admitted with CAD between Jan – Aug 2025. During the study period, 1177 women were diagnosed with CAD. Of these, 79 women (6.7 %) were aged below 45 years, indicating a persistent burden of premature CAD among young women.

Total women patients with CAD 2025 (Jan–Aug)	
Overall CAD in women	CAD under 45 years
1177	79

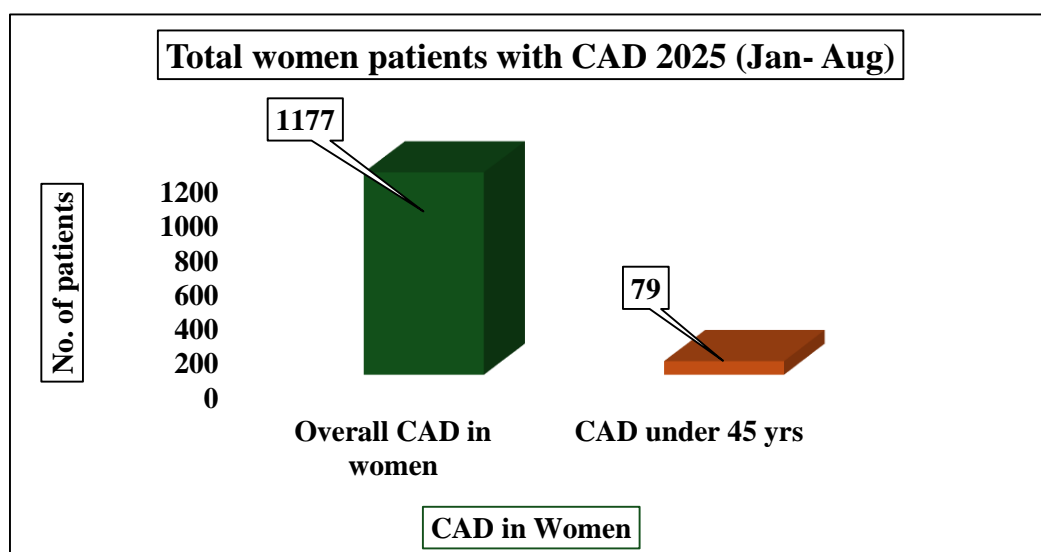


Fig (1): Total women CAD admissions (Jan – Aug 2025)

2.1. Age-wise Distribution of CAD in Women <45 Years

Among the 79 women under 45 years, the majority belonged to the 41–45 years’ age group (n = 52), followed by 36–40 years (n = 23) and 31–35 years (n = 4).

CAD under 45 years	
Age	N=79
31-35	4
36-40	23
41-45	52

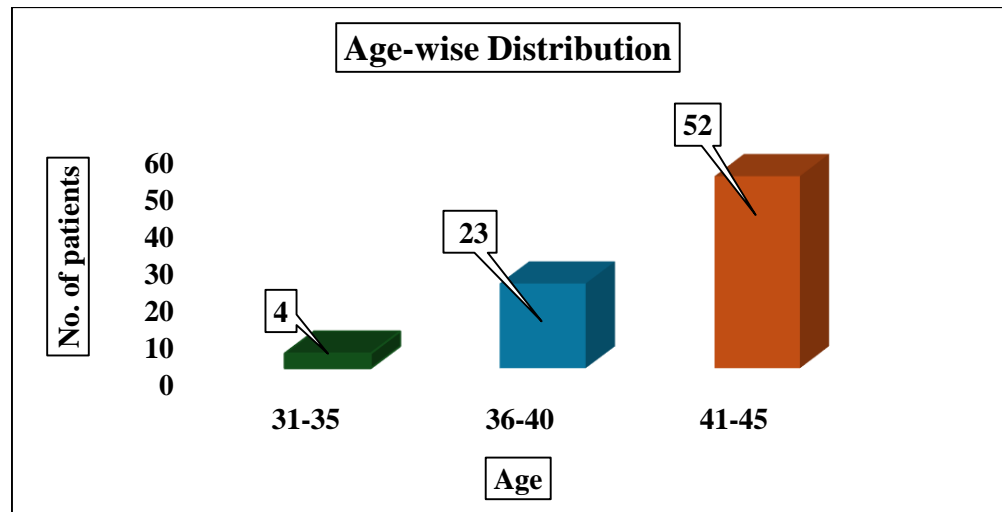


Fig (2): Age-wise Distribution of CAD in Women <45 Years

This distribution demonstrates a progressive increase in CAD incidence with advancing age, even within a younger cohort, suggesting heightened vulnerability as women approach the peri-menopausal period.

