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Research paper

Prevalence, Associated Factors and Ethnomedicinal Plant Use for Hair Fall Management among Adults

A Community-Based Survey

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ABSTRACT

Hair loss is a common concern affecting individuals across different age groups and may arise from a combination of genetic, physiological, nutritional, lifestyle, environmental, and psychological factors. Medicinal plants have traditionally been used for hair and scalp care in various Indian systems of medicine, although scientific evidence supporting their effectiveness remains variable. The present study aimed to assess the prevalence and characteristics of hair fall, identify commonly reported demographic, medical, dietary, lifestyle, hair-care, and environmental factors, and document the use of ethnomedicinal plants for hair-fall management among 200 participants in Chhatarpur District, Madhya Pradesh, India. A community-based descriptive survey was conducted using a structured questionnaire. Information was collected on demographic characteristics, duration and pattern of hair loss, family history, selected medical conditions, dietary and lifestyle practices, hair-care habits, environmental exposures, and the use of medicinal plants. Descriptive statistics were used to summarize the findings as frequencies and percentages. Among the 200 participants, 172 (86.0%) reported hair fall, with 39.5% of affected participants reporting symptoms for more than one year. Diffuse hair loss was the most frequently reported pattern (51.2%). A positive family history was reported by 58.0% of participants, while frequent or persistent stress was reported by 56.0%. Environmental exposure was also common, with 68.0% reporting exposure to pollution and 54.5% reporting the use of hard water. Medicinal plants were used by 64.5% of participants for hair-fall management. Among plant users, 71.3% perceived improvement following their use. Commonly reported plants included *Aloe vera*, *Hibiscus rosa-sinensis*, *Eclipta prostrata*, *Azadirachta indica*, *Phyllanthus emblica*, *Trigonella foenum-graecum*, and *Murraya koenigii*. The findings indicate a high self-reported burden of hair fall and substantial community use of ethnomedicinal plants in Chhatarpur District, highlighting the need for further standardized phytochemical, pharmacological, and clinical investigations to evaluate their safety and therapeutic potential.

1. Introduction

Hair loss, clinically described as alopecia, is a common dermatological condition affecting individuals across different age groups and can have considerable psychological and social consequences. It may present as diffuse thinning, patterned hair loss, patchy alopecia, or excessive hair shedding, depending on its underlying cause. Hereditary predisposition is an important determinant of hair loss, while nutritional status, hormonal disturbances, systemic diseases, medications, stress, and lifestyle practices may also influence hair growth and follicular function (Gokce et

al., 2022). The multifactorial nature of hair loss makes its assessment complex, particularly in community settings where several potential risk factors may occur simultaneously.

Genetic predisposition is strongly associated with common forms of hair loss, particularly androgenetic alopecia. However, environmental and behavioural factors may contribute to increased hair shedding or deterioration of hair and scalp health. Nutritional deficiencies involving iron, zinc, vitamins, and other micronutrients have been investigated in relation to hair disorders, although the strength of evidence varies according to the specific nutrient and clinical condition (Gokce et al., 2022). Hormonal and metabolic disorders, including thyroid abnormalities and polycystic ovary syndrome, may also be associated with hair loss. In addition, psychological stress, inadequate sleep, smoking, alcohol consumption, and inappropriate hair-care practices may influence hair quality and growth. Recent reviews emphasize that hair loss frequently results from interactions among genetic, physiological, nutritional, behavioural, and environmental factors rather than from a single cause (Allam et al., 2025).

In India, traditional systems of medicine have a long history of using medicinal plants for maintaining hair health and managing hair fall, premature greying, dandruff, and scalp disorders. Ethnomedicinal knowledge has resulted in the use of plant-based oils, pastes, extracts, and polyherbal preparations for hair and scalp care. Several medicinal plants contain bioactive constituents with antioxidant, anti-inflammatory, antimicrobial, and follicle-supporting properties, providing a scientific basis for some traditional applications (Bansal et al., 2019; Allam et al., 2025). *Eclipta prostrata* (L.) L., commonly known as Bhringraj, is particularly important in traditional medicine and has been used for hair loss and related conditions.

Phytochemical investigations have identified coumestans, flavonoids, triterpenes, steroids, and other compounds in *E. prostrata*, while experimental studies have reported potential hair-growth-promoting and anti-inflammatory activities (Feng et al., 2019). Similarly, *Phyllanthus emblica* L. (Amla), *Aloe vera*, *Hibiscus rosa-sinensis* L., *Azadirachta indica* A.Juss., *Trigonella foenum-graecum* L., and *Murraya koenigii* (L.) Spreng. are traditionally used in different communities for hair and scalp care.

