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Assessment of Ethno-Cosmetic Practices by Local People of Pir Baba Valley, District Buner, Khyber Pakhtunkhwa, Pakistan

Kalsoom Bibi
MS (Botany Schoolar) Department of Chemical and Life Sciences, Qurtuba University of Science and Information Technology, D.I Khan/Peshawar Khyber Pakhtunkhwa, Pakistan.
Email: kalsomkhan440@gmail.com.

Dr. Zubia Rahim*
Lecturer, Department of Chemical and Life Sciences Qurtuba University of Science and Information Technology, Peshawar Khyber Pakhtunkhwa, Pakistan
Email: hayakhattak7@gmail.com.

ABSTRACT

Plants are a primary source of sustenance in developing nations, with rural populations relying on them for various purposes, including traditional medicine, cosmetics, construction materials, timber, fuel, and food. An ethno-cosmetic study was conducted in the Pir Baba District of Buner, Khyber Pakhtunkhwa, Pakistan during 2023–2024 to document the traditional uses of plants by the local community. The research identified 42 plant species belonging to 26 different families. Herbs accounted for the majority (67.04%) followed by shrubs (21.42%) and trees (9.52%). The most dominant family was Asteraceae, contributing four species (9.52%), followed by Amaranthaceae, Apocynaceae, and Lamiaceae, each with three species (7.14%). Other families including Liliaceae, Brassicaceae, Mimosaceae, Moraceae, Polygonaceae, Poaceae, and Solanaceae, contributed two species each (4.76%) while the remaining 15 families contributed one species each (2.38%). The study revealed that the entire plant is often used for both medicinal and ethno-cosmetic purposes. The highest Use Value (UV) was recorded for Mentha spicata, while the lowest UV was noted for Pinus roxburghii. Additionally Triticum aestivum had the highest Frequency Citation (FC) (19.00) and Relative Frequency Citation (RFC) (0.95). A Pearson correlation coefficient of 0.611 indicated a strong positive relationship between RFC and UV. The findings highlight the significant role of plants in ethno-cosmetic applications. Further research is needed to explore additional species and analyze their phytochemical constituents, which could contribute to the development of new cosmetic formulations.

Keywords: Ethno Cosmetics, Ethnobotany, Botanical Name, Pir Baba Valley, Buner, Use Value, Medicinal Plants, Beautification.

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INTRODUCTRION

Study Area

District Buner is located between 34°11′–34°43′ N latitude and 72°13′–72°45′ E longitude in Khyber Pakhtunkhwa, Pakistan. Prior to 1991, the district was administratively part of Swat. Currently, Buner comprises six tehsils: Salarzai, Daggar, Mandanr, Khudu Khel, Chagharzai, and Gagra. It is bounded by District Swat to the north, Mardan Division to the south, Malakand Division to the west, and Hazara Division to the east (Figure 1). The total area of the district is approximately 1,865 km² (Sher et al., 2011). Topographically, the district can be divided into two major zones: southern plains with gently elevated terrain and northern hilly regions characterized by steep slopes and a local relief exceeding 300 m (Sulaiman et al., 2020).



Figure 1: Map of the study area

Ethnocosmetics is a specialized branch of ethnobiology that investigates traditional plant-based practices related to beauty, skincare, and personal care. It documents indigenous knowledge where local communities utilize botanical resources for cosmetic purposes using culturally inherited practices. With the increasing global demand for natural, organic, and sustainable products, ethnocosmetics has gained considerable scientific importance, not only for preserving traditional knowledge but also for promoting biodiversity conservation and sustainable resource utilization (Zaman et al., 2018). Plants used in ethnocosmetics are known to contain diverse bioactive compounds with dermatological benefits, including antioxidants, antimicrobials, and anti-inflammatory agents. In developing regions, traditional skincare practices remain vital due to limited access to modern healthcare facilities. Approximately 80% of the population in developing countries relies on plant-based remedies for primary healthcare, including skincare applications (Shaheen et al., 2023). Documentation of such knowledge has contributed significantly to the

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development of modern herbal cosmetic products, with nearly 25% of skincare formulations being derived directly or indirectly from plant sources (Haq et al., 2023). Ethnocosmetics is closely linked to ethnobotany, which examines human–plant interactions and their ecological, cultural, and economic significance. Ethnobotanical research plays a crucial role in conserving indigenous knowledge and identifying plant species with medicinal and cosmetic potential. Globally, more than 5,000 angiosperm species are used for medicinal purposes, reflecting the continued reliance on plant-based healthcare systems despite advances in synthetic pharmaceuticals (Hughes et al., 2019). According to the World Health Organization, approximately 60% of the global population depends on traditional medicine, with reliance increasing to about 80% in developing countries (WHO, 2001).

Medicinal plants also form the backbone of the pharmaceutical and cosmetic industries. In Pakistan, extensive ethnobotanical studies have highlighted the richness of medicinal flora and traditional healthcare practices, emphasizing the need for systematic documentation and conservation (Singh et al., 2015). Despite this progress, ethnocosmetic data from many regions, including Pir Baba Valley, remain scarce. Therefore, the present study aims to document and quantitatively analyze the ethnocosmetic applications of indigenous plant species used by local communities in Pir Baba Valley, District Buner, Khyber Pakhtunkhwa, Pakistan. By applying various quantitative ethnobotanical indices, this research seeks to preserve traditional knowledge, identify plant species with high cosmetic significance, and promote the sustainable use of botanical resources for future dermatological and cosmetic applications.