2.2. Risk Factor Profile

Among women under 45 years with CAD:

56 patients (70.9%) had at least one conventional cardiovascular risk factor

23 patients (29.1%) had no identifiable common risk factors

CAD under 45 years	
Risk factors	56
No Risk factors	23

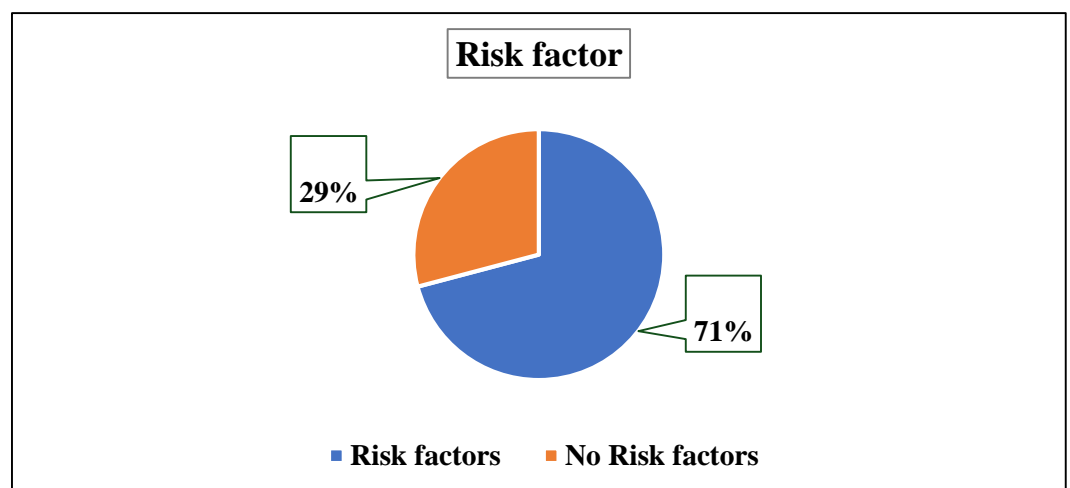


Fig (3): Risk factor of CAD in Women <45 Years

The most prevalent risk factors were;

CAD under 45 years (N=79)		
Risk factors	YES	Percentage (%)
DM	35	42.68
HTN	28	34.15
Dyslipidemia	10	12.20
Hypothyroidism	18	21.95
CKD	2	2.44

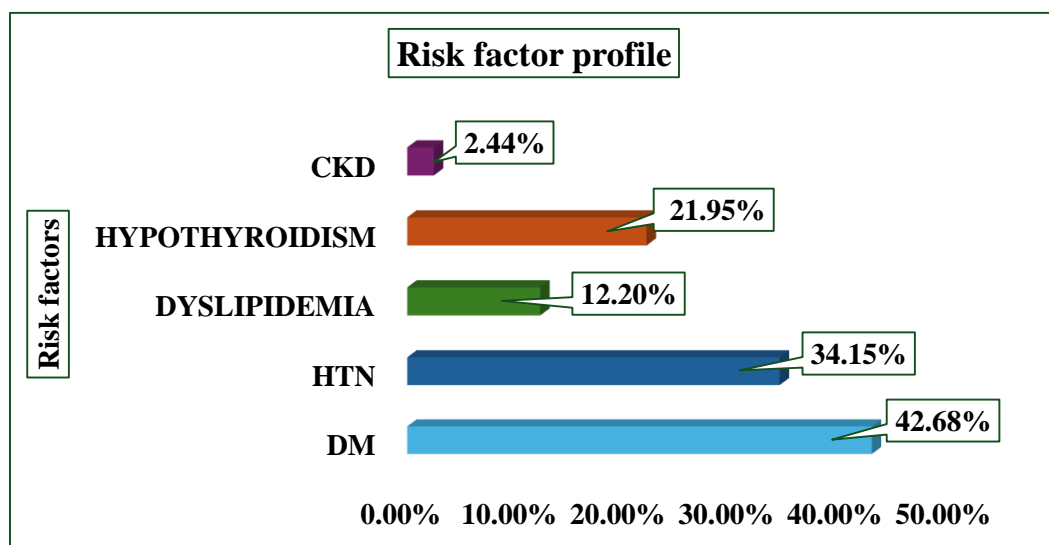


Fig (4): Risk factor profile of CAD in Women <45 Years

The findings demonstrate a strong association between metabolic disorders and early-onset CAD in young women, with diabetes emerging as the dominant contributor.

