Research Letter

Significant Improvement in Atherosclerotic Risk Factors From Intensive Cardiac Rehabilitation (Dean Ornish Program) is Lost Following Program Discontinuation in Rural Elderly Population

Samuel A. Miller, BS; Ghaith Al Tibi, BS; Joseph Khoury, BS; Eyas Ayesh, BS; Alexis Barker, BS; Madeline Butera, BS; Nicolas Chronos, MD

Intensive cardiac rehabilitation (ICR) programs offer an alternative to medications and invasive treatments by focusing on dietary and lifestyle changes to address cardiovascular disease (CVD) naturally. The Dean Ornish program emphasizes a plant-based diet with limited sodium, alcohol, and caffeine alongside nutritional supplements, daily stress management, 30 minutes of aerobic exercise, and weekly support group meetings to promote physical and mental well-being. In the Lifestyle Heart Trial, Dean Ornish ICR program participation resulted in regression of coronary atherosclerosis compared to stenotic progression in controls, and 82% of participants showed regression without lipid-lowering drugs after one year.[1] A prospective cohort study involving 131 ICR participants further showed significant reductions in cardiac risk biomarkers, including body mass index (BMI), blood pressure, C-reactive protein (CRP), low-density lipoprotein cholesterol (LDL-C), and insulin, along with improvements in quality of life and cognitive function (all $P < .001$).[2] Elevated biomarkers such as glycated hemoglobin (HbA1c), LDL-C, high-density lipoprotein cholesterol (HDL-C), triglycerides (TG), CRP, and BMI are associated with increased cardiovascular morbidity and mortality, and thus their reduction through ICR programs significantly impacts CVD progression.[3]

Rural populations face significant disadvantages in American health care, experiencing a 40% higher likelihood of developing heart disease and a 30% increased risk of stroke compared to urban counterparts, due to unique health challenges, social determinants, and limited care access.[4] In 2020, major CVD caused 6995 deaths among individuals aged 60 and older in rural Georgia counties, representing a 25.29% increase from 5583 deaths in 2011.[5]

This study aimed to determine the short-term and long-term effects of Dean Ornish ICR program completion in a rural, elderly patient cohort. Investigating the effects of ICR is essential to determine if patients both achieved short-term improvements, but also maintained these reductions in CVD risk factors in the year following program completion. This research is clinically significant as it addresses whether the benefits of the ICR program are sustained without continued adherence, providing critical insights for developing long-term care strategies and improving cardiovascular outcomes in high-risk, underserved populations.

METHODS

A total of 75 participants from a rural Georgia clinic enrolled in a 9-week Dean Ornish ICR program. Inclusion criteria required patients to have a diagnosis of stable angina pectoris secondary to CVD, complete the 9-week ICR program, and have biomarkers and BMI measured within five months prior to one week after program initiation (pre-ICR/baseline), within one week of program completion (post-ICR), and at 12 to 24 months following program completion (follow-up). Six variables (LDL-C, HDL-C, TG, HbA1c, CRP, and BMI) were assessed using either parametric or nonparametric paired tests based on their normality distribution. For all variables, normality was assessed using the Shapiro-Wilks test. Nonparametric analysis utilized the two-sided Wilcoxon signed-rank paired test using the continuity assumption, and parametric analysis used the two-sided paired t-test. Additionally, since all biomarkers were drawn simultaneously the Bonferroni correction adjusted for the multiple comparison problem ($P = .05/6 = .0833$).

RESULTS

A total of 49 patients (28 males, 21 females; 94% rural; 98% ≥65 years of age; 96% Medicare beneficiaries) met the study eligibility criteria. Patient LDL-C decreased post-ICR (–11.23%, $P = .00139$) but showed negligible change from baseline at follow-up (–0.90%, $P = .824$). Patient TG dropped post-ICR (–18.12%, $P = .00204$) but similarly showed negligible change from baseline at follow-up (–2.26%, $P = .731$). Patient BMI decreased post-ICR (–3.62%, $P = .0000000249$) but returned closer to baseline at follow-up (–1.00%, $P = .310$). Patient HDL-C decreased post-ICR (–4.13%, $P = .170$) and increased above baseline at follow-up (+3.11%, $P = .251$). Patient HbA1c (–1.78%) and CRP (–14.78%) both showed non-statistically significant reductions post-ICR, however both values subsequently increased at follow-up, returning to levels comparable to baseline (–1.46%, –6.60%, respectively). Trends of biomarker levels for the patients are shown in Figure 1.

DISCUSSION

The results demonstrate that the Dean Ornish ICR program effectively reduces factors contributing to atherosclerosis and CVD in elderly, rural patients. Comparing pre- and post-ICR values, LDL-C, TG, and BMI levels significantly decreased, aligning with prior research demonstrating improvements in atherosclerotic risk factors with program adherence.[3,6] The HbA1c and CRP reductions, though present, were not statistically significant. Follow-up data revealed that improvements gained during the nine-week program were lost within 1 to 2 years in the absence of lifestyle supervision. Compared to the post-ICR values, LDL-C, TG, and BMI levels increased, returning to near-baseline values, while HbA1c and CRP similarly rose, though not statistically significantly. Patient HDL-C decreased post-ICR and increased at follow-up, though these changes were not statistically significant. Studies

Author Affiliations: *RUSH Medical College, Chicago, Illinois (Mr Miller); Albert Einstein College of Medicine, Bronx, New York (Mr Al Tibi and Mr Khoury); Georgia Institute of Technology, Atlanta, Georgia (Mr Ayesh).; and Lake Country Medical Group, Eatonton, Georgia (Ms Barker, Ms Butera, and Dr Chronos).*

