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ORIGINAL ARTICLE

Ethnopharmacobotanical Findings of Medicinal Plants in the Kızılcahamam District of Ankara, Turkey

Ankara'nın Kızılcahamam İlçesi (Türkiye) Tıbbi Bitkilerinin Etnofarmakobotanik Bulguları

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ABSTRACT

Objectives: Folk medicines in Kızılcıhamam has not been investigated in detail so far. Thus, this study aimed to conduct a comprehensive investigation of folk medicine in the Kızılcahamam district.

Materials and Methods: Nine scientific field trips were organized to Kızılcahamam between April 2007 and July 2008. Data were obtained by field interviews with local people using open and semi-structured questionnaires. Results were evaluated statistically with the "use-value", "informant consensus factor" and cultural importance index.

Results: Sixty-five species (69 taxa) that belong to 58 genera of 31 families were determined to be used as folk medicines. To the best of our knowledge, this is the first study to record four of these species as folk medicines. Plants from Compositae, Lamiaceae and Rosaceae families were used most frequently as folk medicines in Kızılcahamam. Plants in the study area are mainly used for gastrointestinal system problems, respiratory disorders, and urinary tract diseases. Residents from 41% of the villages where the scientific trips were carried out, declared that they are not using or interested in folk medicines.

Conclusion: This study highlights once again the gradual reduction of folk medicinal knowledge and the urgent need for folk medicine investigations in all parts of Turkey.

Key words: Ankara, folk medicines, ethnobotany, medicinal plants, Kızılcahamam

ÖZ

Amaç: Kızılcahamam halk ilaçları şu ana kadar detaylı bir şekilde araştırılmamıştır. Bu nedenle, bu çalışmada Kızılcahamam ilçesinin halk ilaçlarının kapsamlı bir şekilde incelenmesi amaçlanmıştır.

Gereç ve Yöntemler: 2007 yılı Nisan ayı ile 2008 yılı Temmuz ayları arasında Kızılcahamam'a dokuz bilimsel saha gezisi düzenlenmiştir. Veriler saha çalışmaları esnasında yerel halk ile yapılan açık ve yarı yapılandırılmış bir anket kullanılarak elde edilmiştir. Sonuçlar istatistiksel olarak "kullanım değeri", "bilgilendirici fikir birliği faktörü" ve "kültürel önem endeksi" hesaplanarak değerlendirilmiştir.

Bulgular: Otuz bir familyadan 58 cinse ait 65 türün (69 takson) halk ilacı olarak kullanıldığı belirlenmiştir. Bildiğimiz kadarıyla bu türlerden dördü ilk kez bu çalışma ile halk ilacı olarak kayıt altına alınmıştır. Kızılcahamam'da en çok Compositae, Lamiaceae ve Rosaceae familyalarından bitkilerin halk ilacı olarak kullanıldığı belirlenmiştir. Çalışma alanındaki bitkiler, ağırlıklı olarak mide-bağırsak sistemi problemleri, solunum ve idrar yolu hastalıkları için kullanılmaktadır. Bilimsel gezilerin yapıldığı köylerin %41'inde görüşülen kişiler halk ilaçları kullanmadıklarını veya halk ilaçları ile ilgilenmediklerini beyan etmişlerdir.

Sonuç: Türkiye'nin her bölgesinde halk ilacı bilgisinin giderek azaldığı ve halk ilacı araştırmalarına acil ihtiyaç duyulduğu bu çalışma ile bir kez daha vurgulanmıştır.

Anahtar kelimeler: Ankara, halk ilaçları, etnobotani, tıbbi bitkiler, Kızılcahamam

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INTRODUCTION

Turkey has a quite rich flora with approximately 12,000 taxa.[1] Considering factors such as geographic position, topographical structure, climate, and richness of flora, forming a bridge between the east and west and hosting many civilizations and ethnic diversity, the Anatolian Peninsula is an extremely important region for folk medicines. This important knowledge, gained through trial and error for centuries and transferred from generation to generation, is also an important resource for herbal drug research. Nevertheless, this valuable knowledge is rapidly disappearing because of factors such as migration from villages to big cities, easy access to physicians and pharmacies, young people's indifference to folk medicines, and industrialization and destruction of nature.[2-4] For the aforementioned reasons, this rapidly disappearing treasure of Turkey should be investigated and recorded by experts comprehensively.

One of the cities that need to be studied in terms of ethnobotany in Turkey is Ankara. Despite previous investigations of the ethnobotany of some districts of Ankara, no comprehensive study was conducted in other districts. These studies, conducted in various districts of Ankara, revealed a rich ethnobotanical accumulation. For example, Şimşek et al.[5] reported that 192 usages for 85 plant species from 31 families were recorded in 25 localities of Beypazarı, Ayaş, and Güdül districts. Sarper et al.[6] found that 50 plant species from 18 families were used for treatment, food, and similar purposes in the Haymana district. Moreover, Elçi and Erik[7] revealed that 23 plant species in only six localities in Güdül and Kızılcahamam districts were used for ethnobotanical purposes. Sezik et al.[8] carried out folk medicine research in 28 localities with sampling method from six districts of Ankara (i.e., Yenimahalle, Kazan, Bala, Altındağ, Keçioren, and Çubuk) and stated that 47 species of 42 genera and 22 families were used as folk medicines. In the Çamlıdere district, the neighbor of Kızılcahamam, 79 plant taxa belonging to 66 genera and 33 families were used for the treatment of various disorders. Additionally, eight new folk medicines were included in the Turkish ethnobotanical inventory in this study.[2] However, no comprehensive folk medicine study was conducted in the Kızılcahamam district.

The Kızılcahamam district is located in the northern part of Ankara and mainly under the influence of Iran-Turan floristic area because of its location in Central Anatolia. According to taxonomic studies, the flora of Kızılcahamam is quite rich, and three floristic regions are influential in Kızılcahamam, namely, Euro-Siberian, Mediterranean, and Irano-Turanian [Eyüboğlu Ö. Kızılcahamam Soğuksu Milli Parkı'nın Florası (MSc Thesis), Ankara: Gazi University; 1991. Yıldırım A. Kocaçay Vadisi Kızılcahamam-Çeltikçi (Ankara) Arası Segetal Florası (MSc Thesis), Ankara: Gazi University; 1994]. Conversely, the district has a rich cultural heritage, as it is a transit point in Anatolia.[9] Kızılcahamam is a remarkable study area because of its geographical location, rich biota, cultural accumulation, and significant ethnobotanical findings of neighboring districts [Eyüboğlu Ö. Kızılcahamam Soğuksu Milli Parkı'nın Florası (MSc Thesis), Ankara: Gazi University; 1991. Yıldırım A. Kocaçay Vadisi Kızılcahamam-Çeltikçi (Ankara) Arası Segetal Florası (MSc Thesis), Ankara: Gazi University; 1994. http://www.kizilcahamam.gov.tr/].[9] To the best of our knowledge, no folk medicine studies have covered the entire Kızılcahamam district. Thus, this study aimed to perform a comprehensive investigation of the folk medicine in the Kızılcahamam district.

