PUCHALSKI, Konrad, RADWAŃSKA, Natalia, POLAKOWSKA, Izabela, LABUT, Bartłomiej, POPIELEC-JAKUBIEC, Katarzyna, KABAK, Miraslau, BĘBEN, Agata, GLOWACKA, Zuzanna and NEUMANN, Wojciech. Improvement of lipid profile after 6 months of self-initiated, multicomponent physical activity in a previously inactive 62-year-old patient: a case report. Quality in Sport. 2026;49:67185. eISSN 2450-3118.
https://doi.org/10.12775/QS.2026.49.67185
https://apcz.umk.pl/QS/article/view/67185

The journal has been awarded 20 points in the parametric evaluation by the Ministry of Higher Education and Science of Poland. This is according to the Annex to the announcement of the Minister of Higher Education and Science dated 05.01.2024, No. 32553. The journal has a Unique Identifier: 201398. Scientific disciplines assigned: Economics and Finance (Field of Social Sciences); Management and Quality Sciences (Field of Social Sciences).
Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).
The authors declare that there is no conflict of interest regarding the publication of this paper.
Received: 07.12.2025. Revised: 09.12.2025. Accepted: 27.12.2025. Published: 02.01.2026.

Improvement of lipid profile after 6 months of self-initiated, multicomponent physical activity in a previously inactive 62-year-old patient: a case report

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Abstract

Background: Hypercholesterolemia has become one of the main, modifiable risk factors to develop atherosclerotic cardiovascular diseases.Diet modification and lipid-lowering pharmacotherapy are standard of care, but some patients decline these options. Regular physical activity can improve lipid profile and blood pressure without any medications and diet .

Aim: To evaluate the effect of regular, multicomponent physical activity, without concurrent dietary change or pharmacotherapy on lipid profile, blood pressure and body mass in a previously inactive 62-year-old man.

Material and methods: A 62-year-old male patient with elevated total cholesterol (TC) and LDL-cholesterol (LDL-C) , previously sedentary, declined diet modification and lipid-lowering medications. In April 2025 he initiated a multicomponent program: running (5 km, three times per week), swimming (twice per week), and resistance training (twice per Results: Over 6 months, TC decreased from 217 to 174 mg/dL (−19.8%; 5.61 to 4.50 mmol/L), LDL-C from 147 to 116 mg/dL (−21.1%; 3.81 to 3.00 mmol/L), and HDL-C increased from 49 to 54 mg/dL (+10.2%; 1.27 to 1.40 mmol/L). Non-HDL cholesterol declined from 168 to 120 mg/dL (−28.6%; 4.35 to 3.10 mmol/L). Blood pressure decreased from 135/85 to 122/80 mmHg, and body mass from 85 to 83 kg (−2.4%).

Conclusions: In this previously inactive adult, 6 months of systematic, multicomponent physical activity without dietary or pharmacologic changes was associated with clinically meaningful improvements in LDL-C, non-HDL cholesterol, HDL-C, blood pressure and body mass. The case supports multicomponent exercise as a practical, non-pharmacologic intervention in primary prevention for patients declining standard lipid-lowering strategies.

Keywords: physical activity; hypercholesterolemia; LDL-cholesterol; HDL-cholesterol; non-HDL cholesterol; blood pressure; lifestyle medicine; case report

Introduction

Hypercholesterolemia is a major, modifiable risk factor for atherosclerotic cardiovascular disease and is highly prevalent in older adults. Current European recommendations emphasize lifestyle modification (dietary changes, smoking cessation, weight management, and increased physical activity) and lipid-lowering pharmacotherapy as standard of care in primary and secondary prevention. Nevertheless, some patients decline either pharmacological treatment or structured dietary interventions, limiting available options for risk reduction.

Regular physical activity positively affects lipoprotein metabolism, endothelial function, insulin sensitivity, body composition, and autonomic function. The application of aerobic and/or strength training, either separately, or in combination, have been shown to decrease LDL-C and non-HDL cholesterol, increase HDL-C levels, and decrease blood pressure as well. However, data on the isolated effect of a self-directed, multicomponent exercise program, without concurrent dietary changes or medication, are still relatively limited in routine primary care settings.

The magnitude of the observed changes is compared with effects reported in meta-analyses and guideline documents.

Material and methods

Patient:

A 62-year-old male with long-standing elevated TC and LDL-C and no significant comorbidities was followed in primary care. He had a sedentary lifestyle and declined both diet modification and lipid-lowering pharmacotherapy. The patient had no history of cardiovascular disease, diabetes, or chronic kidney disease Family history of premature cardiovascular disease was negative.

