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Research Article

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Ethnobotanical study of medicinal plants in Nemrut Mountain, Adiyaman-Türkiye

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ABSTRACT: Mount Nemrut which was inscribed in world heritage list of UNESCO has been householder of different civilizations and cultures over centuries. It is in the South-East part of Turkey and also a part of Eastern Taurus Mountain range. The aim of this study is to document the uses of medicinal plants used in the villages around Nemrut mountain and provide a basic ethnopharmacological knowledge. A 2-year field study had been carried out in 18 villages (2012-2013). Information was obtained from personal conversations and guided fieldtrips with 44 informants which are selected especially as old and traditional healers of villages. Also, Informant Consensus Factor (F_{IC}) of ailments and the use values (UV) of plants were calculated. Data on medicinal uses of 82 taxa, belonging to 36 botanical families, were obtained and presented. According to the calculation mode on the basis of the use value *Pistacia terebinthus* L. (0.34), *Mentha longifolia* subsp. *typhoides* (Briq.) Harley (0.3) was reported to be the highest use value. Dermatological disorders (abscess, wound healing etc.) and diseases of musculoskeletal system and connective tissue (rheumatism, etc) scored the highest F_{IC} values (0.5). *Alcea apterocarpa, Brunnera orientalis, Pastinaca sativa* subsp. *urens* and *Pistacia terebinthus* gall for wound healing, *Quercus brantii* gall for anti-inflammatory, *Andrachne telephioides* for antiviral, *Tanacetum argenteum* subsp. *argenteum* for CNC related activities are suggested as good candidates for further pharmacological researches.

KEYWORDS: Folk medicine; ethnomedicine; Nemrut; ethnobotany

1. INTRODUCTION

The Nemrut is a mountain of the Taurus range. It is located in the in the region between the Euphrates and Tigris rivers in South-eastern of Turkey. Due to its strategically important location, it has been the settlement area of many different and powerful civilizations since the Paleolithic era. The Kingdom of Commagene was established in this region [1]. King of Commagene I Antiochus had a tomb and a tumulus for himself on the summit of Mount Nemrut in BC.62-32. In 1986, Mount Nemrut inscribed into the UNESCO World heritage list. [1, 2].

Many different populations have been settled in the region throughout history. Around Mount Nemrut, Kahta (Adiyaman); Assyrian, Persian, Macedonian and Seleucid states, Commagene Kingdom and Roman Empire ruled). It was one of the border fortresses of the Islamic world in the Middle Ages [3]. All these civilizations have left traces of themselves in the region and have contributed to cultural diversity.

UNESCO defines "Heritage" as our legacy from the past, what we live with today, and what we pass on to future generations. Since the ethnobotany is the study of the interactions and relationships between the cultures and the uses of plants by human societies over time, ethnobotanical investigation of this area takes a new meaning which has been householder of such different civilizations and cultures over centuries. Obviously in this age, information contamination of human societies by developing technological and communication organs forces the ethnobotanical studies and documentation of traditional knowledge becomes more important and urgent.

Mt. Nemrut is located in the transition zone of the Mediterranean and Iran-Turan phytogeographic regions. Therefore, the rate of biodiversity and endemism is high. Iranian-Turanian floristic region characterized by a high proportion of dwarf shrubs, grasses and meadow although the tree species are relatively a small number [4]. 250 vascular plant species and 149 genera belonging to 44 families were presented by Tel [5]. Families with the highest taxa were determined as Asteraceae, Lamiaceae and Poaceae.

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Additionally, Mutlu presented floristic characteristics of Mt Nemrut National Park and its surroundings in 2020. 777 species 403 genera belonging to 88 families were indicated in the study. Most of them were Iranian-Turanian element (%34.9) and endemism was found as 15.19% [6].

Anatolia has a wide plant diversity of flora including aprx. 11500 taxons which 33% of them are endemic and this provides a rich traditional knowledge on using these plants especially for medicinal purposes for centuries. Although there are too many ethnobotanical reports on different regions of Turkey [7–12], studies on the Southeast region of Anatolia are limited [13–17, 32, 98]. The closest region to Nemrut studied before is conducted by Akan and Bakır Sade in Narince and Kahta which is located in the South of the mountain [14].

The region attracted our attention not only because of the cultural richness of the region and the fact that the mountain has hosted many civilizations and also the villages around the mountain are at the end of the road and the traditional life in the countryside has been preserved. The aim of this study is to document the traditional knowledge on local names and uses of medicinal plants of Nemrut mountain, provide a basic ethnopharmacological knowledge and support the association between past and future.

