International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

A Review on Herbal Medicinal Plant Used in Cholesterol Control

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Date of Submission: 23-04-2026 Date of Acceptance: 03-05-2026

ABSTRACT
Now - a days people are shifting towards western lifestyle and food which is increasing the level of cholesterol and hence increase in the risk of cardiovascular diseases. Cardiovascular disease is causing premature death at the highest rate than other disease. In market various cholesterol reducing drugs are present which people are consuming. Intake of these drugs various lifr threatening side effects. People can switch to natural sources of reducing cholesterol level which will be healthy as well as safe. Acalypha indica plant, Centella asiatica plant, Capsicum fruit, Cuminum seeds, Daucus carota root, Cinnamomum tamala leaf, are safe as they are from a plant source and it proven to lower cholesterol level. When abnormally high levels of lipids (fatty substances) are found in the blood, this condition is known as hyperlipidemia. Obesity is also related to this disorder. Hypolipidemic drugs are extensively used to prevent such disorders, but these drugs have other adverse effects. In India about more than 150 medicinal plants. Cardiovascular disease is one of the most important causes of death in industrialized countries. Hyperlipidemia is a major risk factor for cardiovascular disease. Medicinal plants and their active ingredients have long been addressed for the treatment of lipidemia and associated complications. Hypercholesterolemia is patho-physiological condition of metabolism caused by incessant increase in blood cholesterol levels and might be a possible risk factor for many cardiovascular and its associated diseases.

KEYWORDS: Cardiovascular Disease, Hyperlipidemia, Herbal Medicine, Cholesterol, Lipid, Obesity.

I. INTRODUCTION:

The various parts of herbal plants viz. roots, stems, leaves, barks, flowers, fruits, etc. are the equipment's of herbal plants as these diverse plant materials consist of biologically active compounds having various therapeutic effects. These biologically active compounds present in herbal plants are exploited with different methods in various conventional medicines for many treatments. Thus, treatment with herbal plants is as old as mankind itself.[1] There are lots of herbal plants which are highly beneficial for decreasing cholesterol in the body.[2]

HERBAL: Herbal refers to plant-based materials or plant parts derived from plants that are used in general traditional and practical applications. These materials come from different parts of plants such as leaves, roots, stems, bark, seeds, and flowers. Herbal resources are widely recognized in traditional knowledge systems due to their natural origin and long historical use. Herbal materials contain naturally occurring plant compounds that are responsible for their general characteristics. These plant-based materials are used in different cultures as part of traditional and natural practices.[3]

MEDICINAL PLANTS: The use of plants as a source of remedy has been dated to times immemorial, even to the earliest existence of man, where plants were provided for the purpose of food and healing .[4] The term medicinal plants includes various types of plants used in herbalism, and some of these plants possess significant medicinal activities. These medicinal plants are considered rich resources of ingredients which can be used in drug development and synthesis. Today, the use of plants for the remedy of diseases is usually termed phytotherapy, phytomedicine, or complementary and alternative medicine (CAM).[5] Complementary and alternative medicine (CAM) is a group of diverse medical and healthcare systems, practices, and products that are not considered part of conventional medicine. It is often used together with conventional medicine, which is practiced by medical professionals such as doctors and allied health workers.[6] Traditional medicine refers to health practices, knowledge, and beliefs that involve plant, animal, and mineral-based medicines, as well as other therapies used to treat, diagnose, and prevent illness or maintain well-being. [7] Phytotherapy is a medical practice that uses plant

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

materials for the treatment of diseases and is closely related to the use of phytochemicals, the bioactive components of plants.[8]

THE USE OF HERBS AS MEDICINE:

1. Many of the herbs and spices used by humans to season food yield useful medicinal compounds. [9-10-11]
2. Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies including opium, aspirin, digitalis and quinine.[12]
3. At least 7,000 medical compounds in the modern pharmacopoeia are derived from plants, including ingredients in heart drugs, anticancer agents, hormones, ulcer treatments and decongestants.
4. Reserpine, extracted from Rauvolfia serpentina are used for lowering blood pressure and as tranquilizer and in India as a treatment for snake bite.[13]
5. L-Dopa, from Mucuna dearingiana, is used for treating Parkinson's disease
6. Ephedrine, derived from Ephedra sinica, is used as a decongestant
7. Picrotoxin from Anamirta cocculus is used as nervous system stimulant. [14]
8. These phytochemicals often have antiviral, antibacterial, antifungal and antihelminthic properties.[15]
9. A fromomum melegueta is a potent antimicrobial and apparently keeps Shigellosis and similar infections at bay. [16]
10. Some birds select nesting material rich in antimicrobial agents which protect their young from harmful bacteria·
11. Sick animals tend to forage plants rich in secondary metabolites since these phytochemicals often have antiviral, antibacterial, antifungal and anti helminthic properties.[17]

CHOLESTEROL DISEASES: Hyperlipidemia is a condition that incorporates various genetic and acquired disorders that describe elevated lipid levels within the human body. Hyperlipidemia is extremely common, especially in the Western hemisphere, but also throughout the world. Alternatively, a more objective definition describes hyperlipidemia as low-density lipoprotein (LDL), total cholesterol, triglyceride levels, or lipoprotein levels greater than the 90th percentile in comparison to the general population, or an HDL level less than the 10th percentile when compared to the general population.[18] Lipids typically include cholesterol levels, lipoproteins, chylomicrons, VLDL, LDL, apolipoproteins, and HDL.[19]

Fig No .1 Cholesterol

Through a vast array of trials and studies, it has been consistently shown that elevated levels of LDL cholesterol increase a person's risk for the development of atherosclerotic plaques and subsequent vascular disease. In stark contrast, high-density lipoprotein (HDL) cholesterol assists in regulating cholesterol levels to prevent imbalances that would increase the risk of atherosclerotic vascular disease.

