

## **Ethnobotanical Insights on *Andrographis paniculata* (Burm. f.) Wall. ex Nees in select villages of Narharpur Block, Uttar Bastar Kanker, Chhattisgarh**

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### **ABSTRACT**

This study delves into the ethnobotanical knowledge and practices around *Andrographis paniculata* (Burm. f.) Wall. ex Nees among traditional healers in Narharpur Block, Uttar Bastar Kanker District. Through interviews with 18 traditional healers representing diverse ethnic backgrounds, educational levels, ages, and genders, the study investigates the correlation between formal education and traditional botanical knowledge. It also explores how age and gender dynamics influence the depth and breadth of traditional medicinal knowledge. The findings reveal that despite higher educational qualifications among some participants, those without formal education often possess a deeper understanding of traditional botanical practices. Furthermore, older participants, particularly those aged 51-60, demonstrate higher levels of relative knowledge compared to younger age groups. Gender dynamics also play a role, with women in certain age brackets exhibiting heightened relative knowledge, attributed to their traditional roles as caretakers. The study highlights the importance of respecting and valuing traditional knowledge systems, emphasizing the need for intergenerational transmission and preservation efforts. Additionally, it examines the factors driving the utilization of herbal medicine, including affordability, concerns about adverse effects of modern medical treatments, and a preference for natural and sustainable healthcare options. The study underscores the significance of leaves in herbal remedies, citing their accessibility, ease of preparation, and biological richness as key factors contributing to their preference among traditional healers. Overall, this study sheds light on the complex interplay of education, age, gender, and cultural factors in shaping traditional healing practices and calls for initiatives to safeguard and promote ethnobotanical knowledge for future generations.

**Keywords:** Ethnobotanical knowledge, Traditional healing practices, Traditional healers, Herbal medicine, Age dynamics, Gender dynamics.

### **INTRODUCTION**

Medicinal plants have been integral to human life for alleviating suffering since the dawn of civilization [1]. It is estimated that over

80,000 plant species have been identified and utilized as medicinal plants worldwide [2]. In Malaysia alone, more than 1,300 plant species have been used traditionally, with knowledge passed down through generations [3]. Indigenous medicinal plants and plant-derived drugs serve as potential sources of

alternative medicine and are extensively employed to treat various health ailments [4]. The use of medicinal plants is fundamental at the primary healthcare level due to their availability, acceptability, compatibility, and affordability. Dependence on these plants varies by country, with about 75-80% of people in developing countries and approximately 25% in developed countries relying on medicinal plants as their first line of treatment [3, 5]. As a result, there is growing encouragement for the indigenous production and processing of these plants across different cultures and religions for the treatment of various diseases.

*Andrographis paniculata* (Burm. f.) Wall. ex Nees (AP), belonging to the Acanthaceae family, is one such significant medicinal plant that is extensively used worldwide. It is traditionally utilized as an herbal medicine in countries such as Bangladesh, China, Hong Kong, India, Pakistan, the Philippines, Malaysia, Indonesia, and Thailand [8, 9]. Ethnobotanical applications of AP include treatments for snake bites, insect bites, diabetes, dysentery, fever, and malaria [3]. In Unani and Ayurvedic medicine, AP is among the most frequently used plants [8]. Recently, commercial extracts of this plant have also been utilized in various countries, although standardization for improved efficacy is still required.

The aerial parts of AP are commonly used, containing compounds such as diterpenoids, diterpene glycosides, lactones, flavonoids, and flavonoid glycosides. Additionally, the

leaves and roots of the plant are employed in traditional remedies for various ailments across Asia and Europe [8]. AP is reported to possess a wide range of pharmacological activities, including anticancer [9], antidiarrheal [10], anti-hepatitis [21], anti-HIV [23], antihyperglycemic [12], anti-inflammatory [12], antimicrobial, antimalarial [13], antioxidant [15], cardiovascular [19], cytotoxic [17], hepatoprotective [11], immunostimulatory [13], and treatments for sexual dysfunctions [18].