2. RESULTS AND DISCUSSION

The study was conducted with 44 informants. 22 of them were women and 22 were men. Mean age was 52.5% and most of the participants were at the age range of 51-70. But the most valuable and special usages of the plants were recorded from the old people between the ages of 80-95. Young people under the age of 30 were also included in the study because we took the pure information from the children who were the only speaking Turkish with us. Sources of all information were questioned and television, book, newspaper knowledge left out of the study therefore all the information were indicated to be come from their ancestors. Mostly the interviews were carried out with healers, midwifes and shepherds. That's why the number of informants are low. All the people were living in the village and educational levels were very low. 36.4% of the villagers were illiterate. Men were farmer or shepherd and women were housewives. Demographic characters of informants are given in Table 1.

Table 1. Demographic characteristics of the informants.

Character		Number	%
Gender	Female	22	50
	Male	22	50
Age Range	30 and below	5	11.4
	31-50	16	36.4
	51-70	18	40.9
	71 and above	5	11.4
Educational level	Illiterate	16	36.4
	Literate unschooled	7	15.9
	Primary school	18	40.9
	High school	3	6.8

We observed that research area was consisted of very closed societies. In some villages, people were not very open for talking to foreigners. So, the presence of a local guide was an important facilitator of the study. In particular, women only talked to our female researcher due to their religious beliefs but they gave very specific information especially about gynaecological diseases. Women were much more knowledgeable about the preparation methods of medicinal plants.

Data on medicinal uses of 82 taxa, belonging to 36 botanical families, were obtained and presented in Table 2. 3 plants were not properly identified in species, reported only as genus. 20 of the mentioned plants were cultured and 64 were wild. Most frequently recorded families were Asteraceae (%13.4) and Lamiaceae (%13.4) followed by Rosaceae (%11), Solanaceae (%6.1), Apiaceae (%4.9) and Malvaceae (%3.7) (Figure 2). Other 30 families were represented by 2 or 1 plants. Similar result regarding the most common families was found in the studies conducted by Tetik et al. in Malatya which is close to Nemrut mountain [18, 45] and Polat et al in Bingöl in East region of Turkey probably due to similar flora and cultural structure.

Table 2. List of medicinal plants used in villages around Nemrut Mountain

Botanical name & Speciment number	Family	Local name	Plant parts used	Ailments treated/ Therapeutic effect	Preparation	Administration	Use value
Anthemis cretica L. (IZEF 5965)	Asteraceae	Papatya	Capitulum	Cardiac disorder Abdominal pain Menstrual disorder Asthma Antidiabetic Birth facilator	Infusion	Internal	0.18
				Against itch	Infusion, mash and wash body	External	
Achillea arabica Kotschy. (IZEF 5966)	Asteraceae	Kurkuri	Aerial part	Remove edema	Infusion	Internal	0.02
Adiantum capillus-veneris L. (IZEF 5967)	Pteridaceae	Fatima nevia Fatma saçı	Aerial part	Wounds in hair	Ointment	External	0.02
Alcea apterocarpa (Fenzl) Boiss. **(E)** (IZEF 5968)	Malvaceae	Hîro	Flower	Asthma	Decoction	Internal	0.18
				Wound healing Abscess	Mash	External	
			Root	Wound healing	Crush Ointment	External	
Alcea setosa (Boiss.) Alef. (IZEF 5969)	Malvaceae	Hîro	Flower	Analgesic	Mash	External	0.02
Allium cepa L. * (IZEF 5970)	Amaryllidaceae	Soğan	Bulbus	Wound healing	Heat, crush and mix with salt	External	0.25
				Hemorrhoids	Heat	External	
				Abscess	Heat	External	
				Wart	Fresh	External	
				Menstrual disorder	Infusion	Internal, one glass every day	
				Increase milk secration	Fresh	Eaten	
				Cold	Cook	Eaten	
Allium sativum L. * (IZEF 5971)	Amaryllidaceae	Sarımsak	Bulbus	Backache	Cooked with olive oil	External, Message	0.09
				Toothache	Fresh	External	
				Wound healing	Crushed		
			Aerial part	Hypertansion	Cook	Eaten	
Amygdalus orientalis Mill.* (SB 1)	Rosaceae	Acıbadem Beyif-i talik	Seed	Headache Antidiabetic	Raw	Eaten	0.05
Amygdalus communis L.* (SB 2)	Rosaceae	Badem Beyf-i şirin	Seed	Throat infection	Cook	Eaten	0.05
			Bark	Wound healing	Mash	External	
Andrachne telephioides L. (IZEF 5973)	Euphorbiaceae	Göğbaluğa	Aerial part	Wart	Fresh	Eaten before breakfast, one week	0.05