Chhatarpur District of Madhya Pradesh provides an important geographical and ethnobotanical context for studying traditional plant-based healthcare practices. The district has a diverse flora and a documented tradition of medicinal-plant use among local and tribal communities. Earlier ethnobotanical investigations have recorded numerous medicinal plants used by communities including Gond, Bhil, and Bediya for the management of various health conditions, demonstrating the continuing importance of traditional plant knowledge in the region (Arjariya & Chaurasia, 2009). However, despite this established ethnobotanical background, information specifically concerning community perceptions of hair loss, associated risk factors, hair-care practices, and the use of medicinal plants for hair-fall management remains limited in the district. This gap provides a rationale for the present investigation.

Growing scientific interest has focused on evaluating the pharmacological potential of plant-derived preparations for hair-loss management. Recent evidence suggests that some herbal interventions may improve hair density, reduce shedding, or support hair growth through antioxidant, anti-inflammatory, hormonal, and follicular mechanisms. However, clinical evidence remains heterogeneous because studies differ in plant species, extraction methods, formulations, dosage, treatment duration, outcome measures, and methodological quality (Allam et al., 2025). Therefore, traditional use should not be interpreted as evidence of clinical efficacy without appropriate pharmacological and clinical validation.

Despite increasing interest in herbal approaches, community-level information regarding the prevalence, characteristics, associated factors, and actual use of ethnomedicinal plants for hair-fall management remains limited. Understanding local perceptions and practices can help identify commonly used medicinal plants and provide a basis for further ethnobotanical, phytochemical, pharmacological, and clinical investigations. Therefore, the present study was undertaken in Chhatarpur District, Madhya Pradesh, to assess the prevalence and characteristics of hair fall among 200 participants and to document associated demographic, medical, dietary, lifestyle, hair-care, and environmental factors.

The study also aimed to document the use of commonly reported ethnomedicinal plants for hair-fall management and the perceived outcomes of their use.

2. Materials and Methods

2.1 Study Design

A community-based descriptive cross-sectional survey was conducted among 200 participants in Chhatarpur District, Madhya Pradesh, India**,** to assess the characteristics of hair fall, potentially associated demographic, medical, dietary, lifestyle, hair-care, and environmental factors, and the use of ethnomedicinal plants for hair-fall management.

2.2 Study Population and Sample Size

A total of 200 participants were included in the study. Participants were selected from the defined study population using the sampling procedure adopted for the survey. Information was collected through a structured questionnaire covering demographic characteristics, hair-fall history, family history, medical conditions, dietary and lifestyle characteristics, hair-care practices, environmental exposure and use of medicinal plants.

2.3 Data Collection

A structured questionnaire was used to obtain information from participants. The questionnaire included questions concerning:

1. demographic characteristics;
2. presence and duration of hair fall;
3. approximate daily hair loss;
4. reported pattern of hair loss;
5. seasonal variation;
6. family history;
7. selected medical conditions;
8. long-term medication use;
9. dietary practices;
10. water consumption;
11. sleep and psychological stress;
12. physical exercise;
13. smoking and alcohol consumption;
14. hair-washing practices;
15. hair colouring and heat styling;
16. oil-massage practices;
17. environmental pollution exposure;
18. water hardness; and
19. use of ethnomedicinal plants for hair-fall management.

2.4 Ethnomedicinal Plant Documentation

Participants were asked whether they used medicinal plants for managing hair fall. Participants who reported medicinal-plant use were further asked about the plants used and their perceived outcomes. The commonly reported plants included *Aloe vera*, *Hibiscus rosa-sinensis*, *Eclipta prostrata*, *Azadirachta indica*, *Phyllanthus emblica*, *Trigonella foenum-graecum* and *Murraya koenigii*.

2.5 Statistical Analysis

The collected data were summarized using descriptive statistics. Frequencies and percentages were calculated for categorical variables. For variables concerning duration, daily hair loss and hair-loss pattern, percentages were calculated using the number of participants reporting hair fall (n = 172) as the denominator. For perceived outcomes of medicinal-plant use, percentages were calculated among medicinal-plant users (n = 129).

3. Results

3.1 Demographic Characteristics

The study included 200 participants, of whom 112 (56.0%) were females and 88 (44.0%) were males. The largest proportion belonged to the 21–40 years age group (116; 58.0%), followed by 41–60 years (55; 27.5%). Nineteen participants (9.5%) were below 20 years, whereas 10 (5.0%) were above 60 years.