Each patient's LDL cholesterol goal is conditional on their overall cardiovascular risk, and medical therapy should be independently tailored to the patient. Managing risk factors, such as hyperlipidemia, to diminish the risk for atherosclerotic cardiovascular disease is referred to as "primary prevention." The grounds for lowering LDL cholesterol derives from widespread epidemiologic data that reveals a positive, continuous correlation between LDL cholesterol levels, cardiovascular events, and patient mortality. Treatment of hyperlipidemia continues to evolve as we better conceptualize the underlying pathophysiology, and we concurrently improve on preceding medical therapies. This article will overview the background, diagnosis, and most recent treatment guidelines for hyperlipidemia. [18]

TYPES OF CHOLESTEROL: Cholesterol, triglycerides (TG), and other fats travel through the bloodstream packaged as large molecules called lipoproteins. These packages differ from one another by the amounts of protein, fat, and related

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Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

compounds they contain.[20] Cholesterol is mainly carried in the blood by two different types of lipoproteins: high-density lipoprotein (HDL) and low-density lipoprotein (LDL).

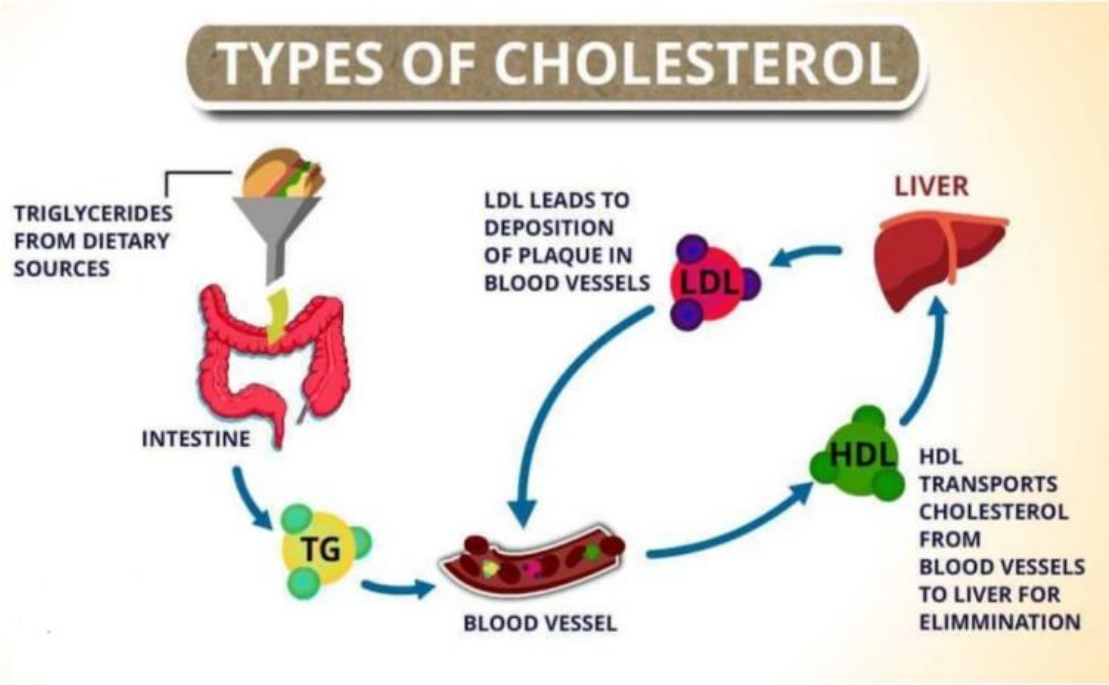

Fig No: 2 Type of Cholesterol: HDL, LDL, Triglycerides

Three main lipoproteins exist in our blood:

1. **High-Density Lipoprotein**
   HDL-cholesterol is also known as the "good" cholesterol since it is believed to carry cholesterol out of the blood vessels to the liver, where it is removed from the body. Higher levels of HDL have been associated with a lower risk of cardiovascular disease. Emerging research suggests that actual levels of HDL in the blood may not be as important as how well it functions to remove cholesterol from the body. [20]

2. **Low-Density Lipoprotein**
   This is the largest portion of circulating cholesterol because this form of cholesterol may contribute to the formation of plaque in blood vessels, LDL-cholesterol is often referred to as the "bad" cholesterol.

3. **Very Low-Density Lipoprotein (VLDL)**
   VLDL is very high in triglycerides and does not carry cholesterol in the blood. Emerging research suggests that classifying LDL-cholesterol as "bad" and HDL-cholesterol as "good" cholesterol may be an oversimplification in relation to CVD risk. There are different forms of each of the classes of lipoproteins; all of which may have different relationships to CVD risk.[21]

MACHANISM OF ACTION OF HERBAL DRUGS IN CHOLESTEROL CONTROL:

1. **Lowering absorption of cholesterol :** Soluble fibres present in Fenugreek form with in the gastrointestinal tract a gel-like mass which traps cholesterol and bile acids hence inhibiting absorption. [22]

2. **Increase bile-acid excretion:** The saponins in Fenugreek bind bile acids and assist in their excretion. This causes liver cholesterol to be utilized by the liver for synthesizing new bile acids. [23]

3. **Modulation of lipid metabolism:** Fenugreek influences the enzymes in lipid synthesis and degradation whereby HMG-CoA reductase is known to reduce the production of LDL-cholesterol. [24]

4. **Antioxidant:** The flavonoids contained in fenugreek exert beneficial effects via

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combating oxidative stress-a known contributor in the pathogenesis of dyslipidemia and atherosclerosis. [25]

Traditional System of Medicine: The traditional systems of medicine are a great source to health care forpeople, it is noted that the greater part of the world‟s population still, depends on various traditional systems of medicines India has the unique significance of having granted systems of medicine like Ayurveda, Siddha, Unani, Homeopathy and with exception of this systems there are lots of healers in the folklore stream who have not been organized under any category. So, in the present review set out would be made to provide a brief description of four systems to familiarize the readers with Indian systems of medicine.. [26]

- **Ayurveda:** Ayurveda is a most ancient original system of Indian medicine from 5000 years.