MATERIALS AND METHODS

Research area

Kızılcahamam is one of the 24 districts of Ankara (Turkey). In history, Kızılcahamam was thought to be used as a settlement place since the Hittites and had been dominated by Phrygians, Scythians, Persians, Alexander the Great, Celts, and Roman Empire. Following the occupation by Arabs in 654, it was again dominated by Roman Empire. By the Malazgirt victory (1071), the majority of the region's population began to be formed by Turks. In the Ottoman Empire period, the Kızılcahamam region was called "Yabanabad," and the region was an important accommodation place that connects Asia and Europe. The first known center of the district is Demirciören village. However, in 1915, the district center moved to Şorba village and remains the center (http://www.kizilcahamam.gov.tr/).

The Kızılcahamam district, which has 105 villages, is situated in north 40.46° latitude, east 32.65° longitude (northwest of Ankara), and A4 square according to Davis's grid system (Figure 1).[10] It is surrounded by Çubuk in the East, Çamlıdere and Güdül in the West, Ayaş and Kazan in the South, and Çerkeş and Gerede in the north (Figure 1). Its distance to Ankara is 79 km, with acreage of 1712 km^2, and altitude of 975 m. Harami Hill (2053 m) and Işık Mountain (2030 m), which are the highest places in Ankara, are within the boundaries of the district. Given its broken and mountainous physical structure, the district has plateaus, such as Yemişen, Hıdırlar, Miyala, Salın, Eldelek, Başköy, Yıldırım, and Kırık, and several streams among these plateaus (http://www.kizilcahamam.bel.tr/2103/Cografi-Konum). Aluç, Beykaya, Yıldırım, and Kavaklı Mountains are the important mountains of the district. Kızılcahamam is quite rich in water resources, in addition to three damns (namely, Kurtboğazı, Eğrekkaya, and Akyar) that satisfy the water requirement of Ankara, and it attracts attention with an abundance of underground water resources. Kocaçay, Kirmir, and Kurtboğazı are important streams of Kızılcahamam.

The region is under the influence of continental and Black Sea climate. It is cold and snowy in winters and hot and droughty in summers. As it has many forests, it is rainy in every season. The average temperature is +11°C, and the average humidity is 66%. The highest temperature is observed in August as +34°C, while the lowest temperature is observed in February at -20°C (http://www.kizilcahamam.gov.tr/). It has a population of 32,647, and the main sources of livelihood are agriculture, livestock, apiculture, and spa tourism (http://www.tuik.gov.tr/Start.do).[9]

The Soğuksu National Park, one of the most important national parks of Turkey, is located within the borders of Kızılcahamam. As it constitutes a transition between steppe and forest

zones, the Soğuksu National Park, covering 1195 hectares, has an extremely rich biota [Turan M. Fayda-Maliyet Analizi Kapsaminda Kızılcahamam Soğuksu Milli Parkı İncelemesi (MSc), Ankara: Ankara University; 2007). In a study investigating the flora of the Soğuksu National Park, a total of 474 species from 74 families were identified, and 49 of these species were endemic. Researchers also reported that the Soğuksu National Park has the floristic elements of the Euro-Siberian and Mediterranean geographical regions. Compositae, Leguminosae, Poaceae, Lamiaceae, and Brassicaceae were the most common families. Forest vegetation mainly consists of *Pinus sylvestris* L., *Pinus nigra* J. F. Arnold, *Abies nordmanniana* (Steven) Spach subsp. *equi-trojani* (Asch. & Sint. ex Boiss.) Coode & Cullen, and *Quercus pubescens* Willd. [Eyüboğlu Ö. Kızılcahamam Soğuksu Milli Parkı'nın Florası (MSc Thesis), Ankara: Gazi University; 1991].

Field trips

Nine scientific field trips were organized to Kızılcahamam between April 2007 and July 2008. Generally, brief information about the aim and scope of the study was given to the local authority (called *mukhtar*) at each settlement area. Afterward, people that are knowledgeable about the folk remedies and elders of villages were reached through mukhtars. Face-to-face interviews were conducted in a suitable setting with 57 people by using open and semi-structured questionnaires. Data obtained during the interviews were recorded. General questions (local name of medicinal plants, used parts, purpose of usage, preparation and application method, source of information, etc.) were asked. After each interview, the plants that used as folk medicines were found for in the field under the guidance of the informants. Subsequently, plant samples were taken and appropriately prepared as herbarium materials. To increase the accuracy in identification, flowering or fruiting plants were collected. Therefore, scientific trips were organized to the region between April and July to coincide with the flowering or fruiting period. Plant specimens were identified by Prof. Dr. Galip Akaydın, through Davis's "Flora of Turkey and the East Aegean Islands,"[1,10,11] and the Latin names of identified plant species were updated according to The Plant List (http://www.theplantlist.org/, revision date: 23.02.2021), while the endemism status were checked from "Türkiye Bitkileri Listesi"[12] After botanical identification, plant specimens were preserved in Gazi University Faculty of Pharmacy Herbarium (GUEF). Visited locations are shown in Figure 1.

