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Ethnobotanical Study of Medicinal Plants Used by Traditional Therapists for Headache Treatment in the Tafila Region, Jordan

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A B S T R A C T

Objective: Indigenous knowledge is taken as one of the important knowledge types about medicinal plants. This knowledge has a wide scope with various aspects, including the ethnobotany of medicinal plants. Ethnobotany refers to the human knowledge about botany and the ecology of plants.

Methods: In this ethnobotanical study, the Tafila region in Jordan was studied. The data were collected using the questionnaire and interview method. The data about time, local name, therapeutic properties, traditional use method, and therapeutic organ utilized for the studied plants were recorded using questionnaire (50 respondents).

Results: The obtained results indicated that medicinal plants, including *Unica granatum L., Quercus coccifera L., Salvia fruticosa Mill, Rosmarinus officinalis L., Sarcopoterium spinosum, Thymus vulgaris L., Achillea fragrantissima, Ocimum basilicum L., Anchusa strigosa, Aloe Vera (L.), Nigella sativa L., Varthemia iphionoides, Coriandrum sativum L., Olea europaea L.,* and *Teucrium polium* L., are used to treat headache. The family Laminaceae was the most frequently used plant family. The leaf was the most frequently used plant organ (28%) for treating headache in this region. Decoction (41%) and infusion (35%) were the most widely used traditional methods for headache treatment in the Tafila region. The qualitative results showed that the medicinal plants Achillea fragrantissima (Forssk) Sch. Bip., Unica granatum L., and Salvia fruticosa Mill are among the most important effective plants against headache due to their higher UR, RCF, and PFU coefficients.

Conclusion: The obtained results showed that the indigenous knowledge contains valuable therapeutic information relating to therapeutic properties of medicinal species. By identifying these ideas, steps can be taken toward production of plant-produced medicines.

Keywords: Therapeutic plants, Ethnobotany, Tafila region, Jordan

➢ **How to cite this paper**

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Introduction

Ethnobotanical study and knowledge refer to the documentation of non-written information in order to use it for therapeutic objectives [1]. In addition to providing information about medicinal plants and their various traditional applications by local communities, ethnobotanical study informs us about people's beliefs and values, and nature conservation methods [2,3]. Due to urbanization and the increasing use of chemical and modern therapies, ethnobotanical knowledge is seriously endangered and traditional medicinal data may be lost [4]. Ethnobotanical studies have played a key role in research studies on herbal therapy and medicinal plants over recent years [5]. These studies have been used for the discovery of new medications and new medication development [6]. Due to its low cost and fewer side effects, herbal therapy has received attention from researchers and pharmaceutical companies [7]. Moreover, high chemical drug prices and their complications have attracted lots of attention to the discovery of new medications using ethnobotanical knowledge [8]. Ethnobotanical studies are conducted to identify flora to treat diseases. Headache is the most common disease or disorder that everyone experiences during his life. Pain developed above the neck and felt in the head is known as headache. Headache is nervous in origin, and tissues and structures surrounding the brain become inflamed and painful [9]. Headaches can be regarded as one of the most common pains and disorders ranging from mild to severe [9]. According to the report presented by the International Headache Society, there are more than 150 types of headaches that occur due to different reasons. Generally, headache is a syndrome with different causes [10]. It occurs due to sleep deprivation, fatigue, migraine, viral infections, sinusitis, dental issues, etc [11]. It is also caused by the activation of certain nerves in blood vessels [11]. Mefenamic acid, aspirin, ibuprofen, acetaminophen, sumatriptan, ergotamine and naproxen are the most frequently used medications for the treatment of headache. These medications have chemical complications.

Jordan, an Asian country, is located in southwest Asia. This country possesses 120 medicinal plant species that are used in this region. So far, no specialized ethnobotanical study has been conducted on ethnobotany *for treatment of headache* in this region. This study aims to identify and report the qualitative and quantitative analyses of the botanical information about *treatment of headache* in the Tafila region.

