

Original Article

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ETHNOPHARMACOBOTANICAL FINDINGS OF MEDICINAL PLANTS IN KIZILCAHAMAM DISTRICT OF ANKARA, TURKEY

ANKARA’NIN KIZILCAHAMAM İLÇESİ (TÜRKİYE) TIBBİ BİTKİLERİNİN ETNOFARMAKOBOTANİK BULGULARI

Türkçe Kısa Başlık: Kızılcahamam Halk İlaçları

İngilizce Kısa Başlık: Medicinal Plants of Kızılcahamam

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Abstract

Objectives: Kızılcahamam folk medicines have not been investigated in detail so far. For this reason, a comprehensive investigation of folk medicine of Kızılcahamam district was aimed at this study.

Materials and Methods: Nine scientific field trips were organised to Kızılcahamam between April 2007 and July 2008. Data were obtained by field interviews with local people using open and semi-structured questionnaire. Results were evaluated statistically with “Use value”, “Informant consensus factor” and “Cultural Importance Index”.

Results: 65 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, four of these species are recorded as folk medicines firstly with this research. Plants from Compositae, Lamiaceae and Rosaceae families were determined to be used most frequently as folk medicines in Kızılcahamam. Plants in the study area are mainly used for gastrointestinal system problems and followed by respiratory 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: Gradual reduction of folk medicinal knowledge and urgent need for folk medicine investigations in all parts of Turkey has highlighted once again by this study.

Keywords: 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 gezi 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: 31 familyadan 58 cinse ait 65 türün (69 takson) halk ilacı olarak kullanıldığı belirlenmiştir. Bildiğimiz kadarıyla bu türlerden dördü ilk kez bu araştırma 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 için kullanılmakta olup, bunu solunum ve idrar yolu hastalıkları takip etmektedir. 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

Introduction

Turkey has a quite rich flora with approximately 12000 taxa.¹ Considering the factors like its geographic position, topographic structure, climate, richness of flora, forming a bridge between east and west, hosting many civilizations and ethnic diversity, 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 due to the factors like migration from villages to the 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 reasons briefly outlined above, this rapidly disappearing treasure of Turkey should be investigated and recorded by experts in a comprehensive manner.

One of the cities that need to be studied in terms of ethnobotany in Turkey is Ankara. Although some districts of Ankara have been studied ethnobotanically, there is still no

comprehensive study in many districts. In these studies, conducted in various districts of Ankara, it is seen that there is a rich ethnobotanical accumulation. For example, in a study conducted by Şimşek et al., 192 usages for 85 plant species from 31 families were recorded in 25 localities of Beypazarı, Ayaş and Güdül districts.⁵ Sarper et al. (2009) found that 50 plant species from 18 families were used for treatment, food, and similar purposes in Haymana district.⁶ In another study conducted by Elçi et al., 23 plant species in only 6 localities in Güdül and Kızılcahamam districts were determined to be used for ethnobotanical purposes.⁷ Sezik et al. carried out folk medicine research in 28 localities with sampling method from 6 districts of Ankara (Yenimahalle, Kazan, Bala, Altındağ, Keçioren, Çubuk) and stated that 47 species of 42 genera and 22 families were used as folk medicine.⁸ In Çamlıdere district, the neighbor of Kızılcahamam, 79 plant taxa belonging to 66 genera and 33 families were recorded to be 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 Kızılcahamam district. Kızılcahamam district is located in the north part of Ankara and mainly under the influence of Iran-Turan floristic area due to its location in Central Anatolia region. According to the taxonomic studies, the flora of Kızılcahamam is quite rich and three floristic regions are influential in Kızılcahamam: 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]. On the other hand, the district has a rich cultural heritage due to being 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, there are no folk medicine studies covering entire Kızılcahamam district. For these reasons, a comprehensive investigation of folk medicine of Kızılcahamam district was aimed at in this study.

Methods

Research area

Kızılcahamam is one of the 24 districts of Ankara (Turkey). In the 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 region's population began to be formed by Turks. In the Ottoman Empire period, 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 is still the center (<http://www.kizilcahamam.gov.tr/>).