Diagnosis:

Pulse Reading (Nadi Parikshan)
Urine Examination
Tongue Examination
Colour of Body
Voice Study
Status of Digestive System.

Treatment:

Different Types of Herbs
Dried Fruits
Ghee
Herbal Preparation (Vati, Ghutika, Churna, Asava, Arishta)

Siddha: This system says that ‘use of metal in treatment rather than herbs.

Diagnosis:

Same as Ayurveda.
Pulse Reading
Urine Examination
Treatment:
Natural Drugs.
Sindooram & Bhasma

Unani: The Unani medicinal system is also known as Tibb e Unani, Greek medicine, System, Arab medicine, and Islamic medicine.

Diagnosis:

Nabz (Pulse)
Urine (Boul)
Stool (Baraz)

Treatment:

Diet therapy – using a special diet
Regimental therapy – Detoxification of the body.
Pharmacotherapy – use of medicines, and natural drugs.

Homeopathy: Homeopathy is a method of treating diseases by administering drugs that have been experimentally proven to possess the power to produce similar symptoms in healthy human beings.

Diagnosis:

Collection of case History & medicinal history of the patient.
Investigation of symptoms & location of disease.
Build up the symptoms picture of the patient.

Treatment:

This system used medicines in the form of mother Tincture, Powder, and Small pills.

Yoga: The word ‘Yoga’ comes from the Sanskrit word ‘Yuj’ which means ‘to unite or integrate.[26]

Treatment:

Yama
Niyama
Asana
Pranayam
Pratyahara
Dharna
Dhyan
Samadhi

LIST OF MEDICINAL PLANTS FOR CHOLESTEROL CONTROL

INDIAN MEDICINAL PLANTS (a compendium of 500 species)

Volume – I

S. No.	Scientific Name (Indian Name)	Family	Medicinal Plant (Part)	Main Phytochemical	Pharmacological Activity	PageNo.
1.	Abelmoschus esculentus (Bhindi)	Malvaceae	Fruit	Mucilage, Flavonoids	Reduces LDL	1

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Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

2	Abrus Precatorius (Ratti)	Fabaceae	Leaf, Root	Flavonoids	Lowers serum lipids	10
3	Acacia catechu (Khair)	Fabaceae	Heartwood	Catechins, Tannins	Lowers LDL	19
4	Acacia nilotica (Babul)	Fabaceae	Bark	Tannins, Saponins	Reduces cholesterol	26
5	Acalypha indica (Kuppaimeni)	Euphorbiaceae	Whole plant	Flavonoids	Serum cholesterol reduction	36
6	Achyranthes aspera (Chirchita)	Amaranthaceae	Whole plant	Saponins	Mild hypolipidemic	39
7	Acorus calamus (Vacha)	Acoraceae	Rhizome	Asarone	Improves lipid metabolism	51
8	Adenanthera pavonina (Raktachandan beej)	Fabaceae	Seed	Flavonoids	Lipid lowering	58
9	Aegle marmelos (Bel)	Rutaceae	Fruit	Marmelosin	Improves lipid profile	62
10	Ageratum conyzoides (Gandhari jhad)	Asteraceae	Whole plant	Flavonoids	Cardio-protective	74
11	Albizia odoratissima (Kala siris)	Fabaceae	Bark	Saponins	Mild lipid lowering	85
12	Allium cepa (Pyaz)	Amaryllidaceae	Bulb	Quercetin	Lowers cholesterol	88
13	Allium sativum (Lahsun)	Amaryllidaceae	Bulb	Allicin	Strong LDL reduction	93
14	Aloe barbadensis (Aloe vera)	Asphodelaceae	Leaf gel	Anthraquinones	Reduces total cholesterol	103
15	Alpinia galanga (Kulanjan)	Zingiberaceae	Rhizome	Galangin	Improves circulation	106
16	Alternanthera sessilis (Matsyakshi)	Amaranthaceae	Leaf	Flavonoids	Serum cholesterol reduction	118
17	Amaranthus spinosus (Kantabhaji)	Amaranthaceae	Leaf	Fiber	Lowers total cholesterol	121
18	Anacardium occidentale (Kaju)	Anacardiaceae	Seed	Phenolics	Improves HDL/LDL ratio	137
19	Ananas comosus (Ananas)	Bromeliaceae	Fruit	Bromelain	Reduces lipid accumulation	146
20	Andrographis paniculata (Kalmegh)	Acanthaceae	Whole plant	Andrographolide	Hypolipidemic	149
21	Anethum graveolens (Suva)	Apiaceae	Seed	Essential oils	Reduces lipid levels	153
22	Annona squamosa (Sitaphal)	Annonaceae	Leaf	Acetogenins	Improves lipid profile	160
23	Arachis hypogaea (Moongfali)	Fabaceae	Seed	Unsaturated fatty acids	Improves lipid profile	176
24	Asparagus Racemosus	Asparagaceae	Root	Saponins	Mild lipid lowering	218

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Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

	(Shatavari)					
25	Azadirachta indica (Neem)	Meliaceae	Leaf	Limonoids	Hypolipidemic	227
26	Beta vulgaris (Chukandar)	Amaranthaceae	Root	Betalains	Cardio-protective	265
27	Boerhavia Diffusa (Punarnava)	Nyctaginaceae	Root	Alkaloids	Hypolipidemic	281
28	Boswellia serrata (Salai guggul)	Burseraceae	Resin	Boswellic acids	Improves lipid profile	297
29	Brassica juncea (Sarson)	Brassicaceae	Seed	Omega fatty acids	Reduces LDL	301
30	Brassica oleracea var. capitata (Patta gobhi)	Brassicaceae	Leaf	Glucosinolates	Lowers total cholesterol	306
31	Camellia sinensis (Green tea)	Theaceae	Leaf	Catechins	Reduces LDL	349
32	Capsicum annuum (Mirch)	Solanaceae	Fruit	Capsaicin	Improves lipid metabolism	375
33	Carica papaya (Papita)	Caricaceae	Fruit	Fiber	Reduces bad cholesterol	383