Materials and Methods

This cross-sectional ethnobotanical study was conducted between March 2023 and September 2023 in the Tafila region, Jordan. Tafila is a town with a population of 27,559 people in southern Jordan, located 183 kilometers southwest of Amman. It is the capital of Tafila Governorate. Tafila is well known for having green gardens replete with olive and fig trees, and grape-vines. Tafila was first built by the Edomites and called Tophel. There are more than 360 natural springs in al-the Tafila region. The map of the Tafila region is shown in Figure 1.

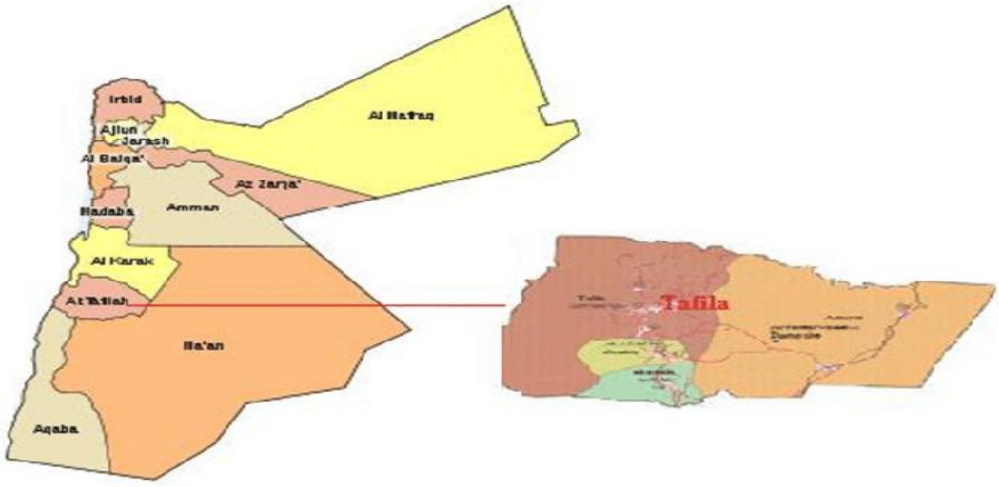

Figure 1: Map of the Tafila region

The traditional therapeutic data about medicinal plants affecting headache were gathered using the ethnobotanical standard questionnaire. The interviewer personally conducted an interview by attending every *traditional medicine store* in the Tafila region. The questioner asked questions based on the standard questionnaire designed to collect traditional information about medicinal plants. The complete list of *traditional medicine store*s in the Tafila region was prepared by the deputy of food and drug. The questionnaire included demographic and personal information and the names of native plants, the organ used, how to use it, and the effect of traditional therapy.

Quantitative methods used in ethnobotanical studies allow researchers to use these formulas to select the most important species of medicinal plants for starting medicinal research during clinical studies. In order to analyze the data obtained from the interviews and in line with the objectives of this study, indicators, such as the usage report (UR) index and quantitative index of the relative frequency of citation (RFC) were reported. UR is the total number of usage reports for any item reported by informants. The RFC quantitative index was calculated for the relative importance of species for local medicines of the region. The RFC index is obtained by the following formula:

$$RFC = FC/ N$$

The RFC index indicates the number of people who indicated the use of a particular species. In relation to the mentioned FC, the number of Ba is equal to the informants and interviewees who mentioned a specific species and N is equal to the total number of people who were interviewed. The RFC index varies from zero (when no local knowledgeable person has stated the application for the plant in question) to one (when all local knowledgeable persons have stated the medicinal use for the plant in question).

Ethical considerations

The written consent to participate in the study was obtained from interviewees and they were assured that their personal information is kept confidential.

Results

According to the obtained results, the medicinal plants: Unica granatum L, Quercus coccifera L., Salvia fruticosa Mill, Rosmarinus officinalis L., Sarcopoterium spinosum, Thymus vulgaris L., Achillea fragrantissima, Ocimum basilicum L,

Anchusa strigosa, Aloe Vera (L.), Nigella sativa L., Varthemia iphionoides, Coriandrum sativum L., Olea europaea L., Teucrium polium L. are used for treating headache in the Tafila region. In this study, *the botanical knowledge held by* the traditional therapists and knowledgeable people in this region, especially with regard to the medicinal plants effective against headache, was acquired. The results are shown in Table 1.