Given its extensive use in traditional medicinal systems for various diseases, it is essential to evaluate how native communities have been benefiting from *Andrographis paniculata* (AP). This paper reviews the ethnobotany and usage of this plant by the native communities of Narharpur Block in the Uttar Bastar Kanker District of Chhattisgarh. In Chhattisgarh, AP has been employed to treat a variety of chronic and infectious disorders, including gastrointestinal and upper respiratory infections, fever, herpes, and sore throats. Locally known as "Kalmegh," and referred to as "bhui neem" due to its resemblance to neem (though it is smaller and has a better taste), it is also called "bhoyling" in the Uttar Bastar region. Kalmegh is an erect, annual herb that is regarded as a wonder drug in tribal medicine.

### Origin and Distribution

*Andrographis paniculata* is native to Taiwan, Mainland China, and India. It is also

widespread across tropical and subtropical regions of Asia, including Southeast Asia, as well as other countries such as Cambodia, the Caribbean islands, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, and Vietnam [11-12]. Additionally, this plant can be found in various phytogeographical and edaphic zones of China, America, the West Indies, and Christmas Island [13].

### Plant Description

Kingdom: Plantae

Subkingdom: Tracheobionta (Vascular plants)

Super division: Spermatophyta (Seed plants)

Division: Angiosperms

Class: Dicotyledonae

Order: Lamiales

Family: Acanthaceae

Genus: *Andrographis*

Species: *A. paniculata*

*Andrographis paniculata* is an annual herbaceous plant that grows to a height of 30-110 cm in wet, shady areas. The stem is abruptly quadrangular, branching, and fragile. The leaves are simple, opposite, lanceolate, and glabrous. They measure 2-12 cm long and 1-3 cm wide, with an acute and whole or slightly undulated edge. Upper leaves are often bractiform and have a short petiole. The plant's inflorescence is patent, terminal and axillary in panicle, 10-30 mm long, with little bracts and short pedicels [10]. The flowers have a 5-partite, small, linear

calyx, a narrow, 6 mm long corolla tube with a bilabiate limb, an oblong upper lip with a yellowish top, a broadly cuneate lower lip with violet markings, and two stamens inserted in the throat and far. The lower lip the flower is broadly cuneate, three-lobed, and white with violet markings. It has two stamens that are inserted in the throat and far exerted. The anther is bearded. Superior ovary, two-celled; style widely exerted. The plant's capsule is erect and linear-oblong, measuring 1-2 cm long and 2-5 mm wide. It is compressed, longitudinally grooved on broad faces, acute at both ends, and sparsely glandular-hairy. Seeds are tiny, subquadrate (1-5) [10].

**Habitat:** *Andrographis paniculata* is commonly cultivated from seeds in its natural habitat, including pine, evergreen, and deciduous forests, as well as roads and villages. In India, this crop is grown during the rainy summer season [18]. This crop can be grown commercially in any soil with a high organic matter content. For one hectare, around 400 g of seed is sufficient. The spacing is maintained at 30×15 cm. No significant insect or disease infestations have been documented. Plants in flowering stage (90-120 days after sowing) are clipped at the base, leaving 10-15cm [11].



**Figure 1. Morphology of the Plant**

**Plant part used:** Generally the entire plant part is used in ethnomedicinal purpose and some time The aerial portions of the plant (leaves and stems) are utilized to extract active phytochemicals, which have medical benefits. In rare cases, roots are employed [12].

## STUDY AREA

An ethnobotanical study was conducted in the Narharpur block, specifically within the Sarona sub-block of the Kanker district in Chhattisgarh. This comprehensive survey covered several settlements, including Saletola, Sarwandi, Dudhawa, Bhimadih, Kapuspoti, Dhanora, and Sarona. These villages are located near the Dudhawa Jalashay, a reservoir situated in western Chhattisgarh. The study area encompasses 300 square kilometers and is geographically positioned at 22 degrees north latitude and 83 degrees east longitude.