Aristolochia bottae Jaub. & Spach (IZEF 5974)	Aristolochiaceae	Kundire gusk	Root	Antidiabetic	Crush Infusion	Internal	0.09
Armeniaca vulgaris Lam.* (IZEF 5975)	Rosaceae	Delgithal Miş miş-i tahl	Seed	Antidiareic	Fresh	Eaten	0.02
Arum elongatum Steven (IZEF 5976)	Araceae	Karî	Stem	Intestinal worms	Cook	Internal	0.02
			Leaf	Antidiabetic	Decoction		
Brunnera orientalis (Schenk) I.M.Johnst. (IZEF 5977)	Boraginaceae	Gliziğa	Root	Wound healing	Ointment	External	0.02
Capsicum annuum L.* (SB 3)	Solanaceae	Biber	Fruit	Earache	Mix with milk	1 drop a day	0.02
Carduus nutans L. (IZEF 5978)	Asteraceae	Öksürük otu	Capitulum	Cough	Infusion	Internal	0.02
Carex divisa Huds. (IZEF 5979)	Cyperaceae	No name	Tuber	Stomachache	Fresh	Eaten	0.02
Centaurea solstitialis L. (IZEF 5980)	Asteraceae	Goççanik	Young shoots	Cold	Infusion	Internal	0.02
Chondrilla juncea L. (IZEF 5981)	Asteraceae	Benişt Sakız	Root gum	Constipation Wound healing	Decoction	Chewing External	0.07
Cicer arietinum L. * (IZEF 5982)	Fabaceae	Nohut	Fruit	Antifungal	Powdered	External	0.02
Citrullus lanatus (Thunb.) Matsum. & Nakai* (SB 4)	Cucurbitaceae	Karpuz	Fruit juice	Intestinal worms	Fresh	Internal, 1glass everyday, for 20 days	0.05
Corydalis oppositifolia DC. (IZEF 5989)	Papaveraceae	Gönarmırk	Tuber	Constipation	Fresh	Eaten	0.02
Cota wiedemanniana (Fisch. & C.A.Mey.) Holub (IZEF 5972)	Asteraceae	Papatya Kayıngoz	Capitulum	Asthma Bronchitis Cold and flu Antidiabetic	Infusion	Internal, 1 glass 3 times a day	0.09
Crataegus monogyna Jacq. subsp. *monogyna* (IZEF 5983)	Rosaceae	Alıç	Flower	Cardiac disorders	Infusion Syrup	Internal	0.05
Cyclotrichium niveum (Boiss.) Manden. & Scheng. **(E)** **(**IZEF 5984)	Lamiaceae	Dağ nanesi	Leaf	Abdominal pain Throat infection	Infusion	Internal	0.05
Cydonia oblonga Mill.* (SB 5)	Rosaceae	Ayva	Leaf	Cough	Infusion	Internal	0.02
Ecballium elaterium (L.) A.Rich. (IZEF 5985)	Cucurbitaceae	Çıtıratı	Fruit juice	Sinusitis Headache	Fresh	1 drop to nose	0.09
Euphorbia esula subsp. *tommasiniana* (Bertol.) Kuzmanov (IZEF 5987)	Euphorbiaceae	Xaşîl	Latex	Toothache	Fresh	3 drops a day	0.02
Ficus carica subsp. *rupestris* (Hausskn.) Browicz (IZEF 5988)	Moraceae	İncir	Latex	Wart Nosebleed	Fresh	External, 1 drop	0.09
			Fruit	Constipation Strenghten weak children	Syrup	Internal	
Galium aparine L. (IZEF 5990)	Rubiaceae	Zimanxwînk	Aerial part	Against itch	Fresh	External	0.02
Glycyrrhiza glabra L. var. *glabra* (IZEF 5991)	Fabaceae	Sûs Meyan	Root	Asthma Stomachache	Infusion Syrup	Internal	0.05
Helichrysum plicatum DC. subsp. *plicatum* (IZEF 5992)	Asteraceae	Acıot Gihatalik	Aerial part	Stomachache	Infusion	Internal	0.02
Hypericum scabrum L. (IZEF 5994)	Hypericaceae	Sarı çiçek	Aerial part	Kidney stones	Infusion	Internal, 3 glass a	0.02

