



High cholesterol in a young woman with normal weight

Samaneh Bahoosh¹, Elham Vafaei^{2*}

¹ Data scientist, Azad University Science and Research, Vancouver, Canada.

² MD, General Practitioner, Iran University of Medical Sciences, Tehran, Iran.

*Corresponding authors: Dr. Elham Vafaei.

MD, General Practitioner, Iran University of Medical Sciences, Tehran, Iran.

E-mail: elhamvafaeim@gmail.com

DOI: <https://doi.org/10.54448/ijn25315>

Received: 05-05-2025; Revised: 07-29-2025; Accepted: 08-06-2025; Published: 08-14-2025; IJN-id: e25315

Editor: Dr. Alejandra Giselle Juárez Rebollar, MSc / DDS / OMFS.

Abstract

Hypercholesterolemia is often associated with obesity and unhealthy lifestyle decisions. However, people with a normal body weight can also experience increased cholesterol levels, which emphasizes the need for routine lipid screening beyond conventional risk factors. This study presents a case of a 33-year-old woman with a BMI of 22.7, in which high cholesterol (total cholesterol: 301 mg/dL, LDL: 215 mg/dL) was diagnosed, although they have no known cardiovascular risk factors. Instead of medication, she took a structured nutritional scheme that focused on increased fiber intake, reduced saturated fat consumption, and regular physical activity. Within 40 days, their total cholesterol level fell by 20%, and the LDL mirror fell by 25% and improved over six months. This case underlines the effectiveness of early dietary interventions in lipid management and underlines the boundaries of the BMI as the sole indicator of cardiovascular risk. Regular lipid reviews and preventive nutritional strategies should be prioritized for individuals independently of body weight. Future research should examine the long-term effects of changes in nutrition on cardiovascular health and compliance with patients.

Keywords: High Cholesterol, Heart Disease Risk Factor, Preventive Health, Life Style, Mediterranean Diet.

Introduction

Cholesterol is a lipid essential for the body to produce hormones, bile acids, and cell membranes,

under various other roles. Increased cholesterol levels increase the risk of cardiovascular diseases (CVD) such as atherosclerosis, coronary heart disease, and stroke, especially those associated with lipoprotein cholesterol [1]. Inadequate physical activity, but recent examinations suggest that people with normal body weight are also exposed to increased cholesterol levels if they consume an unhealthy diet [2].

Acts as a useful indicator of cardiovascular risk by establishing that more accurate results can be obtained using different evaluation techniques. Nutrition is crucial in preventing cardiovascular diseases and high cholesterol because eating habits are intimately related to lipid metabolism. An increasing amount of empirical data has demonstrated the benefit of dietary fiber, especially soluble fiber, for lipid profiles and low-density lipoproteins [3]. These foods, such as oats, fruit, vegetables, and legumes, were recommended to reduce cholesterol levels and the risk of cardiovascular diseases [4]. In particular, it has been proven that higher dietary fiber intake reduces both LDL and total cholesterol levels, thereby decreasing the risk of severe cardiovascular events [5].

A Mediterranean diet rich in soluble fiber, unsaturated fat, and plant protein has been widely proven to be effective in preventing cardiovascular disease and controlling lipid levels. It is important in the non-pharmacological treatment of high cholesterol. Studies consistently show that following this diet reduces cholesterol, lowers inflammation, and improves endothelial function, thus reducing cardiovascular risk [6,7]. Following certain lifestyle modifications, such as eating a nutrient-dense diet and exercising frequently, can have a big impact on

cholesterol control and overall heart health in people who have never had heart-related problems before [8].

These results highlight the crucial significance of initial dietary modifications in averting metabolic disorders, even in people lacking conventional risk factors. This research showcases the advantages of heightened soluble fiber consumption and lowered saturated fats for enhancing lipid profiles and minimizing cardiovascular risks without the necessity for medication.

Case Report

Ethical Approval

This study was approved by the Ethics Committee of Iran University of Medical Sciences (IUMS) under the code IR.IUMS.FMD.REC.1403.479.

Clinical Case Development

A 33-year-old woman weighing 58 kg and 160 cm tall (BMI: 22.7 kg m⁻²) expressed concern about her cholesterol level after a control laboratory result, although she had no signs of heart disease or diabetes. She has never been diagnosed with high blood pressure, diabetes, or another heart attack, and does not exhibit any typical signs of high lipid levels. Her family background was diabetes; Both her father and sister were diagnosed with type 2 diabetes. However, she was unaware of her cholesterol level until her recent routine checkup.