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Correspondence: *Samuel A. Miller, RUSH Medical College, 1101 South State Street Unit H502, Chicago, IL 60605, (ashermiller421@gmail.com).*

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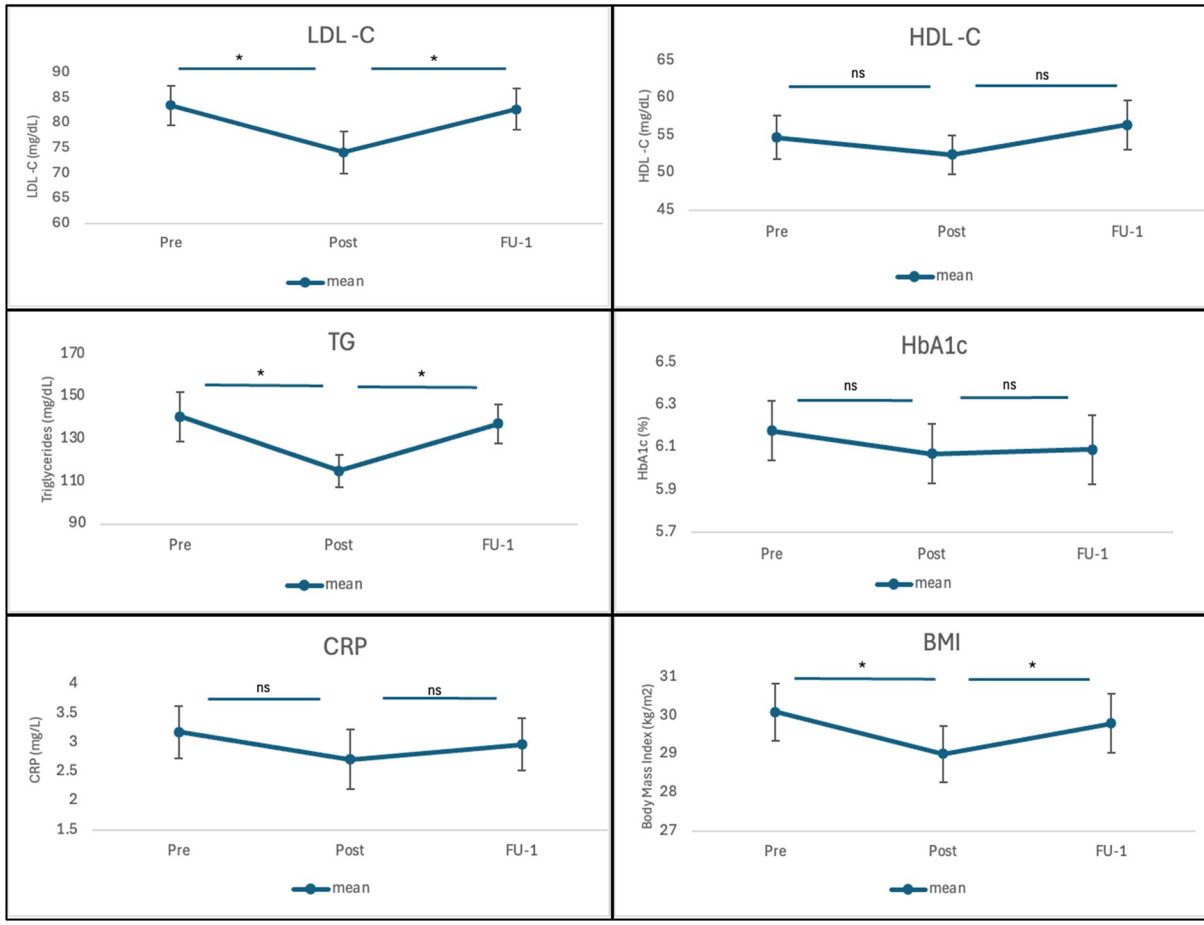

Figure 1. Trends in biomarker and BMI data depicted for pre-ICR, post-ICR, and follow-up. Abbreviations: BMI, body mass index; CRP, C-reactive protein; FU, follow-up; HbA1c, glycated hemoglobin; HDL-C, high-density lipoprotein cholesterol; ICR, intensive cardiac rehabilitation; LDL-L, low-density lipoprotein cholesterol; ns, not statistically significant; TG, triglycerides. *statistically significant.

have demonstrated that HDL-C levels decrease significantly after a period of very low-calorie diet, but increase significantly after a weight-maintaining diet, suggesting that HDL-C levels can fluctuate with changes in dietary intake and weight stabilization.[7]

All ICR programs require significant improvements in at least five cardiovascular metrics; the Ornish program meets Medicare standards, demonstrating benefits in LDL-C, TG, BMI, and other markers. However, Medicare limits ICR sessions to 72 hours over 18 weeks, which may not be sufficient to sustain long-term benefits, highlighting the need to provide additional support to these patients.[8] Our findings support previous research, indicating that in the absence of continued lifestyle adherence support through ICR program maintenance, participants are unable to sustain the benefits achieved during initial program participation.[9]

This study was limited by its single-center design, regional participant base, retrospective nature, and variability in follow-up timing, including coronavirus disease-2019 confounding factors. Surveys assessing adherence to program practices post-ICR could provide insights into patient lifestyle routine and retention.

Long-term structured supervision is essential for high-risk patients to sustain ICR program benefits. While the Dean Ornish program improves atherosclerotic risk factors in elderly and rural populations, follow-up data reveal a regression of benefits without continued intervention. Implementing long-term maintenance protocols, including monthly follow-ups and ongoing education, could enhance adherence and preserve cardiovascular improvements, ultimately reducing CVD progression in vulnerable populations.

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