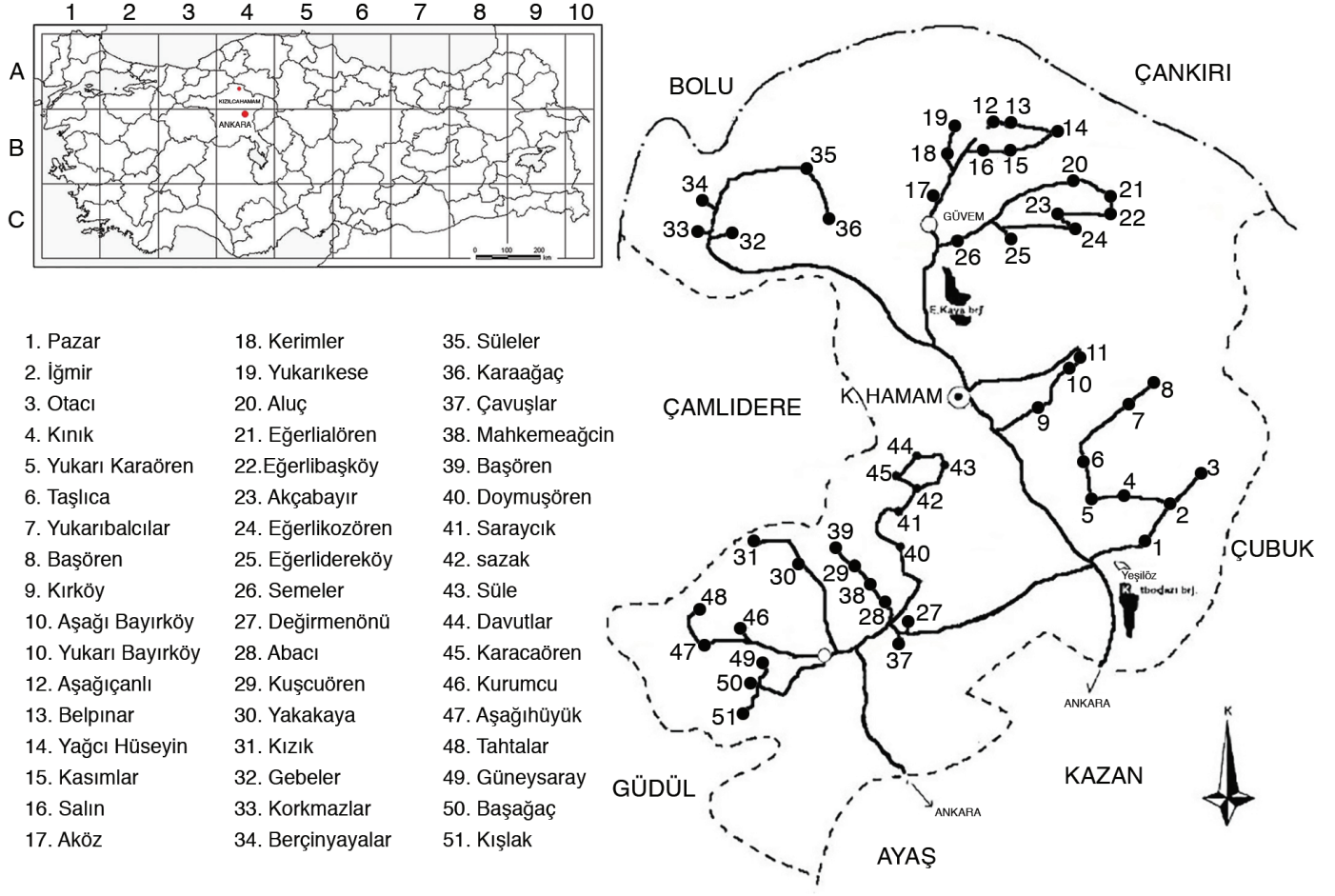

Figure 1. Position of Ankara and Kızılcahamam in Davis's grid system and visited locations

Statistical analysis

Initially, the distribution of folk medicines among 11 pharmacological categories was determined. Subsequently, the informant consensus factor (FIC), use value (UV), and cultural importance index (CI) were calculated using previously described formulas.[2] High FIC degrees (close to 1) correlate with the consent for the use of folk medicine in specific situations by the informant, while the high UV and CI signifies the importance of a plant and high frequency of declaration.[13-16]

RESULTS

Kızılcahamam folk remedies have not been investigated in detail previously. Thus, the ones that are still not forgotten in the folk medicine accumulation of the district were determined and recorded by field studies. During our research, nine field trips were organized to the district, and 51 localities were visited (Figure 1). After the study, people knowledgeable about folk medicine could be reached in 30 of these locations, while there were no knowledgeable people in the other 21 locations. After the identification of plant specimens, 65 species (69 taxa) from 58 genera and 31 families were determined to be used as folk medicines. While seven of the species used as folk medicines in the district were cultivated plants, the rest were wild. The plants used as folk medicine in Kızılcahamam are compiled together and presented in Table 1. In this table, the Latin names of the medicinal plants are given alphabetically (by family and species name) with other relevant data (GUEF numbers, local names, purpose of usages, preparation, and administration methods).

Table 1 shows that Compositae (13 genera, 12 species, and 13 taxa), Lamiaceae (6 genera, 9 species, and 10 taxa), and Rosaceae (7 genera, 9 species, and 9 taxa) are the most commonly referred families in Kızılcahamam as folk medicines (Figure 2). In addition, the most cited plant species are *Malva neglecta*, *Urtica dioica*, *Pinus nigra* subsp. *pallasiana*, *Pinus sylvestris,* and *Rosa canina* (with UV values of 0.29, 0.28, 0.21, 0.17, and 0.17, respectively). Some differences were noted in this order according to the CI, *Urtica dioica* at the first place (CI: 0.98), *Malva neglecta* and *Rosa canina* at the second place (CI: 0.43), and *Cota tinctoria* and *Viscum album* at the third rank (CI: 0.35) (Table 1).

Folk medicines are generally used after certain preparation methods in the area, while only 32% of them are used directly. For example, half of the folk medicines used internally are prepared as tea (33.9% decoction and 16.7% infusion) in Kızılcahamam. Some of the internally used folk remedies were prepared as meals (e.g., *Beta lomatogona* and *Malva neglecta*), jam (e.g., *Rosa canina*), or poultice (e.g., *Malva neglecta* and *Quercus robur*) before use. Interesting uses such as intrauterine administration of *Malva neglecta* for women's infertility were also noted (Table 1). Regarding forms of administration, folk medicines were generally used orally (83.4%) (Table 2).

Folk remedies identified in Kızılcahamam are generally monocomponent and process in a simple preparation. The most preferred plant parts in Kızılcahamam folk medicine are aerial parts, leaf, and fruit. However, inflorescence (e.g., *Tilia rubra* subsp. *caucasica*), fresh shoot (e.g., *Pinus nigra* subsp. *pallasiana*), phloem (the tissue that appears after peeling the peridem tissue of *Pinus sylvestris* stem), and whole plant (e.g., *Viscum album*) are the least used parts (Figure 3).

