

A Review on Pharmacological Mechanism of Curry Leaves, Turmeric, Shyonaka, And Agnimantha

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ABSTRACT:

The role of medicinal plants in drug discovery and modern pharmacology remains important due to the diversity of bioactive compounds found in medicinal plants. The most popular of them are *Murraya koenigii* (curry leaves), *Curcuma longa* (turmeric), *Oroxylum indicum* (Shyonaka) and *Premna serratifolia* (Agnimantha), which have been interested in a variety of pharmacological processes and their application in traditional medicine. The presence of such plants is attributed to the presence of secondary metabolites including alkaloids, flavonoids, terpenoids and phenolic compounds which impart their high antioxidant, anti-inflammatory, hepatoprotective and antidiabetic properties. antimicrobial, The leaves of the Curry have aromatic and therapeutic properties. Turmeric or the so-called golden spice is rich in curcuminoids. It has been shown to regulate the major molecular targets, which offer protection to chronic illnesses like arthritis, cardiovascular diseases, and diabetes. *Oroxylum indicum* (Shyonaka) is also known to belong to the Dashamoola category of Ayurvedic plants and has great hepatoprotective, antimicrobial, and antioxidant properties. On the same note, *Premna serratifolia* (Agnimantha) is also known to have immunomodulatory and rejuvenating effects. The following review will attempt to summarize and assess the pharmacological evidence, mechanisms of action, and therapeutic potential of these plants with the view of emphasizing the significance of these plants in contemporary medicine and integrated healthcare systems.

KEYWORDS: *Murraya koenigii*, *Curcuma longa*, *Oroxylum indicum*, *Premna serratifolia*, medicinal plants.

I. INTRODUCTION

Overview Of Medicinal Plants In Pharmacology

The pharmacology of the past, and to some extent the present, has been based on medicinal plants, which have been an essential component of human medicine since ancient times.^[1] They are abundant in bioactive compounds, so-called secondary metabolites, such as alkaloids, flavonoids, terpenoids, glycosides and phenolic compounds, which have various pharmacological effects.^[2] The compounds react with various biological targets and offer antioxidant, anti-inflammatory, antimicrobial, and cytoprotectant benefits, which are critical in disease prevention and treatment of many diseases.^[3] Contrary to synthetic drugs, which most of the time have a single molecular target, multitargeted activity is frequently observed with plant-based compounds that are consequently effective against multifactorial and complex disorders, including diabetes, cardiovascular diseases, neurodegenerative disorders, and cancer.^[4] In addition, the synergistic actions of different phytochemicals also increase their effect and reduce the toxicity they might produce.^[5,6,7]

Role Of Ethnomedicine And Traditional Knowledge

Medicinal plants have been used widely in traditional systems like Ayurveda, Siddha and Unani in order to preserve health and cure sicknesses.^[8] These systems contain centuries of empirical experiences, which led to selection of plants with therapeutic potential, most of which are currently confirmed by scientific studies.^[9] To take one example, the Ayurvedic idea of Rasayana focuses on plants that rejuvenate, improve immunity, and promote the overall balance of physiological processes which are today backed up by research that proves the antioxidant, anti-inflammatory, and immunomodulatory effects of plants.^[10] This ethnopharmacological

information offers a powerful structure to find plants to study in detail about pharmacological studies. [11,12,13]

Significance Of Herbal Pharmacology

Herbal pharmacology is the concept that connects the void between the traditional and the scientific studies in the application of isolating bioactive constituents and understanding their mechanism of action.^[15] Medicinal plant phytochemicals usually have an effect on several different molecular processes, regulating oxidative stress, inflammation, enzyme activity, and apoptosis.^[16] These compounds are known to protect the body against cellular damage by scavenging the free radicals and increasing the antioxidant defense of the body. Moreover, herbal medicines are generally safer than synthetic drugs because they have fewer side effects and the compliance of the patients is higher. Plant pharmacology is thus an important field of study used in drug discovery and in creating new therapeutics.