MATERIALS AND METHODS

Survey Site

To collect information about the ethnobotanical plants of research area, regular field trip were conducted in summer seasons. Several different ethnomedical uses were investigated through interviews with various informants. Before starting the research work, general information about the study area was collected. Field surveys included general meetings, interviews with men and women, consultations with local herbalists, and transect walks. Interviews were performed by visiting each place and using the local language, Pashto.

Data Collection

Ethnobotanical information was obtained from knowledgeable local informants, including pansaries, shepherds, hakims, and men and women aged above 40 years, who are considered reliable custodians of traditional knowledge (Zahidullah et al., 2016). Informants belonging to different age groups and occupations were randomly selected. Data were collected through informal interviews and a structured questionnaire method. The survey was conducted from August 2023 to April 2024, covering both summer and winter seasons (2023–2024). Information recorded included local plant names, parts used, preparation methods, routes of administration, dosage, and ethnocosmetic as well as ethnomedical applications. Voucher plant specimens were collected during the summer field surveys for proper identification and preservation.

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Plant Preservation and Identification

Different species of plants were gathered from the study spot. Initially, the plant species were permitted to air dry in a ventilated area before being mounted on paper and compressed using a plant presser. The paper was changed every 24 hours until the plants had dried completely. Plant species that had dried were pasted into herbarium sheets. The Latin scientific names, family names, and publishing authors' names were checked with the Flora of Pakistan (Hussain et al., 2019). The investigated plant samples were compared for further verification with previously identified plant materials kept in the Qurtaba University Herbarium in Peshawar, Pakistan. After accurate identification, the specimens were placed on the herbarium sheet. With respect to their botanical, local, and family names, the plant species were divided into three life forms i.e., trees, shrubs, and herbs.

Quantitative analysis

A quantitative ethnocosmetic survey use quantitative methods to directly analyze data on plant utilization (Hussain et al., 2020).

Use value (UV) analysis:

Use Value (UV) analysis can be applied to ethnocosmetic research to assess the importance of plant species used in traditional beauty and skincare practices. Ethnocosmetics refers to the study of natural plant-based ingredients used in traditional cosmetic applications, such as skin care, hair care, and body care across different cultures. The plant species importance is determined by the use value analysis and can be calculated by using the standard formula.

$$\mathrm{UVi}\,\frac{\sum \mathrm{Ui}}{\mathrm{N}}$$

Here, N is the overall number of informants who reported the species, and U represents the number of uses for which the species was documented (Rehman et al., 2023).

Relative frequency of citation (RFC)

The Relative Frequency of Citation (RFC) is a quantitative ethnobotanical index used to measure the local significance of a plant species based on how frequently it is mentioned by informants. In ethnocosmetic studies, RFC helps identify the most culturally and traditionally valued plant species used in beauty and personal care practices. The RFC used to conclude the local significance of the species and can be calculated as using the below mentioned formula.

$$\mathrm{RFC} = \frac{\mathrm{FC}}{\mathrm{N}} \; (< 0 \; \mathrm{RFC} > 1)$$

Where FC is the number of informant citing the useful species and N is the total number of informants (Rehman et al., 2023).

Pearson correlation coefficient:

The Pearson correlation coefficient (r) is a statistical measure used to determine the strength and direction of the relationship between two continuous variables. In ethnocosmetic studies, this index helps analyze associations between different

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ethnobotanical variables, such as the frequency of plant citations, their use values, and the demographic factors of informants (e.g., age, gender, and region). The formula for the Pearson correlation coefficient is

$$r = \frac{COV(X,Y)}{SD(X) \times SD(Y)} = \frac{E(X - X')(Y - Y')}{SD(X) \times SD(Y)}$$

In this equation, the Pearson correlation is denoted by rrr, while COV represents the covariance. XXX and YYY are the variables whose association is being examined, and SD stands for the standard deviation of these variables (Rehman et al., 2023).

RESULTS

Ethno cosmetic research explores the biological, economic, skin-enhancing, and cultural relationships between local communities and the plants they use. This field aims to enhance our understanding of plant biodiversity by examining both the biological diversity of plants and human knowledge regarding their uses, applications, and conservation. Such research is intended to inform future social and scientific interventions, contributing to a more comprehensive understanding of plant-resource interactions. The goal of the current study was to record the traditional knowledge regarding plants passed from generation to generation of locals of Peer Baba District Buner. The study documented a diverse range of plant species from the selected sites of Pir Baba Valley, District Buner representing 26 different families. Among these, Asteraceae had the highest number of species (4), accounting for 9.52% of the total, followed by Amaranthaceae, Apocynaceae, and Labiateace, each contributing 7.14%. (Table 4.1).

The study also recorded different plant habits, including trees (Acacia modesta, Acacia nilotica, Ailanthus altissima), shrubs (Nerium odorum, Dodonaea viscosa), and herbs (Amaranthus spinosus, Brassica compestris). Various plant parts were utilized, including leaves, stems, flowers, fruits, roots, and whole plants, indicating their diverse applications in medicinal, nutritional, and economic contexts (Table 4.2). The Frequency of Citation (FC) and Relative Frequency of Citation (RFC) values further reinforced the significance of these plants in traditional knowledge and local practices. This comprehensive analysis underscores the importance of conserving and documenting plant species to preserve indigenous knowledge and promote sustainable utilization.