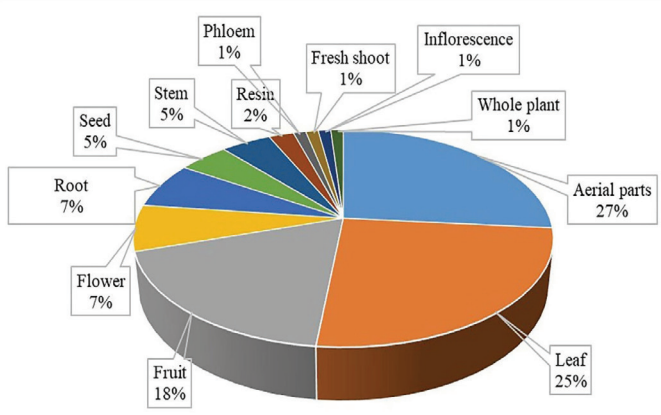

Figure 3. Distribution chart of plants according to used parts

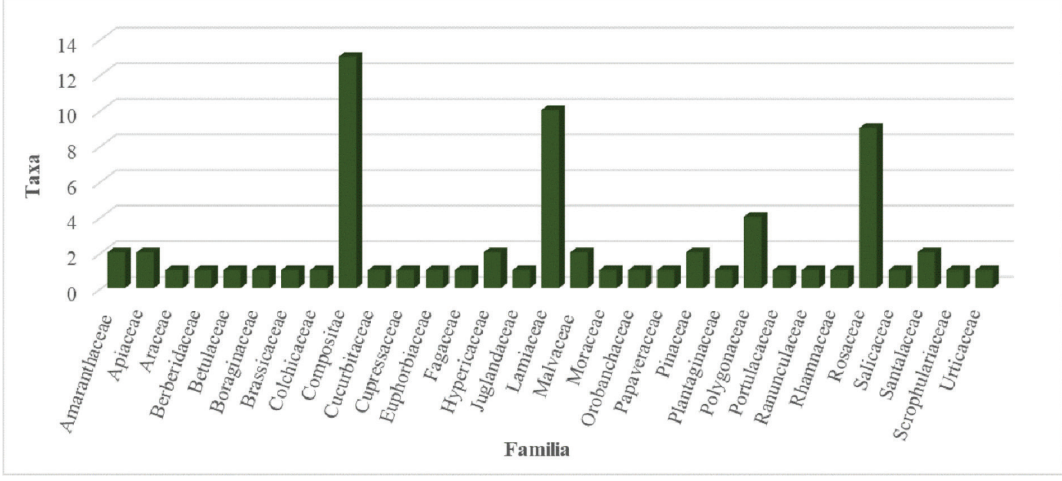

Figure 2. Distribution chart of plants according to family

Table 1. Ethnobotanical usages of plants in Kızılcahamam district

Family and scientific name (GUEF no)	Locality[a]	Local name	Used part[b]	Purpose of usage, preparation and application method[b]	UV	CI
Amaranthaceae						
Beta lomatogona Fisch. & C. A. Mey. (2690)	27	Göverek	A.p.	For constipation; (I), e.d. or cooked as meal.	0.03	0.01
Chenopodium album L. (2693)	27	Sirken	A.p.	For constipation; (I), eaten fresh.	0.01	0.01
Apiaceae						
Foeniculum vulgare Mill. (2752)*	51	Rezene	L.	For stomach disorders; (I), dec.	0.01	0.01
Petroselinum crispum (Mill.) Fuss*	-	Maydanoz	A.p.	For inflammation; (I), e.d.	0.01	0.01
Araceae						
Arum euxinum R. R. Mill (2631, 2645)	5, 12	Gavur mancarı	Ro.	For hemorrhoid; (I), mixed with rye flour and honey to obtain a pill and eaten on empty stomach for a few days. Or smashed Ro. are mixed with honey and eaten. For leukemia; (I), e.d. or cooked. For hypercholesterolemia; (I), e.d.	0.07	0.12
			Ro./ L.	As foodstuff; (I), e.d. (just L.) or roasted, mixed with honey and eaten.		-
Berberidaceae						
Berberis crataegina DC. (2732)	46	Ak çalı	Fr.	For pain; (I), dec.	0.01	0.01
Betulaceae						
Corylus avellana L.	-	Fındık	L.	For snake bite; (E), crushed leaves are wrapped on affected area.	0.01	0.01
Boraginaceae						
Echium italicum L. (2653)	19	Kızılcık otu, kızılbacak	Ro.	For wound healing and abscess; (E), Ro. is roasted with butter to obtain an ointment, then app. aff. and covered with cloth. Or Ro. collected in the autumn are chopped, mixed with soap, sugar and egg yolk (this mixture is named as "sweet ointment"), app. aff., covered with cloth.	0.07	0.01
Brassicaceae						
Sinapis arvensis L. (2728)	46	Hardal	Se.	For kidney stone; (I), eaten.	0.01	0.01
Colchicaceae						
Colchicum szovitsii Fisch. & C. A. Mey. (2644)	12	Siğilotu, boru otu	L.	For hyperglycemia; (I), as dec.	0.01	0.01
Compositae						
Achillea sp. (2627)	3	Kokağan otu	A.p.	As perfume; (E), applied to hands.	0.01	0.01
Arctium minus (Hill) Bernh. (2651, 2704, 2717)	16, 42, 46	Kabalak	L.	For rheumatismal pain; (E), wrapped on affected area until recovery with intervals.	0.05	0.05
Cota tinctoria (L.) J. Gay (2666, 2680, 2694, 2698, 2711)	32, 36, 27, 38, 45	Beyaz papatya, papatya, akbaba	F.	For stomach disorders; (I), dec. with *Rosa canina* L. Fr. (daily 3x1-2 tea glass full dec. for 1-2 month). For cough and stomachache; (I), dec. with apple Fr. rind. For urinary tract inflammation; (I), inf. is drunk until recovery. To lose weight, as diuretic; (I), dec.	0.10	0.35

Table 1. continued

Family and scientific name (GUEF no)	Locality[a]	Local name	Used part[b]	Purpose of usage, preparation and application method[b]	UV	CI
Centaurea solstitialis L. (2656)	25	Çayır dikeni	Flowering A.p.	For hemorrhoid and constipation; (I), a glass of dec. is drunk on empty stomach.	0.03	0.01
Chondrilla juncea L. (2686)	36	Ciklet	Ro. Lt.	As stomachic; (I), Lt. obtained from Ro. is air dried and chewed.	0.01	0.01
Cichorium intybus L. (2731, 2750)	46, 51	Sütleğen	Ro. Lt.	For dental disorders; (I), Lt. obtained from drilled Ro. is dried and chewed.	0.03	0.03
Cirsium arvense (L.) Scop. (2709)	45	Isırgan	A.p.	For urinary tract and prostate disorders; (I), as dec.	0.03	0.01
Cyanus depressus (M. Bieb.) Soják (2707)	42	-	A.p.	For heart health and vascular occlusion; (I), dec. is prepared with a sprinkle of A.p. and drunk after gets warm.	0.03	0.01
Inula oculus-christi L. (2743)	50	Mayasılotu	L.	For hemorrhoid; (I), dried and crushed leaves are drunk with a glass of water.	0.01	0.01
Onopordum turcicum Danin (2695)	27	Galgan	F.	For hyperglycemia; (I), dec.	0.01	0.01
Taraxacum scaturiginosum G. E. Haglund (2633)	6	Ağacakavağı, hindiba, eşek karakavuğu	L.	For hyperglycemia, hypertension and hypercholesterolemia; (I), e.d.	0.05	0.03
Tragopogon dubius Scop. (2730)	46	Yemlik	L.	For wound healing; (I), e.d.	0.01	0.01
Tripleurospermum elongatum (DC.) Bornm. (2641, 2714)	11, 46	Papatya otu	L.	For bronchitis; (I), inf. (daily 1 glass on empty stomach in the mornings or 3-4x1 glass) or inf. with A.p. of *Urtica dioica* L. For stomach disorders; (I), dec. For prostate disorders; (I), inf. with A.p. of *Urtica dioica* L.	0.05	0.10
Cucurbitaceae						
Citrullus lanatus (Thunb.) Matsum. & Nakai*		Karpuz	Fr.	For stomachache and prostate disorders; (I), Fr. juice is drunk (daily 2x1 glass) on empty stomach for at least one week.	0.03	0.03
Cupressaceae						
Juniperus communis L. var. *saxatilis* Pall. (2652, 2712)	16, 46	Ardıç	Ro., S. Fr.	For eczema; (I), tar obtained from Ro. and S. by dry distillation is drunk with water on empty stomach. For shortness of breath; (I), as dec.	0.03	0.07
Euphorbiaceae						
Euphorbia condylocarpa M. Bieb. (2648)	12	Sütleğen	Lt.	For inflamed wounds; Lt. that obtained from torn plant were app. aff.	0.01	0.01
Fagaceae						
Quercus robur L. (2653, 2721)	21, 46	Meşe, karaağaç	G. L. Ro.	For heart disorders; (I), e.d. For stomachache; (I), dec. For knee pain; (E), prepared po. from fresh Ro., app. aff. for one night. This application is repeated for 3-4 day.	0.05	0.10
Hypericaceae						
Hypericum heterophyllum Vent. (2677)	33	Yağşan otu	A.p.	For wounds on animals: (E), app. aff.	0.01	0.01

