CODEN: WJAPAC Impact Factor: 3.87 ISSN: 3049-3013

World Journal of Advance Pharmaceutical Sciences

Volume 2, Issue 4. Page: 57-60 Research Article www.wjaps.com

INVESTIGATING THE LIPID-LOWERING POTENTIAL OF *LITCHI CHINENSIS* SEED EXTRACT THROUGH *IN-VIVO* STUDIES

Kavya M. K.[1]*, Dr. Suresha B. S.[2], Dr. T. Balasubramanian[3], Ahalya Devi K. H.[4], Preethi B. H.[5] and Puneeth Kumar S. L.[6]

[1,5,6]PG Scholar, Department of Pharmacology, Bharathi College of Pharmacy, Bharathinagara – 571422.
[2,3]Associate Professor, Department of Pharmacology, Bharathi College of Pharmacy, Bharathinagara – 571422.
[4]Assistant Professor, Department of Pharmacology, Bharathi College of Pharmacy, Bharathinagara – 571422.

How to cite this Article Kavya M. K.*, Dr. Suresha B. S., Dr. T. Balasubramanian, Ahalya Devi K. H., Preethi B. H. and Puneeth Kumar S. L. (2025). INVESTIGATING THE LIPID-LOWERING POTENTIAL OF LITCHI CHINENSIS SEED EXTRACT THROUGH IN-VIVO STUDIES, 2(4), 57-60.

Article Info

Article Received: 16 September 2025,

Article Revised: 06 October 2025,

Article Accepted: 26 October 2025.

DOI: https://doi.org/10.5281/zenodo.17495011

***Corresponding author:**

***Kavya M. K.**

PG Scholar, Department of Pharmacology, Bharathi College of Pharmacy, Bharathinagara – 571422.

ABSTRACT

The present study investigates the lipid-lowering potential of Litchi chinensis seed extract through in-vivo evaluation in hyperlipidemic animal models. Hyperlipidemia was induced to assess alterations in biochemical parameters, including triglycerides (TG), total cholesterol (TC), low-density lipoprotein (LDL), high-density lipoprotein (HDL), very low-density lipoprotein (VLDL), and the atherogenic index (AI). The hypercholesterolemic (HC) group showed significant elevation in TG, TC, LDL, VLDL, and AI levels, accompanied by a marked reduction in HDL compared to the normal control group, confirming successful induction of hyperlipidemia. Administration of Litchi chinensis seed extract at two different doses resulted in significant restoration of lipid parameters toward normal values. The high-dose group exhibited a more pronounced reduction in TG, TC, LDL, VLDL, and AI, along with an increase in HDL, comparable to the standard drug-treated group. The low-dose treatment also demonstrated a moderate but statistically significant improvement. These findings indicate that the hypolipidemic activity of Litchi chinensis seed extract may be attributed to its rich content of bioactive phytoconstituents such as flavonoids, polyphenols, and saponins, which are known to modulate lipid metabolism and enhance antioxidant defense. Overall, the study concludes that Litchi chinensis seed extract exhibits potent lipid-lowering, supporting its potential use as a natural therapeutic agent for the management of hyperlipidemia.

KEYWORDS: Litchi chinensis, lipid profile, hypolipidemic activity, triglycerides, cholesterol.

INTRODUCTION

Hyperlipidemia is recognized as a major risk factor in the development and progression of coronary heart disease (CHD), stroke, atherosclerosis and other cardiovascular disorders.[1,2] It is primarily characterized by elevated levels of total cholesterol (TC), low-density lipoprotein (LDL), very low-density lipoprotein (VLDL) and reduced high-density lipoprotein (HDL) in the serum.[3] These lipid abnormalities are strongly linked to the pathogenesis of atherosclerotic cardiovascular disease.[4] In particular, hypercholesterolemia and hypertriglyceridemia are closely associated with an increased risk of ischemic heart disease.[5] Hyperlipidemia is a well-established predictive risk factor for the development of atherosclerosis, coronary artery disease (CAD) and cerebrovascular diseases,

which are among the leading causes of mortality in developing countries such as India.[6] Although a wide range of allopathic hypolipidemic drugs are commercially available, their usage is often limited due to significant side effects, severe contraindications, and high cost. These limitations have intensified the need for safer and more affordable alternative therapies.[7]

