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Ethnobotanical and Ethnomedicinal Significance of *Myrtus communis* L. in Lower Swat, Pakistan

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SUMMARY

Myrtus communis L. belongs to the family Myrtaceae and is commonly found in the Lower District, Swat. A survey reported that *Myrtus communis* is traditionally used for medicinal and cultural purposes. Local residents provided information about local uses, recipe preparation, and diseases treated, which were recorded. The primary aim of the study was to understand the cultural and ethnomedicinal uses of this species in the study area. Data were collected from 311 informants across eleven localities in Lower Swat: Islamphur (Balavo), Shagai (Ghwara Khela Batorda), Shagai (Shne Shah), Marghazar (Daba Tangai), Marghazar (Manrvano Dub), Barikot (Natmera), Barikot (Nawagai), Barikot (Qwanj), Amlokdara (Gorykan), Jambeel (Shagai), Jambeel (Jhelkanai), and Kokarai (Lokmera/Chamanr). The overarching goal was to involve all participants in gathering information on the medicinal uses and importance of *Myrtus communis*. It is noted that various parts of this species (i.e., leaves, fruits, flowers, stem, and whole plant) are used in cultural practices and to cure different diseases (Figure). Culturally, this species is used for tea (n=49), as a flavoring agent (n=17), and as food (n=17) (Figure). Ethnopharmacologically, it is used to cure chest disorders (n=39), headaches (n=32), hypertension (n=31), diabetes (n=28), stomach issues (n=25), gastric ulcers (n=22), diarrhea (n=16), and tooth pain (n=15) (Figure). The highest Relative Popularity Level (RPL), i.e., 1.00, is noted for the following cultural uses and diseases: diabetes, stomach issues, gastric ulcers, headaches, chest disorders, hypertension, and tea. The lowest RPL (i.e., 0.14) was noted for anthelmintic and anxiety. The highest Rank Order Priority (ROP) is noted for tea (ROP=15.8), while the ROP for other cultural uses is food (ROP=4.68) and flavoring agents (ROP=4.49).

Keywords: *Myrtus communis*, Traditional uses, Swat, Pakistan

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INTRODUCTION

There are about 5,500 species of woody flowering plants in the Myrtaceae family, which is divided into 144 genera and 17 tribes. With 51 genera and roughly 2,500 species mostly found in the Neotropics, the tribe Myrteae accounts for half of the biodiversity of the Myrtaceae family. However, 15 genera and roughly 450 species are found on other continents, including Southeast Asia, Northeast Australia, and the Pacific islands, including New Zealand and New Caledonia. The genus *Myrtus* is the only one found in

Africa and Asia, and Europe (Sisay and Gashaw, 2017; Aboualgasem et al., 2022; Al-Snafi et al., 2024).

Myrtus communis develops into a small tree or an evergreen shrub, growing up to 2.5 meters tall. It has a branching stem with dark, evergreen leaves that are glabrous, opposite, glossy, whorled or paired, coriaceous, stiff, lanceolate to oblong, entire-margined, aromatic, acuminate, and 2.5–3.8 cm long. The leaves also lack lamina glands. The axillary flowers, which have a thin peduncle 2 cm in diameter, are starry, fragrant, and can be either pink or white. The stamens have yellow anthers. The blooms, which have five sepals, five petals, and numerous stamens, appear from June to September. The berry fruits, on the other hand, are edible, small, round, and packed with seeds. They ripen in the autumn, from October to February, and are often blue-black, although some varieties have white-yellow fruits. Folk medicine uses several parts of *Myrtus communis* L., including leaves, fruits, flowers, roots, and volatile oils (Dastagir et al., 2022; Giuliani et al., 2022; Al-Snafi et al., 2024). *M. communis* L. is in Sawat known as Manhro.

The habitat of *Myrtus communis* L., a common shrub in the Mediterranean, Asia, and northern subtropical Africa, may have been lost or fragmented as a result of urbanization and agricultural growth (Dabbaghi et al., 2023; Gwynne-Evans et al., 2024). Wild subpopulations are under pressure from increased urbanization, natural fires, livestock grazing, other wild herbivores, and wood cutting. Myrtle fruit and leaf material are frequently gathered from wild subpopulations. However, because it produces many seeds with a high germination rate, the species has high ecological tolerance and is an effective successional species in abandoned fields (Nedjimi, 2024). In general, ethnobotany is the study of human-plant interactions. Some might characterize it as the scientific study of how human cultures interact with plants. The study of plants used for a range of economic and non-commercial societal reasons (e.g., tools and construction materials, food, ritual, divination, cosmetics, adornment, textiles or clothes, cash, and in social life) is included in the purview of ethnobotany (Matsehorova and Odyntsova, 2024).