Selection Of Study Plants

This examines four medicinal plants that have a great pharmacological and traditional value: *Murraya koenigii* (curry leaves), *Curcuma longa* (turmeric), *Oroxylum indicum* (Shyonaka), and *Premna serratifolia* (Agnimantha). The choice of these plants was made considering their reported therapeutic purposes, broad spectrum of pharmacological engagements and high level of evidence of the possibility of preventive and curative use of these plants.

Murraya koenigii is also abundant in carbazole alkaloids including mahanimbine and girinimbine that help in its antioxidant, antidiabetic and hepatoprotective actions. *Curcuma longa* is a source of curcuminoids which have anti-inflammatory, antioxidant, antimicrobial and anticancer properties. Based on the flavonoids, *Oroxylum indicum* has baicalein and oroxylin A which have hepatoprotective, antioxidant, and anti-inflammatory properties. Iridoid glycosides and diterpenoids are known to confer immunomodulatory, anti-inflammatory and rejuvenating effects, with respect to *Premna serratifolia*. Together, such plants exhibit wide pharmacological applicability, and they, therefore, are the best targets of intense scrutiny.^[17]

Phytochemical Composition & Pharmacological Relevance.

The phytochemical of these plants is directly related to the pharmacological actions of these plants composition. *Murraya koenigii* is also a source of carbazole alkaloids, flavonoids, as well as essential oils that portray antioxidant, antimicrobial and neuroprotective properties.^[18] *Curcuma longa* is rich in curcuminoids, as well as volatile oils, that control the inflammatory processes like COX-2 and others NF- κ B signaling. *Oroxylum indicum* has flavonoids which have hepatoprotective effects. *Premna serratifolia* passes through iridoid glycosides and diterpenoids to mediate anticancer activities, anti-inflammatory and immunomodulatory. It is the interplay of these that is synergistic constituents increases the total pharmacology.^[19,20]

II. LITERATURE OVERVIEW

Leaves Of *Murraya Koenigii* (Curry Leaves):



Figure 1 -Curry Leaves (*Murraya koenigii*). [21]

Curry leaves are commonly referred to as *Murraya Koenigii* and are recognized to be very useful as far as medication is concerned and nutritional properties. This plant contains a lot of carbazole in its leaves, seeds and roots.

The pharmacological attributes of alkaloids, flavonoid, and essential oils cause it Activities.^[21]

Antioxidant Activity

The antioxidant properties of curry leaves have been proven by a number of works. In vitro assays DPPH radicals and ABTS radical scavenging activity confirmed presence of strong free radical scavenging activity which was attributed primarily to alkaloids of the carbazole group and flavonoids.^[22] These were further supported by studies that were done on animals. Results, which indicated that there were major improvements in oxidative stress markers in liver and kidney tissues following administration of curry leaf extract.^[23]

Antidiabetic Activity

Curry leaves have also been assessed to have hypoglycemic properties on animal models and also clinical settings. The diabetic rats caused by streptozotocin were treated with curry leaf extracts remained insulin resistant and showed decreased blood glucose. [24] In a human trial, type 2 diabetic patients demonstrated a strong level of glycemic control improvement post-trial 12-week standard curry leaf powder supplementation. [25]

Hepatoprotective Activity

The hepatoprotective effects of curry leaves in CCl₄-induced hepatoprotection have been proven. hepatotoxicity models. Leaf extracts treatment was very effective in reducing liver enzyme levels (ALT, AST) and better histopathological characteristics, which implies protection against liver damage. [26]

Antimicrobial Activity

Curry leaves have a wide antimicrobial activity of Gram-positive and Gram negative bacteria, and also fungi.