						day	
Inula sp. (IZEF 5995)	Asteraceae	Simil	Leaf	Increase nasal secration, ease sneeze	Crush	Inhalation	0.02
Juglans regia L. * (IZEF 5996)	Juglandaceae	Ceviz Parregozın	Leaf	Gynecologic infections	Fresh	Internal, roled 1 leaf in vagina	0.16
				Prostate	Decoction	Internal	
				Crick	Fresh	Compress	
			Fruit	Cardiac disorders	Fresh	Eaten	
				Asthma	Maceration	Internal	
				Wound healing		External	
Juniperus oxycedrus L. subsp. *oxycedrus* (IZEF 5997)	Cupressaceae	Zırtto Ardıç Hevrıs	Fruit	Cardiac disorders	Decoction	Internal, three times a day	0.09
				Asthma			
			Seed	Kidney stone	Infusion		
Malus domestica Borkh.* (SB 6)	Rosaceae	Elma	Leaf	Scorpion bite	Fresh	External	0.02
Malva neglecta Wallr. (IZEF 5998)	Malvaceae	Toleke	Aerial part	Kneeache	Crush in a cloth, heat	External	0.02
Mentha longifolia subsp. *typhoides* (Briq.) Harley (IZEF 5999)	Lamiaceae	Pûnge Pung Yarpuz	Aerial parts	Children sunstroke	Filtrate yoghurt over a cloth and mix with the filtrate.	External	0.3
			Leaf	Stomacache	Infusion	Internal	
				Toothache	Fresh	Compress	
				Children colic	Crush in a cloth		
			Aerial part	Headache	Infusion	Internal	
				Stomachache			
				Asthma			
				Cough			
				Cold			
Micromeria myrtifolia Boiss. & Hohen. (IZEF 6000)	Lamiaceae	Dağ çayı	Aerial part	Stomachache	Infusion	Internal	0.02
Morus nigra L. * (IZEF 6001)	Moraceae	Karadut Kırmızıdut	Fruit	Stomachache	Molasses	Internal	0.23
				Cough, Throat infection			
				Measles healing			
				Tuberculosis			
				Hemorrhoids	Crush	External	
			Leaf	Abscess	Fresh	Compress	
				Antidiabetic	Infusion	Internal, one glass before meal	
Nicotiana tabacum L.* (SB 7)	Solanaceae	Tütün	Leaf	Children diarrhea	Crush with honey	External, on wrist vein	0.02
Olea europaea subsp. *europaea L.* (IZEF 6002)	Oleaceae	Zeytin	Fruit	Birth facilitator	Oil	External	0.09
				Hematoma	Crush		

				Wound healing	Mash		
			Leaf	Toothache	Heat	External	
Onopordum carduchorum Bornm. & Beauverd (IZEF 6003)	Asteraceae	Serkeşiş Eşekdikeni	Seed	Hemorrhoids Cardiac disorder Stomacache	Fresh Crush	Eaten	0.09
				Antifungal		External	
Origanum vulgare subsp. *hirtum* (Link) Letsw. (IZEF 6005)	Lamiaceae	Catırg Kekik	Aerial part	Cold and flu	Infusion	Internal	0.02
Paliurus spina-christi Mill. (IZEF 6006)	Rhamnaceae	Dırrı	Seed (mature fruits)	Antidiabetic	Infusion	Eaten with breakfast	0.02
Pastinaca sativa subsp. *urens* Čelak. (IZEF 6007)	Apiaceae	Adamotu	Root	Wound healing	Husk and crush	External	0.07
				Stomachache		Internal	
Petroselinum crispum (Mill.) Fuss* (IZEF 6008)	Apiaceae	Maydanoz	Aerial part	Gynecologic infections	Boil in milk	Sit on vapour	0.05
				Anemia	Fresh	Eaten	
Physalis alkekengi L. (IZEF 6009)	Solanaceae	Îsotêmaran Yılanbiberi	Root	Rheumatism	Cut	External	0.02
Pistacia terebinthus L. (IZEF 6010)	Anacardiaceae	Benîşt Menengiç Mengüş	Mastic	Stomachache	Ointment with animal fat	Internal, 3 times on an empty stomach	0.34
				Abscess	Fresh	External	
				Wound healing	Ointment		
			Leaf	Varicosis Sinusitis	Cook	Internal	
			Fruit	Cough Asthma	Decoction		
			Root	Cough	Decoction		
Plantago major L. (IZEF 6012)	Plantaginaceae	Geheprüze Yaraotu	Leaf	Wound healing	Fresh	Compress	0.02
Platanus orientalis L. * (IZEF 6013)	Platanaceae	Çınar	Bark	Eye infection	Decoction	External	0.05
			Leaf	Toothache	Infusion	Internal	
Populus euphratica Oliv. (IZEF 6014)	Salicaceae	Kavak	Dust in wormwood hole	Wound healing in circumcise	Powder	External	0.05
			Leaf	Abortive	Decoction	Internal	
Potentilla sp. (IZEF 6015)	Rosaceae	Piruz Gehepiruze Siğilotu	Aerial part	Wart	Crush	External	0.05
				Abscess			
Prangos pabularia Lindl. (IZEF 6016)	Apiaceae	Adamotu	Root	Wound healing Hemorrhoids Toothache	Mash with water	External	0.11
				Aphrodisiac	Powder	Internal	
Punica granatum L. * (IZEF 6017)	Punicaceae	Nar çiçeği	Flower	Stomachache	Infusion	Internal, 1 glass, two times a day	0.09
			Fruit bark	Eye infections	Decoction	1 drop	
			Fruit	Antidiabetic Antidiareic	Crush	Internal	
Quercus brantii Lindl. (IZEF 6018)	Fagaceae	Meşe	Gall	Wound healing in circumcise	Powder	External	0.23