3.2 Hair-Fall Profile

Hair fall was reported by 172 participants (86.0%), while 28 (14.0%) did not report significant hair fall. Among the 172 participants reporting hair fall, 68 (39.5%) had experienced the condition for more than one year. Forty-five participants (26.2%) reported hair fall for 6–12 months, 33 (19.2%) for 3–6 months and 26 (15.1%) for less than three months.

Regarding approximate daily hair loss, 77 participants (44.8%) reported losing 50–100 hairs per day. Thirty-four (19.8%) reported fewer than 50 hairs/day, 30 (17.4%) reported 100–150 hairs/day and 31 (18.0%) reported more than 150 hairs/day.

Diffuse hair loss was the most frequently reported pattern (88; 51.2%), followed by hairline recession (37; 21.5%), hair breakage (29; 16.9%) and patchy alopecia (18; 10.4%). Seasonal hair fall was reported by 122 participants (61.0%).

Table 1 Hair Fall Characteristics (n = 200)

Variable	Frequency	Percentage (%)
Hair fall present	172	86.0
Hair fall absent	28	14.0
<3 months	26	15.1
3–6 months	33	19.2
6–12 months	45	26.2
>1 year	68	39.5
<50 hairs/day	34	19.8
50–100 hairs/day	77	44.8
100–150 hairs/day	30	17.4
>150 hairs/day	31	18.0
Diffuse hair loss	88	51.2
Hairline recession	37	21.5
Hair breakage	29	16.9
Patchy alopecia	18	10.4
Seasonal hair fall	122	61.0

3.3 Family History and Medical Conditions

A positive family history of hair fall was reported by 116 participants (58.0%), whereas 84 (42.0%) reported no family history. Thyroid disorders were reported by 26 participants (13.0%), anaemia by 24 (12.0%), diabetes by 18 (9.0%) and PCOS by 18 (9.0%). Autoimmune disease was reported by 6 participants (3.0%). Long-term medication use was reported by 44 participants (22.0%).

Table 2 Family History and Medical Conditions

Variable	Frequency	Percentage (%)
Positive family history	116	58.0
No family history	84	42.0
Thyroid disorder	26	13.0
Anaemia	24	12.0
Diabetes	18	9.0
PCOS	18	9.0
Autoimmune disease	6	3.0
Long-term medication	44	22.0

3.4 Dietary and Lifestyle Characteristics

A mixed diet was reported by 128 participants (64.0%), while 58 (29.0%) followed a vegetarian diet and 14 (7.0%) reported a non-vegetarian diet. Daily consumption of green leafy vegetables was reported by 72 participants (36.0%). Ninety-eight participants (49.0%) consumed approximately 1–2 L of water per day. Sleep duration of less than six hours was reported by 78 (39.0%). Frequent or constant psychological stress was reported by 112 participants (56.0%). Regular physical exercise was reported by 70 participants (35.0%). Smoking and regular alcohol consumption were reported by 36 (18.0%) and 24 (12.0%), respectively.

Table 3 Dietary and Lifestyle Factors

Variable	Frequency	Percentage (%)
Vegetarian diet	58	29.0
Non-vegetarian diet	14	7.0
Mixed diet	128	64.0
Daily vegetables	72	36.0
Water intake 1–2 L/day	98	49.0
Sleep <6 h/day	78	39.0
Frequent/constant stress	112	56.0
Regular exercise	70	35.0
Smoking	36	18.0
Regular alcohol consumption	24	12.0

3.5 Hair-Care Practices

Twice-weekly hair washing was the most frequently reported practice (86; 43.0%), followed by alternate-day washing (64; 32.0%), weekly washing (32; 16.0%) and daily washing (18; 9.0%). Hair dye use and/or heat styling was reported by 80 participants (40.0%). Regular oil massage was reported by 94 participants (47.0%), while 70 (35.0%) used oil occasionally and 36 (18.0%) reported never using hair oil.

Table 4 Hair-Care Practices

Variable	Frequency	Percentage (%)
Daily hair washing	18	9.0
Alternate-day washing	64	32.0
Twice-weekly washing	86	43.0
Weekly washing	32	16.0
Hair dye/heat styling	80	40.0
Regular oil massage	94	47.0
Occasional oil massage	70	35.0
Never used hair oil	36	18.0

3.6 Environmental Exposure

Exposure to environmental pollution was reported by 136 participants (68.0%). Hard-water exposure was reported by 109 (54.5%), whereas 53 (26.5%) reported soft water. Thirty-eight participants (19.0%) were uncertain regarding the hardness of the water.