Table 1 Ethnocosmetic Plants Documented in the Study Area

Scientific Name	Local / Common Name	Family	Life Form	Part(s) Used	Major Constituents (Selected)	Ethnobotanical / Ethnocosmetic Uses	Mode of Administration
Acacia modesta	Palosa	Mimosaceae	Tree	Gum	Aldehydes, farnesol, geraniol	Teeth cleaning, antimicrobial	Topical (gum paste), Oral rinse
Acacia	Kikar	Fabaceae	Tre	Gum	Flavonoid	Antimicro	Topical

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nilotica			e	, leaves, bark	s, tannins, alkaloids	bial, skin care	paste, Decoction
Ailanthus altissima	Spina Shandi	Simarubaceae	Tree	Leaf extract	Growth-inhibitory compounds	Wound healing, anti-inflammatory	Topical extract
Allium sativum	Piaz	Alliaceae	Herb	Bulb	Allicin, ajoene, flavonoids	Skin conditioning	Topical application
Alnus nitida	Geiray	Betulaceae	Tree	Bark	Ellagic acid, quercetin, vitamin C	Scabies, skin infections	Topical decoction
Amaranthus caudatus	Ganhar	Amaranthaceae	Herb	Seed oil	Oleic acid, amino acids, vitamins	Anti-aging, skin softening	Topical oil
Amaranthus spinosus	Chalwairary	Amaranthaceae	Herb	Whole plant	Alkaloids, saponins	Anti-inflammatory, antimicrobial	Paste, Topical
Amaranthus viridis	Gunhar	Amaranthaceae	Herb	Whole plant	Rutin, lysine, palmitic acid	Emollient, antioxidant	Topical application
Asparagus officinalis	Taunter	Liliaceae	Herb	Whole plant	Vitamins, flavonoids, tannins	Antibacterial, anti-inflammatory	Paste, Decoction
Asphodelus tenuifolius	Fiazaky	Liliaceae	Herb	Whole plant	Carbohydrates, albuminoids	Skin whitening	Topical paste
Avena sativa	Jamdar	Poaceae	Herb	Whole plant	β-glucan, flavonoids	Skin & hair conditioning	Wash, Topical
Berberis lyceum	Kawary	Berberidaceae	Shrub	Whole	Berberine, alkaloids	Wound healing,	Paste, Decoction

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				plant		antioxidant	
Brassica campestris	Sharsham	Brassicaceae	Herb	Seed oil	Glucosinolates, flavonoids	Anti-dandruff, emollient	Topical oil
Capsicum annuum	Marchakay	Solanaceae	Herb	Fruit	Capsaicin, carotenoids	Natural pigment, skin tonic	Topical formulation
Carallum a edulis	Pamunkay	Apocynaceae	Herb	Stem	Pregnane glycosides	Anti-aging, hair growth	Paste, Topical
Celtis australis	Tagha	Ulmaceae	Tree	Leaves, bark	Ursolic acid, rutin	Acne, eczema	Paste, Decoction
Chenopodium album	Sarmai	Chenopodiaceae	Herb	Leaves	Quercetin, gallic acid	Hair dye	Paste, Wash
Cichorium intybus	Han	Asteraceae	Herb	Leaves, flowers	Lactucin, flavonoids	Skin & hair care	Paste, Wash
Conyza bonariensis	Kharphul	Asteraceae	Herb	Whole plant	Flavonoids, terpenoids	Anti-aging, wound healing	Topical extract
Cynodon dactylon	Kabal	Poaceae	Herb	Whole plant	Phenolics, fatty acids	Skin cleansing, hair care	Wash, Paste
Dalbergia sissoo	Shawa	Fabaceae	Tree	Bark	Dalbergin, chromenes	Cosmetic formulations	Extract, Topical
Debregeasia salicifolia	Ajlai	Urticaceae	Shrub	Whole plant	Flavonoids, carotenoids	Skin decoctions	Decoction
Dodonaea viscosa	Ghurhasky	Sapindaceae	Shrub	Leaves, resin	Fatty acids, resins	Creams, shampoos	Topical
Eruca sativa	Jamama	Brassicaceae	Herb	Whole plant	Glucosinolates, phenolics	Hair fall control	Oil, Paste
Euphorbi	Mandan	Euphorbia	Her	Who	Terpenoid	Skin	Topical

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a heliosco pia	o	ceae	b	le plant	s, flavonoid s	smoothnes s	(external)
Ficus carica	Enzer	Moraceae	Tre e	Gum	Triterpen oids, sterols	Skin infusion	Infusion, Topical
Helianth us annuus	Nwar Paras	Asteraceae	Her b	Seed s	Vitamin E, flavonoid s	Anti-aging	Topical oil
Lotus cornicula tus	—	Papilionac eae	Her b	Who le plant	Phenolics, minerals	Natural dye	Paste, Extract
Luffa cylindric al	Toorai	Cucurbitac eae	Her b	Fruit	Cellulose, lignin	Skin exfoliation	Dry scrub
Malus pumila	Manra	Rosaceae	Tre e	Who le plant	Organic acids, flavonoid s	Serums, creams	Extract, Topical
Malva neglecta	Penerak	Malvaceae	Her b	Leav es	Essential oils	Anti-inflammat ory	Paste, Poultice
Mentha arvensis	Podina	Lamiaceae	Her b	Leav es	Menthol-rich oil	Hair growth	Oil, Wash
Mentha longifoli a	Inalay	Lamiaceae	Her b	Leav es	Piperitone oxide	Toothpast e fragrance	Powder, Extract
Morus laevigata	Shah Toot	Moraceae	Tre e	Leav es	Phenolic acids	UV protection	Extract, Topical
Portulaca oleracea	Warkha rry	Portulacac eae	Her b	Aeri al parts	Allantoin	Anti-acne	Paste, Gel
Nerium oleander	Asli Gandec har	Apocynac eae	Shr ub	Leav es	Oleandrin	Skin ailments	External applicatio n only
Otostegi a limbata	Speen Azghay	Lamiaceae	Shr ub	Who le plant	Essential oils	Wound healing	Paste, Decoction
Rhazya stricta	Gandec har	Apocynac eae	Shr ub	Who le plant	Alkaloids, flavonoid s	Skin diseases	External applicatio n