Litchi (*Litchi chinensis*), a member of the Sapindaceae (soapberry) family, is a widely cultivated fruit crop in tropical and subtropical regions. It likely originated in Southern China and Northern Vietnam and is now grown in over 20 countries.[8] The fruit is known for its sweet, juicy, translucent aril and a single large seed.[9] Litchi flowers are of three types-staminate, pistillate, and imperfectly hermaphroditic-appearing sequentially on the same panicle.[10,11] Other reported pharmacological effects include anti-diabetic, anti-hyperlipidemic, anti-hyperglycemic, anti-hypertensive, antiviral and immunomodulatory activities.[12] While *L. chinensis* is reported to have anti-hyperlipidemic potential, scientific evidence is limited. Hence, the present study aims to investigate its efficacy in managing hyperlipidemia.[13] Recent studies have identified specific nutrients that can be utilized as dietary supplements to address nutritional imbalances and reduce the cardiovascular risks associated with hyperlipidemia. For example, several reports highlight the antihypercholesterolemic properties of fixed oils rich in polyunsaturated fatty acids, particularly linolenic and linoleic acids.[14] The primary goal of hyperlipidemia management is to reduce the risk of developing ischemic heart disease and to prevent further cardiovascular or cerebrovascular events. However, currently available hypolipidemic drugs are often associated with various adverse effects, including hyperuricemia, diarrhea, nausea, myositis, gastric irritation, flushing, dry skin and abnormal liver function. This has led to increasing interest in alternative treatments, including plant-based therapies, which may offer effective lipid-lowering effects.[15,16,17]

MATERIALS AND METHODOLOGY

Preparation of *Litchi chinensis* extract

Litchi chinensis (Sapindaceae) fruits were collected from Maddur, Mandya district, Karnataka. Seeds were authenticated by Dr. Thejesh Kumar M.P., Department of Botany (PG), Bharathi College, Bharathinagara. The seeds were shade-dried and coarsely powdered using an electric grinder. Finely powdered seeds were extracted using 70% ethanol by hot continuous Soxhlet extraction.

Experimental animals

Healthy male Wistar Albino rats (10–12 weeks old, 130–150 g) were procured from Vaarunya Biolabs Pvt. Ltd., Bengaluru. Animals were acclimatized in the animal house of Bharathi College of Pharmacy, Bharathinagara, and housed in polypropylene cages with husk bedding under standard conditions (12 h light/dark cycle). They were fed standard pelleted diet and water *ad libitum*. All procedures complied with CCSEA guidelines, and the study was approved by the IAEC (Ref: BCP/IAEC/2024/02, dated 13/09/2024).

Albino rats either sex weighing between 130-150 gm are divided into 5 groups consisting of six rats in each group. Hyperlipidemic was induced by using Vanaspati ghee and coconut oil (V/V) at the ratio of 3:1 with the dose of 3ml/kg body weight daily orally given along with normal laboratory diet for the first 21 days, next 21 days mentioned in the following groups.

- **Group 1 (Normal Control, NC):** Received standard pellet diet and purified water daily for 6 weeks.
- **Group 2 (Hyperlipidemic Control, HFD):** Received high-fat diet (HFD) along with standard pellet diet daily for 6 weeks.
- **Group 3 (Standard Treatment, HFD+Atorvastatin):** Received HFD and standard diet for 6 weeks; from week 4–6, Atorvastatin (10 mg/kg) was administered orally.
- **Group 4 (Low Dose Extract, HFD+LCE250):** Received HFD and standard diet for 6 weeks; from week 4–6, ethanolic seed extract of *Litchi chinensis* (250 mg/kg) was administered orally.
- **Group 5 (High Dose Extract, HFD+LCE500):** Same as Group 4, but extract dose was 500 mg/kg.

After 24 h of the final treatment, animals were weighed, anaesthetized, and blood was collected via cardiac puncture. Serum was separated by centrifugation (3000 rpm, 15 min) and analyzed for various biochemical parameters.

Chemicals and reagents

All analytical-grade chemicals were procured from Sigma-Aldrich, Bangalore, and biochemical analyses were conducted using Agappe Diagnostics kits (Kerala, India).

Biochemical Parameters

Serum TC, TG, and HDL were measured using commercial diagnostic kits, while LDL, VLDL, and AI were calculated using standard formulas.

Statistical Analysis

Data are expressed as mean ± SEM. Statistical analysis was performed using one-way ANOVA with Dunnett's test. Significance levels: $P < 0.001$ (high), <0.01 (moderate), and <0.05 (significant).

RESULTS AND DISCUSSION

The lipid profile parameters of experimental groups treated with Litchi chinensis seed extract are presented in Table 1. The hyperlipidemic control (HC) group showed a significant elevation in triglycerides (TG), total cholesterol (TC), low-density lipoprotein (LDL), very low-density lipoprotein (VLDL) and atherogenic index (AI), accompanied by a marked reduction in high-density lipoprotein (HDL) when compared to the normal control group. These alterations confirm the successful induction

of hyperlipidemia and mimic the dyslipidemic state.