Before the observation period he had used dietary supplements containing bergamot and monacolin K for several months, without meaningful improvement of his lipid profile. Supplement use remained unchanged throughout the one year period.

Baseline assessment (April 2025) showed:

- TC: 217 mg/dL (5.61 mmol/L)
- LDL-C: 147 mg/dL (3.81 mmol/L)
- HDL-C: 49 mg/dL (1.27 mmol/L)
- Non-HDL cholesterol: 168 mg/dL (4.35 mmol/L)
- Blood pressure: 135/85 mmHg
- Body mass: 85 kg

The patient reported no special diet; he consumed a typical mixed diet without structured caloric restriction.

Intervention

Beginning in April 2025, the patient self-initiated the following regular physical activity program:

- Running: approximately 5 km, three times per week, at self-selected, moderate intensity.
- Swimming: twice per week, 45–60 minutes per session.
- Resistance training: twice per week, 90minutes per session, whole-body routines with machines and free weights.

Total weekly training frequency was seven sessions, combining endurance and resistance components. No changes were introduced in diet, supplements, or pharmacotherapy during the 6-month period. The program was maintained without formal supervision by a coach or physiotherapist.

Data collection and analysis

Outcomes were collected at baseline (April 2025) and at 6-month follow-up (October 2025) within routine laboratory and clinical practice. Standard laboratory methods were used for lipid measurements in a fasting state, according to local procedures in [name of laboratory/clinic – optional]. Non-HDL cholesterol was calculated as TC − HDL-C. Descriptive analysis was performed; results are reported as absolute values, absolute differences and percentage changes. SI unit conversion for cholesterol applied a factor of 1 mmol/L = 38.67 mg/dL.

Objective monitoring of training intensity (e.g. heart rate, accelerometry) was not undertaken. Adherence and safety were assessed based on patient self-report.

Results

Lipid profile

At 6 months, lipid parameters had improved substantially compared with baseline:

- TC: decreased from 217 to 174 mg/dL (5.61 to 4.50 mmol/L); change −43 mg/dL (−1.11 mmol/L), corresponding to −19.8%.
- LDL-C: decreased from 147 to 116 mg/dL (3.81 to 3.00 mmol/L); change −31 mg/dL (−0.80 mmol/L), i.e. −21.1%.
- HDL-C: increased from 49 to 54 mg/dL (1.27 to 1.40 mmol/L); change +5 mg/dL (+0.13 mmol/L), i.e. +10.2%.
- Non-HDL cholesterol: decreased from 168 to 120 mg/dL (4.35 to 3.10 mmol/L); change −48 mg/dL (−1.25 mmol/L), corresponding to −28.6%.

Somatic and hemodynamic parameters

- Body mass: decreased from 85 to 83 kg; absolute change −2 kg (−2.4%). Waist circumference was not systematically recorded.
- Blood pressure: decreased from 135/85 to 122/80 mmHg. Systolic blood pressure declined by 13 mmHg (−9.6%) and diastolic blood pressure by 5 mmHg (−5.9%).

Adherence and safety

The patient reported full adherence to the planned exercise program over the 6-month period, without breaks exceeding a few days.None of the cardiovascular symptoms (chest pain, syncope, palpitations) or other adverse symptoms were reported. No hospitalizations occurred during the observation period.

Discussion

Principal findings

Exercise in the form of a 6-month multi-component program that involved the participant being responsible for his own exercise program which included running, swimming, and resistance training was shown to be associated with clinical improvements to the lipid profile, blood pressure, and body composition of a 62-year-old previously sedentary male participant who did not make any dietary changes nor initiate lipid-lowering medication during this period. The reduction in LDL-C was 31mg/dl (-0.8mmol/l; -21.1%), and the reduction in non-HDL-C was 48mg/dl (-1.25mmol/l; -28.6%) while the increase in HDL-C was 10.2% during the same time frame. Additionally, systolic blood pressure decreased by 13mmHg, and diastolic blood pressure decreased by 5mmHg; there was also a moderate decrease in body weight (-2.4%).The magnitude of change, particularly for LDL-C and non-HDL cholesterol, is meaningful from a cardiovascular prevention perspective, given guideline-based targets for high-risk patients and the linear relationship between LDL-C reductions and event risk.

Comparison with literature

Meta-analyses of aerobic exercise typically show modest average changes in lipid profile: LDL-C reductions of approximately 3–6 mg/dL and HDL-C increases of 2–3 mg/dL, with considerable inter-individual variability. Resistance training can additionally improve HDL-C and non-HDL cholesterol. Combined endurance and resistance programs often exert additive effects on cardiometabolic risk factors.