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Habit of Ethnocosmetic Plant Species

The fig. 2 illustrates the habit-wise distribution of ethnocosmetic plant species recorded from the study area. Herbs were the most dominant life form with **22 species**, followed by **trees (9 species)** and **shrubs (7 species)**. This dominance of herbaceous species indicates their greater availability and frequent utilization in traditional ethnocosmetic practices. The dominance of herbaceous species among the documented ethnocosmetic plants can be attributed to their **wide availability, rapid growth, and ease of collection**. Herbs are generally more accessible to local communities and can be harvested without specialized tools or long-term ecological impact. Moreover, herbaceous plants are often rich in **bioactive secondary metabolites**, such as phenolics, flavonoids, and essential oils, which are effective in skin and hair care formulations. Their **short life cycle and year-round presence** further enhance their frequent use in traditional ethnocosmetic practices compared to trees and shrubs.

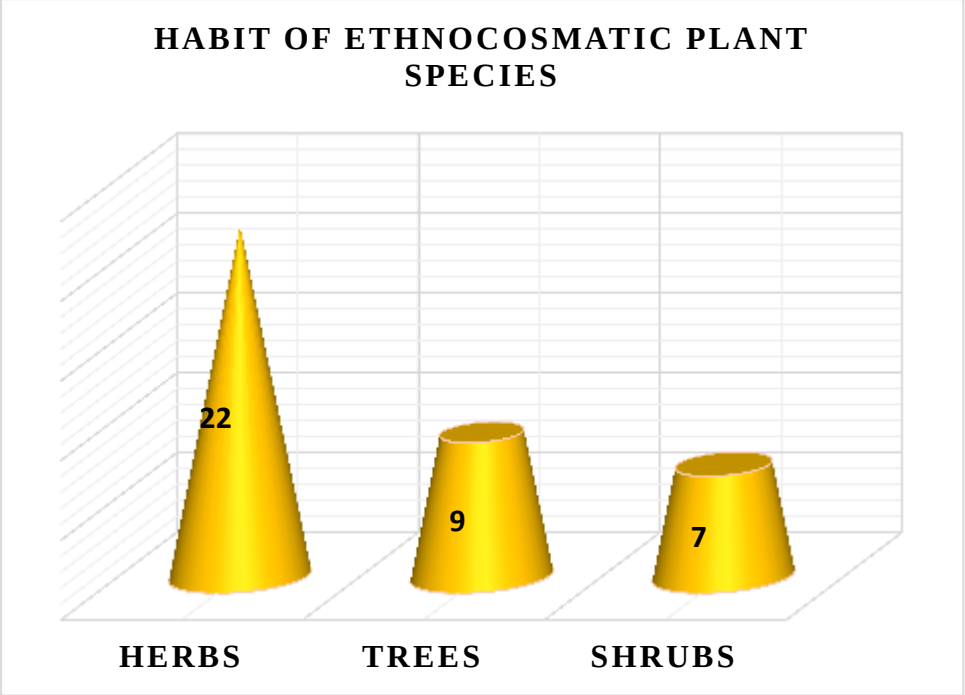


Fig. 2 Habit of Ethnocosmetics Plant Species

Distribution of Plants by Mode of Administration

Table 4.3 shows the distribution of ethnocosmetic plants based on their modes of administration. Topical application was the most prevalent mode, with 21 plant species, highlighting the primary focus on external skin and hair care treatments. This was followed by the use of plants in the form of paste preparations (9 species). Decoctions and extracts were each reported for 6 species, indicating moderate use of processed plant formulations. Oil applications were recorded for 5 species, while wash or rinse preparations were less common (4 species). Only one species was used as a dry scrub, and three species were strictly restricted to external application, reflecting traditional safety awareness in ethnocosmetic practices.