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				Wound healing	Ember	External	
				Tootache	Powder	Gargle	
				Gynecologic infections	Maseration with oil	Compress	
				Emmenagogue	Powder in a cloth	Compress	
				Stomachache	Powder	Internal, on an empty stomach	
				Nosebleed	Boil with milk	Inhalation	
Rheum ribes L. (IZEF 6019)	Polygonaceae	Riwis	Root	Antidiabetic	Decoction Fresh	Internal Eaten	0.14
Rhus coriaria L. (IZEF 6020)	Anacardiaceae	Sumak	Fruit	Constipation	Crush	Internal, one spoon a day	0.02
Rosa canina L. (IZEF 6021)	Rosaceae	Şîlan Gül	Flower	Respiratory disorder Asthma Stomachache Cold	Syrup	Internal, 1-2 spoon a day	0.14
Rubus sanctus Schreb. (IZEF 6022)	Rosaceae	Dırîreşk Böğürtlen	Leaf Root Fruit	Burn healing Kidney stone Anemia	Cook Infusion Fresh	External Internal Eaten	0.11
				Antidiabetic Diuretic	Decoction Cook	Internal Eaten	
Rumex acetocella L. (IZEF 6023)	Polygonaceae	Tirşuk	Aerial part	Antidiabetic	Fresh	Eaten	0.02
Salix acmophylla Boiss. (IZEF 6024)	Salicaceae	Söğüt	Leaf	Prostate	Infusion	Internal	0.02
Salvia multicaulis Vahl. (IZEF 6025)	Lamiaceae	Çay otu	Aerial part	Cold and flu	Infusion	Internal	0.02
Satureja hortensis L. (IZEF 6026)	Lamiaceae	Zahter	Leaf	Antikoagulan	Infusion	Internal	0.05
Scrophularia sp. (IZEF 6027)	Scrophulariaceae	Singil otu	Aerial part	Warts	Raw	Eaten, one week	0.02
Sideritis libanotica subsp. *kurdica* (Bornm.) Hub. -Mor. (IZEF 6028)	Lamiaceae	Çay otu	Aerial part	Headache Cold and flu Kidney stone	Infusion	Internal	0.09
Sinapis arvensis L. (IZEF 5986)	Brassicaceae	Ğardal	Leaf	Diuretic	Raw	Eaten	0.02
Solanum melongena L.* (SB 8)	Solanaceae	Bayincan Patlican	Fruit	Wound healing Abscess	Ember	External	0.07
Solanum tuberosum L.* (SB 9)	Solanaceae	Patates	Tuber	Haedache	Mash	External	0.02
Tanacetum argenteum subsp. *argenteum* (Lam.) Willd. **(E)** **(**IZEF 6029)	Asteraceae	Döşemeotu	Leaf	Sedative Halusinogenic	Grind	Smoke	0.02
Tanacetum densum subsp. *amani* Heywood. **(E)** **(**IZEF 6030)	Asteraceae	Minare çiçeği	Aerial part	Gall disorders, abdominal pain	Infusion	Internal	0.05
Teucrium polium L. (IZEF 6031)	Lamiaceae	Meryemxort Talik Giyatalik	Aerial part	Menstrual pain Antidiabetic Abdomial pain	Raw	Eaten	0.11
				Cardiac disorders Headache	Infusion	Internal	