The forest range in this region is home to a diverse array of tribal communities, including the Gond, Halba, Teli, Marar, Kewat, Rawat, Panaka, Gadha, Nai, Gadhariya, Lohar, Dhobi, and Kalar tribes. These tribes constitute the majority of the local population. Within the Kanker district, Narharpur is notable for its high tribal population, with 105,915 tribal members out of a total population of 140,506. This demographic makes Narharpur the most tribally dominant block in the subdivision, accounting for 75% of the total tribal population.



**Figure 2. Map of the study area.**

## Material and Methods

The study followed ethical guidelines regarding studies involving indigenous communities. All participants provided informed consent after a clear explanation of

the research's purpose. Confidentiality was strictly upheld, and the findings were shared with the community to foster transparency and mutual benefit.

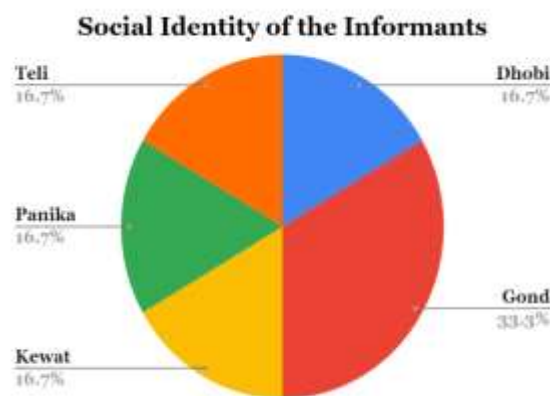
### Data Collection

Semi-structured interviews were conducted to gather ethnobotanical data from the indigenous communities regarding their knowledge and utilization of *Andrographis paniculata*. A purposive sampling technique was employed to select participants who were knowledgeable about traditional medicinal practices and had experience with the use of *A. paniculata* [17]. Prior to the interviews, participants were informed about the research objectives, and their consent was obtained. The interviews were conducted in a conversational style, allowing flexibility for participants to share their experiences and insights freely. Open-ended questions were utilized to explore various aspects of *A. paniculata* use, including traditional remedies, preparation methods, dosage, and perceived effectiveness [19].

### RESULTS AND DISCUSSION

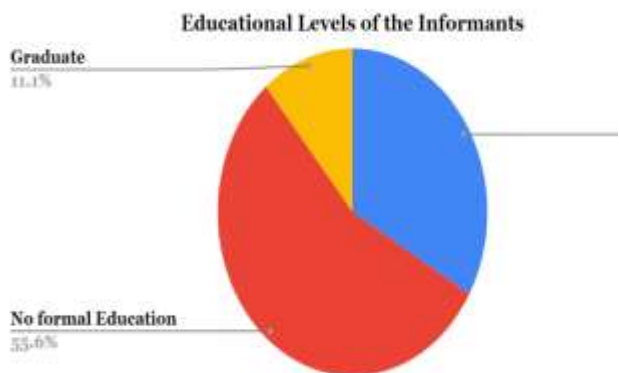
In the ethnobotanical study conducted at Narharpur block of Uttar Bastar Kanker district, the participants consisted of 18 traditional healers, each deeply rooted within their respective communities. The breakdown of these participants revealed a diverse representation across various ethnic groups. Notably, 16.7% of the participants hailed from the Teli community, another 16.7% from the Dhobi community, an equal proportion from the Panika community, and

similarly from the Kewat community. The Gond community, known for its rich indigenous knowledge, comprised the largest portion, with 33.3% of the participants belonging to this community. These traditional healers, belonging to different ethnic backgrounds, collectively brought forth a wealth of traditional botanical knowledge, enriching the study with their unique perspectives and practices.