In Pakistan, the majority of plant studies have focused on their medicinal and other uses (Khan et al., 2017; Umair et al., 2017; Umair et al., 2019; Amjad et al., 2020; Amjad et al., 2021; Hassan et al., 2021; Haidar et al., 2026). While beneficial, these studies often lack information on the plants' significance to people and their various applications. Consequently, some plants may not receive the recognition they merit. *Myrtus communis* L., a significant plant with great cultural and medicinal importance in Lower Swat, is one such example. Little is known regarding its usage in this region. Therefore, *Myrtus communis* L. requires careful research to understand how people utilize it, why it matters to them, and how we can contribute to its protection. This will ensure sustainable use and help preserve local knowledge. *Myrtus communis* L. is a plant that needs our care. By studying it, we can learn more about its significance and how to keep it safe.

MATERIALS AND METHODS

STUDY AREA

In district Swat, located in the northern region of Pakistan, the latitudes range from 34° to 35° 55' north and the longitudes from 72° 08' to 72° 50' east. The northern areas include Chitral and Ghizer, to the east are Kohistan and Shangla, while Buner and District Malakand are to the south (Shah *et al*. 2018). The total area of Swat is 5,337 km², with a population of 1,250,000 and a density of 236 residents per km². The elevation in Swat ranges from 760 to 2,280 m. The temperature typically ranges between 22°C and 28°C, with an average rainfall of 864 mm. Most people have one or two cows, from which they sell milk, and they may keep small livestock like goats, sheep, or domesticated birds. Most people are involved in horticulture, using fresh vegetables and fruits, which they also sell (Ali, 2023; Ali et al., 2026).

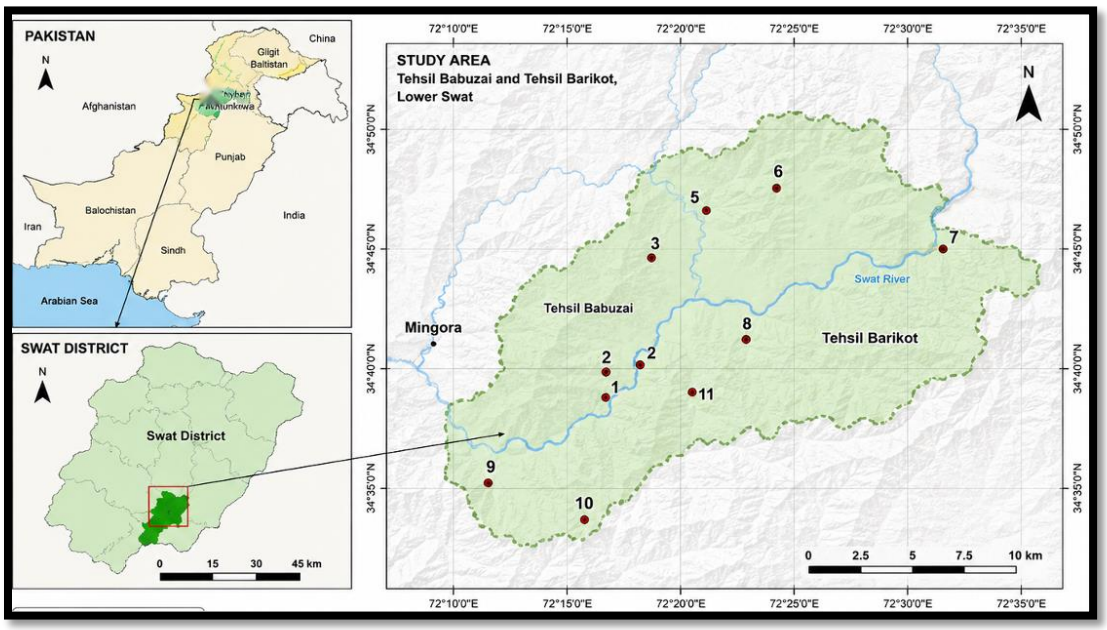

Figure 1: Map of the study area.

Study Sites

An ethnobotanical study was conducted from November 2019 to February 2021 to investigate the local uses of medicinal plants in Tehsil Babozai and Barikot, District Swat, Pakistan, in the Hindu Kush mountain range. The selected localities include Islamphur (Balavo), Shagai (Ghwara Khela Batorda), Shagai (Shne Shah), Marghazar (Daba Tangai), Marghazar (Manrvano Dub), Barikot (Natmera), Barikot (Nawagai), Barikot (Qwanj), Amlokdara (Gorykan), Jambeel (Shagai), Jambeel (Jhelkanai), and Kokarai (Lokmera/Chamanr), chosen based on the medicinal importance of *Myrtus communis*.

METHODOLOGY

Data were collected through interviews with 311 respondents, and data on cultural and ethnopharmacological applications were gathered.

ANALYSIS OF QUANTITATIVE ETHNO-MEDICAL DATA

The data were evaluated using four different indices: frequency of citation (FC), fidelity level (FL), relative popularity level (RPL), and rank order priority (ROP).