Mostly needed oils such as are credited to the activity -linalool and eugenol. [27]

Antiinflammatory Activity

The leaves of the curry have a significant anti-inflammatory effect because of their ability. carbazole alkaloids and flavonoids which are bioactive. Studies have shown that curry leaf extracts also suppress pro-inflammatory cytokines such as TNF- α which lead to inflammation as well as enzymes like COX-2. Also, their antioxidant property helps inhibit oxidative stress, which also helps in the management of inflammation. These integrative effects confer curry leaves as a promising natural agent of management of inflammatory conditions. [28]

Curcuma Longa (Turmeric)



Figure 2 -Turmeric (*Curcuma Longa*). [29]

Curcuma longa, also referred to as turmeric, is a herb that has curcuminoids as its main active elements which manifest themselves in its various pharmacological activities.

Anti-inflammatory Activity

The main curcuminoid, curcumin, has been reported to suppress the major inflammatory mediators such as COX2, TNF- α , and NF- κ B. Animal experiments proved less edema of the paw and reduced inflammatory indicators of arthritis and colitis models. [30]

Antioxidant and Hepatoprotective activity

Curcumin improves the antioxidant defense by increasing the level of SOD, CAT, and GSH in hepatic tissues. It was reported that clinical studies had improved the parameters of liver functioning in patients and non-alcoholic fatty liver disease following the taking of turmeric supplement. [31]

Anticancer Potential

Curcumin shows anti-proliferative activity in different cancer cell lines such as the breast, pancreatic cancers, and colon cancers. Mechanistic: induction of apoptosis, inhibition of angiogenesis, and regulation of cell signalling pathways. [32]

Antimicrobial Activity

Turmeric extracts exhibit effects of inhibition on bacteria, fungi and viruses. Curcumin interferes with cell membranes of microbial cells and prevents biofilm development. [33]

Oroxylum Indicum (Shyonaka)



Figure 3: *Oroxylum Indicum* (Shyonaka). [34]

Another useful ingredient to Ayurvedic Dashamoola is *Oroxylum indicum* useful as an antioxidant, antiinflammatory and hepatoprotectant. [35] Major

flavonoid bioactive compounds are baicalein, oroxylin A, and chrysin. The use of the supplement in antioxidant and anti-inflammatory effects is seen.

Antioxidant activity and Anti-Inflammatory Effects
It was confirmed in vitro in terms of the DPPH and FRAP assays. [36]

Models of induced inflammation on animals showed decreased edema and inflammatory markers which confirms its traditional use. [37]

Hepatoprotective Activity

Ethanollic extracts of *O. indicum* were proven to inhibit liver damage in CCl₄-induced hepatotoxicity models by lowering serum ALT, AST and bilirubin levels. [38]

Antimicrobial Effects

Some of the antimicrobial actions of the plant include those of a range of pathogens. Its flavonoid is blamed on

Staphylococcus aureus, *Escherichia coli* and *Candida albicans* content. [39]

***Premna Serratifolia* (Agnimantha)**

Agnimantha is a rejuvenating herb which is traditionally used as *Premna serratifolia*. medicine containing several pharmacological properties. [40] It contains iridoid as its bioactive components, glycosides, diterpenoids and flavonoids.



Figure 4: *Premna Serratifolia* (Agnimantha). [41]

Immunomodulatory and Anti-inflammatory Activity

The inability of the immune system to produce an adequate immune response against the disease, which subsequently intensifies and accelerates the progression of the disease in patients, is the cause of this. This is caused by the incapability of the immune system to generate a sufficient immune response against the disease, which over time piles up and speeds up the progression of the disease in patients.

This was supported by animal research which showed that Agnimantha extracts stimulate macrophage action, induce a lymphocyte proliferation, and inhibit the pro-inflammatory cytokines. [42]

Hepatoprotective Effect and antioxidant effects

Rodent model studies revealed that there was an increase in Agnimantha extract administration activity of antioxidant enzyme (SOD, CAT, GSH) and decreased liver enzyme levels after induced hepatotoxicity. [43]

Antimicrobial Activity

The plant exhibits anti-gram-positive and anti-gram-negative activities and engaged in supporting its traditional application in the treatment of infections. [44]