Table 1: Traditional Herbal Remedies for Headache: Local Plants, Parts Used, and Methods of Administration

The plant local name	Scientific name	Herbal family	Organ used	Traditional way of using	Traditional therapeutic effect
Rumman	Unica granatum L.	Lythraceae	Fruit	Decoction	Headache
Baloot	Quercus coccifera L.	Fagaceae	Fruit and Root	Decoction	Headache
Meirameieh	Salvia fruticosa Mill	Lamiaceae	Leaf	Decoction, Infusion	Headache
Hasa alban	Rosmarinus officinalis L.	Lamiaceae	Leaf	Infusion	Headache
Billan	Sarcopoterium spinosum (L.) Spach	Rosaceae	Root	Poultice	Headache
Zaatar	Thymus vulgaris L.	Lamiaceae	Leaf	Infusion	Headache
Kaisoom	Achillea fragrantissima (Forssk) Sch. Bip.	Asteraceae	Aerial parts	Infusion	Headache
Baseil	Ocimum basilicum L.	Lamiaceae	Aerial parts	Decoction, Poultice	Headache
Himhim	Anchusa strigosa Banks and Sol.	Boraginacea	Aerial parts	Decoction	Headache
Saber	Aloe Vera (L.)	Asphodelaceae	Leaves and fruit	Sap	Headache

Habit el-Baraka	Nigella sativa L.	Ranunculaceae	Seeds	Decoction	Headache
Ktaile	Varthemia iphionoides Boiss and Blanche	Asteraceae	Flowering tops	Infusion	Headache
Kuzbara	Coriandrum sativum L.	Apiaceae	Leaves and Seed	Decoction	Headache
Zaitoon	Olea europaea L.	Oleaceae	Fruit	Oil	Headache
Jeada	Teucrium polium L.	Lamiaceae	Aerial parts	Infusion	Headache

This study showed that there are 15 medicinal plant species from 12 families in the Tafila region that are used for headache treatment. The results of plant families' distribution are presented in Figure 2.

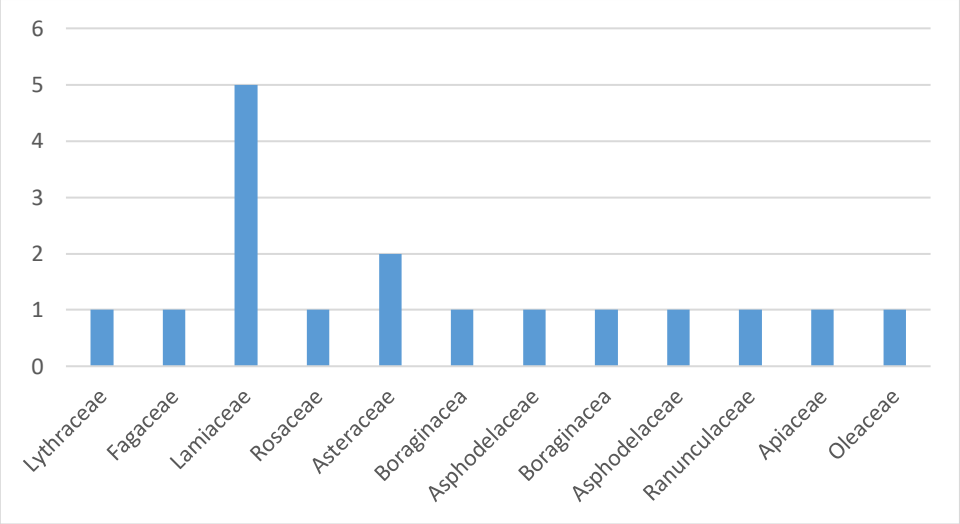

Figure 2: Distribution of effective plant families against headache

As shown in Figure 3, the leaf is the most frequent plant organ (28%) used for treating headache in this region.