Frequency of Citation (FC)

The frequency of citation (FC) was determined using the total number of informants from the study region (Bashir et al., 2023; Haidar et al., 2026; Jahangeer et al., 2026) who reported the cultural and therapeutic use of *Myrtus communis* during the investigation. Regardless of the number of cultural uses and especially diseases of *Myrtus communis* reported, each informant was counted only once. Therefore, the FC represents the level of recognition and cultural and medicinal use of *Myrtus communis* among the indigenous communities of the study region, with higher FC values indicating greater relevance and cultural significance of the plant.

Fidelity Level (FL)

The percentage of informants in the study area who identified *Myrtus communis* for a particular medical ailment was determined using the Fidelity Level (FL). The formula is used to compute the FL (Naz et al., 2022):

$$FL\ (\%) = N_p/FC \times 100$$

Where,

Np is the number of people who stated *Myrtus communis* for a specific condition.

Relative Popularity Level (RPL)

The relative popularity of several cultural uses and especially diseases within the study area is shown by the Relative Popularity Index (RPL). It has been noted that the proportion of maximal FC is higher in well-known cultural uses and especially diseases. The remaining cultural uses and especially diseases uses were deemed undesirable. For cultural uses and especially diseases, the relative popularity level was one, but for unpopular cultural uses diseases, it was lower than one (Friedman et al., 1986; Ali-Shtayeh et al., 2000).

Rank Order Priority (ROP)

Based on their FL and RPL values for the adjustment criterion, the ROP index classifies cultural uses, particularly illnesses (Faiz et al., 2022; Hassan et al., 2022; Rahman et al., 2022). The following formula was used to determine a rank order priority for cultural uses, particularly diseases (Friedman et al., 1986; Ali-Shtayeh et al., 2000):

$$ROP = FL \times RPL$$

Graphical Analysis

The graphs were designed with the help of MS Excel (2013) and Past statistical software (5.3).

RESULTS

PROFILE OF RESPONDENTS

A total of 311 questionnaires were filled out by respondents, of which 244 were male and the remaining 67 were female. They have different occupations, including Teachers (n=24), Students (n=42), Housewives (n=53), Private Employees (n=31), Farmers (n=71), Traditional Healers (n=22), Government Employees (n=48), and Doctors (n=20). They belong to different age groups: 18 to 42 (n=65), 43 to 62 (n=55), 63 to 72 (n=82), and above 72 (n=109). It is noted that most of the respondents (71%) are educated: PhD (n=2), Master's (n=18), Graduate (n=35), Intermediate (n=43), Matric (n=52), and Primary (n=71), while the remaining 29% are illiterate. Most of the respondents belong to rural areas (n=230), while others belong to urban areas (n=81) (Figure 2).