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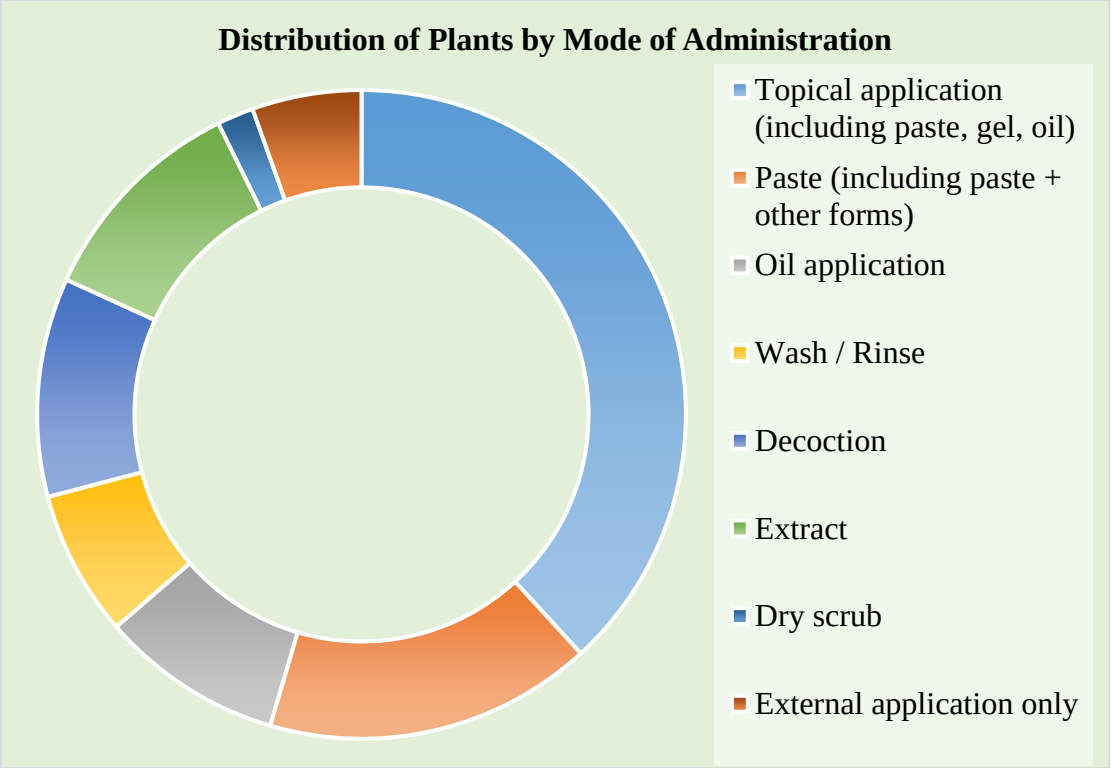


Fig.3 Distribution of Plants by Mode of Administration

Families Wise Percentage of ethnocosmetic Plants

The present's ethnocosmetic study analyzing the distribution of plant families used in traditional beauty and skincare practices. It lists 26 plant families along with the number of species identified in each and their corresponding percentage representation. The Asteraceae family has the highest number of species (4), making up 9.52% of the total, followed by Amaranthaceae, Apocynaceae, and Labiateae, each contributing 7.14% with three species. Several families, including Alliaceae, Berberidaceae, and Betulaceae, contain only one species, accounting for 2.38% each. Families such as Brassicaceae, Liliaceae, Mimosaceae, Moraceae, Pallionaceae, Poaceae, and Solanaceae have two species, each contributing 4.76% to the total (Table 4.1). This distribution highlights the diversity of botanical sources in ethnocosmetic applications, with certain families being more prominent due to their bioactive compounds. The presence of families like Asteraceae (known for anti-inflammatory properties) and Labiateae (rich in aromatic plants) suggests their significant role in traditional skincare and medicinal beauty treatments. Overall, the study underscores the varied use of plant species in ethnocosmetic practices, emphasizing the reliance on natural resources for beauty and wellness.

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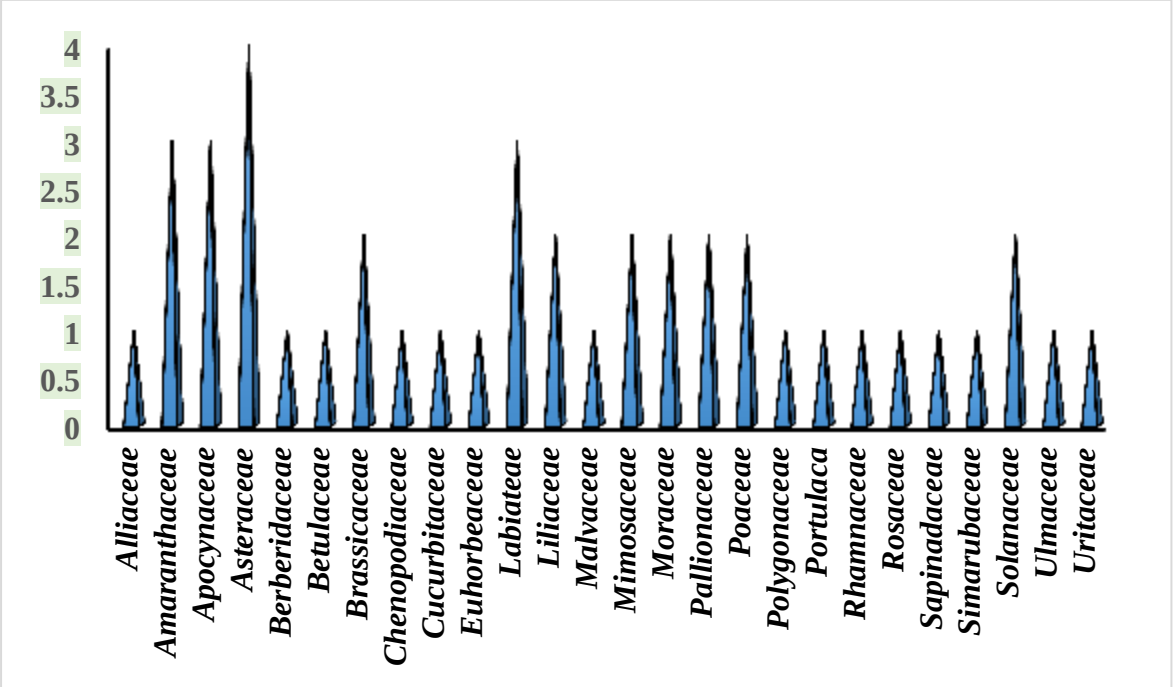
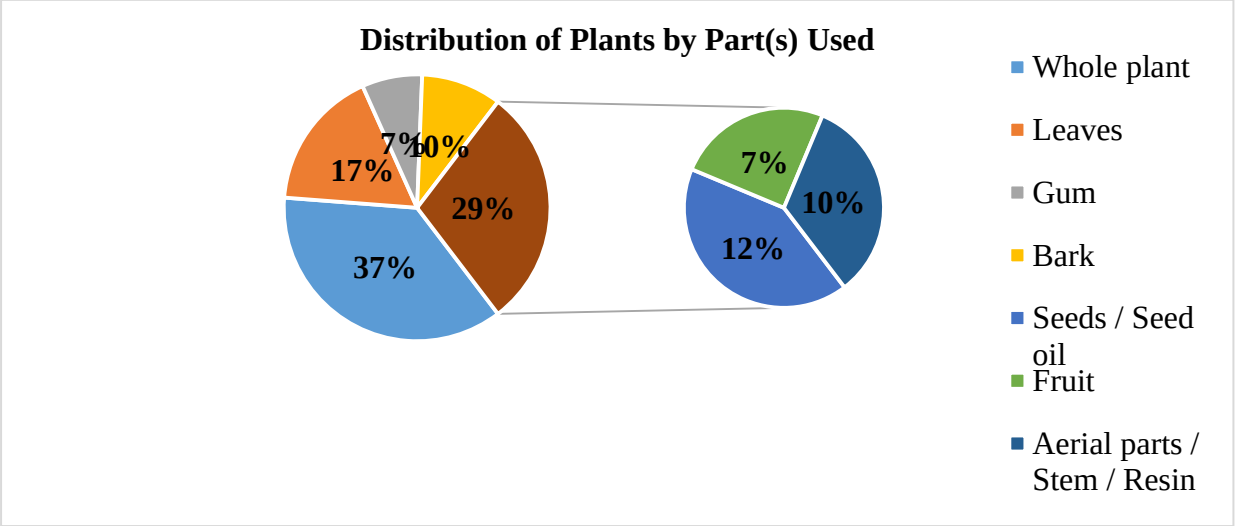