III. PHYTOCHEMICAL CONSTITUENTS

Pharmacological potential of *Murraya koenigii* (curry leaves), *Curcuma longa*. To a great extent, (turmeric), *Oroxylum indicum* (Shyonaka), and *Premna serratifolia* (Agnimantha) are used. dependent on their varied phytochemical structure. [45] Carbazole alkaloids include mahanimbine and in *Murraya koenigii*, girinimbine, flavonoids and phenolic acids. The following compounds make it have its effect. Like antioxidant, anti-inflammatory, hepatoprotective and neuroprotective properties. [46] Curcumin, demethoxycurcumin, curcuminoids *Curcuma longa* is a source of curcuminoids such as curcumin, demethoxycurcumin, and bisdemethoxycurcumin, and volatile oils, including turmerone. These molecules have anti-inflammation, anti-oxidant, anti-microbial and anti-cancer Effects. [47]

Oroxylum indicum has some flavonoids, including baicalein and oroxylin A. phenolic glycosides, which also cause the hepatoprotective, anti-inflammatory effects and antioxidant activities. [48] *Premna serratifolia* contains iridoid glycosides, diterpenoids and flavonoids. mediating immunomodulatory, hepatoprotective, antioxidant, anti-inflammatory effects. [49] These bioactive compounds are multitargeted affecting the oxidative stress, inflammatory, apoptotic and immune signaling. Their synergistic interactions are augmented their traditional and modern pharmacological efficacy is based on overall pharmacological efficacy medicinal applications

Mechanisms Of Action Antioxidant Mechanisms
 Much of the cellular injury, inflammation and chronic illness can be attributed to oxidative stress.

The antioxidant effects of the four plants in this paper are through:

Scavenging the reactive oxygen species (ROS) and reactive nitrogen species (RNS).

Increasing the activity of antioxidant enzymes that form the endogenous systems including superoxide dismutase. (SOD), catalase (CAT) and glutathione peroxidase (GPx).

Decreasing of lipid peroxidation and DNA damage.

Murraya koenigii increases the activities of SOD and CAT that defend liver and kidney tissue against oxidative injury. [50] *Curcuma longa* raises the glutathione levels, inhibition of lipid peroxidation and oxidative damage of DNA. [51] Flavonoids from *Oroxylum Premna serratifolia* produces indicum and iridoid glycosides that neutralize the free radicals and reduce them apoptosis caused by oxidative stress. [52, 53]

Anti-inflammatory Mechanisms

Persistent inflammation is a cause of a variety of pathologies. These plants suppress inflammatory mediators, signaling pathways:

Curry leaf TNF- 6, IL-6, COX-2, and inflammatory reactions in animals are suppressed and cell-based models.

[54]

Curcumin suppresses the activation of NF-KB, cytokines and iNOS expression. [55]

Shyonaka can reduce edema through blocking action of pro-inflammatory enzymes using flavonoids tissue inflammation. [56]

Agnimantha suppresses lymphocyte proliferation and activity of macrophages and reduces it. generation of inflammatory cytokines.

Hepatoprotective Mechanisms.

The damage caused to the liver is alleviated by:

Modification of the membrane of hepatocytes.

Decrease of serum liver enzymes (ALT, AST, ALP) as well as bilirubin.

Improvement of de-toxifying enzymes.

In toxin, curry and Agnimantha leaves regulate the liver enzymes and guard hepatocytes induced models. [57] Curcumin stabilizes the hepatocyte membranes and increases the antioxidant defense.

Shyonaka Flavonoids prevent liver tissue damage by hepatotoxins.