Volume –II

S. No.	**Scientific Name (Indian Name)**	**Family**	**Medicinal Plant(Part)**	**Main Phytochemical**	**Pharmacological Activity**	**Page No.**
34	Cassia fistula (Amaltas)	Fabaceae	Pulp	Flavonoids	Mild lipid lowering	11
35	Cassia senna (Senna)	Fabaceae	Leaf	Sennosides	Indirect lipid reduction	23
36	Cassia tora (Chakramarda)	Fabaceae	Seed	Anthraquinones	Reduces serum lipids	26
37	Centella asiatica (Brahmi)	Apiaceae	Whole plant	Asiaticoside	Improves lipid profile	52
38	Chenopodium album (Bathua)	Amaranthaceae	Leaf	Fiber	Lowers total cholesterol	61
39	Cicer arietinum (Chana)	Fabaceae	Seed	Dietary fiber	Reduces LDL	70
40	Cichorium intybus (Kasni)	Asteraceae	Root	Inulin	Lowers serum cholesterol	74
41	Cinnamomum tamala (Tejpatta)	Lauraceae	Leaf	Eugenol	Improves lipid metabolism	84
42	Cinnamomum verum (Dalchini)	Lauraceae	Bark	Cinnamaldehyde	Reduces LDL & TG	87
43	Citrus aurantifolia (Nimbu)	Rutaceae	Fruit	Vitamin C, Flavonoids	Lowers cholesterol	94
44	Citrus limon (Lemon)	Rutaceae	Fruit	Flavonoids	Reduces LDL	97
29	Citrus reticulata (Santra)	Rutaceae	Fruit	Hesperidin	Improves lipid profile	108
42	Commiphora Mukul (Guggul)	Burseraceae	Resin	Guggulsterone	Strong hypolipidemic	164
47	Coriandrum sativum	Apiaceae	Seed	Linalool	Lowers total cholesterol	184

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

	(Dhaniya)					
48	Cucumis melo (Kharbuja)	Cucurbitaceae	Fruit	Fiber	Mild cholesterol reduction	227
49	Cucumis sativus (Kheera)	Cucurbitaceae	Fruit	Fiber	Supports lipid control	231
50	Cucurbita maxima (Kaddu)	Cucurbitaceae	Seed	Unsaturated fatty acids	Improves HDL	238
51	Cuminum cyminum (Jeera)	Apiaceae	Seed	Cuminaldehyde	Reduces serum cholesterol	241
52	Curcuma longa (Haldi)	Zingiberaceae	Rhizome	Curcumin	Reduces LDL & TG	259
53	Cymbopogon Citrates (Lemongrass)	Poaceae	Leaf	Citral	Improves lipid metabolism	281
54	Cynodon dactylon (Doob grass)	Poaceae	Whole plant	Flavonoids	Mild hypolipidemic	289
55	Daucus carota (Gajar)	Apiaceae	Root	Beta-carotene	Reduces cholesterol	311
56	Eclipta Prostrate (Bhringraj)	Asteraceae	Whole plant	Wedelolactone	Improves lipid profile	350
57	Elettaria cardamomum (Elaichi)	Zingiberaceae	Seed	Cineole	Reduces total cholesterol	360
58	Eleusine coracana (Ragi)	Poaceae	Grain	Fiber	Lowers LDL	365

Volume –III

S. No.	Scientific Name (Indian Name)	Family	Medicinal Plant (Part)	Main Phytochemical	Pharmacological Activity	Page No.
59	Ferula Asafetida (Hing)	Apiaceae	Oleogum resin	Ferulic acid	Reduces LDL & TG	13
60	Ficus benghalensis (Bargad)	Moraceae	Bark	Flavonoids	Improves lipid profile	20
61	Ficus racemosa (Gular)	Moraceae	Bark/Fruit	Tannins	Hypolipidemic	34
62	Ficus religiosa (Peepal)	Moraceae	Bark	Phytosterols	Reduces cholesterol	38
63	Foeniculum vulgare (Saunf)	Apiaceae	Seed	Anethole	Mild lipid lowering	50
64	Garcinia gummi-gutta (Kokum)	Clusiaceae	Fruit rind	Hydroxycitric acid	Reduces lipid synthesis	59
65	Glycyrrhiza glabra (Mulethi)	Fabaceae	Root	Glycyrrhizin	Improves lipid metabolism	84
66	Gymnema sylvestre (Gudmar)	Apocynaceae	Leaf	Gymnemic acid	Lowers cholesterol & TG	107
67	Helianthus annuus (Surajmukhi)	Asteraceae	Seed	Unsaturated fatty acids	Lowers LDL	127
68	Hemidesmus indicus (Anantmool)	Apocynaceae	Root	Saponins	Improves lipid profile	141
69	Hibiscus rosa-sinensis (Gudhal)	Malvaceae	Flower	Anthocyanins	Reduces serum cholesterol	149
70	Holoptelea integrifolia (Chilbil)	Ulmaceae	Bark	Sterols	Hypolipidemic	162