Fig. 4 Families and their percentages of listed plants

Distribution of Plants by Part(s) Used

Fig 5 presents the distribution of ethnocosmetic plants based on the plant parts utilized in traditional practices. The whole plant was the most frequently used part, with 15 species, indicating its broad application in ethnocosmetic formulations. Leaves were the second most commonly used part (7 species), followed by seeds or seed oil (5 species). Bark and aerial parts, including stem and resin, were each used from 4 plant species. Gum and fruits were comparatively less utilized, each represented by 3 species. The predominance of whole plants and leaves suggests their easy availability and high concentration of bioactive compounds, making them suitable for preparation of traditional cosmetic remedies.



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http://amresearchreview.com/index.php/Journal/about

Fig.5 Distribution of Plants by Part(s) Used

Quantitative Analysis

Quantitative ethnobotanical indices were applied to evaluate the importance and use intensity of ethnocosmetic plant species documented from the study area (Table 4.2; Figures 5–7). These indices included frequency of citation (FC), relative frequency of citation (RFC), and use value (UV), which collectively reflect the cultural significance and utilization level of each species among local informants.

The relative frequency of citation (RFC) values of the recorded plant species ranged from 0.50 to 0.85, indicating variable levels of recognition and use among the informants. Species such as Avena sativa, Amaranthus viridis, Malva neglecta, Nerium odorum, and Cichorium intybus exhibited higher RFC values (≥0.80), reflecting their widespread acknowledgment and frequent use in ethnocosmetic practices. In contrast, species including Celtis australis, Capsicum annum, Asphodelus tenuifolius, and Solanum nigrum showed comparatively lower RFC values (≤0.55), suggesting limited or specialized use within the community.

The use value (UV) of documented species varied from 0.65 to 3.70, demonstrating notable differences in the number of uses reported per species. The highest UV was recorded for Lotus corniculatus (UV = 3.70), indicating its extensive ethnocosmetic utilization. Other species with high UV values included Avena sativa (2.65), Helianthus annuus (2.40), Acacia modesta (2.20), Cichorium intybus (2.10), and Morus laevigata (2.00), highlighting their multipurpose roles in traditional cosmetic formulations. Moderate UV values (1.00–1.80) were observed for species such as Malva neglecta, Rumex nepalensis, Chenopodium album, Dodonaea viscosa, Ficus carica, and Brassica campestris, indicating regular but less diversified use. Conversely, the lowest UV values were recorded for Solanum nigrum (0.65) and Acacia nilotica, Allium sativum, Alnus nitida, and Asparagus officinalis (UV = 0.80), reflecting their limited ethnocosmetic applications. Overall, the quantitative analysis highlights a small number of highly valued plant species that play a central role in local ethnocosmetic traditions, while a larger proportion of species are used occasionally or for specific purposes. These findings emphasize the cultural importance of certain plant taxa and provide a quantitative basis for selecting priority species for further phytochemical and pharmacological investigations.