Upon routine medical examination, the lipid profile of the patient is presented in Table 1.

Table 1. Patient's Initial Lipid Profile.

| Parameter | Value | Reference Range |
|------------------------------|-----------|--------------------|
| Total Cholesterol | 301 mg/dL | < 200 mg/dL |
| LDL Cholesterol (LDL) | 215 mg/dL | < 100 mg/dL |
| HDL Cholesterol (HDL) | 47 mg/dL | > 40 mg/dL (women) |
| Triglycerides | 160 mg/dL | < 150 mg/dL |
| Fasting Blood Sugar | 92 mg/dL | 70-99 mg/dL |

Source: Own authorship.

Despite the medical advice, the patient managed her cholesterol independently through a regimen of diet and exercise. They gave her only general dietary guidelines, without any formal treatment plan or monitoring. He introduced strict nutritional control measures, including the elimination of saturated fat, refined flour, red meat, eggs, and dairy products, and their replacement by plant-based alternatives, fish, and skinless chicken. She increased her fiber intake considerably by eating more fruit and vegetables (particularly apples and carrots) and nuts, such as

walnuts and pistachios. Furthermore, a strenuous one-hour walk after lunch became a regular part of her daily routine. The patient was on a structured 36-day diet, repeating a 12-day meal plan with a highfiber, low-fat, nutrient-rich diet three times a day, with a low use of oil, salt, and sugar (Table 2).

Table 2. 12-Day Meal Plan.

| Day | Breakfast | Mid-Morning Snack | Lunch | Dinner |
|-----|--------------------------------------|--|---|--|
| 1 | 2 tbsp sesame + turmeric tea + apple | Apple | 3 cooked tomatoes + 100g boiled chicken breast + 100g whole-grain bread + 2 medium potatoes | 2 tbsp low-fat yogurt + 3 dried apricots |
| 2 | Cucumber + orange | Apple + 3 dried apricots + raisins + cucumber + 10 cooked cherries | Dill rice (no oil) + 80g boiled fish seasoned with turmeric, garlic, and pepper | 200g lettuce |
| 3 | Bread + low-fat yogurt | Cooked cherries + 1 glass natural apple juice (with skin) + dried apricots | Lettuce + egg whites + 3 cooked tomatoes + boiled soy protein + spices | 10 strawberries + raisins |
| 4 | 2 apples | Chopped lettuce + raisins + 2 tbsp low-fat yogurt | Oil-free lentil stew + whole-grain bread + small orange | Shirazi (chopped cucumber, tomato, onion, lemon juice) |
| 5 | Lentil stew + whole-grain bread | Natural apple juice + orange juice | Boiled chicken with barberry + dill rice + 2 raw onions | Mango + 10 olives |
| 6 | Sugar-free cherry compote | Lettuce + raisins + 2 tbsp low-fat yogurt | Vegetable soup (potatoes, boiled soy, cooked tomatoes, corn, parsley, onion, garlic) | Cucumber |
| 7 | Natural juice | 2 nectarines + olives + 10 raisins | Oil-free lentil stew + bread + fresh lemon | Mango + cucumber |
| 8 | Bread + cheese + tomato | Fresh cherries + olives | Fish + rice + mango | Fruit salad |
| 9 | Fruit salad | Lettuce + low-fat yogurt + raisins + whole-grain bread | Olives + nectarine | Apple boiled chicken |
| 10 | Bread cucumber | Natural orange and apple juice | Boiled chicken + wholegrain bread | Salad |
| 11 | Bread + raisins | Lettuce + sesame oil + lemon juice | Boiled chicken + bread | Apple compote |
| 12 | Bread + apple compote | | Lentil stew | Salad + low-fat yogurt |

Source: Own authorship.

The patient adhered to a strict 12-day dietary intervention, repeated three times for a total of 36 days. The plan aimed to reduce cholesterol levels through a high-fiber, low-fat diet, eliminating saturated fats, refined carbohydrates, and high-sodium foods. Meals incorporated fresh fruits, vegetables, whole grains, and lean protein sources, with a focus on nutrient balance and portion control. Physical activity included daily one-hour walks post-lunch. The results and monitoring of dietary changes. After 40 days of following this diet, a follow-up lipid profile was performed (Table 3).

