Research Article

Effect of Baryta muriatica 3X on Low-Density Lipoprotein Cholesterol in Adults with Hyperlipidemia: A Randomized, Placebo-Controlled Single-Blind Clinical Trial

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Abstract

Background

Hyperlipidemia is a major modifiable risk factor for atherosclerotic cardiovascular disease, with elevated low-density lipoprotein cholesterol (LDL-C) contributing substantially to cardiovascular morbidity and mortality. Although conventional lipid-lowering therapies are effective, interest in complementary and integrative approaches has increased because of the need for individualized and holistic management strategies. *Baryta muriatica* has traditionally been used in homeopathic practice for vascular and degenerative disorders; however, clinical evidence supporting its role in hyperlipidemia remains limited.

Objective

To evaluate the efficacy of *Baryta muriatica* 3X in reducing LDL-C levels in adults with hyperlipidemia compared with placebo.

Methods

A randomized, placebo-controlled clinical trial was conducted at Bharati Vidyapeeth Homoeopathic Medical College and Hospital, Pune, India, including patients recruited from the outpatient department and affiliated rural and urban camps. Fifty-two adults aged 25–70 years with LDL-C concentrations >100 mg/dL were randomly allocated to receive either *Baryta muriatica* 3X (n = 26) or placebo (Sac Lac, n = 26) for three months. Participants attended follow-up visits every 15 days. The primary outcome was the change in LDL-C concentration from baseline to three months. Within-group comparisons were performed using paired *t*-tests, while between-group differences were analysed using unpaired *t*-tests. Statistical significance was defined as $p < 0.05$.

Results

Baseline demographic and biochemical characteristics were comparable between groups. Participants receiving *Baryta muriatica* 3X demonstrated a statistically significant reduction in mean LDL-C from 140.19 ± 9.44 mg/dL at baseline to 137.88 ± 9.40 mg/dL after three months (mean difference: 2.31 mg/dL; $p = 0.0005$). In contrast, the placebo group showed no statistically significant change (134.96 ± 9.68 mg/dL to 135.15 ± 10.34 mg/dL; $p = 0.380$). The between-group comparison of change scores favored the intervention group ($p = 0.0003$). A greater proportion of participants in the intervention group demonstrated a clinically favorable LDL-C response than those receiving placebo.

Conclusion

Baryta muriatica 3X was associated with a statistically significant reduction in LDL-C compared with placebo over a three-month treatment period. However, the absolute magnitude of LDL-C reduction was modest, and the findings should be interpreted in light of the limited sample size and short follow-up period. Larger, adequately powered randomized controlled trials are required to confirm these findings and establish their clinical relevance.

Keywords Hyperlipidemia; Low-density lipoprotein cholesterol; *Baryta muriatica*; Homeopathy; Integrative medicine; Randomized controlled trial.

Introduction

Hyperlipidemia is a major modifiable risk factor for atherosclerotic cardiovascular disease (ASCVD), one of the leading causes of morbidity and mortality worldwide.(1,2) Elevated concentrations of low-density lipoprotein cholesterol (LDL-C) play a central role in the initiation and progression of atherosclerosis through endothelial dysfunction, oxidative modification of lipoproteins, chronic vascular inflammation, and plaque formation.(3–5) Persistent hyperlipidemia substantially increases the risk of coronary artery disease, ischemic stroke, and peripheral arterial disease, making effective lipid management an important public health priority.(1,6)

The prevalence of hyperlipidemia has increased considerably over recent decades, particularly in low- and middle-income countries undergoing rapid urbanization and lifestyle transitions. In India, changing dietary habits, reduced physical activity, obesity, diabetes mellitus, and population ageing have contributed to a growing burden of hyperlipidemia. Epidemiological studies have demonstrated a high prevalence of elevated LDL-C, hypertriglyceridemia, and reduced high-density lipoprotein cholesterol (HDL-C), emphasizing the need for effective preventive and therapeutic strategies.(7)

Current management of hyperlipidemia combines lifestyle modification with pharmacological interventions, particularly statins, which remain the first-line therapy for reducing LDL-C and cardiovascular risk. Although these therapies have demonstrated substantial clinical benefit, long-term treatment adherence may be influenced by factors such as medication intolerance, perceived adverse effects, polypharmacy, cost, and patient preference.(1,8) Consequently, there is increasing interest in complementary and integrative approaches that may be used alongside evidence-based conventional care, provided that their efficacy and safety are supported by appropriately designed clinical studies.