2.3. Echocardiographic Findings

ECHO findings	Total no. of Patients
Normal LV function	47
Adequate LV function	3
Fair LV Function	4
Mild LV Dysfunction	7
Moderate LV Dysfunction	8
Severe LV Dysfunction	7
Mild to Moderate LV dysfunction	1
Moderate LV Dysfunction	8
Total	79

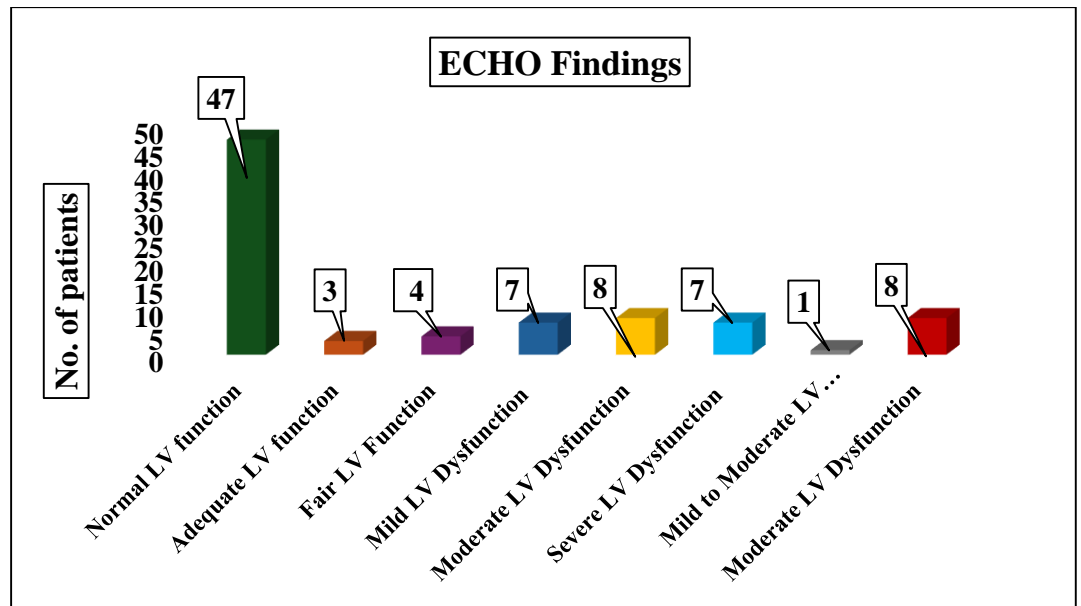


Fig (5): ECHO findings of CAD in Women <45 Years

Despite documented CAD, a substantial proportion of patients had preserved ventricular function, suggesting early-stage disease or timely diagnosis in many cases.

2.4. Treadmill Test (TMT) Findings

TMT findings	Total no. of Patients
Inconclusive	7
Negative	4
Positive	18
Not available	50
Total	79