Table 2: Quantitative analysis of the plants of selected area

S. No	Botanical name	Family	Local name	Habit	Part used	*FC	*RFC	***∑Ui	****UV
1	Acacia modesta Wall.	Mimosaceae	Palosa	T	L, Fl, St	0.70	14.00	44	2.20
2	Acacia nilotica Wall.	Mimosaceae	Kikar	T	G	0.70	14.00	16	0.80

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3	Ailanthus altissima Linn.	Simarubaceae	spina Shandi	T	L, T, B	0.75	15.00	25	1.25
4	Allium sativum Linn.	Alliaceae	Piaz	T	W	0.65	13.00	16	0.80
5	Alnus nitida Endl.	Betulaceae	Geiray	H	W	0.65	13.00	16	0.80
6	Amaranthus coudatus Linn.	Amaranthaceae	Ganhar	H	Fls	0.55	11.00	15	0.75
7	Amaranthus spinosus Linn.	Amaranthaceae	Chalwairary	H	L	0.65	13.00	17	0.85
8	Amaranthus viridis Linn.	Amaranthaceae	Gunhar	H	Stem, S, R	0.85	17.00	30	1.50
9	Arthemisia vulgaris Linn.	Asteraceae	Gunhar	H	L, W	0.65	13.00	22	1.10
10	Asparagus officinialis Linn.	Liliaceae	Taunter	T	W	0.60	12.00	14	0.70
11	Asphodelus tenuifolius Carvan.	Liliaceae	Fiazakay	H	Lx	0.55	11.00	16	0.80
12	Avena sativa Linn.	poaceae	Jamdar	H	L	0.85	17.00	53	2.65
13	Berbaris lycium Royle.	Berberidaceae	Kawary	T	F	0.65	13.00	17	0.85
14	Brassica compestris Linn.	Brassicaceae	Sharsham	H	L, F	0.80	16.00	32	1.60
15	Capsicum annum Linn	Solanaceae	Marchakay	H	V	0.55	11.00	14	0.70

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http://amresearchreview.com/index.php/Journal/about

16	Caralluma edulis Edgrew.	Apocynaceae	Pamunkay	H	W	0.75	15.00	17	0.85
17	Celtis australis Linn.	Ulmaceae	Tagha	H	W	0.50	10.00	14	0.70
18	Chenopodium album Linn	Chenopodiaceae	Sarmai	H	B, W	0.80	16.00	26	1.30
19	Cichorium intybus Linn	Asteraceae	Han	H	L, S	0.80	16.00	42	2.10
20	Conyza boneriansis Linn	Asteraceae	Kharphul	H	St, R, L	0.65	13.00	21	1.05
21	Cynodon dactylon Linn	poaceae	Kabal	H	W	0.70	14.00	21	1.05
22	Dalbergia sissoo Roxb.	Pallionaceae	Shawa	T	L, F	0.70	14.00	25	1.25
23	Debregeasia salicifolia Rendle.	Uritaceae	Ajlai	S	W	0.60	12.00	17	0.85
24	Dodonaea viscosa Linn.	Sapinadaceae	Ghurhasky Bary	S	L, F	0.70	14.00	26	1.30
25	Eruca sativa Miller.	Brassicaceae	Jamama	H	L	0.55	11.00	17	0.85
26	Euphorbia helicopia Linn	Euhorbeaceae	Mandano	H	W	0.65	13.00	18	0.90
27	Ficus carica Forsk	Moraceae	Enzar	T	W	0.65	13.00	30	1.50
28	Helianthus annus Linn	Asteraceae	Nwarparas	H	W	0.80	16.00	48	2.40

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue2 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

29	Lotus corniculatus Linn.	Papilionaceae	Fatekhany	H	L	0.75	15.00	74	3.70
30	Luffa cylindrica Room.	Cucurbitaceae	Toorai	H	L, F	0.70	14.00	26	1.30
31	Malus pumila Mill.	Rosaceae	Manra	T	L, F	0.75	15.00	25	1.25
32	Malva neglecta Linn.	Malvaceae	Panerak	H	Lx, S	0.85	17.00	36	1.80
33	Mentha logifolia L.	Labiateae	Phodina	H	W	0.55	11.00	18	0.90
34	Mentha arvensis Linn.	Labiateae	Inalay	H	F, S	0.80	16.00	22	1.10
35	Morus lavagata Mill.	Moraceae	Shah Tooth	T	W	0.75	15.00	40	2.00
36	Portulaca oleracea Linn	Portulaca	Warkharry	T	W	0.60	12.00	22	1.10
37	Nerium odorum	Apocynaceae	Asli Gandechar	S	W	0.85	17.00	31	1.55
38	Otostegia limbata	Labiateae	Speen azghay	S	V	0.70	14.00	21	1.05
39	Rhazye stricata	Apocynaceae	Gandechar	S	Fl	0.60	12.00	15	0.75
40	Rumex nepalnsis Spreng.	Polygonaceae	Tarooky	S	L	0.70	14.00	34	1.70
41	Solanum nigrum Roxb.	Solanaceae	Kach machu	S	S	0.55	11.00	13	0.65

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue2 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

42	Zizyphus nummularia Burm.	Rhamnaceae	Bera	T	W	0.75	15.00	26	1.30

Note: **T** = Tree, **H** = Herb, **S** = Shrub, **L** = Leaves, **Fl / Fls** = Flowers, **F** = Fruits, **St** = Stem, **B** = Bark, **R** = Roots, **S** = Seeds, **W** = Whole plant, **G** = Gum, **T** = Trunk, **V** = Vegetable, **Lx** = Latex.

DISCUSSION

The present ethnocosmetic investigation provides a comprehensive account of plant-based cosmetic knowledge practiced by local communities of Pir Baba Valley, District Buner. The findings demonstrate a strong relationship between local biodiversity, traditional knowledge systems, and the utilization of plant resources for skin, hair, and beauty-related purposes. Ethnobotanical and ethnocosmetic studies play a vital role in documenting indigenous knowledge before it is lost due to modernization and socio-cultural changes (Cotton, 1996; Pieroni et al., 2014).

