

Quantitative Ethnobotanical Analysis of Medicinal Plants Used by the Oraon Tribe in Raigarh District, Chhattisgarh

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ABSTRACT

The present study quantitatively evaluates ethnomedicinal plant use among the Oraon tribe of Raigarh district, Chhattisgarh. Building upon prior qualitative documentation, this research assesses the cultural significance, informant consensus, and use value of medicinal plants across 20 villages: Bhupdeopur, Daghora, Govindpur, Shivpuri, Pali, Lakha, Chiraipani, Gerwani, Rampur, Pussour, Bade Haldi, Attarmuda, Delari, Saraipali, Gaourmudi, Urbana, Rabo, Badgaon, Danout, and Taraimal. A total of 45 informants were interviewed using semi-structured questionnaires. Twenty plant species were quantitatively analyzed using Use Value (UV), Fidelity Level (FL), and Informant Consensus Factor (ICF). Results showed that *Azadirachta indica* (UV = 0.86), *Ocimum sanctum* (UV = 0.78), and *Psidium guajava* (UV = 0.73) had the highest cultural significance. ICF values were highest for gastrointestinal disorders (0.82) and respiratory ailments (0.79). The study reveals strong traditional reliance on medicinal plants but also indicates declining knowledge among younger generations. These findings highlight the importance of conserving ethnomedicinal heritage and plant diversity in Raigarh district.

Keywords: Quantitative ethnobotany, Use Value, Fidelity Level, ICF, Oraon tribe, Raigarh, medicinal plants

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1. INTRODUCTION

Ethnobotany is the scientific study of how indigenous communities interact with plants, particularly for medicinal purposes. Across India, tribal populations possess a rich and diverse body of traditional knowledge, much of which has been preserved through oral transmission over many generations. The Oraon tribe, one of the major tribal communities of Chhattisgarh, continues to rely extensively on plant-based remedies for their primary healthcare needs. This dependence is closely tied to their cultural traditions, their intimate relationship with the surrounding forests, and their limited access to modern medical facilities in remote areas.

Raigarh district in Chhattisgarh is known for its rich floristic diversity and abundant forest resources, which support a large variety of medicinally important plant species. Although several ethnobotanical studies have been conducted in the region, most have focused primarily on qualitative documentation of traditional plant uses. Quantitative ethnobotanical investigations, which apply structured analytical tools to evaluate the cultural significance of plants and the level of agreement among informants, remain comparatively limited.

Techniques such as Use Value (UV), Fidelity Level (FL), and Informant Consensus Factor (ICF) provide a systematic framework for understanding the relative importance of each medicinal plant within a

community. These indices help identify which plants are most frequently used, how strongly they are associated with particular ailments, and how consistently their uses are reported across different informants. Applying these quantitative methods to the medicinal plant knowledge of the Oraon community offers a more precise and scientifically grounded understanding of their traditional healthcare practices. The present study seeks to contribute to this field by documenting the medicinal plants used by the Oraon tribe in Raigarh district and analyzing them through quantitative ethnobotanical indices. By integrating traditional knowledge with systematic analysis, the research supports the preservation of indigenous ethnomedicinal practices and provides insights that may be valuable for future pharmacological evaluations and biodiversity conservation efforts.

2. MATERIALS AND METHODS

2.1 Study Area

The research was carried out in twenty Oraon-dominated villages located in Raigarh district of Chhattisgarh. These villages include Bhupdeopur, Daghora, Govindpur, Shivpuri, Pali, Lakha, Chiraipani, Gerwani, Rampur, Pussour, Bade Haldi, Attarmuda, Delari, Saraipali, Gaourmudi, Urbana, Rabo, Badgaon, Danout, and Taraimal. The district is characterized by a tropical climate and extensive forest cover that supports rich medicinal plant diversity. The

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geographical and ecological conditions of this region provide an ideal environment for traditional herbal practices to flourish among tribal communities.

2.2 Informant Selection

A total of forty-five informants between the ages of 30 and 80 years were selected for the study. Selection was based on their familiarity with medicinal plants and traditional healing practices. The group included experienced local healers (vaidyas), elderly individuals possessing intergenerational knowledge, and women who regularly prepare and use herbal remedies within their households. These informants were considered reliable sources of traditional ethnomedicinal information.

2.3 Data Collection

Ethnobotanical information was collected through semi-structured interviews, guided field visits, and participatory observation. During interactions with informants, details related to local plant names, plant parts used, methods of preparation, routes of administration, and ailments treated were carefully documented. Plant specimens mentioned by the informants were collected from natural habitats during field walks and subsequently identified using standard regional floras and through verification with herbarium materials. This ensured the scientific accuracy of plant identification.

2.4 Quantitative Indices

To assess the cultural significance and consensus associated with each medicinal plant, three quantitative ethnobotanical indices were employed.

The Use Value (UV) was calculated to determine the relative importance of each species based on how frequently it was cited by informants. It was computed using the formula:

$$UV = \frac{\sum U_i}{N}$$

where U_i represents the number of use-reports for a species and N is the total number of informants.