**Figure 3. Social identity of the informants.**

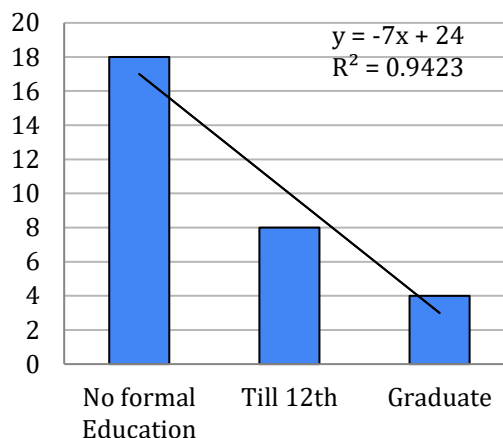
The educational background of the participants revealed intriguing insights into the relationship between formal education and traditional botanical knowledge. Among the 18 participants, a mere 11.1% had attained a graduation degree, while 33.3% had completed high school. Remarkably, the majority, constituting 55.5% of the participants, had no formal education.



**Figure 4. Educational levels of the informants.**

The correlation between educational attainment and botanical knowledge became apparent when examining the findings in conjunction with the participants' backgrounds. Despite the higher educational qualifications of some participants, it was observed that those without any formal education possessed a more profound and comprehensive understanding of traditional botanical practices. This suggests that within the context of traditional healing and ethnobotanical knowledge, formal education might not necessarily correlate with a deeper understanding of indigenous plant uses and remedies.

**Relative Knowledge (Citation) of Informants vs Education Levels of Informants the Study Area**

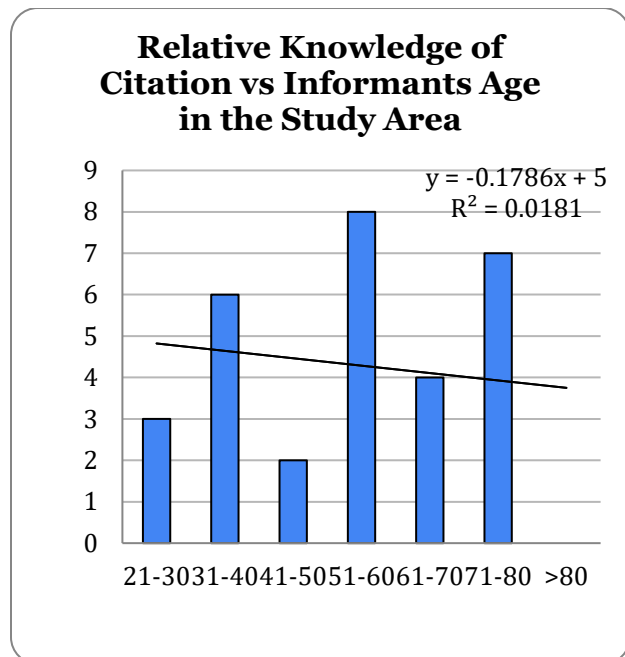


**Figure 5. Relative Knowledge of Informants vs Education levels of informants the study area.**

These findings underscore the significance of respecting and valuing traditional knowledge systems, which are often passed down through generations within communities. It highlights the importance of recognizing and preserving the wisdom held by individuals who have been immersed in their cultural practices and traditions, irrespective of their formal educational background.

Examining the observation pertaining to the ethnobotanical study's participants, a fascinating trend emerges regarding the distribution of relative knowledge across different age groups. Among the 18 individuals involved in the study, it becomes evident that those within the 51-60 age bracket exhibit a notably higher level of relative knowledge compared to others. Conversely, participants falling within the 41-50 age range demonstrate relatively lower

levels of knowledge compared to the rest of the group.