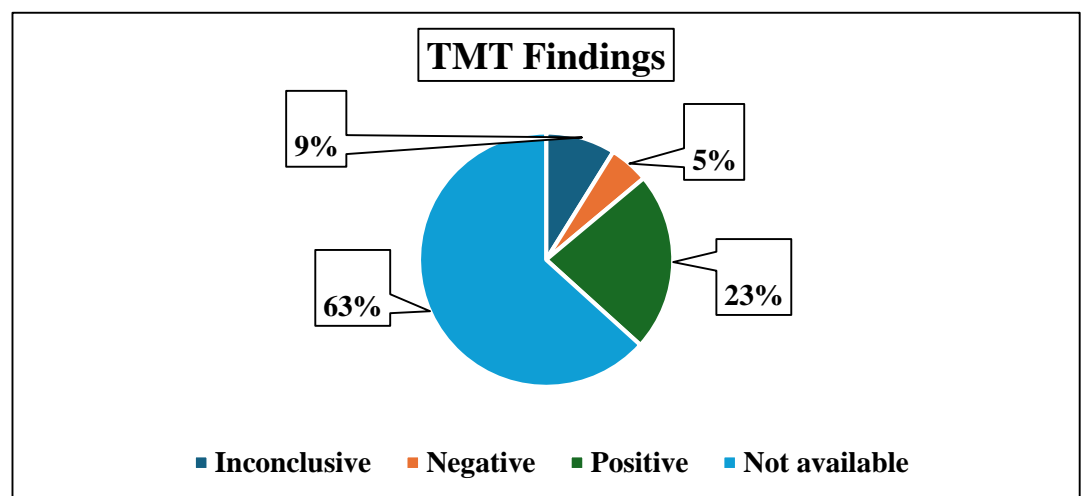


Fig (6): TMT findings of CAD in Women <45 Years

Functional stress testing was underutilized, reflecting possible diagnostic limitations, atypical symptom presentation, or reliance on alternative diagnostic modalities in young women

2.5. Thrombolysis Status

Thrombolysis	Total no. of Patients
Inj. Streptokinase	2
Inj. Streptokinase outside	2
Inj. Tenecteplase Outside	1
Inj. Tenecteplase	1
Not given	73
Grand Total	79

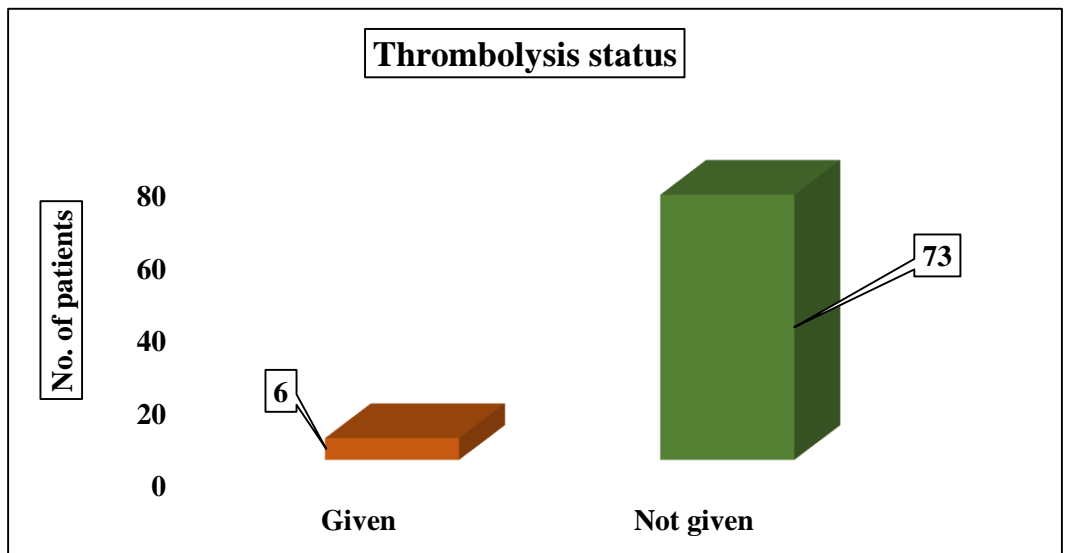


Fig (6): Thrombolysis status of CAD in Women <45 Years

The low rate of thrombolysis may reflect late presentation, atypical symptoms, or non-ST elevation presentations among young women.