Table 1. continued

Family and scientific name (GUEF no)	Locality[a]	Local name	Used part[b]	Purpose of usage, preparation and application method[b]	UV	CI
Hypericum perforatum L. (2663, 2670, 2691)	32, 33, 27	-	A.p., F.	For stomachache or gastric ulcer; (I), as dec., is drunk until the pain is over.	0.05	0.05
Juglandaceae						
Juglans regia L. (2652, 2697, 2705, 2720)	19, 38, 42, 46	Ceviz	Se.	For diabetes; (I), 15-20 Se. crushed and macerated in a glass of water for one night. In the morning, a tea cup of maceration water is drunk and 1-2 Se. are eaten. Or juice of half lemon and 3 Se. are added to a glass of water and waited for one night. In the morning, maceration water is drunk and Se. is eaten. This application is repeated for 15-20 days. For, high cholesterol; (I), fresh cotyledons macerated with water for one night. In the morning, maceration water is drunk and cotyledons are eaten. For goiter; (I), marble sized immature Se. is swallowed with water.	0.07	0.14
Lamiaceae						
Ajuga chamaepitys (L.) Schreb. subsp. *chia* (Schreb.) Arcang. (2647)	12	Ömür çiçeği	F.	For hemorrhoid; (E), directly app. aff.	0.01	0.01
Ballota larendana Boiss. & Heldr. (2724)	46	-	A.p.	For women's infertility; (E), boiled with milk and used as sitz bath for one week. Application starts in the morning and continues until the evening. It causes excessive sweating. At this time, patient should be protected from cold.	0.01	0.01
Mentha aquatica L. (2628, 2748)	3, 51	Su nanesi	L.	For stomachache; (I), dec.	0.03	0.03
Mentha longifolia (L.) L. (2667)	32	Yarpuz	A.p.	For inflammation; (I), inf.	0.01	0.01
Mentha x *piperita* L.* (2737)	46	Nane	A.p.	For abdominal pain and common cold; (I), e.d. or as dec.	0.07	0.03
Phlomis sp. (2640)	11	Kedi kulağı	A.p.	For gastric ulcer; (I), inf. (daily 2-3x1 glass).	0.01	0.01
Sideritis germanicopolitana Bornm. (2672)	33	Adaçayı	A.p.	For cough; (I), inf. with lemon and thyme. For kidney inflammation and other inflammations; (I), inf. with one slice of lemon (people who have liver diseases should not use this preparation).	0.05	0.05
Thymus leucostomus Hausskn. & Velen. (2681, 2699, 2702, 2729)	36, 38, 42, 46	Kekik	A.p.	For stomachache, asthma, bronchitis and as panacea; (I), inf. For cough; (I), inf. with F. of *Cota tinctoria*.	0.08	0.21
Thymus leucotrichus Halácsy (2669)	34	Kekik	A.p.	For cough; (I), inf. is prepared by a sprinkle of *Thymus leucotrichus*, A.p. of sage and lemon for 5-10 minutes, drunk after adding sugar.	0.01	0.01
Thymus longicaulis C. Presl subsp. *chaubardii* (Rchb.f.) Jalas (2646, 2664)	12, 32	Kekik	A.p.	For asthma and bronchitis; (I), inf. (daily 3x1-2 tea cup, for 1-3 months). For stomach disorders; (I), inf. As spice.	0.07	0.08

Table 1. continued

Family and scientific name (GUEF no)	Locality[a]	Local name	Used part[b]	Purpose of usage, preparation and application method[b]	UV	CI
Malvaceae						
Malva neglecta Wallr. (2635, 2665 2682, 2689, 2723, 2747)	10, 32, 36, 27, 46, 51	Ebemgömeci, ebemkömeci	A.p.	For hyperglycemia; (I), inf. or e.d. or cooked as meal. For stomach disorders; (I), inf. or e.d. or cooked as meal. (E), po. m., applied on abdomen. For constipation; (E), po. m., applied on abdomen. (I), e.d. or dec. For hemorrhoid; (E), fresh or dried A.p. boiled with milk and app. aff. This application drains the inflammation. Or (I), cooked as meal. For pain in waist and knee, rheumatismal pain; (E), boiled to obtain a po. and app. aff. or (I), dec. Women's infertility; crushed and boiled in water and milk added to obtain a po., after the milk has absorbed, placed into uterus. Or boiled in milk, as sitz bath. Or crushed and boiled in milk and water to obtain a po., then placed into uterus. Or boiled in milk, as sitz bath.	0.29	0.43
			L.	For prostate disorders; (I), dec.		
Tilia rubra DC. subsp. *caucasica* (Rupr.) V. Engl. (2675, 2678)	33, 36	Yabani ıhlamur, dağ ıhlamuru	Inflorescence with bracts	For common cold; (I), inf. For asthma, cough, tonsillitis, abdominal pain and as sedative for children; (I), as dec. Residue could be used to prepare dec. for 2-3 times.	0.10	0.10
Moraceae						
Morus nigra L.* (2735)	46	Dut	Fr.	As blood-former; (I), e.d.	0.01	0.01
Orobanchaceae						
Rhinanthus serotinus (Schönh.) Oborny subsp. *aestivalis* (N.W.Zinger) Dostál (2715)	46	-	Se.	For urinary tract disorders; (I), dec.	0.01	0.01
Papaveraceae						
Chelidonium majus L. (2685)	36	Temreotu	Lt.	For "temre" (a skin disorder); (E), the Lt. that running from plucked leaves is app. aff.	0.01	0.01
Pinaceae						
Pinus nigra J. F. Arnold subsp. *pallasiana* (Lamb.) Holmboe (2639)	11	Çam	Fresh shoot	For shortness of breath and asthma; (I), inf. is drunk at two times a day after waiting in cold for one night. Or e.d.	0.21	0.03
			S.	For shortness of breath and asthma; (I), dec., for 10 days. For inflamed wounds; (I), dec.		
			R.	For shortness of breath and asthma; (I), mixed with honey. For abscess and wound healing; (E), directly, or mixed with honey or mixed with soap, app. aff. It heals the wound and drains the inflammation. For removing foreign objects from skin (e.g. splinter); (E), app. aff.		

Table 1. continued

Family and scientific name (GUEF no)	Locality[a]	Local name	Used part[b]	Purpose of usage, preparation and application method[b]	UV	CI
Pinus sylvestris L. (2625, 2638, 2654, 2746)	2, 11, 21, 51	Çam	Ph.	For lung disorders, tuberculosis, asthma, stomachache; (I), mixed with honey and eaten.	0.17	0.28
			Se.	Stomach disorders; (I), crushed, mixed with honey and eaten. For shortness of breath; (I), crushed Se. is mixed with honey and eaten.		
			R.	For removing foreign objects from skin (e.g. splinter); (E), app. aff.		
			C.	For shortness of breath: (I), dec. prepared with a handful of C. that collected in the November. Or small immature C. is mixed with honey and eaten. Women's urinary tract disorders; (I), dec. with C., equal amount of leaves of *Cydonia oblonga* and A.p. of nettle (3 times in a day, for 1-3 months).		
Plantaginaceae						
Plantago major L. (2703, 2706, 2710, 2716)	42, 45, 46	Siğil otu	L.	For abscess; (E), app. aff. For gastric ulcer; (I), mixed with honey, butter and eaten.	0.05	0.10
Polygonaceae						
Polygonum cognatum Meissn. (2629, 2634, 2688)	3, 9, 27	Madımalak, kadımalak, dağ mancarı, üfelek	A.p.	For stomach and intestinal disorders; (I), boiled and eaten. As foodstuff: (I), e.d.	0.05	0.10
Rumex crispus L. (2649, 2749)	12, 51	Kenger, kuzukulağı	L.	For hyperglycemia; (I), e.d. As appetite suppressant; (I), eaten.	0.03	0.07
Rumex scutatus L. (2626)	3	Acıkıcı	A.p.	As foodstuff; (I), e.d.	0.01	0.01
Rumex sp. (2739)	46	Roka	L.	For hyperglycemia; (I), e.d.	0.01	0.01
Portulacaceae						
Portulaca oleracea L. (2733)	46	Sirkenotu, semizotu	A.p.	For hyperglycemia, inappetency and cancer; (I), e.d.	0.05	0.01
Ranunculaceae						
Nigella sativa L.*	-	Çörekotu	Se.	For shortness of breath; (I), mixed with honey.	0.01	0.01
Rhamnaceae						
Paliurus spina-christi Mill. (2708, 2751)	42, 51	Karaçalı	Fr.	For stomach disorders and kidney stone; (I), dec.	0.03	0.07
Rosaceae						
Crataegus orientalis Pall. ex M. Bieb. (2740)	46	Kürdili	Fr.	For diarrhea and stomach disorders; (I), mature Fr. are eaten.	0.07	0.05
			F.	For hypertension and hyperglycemia; (I), inf. is drunk in the mornings on empty stomach.		
Cydonia oblonga Mill. (2660, 2692)	28, 27	Ayva	L.	For shortness of breath, bronchitis and cough; (I), dec. is drunk with lemon juice. For women's urinary tract disorders; (I), as dec. with equal amount of leaves of *Cydonia oblonga*, C. of *Pinus sylvestris* L. and A.p. of *Urtica dioica* L. (daily 3x1, for 1-3 month).	0.07	0.03