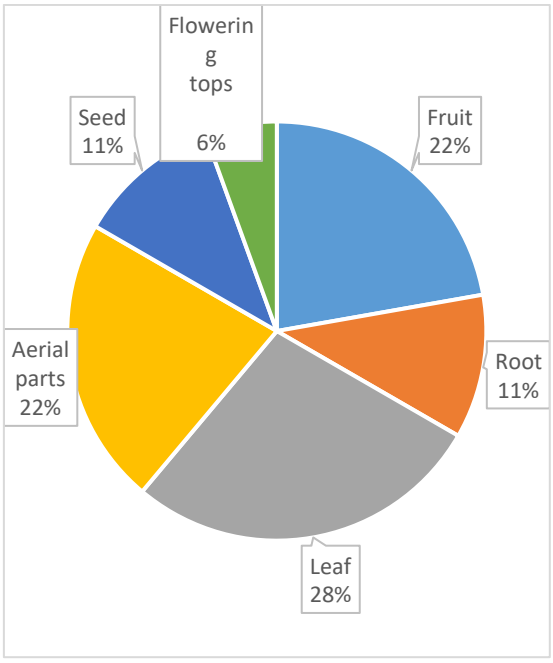

Figure 3: Percentage of plant organs used in this study

As shown in Figure 4, decoction (41%) and infusion (35%) are the most widely used traditional methods for headache treatment in the Tafila region.

The results of qualitative analysis and UR, RCF, and PFU items are presented in Table 2.

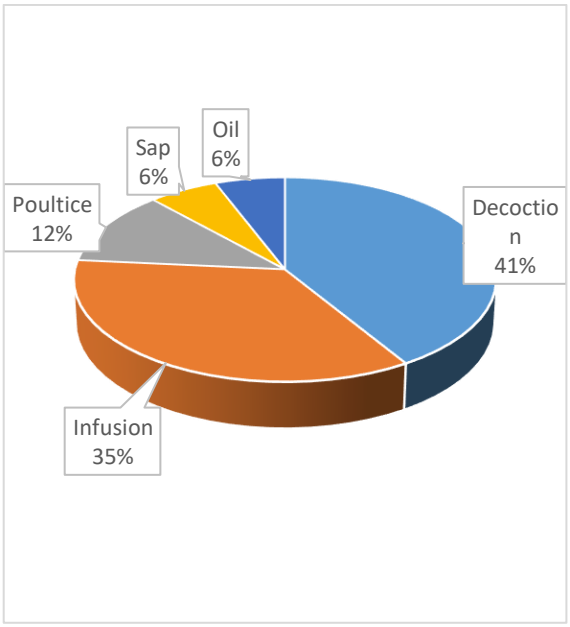

Figure 4: Percentage of the traditional use of medicinal plants effective against headache

Table 2: Medicinal plants for headache

The name of the plant	UR	RCF	Percentage of frequency of use (PFU)
Unica granatum L.	0.73	28	56%
Quercus coccifera L.	0.69	24	48%
Salvia fruticosa Mill	0.73	28	56%
Rosmarinus officinalis L.	0.59	14	28%
Sarcopoterium spinosum (L.) Spach	0.62	18	36%
Thymus vulgaris L.	0.63	20	40%
Achillea fragrantissima (Forssk) Sch. Bip.	0.77	30	60%
Ocimum basilicum L.	0.69	24	48%
Anchusa strigosa Banks and Sol.	0.65	22	44%
Aloe Vera (L.)	0.69	24	48%
Nigella sativa L.	0.62	18	36%
Varthemia iphionoides Boiss and Blanche	0.63	20	40%
Coriandrum sativum L.	0.59	14	28%
Olea europaea L.	0.62	18	36%
Teucrium polium L.	0.62	18	36%

According to the results presented in Table 2, the qualitative results showed that the medicinal plants Achillea fragrantissima (Forssk) Sch. Bip., Unica granatum L., and Salvia fruticosa Mill are the most important plants effective against headache due to their higher UR, RUF, and PFU.