Table 3. Follow-Up Lipid Profile.

| Parameter | Value | Change | Reference Range |
|------------------------------|-----------|-----------------------|--------------------|
| Total Cholesterol | 239 mg/dL | Decrease of 20% | < 200 mg/dL |
| LDL Cholesterol (LDL) | 161 mg/dL | Decrease of 25% | < 100 mg/dL |
| HDL Cholesterol (HDL) | 48 mg/dL | Increase of 2% | > 40 mg/dL (women) |
| Triglycerides | 145 mg/dL | Decrease of 9% | < 150 mg/dL |
| Fasting Blood Sugar | 90 mg/dL | No significant change | 70–99 mg/dL |

Source: Own authorship.

Over the 40-day interval, total cholesterol fell by 20% and LDL cholesterol by 25%. These results were due to dietary changes alone - no medications were given. Sensible Diet Plan After an initial drop in cholesterol levels, the patient continued to perfect her diet for six months. Schedule changes included: Moderate egg intake: Eggs were reintroduced into the diet, but limited to 1-2 weekly. Limited meat and dairy consumption: Dairy and lean meats (chicken and fish) were reduced to 1-2 servings per week. Continued focus on high-fiber foods: Consumption of high-fiber fruits, vegetables, and nuts continued. Follow-up result six months later. A second lipid profile was obtained after six months of repeated dietary changes (Table 4).

Table 4. Second Follow-Up Lipid Profile.

| Parameter | Value | Change | Reference Range |
|------------------------------|-----------|-----------------------|--------------------|
| Total Cholesterol | 215 mg/dL | Decrease of 10% | < 200 mg/dL |
| LDL Cholesterol (LDL) | 140 mg/dL | Decrease of 13% | < 100 mg/dL |
| HDL Cholesterol (HDL) | 50 mg/dL | Increase of 4% | > 40 mg/dL (women) |
| Triglycerides | 138 mg/dL | Decrease of 5% | < 150 mg/dL |
| Fasting Blood Sugar | 88 mg/dL | No significant change | 70–99 mg/dL |

Source: Own authorship.

Over six months, the patient maintained a nutrient-dense, high-fiber diet, leading to improvements in her lipid profile: total cholesterol decreased by 10% and LDL levels by 13%. Notably, she did not experience any adverse effects typically associated with restrictive diets, such as hair loss, and she lost 4 kg, indicating improved overall body composition. One month after the initial follow-up, she slightly relaxed her dietary restrictions by reintroducing some high-fat foods like cheese and eggs in moderation while still prioritizing high-fiber options. This shift underscores the challenges of adhering to strict dietary changes over time, especially as lifestyle demands change.

Discussion

Even in people who have no clear clinical symptoms of diabetes or cardiovascular diseases (CVD), regular cholesterol screenings are of crucial importance, as shown in this case study. The research focuses on a 33-year-old woman with a healthy body mass index, but a significantly high cholesterol level. This case underlines that hypercholesterolemia can be a reserved but significant danger to CVD, even if typical risk factors such as obesity are not present.

The results counteracted the traditional emphasis on body weight as a central measure of metabolic health and underlined the need for more thorough risk assessment methods that include lipid analysis and genetic factors [9]. Regular cholesterol screening is essential for preventive health care, particularly in overweight people and those with a family history of metabolic diseases, irrespective of weight. Early screening allows for early intervention to reduce the risk of atherosclerosis and cardiovascular disease. The present case highlights how dietary and lifestyle changes can make a difference to lipid profiles. As high cholesterol in young people increases the long-term risk of cardiovascular disease, early detection and intervention are crucial. Future research should look at the long-term results of early dietary and pharmacological approaches, including the use of statins, with attention to adherence and adverse reactions [10].

Lipid assessment recommendations vary by age and risk factors, but health guidelines consistently emphasize the importance of early detection. The American Heart Association advises lipid screening in children aged 9-11, particularly those at higher risk. For adults, routine assessments are recommended starting at age 35 for men and 45 for women with risk factors, while individuals with cardiovascular risks may benefit from screening as early as ages 20-39. Early

identification of dyslipidemia in asymptomatic young adults enables timely intervention to reduce heart disease risk. These guidelines underscore the importance of incorporating lipid screening into routine healthcare to manage dyslipidemia from its early stages [11-13].

The effectiveness of nutritional interventions in this case shows the central role of changes in lifestyle in the treatment of hypercholesterolemia. By reducing saturated fats and refined carbohydrates while increasing the fiber intake, the patient achieved a reduction in total cholesterol by 20% within 40 days and a reduction in the LDL cholesterol level by 25%. These results in harmony with the existing literature, which found that the role of soluble fibers, such as those found in oats, legumes, and fruits [14].