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

71	Hordeum vulgare (Jau)	Poaceae	Grain	Beta-glucan	Strong LDL reduction	175
72	Hygrophila auriculata (Talmakhana)	Acanthaceae	Seed	Alkaloids	Lipid lowering	191
73	Illicium verum (Star anise)	Schisandraceae	Fruit	Anethole	Improves lipid metabolism	206
74	Inula racemosa (Pushkarmool)	Asteraceae	Root	Alantolactone	Hypolipidemic	214
75	Ipomoea batatas (Shakarkand)	Convolvulaceae	Tuber	Fiber	Reduces cholesterol	218
76	Juglans regia (Akhrot)	Juglandaceae	Seed	Omega-3 fatty acids	Improves HDL & lowers LDL	264
77	Lablab purpureus (Sem)	Fabaceae	Seed	Fiber	Reduces serum cholesterol	289
78	Lagenaria siceraria (Lauki)	Cucurbitaceae	Fruit	Fiber	Hypolipidemic	292
79	Lens culinaris (Masoor)	Fabaceae	Seed	Fiber	Lowers LDL	309
80	Lepidium sativum (Halim)	Brassicaceae	Seed	Glucosinolates	Lipid lowering	313
81	Linum usitatissimum (Alsi)	Linaceae	Seed	Omega-3, Lignans	Strong hypolipidemic	333
82	Luffa acutangula (Tori)	Cucurbitaceae	Fruit	Fiber	Mild cholesterol reduction	347
83	Lycopersicon esculentum (Tamatar)	Solanaceae	Fruit	Lycopene	Reduces LDL oxidation	354
84	Mangifera indica (Aam)	Anacardiaceae	Leaf	Mangiferin	Improves lipid profile	380

Volume –IV

S. No.	Scientific Name (Indian Name)	Family	Medicinal Plant(Part)	Main Phytochemical	Pharmacological Activity	Page No.
85	Momordica Charantia (Karela)	Cucurbitaceae	Fruit	Charantin	Lowers cholesterol & TG	48
86	Moringa oleifera (Sahjan)	Moringaceae	Leaf	Quercetin	Reduces LDL & total cholesterol	59
87	Morus alba (Shahtoot)	Moraceae	Leaf/Fruit	Anthocyanins	Improves lipid profile	65
88	Murraya koenigii (Curry patta)	Rutaceae	Leaf	Carbazole alkaloids	Hypolipidemic	75
89	Myristica fragrans (Jaiphal)	Myristicaceae	Seed	Myristicin	Mild lipid lowering	90
90	Nelumbo nucifera (Kamal)	Nelumbonaceae	Seed/Leaf	Flavonoids	Reduces serum cholesterol	110
91	Nigella sativa (Kalonji)	Ranunculaceae	Seed	Thymoquinone	Strong hypolipidemic	139
92	Ocimum americanum (Tulsi - Wild)	Lamiaceae	Leaf	Eugenol	Improves lipid metabolism	157
93	Ocimum Basilicum (Sweet basil)	Lamiaceae	Leaf	Linalool	Mild cholesterol reduction	160
94	Ocimum tenuiflorum (Tulsi)	Lamiaceae	Leaf	Eugenol	Reduces LDL & TG	168
95	Oryza sativa (Chawal - Rice bran)	Poaceae	Bran	Gamma-oryzanol	Lowers LDL	193
96	Pisum sativum (Matar)	Fabaceae	Seed	Fiber	Reduces cholesterol	308
97	Plantago ovata (Isabgol)	Plantaginaceae	Husk	Psyllium fiber	Strong LDL reduction	312
98	Pongamia pinnata (Karanja)	Fabaceae	Seed	Flavonoids	Hypolipidemic	339

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

99	Portulaca oleracea (Kulfa)	Portulacaceae	Whole plant	Omega-3 fatty acids	Improves HDL	345
100	Prunus domestica (Aloo Bukhara)	Rosaceae	Fruit	Polyphenols	Lowers cholesterol	356
101	Prunus dulcis (Badam)	Rosaceae	Seed	MUFA	Reduces LDL	363
102	Psidium guajava (Amrood)	Myrtaceae	Leaf/Fruit	Quercetin	Improves lipid profile	371
103	Pterocarpus marsupium (Vijaysar)	Fabaceae	Heartwood	Pterostilbene	Hypolipidemic	381
104	Pueraria tuberosa (Vidarikand)	Fabaceae	Tuber	Isoflavones	Reduces serum lipids	391
105	Punica granatum (Anar)	Lythraceae	Fruit peel	Punicalagin	Strong LDL reduction	396
106	Raphanus sativus (Mooli)	Brassicaceae	Root	Glucosinolates	Mild lipid lowering	407

Volume – V

S. No.	Scientific Name (Indian Name)	Family	Medicinal Plant(Part)	Main Phytochemical	Pharmacological Activity	Page NO
107	Ricinus communis (Arandi)	Euphorbiaceae	Seed oil	Ricinoleic acid	Mild lipid lowering	1
108	Rubia cordifolia (Manjistha)	Rubiaceae	Root	Anthraquinones	Improves lipid profile	17
109	Salacia reticulata (Saptrangi)	Celastraceae	Root	Salacinol	Reduces LDL & TG	47
110	Sesamum indicum (Til)	Pedaliaceae	Seed	Sesamin	Lowers total cholesterol	104
112	Solanum melongena (Baingan)	Solanaceae	Fruit	Nasunin (anthocyanin)	Reduces LDL	157
113	Sphaeranthus indicus (Gorakhmundi)	Asteraceae	Whole plant	Eudesmanolides	Hypolipidemic	180
114	Syzygium cumini (Jamun)	Myrtaceae	Seed/Fruit	Jamboline	Improves lipid metabolism	225
115	Tamarindus indica (Imli)	Fabaceae	Fruit pulp	Polyphenols	Mild cholesterol reduction	235
116	Taraxacum officinale (Dandelion)	Asteraceae	Leaf/Root	Taraxasterol	Reduces serum lipids	243
117	Terminalia arjuna (Arjun)	Combretaceae	Bark	Arjunolic acid	Strong LDL reduction	253
118	Terminalia bellirica (Baheda)	Combretaceae	Fruit	Gallic acid	Hypolipidemic	258
119	Terminalia chebula (Haritaki)	Combretaceae	Fruit	Chebulinic acid	Lowers cholesterol	263
120	Tinospora cordifolia (Giloy)	Menispermaceae	Stem	Tinosporaside	Improves lipid profile	283
121	Tribulus terrestris (Gokhru)	Zygophyllaceae	Fruit	Saponins	Mild lipid lowering	311
122	Trigonella foenumgraecum (Methi)	Fabaceae	Seed	Diosgenin	Strong LDL & TG reduction	331