Homeopathy is one of the complementary medicine systems widely practiced in several countries, including India. Within homeopathic Materia Medica, *Baryta muriatica* has traditionally been described for conditions associated with vascular degeneration, arteriosclerosis, hypertension, and age-related circulatory disorders.(9–11) Despite these traditional therapeutic indications, clinical evidence evaluating its effectiveness in patients with hyperlipidemia remains scarce.(12) Most published studies in this field have investigated other homeopathic medicines or individualized treatment approaches, while randomized controlled clinical trials specifically evaluating *Baryta muriatica* for dyslipidemia are limited.(13–15)

Given the increasing burden of hyperlipidemia and the limited clinical evidence regarding the role of *Baryta muriatica* in lipid management, further investigation is warranted. Generating clinical evidence through randomized controlled studies is important for evaluating the potential contribution of complementary therapies within an evidence-informed integrative healthcare framework.

Therefore, the present randomized placebo-controlled clinical trial was undertaken to evaluate the effect of *Baryta muriatica* 3X on low-density lipoprotein cholesterol (LDL-C) in adults with hyperlipidemia over a three-month treatment period.

Materials And Methods

2.1 Study Design

This randomized, single-blind, placebo-controlled clinical trial was conducted to evaluate the efficacy of *Baryta muriatica* 3X in adults with hyperlipidemia. The study was designed and reported in accordance with the Consolidated Standards of Reporting Trials (CONSORT) 2010 statement for randomized controlled trials.

2.2 Study Setting

The study was carried out at the Outpatient Department of Bharati Vidyapeeth (Deemed to be University) Homoeopathic Medical College and Hospital, Pune, Maharashtra, India. Participants were recruited from the hospital outpatient department as well as affiliated rural and urban health camps from [November 2024] to

[November 2025].

2.3 Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee of Bharati Vidyapeeth (Deemed to be University) Homoeopathic Medical College and Hospital (Approval No. BVDUHMC/2024/12). Written informed consent was obtained from all participants before enrolment. The trial was prospectively registered with the Clinical Trials Registry–India (CTRI No. CTRI/2024/11/076703) before participant recruitment.

2.4 Participants

Adults aged 25–70 years with hyperlipidemia and an LDL-C concentration >100 mg/dL were screened for eligibility. Eligible participants were enrolled after providing written informed consent.

2.5 Inclusion Criteria

- Adults aged 25–70 years.
- LDL-C concentration >100 mg/dL.
- Willingness to participate and provide written informed consent.
- Receiving stable conventional medical therapy, including statins where prescribed.

2.6 Exclusion Criteria

- Pregnancy or lactation.
- Serious systemic illness requiring intensive medical management.
- Known hypersensitivity to study medication.
- Inability or unwillingness to comply with the study protocol.
- Participation in another clinical trial during the study period.

2.7 Sample Size

The required sample size was determined using a formal sample size calculation before study initiation. Fifty-two eligible participants were enrolled and randomly allocated in a 1:1 ratio to the intervention and placebo groups.

2.8 Randomization and Blinding

Participants were randomized using a computer-generated randomization sequence into either the *Baryta muriatica* 3X group or the placebo group. The study employed a single-blind design in which participants were unaware of their treatment allocation. The placebo preparation was identical in appearance, taste, and packaging to the active intervention to maintain blinding throughout the study.

2.9 Intervention

Participants allocated to the intervention group received *Baryta muriatica* 3X manufactured by SBL. The prescribed dosage was two pills three times daily for three months.

Participants allocated to the control group received an identical placebo (Sac Lac), manufactured by the same company and matched in appearance, taste, and packaging. The placebo was administered at the same dosage and frequency as the active intervention.

2.10 Concomitant Therapy

Participants in both groups continued their prescribed conventional medications, including statin therapy where applicable, throughout the study. Conventional medication regimens remained unchanged during the three-month study period unless modification was considered medically necessary by the treating physician. Lifestyle advice

regarding diet and physical activity was provided equally to participants in both groups to minimize performance bias.