In this case, the reduction in LDL-C (−31 mg/dL) and non-HDL (−48 mg/dL) exceeds average values reported in many training studies, which may reflect high training volume (seven sessions per week), good adherence, relatively high baseline LDL-C, and the multicomponent nature of the program. The HDL-C increase (+5 mg/dL) is also slightly higher than mean values reported in meta-analyses.

Regarding blood pressure, systematic reviews suggest that endurance training generally reduces systolic BP by ~5–8 mmHg and diastolic by ~2–4 mmHg in adults with elevated BP. The observed systolic reduction of 13 mmHg is greater than the mean effect but remains within the range described in individual trials, especially when baseline blood pressure is moderately elevated and adherence is high.

Possible mechanisms

Several mechanisms may account for the observed changes:

- Increased skeletal muscle lipoprotein lipase activity and enhanced clearance of triglyceride-rich lipoproteins.
- Upregulation of hepatic LDL receptors and increased LDL clearance.

- Improved insulin sensitivity and reduced hepatic very-low-density lipoprotein (VLDL) production.
- Reduction of visceral fat and improvement of body composition, even with modest weight loss;
- Improved endothelial function and arterial compliance;
- Favorable modulation of autonomic nervous system activity, contributing to blood pressure reduction.

Although body mass decreased only by 2.4%, exercise-induced changes in body composition (reduced visceral fat, increased lean mass) may underlie part of the cardiometabolic benefits, even without major weight loss.

Alternative explanations and limitations

Several limitations should be considered. First, only two time points (baseline and 6 months) were assessed, and intermediate dynamics of change are unknown. Second, triglycerides were not measured, so potential changes in atherogenic dyslipidemia patterns (e.g., TG/HDL-C ratio) could not be evaluated. Third, diet was not formally monitored; although the patient reported no intentional diet modification, unrecognized changes in caloric intake or macronutrient composition may have contributed to the improvements.

Analytical and biological variability for lipid parameters typically ranges from 5% to 7%, which is substantially smaller than the magnitude of the observed changes; thus measurement error alone is unlikely to explain the findings. However, the single-case design precludes causal inference and generalization to broader populations. Objective assessment of training intensity (e.g., heart rate monitoring, accelerometry) was not performed, limiting precise characterization of the dose–response relationship.

Practical implications

For patients who decline lipid-lowering pharmacotherapy or structured dietary interventions, a pragmatic, multicomponent exercise program can be an acceptable and potentially effective strategy to reduce cardiovascular risk. The combination of endurance (running, swimming) and resistance training implemented in this case is simple, low-cost, and broadly consistent with World Health Organization recommendations of at least 150–300 minutes of moderate-intensity aerobic activity per week plus muscle-strengthening activities on 2 or more days.

In clinical practice, it appears reasonable to:

- recommend individually tailored programs combining aerobic and resistance exercise;
- monitor lipid profile (including TG and non-HDL cholesterol), blood pressure, body mass and waist circumference at regular intervals (e.g., every 3–6 months);
- encourage simple training logs and, if feasible, heart rate or perceived exertion monitoring to optimize intensity and adherence;
- consider light supervision and behavioral support, particularly in initially sedentary older adults, to enhance safety and long-term sustainability.

Conclusions

In a previously inactive 62-year-old man with hypercholesterolemia, 6 months of regular, self-directed, multicomponent physical activity was associated with clinically relevant reductions in LDL-C (−21.1%) and non-HDL cholesterol (−28.6%), an increase in HDL-C (+10.2%), lower blood pressure (135/85 -> 122/80 mmHg) and modest weight loss (from 85kg to 83 kg), without any dietary or pharmacologic changes.

Combining endurance and resistance training appears to be an effective, non-pharmacologic strategy to improve lipid profile and blood pressure in primary prevention, particularly in motivated patients who refuse or postpone pharmacological treatment. Further prospective studies are warranted to better characterize the dose–response relationship between multicomponent physical activity and lipid changes in older adults.

Disclosure

Patient consent: Written informed consent for publication of anonymized clinical data was obtained from the patient.

Ethics: According to local regulations, this single-patient case report did not require institutional review board approval.

Conflict of interest: The authors declare no conflicts of interest.

Funding: No external funding was received for this work.

Author contributions:
Concept and design – IP, KP, WN
Data collection –IP, KPJ
Analysis and interpretation – AB, BL, NR
Manuscript drafting –MK, KPJ
Critical revision – MK,ZG
All authors read and approved the final version of the manuscript.

Use of AI: An artificial intelligence tool was used only for language editing and manuscript structuring. All clinical content, data, and interpretations were authored, verified and are the responsibility of the human authors.

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