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

123	Triticum aestivum (Gehu)	Poaceae	Grain	Fiber	Reduces cholesterol	335
124	Vigna mungo (Urad)	Fabaceae	Seed	Protein + Fiber	Lowers LDL	367
125	Vigna radiata (Moong)	Fabaceae	Seed	Fiber	Improves lipid profile	374
126	Vitis vinifera (Angoor)	Vitaceae	Fruit	Resveratrol	Reduces LDL oxidation	396
127	Withania somnifera (Ashwagandha)	Solanaceae	Root	Withanolides	Lowers cholesterol	409
128	Zea mays (Makka)	Poaceae	Bran	Beta-sitosterol	Mild LDL reduction	427
129	Zingiber officinale (Adrak)	Zingiberaceae	Rhizome	Gingerol	Reduces TG & LDL	431

INDIAN MEDICINAL PLANTS (Kirtikar, K.R. & Basu, B.D)
Volume I

S No	Scientific Name (Indian Name)	Family	Medicinal plants(part)	Main Phytochemical	Pharmacological Activity	Page No
1	Coptis teeta (Mishmi teeta)	Ranunculaceae	Rhizome	Berberine	Reduces serum cholesterol & triglycerides	19
2	Tinospora cordifolia (Giloy)	Menispermaceae	Stem	Berberine, Tinosporin	Improves lipid profile, antioxidant	77
3	Tinospora crispa (Guduchi)	Menispermaceae	Stem	Berberine	Hypolipidemic, antidiabetic	76
4	Coscinium fenestratum (Daruhaldi)	Menispermaceae	Stem	Berberine	Lowers cholesterol & blood sugar	84
5	Berberis aristata (Daruharidra)	Berberidaceae	Root/Bark	Berberine	↓ LDL, improves HDL	104
6	Berberis lycium (Kashmal)	Berberidaceae	Root	Berberine	Hypolipidemic	104
7	Berberis asiatica (Kashmal)	Berberidaceae	Root	Berberine	Reduces blood lipids	104
8	Berberis petiolaris (Barberry)	Berberidaceae	Root	Berberine	Lipid lowering	102
9	Dillenia indica (Chalta)	Dilleniaceae	Fruit	Flavonoids	Lowers cholesterol levels	53
10	Annona squamosa (Sitaphal)	Annonaceae	Leaf/Seed	Acetogenins	Reduces lipid accumulation	66
11	Cissampelos pareira (Patha)	Menispermaceae	Root	Isoquinoline alkaloids	Supports metabolism, anti-inflammatory	95
12	Stephania glabra (Stephania)	Menispermaceae	Root	Alkaloids	Cardioprotective, improves circulation	94
13	Stephania hernandifolia (Stephania)	Menispermaceae	Root	Alkaloids	Cardioprotective	92
14	Nymphaea alba	Nymphaeaceae	Flower	Flavonoids	Antioxidant, heart	111

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

	(Safed kamal)				protective	
15	Nymphaea stellata (Neel kamal)	Nymphaeaceae	Flower	Flavonoids	Anti-inflammatory, antioxidant	113
16	Polyalthia longifolia (Ashok)	Annonaceae	Leaf	Alkaloids	Cardioprotective	72
17	Cocculus hirsutus (Jaljamni)	Menispermaceae	Leaf	Alkaloids	Antioxidant	86
18	Pericampylus Glaucus (Patha)	Menispermaceae	Root	Flavonoids	Anti-inflammatory	91
19	Michelia Champaca (Champa)	Magnoliaceae	Flower	Linalool	Antioxidant	56
20	Illicium Griffithii (Chakr phool)	Schisandraceae	Fruit	Anethole	Improves lipid metabolism	60
21	Paeonia emodi (Peony)	Paeoniaceae	Root	Paeoniflorin	Anti-inflammatory, cardioprotective	25
22	Cimicifuga Foetida (Bugbane)	Ranunculaceae	Root	Triterpenes	Hormonal, metabolic support	24
23	Phaseolus mungo	Urad dal	Fabaceae	Seed	Reduces cholesterol, improves lipid profile	797
24	Vigna catjang	Lobia	Fabaceae	Seed	Hypolipidemic, antioxidant	800
25	Cajanus indicus	Arhar dal	Fabaceae	Seed	Reduces cholesterol, cardioprotective	812
26	Pterocarpus marsupium	Vijaysar	Fabaceae	Heartwood	Hypolipidemic, antidiabetic	828
27	Pongamia glabra	Karanja	Fabaceae	Seed	Lipid lowering anti-inflametery	830

Volume –II

S. No.	Scientific Name (Indian Name)	Family	Medicinal Part	Major Phytochemicals	Pharmacological Activity	Page No
28	Cassia fistula (Amaltas)	Fabaceae	Fruit pulp	Anthraquinones, Flavonoids	Hypolipidemic, mild laxative (reduces cholesterol)	856
29	Cassia auriculata (Tarwar)	Fabaceae	Flower/ Leaf	Flavonoids, Tannins	Lipid lowering, antidiabetic	867
30	Tamarindus indica (Imli)	Fabaceae	Fruit pulp	Tartaric acid, Polyphenols	Reduces cholesterol, antioxidant	887
31	Bauhinia variegata (Kachnar)	Fabaceae	Bark/ Flower	Flavonoids, Glycosides	Hypolipidemic, anti-inflammatory	896
32	Mimosa pudica (Lajwanti)	Fabaceae	Whole plant	Alkaloids, Flavonoids	Antioxidant, supports lipid control	915
33	Acacia catechu (Khair)	Fabaceae	Heartwood	Catechin, Tannins	Reduces LDL, antioxidant	926
34	Prunus Amygdalus (Badam)	Rosaceae	Seed	Oleic acid, Vitamin E	Lowers LDL, cardioprotective	945
35	Rosa	Rosaceae	Petals	Flavonoids,	Antioxidant, heart	973