2. 6. Readmission and Mortality

CAD under 45 years (N=79)		
Age	Alive	Death
31-35	4	
36-40	22	1
41-45	52	

CAD under 45 years (N=79)	
Row Labels	Frequency
Readmission	1
No Readmission	78

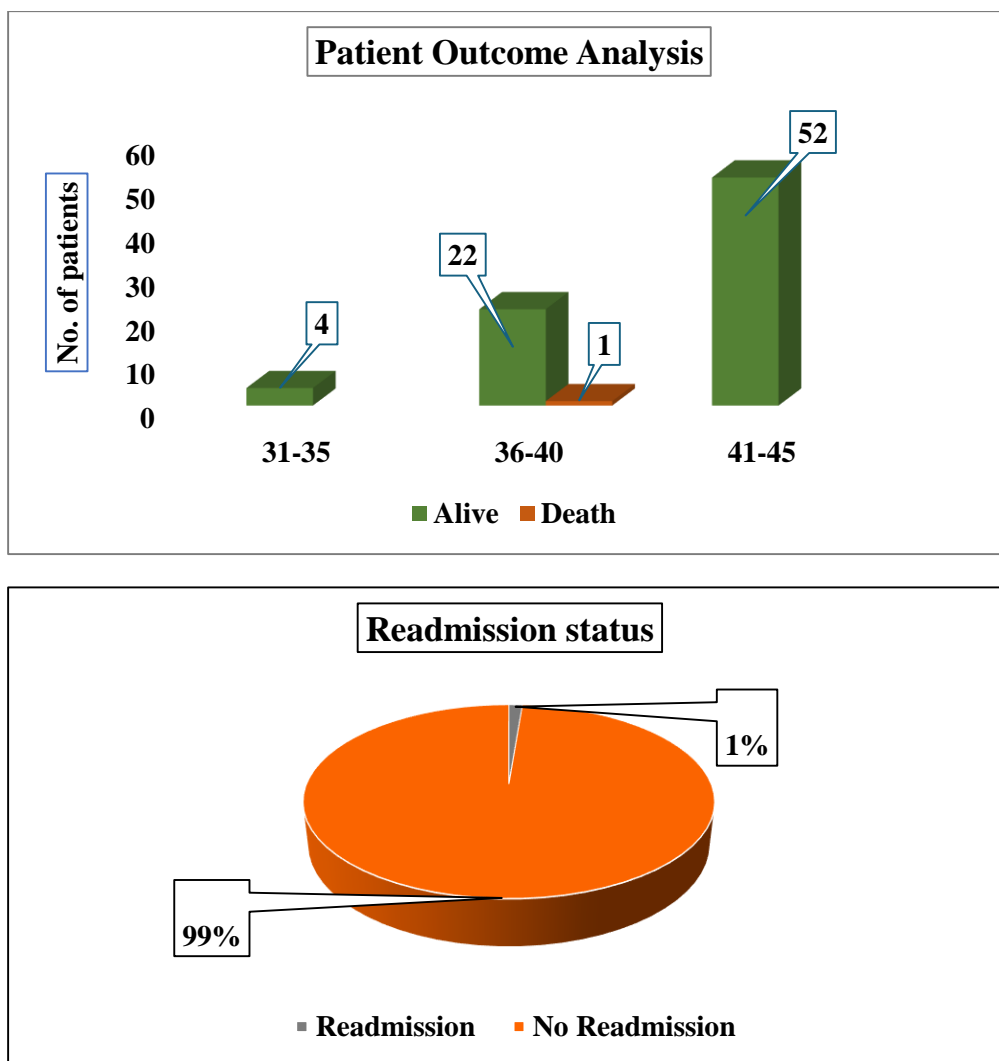


Fig (7): Readmission & Mortality status of CAD in Women <45 Years

Overall outcomes were favorable, with low readmission and mortality rates, indicating effective acute management.

2.7. Mortality and Cause of death

Age	No. of Patients	Cause of Death
36-40	1	Cardiogenic shock

The single mortality observed in this study occurred in a women aged 36 – 40 years and was attributed to cardiogenic shock.

3. Treatment Modalities in Women with CAD below 45 years

Among the 79 women diagnosed with CAD, varied treatment patterns were observed.

CAD Types	CABG	CAG (Medical)	CAG not taken	DVR	MVR	POBA	PTCA	Total
SVD		4				2	13	19
DVD	3						7	10
TVD	4					1	4	9
Medical			5	1	3			41
CAG-Normal		32						
Total	7	36	5	1	3	3	24	79

A total of 36 patients had normal coronary arteries on CAG. 24 patients underwent PTCA, making it the most commonly performed revascularization procedure. 7 patients required CABG, indicating severe or multi-vessel CAD. 3 patients underwent POBA. 32 patients were managed medically following CAG.

Valve-related interventions were infrequent; 3 patients underwent mitral valve replacement (MVR) and 1 patient underwent Device valve replacement (DVR).