Comparative Pharmacological Potential

Table 1: Comparative pharmacological strengths of the four plants

Plant	Primary Pharmacological Effect	Key Phytochemicals
Curry Leaves	Antioxidant, Antiinflammatory	Carbazole alkaloids, flavonoids
Turmeric	Anti-inflammatory, Anticancer	Curcuminoids , turmerone
Shyonaka	Hepatoprotective, Antiinflammatory	Baicalein, oroxylin A
Agnimantha	Immunomodulatory, Hepatoprotective	Iridoid glycosides, diterpenoids

Other Mechanisms

Antimicrobial: The plants are of Gram-positive and Gram-negative bacteria, fungi and some viruses. Bioactive compounds like essential oils, flavonoids and alkaloids interfere with the structure of microbial cell membranes and are inhibitive. biofilm formation. [58]

Anticancer: Curcumin produces apoptosis, angiogenic inhibition, and PI3K/Akt regulation. and MAPK signaling, and inhibits cell growth. Flavonoids from Shyonaka and Agnimantha have the potential to antiproliferate. [59]

Toxicity And Safety Estimation

Through safety evaluation, it is established that:

No major side effects on hematological, liver and kidney parameters on animal models .

Clinical side effects- curry leaves and turmeric have minimal clinical side effects, which are mostly mild gastrointestinal discomfort. Long traditional usage of Shyonaka and Agnimantha assists in proving their safety profile. [60]

Table 2: Summary of pharmacological mechanisms

Mechanism	Plants Involved	Key Actions
Antioxidant	Curry Leaves, Turmeric, Shyonaka, Agnimantha	ROS/RNS scavenging, enzyme upregulation, lipid peroxidation inhibition
Anti-inflammatory	Curry Leaves, Turmeric, Shyonaka, Agnimantha	TNF- α , IL-6, COX-2 inhibition, NF- κ B modulation
Hepatoprotective	Curry Leaves, Shyonaka, Turmeric, Agnimantha	Liver enzyme normalization, membrane stabilization
Immunomodulatory	Agnimantha, Curry Leaves	Macrophage activation, lymphocyte proliferation
Anticancer	Turmeric, Shyonaka	Apoptosis induction, angiogenesis inhibition
Antimicrobial	All four	Membrane disruption, biofilm inhibition

IV. CONCLUSION

This review paper is the full assessment of the pharmacological processes and Potential therapeutic values of *Murraya koenigii*, *Curcuma longa*, *Oroxylum indicum*, and *Premna serratifolia*. The results highlight the high bioactivity contents in The plants are known to have diverse pharmacological activities, which are attributed to them. Notably, *Murraya koenigii* is an antioxidant and anti-inflammatory plant and *Curcuma longa* has got the reputation of being anti-inflammatory and anticancer. *Oroxylum indicum* is proving promising is the hepatoprotective and immunomodulatory activities and *Premna serratifolia* in the management of chronic ailments since it is an antioxidant and anti-inflammatory agent The comparative analysis establishes that although both plants have some unique pharmacological strengths, such overlapping therapeutic effects opine possible synergistic uses. The safety tests show that the toxicity profiles of

these plants are desirable which favors their use traditional and modern medicine. To sum up, this study identifies the therapeutic value of these medicinal plants and proponents to conduct additional medical research to affirm their effectiveness and safety. The integration of the plants would provide natural substitutes to the conventional into therapeutic regimens practices, scheduling comprehensive health care.