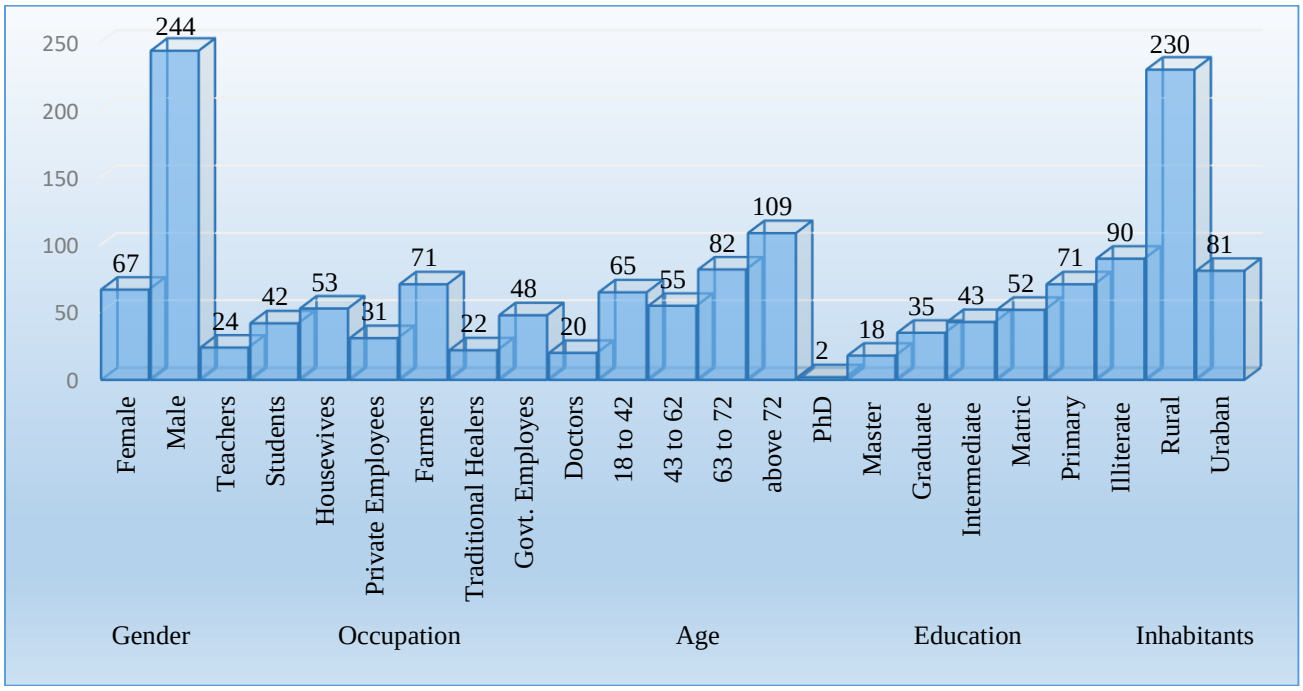

Figure 2: Profile of respondents of the study area.

ATTITUDE OF RESPONDENTS

The reported applications of *Myrtus communis* appeared in all respondents within the given distribution, indicating that its importance was not confined to just one level of respondent reference. The FC above 72 age group showed the greatest overall presence, featuring particularly high rates for different applications, whereas the respondents of 28–42 age group made a significant contribution to multiple reported uses. *Myrtus communis* is widely acknowledged and significant to the Himalayan region people, evident from its presence in both the intermediate and higher age group categories. The category with the most citations indicates that *Myrtus communis* is widely recognized by the surveyed population. In general, the distribution reinforces *Myrtus communis*'s status as an important ethnomedical plant in the study area and indicates a strong level of informant acknowledgment of the plant (Figure 3).

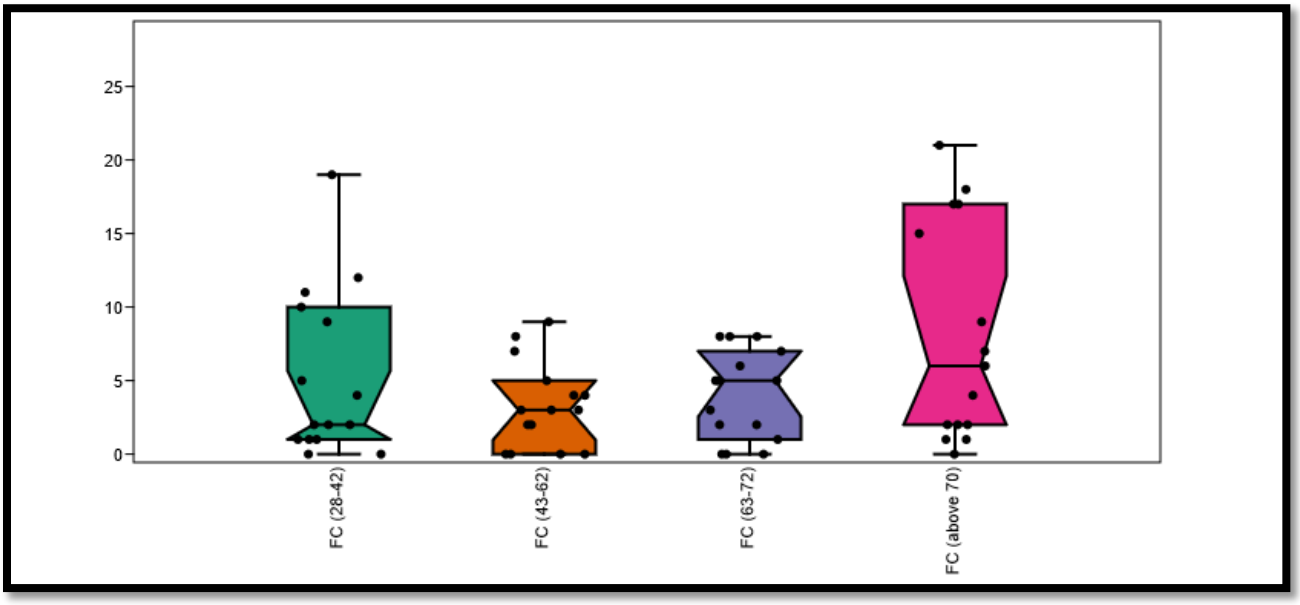

Figure 3: Ratios of different age group preferences regarding ethnomedicinal uses in the study area.

QAUNTITAVE ANALYSIS

It is noted that various parts of this species (i.e., leaves, fruits, flowers, stem, and whole plant) are used in cultural practices and to cure different diseases (Figure 4).