Table 1: Impact of *Litchi chinensis* Seed Extract on Serum Lipid Levels Following 6 Weeks of Administration.

Groups	Biochemical parameters(mg/dL)					
	Triglyceride (mg/dl)	Total Cholesterol (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)	Atherogenic Index ratio
Group Ⅰ	59.03±1.101	50.00±0.592	19.96±0.331	25.44±0.470	11.80±0.221	1.74±0.063
Group Ⅱ	70.64±1.644***	57.10±1.174***	16.98±0.401***	30.15±0.920**	14.12±0.329***	2.36±0.09***
Group Ⅲ	60.69±1.601**	52.2±1.475**	19.20±0.364**	24.79±1.203***	12.24±0.240**	1.85±0.082**
Group Ⅳ	64.01±2.391*	52.971±0.887*	18.76±0.336*	25.71±0.594**	12.80±0.478*	2.01±0.113*
Group Ⅴ	61.69±1.452**	51.42±0.684**	19.52±0.771**	24.15±0.772***	12.28±0.302**	1.86±0.103**

Administration of Litchi chinensis seed extract at both low and high doses significantly restored the altered biochemical parameters toward normal levels. The high-dose group exhibited a more pronounced lipid-lowering effect, demonstrating a marked reduction in TG (61.69 ± 1.452 mg/dL), TC (51.422 ± 0.684 mg/dL), LDL (24.154 ± 0.772 mg/dL), VLDL (12.280 ± 0.302 mg/dL), and AI (1.864 ± 0.103), along with an elevation in HDL (19.522 ± 0.771 mg/dL), which was comparable to the standard drug-treated group. The low-dose treatment also produced a moderate but significant improvement in lipid parameters, indicating a dose-dependent response.

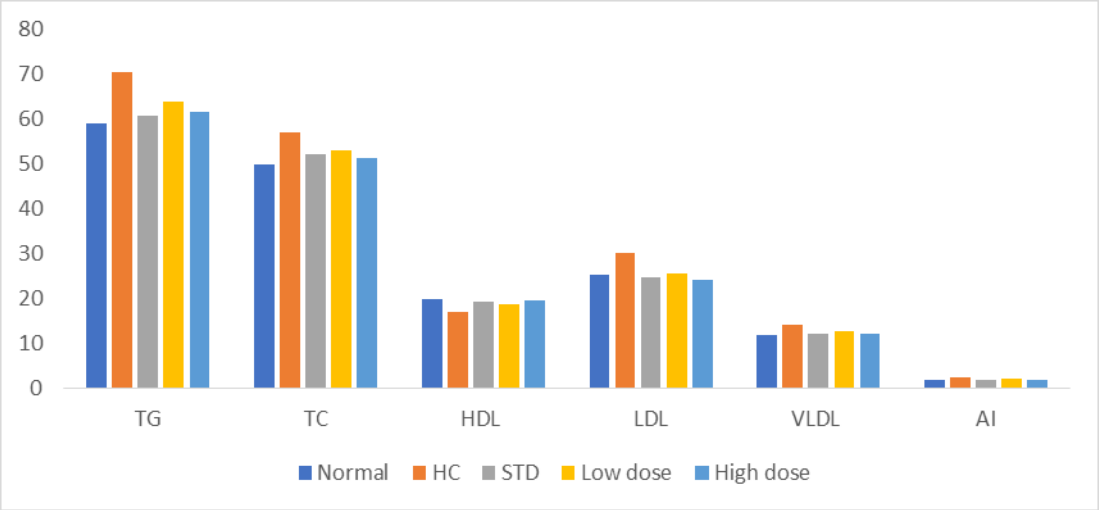

Figure-1: Graph showing mean serum lipid parameters in 5 groups at the end of 6th week.

The observed hypolipidemic activity of Litchi chinensis seed extract may be attributed to the presence of polyphenolic compounds, flavonoids, and saponins known to modulate lipid metabolism. These bioactive constituents possibly enhance cholesterol catabolism, inhibit intestinal lipid absorption, and promote hepatic uptake of LDL. Moreover, the improvement in HDL levels suggests a cardioprotective role by facilitating reverse cholesterol transport.

Overall, the results indicate that Litchi chinensis seed extract exhibits potent lipid-lowering potential comparable to standard antihyperlipidemic therapy. The findings support its traditional use and highlight its promise as a natural therapeutic agent for the management of hyperlipidemia.