Kızılcahamam district, which has 105 villages, is situated in north 40.46° latitude, east 32.65° longitude (north-west 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; Çerkeş and Gerede in the North (Figure 1). Its distance to Ankara is 79 km, acreage is 1712 km², altitude is 975 m. Harami Hill (2053 m.) and Işık Mountain (2030 m.) which are the highest places of Ankara are within the boundaries of the district. Due to its broken and mountainous physical structure, the district has plateaus like Yemişen, Hıdırlar, Miyala, Salın, Eldelek, Başköy, Yıldırım, and Kırık, and a large number of streams among

these plateaus (<http://www.kizilcahamam.bel.tr/2103/Cografik-Konum>). Alu, Beykaya, Yıldırım and Kavaklı Mountains are the important mountains of the district. Kızılcahamam is quite rich in water resources, in addition to 3 dams (Kurtboğazı, Eğrekaya, Akyar) that satisfy the water requirement of Ankara and it attracts attention with an abundance of underground water resources, as well. Kocaçay, Kirmir and Kurtboğazı are the important streams of Kızılcahamam.

The region is under the influence of continental and Black Sea climate. It is cold and snowy in winters, hot and droughty in summers. Due to being forested, it is rainy in every season. The average temperature is +11°C and average humidity is %66. The highest temperature is observed in August as +34°C; while the lowest temperature observed in February is -20°C (<http://www.kizilcahamam.gov.tr/>). Its population is 32647, the main source of livelihood is agriculture, livestock, apiculture and spa tourism (<http://www.tuik.gov.tr/Start.do>).⁹

One of the most important national parks of Turkey, Soğuksu National Park, is located within the borders of Kızılcahamam. Because of constituting a transition between steppe and forest zone, Soğuksu National Park, covering 1195 hectares has extremely rich biota [Turan M. Fayda-Maliyet Analizi Kapsamında Kızılcahamam Soğuksu Milli Parkı İncelemesi (MSc), Ankara: Ankara University; 2007]. In a study investigating the flora of Soğuksu National Park, a total of 474 species from 74 families were identified and 49 of these species were reported to be endemic. Researchers also reported that Soğuksu National Park has the floristic elements of the Euro-Siberian and Mediterranean geographical regions. In addition, Compositae, Leguminosae, Poaceae, Lamiaceae and Brassicaceae were determined to be 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 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. Interviews were conducted with “face-to-face interview technique” in a suitable setting with 57 people by using open and semi-structured questionnaires. The 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 to the interviewees. After each interview, the plants that were determined to be used as folk medicine were found in the field under the guidance of the informants. Subsequently, plant samples were taken and appropriately prepared as herbarium material. In order to provide accuracy in identification, attention was paid to the collection of flowering or fruiting plants. Therefore, scientific trips were organized to the region between April and July to coincide with the flowering or fruiting period. Identification of plant specimens was performed by Prof. Dr. Galip AKAYDIN, through Davis's “Flora of Turkey and the East Aegean Islands”^{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 GUEF (Gazi University Faculty of Pharmacy Herbarium). Visited locations are given in Figure 1.

Statistical methods

Initially, the distribution of folk medicines among 11 pharmacological categories was determined. Subsequently, Informant consensus factor (FIC), Use value (UV) and Cultural Importance Index (CI) were calculated by the formulas which were previously described.² High FIC degrees (close to 1) correlate with the consent for the use of a 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 before. For this reason, 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). At the end of our 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 identification of plant specimens, 65 species (69 taxa) from 58 genera and 31 families were determined to be used as folk medicine. While 7 of the species used as folk medicine in the district were cultivated plants, the rest were wild. The plants found to be used as a folk medicine in Kızılcahamam are compiled together and presented in Supplementary material. In this table, the Latin names of the folk medicinal plants are given alphabetically (by family and species name, respectively) with other relevant data (GUEF numbers, local names, purpose of usages, preparation and administration methods).