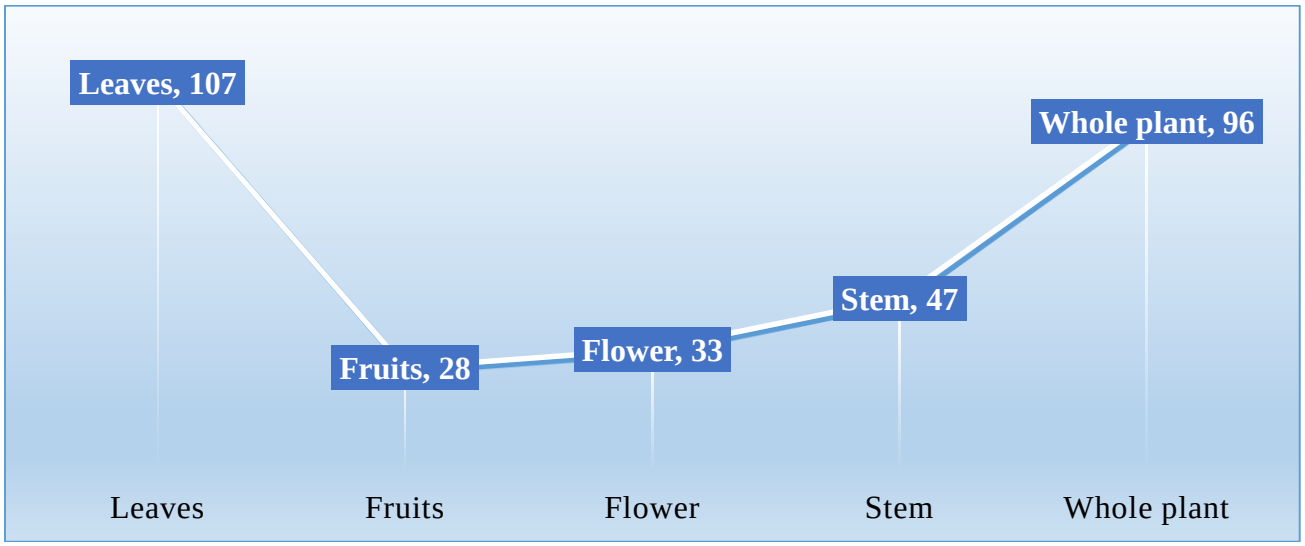

Figure 4: Uses of parts of *Myrtus communis* L. from study area.

Frequency of Citation (FC)

It is noted that, culturally, this species is used for tea (n=49), flavoring agent (n=17) and food (n=17); while ethnopharmacologically, it is used to cure chest disorders (n=39), headaches (n=32), hypertension (n=31), diabetes (n=28), stomach issues (n=25), gastric ulcers (n=22), as a diarrhea (n=16), and tooth pain (n=15) (Figure 5). It is noted that a higher tendency of uses (n=122) of this species was found in the oldest

age group (above 70), followed by the age group 28-42 (n=79), the age group 63-72 (n=60), and the age group 43-62 (n=50) (Figure 6).