Table 1. continued

Family and scientific name (GUEF no)	Locality[a]	Local name	Used part[b]	Purpose of usage, preparation and application method[b]	UV	CI
Malus sylvestris (L.) Mill. (2683)	36	Acı elma, yabani elma	Fr.	For hyperglycemia; (I), sugar free compote is prepared with dried Fr. and drunk. Or dried layers of Fr. pulp (this preparation is called as "pestil") are eaten. Or pestil is macerated in water and drunk.	0.05	0.01
Prunus cerasus L.*(2734)	46	Vişne	Fr.	For hyperglycemia; (I), sugar free compote that prepared from Fr. is drunk, marc is eaten as well.	0.01	0.01
Prunus spinosa L. (2636, 2713, 2725)	10, 46	Karamuk	Fr.	For hyperglycemia; (I), dec. prepared from mature black Fr.	0.03	0.03
Rosa canina L. (2632, 2662, 2673, 2687, 2718)	6, 32, 33, 36, 46	Kuşburnu	Fr.	For bronchitis; (I), dec. Or Fr. juice is drunk. Or jam prepared from Fr. is consumed twice a day. For cough and shortness of breath; (I), inf. For hemorrhoid; (I), dec. prepared by boiling for 15 minutes is drunk after get warm. For hyperglycemia; (I), Fr. juice is boiled and drunk on empty stomach (daily 2x1 tea cup). For hypertension; (I), viscous dec. is mixed with water, drunk in the evenings (daily 2-3 glass). For stomach disorders; (I), dec. of Fr. with F. of *Cota tinctoria* (daily 3x1-2 tea cup, for 1-2 month). For prevent diseases; (I), mature Fr. are boiled for 1-2 hour, squashed, sieved, remaining pulps is drunk with water or eaten.	0.17	0.43
Sanguisorba minor Scop. (2700)	41	Tere	L.	For wound healing; (E), crushed, mixed with butter, app. aff. For lung disorders; (I), mixed with honey and eaten.	0.03	0.03
Sorbus domestica L. (2736, 2742, 2744)	46, 50, 51	Övez	Fr. Fr. and L. L.	For children's diarrhea; (I), e.d. For urinary tract disorders; (I), dec. For kidney stone; (I), prepared inf. is drunk on empty stomach after waiting in cold for one night.	0.05	0.10
Sorbus umbellata (Desf.) Fritsch (2741)	46	Alıç	Fr.	For hyperglycemia and heart disorders; (I), dec.	0.03	0.03
Salicaceae						
Salix alba L. (2659)	28	Söğüt	L. S.	For headache; (E), leaves are burnt, obtained ash applied on head. This application must cause wounds on head, otherwise it has no effect. For eczema on hand; (E), S. is burnt, obtained ash mixed with water, hands are washed with supernatant.	0.03	0.03
Santalaceae						
Viscum album L. (2630, 2657, 2676, 2719)	3, 27, 33, 46	Purç	L. W.p. Fr.	For stomachache, prostate disorders and kidney stone; (I), dec. For shortness of breath and hypertension; (I), dec. For leg pain; (I), dec. is drunk and (E), residue app. aff. For leg pain; (E), slivered Fr. is app. aff.	0.12	0.35

Table 1. continued

Family and scientific name (GUEF no)	Locality[a]	Local name	Used part[b]	Purpose of usage, preparation and application method[b]	UV	CI
Viscum album L. subsp. *austriacum* (Wiesb.) Vollm. (2727)	46	Purç	Fr.	For urinary tract inflammation, bronchitis and cough; (I), dec.	0.05	0.03
Scrophulariaceae						
Verbascum insulare Boiss. &Heldr. (2643, 2684, 2701, 2722)	12, 36, 42	Sığırkuyruğu	F.	For wounds on animals: (E), crushed and app. aff.	0.05	0.15
			A.p.	For wounds on animals: (E), wrapped on wounds, this application kills worms on wounds. For fishing: immersed to water. This application kills the fishes.		
Urticaceae						
Urtica dioica L. (2655, 2658, 2661, 2671, 2679, 2696, 2738, 2745)	25, 27, 32, 33, 36, 38, 46, 51	Dalağan otu, Isırgan otu	A.p.	For women's urinary tract disorders; (I), dec. with equal amount of A.p. of *Urtica dioica*, C. of *Pinus sylvestris* and leaves of *Cydonia oblonga* is drunk 3 times a day for 1-3 months. For prostate disorders; (I), inf., on empty stomach, in the evenings. For prostate cancer; (I), inf. is prepared with 500 g fresh A.p. and 4 L water, drunk on empty stomach. For prostate disorders and bronchitis; (I), inf. with leaves of *Tripleurospermum elongatum*. For rheumatism; (I), 1-2 glass of dec. was drunk every day. For shortness of breath; (I), A.p. (without F. and Se.) cooked as meal and eaten every day. For dandruff; (E), dec. of fresh A.p. is applied on scalp after shower. After waiting a while, hair is rinsed. This application is repeated three consecutive baths. For hemorrhoid; (I), inf. is drunk three times a day on empty stomach. Residue could be used to prepare inf. once more. As foodstuff: cooked as meal.	0.28	0.98
			A.p. with Se.	For urinary tract disorders, lung and urinary tract cancer; (I), a glass of dec. is drunk 3 times a day on empty stomach.		
			Se.	For cancer; (I), as dec./inf. or consumed with honey or eaten with meals.		
			L.	For knee pain or rheumatism; (E), knee was bitten to green thin hornet, and L. of *Urtica dioica* app. aff. Or fresh L. is wrapped on affected are for 5-10 minutes.		