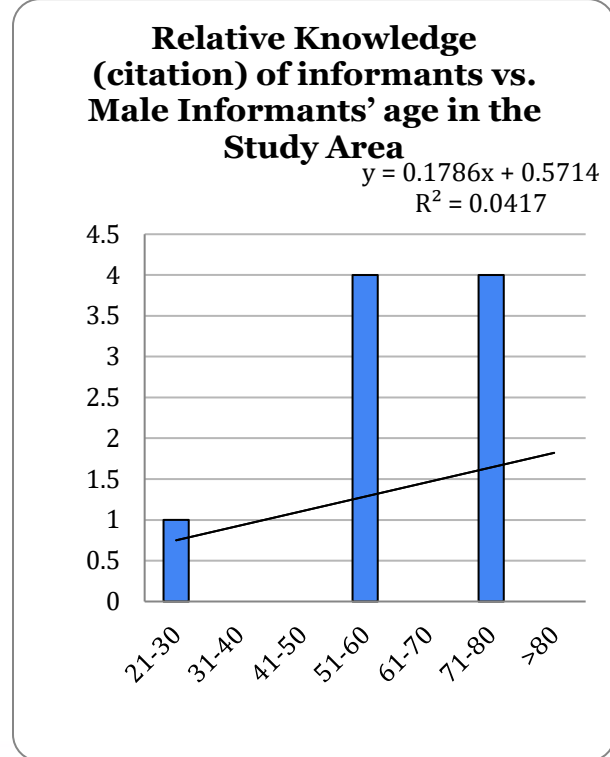
**Figure. 6: Relative Knowledge of citation vs Informants Age in the Study Area.**

This observation sheds light on the potential influence of age on the depth and breadth of traditional botanical knowledge among the participants. It suggests that individuals in the 51-60 age group have likely accumulated a wealth of experience and wisdom over the years, honing their understanding of ethnobotanical practices through lifelong immersion in their cultural traditions. On the other hand, those in the 41-50 age category may still be in the process of acquiring and refining their knowledge, resulting in comparatively lower levels of relative expertise. This disparity underscores the importance of considering age as a significant factor in assessing traditional knowledge systems. It emphasizes the need to recognize and value the expertise of older generations who serve as custodians of invaluable indigenous knowledge, while also

acknowledging the ongoing transmission and evolution of traditional practices among younger individuals. The preeminence of older respondents in providing reliable information in ethnobotanical studies is often attributed to their custodianship of ancestral knowledge deeply ingrained in oral traditions. Their advanced age signifies a lifetime of immersion in the cultural fabric, making them repositories of invaluable traditional wisdom passed down through generations. This reservoir of knowledge encompasses the intricate uses of medicinal plants, embodying centuries of accumulated wisdom and experience. However, a concerning trend emerges as modernization and external cultural influences seep into traditional communities. Among younger generations, there appears to be a growing skepticism towards herbal medicine, possibly influenced by the allure of modern healthcare practices and the pervasive influence of exotic cultures. This erosion of trust in traditional remedies among the youth contributes to a loss of vital information on medicinal plants, jeopardizing the continuity of traditional medical knowledge. The intergenerational transmission of traditional knowledge, vital for its preservation, faces significant challenges in contemporary society. While older individuals possess invaluable expertise, ensuring its effective transmission to younger generations is not always guaranteed. This breakdown in knowledge transfer poses a grave threat to the survival of traditional medical knowledge, risking the loss of centuries-old practices and remedies that have sustained communities for generations. Addressing this challenge necessitates concerted efforts to bridge the gap between generations, fostering mutual understanding and appreciation for traditional knowledge systems. Initiatives aimed at revitalizing interest in ethnobotanical practices among younger

individuals and facilitating meaningful intergenerational dialogue are imperative to safeguarding this invaluable heritage for future generations. The disparity in relative knowledge among participants across different age and gender groups, as depicted in the third and fourth graphs, reveals intriguing insights into the dynamics of traditional medicinal knowledge within the studied community.

In the male cohort, a notable trend emerges wherein individuals aged 51-60 and 71-80 demonstrate higher levels of relative knowledge compared to others. This phenomenon is particularly pronounced in these age groups, where the presence of more males coincides with elevated levels of expertise. Conversely, younger males, particularly those aged 20-30, exhibit lower levels of relative knowledge, suggesting a potential generational gap in traditional botanical understanding.