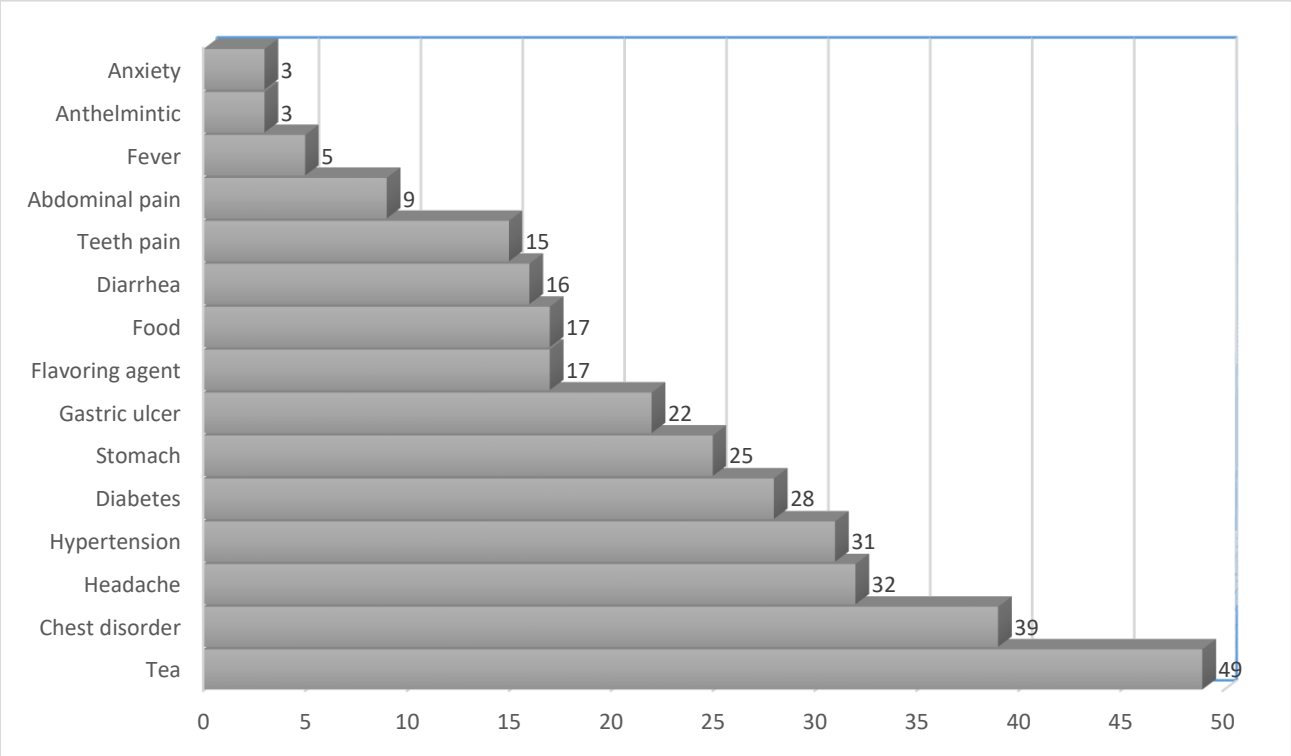

Figure 5: Cultural and traditional medicinal Uses of species in the study area.

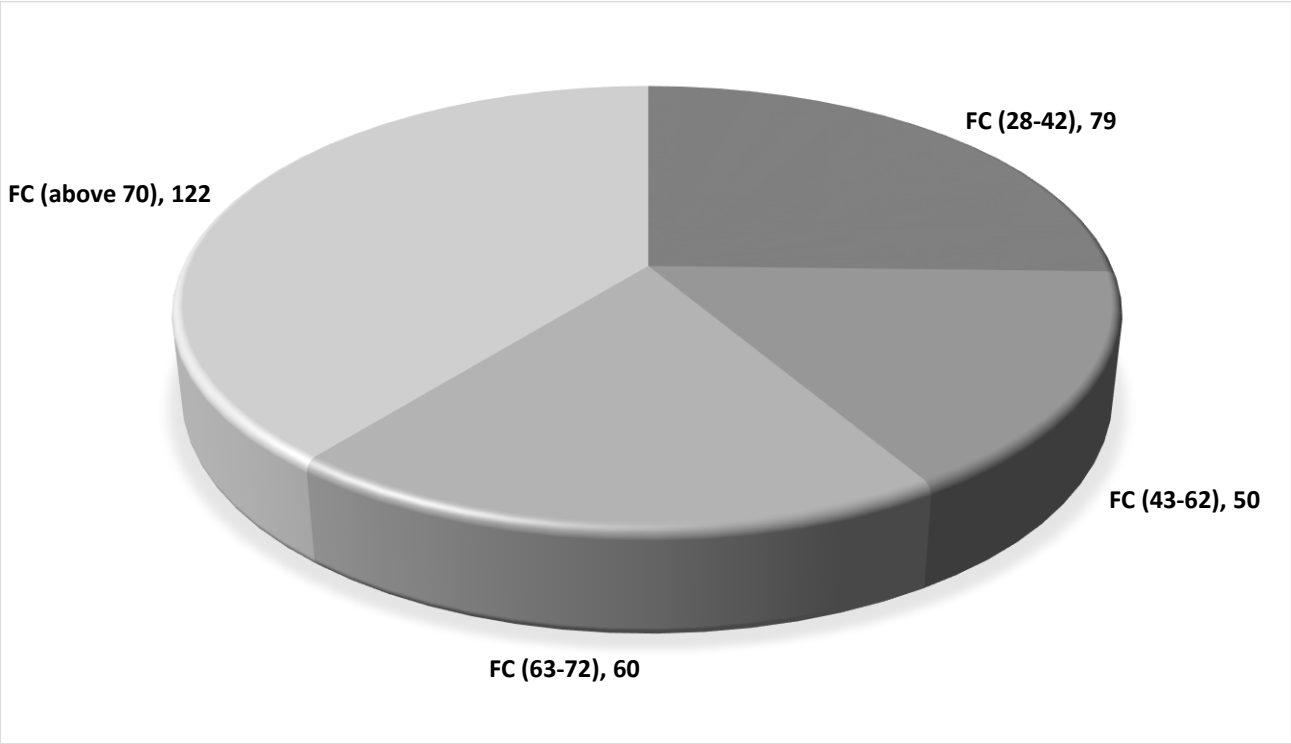

Figure 6: Trends in species usage across different age groups.

Fidelity Level (FL)

The species with the highest therapeutic value, which corresponds to the highest FL, has been discovered in the research region. Tea (FL=15.80) has the highest FL value, followed by Chest disorder (FL=12.54), Headache (FL=10.29), Hypertension (FL=9.97), Diabetes (FL=9.00), Stomach (FL=8.04), Gastric ulcer (FL=7.07), Food (FL=5.70), Flavoring agent (FL=5.47), Diarrhea (FL=5.14), Teeth pain (FL=4.82), Abdominal pain (FL=2.89), Fever (FL=1.61), and Anthelmintic (FL=0.96). By contrast, Anxiety (FL=0.96) has the lowest percentage, which was seen in Table 1 and Figure 7.