2.11 Outcome Measure

The primary outcome measure was the change in serum low-density lipoprotein cholesterol (LDL-C) concentration from baseline to the completion of the three-month intervention period. Blood samples were collected before initiation of treatment and at the end of the study using standard laboratory procedures.

Statistical Analysis

Statistical analyses were performed using Python (Python Software Foundation, Wilmington, DE, USA). Data management and preprocessing were conducted using the Pandas library, while statistical analyses were performed using Python's scientific computing libraries. Data visualization and graphical representation of the results were generated using Matplotlib and Plotly. Continuous variables are presented as mean ± standard deviation (SD). Within-group comparisons were performed using paired Student's *t*-tests, and between-group comparisons were performed using independent Student's *t*-tests. All statistical tests were two-tailed, and a *p*-value < 0.05 was considered statistically significant.

3.1 Participant Flow

A total of 52 participants meeting the eligibility criteria were enrolled in the study and randomized into two groups. Twenty-six participants were allocated to receive *Baryta muriatica* 3X (intervention group), while the remaining twenty-six participants received placebo (Sac Lac). All randomized participants completed the three-month treatment period and were included in the final statistical analysis. No participants were lost to follow-up, withdrew consent, or were excluded after randomization. The participant flow throughout the study is illustrated in Figure 1. This trial is reported in accordance with the CONSORT 2010 Statement.(16)

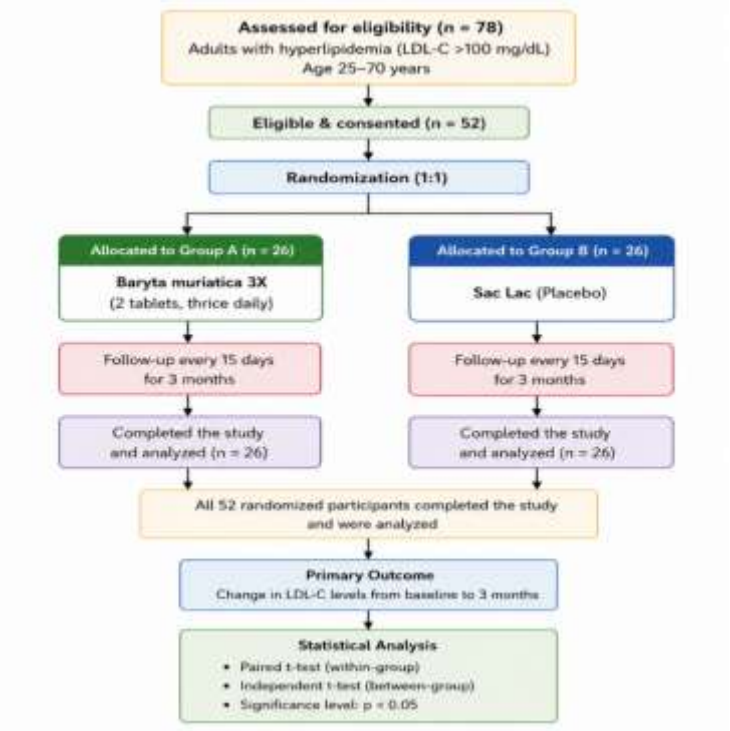


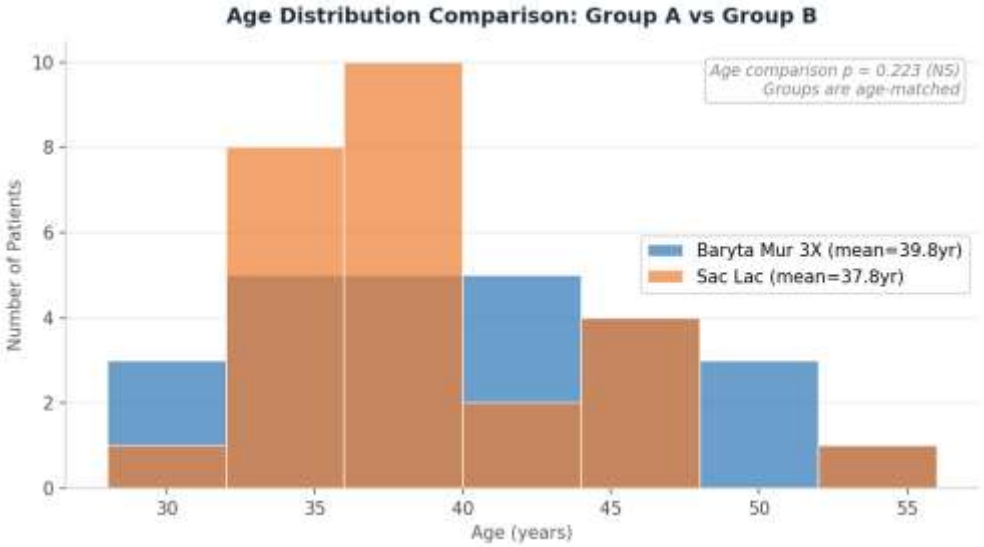
Figure 1. CONSORT flow diagram of participant recruitment, randomization, follow-up and analysis.