Thymus kotschyanus Boiss. & Hohen. subsp. *kotschyanus* (IZEF 6004)	Lamiaceae	Çattali	Aerial part	Stomachache Appetizing	Infusion	Internal	0.05
Thymbra spicata L. subsp. *spicata* (IZEF 6032)	Lamiaceae	Isutbej	Leaf	Toothache	Fresh	External	0.02
Tordylium hasselquistiae DC. (IZEF 6033)	Apiaceae	Çük sabunu Kuş sabunu	Leaf	Humidifier Cleaner	Foamed with water	External	0.05
Tribulus terrestris L. (IZEF 6034)	Zygophyllaceae	Gurnigiçem ma	Leaf	Cardiac disorder	Infusion	Internal	0.02
Triticum aestivum L. * (IZEF 6035)	Poaceae	Buğday	Amylum	Fracture healing, dislocation healing	Mash	External	0.11
				Wound healing Abscess	Powder with animal fat	External	
				Painful urination	Mix with ember and wrap with a cloth	Sit on the cloth	
Urtica dioica L. (IZEF 6036)	Urticaceae	Gezgezok	Aerial part	Kneeache	Fresh	External	0.18
		Isırgan	Leaf	Wound healing	Crush		
				Respiratory diseases Antidiabetic Stomachache Cardiac disorders	Infusion	Internal	
Vitex agnus-castus L. (IZEF 6037)	Lamiaceae	Hayıt Kifir	Leaf	Antifungal	Fresh	External	0.02
Vitis vinifera L. * (IZEF 6038)	Vitaceae	Kara üzüm Asma	Fruits	Intestinal pains	Powder	Internal	0.2
				Regenaration in convalescense	Molasses		
				Abscess	Mix molasses with flour and salt	External	
			Seed	Eye infections Branch secration	Crush	Compress	
			Leaves	Wound healing	Fresh	Compress	
Zea mays subsp. *mays* L. * (IZEF 6039)	Poaceae	Mısır	Stylus	Kidney stone Asthma	Infusion	Internal	0.05

*Cultured
E: Endemic
IZEF: Ege University Faculty of Pharmacy Herbarium

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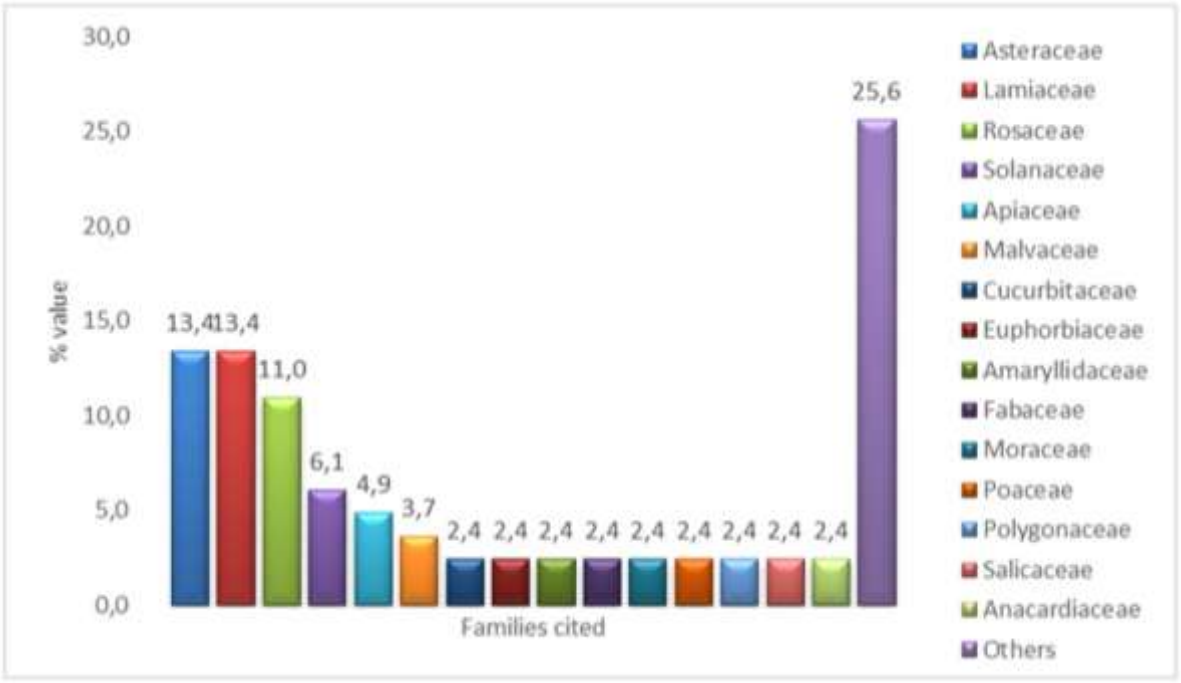