Relative Popularity Level (RPL)

The highest RPL, i.e., 1.00, is noted for the following cultural uses and especially diseases: Diabetes, Stomach, Gastric ulcer, Headache, Chest disorder, Hypertension, and Tea; while the lowest RPL (i.e., 0.14) was noted for Anthelmintic and Anxiety. Additionally, RPL was noted for other cultural uses as follows: Flavoring agent (RPL=0.82), Food (RPL=0.82), Diarrhea (RPL=0.77), Teeth pain (RPL=0.72), Abdominal pain (RPL=0.43), and Fever (RPL=0.24) (Table 1 and Figure 7).

Rank Order Priority (ROP)

The highest Rank Order Priority is noted for Tea (ROP=15.8), followed by Chest Disorder (ROP=12.5), Headache (ROP=10.3), Hypertension (ROP=9.97), Diabetes (ROP=9), Stomach (ROP=8.038585), Gastric Ulcer (ROP=7.07), Diarrhea (ROP=3.98), Tooth Pain (ROP=3.495), Abdominal Pain (ROP=1.26), Fever (ROP=0.388), Anthelmintic (ROP=0.1398), and Anxiety (ROP=0.1398) for diseases, while the Rank Order Priority for cultural uses is Food (ROP=4.68) and Flavoring Agent (ROP=4.489) (Table 1 and Figure 7).

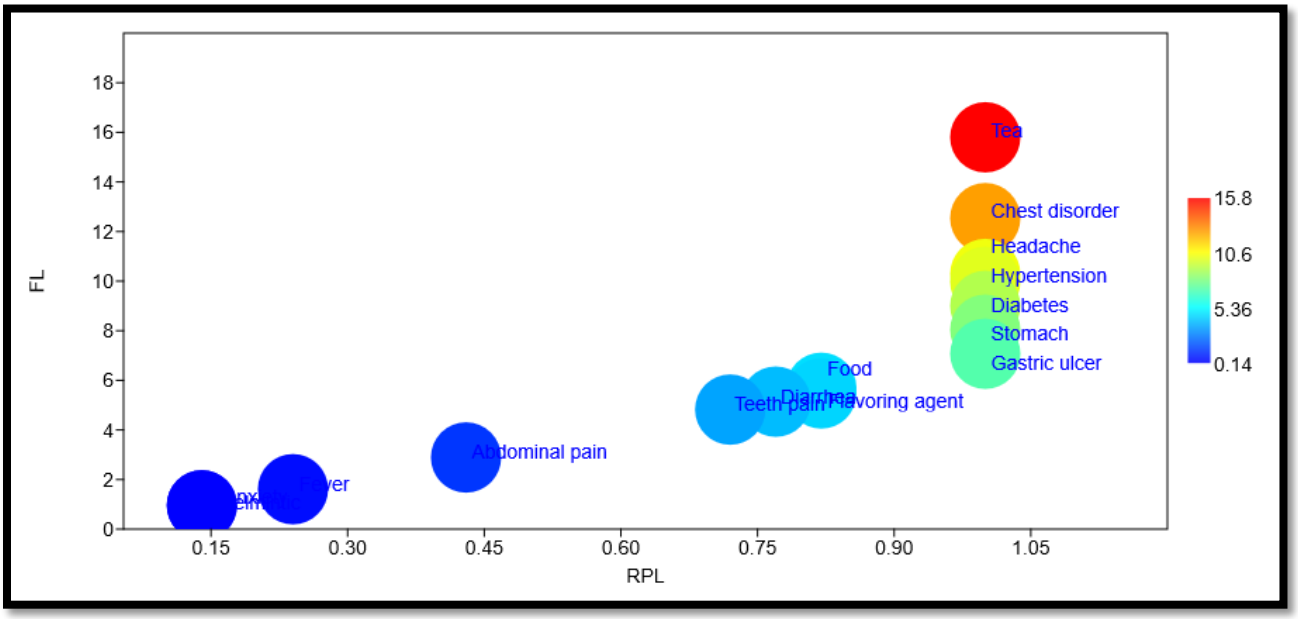

Figure: 7: Comparison of FL, RPL and ROP.

Table 1: Cultural and medicinal and daily uses of *Myrtus communis* in Lower Swat, Pakistan.

