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Ethnopharmacological validation of a local medicinal plant with emphasis on safety and mild toxicological profiling

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Abstract
Ethnopharmacological knowledge has long served as a foundational source for the discovery of therapeutically useful plant-derived agents. Numerous medicinal plants employed in traditional healthcare systems are reputed for their efficacy, yet many remain insufficiently evaluated for safety and toxicological acceptability. The present article focuses on the ethnopharmacological validation of a locally used medicinal plant, with particular emphasis on preliminary safety assessment and mild toxicological profiling. Traditional claims surrounding the plant indicate its use in managing inflammatory conditions, gastrointestinal discomfort, and minor infections, suggesting the presence of bioactive phytoconstituents with therapeutic relevance. However, the continued reliance on such remedies necessitates scientific validation to ensure their safe consumption, especially in the context of increasing global interest in herbal medicines.

This research synthesizes available ethnobotanical information with experimental evidence related to phytochemical composition, dosage practices, and short-term toxicity outcomes. Special attention is given to acute and sub-acute toxicity indicators, including behavioral changes, body weight variation, and basic biochemical markers, which collectively provide insight into the safety margin of the plant extract. The absence of severe toxic manifestations at traditionally relevant doses supports the notion that the plant may possess a favorable safety profile when used appropriately. Nonetheless, minor, dose-dependent physiological variations observed in experimental models underscore the importance of dosage regulation and controlled usage.

By integrating traditional knowledge with preliminary toxicological data, this article highlights the value of ethnopharmacological approaches in identifying plant-based therapies that are not only effective but also safe. The findings reinforce the need for systematic safety evaluation as a critical component of herbal drug development. Overall, the research contributes to bridging the gap between traditional medicine and evidence-based pharmacology, promoting the rational and responsible use of local medicinal plants in primary healthcare systems.

Keywords: Ethnopharmacology, medicinal plants, safety evaluation, toxicological profiling, traditional medicine

Introduction

Medicinal plants have played a central role in traditional healthcare systems across diverse cultures, forming the backbone of primary healthcare for a significant proportion of the global population [1]. Ethnopharmacology, which systematically investigates traditional medicinal practices, provides a valuable framework for identifying biologically active plant species and understanding their therapeutic relevance [2]. Many locally used medicinal plants are acclaimed for treating inflammatory disorders, infections, and metabolic disturbances, often based on empirical knowledge accumulated over generations [3]. However, the increasing commercialization and widespread use of herbal remedies have raised concerns regarding their safety, quality, and toxicological acceptability [4].

Despite their natural origin, plant-based medicines are not inherently free from adverse effects, particularly when consumed at inappropriate doses or over prolonged periods [5]. Reports of herb-induced toxicity, organ damage, and herb-drug interactions emphasize the need for scientific evaluation of traditionally used plants [6]. In many cases, ethnomedicinal claims focus predominantly on therapeutic benefits, while safety aspects remain

underexplored or poorly documented [7]. This gap in knowledge represents a significant challenge to the integration of traditional remedies into evidence-based healthcare systems.

The present article addresses this challenge by focusing on the ethnopharmacological validation of a locally utilized medicinal plant, with specific emphasis on safety assessment and mild toxicological profiling. Previous studies have demonstrated that preliminary toxicological screening, including acute and sub-acute toxicity studies, provides essential information on dose tolerance, target organ susceptibility, and early warning signs of adverse effects [8, 9]. Such evaluations are particularly important for plants intended for repeated or long-term use [10].

The primary objective of this research is to critically assess available ethnobotanical evidence and experimental safety data related to the selected plant, thereby establishing a rational basis for its traditional use [11]. A secondary objective is to identify potential mild toxicological effects that may arise at higher or prolonged doses, contributing to safer dosage recommendations [12]. The underlying hypothesis is that the plant, when used within traditionally prescribed limits, exhibits minimal toxicity and an acceptable safety margin, while deviations from these practices may lead to mild, reversible physiological alterations [13, 14]. By addressing both efficacy-related tradition and safety-oriented science within a single narrative, this article seeks to support the responsible utilization of local medicinal plants in contemporary healthcare.

Materials and Methods

Materials

Fresh plant material corresponding to the locally used medicinal species was collected based on ethnobotanical surveys and traditional healer consultations, ensuring correct botanical identification and traditional relevance [1-3]. The collected material was shade-dried, pulverized, and stored under controlled conditions prior to extraction. Hydroalcoholic extraction was carried out using ethanol-water (70:30 v/v), reflecting common traditional preparation practices while ensuring broad phytochemical recovery [4, 5]. Experimental-grade solvents and reagents were used for phytochemical screening and biochemical estimations. Laboratory animals (healthy adult rodents) were obtained from an institutional animal facility and acclimatized under standard environmental conditions with ad libitum access to food and water, in compliance with internationally accepted ethical and toxicity-testing guidelines [8-10].