The Mediterranean diet has been demonstrated to be especially successful in lowering cholesterol and the risk of cardiovascular disease because of its emphasis on fruits, vegetables, whole grains, lean proteins, and healthy fats [15]. Targeted dietary interventions can reduce cholesterol, improve endothelial function, reduce inflammation, and provide cardiovascular benefits, even in normal-weight individuals who may not be aware of their risk. Early, structured nutrition strategies may improve outcomes without medication. However, the case also reveals limitations such as short duration of follow-up, lack of pharmacological support, and reliance on a self-directed schedule that may have an impact on adherence and long-term success.

The possible reintroduction of high-fat foods highlights the difficulty of maintaining a strict diet. Future research should include long-term randomized controlled trials combining dietary and pharmacological approaches. Public health efforts should also focus on routine cholesterol screening and support sustainable and flexible dietary strategies, particularly for low-income groups.

Study Limitations

The 6-month follow-up period restricts our ability to understand long-term effects. Without official monitoring, the self-directed dietary intervention may have an impact on adherence and reproducibility. Its lack of a control group as a single case report restricts its generalizability. Although objective lipid measurements reduce potential bias, the patient's role as a co-author does introduce some. The return of high-fat foods raises concerns about adherence and presents the need for adaptable food plans. In future research, longer follow-up and controlled trials should be used to overcome these limitations.

Conclusion

The research has highlighted the importance of regular cholesterol screening for all individuals, regardless of weight or visible signs of cardiovascular disease, to allow early detection and lifestyle interventions. It underlines the effectiveness of dietary strategies in reducing cholesterol, especially for those seeking non-pharmacological alternatives. The study calls for further research on the long-term impact and sustainability of dietary interventions, their potential to replace medicinal products such as statins, and their wider metabolic benefits. Increasing screening programs and promoting lifestyle changes are key to preventing cardiovascular disease in low-risk groups. The patient's long-lasting lipid improvements in this case demonstrate that non-pharmacological strategies, like a high-fiber, low-fat diet, can successfully manage hypercholesterolemia. To prevent cardiovascular diseases in low-risk populations, public health initiatives should place a high priority on easily accessible screening programs and encourage sustainable dietary practices, such as the Mediterranean diet. The long-term viability of dietary interventions, their potential to take the place of drugs like statins, and their broader metabolic advantages for a variety of populations all require more investigation.

List of Abbreviations

- BMI: Body Mass Index
- CVD: Cardiovascular Disease
- HDL: High-Density Lipoprotein
- LDL: Low-Density Lipoprotein

CRedit

Author contributions: **Conceptualization-** Samaneh Bahoosh, Elham Vafaei; **Data curation-** Samaneh Bahoosh, Elham Vafaei; **Formal Analysis-** Samaneh Bahoosh, Elham Vafaei; **Investigation-** Samaneh Bahoosh, Elham Vafaei; **Methodology-** Samaneh Bahoosh, Elham Vafaei; **Project administration-** Samaneh Bahoosh; **Supervision-** Elham Vafaei; **Writing - original draft-** Samaneh Bahoosh, Elham Vafaei; **Writing-review & editing-** Samaneh Bahoosh, Elham Vafaei.

Acknowledgment

Not applicable.

Ethical Approval

This study was approved by the Ethics Committee of Iran University of Medical Sciences (IUMS) under the code IR.IUMS.FMD.REC.1403.479.

Informed Consent

It was applied.

Funding

Not applicable.

Data Sharing Statement

The data presented in this case are fully included in Tables 1-4 within the manuscript. No additional datasets were generated. Data are available upon reasonable request from the corresponding author due to privacy considerations, as the patient is a co-author.

Conflict of Interest

The authors declare no conflict of interest.

Similarity Check

It was applied by Ithenticate®.

Application of Artificial Intelligence (AI)

Not applicable.

Peer Review Process

It was performed.

About The License©

The author(s) 2025. The text of this article is open access and licensed under a Creative Commons Attribution 4.0 International License.