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

	Damascene (Gulab)			Anthocyanins	protective	
36	Coriandrum sativum (Dhaniya)	Apiaceae	Seed	Linalool, Flavonoids	Hypolipidemic, digestive	1225
37	Cuminum cyminum (Jeera)	Apiaceae	Seed	Cuminaldehyde	Reduces cholesterol, improves metabolism	1227
38	Daucus carota (Gajar)	Apiaceae	Root	Beta-carotene	Lowers cholesterol, antioxidant	1229
39	Emblica officinalis (Amla)	Phyllanthaceae	Fruit	Vitamin C, Tannins	Strong hypolipidemic, antioxidant	1046
40	Terminalia arjuna (Arjun)	Combretaceae	Bark	Arjunolic acid, Triterpenoids	Cardioprotective, reduces cholesterol	1023
41	Terminalia chebula (Harad)	Combretaceae	Fruit	Tannins	Lipid lowering, antioxidant	1020
42	Terminalia bellirica (Baheda)	Combretaceae	Fruit	Gallic acid	Reduces cholesterol	1017
43	Syzygium cumini (Jamun)	Myrtaceae	Seed/Fruit	Jamboline, Flavonoids	Antidiabetic + lipid lowering	1052
44	Punica granatum (Anar)	Lythraceae	Fruit	Punicalagin	Reduces LDL, antioxidant	1084
45	Momordica charantia (Karela)	Cucurbitaceae	Fruit	Charantin	Hypolipidemic, antidiabetic	1133
46	Allium sativum (Lahsun)	Amaryllidaceae	Bulb	Allicin	Strong cholesterol lowering	—
47	Silybum marianum (Milk thistle)	Asteraceae	Seed	Silymarin	Liver protective, improves lipid profile	1417
48	Cichorium intybus (Kasni)	Asteraceae	Root	Inulin	Lowers cholesterol, digestive	1433

Volume –3

S. No.	Scientific Name (Indian Name)	Family	Medicinal Part	Main Phytochemical	Pharmacological Activity	Page No.
49	Solanum nigrum (Makoy)	Solanaceae	Whole plant	Solanine	Hypolipidemic	1751
50	Solanum melongena (Baingan)	Solanaceae	Fruit	Nasunin	Reduces cholesterol	1755
51	Capsicum annuum (Mirch)	Solanaceae	Fruit	Capsaicin	Improves metabolism	1770
52	Withania somnifera (Ashwagandha)	Solanaceae	Root	Withanolides	Reduces lipids	1784
53	Datura stramonium (Datura)	Solanaceae	Leaves/ Seeds	Atropine	Medicinal use	1788
54	Nicotiana tabacum (Tambaku)	Solanaceae	Leaves	Nicotine	Alkaloid activity	1796
55	Vernonia cinerea	Asteraceae	Whole plant	Flavonoids	Lipid lowering	1825

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

	(Sahadevi)					
56	Adhatoda Vasica (Vasaka)	Acanthaceae	Leaves	Vasicine	Anti-inflammatory	1898
57	Rauvolfia serpentina (Sarpagandha)	Apocynaceae	Root	Reserpine	Reduces BP & lipids	1905
58	Ocimum sanctum (Tulsi)	Lamiaceae	Leaves	Eugenol	Improves lipid profile	1961
59	Mentha piperita (Pudina)	Lamiaceae	Leaves	Menthol	Digestive & lipid support	1979
60	Origanum majorana (Marwa)	Lamiaceae	Leaves	Terpenoids	Antioxidant	1985
61	Salvia officinalis (Sage)	Lamiaceae	Leaves	Rosmarinic acid	Lipid lowering	1992
62	Plantago ovata (Isabgol)	Plantaginaceae	Seeds	Psyllium	Reduces cholesterol	2038
63	Euphorbia hirta (D udhi)	Euphorbiaceae	Whole plant	Tannins	Medicinal use	2199
64	Azadirachta indica (Neem)	Meliaceae	Leaves	Azadirachtin	Reduces lipids	1200
65	Allium sativum (Lahsun)	Amaryllidaceae	Bulb	Allicin	Reduces LDL	1215
66	Curcuma longa (Haldi)	Zingiberaceae	Rhizome	Curcumin	Hypolipidemic	1220
67	Zingiber officinale (Adrak)	Zingiberaceae	Rhizome	Gingerol	Lipid lowering	1230
68	Cinnamomum verum (Dalchini)	Lauraceae	Bark	Cinnamaldehyde	Reduces TG	1245
69	Nigella sativa (Kalonji)	Ranunculaceae	Seeds	Thymoquinone	Hypolipidemic	1250
70	Linum usitatissimum (Alsi)	Linaceae	Seeds	Omega-3	Lowers cholesterol	1260
71	Terminalia arjuna (Arjun)	Combretaceae	Bark	Tannins	Cardioprotective	1275
72	Commiphora mukul (Guggul)	Burseraceae	Resin	Guggulsterone	Reduces cholesterol	1280
73	Camellia sinensis (Green tea)	Theaceae	Leaves	Catechins	Improves lipid profile	1290
74	Aloe vera (Ghritkumari)	Asphodelaceae	Leaves	Aloin	Hypolipidemic	1300
75	Syzygium cumini (Jamun)	Myrtaceae	Seed/Fruit	Jamboline	Controls lipids	1310
76	Momordica charan tia (Karela)	Cucurbitaceae	Fruit	Charantin	Reduces cholesterol	1320
77	Glycyrrhiza glabra (Mulethi)	Fabaceae	Root	Glycyrrhizin	Lipid lowering	1330
78	Coriandrum	Apiaceae	Seeds	Linalool	Improves lipid	1340