CONCLUSION

The present study demonstrated that Litchi chinensis seed extract possesses significant lipid-lowering potential in experimentally induced hyperlipidemic animal models. Administration of the ethanolic extract effectively modulated key biochemical parameters, including triglycerides, total cholesterol, LDL, VLDL and HDL, thereby restoring the lipid profile toward normalcy. Among the tested doses, the high-dose group exhibited superior efficacy, comparable to the standard drug-treated group, suggesting a strong hypolipidemic activity in a dose-dependent manner.

The ability of Litchi chinensis seed extract to reduce atherogenic lipids and increase HDL levels indicates its potential in preventing associated with hyperlipidemia. The reduction in the atherogenic index further confirms its cardioprotective effect. The observed effects may be attributed to the synergistic action of bioactive phytoconstituents such as flavonoids, polyphenols and saponins, which are known to exert antioxidant and lipid-regulating properties. These compounds likely inhibit cholesterol synthesis, enhance lipid catabolism and promote reverse cholesterol transport, thereby contributing to the overall hypolipidemic action.

The findings of this study provide scientific evidence supporting the traditional use of Litchi chinensis seeds in the management of lipid disorders. Further investigations focusing on isolation, characterization and mechanistic evaluation of active constituents are warranted to elucidate the precise biochemical pathways involved. Additionally, long-term safety and efficacy studies could establish the therapeutic potential of Litchi chinensis seed extract as a promising natural alternative or complementary agent in the treatment and prevention of hyperlipidemia.

REFERENCES

1. Krauss RM, Kesäniemi YA. Cardiovascular disease and hyperlipidaemia. Current Opinion in Lipidology, 1994 Aug 1; 5(4): 249-51.
2. Brown SL. Lowered serum cholesterol and low mood. BMJ., 1996 Sep 14; 313(7058): 637-8.
3. Smith GD, Pekkanen J. Should there be a moratorium on the use of cholesterol lowering drugs?. BMJ: British Medical Journal, 1992 Feb 15; 304(6824): 431.
4. Smith GD, Song F, Sheldon TA. Cholesterol lowering and mortality: the importance of considering initial level of risk. British medical journal, 1993 May 22; 306(6889): 1367-73.
5. Brown SL. Lowered serum cholesterol and low mood. BMJ., 1996 Sep 14; 313(7058): 637-8.
6. Grundy SM. Cholesterol and coronary heart disease: a new era. Jama., 1986 Nov 28; 256(20): 2849-58.
7. Saravanan R, Rajendra Prasad N, Pugalendi KV. Effect of Piper betle leaf extract on alcoholic toxicity in the rat brain. Journal of medicinal food., 2003 Oct 1; 6(3): 261-5.
8. Ghatak A, Asthana OP. Recent trends in hyperlipoproteinemias and its pharmacotherapy. Indian J Pharmacol, 1995; 27(1): 14-29.
9. Faulds D, Lewis NJ, Milne RJ. Recombinant Granulocyte Colony-Stimulating Factor (rG-CSF) Pharmacoeconomic Considerations in Chemotherapy-Induced Neutropenia. Pharmaco Economics, 1992 Apr; 1(4): 231-49.
10. Cicero AF, Derosa G. Rice bran and its main components: potential role in the management of coronary risk factors.
11. Punia S, Kumar M. Litchi (Litchi chinenis) seed: Nutritional profile, bioactivities, and its industrial applications. Trends in Food Science & Technology, 2021 Feb 1; 108: 58-70.
12. Nand V, Dwivedi AK, Tripathi VK. Influence of GA3 and ZnSO4 on Fruiting, Yield and Quality Parameters of Litchi (Litchi chinensis S.) cv. Dehradun. J. Exp. Agric. Int., 2023; 45(6): 20-30.
13. Liu SY. Studies Of Litchi Chinensis, Sonn. University of Michigan, 1954.
14. Cronje RB. Effect of fruit development, maturity and harvesting of litchi (Litchi chinensis Sonn.) on postharvest fruit quality. Stewart Postharvest Review, 2008 Jun 1; 4(3): 1-0.
15. Bano A, Singh UP. A Review on Pharmacognosy, Phytochemistry and Pharmacological Properties of *Lychee chinensis.*
16. Wen L, Wu D, Jiang Y.et al. Identification of flavonoids in litchi (*Litchi chinensis* Sonn.) leaf and evaluation of anticancer activities. J. Funct. Foods, 2014; 6: 555-63.
17. Yao P, Gao Y, Simal-Gandara J.et al. Litchi (*Litchi chinensis* Sonn.): A comprehensive review of phytochemistry, medicinal properties, and product development. Food & Function, 2021; 12(20): 9527-48.