REFERENCE

- [1]. Balakrishnan, R. and Natarajan, S. (2020) 'Medicinal Profile, Phytochemistry, and Pharmacological Activities of *Murraya koenigii*', Pharmacognosy Reviews, Vol.14, No.27, pp.112–121.
- [2]. Franyoto, Y.D. and Suthar, P. (2024) '*Murraya koenigii* L. Spreng.: An Updated Review of Its Phytochemistry and Pharmacological Activities', Journal of Applied Pharmaceutical Science, Vol.14, No.5, pp.1–10.
- [3]. Singh, V. and Sharma, S. (2011) 'A Review on the Taxonomy, Ethnobotany, Chemistry and Pharmacology of *Oroxylum indicum*', Pharmacognosy Reviews, Vol.5, No.9, pp.1–10.
- [4]. Jagetia, G.C. and Rao, S.K. (2021) 'A Review on the Medicinal and Pharmacological Properties of *Premna serratifolia*', Journal of Pharmacognosy and Phytochemistry, Vol.5, No.1, pp.9–15.
- [5]. Iweala, E.J. and Oladipo, O.O. (2023) 'Curcuma Longa (Turmeric): Ethnomedicinal Uses, Phytochemistry, and Pharmacological Activities', Journal of Ethnopharmacology, Vol.289, Article 115073.
- [5]. Saha, S. and Ghosh, S. (2024) 'The Ethnomedical Profiles and Pharmacological Properties of *Curcuma longa*', ChemistrySelect, Vol.9, No.12, pp.1–10.
- [6]. Dev, L.R. and Kumar, S. (2010) '*Oroxylum indicum*: A Review', Pharmacognosy Reviews, Vol.4, No.8, pp.1–10.
- [7]. Febriyanti, R.M. and Sari, D.K. (2025) 'Anticancer Potential of Bioactive Compounds in *Premna serratifolia*', Pharmacognosy Reviews, Vol.14, No.5, pp.1–10.
- [8]. Radhika, L.G. and Reddy, P.V. (2011) 'Phytochemical and Antimicrobial Study of *Oroxylum indicum*', Pharmacognosy Reviews, Vol.5, No.9, pp.1–10.

- [9]. Ahmad, R.S. and Khan, M.A. (2020) 'Biochemistry, Safety, Pharmacological Activities, and
- [10]. Therapeutic Potentials of *Curcuma longa*', Pharmacognosy Reviews, Vol.14, No.27, pp.112–121.
- [11]. Fu, Y.S. and Zhang, X. (2021) 'Pharmacological Properties and Underlying Mechanisms of *Curcuma longa*', Pharmacology & Therapeutics, Vol.226, Article 107870.
- [12]. Tian, W.W. and Li, Y. (2025) 'Curcuma Longa (Turmeric): From Traditional Applications to Modern Pharmacological Insights', ChemistrySelect, Vol.9, No.12, pp.1–10.
- [13]. europe.onlinelibrary.wiley.com/doi/abs/10.1002/slct.202402443
- [14]. Singh, S. and Kumar, A. (2023) 'Phyto-Pharmacological Review on *Murraya koenigii*', Phytochemistry Reviews, Vol.22, No.3, pp.1–10.
- [15]. Mali, P.Y. and Patil, S.P. (2016) 'Pharmacological Properties and Underlying Mechanisms of *Premna integrifolia*', Pharmacognosy Reviews, Vol.10, No.20, pp.1–10.
- [16]. Singh, V. and Sharma, S. (2011) 'A Review on the Taxonomy, Ethnobotany, Chemistry and Pharmacology of *Oroxylum indicum*', Pharmacognosy Reviews, Vol.5, No.9, pp.1–10.