3.2 Baseline Characteristics

The baseline demographic and clinical characteristics of the participants are presented in Table 1. The intervention and placebo groups each consisted of 26 participants.

The mean age of participants in the *Baryta muriatica* 3X group was 39.8 ± 6.4 years, while that of the placebo group was 37.8 ± 5.4 years, with no statistically significant difference between the groups (t = 1.233, p = 0.223). The sex distribution was also comparable between the intervention group (17 males and 9 females) and the placebo group (16 males and 10 females).

Baseline LDL-C concentrations were 140.19 ± 9.44 mg/dL in the intervention group and 134.96 ± 9.68 mg/dL in the placebo group. Although the intervention group demonstrated a slightly higher mean LDL-C concentration at baseline, the difference was not statistically significant (t = 1.973, p = 0.054). These findings indicate that the two groups were comparable with respect to demographic and baseline clinical characteristics prior to initiation of the intervention.



Graph 1. Baseline demographic and clinical characteristics of participants in the intervention and placebo groups.

3.3 Changes in LDL-C Following Treatment

Changes in serum LDL-C concentrations after three months of treatment are presented in Table 2. Participants receiving *Baryta muriatica* 3X demonstrated a statistically significant reduction in LDL-C concentrations, with the mean value decreasing from 140.19 ± 9.44 mg/dL at baseline to 137.88 ± 9.40 mg/dL after treatment (mean change: −2.31 mg/dL; paired Student's t-test, t = 4.026, p = 0.0005). In contrast, participants receiving placebo (Sac Lac) showed no statistically significant change in LDL-C concentrations, with values changing from 134.96 ± 9.68 mg/dL at baseline to 135.15 ± 10.34 mg/dL after treatment (mean change: +0.19 mg/dL; paired Student's t-test, p = 0.380).

Table 1. Baseline demographic and clinical characteristics of participants in the intervention and placebo groups.

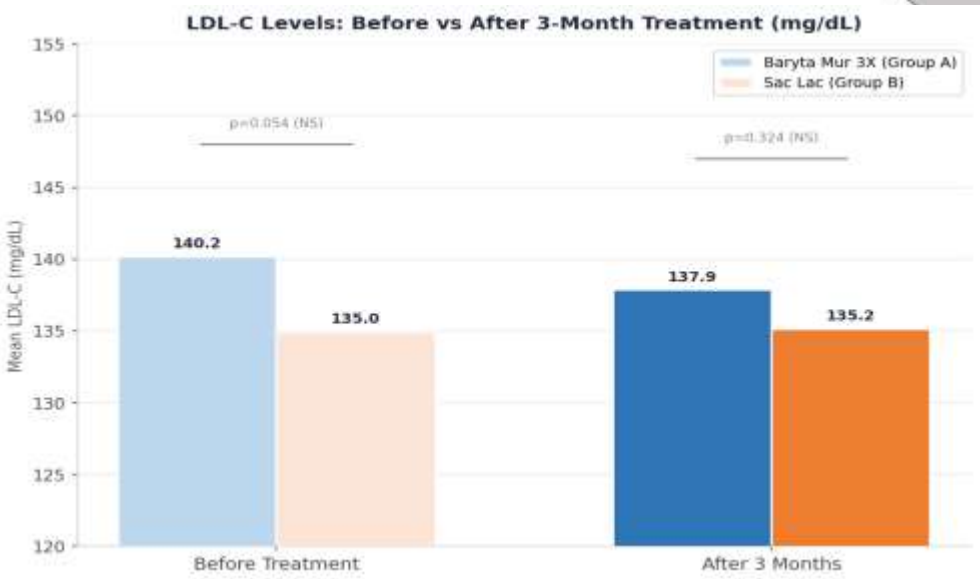
Parameter	Group A (Baryta Mur 3X)	Group B (Sac Lac)	t-value	p-value
n	26	26	—	—
Age Mean ± SD (years)	39.8 ± 6.4	37.8 ± 5.4	1.233	0.223 (NS)
Age Range (years)	30 – 52	30 – 55	—	—
Male / Female	17 / 9	16 / 10	—	NS
Baseline LDL-C Mean ± SD (mg/dL)	140.19 ± 9.44	134.96 ± 9.68	1.973	0.054 (NS)
Baseline LDL-C Range (mg/dL)	122 – 164	119 – 158	—	—
Baseline LDL-C Median (mg/dL)	140.0	133.5	—	—