The Fidelity Level (FL) was used to evaluate the degree of specificity of plant use for particular ailments. It was calculated as:

$$FL(\%) = \frac{N_p}{N} \times 100$$

where N_p is the number of informants mentioning a plant for the same ailment, and N is the total number of informants reporting uses for that plant.

The Informant Consensus Factor (ICF) was applied to measure the level of agreement among informants regarding the use of plants for specific disease categories. It was determined using the formula:

$$ICF = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

where N_{ur} is the number of use-reports for a particular ailment category, and N_t is the number of plant taxa used for that category.

3. RESULTS

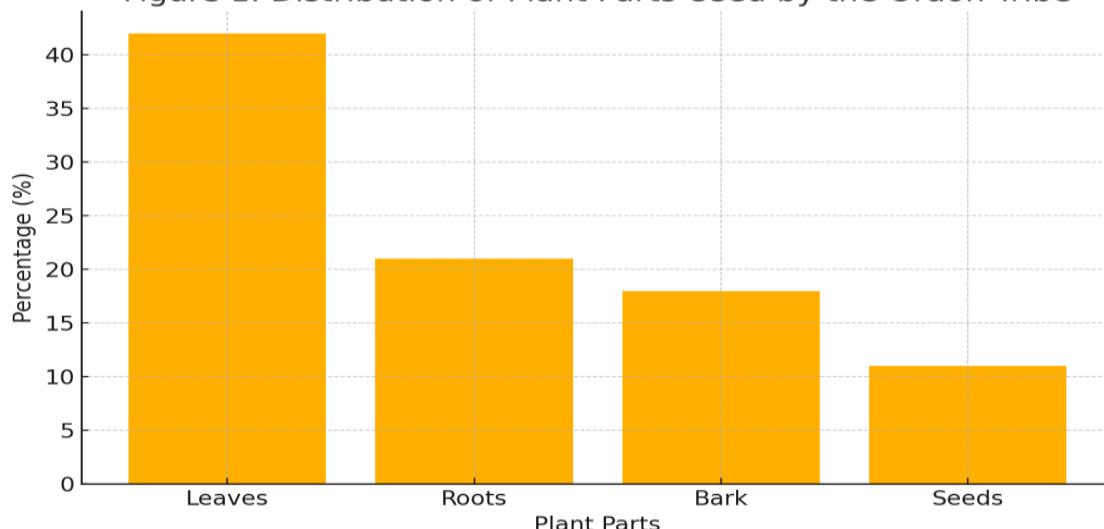
3.1 Medicinal Plant Diversity

The study documented a total of **20 medicinal plant species** distributed across **16 families**. The community utilizes various plant parts for medicinal preparations. Among these, **leaves were the most frequently used (42%)**, followed by **roots (21%)**, **bark (18%)**, and **seeds (11%)**. The distribution of plant part usage is summarized in **Table 1**.

Table 1. Plant Parts Used by the Oraon Tribe

Plant Part	Percentage (%)
Leaves	42
Roots	21
Bark	18
Seeds	11

Figure 1. Distribution of Plant Parts Used by the Oraon Tribe



Graphical Representation: Plant Parts Used

The dominance of leaves is likely due to their easy accessibility and quick regenerative capability, which allows harvesting without causing long-term damage to the plant. Conversely, roots and bark require more destructive extraction, which may explain their relatively lower usage. This pattern reflects an inherent awareness of sustainable harvesting practices within the community.

3.2 Use Value (UV) Analysis

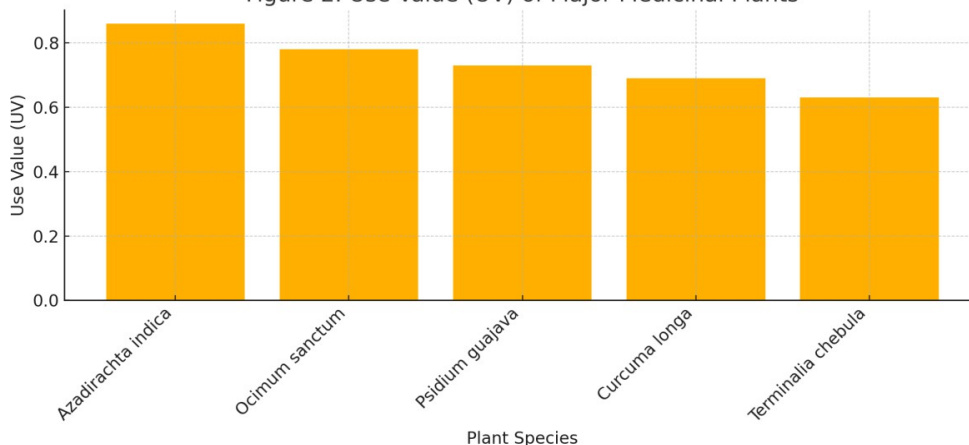
The Use Value (UV) analysis revealed significant variability in the cultural and medicinal importance of plant species. Five species exhibited notably high UV values, indicating broad acceptance and frequent use across the community. These data are presented in **Table 2**.