Family-wise distribution revealed that Asteraceae was the most dominant family, followed by Amaranthaceae, Apocynaceae, and Lamiaceae. The dominance of Asteraceae in ethnobotanical and ethnocosmetic studies has been consistently reported from different regions of Pakistan and other parts of the world (Ahmad et al., 2017; Aziz et al., 2018). This prominence can be attributed to the family's richness in bioactive secondary metabolites such as flavonoids, terpenoids, phenolics, and essential oils, which exhibit anti-inflammatory, antioxidant, antimicrobial, and wound-healing properties (Heinrich et al., 2009; Alamgir, 2017). Similarly, the frequent occurrence of Lamiaceae reflects its aromatic nature and high essential oil content, which is widely exploited in traditional skincare, hair care, and cleansing formulations (Baser & Buchbauer, 2010).

The dominance of herbaceous species over trees and shrubs observed in the present study is in agreement with previous ethnobotanical investigations conducted in mountainous and rural regions of Pakistan (Shinwari & Qaiser, 2011; Rahman et al., 2016). Herbs are generally more abundant, easily accessible, and regenerate quickly, allowing sustainable harvesting without long-term ecological damage (Cunningham, 2001). Moreover, herbaceous plants often possess higher concentrations of active phytochemicals in their aerial parts, making them more suitable for cosmetic and dermatological preparations (Giday et al., 2009).

Analysis of plant parts used showed that whole plants and leaves were the most frequently utilized components. Similar trends have been reported in ethnocosmetic and ethnomedicinal studies, where leaves are preferred due to their ease of collection and high content of biologically active compounds such as phenolics, vitamins, and essential oils (Telefo et al., 2011; Umair et al., 2017). The use of whole plants, particularly in herbs, suggests a holistic approach in traditional remedies, where synergistic effects of multiple phytochemicals are believed to enhance efficacy (Heinrich et al., 2009).

The predominance of topical application as the principal mode of administration reflects the cosmetic-oriented nature of traditional practices in the study area. External

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application through pastes, oils, washes, and extracts allows direct delivery of active compounds to the skin and hair, increasing effectiveness while minimizing systemic toxicity (Burlando & Cornara, 2017). The limited use of internal administration further demonstrates indigenous safety awareness, as many cosmetic plants may possess potent bioactive compounds that require cautious use (Alamgir, 2017).

Quantitative ethnobotanical indices further validated the cultural and functional importance of documented species. High RFC values for species such as Avena sativa, Amaranthus viridis, Malva neglecta, and Cichorium intybus indicate widespread recognition and frequent use among informants, reflecting strong cultural acceptance (Tardío & Pardo-de-Santayana, 2008). Similarly, elevated UV values recorded for Lotus corniculatus, Avena sativa, Helianthus annuus, and Acacia modesta suggest multipurpose utilization and repeated application in ethnocosmetic formulations. High UV values are widely regarded as indicators of plants with greater ethnobotanical significance and potential pharmacological value (Phillips & Gentry, 1993; Albuquerque et al., 2014). In contrast, species with lower RFC and UV values appear to be used for specific or limited purposes, possibly due to restricted availability, specialized traditional knowledge, or concerns related to toxicity. Such variation in plant use reflects the dynamic and selective nature of indigenous knowledge systems (Martin, 1995). Overall, the integration of qualitative observations with quantitative indices confirms that ethnocosmetic practices in Pir Baba Valley are deeply rooted in ecological availability and cultural experience. The dominance of specific plant families, herbaceous life forms, preferred plant parts, and topical modes of application highlights adaptive strategies developed by local communities to maximize benefits from natural resources. These findings emphasize the importance of conserving both plant biodiversity and indigenous knowledge systems, while species with high RFC and UV values should be prioritized for future phytochemical, pharmacological, and cosmetic product development studies (Heinrich et al., 2009; Burlando & Cornara, 2017).

CONCLUSION AND RECOMMENDATION

The flora of the area was Ethno cosmetically vital and utilized by local peoples from ages to ages. The examined regions are rustic in nature and the inhabitants are exceedingly reliant on the local plants for their cosmetic and medicinal services needs and different prerequisites. This ethnocosmetic study highlights the diverse botanical resources used in traditional beauty and skincare practices, with Asteraceae being the most prominent family. The data reveals a strong reliance on herbs (69.04%) due to their abundance and medicinal properties. Quantitative analysis indicates that certain species, such as T. aestivum, B. campestris, and C. sativa, have high relative frequency citation (RFC) and use values (UV), reflecting their significance in local ethnobotanical knowledge. The Pearson correlation coefficient (0.611) confirms a strong relationship between UV and RFC, suggesting that frequently used species are well-known to locals. The findings emphasize the importance of preserving traditional knowledge and sustainable use of ethnocosmetic plants to ensure their continued availability for future generations.

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue2 (2026)

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RECOMMENDATIONS

Sustainable harvesting and conservation strategies should be prioritized to protect frequently utilized ethnocosmetic plant species, particularly those exhibiting high use value (UV) and relative frequency of citation (RFC). Documentation and preservation of indigenous ethnobotanical knowledge are essential to ensure its intergenerational transmission and potential integration into modern cosmetic and medicinal systems. Further pharmacological and clinical investigations are recommended to validate the safety, efficacy, and bioactive constituents of these plants for pharmaceutical and cosmetic applications. Cultivation of high-demand species should be encouraged to minimize pressure on wild populations and ensure sustainable availability. Additionally, educational programs should be implemented to train local communities in sustainable harvesting practices and enhance awareness of the economic potential of ethnocosmetic resources. Finally, policy frameworks and collaborations between traditional practitioners, conservation agencies, and the cosmetic industry are needed to regulate plant collection and promote biodiversity-friendly development of natural beauty products.

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