Table 2: Changes in serum LDL-C concentrations after three months of treatment

Group	Baseline LDL-C (mg/dL) Mean ± SD	Post-treatment LDL-C (mg/dL) Mean ± SD	Mean Change (mg/dL)	Statistical Test	*p*-value
Baryta muriatica 3X (n = 26)	140.19 ± 9.44	137.88 ± 9.40	−2.31	Paired Student's *t*-test (*t* = 4.026)	0.0005
Placebo (Sac Lac) (n = 26)	134.96 ± 9.68	135.15 ± 10.34	+0.19	Paired Student's *t*-test	0.380

Group A (Baryta Muriatica 3X): Mean LDL-C reduced from 140.19 ± 9.44 mg/dL to 137.88 ± 9.40 mg/dL — a mean reduction of 2.31 mg/dL (–1.63%). This reduction is statistically significant (t = 4.026, p = 0.0005), indicating a consistent treatment effect across patients.

Group B (Sac Lac / Placebo): Mean LDL-C showed a negligible non-significant change from 134.96 ± 9.68 to 135.15 ± 10.34 mg/dL (mean change = +0.19 mg/dL; t = –0.895, p = 0.380). This confirms no treatment effect in the absence of active medicine.



Graph 2. Changes in LDL-C concentrations following three months of treatment.

3.4 Between-Group Comparison of Changes in LDL-C

The comparison of treatment effects between the intervention and placebo groups is presented in **Table 3**. Participants treated with *Baryta muriatica* 3X demonstrated a significantly greater reduction in LDL-C concentrations than participants receiving placebo, as evidenced by the statistically significant between-group difference in mean LDL-C change (independent Student's t-test, t = −4.084, p = 0.0003).

Table 3. Between-group comparison of changes in LDL-C concentrations after three months of treatment. Baseline, Post-Treatment and Change Score Analysis

Comparison	Group A	Group B	t-value	p-value
Baseline LDL-C (mg/dL)	140.19 ± 9.44	134.96 ± 9.68	1.973	0.054 (NS)
Post-Treatment LDL-C (mg/dL)	137.88 ± 9.40	135.15 ± 10.34	0.997	0.324 (NS)
Mean Change in LDL-C (mg/dL)	–2.31 ± 2.92	+0.19 ± 1.10	–4.084	0.0003 ***
Mean % Change in LDL-C	–1.63%	+0.11%	—	—

The key finding is in the change score comparison: Group A showed a mean LDL-C reduction of –2.31 mg/dL while Group B showed a marginal increase of +0.19 mg/dL. The between-group difference in change scores (–2.50 mg/dL net) is highly statistically significant (t = –4.084, p = 0.0003), confirming that Baryta Muriatica 3X produces a significantly greater reduction in LDL-C compared to placebo.

Notably, while post-treatment absolute LDL-C values do not differ significantly (p = 0.324) — owing to the modest but significant baseline difference (p = 0.054) — the change score analysis is the most appropriate and unbiased comparison, and it strongly favours Group A.