Supplementary material shows that Compositae (13 genera, 12 species, 13 taxa), Lamiaceae (6 genera, 9 species, 10 taxa) and Rosaceae (7 genera, 9 species, 9 taxa) are the most commonly referred families in Kızılcahamam as folk medicine (Figure 2). In addition, the most cited plant species are *Malva neglecta*, *Urtica dioica*, *Pinus nigra* subsp. *pallasiana*, *Pinus sylvestris* and *Rosa canina* in the district (UV values 0.29, 0.28, 0.21, 0.17 and 0.17, respectively). There are some differences in this order according to CI; *Urtica dioica* is at the first place (CI = 0.98), *Malva neglecta* and *Rosa canina* are in the second-order (CI = 0.43) and *Cota tinctoria* and *Viscum album* are in the third order (CI = 0.35) (Supplementary material).

Folk medicines are generally used after certain preparation methods in the area while just 32% of them are used directly. For example, half of the folk medicines used internally are prepared as tea (33.9% decoction; 16.7% infusion) in Kızılcahamam. In addition, it was determined that some of the internally used folk remedies were prepared as meals (e.g. *Beta lomatogona*, *Malva neglecta*), jam (e.g. *Rosa canina*) or poultice (e.g. *Malva neglecta*, *Quercus robur*) before use. Interesting uses such as intrauterine administration of *Malva neglecta* for women's infertility were also found (Supplementary material). When the forms of administration were analysed, it was determined that the folk medicines were generally used orally (83.4 %) in the studied district as shown in Table 1.

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

Table 1. Distribution of folk medicines according to their preparation and application methods in Kızılcahamam.

Application method	Preparation method	Number	Percentages (%)
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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

During the field studies, diseases that local people tried to treat with folk remedies were classified into 11 groups (Table 2). The distribution of folk medicines according to pharmacological categories is the treatment of respiratory system disorders (18 medicines, 47 citations), gastrointestinal problems (28 medicines, 44 citations) and urinary tract problems (17 medicines, 29 citations) in Kızılcahamam (Table 2). Shortness of breath is the most referenced respiratory system disorder that is treated by folk medicines; while hemorrhoid and prostate disorders are the 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), skeleto-muscular system disorders (0.69) and respiratory system disorders (0.63) are in the second and third place, respectively. FIC is accepted as being the degree of agreement among the different people interviewed concerning the use of a given taxon.¹⁴ Thus, differences in order according to citation and FIC value were thought to be based on the disagreement among informants and using 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 also detected to be used for ethnobotanical purposes. It was named as "Kuzugöbeği, ayımantarı" among local people and used for knee pain, to induce sleep, as sedative and foodstuff by cooking as meal. Due to being a member of Kingdom Fungi, it was not given in table with other plant-sourced folk medicines.

Table 2. 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

Discussion

As a result of the field studies conducted in Kızılcahamam district, important contributions were made 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 (Supplementary Table). In addition, 4 of the plants (*Arum euxinum*, *Ballota larendana*, *Sideritis germanicopolitana* and *Verbascum insulare*), which are endemic species, found to be used as folk remedies in the district.

