

## The Effects of Exercise Training on LDL Mediated Blood Flow in Coronary Artery Disease: A Systematic Review

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**Abstract :** Background: Regular exercise reduces risk factors associated with cardiovascular diseases. Over the past decade, exercise interventions have been introduced to reduce the risk of and prevent coronary artery disease (CAD). Elevated low-density lipoproteins (LDL) contribute to the formation of atherosclerosis, its manifestations on the endothelial narrow the coronary artery and affect the endothelial function. Therefore, flow-mediated dilation (FMD) technique is used to assess the function. The results of previous studies have been inconsistent and difficult to interpret across different types of exercise programs. The relationship between exercise therapy and lipid levels has been extensively studied, and it is known to improve the lipid profile and endothelial function. However, the effectiveness of exercise in altering LDL levels and improving blood flow is controversial. Objective: This review aims to explore the evidence and quantify the impact of exercise training on LDL levels and vascular function by FMD. Methods: Electronic databases were searched PubMed, Google Scholar, Web of Science, the Cochrane Library, and EBSCO using the keywords: "low and/or moderate aerobic training", "blood flow", "atherosclerosis", "LDL mediated blood flow", "Cardiac Rehabilitation", "low-density lipoproteins", "flow-mediated dilation", "endothelial function", "brachial artery flow-mediated dilation", "oxidized low-density lipoproteins" and "coronary artery disease". The studies were conducted for 6 weeks or more and influenced LDL levels and/or FMD. Studies with different intensity training and endurance training in healthy or CAD individuals were included. Results: Twenty-one randomized controlled trials (RCTs) (14 FMD and 7 LDL studies) with 776 participants (605 exercise participants and 171 control participants) met eligibility criteria and were included in the systematic review. Endurance training resulted in a greater reduction in LDL levels and their subfractions and a better FMD response. Overall, the training groups showed improved physical fitness status compared with the control groups. Participants whose exercise duration was  $\geq 150$  minutes /week had significant improvement in FMD and LDL levels compared with those with  $< 150$  minutes/week. Conclusion: In conclusion, although the relationship between physical training, LDL levels, and blood flow in CAD is complex and multifaceted, there are promising results for controlling primary and secondary prevention of CAD by exercise. Exercise training, including resistance, aerobic, and interval training, is positively correlated with improved FMD. However, the small body of evidence for LDL studies (resistance and interval training) did not prove to be significantly associated with improved blood flow. Increasing evidence suggests that exercise training is a promising adjunctive therapy to improve cardiovascular health, potentially improving blood flow and contributing to the overall management of CAD.

**Keywords :** exercise training, low density lipoprotein, flow mediated dilation, coronary artery disease

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