Table 4: Clinical Response Classification

Outcome	Group A (Baryta Mur 3X)	Group B (Sac Lac)	Interpretation
LDL-C Improved (reduced after tx)	20/26 (76.9%)	4/26 (15.4%)	5× higher response rate in Group A
LDL-C Unchanged	3/26 (11.5%)	15/26 (57.7%)	Majority of controls unchanged
LDL-C Worsened (increased after tx)	3/26 (11.5%)	7/26 (26.9%)	Higher worsening in placebo arm
Mean LDL-C reduction	–2.31 mg/dL	+0.19 mg/dL	Net difference of 2.50 mg/dL

76.9% of Group A patients showed an improvement (reduction) in LDL-C after 3 months of Baryta Muriatica 3X, compared to only 15.4% in the placebo group. The contrast is particularly striking in the 'unchanged' category — 57.7% of Group B patients showed no change at all, confirming the absence of a placebo effect on LDL-C over 3 months.

Statistical Interpretation of Findings

The mean LDL-C concentration in the *Baryta muriatica* 3X group decreased from 140.19 ± 9.44 mg/dL at baseline to 137.88 ± 9.40 mg/dL after three months, corresponding to a mean reduction of 2.31 mg/dL. This within-group change was statistically significant (paired Student's *t*-test, $t = 4.026$, $p = 0.0005$). In the placebo group, mean LDL-C increased from 134.96 ± 9.68 mg/dL to 135.15 ± 10.34 mg/dL, with no statistically significant within-group change ($p = 0.380$).

The between-group comparison demonstrated a statistically significant difference in mean LDL-C changes, favouring the intervention group (independent Student's *t*-test, $t = -4.084$, $p = 0.0003$). The difference between the mean changes was approximately 2.50 mg/dL. Although the findings indicate a statistically significant difference between groups over the three-month study period, the absolute reduction in LDL-C was modest. The results should therefore be interpreted cautiously, considering the sample size, study duration, and concomitant conventional treatment.

4. Discussion

4.1 Principal Findings

The present randomized, single-blind, placebo-controlled clinical trial evaluated the effect of *Baryta muriatica* 3X as an adjunct to conventional therapy in the management of hyperlipidemia. The findings demonstrated that participants receiving *Baryta muriatica* 3X exhibited a statistically significant reduction in LDL-C concentrations after three months of treatment, whereas no significant change was observed in the placebo group. Furthermore, the between-group comparison demonstrated a significantly greater reduction in LDL-C concentrations among participants receiving *Baryta muriatica* 3X than among those receiving placebo. Since both groups were comparable at baseline and continued stable conventional medication and standardized lifestyle advice throughout the study, the observed difference is consistent with an additional effect associated with the intervention under the conditions of this trial.

4.2 Comparison with Existing Literature

Hyperlipidemia remains one of the most important modifiable risk factors for cardiovascular disease, and lowering LDL-C is a primary therapeutic target in current clinical practice.(1,8,17) Contemporary management combines pharmacological therapy, particularly statins, with dietary modification, physical activity, and other lifestyle interventions.(1) Despite the well-established efficacy of conventional treatment, interest in complementary and integrative approaches has increased, particularly among patients seeking additional therapeutic options alongside standard care. Although published clinical evidence supporting homeopathic interventions for hyperlipidemia remains limited, the present findings contribute to the emerging body of randomized clinical research evaluating complementary therapeutic approaches, the present findings contribute to the growing body of research evaluating complementary therapies using randomized controlled trial designs.(12,14,15) The statistically significant reduction in LDL-C observed in the intervention group suggests that *Baryta muriatica* 3X warrants further investigation as an adjunctive intervention, while recognizing that confirmation through larger, multicentre studies is required.

4.3 Interpretation of the Findings

An important aspect of the present study is that all participants continued their prescribed statin therapy throughout the study period, and medication regimens remained unchanged after enrolment. In addition, both groups received identical dietary and lifestyle counselling, thereby minimizing the influence of these factors on the observed outcomes. Consequently, the statistically significant reduction in LDL-C concentrations observed in the intervention group is unlikely to be explained by differences in conventional management or lifestyle advice alone. Nevertheless, the study was not designed to investigate the biological mechanisms underlying the observed effect, and no mechanistic conclusions can therefore be drawn. Future experimental and clinical studies are required to investigate the potential mechanisms through which *Baryta muriatica* 3X may influence lipid metabolism.