[a]: Localities that corresponds the numbers are given in Figure 1, [b]: Abbreviations, *: Cultivated plants, A.p.: Aerial parts, app. aff.: Applied on affected area, C.: Cone, dec.: Decoction, E: Externally, e.d.: Eaten directly, F.: Flower, Fr.: Fruit, G.: Gall, I: Internally, inf.: Infusion, L.: Leaf, Lt.: Latex, Ph.: Phloem, po.: Poultice, po. m.: Poultice with milk, R.: Resin, Ro.: Root, S.: Stem, Se.: Seed, W.p.: Whole plant, UV: Use value, CI: Cultural importance index

During the field studies, diseases that local people tried to treat with folk remedies were classified into 11 groups (Table 3). The distribution of folk medicines according to pharmacological categories in Kızılcahamam is as follows: Respiratory system disorders, 18 medicines and 47 citations; gastrointestinal problems, 28 medicines and 44 citations, and urinary tract problems, 17 medicines and 29 citations (Table 3). Shortness of breath is the most referenced respiratory system disorder that is treated by folk medicines, while hemorrhoid and prostate disorders are illnesses that are attempted to be cured by folk medicines among gastrointestinal system and urinary tract problems. However, this order changes when FIC values are considered; dental diseases have the highest FIC value (1.00), followed by skeletomuscular system disorders (0.69) and respiratory system disorders (0.63) that ranked second and third, respectively. FIC is accepted as being the degree of agreement among the people interviewed concerning the use of a given taxon.[14] Thus, differences according to citation and FIC value were thought to be based on the disagreement among informants and the use of the same folk medicine for very different purposes. Dental disorders have the highest FIC value because of the citation of the same plant twice for dental illness, rather than being popular.

During our field study, a mushroom (*Morchella* sp.) was used for ethnobotanical purposes. It was named as "Kuzugöbeği, ayı mantarı" among local people and used for knee pain, inducing sleep, sedation, and foodstuff by cooking as meal. As it is a member of Kingdom Fungi, it was not listed in the table with other plant-sourced medicines.

DISCUSSION

The result of field studies conducted in the Kızılcahamam district provided important contributions to Turkish Folk Medicine literature. To the best of our knowledge, folk medicinal usage of *Beta lomatogona, Ballota larendana*, *Tripleurospermum elongatum,* and *Verbascum insulare* are recorded firstly within this research in Turkey (Table 1). In addition, four endemic plants, namely, *Arum euxinum*, *Ballota larendana*, *Sideritis germanicopolitana,* and *Verbascum insulare*, were used as folk remedies in the district.

Table 2. Distribution of folk medicines according to their preparation and application methods in Kızılcahamam

Application method	Preparation method	Number	Percentages (%)
Externally	a) Without processing, directly	14	8.0
	b) After process (as poultice, ointment, ...)	15	8.6
Internally	a) Without processing, directly	42	24.1
	b) Infusion	29	16.7
	c) Cooked as meal	9	5.2
	d) Decoction	59	33.9
	e) Other preparations (as jam, pill, ...)	6	3.5
Total		174	100.0

Table 3. Distribution of used plants by pharmacological categories and FIC values

Category of illness	Taxa	All taxa (%)	Use citation	All use citation (%)	FIC value
Respiratory system disorders	18	26.08	47	22.82	0.63
Gastrointestinal system disorders	28	40.57	44	21.36	0.37
Urogenital system disorders	17	24.63	29	14.08	0.43
Metabolic disorders	16	23.18	25	12.14	0.38
Dermatological system disorders	12	17.39	19	9.22	0.39
Skeleto-muscular system disorders	5	7.24	14	6.80	0.69
Cardiovascular disorders	9	13.04	11	5.34	0.20
Immunological disorders	8	11.59	9	4.37	0.13
Central nervous system disorders	3	4.34	3	1.45	0.00
Veterinary disorders	2	2.89	3	1.45	0.5
Dental disorders	1	1.44	2	0.97	1.00

FIC: Informant consensus factor

Folk medicines used in Kızılcahamam have similar usages in different parts of Turkey. The similarity is quite high with Çamlıdere, a border neighboring district of Kızılcahamam. Moreover, 27 of the 69 taxa used as folk medicines in Kızılcahamam have similar uses in Çamlıdere. For example, *Cota tinctoria* (urinary tract inflammation), *Juglans regia* (diabetes), *Viscum album* (shortness of breath and urinary tract disorders), *Malva neglecta* (hemorrhoid and rheumatism), *Cydonia oblonga* (shortness of breath, bronchitis, and cough), *Prunus spinosa* (diabetes) are used for same conditions in both districts. The utilization of *Salix alba* is an interesting example of this similarity, as the ash obtained from its root or leaf is applied to the head for the treatment of headache.[2] In Güdül, another border neighboring district of Ankara, *Paliurus spina-christi* was used for kidney stone similar to its use in Kızılcahamam.[7] Similar utilizations were also discovered with other remote districts of Ankara. For example, *Malva neglecta*, one of the most cited plants in our study area, is used for the treatment of hemorrhoids in Haymana and Beypazarı districts as in Kızılcahamam.[5,6] *Taraxacum scaturiginosum* was used for diabetes (or hyperglycemia) in both Beypazarı and Kızılcahamam districts.[5] *Echium italicum*, *Thymus leucostomus*, and *Sorbus domestica* were used with the same purposes in different districts of Ankara.[5] Similarities were observed with different provinces as well; for example, *Crataegus orientalis* is utilized for hypertension or hyperglycemia in different parts of Anatolia (e.g., Ağrı, Manisa) as in Kızılcahamam.[17-19] *Plantago major* is used for the treatment of abscess in almost every part of Turkey as in Kızılcahamam.[4-6,17,19-23] Furthermore, *Ajuga chamaepitys* subsp. *chia, Morus nigra*, *Centaurea solstitialis, Echium italicum*, and *Sanguisorba minor* were used in different provinces similarly as determined in our study area.[4,19,20,23-26] Similar usages in nearby districts/provinces are already expected. Having similar flora and the ease of idea exchange could be the reasons for this situation. The similar use of folk medicines at different locations may be considered an indication of the accuracy of the identified folk medicinal knowledge. Besides, domestic migration, development of communication, and transport facilities may contribute to the dissemination of information to remote areas.

Conversely, different species of some genera used in Kızılcahamam were detected to have similar usages in different parts of Turkey. When the border neighboring districts were examined, interesting similar utilizations were encountered; one of them is *Tripleurospermum callosum* (Boiss. & Heldr.) E. Hossain used for bronchitis in Çamlıdere, similar to *Tripleurospermum elongatum*. Similarities in the usage between *Prunus avium* (L.) L. and *Prunus cerasus* (diabetes and hyperglycemia), and between *Juniperus oxycedrus* L. and *Juniperus communis* var. *saxatilis* (for eczema) are among other examples.[2] Similarly, in Güdül, *Rumex tuberosus* L. is used for hyperglycemia just as *Rumex crispus* is used in Kızılcahamam.[7] Similar usages were also observed in remote districts of Ankara, such as between *Onopordum turcicum* and *Onopordum acanthium* L., and between *Salix alba* and *Salix babylonica,* which were used in Haymana.[6] The same situation applies for other provinces of Turkey: Some different *Hypericum* species (e.g., *Hypericum polyphyllum* Boiss. & Balansa and *Hypericum empetrifolium* Willd.) are utilized for the treatment of stomach disorders in Ağrı and Muğla, as in Kızılcahamam.[17,27] *Arum* species are other examples. The root of *Arum euxinum* is used for hemorrhoid treatment in Kızılcahamam, and different *Arum* species (e.g., *Arum balansanum* R. R. Mill. and *Arum italicum* Mill.) are also used for the same purpose in different regions of Anatolia.[4,28,29] This may result from local people's assumption that different species of a genus are the same because of morphological similarities. Moreover, different species of a genus are likely to show phytochemical similarity. Thus, based on the information obtained from different regions by information exchange, people may have tried to prepare the same medicine with morphologically similar plants that are grown nearby, seen the same effect, and continued to use them.