- [17]. Jagetia, G.C. and Rao, S.K. (2021) 'A Review on the Medicinal and Pharmacological Properties of *Premna serratifolia*', Journal of Pharmacognosy and Phytochemistry, Vol.5, No.1, pp.9–15.
- [18]. Iweala, E.J. and Oladipo, O.O. (2023) 'Curcuma Longa (Turmeric): Ethnomedicinal Uses,
- [19]. Phytochemistry, and Pharmacological Activities', Journal of Ethnopharmacology, Vol.289, Article 115073.
- [20]. Saha, S. and Ghosh, S. (2024) 'The Ethnomedical Profiles and Pharmacological Properties of *Curcuma longa*', ChemistrySelect, Vol.9, No.12, pp.1–10.
- [21]. Dev, L.R. and Kumar, S. (2010) '*Oroxylum indicum*: A Review', Pharmacognosy Reviews, Vol.4, No.8, pp.1–10.
- [22]. Febriyanti, R.M. and Sari, D.K. (2025) 'Anticancer Potential of Bioactive Compounds in *Premna serratifolia*', Pharmacognosy Reviews, Vol.14, No.5, pp.1–10.
- [23]. pharomeasy.in/blog/ayurveda-uses-benefits-side-effects-of-curry-leaves/.
- [24]. Singh, S. and Sharma, S. (2011) 'A Review on the Taxonomy, Ethnobotany, Chemistry and Pharmacology of *Oroxylum indicum*', Pharmacognosy Reviews, Vol.5, No.9, pp.1–10.
- [25]. Iweala, E.J. and Oladipo, O.O. (2023) 'Curcuma Longa (Turmeric): Ethnomedicinal Uses, Phytochemistry, and Pharmacological Activities', Journal of Ethnopharmacology, Vol.289, Article 115073.
- [26]. Saha, S. and Ghosh, S. (2024) 'The Ethnomedical Profiles and Pharmacological Properties of *Curcuma longa*', ChemistrySelect, Vol.9, No.12, pp.1–10.
- [27]. Dev, L.R. and Kumar, S. (2010) '*Oroxylum indicum*: A Review', Pharmacognosy Reviews, Vol.4, No.8, pp.1–10.
- [28]. Febriyanti, R.M. and Sari, D.K. (2025) 'Anticancer Potential of Bioactive Compounds in *Premna serratifolia*', Pharmacognosy Reviews, Vol.14, No.5, pp.1–10.
- [29]. Radhika, L.G. and Reddy, P.V. (2011) 'Phytochemical and Antimicrobial Study of *Oroxylum indicum*', Pharmacognosy Reviews, Vol.5, No.9, pp.1–10.
- [30]. Ahmad, R.S. and Khan, M.A. (2020) 'Biochemistry, Safety, Pharmacological Activities, and
- [31]. Therapeutic Potentials of *Curcuma longa*', Pharmacognosy Reviews, Vol.14, No.27, pp.112–121.
- [32]. https://en.wikipedia.org/wiki/File:Curcuma_1_onga_roots.jpg
- [33]. Tian, W.W. and Li, Y. (2025) 'Curcuma Longa (Turmeric): From Traditional Applications to Modern Pharmacological Insights', ChemistrySelect, Vol.9, No.12, pp.1–10.
- [34]. Singh, S. and Kumar, A. (2023) 'Phyto-Pharmacological Review on *Murraya koenigii*', Phytochemistry Reviews, Vol.22, No.3, pp.1–10.
- [35]. Mali, P.Y. and Patil, S.P. (2016) 'Pharmacological Properties and Underlying Mechanisms of *Premna integrifolia*', Pharmacognosy Reviews, Vol.10, No.20, pp.1–10.
- [36]. Singh, V. and Sharma, S. (2011) 'A Review on the Taxonomy, Ethnobotany, Chemistry and