It has been observed that 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. It is seen that 27 of the 69 taxa used as folk medicine in Kızılcahamam have similar uses in Çamlıdere. For example, *Cota tinctoria* (for urinary tract inflammation), *Juglans regia* (for diabetes), *Viscum album* (for shortness of breath and urinary tract disorders), *Malva neglecta* (for hemorrhoid and rheumatism), *Cydonia oblonga* (for shortness of breath, bronchitis and cough), *Prunus spinosa* (for diabetes) are used for same conditions in both districts. The utilization of *Salix alba* is an interesting example for 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 detected to be used for kidney stone similar to its use in Kızılcahamam.⁷ Similar utilizations have been discovered with other remote districts of Ankara, as well. To illustrate, *Malva neglecta*, one of the most cited plants in our study area, is detected to be used for the treatment of hemorrhoids in Haymana and Beypazarı districts as in Kızılcahamam.^{5,6} *Taraxacum scaturiginosum* was recorded to be used for diabetes (or hyperglycemia) in both of Beypazarı and Kızılcahamam districts.⁵ *Echium italicum*, *Thymus leucostomus*, *Sorbus domestica* are other examples that were detected to be 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 another example which is used for abscess almost every part of Turkey as in Kızılcahamam.^{4-6, 17, 19-23} These examples can be multiplied; *Ajuga chamaepitys* subsp. *chia*, *Morus nigra*, *Centaurea solstitialis*, *Echium italicum*, *Sanguisorba minor* were detected to be used in different provinces in a similar manner as determined in our study area.^{4, 19, 20, 23-26} Encountering similar usages in nearby districts/provinces are already expected. Both having similar flora and ease of idea exchanging could be assumed to be one of the reasons for this situation. The similar use of folk medicines at different locations may also be considered as an indication of the accuracy of the identified folk medicinal knowledge. Besides, domestic migration, development of communication and transport facilities may contribute to dissemination of information to remote areas.

On the other hand, different species of some genus 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 like *Tripleurospermum elongatum*. Similarities in the usage between *Prunus avium* (L.) L. and *Prunus cerasus* (for diabetes, hyperglycemia); *Juniperus oxycedrus* L. and *Juniperus communis* var. *saxatilis* (for eczema) are among the other examples.² Likewise, in Güdül, *Rumex tuberosus* L. is used for hyperglycemia just as the utilization of *Rumex crispus* in Kızılcahamam.⁷ Similar usages were also observed in remote districts of Ankara. Similarities between *Onopordum turcicum* and *Onopordum acanthium* L.; *Salix alba* and *Salix babylonica*, which were detected to be used in Haymana, could be given as examples of this usage.⁶ The same situation applies for other provinces of Turkey, such as; 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 that could be given. The root of *Arum euxinum* is used for hemorrhoid treatment in Kızılcahamam and different *Arum* species (eg. *Arum balansanum* R. R. Mill., *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 of different species of genus as the same plant due to morphological similarities. Also, 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 above mentioned similarities, quite different usages for the same species were determined in different parts of Ankara, as well. These differences were observed even in the 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 stone in our research area, but it is recommended for shortness of breath in Çamlıdere.² *Crataegus orientalis*, that is used in the case of diarrhea, stomach disorders, hypertension and hyperglycemia, is another example that could be given. Unlike the usages detected in Kızılcahamam, it is used for shortness of breath and heart disorders in Güdül district.⁷ *Arctium minus*, *Cichorium intybus*, *Sinapis arvensis* are the other examples which were recorded to be used for different purposes in different districts of Ankara.⁸ Anatolian peninsula has hosted quite different cultures throughout history and this situation has been inevitably reflected on folk medicine knowledge. Communities, migrating from different regions throughout history have blended their folk medicine 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 from region to region. As mentioned before, folk medicines are mostly cited for the treatment of gastrointestinal system disorders (especially hemorrhoid and stomach ache), respiratory (especially shortness of breath, asthma, common colds) and urogenital system problems (especially, prostate disorders) in Kızılcahamam. Considering these results, aforementioned disorders could be considered to be the most common health problems in 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 recognition of this disorder and using folk medicine for the treatment is engrossing. Likewise, informants expressed that they use various plants as folk medicine to treat some illnesses, such as cancer (*Arum euxinum*, *Urtica dioica*, *Portulaca oleracea*), hypercholesterolemia (*Juglans regia*), hyperglycemia (*Prunus spinosa*, *Rosa canina*, *Juglans regia*), goiter (*Juglans regia*), vascular occlusion (*Cyanus depressus*). Recently these disorders are becoming increasingly widespread, and in addition to this, nowadays 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. Another explanation is that this information is obtained from various sources. Nevertheless, interviewees indicated that they learned these uses from their ancestors. Therefore, 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. *Citrullus lanatus* that is used against prostate disorders could be thought to be an example of this subject. It is well known to be rich in lycopene³⁰ that reduces risk of prostate disorders.³¹ Methanol extract of seeds were demonstrated to cause a significant decrease in the enlarged prostate.³² Whereas, this usage could be interpreted as information pollution in terms of folk medicine knowledge.

