Effect of Exercise Level on Clinical Presentation and CMVD Diagnoses in ANOCA/INOCA Patients

Authors: Audrey Baker; Swaathi Reddy; Silpa Masenini, MBBS; Kamryn Wilson, BS; Caitilin Ferrer; Jane Carnesi, BS; Claire Hanycz, BS; Evan Latika, BS; Danielle Tapp, PhD; Timothy D. Henry, MD; Odayme Quesada, MD

Introduction: Angina with Non-Obstructive Coronary Artery Disease (ANOCA) is a common an under diagnosed condition characterized by chronic and debilitating angina. Coronary Microvascular and Vasomotor Dysfunction (CMVD) is the underlying cause of ischemia and angina in these patients. Prior studies in ANOCA patients have found exercise capacity to be reduced in patients with worse anginal symptom onset. However, the relationship between exercise capacity, underlying CMVD in an ANOCA population in remains unknown.

Methods: Here, we utilized the prospective Women's Heart Center (WHC) registry to examine ANOCA patients undergoing Invasive Coronary Functional Testing (ICFT) for CMVD diagnosis between October 2020 and December 2024. The Duke Activity Status Index (DASI) was used to determine patient reported exercise capacity, DASI scores were separated into high capacity (>37) and low capacity (<37) in line with prior reports. High and low exercise capacity groups were compared on validated questionnaires including: University of San Diego Shortness of Breath (UCSD SOB), Rapid Eating Assessment (REAP), Duke Activity Status Index (DASI) and Perceived Stress Scale (PSS). Continuous measures of CMVD collected during ICFT were compared including change in Coronary Diameter (Change in CD) and Coronary Flow Reserve (CFR).

Results: The differences between high exercise capacity patients (DASI scores >37) and low exercise capacity patients are described in Table 1. Compared to low exercise capacity, patients with high exercise capacity had a lower prevalence of type 2 diabetes (1% vs 15%, P=0.003). Patients with lower exercise capacity had lower SAQ compared to high functioning patients, consistent with worse anginal symptoms (P<0.001, Table 1). Patients with high exercise capacity had higher UCSD SOB scores (Low=46.43, SD=23.73; high=27.81, SD=23.03, p=<.001) consistent with better shortness of breath. Overall DASI scores correlated with CFR, finding a weak, but significant correlation showing increased exercise capacity was associated with improved CFR. (Rho=.1881, 95% CI, p=.0112). Further, DASI and SAQ were correlated, finding a positive relationship between exercise capacity and symptoms (Rho=.372, p=<.001). There was no significant correlation between DASI and the PSS or REAP.

Conclusions: Low functioning patients demonstrated worse anginal symptoms, quality of life, and physical limitation as measured and demonstrated worse shortness of breath compared to high functioning patients. Further, there appears to be a protective effect of exercise capacity on underlying disease as measured by CFR, though this was a mild correlation. Further study is necessary to assess the relationship between functional capacity and anginal symptoms

Table 1: Demographics and Clinical Variables	**DASI Low <37**	**DASI High >37**	**P-Value**
Demographics and Clinical Variables			
Age, Mean (SD)	59.91 (12.16)	51.16 (11.50)	<0.001
Sex Female (%)	87%	97%	0.057
Body Mass Index , Mean (SD)	31.55 (8.3)	31.07 (9.8)	0.673
Hyperlipidemia (%)	77%	77%	0.953
Type 2 Diabetes (%)	15%	1%	0.003
Heart Failure with Preserved	8.25%	7.14%	0.740

Ejection Fraction (%)			
Validated Questionnaires			
SAQ7, Mean (SD)	31.24 (22.0)	42.20 (17.09)	<0.001
PSS, Mean (SD)	14.29 (5.99)	13.54 (6.74)	0.356
REAP, Mean (SD)	59.55 (9.504)	59.32 (8.42)	0.839
DASI, Mean (SD)	24.16 (8.213)	48.43 (6.673)	<0.001
UCSD SOB, Mean (SD)	46.43 (23.74)	27.81 (23.03)	<0.001
ICFT Type Doppler (%)	65%	69%	0.558
Continuous ICFT			
CFR, Mean (SD)	2.241 (0.7029)	2.416 (0.596)	0.087
Change in CD, Mean (SD)	-0.037 (0.129)	-0.029 (0.126)	0.663
CBF, Mean, (SD)	0.408 (0.569)	0.374 (0.497)	0.756