References

- Huff T, Boyd B, Jialal I. Physiology, Cholesterol. 2023 Mar 6. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. PMID: 29262185.
- Feingold KR,. The Effect of Diet on Cardiovascular Disease and Lipid and Lipoprotein Levels. 2024 Mar 31. In: Feingold KR, Ahmed SF, Anawalt B, Blackman MR, Boyce A, Chrousos G, Corpas E, de Herder WW, Dhatariya K, Dungan K, Hofland J, Kalra S, Kaltsas G, Kapoor N, Koch C, Kopp P, Korbonits M, Kovacs CS, Kuohung W, Laferrère B, Levy M, McGee EA, McLachlan R, Muzumdar R, Purnell J, Rey R, Sahay R, Shah AS, Singer F, Sperling MA, Stratakis CA, Trencé DL, Wilson DP, editors. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-. PMID: 33945244.
- Mozaffarian D. Dietary and Policy Priorities for Cardiovascular Disease, Diabetes, and Obesity: A Comprehensive Review. *Circulation*. 2016 Jan 12;133(2):187-225. doi: 10.1161/CIRCULATIONAHA.115.018585.
- Soliman GA. Dietary Fiber, Atherosclerosis, and Cardiovascular Disease. *Nutrients*. 2019 May 23;11(5):1155. doi: 10.3390/nu11051155.
- Fu L, Zhang G, Qian S, Zhang Q, Tan M. Associations between dietary fiber intake and cardiovascular risk factors: An umbrella review of meta-analyses of randomized controlled trials. *Front Nutr*. 2022 Sep 12;9:972399. doi: 10.3389/fnut.2022.972399.
- Abrignani V, Salvo A, Pacinella G, Tuttolomondo A. The Mediterranean Diet, Its Microbiome Connections, and Cardiovascular Health: A Narrative Review. *Int J Mol Sci*. 2024 Apr 30;25(9):4942. doi: 10.3390/ijms25094942.
- Hooper L, Martin N, Abdelhamid A, Davey Smith G. Reduction in saturated fat intake for cardiovascular disease. *Cochrane Database Syst Rev*. 2015 Jun 10;(6):CD011737. doi: 10.1002/14651858.CD011737. Update in: *Cochrane Database Syst Rev*. 2020 May 19;5:CD011737. doi: 10.1002/14651858.CD011737.
- Janse Van Rensburg WJ. Lifestyle Change Alone Sufficient to Lower Cholesterol in Male Patient With Moderately Elevated Cholesterol: A Case Report. *Am J Lifestyle Med*. 2018 Oct 19;13(2):148-155. doi: 10.1177/1559827618806841.
- M Y, Trivedi N, Makwana N, Krishna PHPP, D K. Prevalence of normal weight obesity and its cardiometabolic implications among government doctors in Gujarat, India: a cross-sectional study. *Clin Diabetes Endocrinol*. 2024 Sep 25;10(1):28. doi: 10.1186/s40842-024-00189-2.
- Jeong SM, Choi S, Kim K, Kim SM, Lee G, Park SY, Kim YY, Son JS, Yun JM, Park SM. Effect of Change in Total Cholesterol Levels on Cardiovascular Disease Among Young Adults. *J Am Heart Assoc*. 2018 Jun 13;7(12):e008819. doi: 10.1161/JAHA.118.008819.
- Berger JH, Faerber JA, Chen F, Lin KY, Brothers JA, O'Byrne ML. Adherence With Lipid Screening Guidelines in Children With Acquired and Congenital Heart Disease: An Observational Study Using Data From The MarketScan Commercial and Medicaid Databases. *J Am Heart Assoc*. 2022 Apr 5;11(7):e024197. doi: 10.1161/JAHA.121.024197.
- Chou R, Dana T, Blazina I, Daeges M, Bougatsos C, Jeanne T. Screening for Dyslipidemia in Younger Adults: A Systematic Review to Update the 2008 U.S. Preventive Services Task Force

Recommendation [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2016 Nov. Report No.: 14-05206-EF-1. PMID: 27875038.

- 13.** Chou R, Dana T, Blazina I, Daeges M, Bougatsos C, Jeanne TL. Screening for Dyslipidemia in Younger Adults: A Systematic Review for the U.S. Preventive Services Task Force. *Ann Intern Med.* 2016 Oct 18;165(8):560-564. doi: 10.7326/M16-0946.
- 14.** Ghavami A, Ziaei R, Talebi S, Barghchi H, Nattagh-Eshtivani E, Moradi S, Rahbarinejad P, Mohammadi H, Ghasemi-Tehrani H, Marx W, Askari G. Soluble Fiber Supplementation and Serum Lipid Profile: A Systematic Review and Dose-Response Meta-Analysis of Randomized Controlled Trials. *Adv Nutr.* 2023 May;14(3):465-474. doi: 10.1016/j.advnut.2023.01.005.
- 15.** Widmer RJ, Flammer AJ, Lerman LO, Lerman A. The Mediterranean diet, its components, and cardiovascular disease. *Am J Med.* 2015 Mar;128(3):229-38. doi: 10.1016/j.amjmed.2014.10.014.