Table 5 Environmental Exposure

Variable	Frequency	Percentage (%)
Pollution exposure	136	68.0
Hard water	109	54.5
Soft water	53	26.5
Don't know	38	19.0

3.7 Ethnomedicinal Plant Use

Medicinal plants were used for hair-fall management by 129 participants (64.5%), while 71 (35.5%) did not use medicinal plants. The most frequently reported medicinal plants were *Aloe vera*, *Hibiscus rosa-sinensis*, *Eclipta prostrata*, *Azadirachta indica*, *Phyllanthus emblica*, *Trigonella foenum-graecum* and *Murraya koenigii*. Among the 129 medicinal-plant users, 92 (71.3%) perceived improvement in hair growth or reduction in hair fall. Twenty-four participants (18.6%) reported no improvement, while 13 (10.1%) were uncertain.

Table 6 Use of Ethnomedicinal Plants

Variable	Frequency	Percentage (%)
Used medicinal plants	129	64.5
Did not use medicinal plants	71	35.5
Reported improvement*	92	71.3
No improvement*	24	18.6
Not sure*	13	10.1

4. Discussion

The present study provides a descriptive overview of hair fall and ethnomedicinal practices among 200 participants. Hair fall was reported by 86.0% of participants, indicating that it was a commonly reported concern in the surveyed population. However, this figure should not be considered the

clinical prevalence of alopecia because the study relied on self-reported information and did not use a clinically diagnosed population as the denominator.

Females constituted 56.0% of participants, while males accounted for 44.0%, with the 21–40-year age group predominating. A positive family history was reported by 58.0% of participants. Although genetic predisposition is relevant to several forms of hair loss, particularly androgenetic alopecia, the present descriptive data cannot establish a statistical association.

Persistent hair fall was frequently reported, with nearly two-fifths of affected participants experiencing the condition for more than one year. Diffuse hair loss was the predominant pattern. Thyroid disorders and anaemia were among the commonly reported medical conditions, while psychological stress and inadequate sleep were also frequent. These factors may influence hair-growth cycles; however, their causal or statistical relationships with hair fall could not be established in the present study.

Environmental and lifestyle factors were also commonly reported. Pollution exposure was reported by 68.0% of participants and hard-water exposure by 54.5%. Regular oil massage, hair dyeing and heat-styling were common hair-care practices. Such exposures may influence scalp or hair-shaft health, although self-reported data cannot establish causality, and hair-shaft breakage should be distinguished from follicular hair loss.

A major finding was the substantial use of ethnomedicinal plants for hair-fall management, with 64.5% of participants reporting their use. Commonly reported species included *Aloe vera*, *Hibiscus rosa-sinensis*, *Eclipta prostrata*, *Azadirachta indica*, *Phyllanthus emblica*, *Trigonella foenum-graecum* and *Murraya koenigii*. These findings are consistent with Indian ethnobotanical literature documenting the traditional use of several of these plants for hair fall, dandruff and related hair-care conditions.

Among medicinal-plant users, 71.3% perceived improvement. This indicates considerable community confidence in ethnomedicinal approaches, but perceived improvement cannot be regarded as evidence of clinical efficacy. The study did not include standardized hair-density measurements, trichoscopy, photographic assessment or a control group. Nevertheless, the reported plants represent promising candidates for future phytochemical, pharmacological and clinical studies.

Seasonal hair fall was reported by 61.0% of participants. The climatic data showed high temperatures during April–May and concentrated rainfall during July–September. Although this seasonal pattern is noteworthy, the present cross-sectional data cannot establish a relationship between climatic variables and hair loss. Longitudinal studies with objective clinical assessments are required to clarify these associations.

5. Conclusion

The present survey documented a high frequency of self-reported hair fall among the 200 participants. Hair fall was reported by 86.0% of participants, with diffuse hair loss being the predominant reported pattern. Persistent hair fall of more than one year was common among affected participants. Positive family history, medical conditions, psychological stress, inadequate sleep, hair-care practices and environmental exposures were frequently reported within the study population.

Ethnomedicinal plant use was also widespread, with 64.5% of participants reporting the use of medicinal plants for hair-fall management. *Aloe vera*, *Hibiscus rosa-sinensis*, *Eclipta prostrata*, *Azadirachta indica*, *Phyllanthus emblica*, *Trigonella foenum-graecum* and *Murraya koenigii* were among the commonly reported plants. Although 71.3% of medicinal-plant users perceived improvement, this finding represents community perception rather than clinically demonstrated efficacy.

The study highlights the continued importance of ethnomedicinal knowledge in hair-care practices and provides a basis for further investigation of commonly used medicinal plants. Future research integrating ethnobotanical documentation, phytochemical characterization, pharmacological testing and controlled clinical evaluation may help determine the therapeutic potential of these plants in hair-loss management.

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