4. Comparison of Clinical Profile and Outcomes of Young Women with CAD across two consecutive years:

Parameters	2024 study	2025 (Jan-Aug) study ^[3]
Total women with CAD	1710	1177
Women <45 years	110 (6.4%)	79 (6.7%)
Predominant age group (yrs.)	41-45 (48 %)	41-45 (65.8%)
Common risk factors present	80.90%	70.90%
Diabetes prevalence	57.20%	42.68%
Hypertension prevalence	27.20%	34.15%
Dyslipidemia assessed	Limited	Limited
Normal coronaries	~21%	~23%
PTCA	27 patients	24 patients
CABG	16 patients	7 patients
Thrombolysis	Nil	Minimal
Readmission rate	18.10%	1.30%
Mortality	Not reported	1 case

The comparative analysis between 2024 and 2025 demonstrates a consistent prevalence of premature CAD among women, accounting for approximately 6-7 % of total female CAD admissions. In both years, women aged 41 – 45 years constituted the predominant affected group, indicating increased vulnerability during the peri-menopausal period. Metabolic risk factors remained prominent, with diabetes being the leading contributor, although its prevalence showed a decline in 2025. Despite persistent underassessment of dyslipidemia, a similar proportion of women exhibited normal coronary arteries in both cohorts, suggesting non-obstructive disease patterns. Notably, 2025 showed reduced readmission rates but recorded one mortality due to Cardiogenic shock, emphasizing that young age does not preclude severe CAD outcomes.

5. Discussion

Although the 2025 study covered a shorter observation period compared to the full-year 2024 cohort (Young women and CAD: A retrospective clinical audit at Kauvery Heart City by *Dharsshni. N*), comparison was undertaken using proportional distributions rather than absolute case numbers. This approach allows meaningful evaluation of clinical patterns, demographic characteristics, and outcomes, as the burden of premature CAD in women remained stable when expressed as a percentage of total female CAD admissions across both periods.

The proportion of women aged <45 years among total female CAD admissions was comparable in both studies, accounting for approximately 6–7% in 2024 and Jan–Aug 2025. The consistency of this prevalence, despite unequal study durations, suggests a stable epidemiological pattern rather than a time-dependent fluctuation, supporting valid comparison between the two cohorts.

Both studies demonstrated a predominance of CAD in the 41–45-year age group among young women, indicating that age-related vulnerability remains consistent over time. This reproducibility across different study durations strengthens the inference that perimenopausal physiological changes, rather than study length, influence disease distribution.

Conventional cardiovascular risk factors were prevalent in both cohorts, with diabetes emerging as the dominant contributor in young women. Although minor variations in risk factor prevalence were observed, these differences likely reflect patient heterogeneity or evolving referral patterns rather than the shorter duration of the 2025 study, as the overall metabolic risk profile remained comparable.

Despite its shorter duration, the 2025 study incorporated additional parameters such as echocardiographic findings, treadmill test results, and thrombolysis status, allowing a more comprehensive clinical characterization. This enhanced phenotyping complements the 2024 data and enables qualitative comparison of disease severity and management strategies beyond temporal constraints.

Angiographic findings, including the proportion of normal coronaries and non-obstructive disease, were similar across both studies when analyzed proportionally. This similarity indicates that coronary disease patterns in young women are consistent over time, permitting valid comparison irrespective of the duration of data collection.

Outcome parameters such as readmission and mortality were interpreted cautiously, acknowledging the shorter follow-up period in 2025. However, the observed reduction in readmission rates suggests improved acute management and early detection, while the single mortality highlights that adverse events, though infrequent, remain clinically relevant in this population.

By emphasizing percentage-based analysis and clinical patterns rather than incidence rates, the present comparison minimizes bias introduced by unequal study durations. This methodological approach is commonly employed in retrospective observational studies to assess consistency of disease characteristics across different time frames.

The primary objective of comparing the two studies was to identify recurring clinical and risk factor patterns in young women with CAD rather than to estimate incidence. The persistence of similar trends across both periods reinforces the clinical relevance of the findings despite differences in study duration.

The consistency observed between the 2024 and Jan–Aug 2025 cohorts underscores the need for longer, prospective surveillance to better quantify temporal trends, while validating that short-term datasets can still provide meaningful insights into premature CAD in women when analyzed appropriately.

6. Conclusion

This study highlights that premature coronary artery disease in young women shows consistent clinical and risk-factor patterns even when analyzed across unequal study durations. The comparable prevalence, age distribution, and angiographic profiles between the 2024 and January–August 2025 cohorts indicate that meaningful comparisons can be drawn using proportional analysis. These findings emphasize that young women, particularly those approaching the peri-menopausal age, remain a vulnerable group requiring early risk identification and focused preventive strategies.

Reference

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