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

	sativum (Dhaniya)				metabolism	

Volume IV

S. No.	Scientific Name (Indian Name)	Family	Plant Part Used	Main Phytochemical	Pharmacological Activity	Page No.
79	Curcuma longa (Haldi)	Zingiberaceae	Rhizome	Curcumin	↓ LDL, antioxidant, anti-atherosclerotic	2423
80	Curcuma aromatica (Wild Haldi)	Zingiberaceae	Rhizome	Curcuminoids	Antioxidant, lipid metabolism support	2419
81	Curcuma zedoaria (Kachur)	Zingiberaceae	Rhizome	Curcumin, turmerones	Hypolipidemic	2420
82	Zingiber officinale (Adrak)	Zingiberaceae	Rhizome	Gingerols	↓ Cholesterol, cardioprotective	2435
83	Kaempferia galanga (Kacholam)	Zingiberaceae	Rhizome	Flavonoids	Antioxidant, lipid-lowering support	2426
84	Hedychium spicatum (Kapur kachri)	Zingiberaceae	Rhizome	Essential oils	Anti-inflammatory, CV protection	2430
85	Costus speciosus (Keukand)	Costaceae	Rhizome	Diosgenin	Hypolipidemic, anti-diabetic	2440
86	Elettaria cardamomum (Elaichi)	Zingiberaceae	Seeds	Cineole	↓ Cholesterol, antioxidant	2442
87	Alpinia galanga (Kulanjan)	Zingiberaceae	Rhizome	Galangin	Lipid-lowering support	2445
88	Cymbopogon citratus (Lemongrass)	Poaceae	Leaves	Citral	Hypocholesterolemic	2681
89	Cymbopogon scho enanthus	Poaceae	Leaves	Citral	Lipid-lowering	2677
90	Vetiveria zizanioides (Khus)	Poaceae	Roots	Vetiverol	Antioxidant, lipid protection	2671
91	Cyperus rotundus (Nagarmotha)	Cyperaceae	Rhizome	Flavonoids	Anti-obesity, ↓ lipids	2637
92	Acorus calamus (Vacha)	Acoraceae	Rhizome	β-asarone	Metabolic regulation	2626
93	Saccharum officinarum (Ganna)	Poaceae	Stem	Polyphenols	Mild lipid regulation	2644
94	Bambusa arundinacea (Bans)	Poaceae	Leaves	Flavonoids	Antioxidant	2702
95	Dioscorea Oppositifolia (Ratalu)	Dioscoreaceae	Tuber	Diosgenin	↓ Cholesterol	2495
96	Smilax glabra (Chopchini)	Smilacaceae	Rhizome	Saponins	Hypolipidemic	2495
97	Asparagus racemosus (Shatavari)	Asparagaceae	Root	Shatavarin	Lipid regulation	2501

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June 2026, pp:203-219 www.ijprajournal.com ISSN: 2456-4494

98	Allium cepa (Pyaz)	Amaryllidaceae	Bulb	Quercetin	Strong ↓ LDL, antioxidant	2511
99	Cocos nucifera (Nariyal)	Arecaceae	Fruit	Fatty acids	Lipid metabolism modulation	2581
100	Phoenix dactylifera (Khajur)	Arecaceae	Fruit	Polyphenols	Prevent lipid oxidation	2561
101	Areca catechu (Supari)	Arecaceae	Seed	Alkaloids	Limited lipid role	2557
102	Pistia stratiotes	Araceae	Whole plant	Flavonoids	Antioxidant	2600
103	Colchicum luteum	Colchicaceae	Corm	Colchicine	Anti-inflammatory (indirect CV benefit)	2524
104	Gloriosa superba	Colchicaceae	Tuber	Colchicine	Anti-inflammatory	2525

II. SUMMARY AND CONCLUSION:

SUMMARY

The present review focuses on herbal medicinal plants and their role in cholesterol control and lipid profile management. Herbal plants consist of various parts such as roots, stems, leaves, bark, flowers, fruits, and seeds, which contain biologically active compounds responsible for therapeutic effects. The use of herbal medicine is ancient and continues to play an important role in traditional and modern healthcare systems.

Medicinal plants are rich sources of phytochemicals such as flavonoids, alkaloids, tannins, saponins, and polyphenols, which contribute to their pharmacological activities. These plants are widely used in phytotherapy and complementary and alternative medicine (CAM) for the prevention and treatment of various diseases.

Hyperlipidemia is a major health condition characterized by elevated levels of cholesterol, triglycerides, and lipoproteins such as LDL and VLDL, along with reduced HDL levels. Increased LDL cholesterol is associated with a higher risk of atherosclerosis and cardiovascular diseases, while HDL plays a protective role.

The review highlights different mechanisms of action of herbal drugs in cholesterol control, including reduction of cholesterol absorption, increased bile acid excretion, modulation of lipid metabolism, and antioxidant activity. Several medicinal plants such as Allium sativum, Curcuma longa, Camellia sinensis, and Nigella sativa have been studied for their hypolipidemic and cardio protective effects.

A large number of Indian medicinal plants listed in different volumes demonstrate significant lipid-lowering activity, improving parameters such as LDL, HDL, triglycerides, and total cholesterol. These plants also exhibit antioxidant, anti-inflammatory, and cardioprotective properties, making them beneficial in managing cholesterol-related disorders.

CONCLUSION

The present review concludes that herbal medicinal plants play a significant role in the management of cholesterol and associated disorders such as hyperlipidemia and cardiovascular diseases. The presence of bioactive phytochemicals in plants contributes to their lipid-lowering, antioxidant, and cardio protective effects.

Herbal drugs act through multiple mechanisms, including inhibition of cholesterol absorption, enhancement of bile acid excretion, regulation of lipid metabolism, and reduction of oxidative stress. These properties make herbal medicines effective in improving lipid profile parameters such as LDL, HDL, triglycerides, and total cholesterol.

Compared to synthetic drugs, herbal medicines are widely used due to their natural origin and traditional acceptance. However, further scientific validation, clinical studies, and standardization are required to establish their safety and efficacy more clearly.

Overall, herbal medicinal plants can be considered as a valuable and promising approach for cholesterol control and maintenance of cardiovascular health.

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