Table 2. Use Value (UV) of Major Medicinal Plants

Plant Species	UV
<i>Azadirachta indica</i>	0.86
<i>Ocimum sanctum</i>	0.78
<i>Psidium guajava</i>	0.73
<i>Curcuma longa</i>	0.69
<i>Terminalia chebula</i>	0.63

Graphical Representation: UV Values

Figure 2. Use Value (UV) of Major Medicinal Plants



Graphical Representation: UV Values

Azadirachta indica exhibited the highest Use Value, underscoring its multipurpose role in traditional medicine, especially in the treatment of skin disorders, fever, and inflammatory conditions. *Ocimum sanctum* and *Psidium guajava* also demonstrated high UV values, reflecting their importance in managing respiratory and gastrointestinal ailments. The spread of UV values highlights the presence of a well-established traditional medicinal system in which certain species hold strong cultural and therapeutic significance.

3.3 Fidelity Level (FL)

Fidelity Level (FL) values were calculated to determine the specificity of plant use for particular ailments. Several species demonstrated high FL values, indicating strong consensus among informants. The results are shown in **Table 3**.

Table 3. Fidelity Level (FL) of Key Species

Plant Species	Ailment Treated	FL (%)
<i>Psidium guajava</i>	Diarrhea	92
<i>Ocimum sanctum</i>	Cough/Cold	88
<i>Curcuma longa</i>	Wound Healing	84
<i>Aegle marmelos</i>	Digestive Issues	81

The elevated FL values confirm the strong association between specific plants and particular ailments. *Psidium guajava* emerged as the dominant remedy for diarrhea, while *Ocimum sanctum* was widely relied upon for respiratory complaints. *Curcuma longa*'s high FL for wound healing further supports its well-established therapeutic reputation in tribal medicine.

3.4 Informant Consensus Factor (ICF)

The Informant Consensus Factor (ICF) was calculated to assess the level of agreement among informants regarding plant usage across major disease categories. The results are presented in **Table 4**.

Table 4. Informant Consensus Factor (ICF) Disease Category

Gastrointestinal disorders	0.82
Respiratory ailments	0.79
Dermatological issues	0.76
Musculoskeletal problems	0.70

The highest ICF value was recorded for gastrointestinal disorders, followed closely by respiratory ailments. These values indicate that these categories are both common and well-understood within the community, with strong consensus regarding the plant species used for treatment. The high ICF values suggest an established, reliable, and widely shared body of ethnomedical knowledge.

4. DISCUSSION

The findings of this study highlight the continued dependence of the Oraon tribe on medicinal plants as a primary source of healthcare. Species such as *Azadirachta indica*, *Ocimum sanctum*, and *Psidium guajava* recorded high Use Value (UV) and Fidelity Level (FL) scores, reflecting their strong cultural significance and the community's confidence in their therapeutic potential. The frequent mention of these species indicates that they form the core of the tribe's traditional medical repertoire and are deeply integrated into daily healthcare practices.

The high Informant Consensus Factor (ICF) values for gastrointestinal and respiratory ailments demonstrate that these categories are both common and widely treated with traditional remedies. This pattern is consistent with ethnobotanical studies from other tribal regions of central India, where similar ailments dominate and comparable plant species are employed. The strong agreement among informants suggests that these remedies have been validated through long-term use and are regarded as effective within the community.

Despite the richness of traditional knowledge observed

in the study, an important concern that emerged was the noticeable decline in knowledge transmission among younger generations. Factors such as modernization, increased access to commercial medicines, reduced dependence on forests, and migration for education and employment have weakened the intergenerational transfer of ethnomedical practices. If not addressed, this trend may result in the gradual erosion of valuable cultural knowledge.

To safeguard this heritage, there is a pressing need to document ethnomedical practices systematically and to encourage the preservation of medicinal plant species within the region. Community-based initiatives—such as herbal gardens, training programs, and awareness activities targeting younger members of the tribe—could play a significant role in revitalizing interest and ensuring the continuity of traditional knowledge. Efforts promoting sustainable harvesting and conservation of medicinal plants are equally important, as these resources are central to the cultural identity and healthcare security of the community.

5. CONCLUSION

This quantitative ethnobotanical investigation confirms that the Oraon tribe maintains a rich and deeply rooted tradition of medicinal plant use, closely tied to their natural surroundings and cultural heritage. Among the species documented, *Azadirachta indica*, *Ocimum sanctum*, and *Psidium guajava* proved to be the most culturally and therapeutically significant, a finding supported by their high Use Value and Fidelity Level scores. Gastrointestinal and respiratory ailments exhibited the highest Informant Consensus Factor, suggesting both their common occurrence within the community and the widespread confidence placed in traditional plant-based remedies for their treatment. At the same time, the study highlights the pressing need to preserve both ethnomedical knowledge and medicinal plant diversity, particularly given the diminishing transmission of traditional practices among younger generations. Collectively, these findings offer a valuable scientific basis for further research in conservation biology, ethnopharmacology, and sustainable utilization of medicinal plant resources.

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