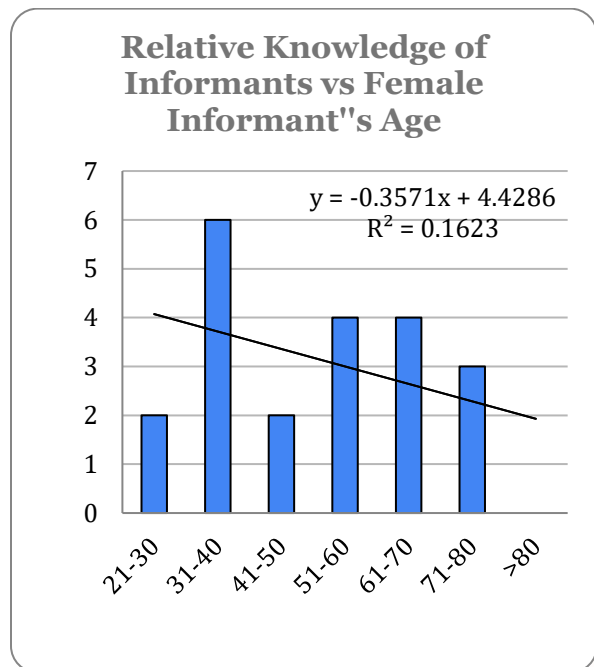


**Figure. 7. Relative Knowledge (citation) of informants vs. Male Informants age in the study Area.**

On the other hand, the female participants, particularly those in the 31-40 age group, display a significant dominance in relative knowledge compared to other age brackets. This trend is particularly noteworthy, indicating that women within this age range possess a deeper understanding of traditional medicinal practices. However, females in the 20-30 and 41-50 age groups exhibit lower levels of relative knowledge, indicating a similar generational gap as observed among males. The prevalence of females, especially in certain age groups, can be attributed to their traditional roles as caretakers within the community. Women often bear the responsibility of maintaining family health and well-being, relying on traditional remedies and practices passed down through generations. Their vigilance towards disease



management and strong attachment to traditional customs contribute to their heightened relative knowledge in certain age brackets.



**Figure. 8 Relative Knowledge of Informants vs Female Informant's Age.**

Overall, these findings underscore the pivotal role of gender and age dynamics in shaping traditional medicinal knowledge within the community. Efforts to preserve and transmit this knowledge must take into account these nuanced factors, ensuring the continued vitality of traditional healing practices for future generations. The utilization of herbal medicine among respondents can be largely attributed to several key factors, with the high cost and adverse effects associated with modern medical treatments prominently among them. Firstly, the financial burden imposed by modern medical treatments acts as a significant deterrent for many individuals, particularly those from economically disadvantaged backgrounds. Herbal remedies often offer a more

affordable alternative, making them accessible to a broader segment of the population who may struggle to afford expensive pharmaceutical drugs or medical procedures. Moreover, the prevalence of adverse side effects linked to modern medical treatments has fostered a growing apprehension and skepticism among individuals towards conventional healthcare practices. Herbal medicine, with its emphasis on natural and holistic approaches, is perceived as a safer and gentler alternative, devoid of the harmful side effects commonly associated with pharmaceutical drugs.

Additionally, the increasing awareness and preference for natural and sustainable healthcare options have fueled the popularity of herbal medicine. Many individuals are drawn to the idea of utilizing plant-based remedies that harness the healing properties of nature, viewing them as a more harmonious and environmentally friendly approach to healthcare. Overall, the decision to use herbal medicine is often driven by a combination of factors, including the desire for affordability, concerns about the adverse effects of modern medical treatments, and a growing preference for natural and sustainable healthcare alternatives. By addressing these underlying motivations, herbal medicine continues to emerge as a viable and appealing option for individuals seeking safe, effective, and holistic approaches to health and wellness. For all the disorders reported the mode of administration of the formulation was reported to be the same. The entire Kalmegh plant was properly dried in the sun, then soaked overnight. The soaked water was consumed in the morning on an empty stomach, and nothing was eaten for an hour afterward. The preference for using leaves in the herbal remedies among the respondents is influenced by several compelling factors. Primarily, leaves are