Discussion

Medicinal plants with their wide genetic diversity and unique ability to synthesis can provide humans with a wide range of natural chemical compounds with various applications from foods to medications and perfumes.

Ethnobotany science is the study of the behavior of people or culture in a specific region with plants native to that region. This study evaluates the indigenous knowledge about medicinal plants in the Tafila region. The study by Abdelhalim (2017) et al., in Jordan showed that medicinal plants are used for treating *digestive* system *problems*, *respiratory* infections, cardiovascular diseases, *skin disorders*, etc. This study showed that medicinal plants, such as Achillea fragrantissima and Nigella sativa are used for treatment of migraine and headache [12]. The results of a study in Italy showed that *Sambucus nigra, Beta vulgaris* L., *Allium cepa* L., *Foeniculum vulgare, Pimpinella anisum* L., *Convallaria majalis* L, *Achillea atrata* L., *Achillea millefolium* L., *Arnica montana* L., *Artemisia absinthium* L., *Glebionis coronaria* (L.), and *Tanacetum balsamita* L. are amongst the effective medicinal plants against headache [13]. Results of a study showed that *Acacia ataxacantha* DC, *Acacia brevispica* Harms, *cacia karroo* Hayne, *cacia macrostachya* DC, *Acacia nilotica* (L.) Delile, *Acacia oerfota* (Forssk.) Schweinf., *Cacia pennata* (L.) Wild, *Aerva lanata* (L.) Juss., *Ageratum conyzoides* (L.) L., *Albizia amara*, *Allium cepa* L, *Allium sativum* L, *Anthonotha macrophylla* P Beauv, *Artemisia absinthium* L., *Artemisia afra*, *Asparagus plumosis* Baker, *Dysphania ambrosioides*, *Eucalyptus citriodora*, *Flueggea virosa*, *Griffonia simplicifolia*, *Halocnemum strobilaceum*, and *Jacaranda mimosifolia* D. Don are amongst medicinal plants used for treating headache in African continent [14]. The results of a study in Lorestan province southwest of Iran found the medicinal plants: *Echeveria elegans, Alhagi persarum, Allium haemanthoides, Althaea officinalis, Anchusa italica, Artemisia annua, Cichorium intybus, Daphne mucronata, Falcaria vulgaris, Ferula angulata, Matricaria recutita, Paliurus spina, Papaver rhoeasa, Violo tricolor, and Ziziphus jujuba* to be used for headaches and migraines treatment [15]. Some of the plant species mentioned in other studies had an anti-headache effect and these studies were in agreement with our study in this respect. In this study, the Laminaceae family assigned the largest number of anti-headache medicinal plants to itself. In some of the other studies, the Laminaceae family assigned the largest number of ethnobotanical studies to themselves due to the weather conditions and soil characteristics [16, 17]. Severe changes in climatic conditions and recent droughts have definitely been effective in reducing the species richness of the region. Our study showed that decoction is the most frequent traditional method of using medicinal plants. In other ethnobotanical studies, the most commonly traditional method to use medicinal plants was reported to be decoction [18]. The ease of access to traditional medicine sources and their cost effectiveness have made people tend highly to use traditional and medicinal plants. People hold the indigenous knowledge of using these valuable medicinal resources (medicinal plants) and this knowledge is transferred from generation to generation. These valuable studies should thus be recorded and kept to preserve this indigenous knowledge [19]. The bioactive compounds and antioxidants present in medicinal plants can effectively help prevent and treat various disorders and diseases, including anemia, cardiovascular diseases, diabetes, and chronic inflammation, by neutralizing free radicals and reducing oxidative stress [20-25].

Conclusion

Considering the diversity of medicinal plants in this region and the importance of medicinal plants in the advancement of Iran's pharmaceutical industry, we had better find a solution to preserve and protect these valuable resources and prevent the loss and destruction of plants. These valuable resources can be used to produce effective anti-headache medicinal plants.

Statements and Declarations

Competing interests

The authors have no competing interests to declare that are relevant to the content of this article.

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None.

Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

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