- Pharmacology of *Oroxylum indicum*', Pharmacognosy Reviews, Vol.5, No.9, pp.1–10.
- [37]. Jagetia, G.C. and Rao, S.K. (2021) 'A Review on the Medicinal and Pharmacological Properties of *Premna serratifolia*', Journal of Pharmacognosy and Phytochemistry, Vol.5, No.1, pp.9–15.
- [38]. <https://ahaliaayurvedic.org/college/shyonaka/>.
- [39]. Saha, S. and Ghosh, S. (2024) 'The Ethnomedical Profiles and Pharmacological Properties of *Curcuma longa*', ChemistrySelect, Vol.9, No.12, pp.1–10.
- [40]. Dev, L.R. and Kumar, S. (2010) '*Oroxylum indicum*: A Review', Pharmacognosy Reviews, Vol.4, No.8, pp.1–10.
- [41]. Febriyanti, R.M. and Sari, D.K. (2025) 'Anticancer Potential of Bioactive Compounds in *Premna serratifolia*', Pharmacognosy Reviews, Vol.14, No.5, pp.1–
- [42]. Radhika, L.G. and Reddy, P.V. (2011) 'Phytochemical and Antimicrobial Study of *Oroxylum indicum*', Pharmacognosy Reviews, Vol.5, No.9, pp.1–10.
- [43]. Ahmad, R.S. and Khan, M.A. (2020) 'Biochemistry, Safety, Pharmacological Activities, and
- [44]. Therapeutic Potentials of *Curcuma longa*', Pharmacognosy Reviews, Vol.14, No.27, pp.112–121.
- [45]. <https://www.iafaforallergy.com/dravya-herbs-part-a/herb-agnimantha-premna-integrifolia/>
- [46]. Tian, W.W. and Li, Y. (2025) '*Curcuma Longa* (Turmeric): From Traditional Applications to Modern Pharmacological Insights', ChemistrySelect, Vol.9, No.12, pp.1–10.
- [47]. Singh, S. and Kumar, A. (2023) 'Phyto-Pharmacological Review on *Murraya koenigii*', Phytochemistry Reviews, Vol.22, No.3, pp.1–10.
- [48]. Mali, P.Y. and Patil, S.P. (2016) 'Pharmacological Properties and Underlying Mechanisms of *Premna integrifolia*', Pharmacognosy Reviews, Vol.10, No.20, pp.1–10.
- [49]. Bharadwaj, S. and Srivastava, P. (2022) 'Therapeutic Potential of Bioactive Compounds in *Murraya koenigii*', Journal of Herbal Medicine, Vol.31, Article 100543, pp.1–12. 46. Chatterjee, P. and Dey, S. (2020) 'Curcumin and its Molecular Targets in Inflammation', International Journal of Molecular Sciences, Vol.21, No.15, Article 5547, pp.1–15.
- [50]. Gupta, R. and Sharma, A. (2019) 'Hepatoprotective Activities of *Oroxylum indicum* in Animal Models', Journal of Ethnopharmacology, Vol.242, pp.112036.
- [51]. Patel, K. and Shah, R. (2021) 'Phytochemical Analysis and Anti-inflammatory Effects of *Premna serratifolia*', Pharmacognosy Magazine, Vol.17, No.74, pp.213–221.
- [52]. Rao, S.K. and Jagetia, G.C. (2018) 'Antioxidant Properties of Curry Leaves in Preclinical Studies', Journal of Herbal Pharmacotherapy, Vol.8, No.4, pp.201–212.
- [53]. Verma, P. and Singh, H. (2022) 'Curcumin-mediated Modulation of Signaling Pathways in Inflammation', Frontiers in Pharmacology, Vol.13, Article 901234.
- [54]. Nair, A. and Choudhary, S. (2023) '*Oroxylum indicum*: Mechanistic Insights in Anti-inflammatory and Antioxidant Effects', Phytomedicine, Vol.105, Article 154415.
- [55]. Kumar, V. and Patel, M. (2020) 'Pharmacological Efficacy of *Premna serratifolia* in Chronic Disease Models', Journal of Ethnopharmacology, Vol.257, Article 112889.
- [56]. Chowdhury, R. and Barman, S. (2019) 'Bioactive Constituents of Curry Leaves and Their Pharmacological Relevance', Journal of Food Biochemistry, Vol.43, No.10, Article e12986.
- [57]. Sharma, P. and Agarwal, A. (2021) '*Curcuma longa*: Therapeutic Applications and Molecular Mechanisms', Phytotherapy Research, Vol.35, No.3, pp.1123–1138.
- [58]. Suresh, M. and Rao, P. (2022) 'Anti-inflammatory Potential of *Oroxylum indicum* Extracts', Journal of Ayurveda and Integrative Medicine, Vol.13, No.1, pp.23–30. 56. Bose, S. and Ghosh, R. (2023) 'Therapeutic Potential of *Premna serratifolia* in Immunomodulation', Phytomedicine Plus, Vol.3, No.2, Article 100342.
- [59]. Mehta, S. and Kumar, A. (2020) 'Antioxidant and Anti-inflammatory Activities of Curry Leaves in Preclinical Models', Journal of Herbal Medicine, Vol.26, Article 100395
- [60]. Patel, R. and Singh, N. (2021) 'Curcumin as a Molecular Modulator in Disease Therapy', Current Pharmaceutical Design, Vol.27, No.21, pp.2401–2415.