In the study area, some interesting folk remedies were encountered. For example, phloem of *Pinus sylvestris* is consumed with honey in the case of stomachache, or the knee is bitten by green thin hornet for treatment of knee pain and rheumatism. *Echium italicum* is used for wound healing in Kızılcahamam, and according to previous bioactivity research, ethanol extract of *Echium italicum* root is determined to cause 37% increased wound tensile strength³³. Similarly, *Hypericum perforatum*, *Phlomis* sp., *Malva neglecta*, *Rosa canina* are used as folk medicine in peptic ulcer symptoms and it is also reported in the literature that these plants have strong *in vivo* anti-ulcerogenic effect.³⁴⁻³⁶ Another interesting folk medicine examples are the usages of *Pinus nigra* subsp. *pallasiana* and *Pinus sylvestris* for removing foreign objects from skin. Their resins were applied to the affected area and foreign materials like splinter could be removed. The usage of *Cota tinctoria* for weight loss is interesting, too. To the best of our knowledge, there is no study that has been conducted to examine this effect. The investigation of the mentioned effect of *Cota tinctoria* can be considered as 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. On the other hand, *Onopordum turcicum* flower is used against hyperglycemia in the research area. In our previous study, this plant species was determined to be used for diabetes in Çamlıdere, a neighboring district and local names of this plant are very similar in both of these districts (called as "galgan" in Kızılcahamam; "Kalkan" in Çamlıdere).² The usage of same folk medicines for same purposes in two neighboring regions increases the reliability of the data obtained in this study. In Kızılcahamam, folk medicines are generally preferred to prepare from a single plant species; only 17 of 69 taxa are included in the mixtures. These mixtures are usually prepared in the form of decoction/infusion (e.g. *Cota tinctoria*, *Cydonia oblonga*, *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 our country because folk remedies are generally prepared as simple formulations and used as a single component in Turkey. In this study, although investigation of the folk remedies was aimed at, other ethnobotanical usages of plants rather than their usage as of folk medicine were also detected and recorded on the field. To illustrate, *Achillea* sp. is used as a perfume by applying to hands; *Arum euxinum*, *Morchella* sp., *Polygonum cognatum*, *Rumex scutatus*, *Thymus longicaulis* subsp. *chaubardii*, *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 prefer to use modern medicine for the treatment of their illnesses; on the other hand, some of the informants expressed that they do not want to use modern medicines due to their side effects and try to cure illnesses with herbal remedies. On the contrary, people who have knowledge of folk medicines are limited; in the visited 51 villages, knowledgeable people or folk medicine users could not be founded in 21 villages (41% of visited locations). However, if this survey was conducted 20 years ago, ethnobotanic information could probably be obtained from all villages. This situation is a very important indicator of the loss of ethnobotanical knowledge due to modern life.

Conclusions

To the best of our knowledge, folk medicines of Kızılcahamam district are studied in detail in this study for the first time. With this study, important contributions were made to the inventory of Turkish Folk Medicines. As mentioned before, rapidly disappearance of folk medicine knowledge and urgent need for recording it in all parts of Turkey are once again pointed out in this study. Folk remedies are important resources in terms of the advantages they provide on new drug researches. They could be considered as sources that have been

shown to be effective on humans and tested for toxicity due to reasons such as being used for centuries, and giving up the use of useless or toxic ones during this long time period. In previous bioactivity studies based on folk medicines conduct by our research group, many herbs used as folk remedies in different regions of Anatolia have been shown to be effective against mentioned bioactivities *in vivo*.^{34, 35, 37-40} There are many drugs obtained based on their traditional use around the world; aspirin (*Salix* sp.), artemisinin (*Artemisia annua* L.), galantamine (*Galanthus woronowii* Losinsk.) are some examples of compounds developed from plants that were used as traditional use.⁴¹⁻⁴³ Besides recording for new folk medicines to the ethnobotanical heritage of Turkey, this study is also important in terms of being a source for future bioactivity studies and the discovery of new drug candidate molecules.