Contrary to the abovementioned similarities, quite different usages for the same species were also determined in different parts of Ankara. These differences were observed even in border neighboring districts; for instance, *Cirsium arvense* is used for urinary tract and prostate disorders in Kızılcahamam, while it is used for shortness of breath in Çamlıdere. *Sinapis arvensis* is used for kidney stones in our research area, but it is recommended for shortness of breath in Çamlıdere.[2] Another example is *Crataegus orientalis*, which is used for diarrhea, stomach disorders, hypertension, and hyperglycemia. Unlike the usages detected in Kızılcahamam, this plant is used for shortness of breath and heart disorders in the Güdül district.[7] *Arctium minus*, *Cichorium intybus*, and *Sinapis arvensis* are other examples, which were used for different purposes in different districts of Ankara.[8]

The Anatolian Peninsula has hosted quite different cultures throughout history, and this situation has been inevitably reflected in folk medicinal knowledge. Communities, migrating from different regions throughout history, have blended their folk medicinal knowledge, which was obtained in the region where they came from, with local folk medicine knowledge. Therefore, the usage of the same plant as a folk remedy may vary by region.

Folk medicines are mostly cited for the treatment of gastrointestinal system disorders (especially hemorrhoid and stomach ache), respiratory (especially shortness of breath, asthma, and common colds), and urogenital system problems (especially, prostate disorders) in Kızılcahamam. Considering these results, the aforementioned disorders could be considered the most common health problems in the study area.

When the cited folk medicines are examined, some plants attract attention with their usage in the treatment of disorders which could be hardly noticed by common people. For example, *Cirsium arvense, Citrullus lanatus*, *Malva neglecta, Tripleurospermum elongatum*, *Urtica dioica*, and *Viscum album* are used for the treatment of prostate disorders, but the recognition of this disorder and use of folk medicine for its treatment are interesting. Likewise, informants expressed that they use various folk medicines to treat some illnesses, such

as cancer (*Arum euxinum, Urtica dioica*, and *Portulaca oleracea*), hypercholesterolemia (*Juglans regia*), hyperglycemia (*Prunus spinosa, Rosa canina*, and *Juglans regia*), goiter (*Juglans regia*), and vascular occlusion (*Cyanus depressus*). Recently, these disorders are becoming increasingly widespread. In addition, at present, reaching a physician has become quite easy. Hence, these situations suggest that people start to search for solutions by themselves after being diagnosed by physicians. Moreover, this information could be obtained from various sources. Nevertheless, interviewees indicated that they learned these uses from their ancestors. Therefore, the mentioned usages were included in the present work. In addition, there may be some uses that may result from information pollution obtained from books, television, newspaper, etc., such as the use of *Citrullus lanatus* against prostate disorders. It is rich in lycopene[30] that reduces the risk of prostate disorders.[31] Methanol extract of seeds were demonstrated to cause a significant reduction in the size of the enlarged prostate.[32] However, this usage could be interpreted as a result of information pollution of folk medicine knowledge.

Some interesting folk remedies were encountered in the study area. For example, the phloem of *Pinus sylvestris* is consumed with honey as treatment of stomachache, or the knee is bitten by green thin hornets for the treatment of knee pain and rheumatism. *Echium italicum* is used for wound healing in Kızılcahamam, and according to previous bioactivity research, the ethanol extract of *Echium italicum* root increased wound tensile strength by 37%.[33] Similarly, *Hypericum perforatum, Phlomis* sp.*, Malva neglecta,* and *Rosa canina* are used as folk medicines in peptic ulcer symptoms, and in the literature, these plants have a strong *in vivo* anti-ulcerogenic effect.[34-36] In addition, *Pinus nigra* subsp. *pallasiana* and *Pinus sylvestris* are interestingly used for removing foreign objects from the skin. When their resins were applied to the affected area, foreign materials such as splinters could be removed. The usage of *Cota tinctoria* for weight loss is also interesting. To the best of our knowledge, no study has examined this effect. The investigation of the mentioned effect of *Cota tinctoria* can be a new research topic. It is possible to increase the number of these examples. This situation is a good example to unroll the possible high potential of folk medicines as the starting point for new drug discovery.

Conversely, *Onopordum turcicum* flower is used against hyperglycemia in the research area. In our previous study, this plant species was used to treat diabetes in Çamlıdere, a neighboring district, and local names of this plant are very similar in both districts (called as "galgan" in Kızılcahamam and "Kalkan" in Çamlıdere).[2] The usage of the same folk medicines for the same purposes in two neighboring regions increases the reliability of the data obtained in this study.

In Kızılcahamam, folk medicines are generally preferred if prepared from a single plant species; only 17 of 69 taxa are included in the mixtures. These mixtures are usually prepared as decoction/infusion (e.g., *Cota tinctoria*, *Cydonia oblonga*, and *Rosa canina*), but there are some ointment (e.g., *Echium italicum*) or poultice (e.g., *Malva neglecta*) formulations, as well. These results are consistent with the folk medicine data previously obtained in Turkey because folk remedies are generally prepared as simple formulations and used as a single component.

In this study, although investigations aimed at folk remedies, other ethnobotanical usages of plants rather than their usage in folk medicine were also detected and recorded on the field. For example, *Achillea* sp. is used as perfume by applied on hands; *Arum euxinum*, *Morchella* sp., *Polygonum cognatum, Rumex scutatus, Thymus longicaulis* subsp*. chaubardii,* and *Urtica dioica* are used as foodstuff, and *Verbascum insulare* is used for fishing.

As a result of interviews, the majority of informants in the research area preferred to use modern medicine for the treatment of their illnesses; by contrast, some of the informants expressed that they do not want to use modern medicines because of their side effects, so they try treating illnesses with herbal remedies. However, people who know about folk medicines are limited; in 51 villages, no knowledgeable people or folk medicine users were found in 21 villages (41% of visited locations). However, if this survey was conducted 20 years ago, ethnobotanical information could probably be obtained from all villages. This situation is a very important indicator of the loss of ethnobotanical knowledge owing to modern life.

CONCLUSION

To the best of our knowledge, this is the first study to explore folk medicines in the Kızılcahamam district. This study provided important contributions to the inventory of Turkish Folk Medicines. This study also highlights the rapid disappearance of folk medicine knowledge and urgent need for recording it in all parts of Turkey. Folk remedies are important resources, as they provide advantages on modern drug research. They could be considered as sources that have been shown to be effective on humans and tested for toxicity because they have been used for centuries, and useless or toxic ones were discarded throughout history. In previous bioactivity studies based on folk medicines conducted by our research group, many herbs used as folk remedies in different regions of Anatolia have been shown to be effective against the mentioned bioactivities *in vivo*.[34,35,37-40] Many drugs have been developed based on their traditional use worldwide; aspirin (*Salix* sp.), artemisinin (*Artemisia annua* L.), galantamine (*Galanthus woronowii* Losinsk.) are some examples of compounds developed from plants that were used traditionally.[41-43] Besides recording new folk medicines to the ethnobotanical heritage of Turkey, this study is a valuable source of data for future bioactivity studies and discovery of new drug candidate molecules.

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