Figure 2. Percentages of plant species by the families used for medicinal purposes

Totally 20 different parts of of the plants used among the people were recorded. The main parts were leaves (%24.04), aerial parts (%21.15), fruits (%13.46), roots (%9.62) and seeds (%6.73) (Figure 3). Dust of hole opened by woodworm in *Populus euphratica* Oliv. and its use in the treatment of circumcision wounds was an interesting and different record. Most of the plants used internally were prepared by infusion method and externally as compress by crushing. Ointments were generally prepared by mixing with animal fat. Using fresh materials, crushing them, mashing, using externally directly or eating were widespread. For drying plants especially laying down in shadow were preferred instead of leaving under sun. Besides being an important economic source of the local people, special preparing method "Molasses" of fruits of *Morus nigra* L. and *Vitis vinifera* L. is also reported for the treatment of different ailments such as respiratory disease, haemorrhoids and abscess.

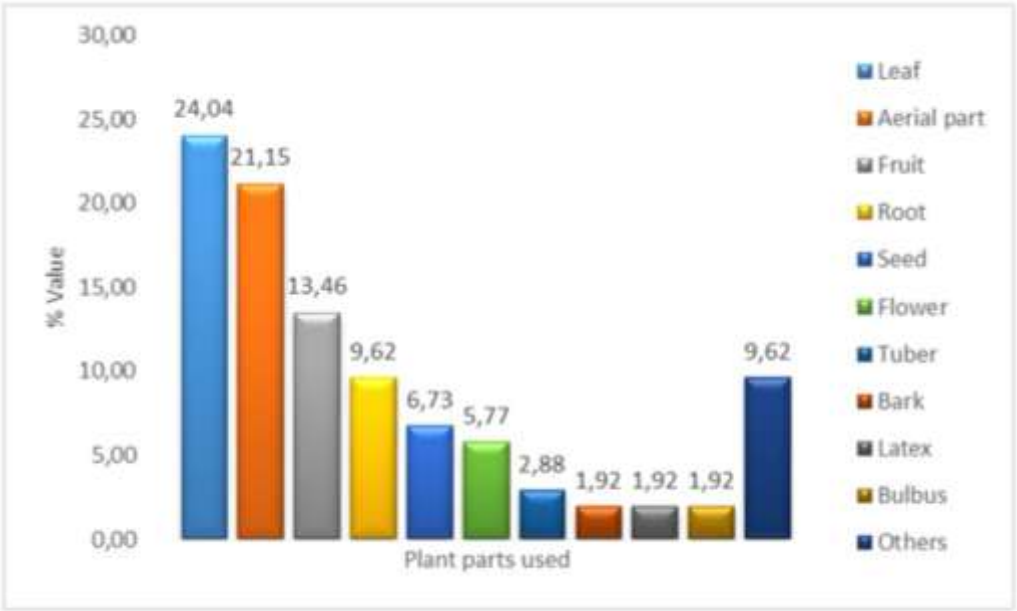

Figure 3. Percentages of plant parts used for medicinal purposes

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According to the calculation mode on the basis of the use value *Pistacia terebinthus* L. 0.34, *Mentha longifolia* subsp. *typhoides* (Briq.) Harley 0.3, *Allium cepa* L. 0.25, *Quercus brantii* Lindl. 0.23, *Morus nigra* L. 0.23, *Vitis vinifera* L. 0.20, *Alcea apterocarpa* Boiss. 0.18, *Anthemis cretica* L. 0.18, *Urtica dioica* L. 0.18, *Juglans regia* L. 0.16, *Rheum ribes* L. 0.14 and *Rosa canina* L. 0.14 were reported to be the highest use value.