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Conflict of Interest:

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|---------------------|--------------------|------------------|
| 1. Pazar | 18. Kerimler | 35. Süleler |
| 2. İğmir | 19. Yukarıkese | 36. Karaağaç |
| 3. Otacı | 20. Aluç | 37. Çavuşlar |
| 4. Kınık | 21. Eđerliölren | 38. Mahkemeçağın |
| 5. Yukarı Karaölren | 22. Eđerlibaşköy | 39. Başölren |
| 6. Taşlıca | 23. Akçabayır | 40. Doymuşölren |
| 7. Yukarıbalcılar | 24. Eđerliközölren | 41. Sarayık |
| 8. Başölren | 25. Eđerlidereköy | 42. Sazak |
| 9. Kıköy | 26. Semeler | 43. Süle |
| 10. Aşağı Bayırköy | 27. Değirmenönü | 44. Davutlar |
| 11. Yukarı Bayırköy | 28. Abacı | 45. Karacaölren |
| 12. Aşağıçanlı | 29. Kuşcuölren | 46. Kurumeu |
| 13. Belpınar | 30. Yakakaya | 47. Aşağıhöyük |
| 14. Yağcı Hüseyin | 31. Kızık | 48. Tahtalar |
| 15. Kasımlar | 32. Gebeler | 49. Güneysaray |
| 16. Salın | 33. Korkmazlar | 50. Başağaç |
| 17. Aköz | 34. Berçinyayalar | 51. Kışlak |

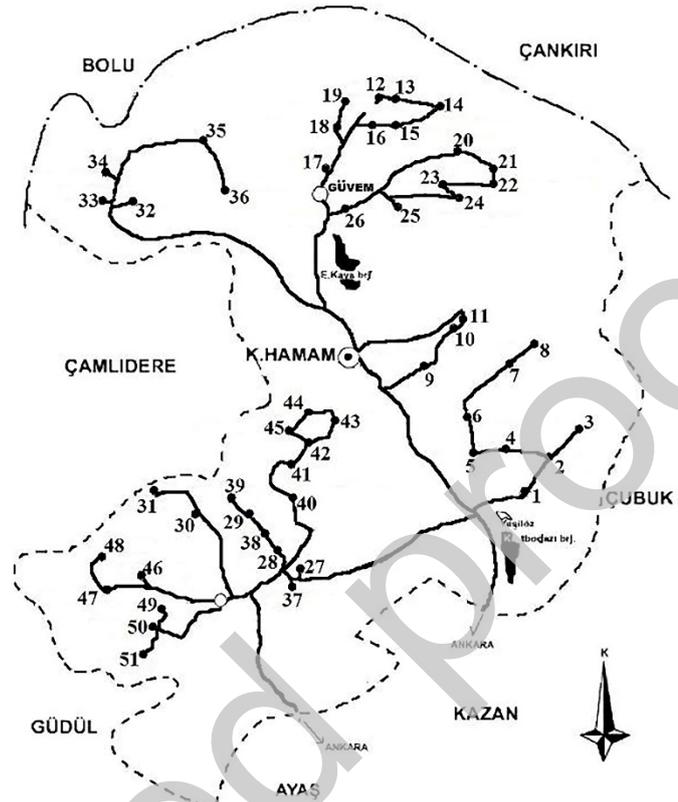


Figure 1. Position of Ankara and Kızılcahamam in Davis grid system and visited locations.