4.4 Clinical Relevance

The clinical significance of the present findings should be interpreted in the context of adjunctive management rather than replacement of conventional therapy. All participants in this study continued their prescribed statin therapy, which remains the cornerstone of lipid-lowering treatment. Although the absolute reduction in LDL-C observed with *Baryta muriatica* 3X was modest, the statistically significant difference compared with placebo suggests that the intervention may have potential as an adjunctive approach in patients receiving standard treatment. These findings support the need for further investigation while emphasizing that *Baryta muriatica* 3X should not be considered a substitute for evidence-based conventional management of hyperlipidemia.

4.5 Strength of the Study

The present study has several methodological strengths. It employed a randomized, single-blind, placebo-controlled design, which reduced the potential for selection bias and improved the internal validity of the findings. The study was prospectively registered with the Clinical Trials Registry–India (CTRI), and ethical approval was obtained before participant recruitment. Both study groups received identical lifestyle counselling and continued stable conventional medication throughout the intervention period, thereby minimizing potential confounding factors. Furthermore, participant retention was high, with only two participants lost to follow-up, resulting in a low attrition rate and complete analysis of all participants who completed the study.

4.6 Limitations

This study has several limitations. First, the relatively small sample size of 52 participants may limit the statistical power and generalizability of the findings. Second, the three-month treatment period does not permit assessment of long-term effects or safety. Third, the study was conducted at a single institution and its associated clinical and community settings, which may limit applicability to other populations. The continuation of conventional lipid-

lowering treatment, where applicable, and lifestyle advice may also have influenced LDL-C levels. Furthermore, the single-blind design may have introduced a risk of bias. Finally, although the between-group difference in LDL-C change was statistically significant, the absolute difference was modest, and its clinical significance remains uncertain. Larger, adequately powered, multicentre, double-blind, placebo-controlled trials with longer follow-up are needed to confirm these findings.

4.7 Future Directions

Future research should focus on larger, multicentre randomized controlled trials with longer follow-up periods to confirm the findings of the present study. Comprehensive assessment of lipid parameters, including total cholesterol, high-density lipoprotein cholesterol, triglycerides, and non-high-density lipoprotein cholesterol, would provide a more complete evaluation of treatment effects. In addition, mechanistic studies investigating the biological basis of the observed changes and studies evaluating clinically relevant cardiovascular outcomes would further clarify the potential role of *Baryta muriatica* 3X as an adjunctive intervention in the management of hyperlipidemia.

5. Conclusion

In this randomized, single-blind, placebo-controlled clinical trial, adjunctive treatment with *Baryta muriatica* 3X was associated with a statistically significant reduction in LDL-C concentrations compared with placebo over a three-month period in patients receiving conventional therapy for hyperlipidemia. Although the observed reduction was modest, the findings suggest that *Baryta muriatica* 3X may have potential as an adjunctive intervention. However, larger, multicentre randomized controlled trials with longer follow-up are required to confirm these findings and to establish their clinical relevance.

6. Declarations

6.1 Ethics Approval and Consent to Participate

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Ethics Committee of Bharati Vidyapeeth (Deemed to be University) Homoeopathic Medical College and Hospital, Pune, India (Approval No. **BVDUHMC/2024/12**). Written informed consent was obtained from all participants before enrolment in the study.

6.2 Trial Registration

The study was prospectively registered with the Clinical Trials Registry–India (CTRI) (Registration No. CTRI/2024/11/076703).

6.3 Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

6.4 Conflict of Interest

The authors declare that they have no competing interests.

6.5 Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

6.6 Authors Contributions

Dr Bibi Ameena Mysore contributed to the study conception and design, participant recruitment, data collection, data interpretation, and preparation of the manuscript.

Dr Vaishali V. Dolas contributed to study supervision, clinical guidance, interpretation of the findings, and critical revision of the manuscript.

Both authors reviewed and approved the final manuscript.

6.7 AI-assisted tools and technologies

Artificial intelligence-assisted tools were used during manuscript preparation for language refinement, organization of text, and editorial assistance. The authors reviewed and verified the manuscript content and remain responsible for the accuracy, integrity, and interpretation of the reported data and conclusions. No AI tool was used to generate, alter, or fabricate the study data or statistical results.

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