Uses	FC (28-42)	FC (43-62)	FC (63-72)	FC (above 72)	FC	FL	RPL	ROP
Diabetes	1	3	6	18	28	9.00	1.00	9.00
Stomach	11	0	8	6	25	8.04	1.00	8.04
Anthelmintic	2	0	0	1	3	0.96	0.14	0.14
Gastric ulcer	10	3	2	7	22	7.07	1.00	7.07
Headache	4	8	3	17	32	10.29	1.00	10.29
Fever	2	0	1	2	5	1.61	0.24	0.39
Abdominal pain	0	7	2	0	9	2.89	0.43	1.26
Chest disorder	12	4	8	15	39	12.54	1.00	12.54
Anxiety	1	0	0	2	3	0.96	0.14	0.14
Diarrhea	0	2	5	9	16	5.14	0.77	3.98
Hypertension	1	5	8	17	31	9.97	1.00	9.97
Teeth pain	9	2	0	4	15	4.82	0.72	3.50
Flavoring agent	5	3	7	2	17	5.47	0.82	4.49
Food	2	9	5	1	17	5.70	0.82	4.68
Tea	19	4	5	21	49	15.80	1.00	15.80

DISCUSSION

In the present study, it is noted that leaves, fruits, flowers, stems, and the whole plant are used culturally (i.e., as flavoring agents, food, and tea) and to cure different diseases (i.e., diabetes, stomach issues, anthelmintic conditions, gastric ulcers, headaches, fever, abdominal pain, chest disorders, anxiety, diarrhea, hypertension, and tooth pain). In the past, *Myrtus communis* was utilized in traditional medicine, herbal remedies, and a variety of cultural practices (Rezaee et al., 2025). Large numbers of people in the modern world who lack access to modern medical facilities also utilize myrtle. Herbal medicines differ from synthetic treatments due to their safety profile, which includes minimizing adverse effects, cost-effectiveness, and natural healing qualities (Dabbaghi et al., 2023). In the Mediterranean, Middle Eastern, and South Asian regions, myrtle has long been used as traditional medicine. Pakistan, Iran, India, Turkey, and Greece are the most prominent of these (Ullah et al., 2025). Gastrointestinal disorders, skin conditions, renal and urinary disorders, musculoskeletal disorders, respiratory infections, eye infections, oral infections, parasitic infections, gynecological conditions, ENT-related issues, fever, cancer, and other ailments are among the various diseases that myrtle has been reported to treat. The cumulative percentage of gastrointestinal disorders that myrtle heals is due to its medicinal properties, as well as its digestive stimulant and antimicrobial effects (Rezaee et al., 2025).

Additionally, traditional myrtle healers reported using the leaves and essential oil to cure cuts, wounds, burns, boils, dermatitis, and fungal infections. These have astringent and antibacterial properties that aid in preventing infection during aftercare. Myrtle extracts have been detected in ointments and herbal pastes for wound care. In addition, it possesses antifungal properties against common skin conditions like fungal dermatitis and ringworm. Additionally, myrtle is utilized to maintain renal and urinary tract health. The literature most frequently mentions the leaves and roots as being useful in treating certain conditions. Physicians employed myrtle extracts to make remedies

for bladder problems, kidney stones, and UTIs. Additionally, a variety of phenolic compounds found in plant parts aid in kidney stone dissolution and enhance renal function in general (Rezaee et al., 2025; Aldosary et al., 2026; Tahrali, 2026).

Over the past 20 years, there has been significant growth in demand for herbal medicines. To ensure the safety, effectiveness, and consistency of herbal medicines, strict quality controls have been implemented. Phytochemical evaluation is the best method for assessing the quality of herbal medication. These methods can also be used to standardize herbal formulations for therapeutic use and identify the classes of bioactive chemicals that give herbs their medicinal qualities (Matsehorova and Odyntsova, 2024). Flavonoids, tannins, terpenoids, alkaloids, phenolic acids, and essential oils are just a few of the phytochemicals found in myrtle. Berries and leaves are known to contain flavonoids and tannins, which have potent antibacterial, anti-inflammatory, and antioxidant properties. The essential oil extract from the myrtle plant is primarily composed of terpenoids, which give it its distinctive scent and antibacterial properties (Yarahmadi et al., 2024). Nonetheless, there are many bioactive substances in the phytochemical composition of myrtle. Twelve of the sixty compounds found in the myrtle plant are volatile organic compounds, including phenols, alcohols, terpenoids, fatty acids, sterols, glycosides, carboxylic acids, flavonoids, derivatives of cinnamic acid, and nitro compounds. These chemicals are responsible for the plant's pharmacological activity, including its antibacterial, antioxidant, and anti-inflammatory properties. In terms of the bioactive compounds utilized in both herbal therapy and contemporary pharmaceutical medications, myrtle plays a significant role (Aboud et al., 2022; Al-Snafi et al., 2024).

CONCLUSIONS

*Myrtus communis*is medicinally very important and is used by the local people of Lower Swat, Pakistan. *M. communis* L. is known in Swat as Manhro. The leaves, fruits, flowers, stem, and whole plant are used for tea (n=49), flavoring agents (n=17), and food (n=17); while ethnopharmacologically, it is used to cure chest disorders (n=39), headaches (n=32), hypertension (n=31), diabetes (n=28), stomach issues (n=25), gastric ulcers (n=22), diarrhea (n=16), and tooth pain (n=15). Due to this information, we collect data, but *Myrtus communis* requires special attention and support to conserve and ensure safety, so that poor people can easily access medication in the future.

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