often the most accessible and abundant part of the plant, making them easy to obtain throughout various seasons. Their widespread availability simplifies the process of harvesting, allowing traditional healers to gather them with minimal effort and resources. Furthermore, the simplicity involved in preparing remedies from leaves contributes to their preference. Leaves can be easily processed into various forms such as teas, poultices, or extracts, which are straightforward to prepare and administer. This ease of preparation aligns well with the practical and immediate needs of traditional healing practices. Beyond their practical advantages, leaves hold significant biological importance. They are the primary site of photosynthesis in plants, a process crucial for the conversion of sunlight into energy. This central role in the plant's metabolic processes often correlates with the presence of high concentrations of secondary metabolites. These compounds, which include alkaloids, flavonoids, and terpenoids, are responsible for the plant's therapeutic properties. The secondary metabolites stored in leaves contribute to their medicinal efficacy, offering a range of biological activities such as anti-inflammatory, antimicrobial, and antioxidant effects. This biochemical richness enhances the effectiveness of leaf-based remedies, providing a potent means of addressing various health conditions.

## Conclusion

The utilization of herbal medicine among respondents can be largely attributed to several key factors, with the high cost and adverse effects associated with modern medical treatments prominently among them. Firstly, the financial burden imposed by modern medical treatments acts as a significant deterrent for many individuals,

particularly those from economically disadvantaged backgrounds. Herbal remedies often offer a more affordable alternative, making them accessible to a broader segment of the population who may struggle to afford expensive pharmaceutical drugs or medical procedures. Moreover, the prevalence of adverse side effects linked to modern medical treatments has fostered a growing apprehension and skepticism among individuals towards conventional healthcare practices. Herbal medicine, with its emphasis on natural and holistic approaches, is perceived as a safer and gentler alternative, devoid of the harmful side effects commonly associated with pharmaceutical drugs. The tribal communities in the Narharpur block of Uttar Bastar Kanker district face considerable socioeconomic challenges that adversely affect their quality of life. These communities are often subjected to low wages and harsh living conditions, which are further exacerbated by their tenuous employment circumstances. A significant portion of these individuals work as landless laborers, performing strenuous tasks without the security afforded by land ownership. Additionally, many engage in small-scale and subsistence farming, serve as farm laborers, or work as woodcutters, all of which yield minimal financial returns.

The economic instability of these communities is further compounded by their lack of productive assets or ownership of assets with very low productivity. Their limited access to relevant vocational skills further constrains their ability to secure more remunerative employment opportunities. Consequently, many individuals within these tribal communities do not have regular, full-time occupations, resulting in extremely low income levels and perpetuating a cycle of poverty. Despite these socioeconomic adversities, the Narharpur block presents an

ideal context for an ethnobotanical study, owing to the diverse tribal communities and their extensive traditional knowledge. The region's vast forest range is home to a rich variety of plant species, many of which play a crucial role in the traditional healthcare practices of the local communities. The varied settlements within Narharpur and the significant reliance on medicinal plants provide a unique and valuable opportunity to explore and document traditional plant utilization and healthcare practices.

This context underscores the resilience of the tribal communities, who continue to preserve and rely on their ancestral knowledge of medicinal plants despite economic hardships. Conducting an ethnobotanical study in this region not only offers insights into the traditional use of plants but also emphasizes the importance of preserving this invaluable knowledge for future generations. Such research has the potential to enhance the visibility and appreciation of traditional practices, thereby contributing to the improvement of socioeconomic conditions for these communities. Additionally, the increasing awareness and preference for natural and sustainable healthcare options have fueled the popularity of herbal medicine. Many individuals are drawn to the idea of utilizing plant-based remedies that harness the healing properties of nature, viewing them as a more harmonious and environmentally friendly approach to healthcare. Overall, the decision to use herbal medicine is often driven by a combination of factors, including the desire for affordability, concerns about the adverse effects of modern medical treatments, and a growing preference for natural and sustainable healthcare alternatives. By addressing these underlying motivations, herbal medicine continues to emerge as a viable and appealing option for

individuals seeking safe, effective, and holistic approaches to health and wellness.

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