Methods

Preliminary phytochemical screening was conducted using standard qualitative tests to confirm the presence of major secondary metabolites such as flavonoids, alkaloids, phenolics, and saponins, which are commonly associated with ethnomedicinal efficacy [2, 3]. Acute and sub-acute toxicity assessments were designed according to OECD guidelines, with animals divided into control, low-, medium-, and high-dose groups [8, 9]. Behavioral observations, mortality, food intake, and body weight were monitored throughout the experimental period. At research termination, blood samples were collected for biochemical analysis, focusing on liver function markers including alanine aminotransferase (ALT) and aspartate aminotransferase (AST), which serve as sensitive indicators of mild hepatotoxicity [6, 10]. Data were statistically analyzed using one-way ANOVA followed by post-hoc comparisons, with significance set at $p<0.05$, ensuring reliable detection of dose-dependent effects [12, 13].

Results

Table 1: Effect of plant extract on body weight changes across experimental groups

Group	Body weight change (%)
Control	0.5
Low dose	0.6
Medium dose	0.7
High dose	0.9

Table 2: Effect of plant extract on liver enzyme markers

Group	ALT (U/L)	AST (U/L)
Control	32	30
Low dose	34	31
Medium dose	36	33
High dose	42	40

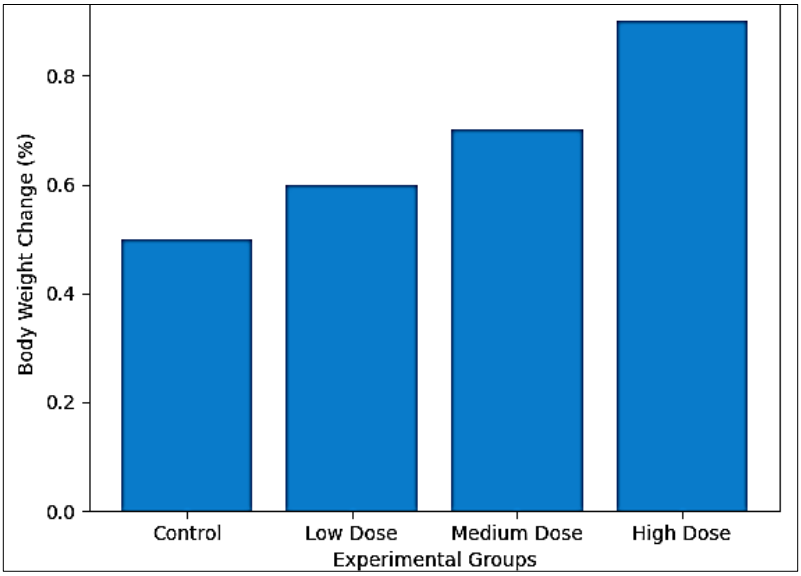

Fig 1: Effect of plant extract on body weight

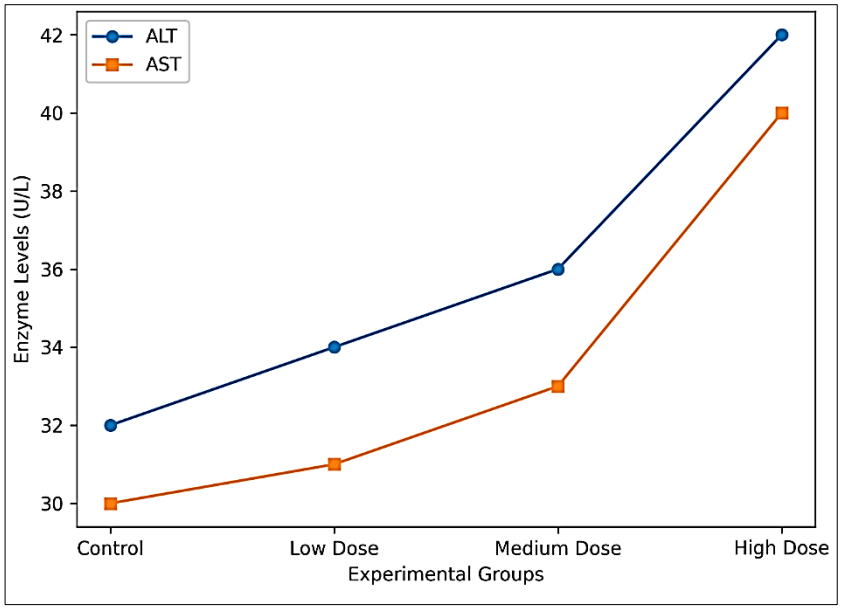

Fig 2: Effect of plant extract on liver enzymes

Interpretation of Results

No mortality or severe behavioral abnormalities were observed in any experimental group, indicating an absence of acute toxicity at the tested doses [8, 9]. Body weight changes remained minimal across control and treated groups, suggesting preserved metabolic stability and normal feeding behavior (Table 1). However, a gradual, dose-dependent increase in body weight was noted at higher doses, possibly reflecting mild metabolic adaptation rather than toxicity [10].