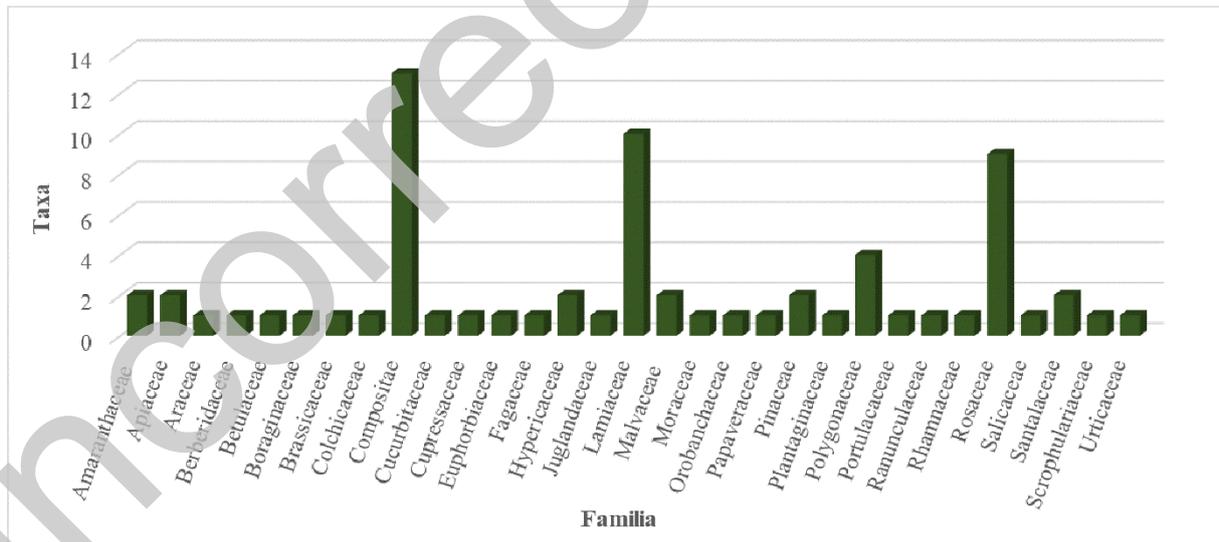


Figure 2. Distribution chart of plants according to family.

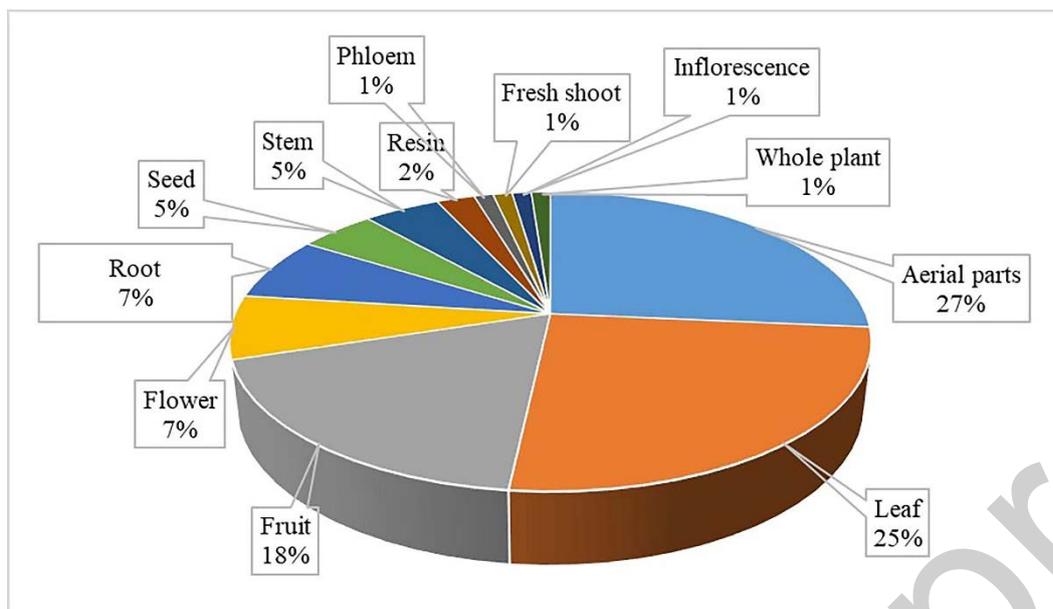


Figure 3. Distribution chart of plants according to used parts.