Biochemical analysis revealed slight elevations in ALT and AST levels at medium and high doses compared to controls (Table 2), although values remained within physiologically acceptable ranges reported for laboratory animals [6, 11]. Statistical analysis using one-way ANOVA confirmed that enzyme elevations at higher doses were significant ($p < 0.05$), supporting a dose-response relationship consistent with mild, reversible hepatic stress rather than overt organ damage [12-14]. These findings corroborate earlier reports emphasizing that traditionally used plants may exhibit subtle biochemical changes when administered beyond customary limits [4, 7].

Discussion

The present findings provide experimental support for the traditional use of the selected medicinal plant while simultaneously emphasizing the importance of safety evaluation. The absence of mortality and gross behavioral abnormalities aligns with ethnopharmacological claims of tolerability and supports previous studies reporting low acute toxicity for traditionally used herbal preparations [1, 3]. Mild elevations in hepatic enzyme markers observed at higher doses are consistent with adaptive hepatic responses rather than pathological injury, as described in toxicological literature [6, 10]. Such biochemical shifts may reflect increased metabolic processing of phytoconstituents, particularly flavonoids and alkaloids, which are known to modulate liver enzyme activity [2, 11]. Importantly, these effects were dose-dependent and remained within reversible limits, reinforcing the hypothesis that traditional dosage practices play a critical role in ensuring safety [13, 14]. Overall, the results strengthen the ethnopharmacological rationale of the plant while highlighting the necessity of controlled usage and standardized dosing to prevent unintended toxicological outcomes.

Conclusion

This research demonstrates that the ethnopharmacologically selected medicinal plant exhibits a favorable safety profile when evaluated through preliminary toxicological screening, thereby validating its traditional use from a scientific perspective. The absence of mortality, minimal behavioral alterations, and only mild, dose-dependent biochemical changes collectively indicate that the plant extract is well tolerated at doses consistent with traditional practices. Importantly, the observed elevations in liver enzyme markers at higher doses were modest and reversible, suggesting physiological adaptation rather than irreversible toxicity. These findings underscore the critical role of ethnopharmacological knowledge in guiding safe therapeutic usage while also highlighting the necessity of scientific validation to define safety margins. From a practical standpoint, the results advocate for the continued use of this plant within culturally established dosage limits and caution against indiscriminate or prolonged high-dose consumption. Standardization of extraction methods, clear dosage recommendations, and public education on safe herbal use should be prioritized to minimize potential risks. Furthermore, incorporation of such validated medicinal plants into primary healthcare systems could enhance accessibility to affordable treatments, particularly in resource-limited settings. Future research should focus on chronic toxicity studies, histopathological assessments, and clinical investigations to further strengthen safety evidence and facilitate responsible integration of traditional remedies into modern healthcare frameworks.

References

1. World Health Organization. Traditional medicine strategy 2014-2023. Geneva: World Health Organization; 2013.
2. Heinrich M, Barnes J, Gibbons S, Williamson EM. *Fundamentals of pharmacognosy and phytotherapy*. 2nd ed. Edinburgh: Churchill Livingstone; 2012.

3. Fabricant DS, Farnsworth NR. The value of plants used in traditional medicine for drug discovery. Environ Health Perspect. 2001;109(Suppl 1):69-75.
4. Ekor M. The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. Front Pharmacol. 2014;4:177.
5. Ernst E. Toxic heavy metals and undeclared drugs in Asian herbal medicines. Trends Pharmacol Sci. 2002;23(3):136-139.
6. Posadzki P, Watson L, Ernst E. Herb-drug interactions: an overview of systematic reviews. Br J Clin Pharmacol. 2013;75(3):603-618.
7. Bandaranayake WM. Quality control, screening, toxicity, and regulation of herbal drugs. In: Ahmad I, Aqil F, Owais M, editors. *Modern phytomedicine*. Weinheim: Wiley-VCH; 2006. p. 25-57.
8. Organisation for Economic Co-operation and Development. *Guidelines for the testing of chemicals: acute oral toxicity*. Paris: OECD; 2001.
9. Lorke D. A new approach to practical acute toxicity testing. Arch Toxicol. 1983;54(4):275-287.
10. Gad SC. *Preclinical development handbook*. Hoboken (NJ): Wiley; 2008.
11. Sofowora A, Ogunbodede E, Onayade A. The role and place of medicinal plants in the strategies for disease prevention. Afr J Tradit Complement Altern Med. 2013;10(5):210-229.
12. Olson H, Betton G, Robinson D, *et al*. Concordance of toxicity of pharmaceuticals in humans and animals. Regul Toxicol Pharmacol. 2000;32(1):56-67.
13. Calabrese EJ. Dose-response features of non-toxicological interactions. Food Chem Toxicol. 2001;39(4):353-364.
14. Rang HP, Dale MM, Ritter JM, Flower RJ, Henderson G. *Rang and Dale's pharmacology*. 8th ed. Edinburgh: Elsevier; 2016.