The reported ailments were grouped into 13 categories and Table 3 indicates the F_{IC} values for each ailment category. Dermatological disorders (abscess, wound healing etc.), diseases of musculoskeletal system and connective tissue (rheumatism, etc) scored the highest F_{IC} values (0.5). But although the general use citations of dermatological diseases are high, we recorded only 3 use citations for musculoskeletal diseases. Respiratory diseases such as asthma, cold and metabolic diseases such as diabetes had also significant F_{IC} values and number of use citations. (0.48, 0.43 respectively).

Table 3. Informant consensus factor (F_{IC}) for the 13 categorized ailment

Ailment Category	(Nur) Number of use citations	% of all use citations	F_{IC}
Dermatological diseases	61	24,9	0,50
Diseases of Musculoskeletal System and connective tissue	3	1,2	0,50
Respiratory diseases	43	17,6	0,48
Matabolic diseases	22	9,0	0,43
Digestive system	39	15,9	0,34
Gynaecologic diseases	13	5,3	0,33
Certain infectious and parasitic diseases	5	2,0	0,25
Urogenital diseases	13	5,3	0,17
Dental pain	9	3,7	0,13
General pain	11	4,5	0,10
Circulatory diseases	19	7,8	0,06
Sensory organs	5	2,0	0,00
Poisoning and external causes	2	0,8	0,00

Combinational therapies are also recorded in the study. These are presented in Table 4 especially as the mode of administration inhalation, bath or sitting on vapour is commonly used in multiherbal therapies. *Prunus dulcis* and *Raphanus sativus* were only mentioned on multiherbal recipes.

The respondents of the questionnaire were mostly Kurdish ethnic backgrounds and local names of the plants were also reported. Spellings were checked from "Kurdish Plant Names Atlas". Some of local names were same for different plants such as "benişt" for *Chondrilla juncea* var. *juncea* and *Pistacia terbinthus*, "gihatalik" for *Helichrysum plicatum* subsp. *plicatum* and *Teucrium polium*, "adamotu" for *Pastinaca sativa* subsp. *urens* and *Prangos pabularia*. Some of the plant names were recorded several times from different parts of Turkey and well-known names like "yaraotu" for *Plantago major*, "alıç" for *Crataegus monogyna* subsp. *monogyna*, "sarımsak" for *Allium sativum*, "papatya" for *Anthemis cretica*, "meyan" for *Glycyrrhiza glabra* var. *glabra*, "sumak" for *Rhus coriaria* and "zahter" for *Satureja hortensis* [12, 19–24]. These examples are all Turkish names and it is thought to have been involved recently in last 50 years in the area. Besides when we look at the names of plants in Kurdish in the studies carried out in regions with Kurdish ethnic origin, we see that many nomenclature is the same. For example, the local names "Rıwıs" for *Rheum ribes*, "Ping, pung" for *Mentha* species, "Toleke" for *Malva* species, "Hiro" for *Alcea* species, "Meryemxhort" for *Teucrium polium*,

"Gezgezok" for *Urtica* species are common [25–27]. However, some species were recorded for the first time by Kurdish names from this area such as "kurkuri" for *Achillea arabica*, "gliziga" for *Brunnera orientalis*, "göğbaloğa" for *Andrachne telephioides*, "kundire kusk" for *Aristolochia bottae*, "Zimanxwînk" for *Galium aparine*, "Îsotêmaran" for *Physalis alkegengi*.

Pistacia terebinthus L. was one of the most used plants in the research area. The plant is native to Mediterranean and well-known tree in southeast of Turkey. Previous ethnomedicinal records are generally consistent with our data. Ripe fruits of *Pistacia terebinthus* are popularly consumed as menengic coffee in Turkey. This drink is also recorded to be used as diuretic against urinary tract infections before [8, 13]. Although it is registered that its fruits are used against toothache, colds, asthma, bronchitis and diuretic and leaves against stomach-ache, [12, 28, 29] wound healing and anti-abscess usage of mastic (plant oleoresin) which is called as "benist" was new data in our research.

Another plant with high use value was *Mentha longifolia* subsp. *typhoides (*Briq.) Harley. Leaves and aerial parts were very commonly used against pain and relieving respiratory problems among the villagers. It is also a well-known and commonly consumed plant in Turkey [30–33] and other countries especially Middle Eastern [34–38] for the treatment of similar diseases. Antimicrobial, antioxidant, anthelmintic, antinociceptive, anti-inflammatory, antipyretic, neuroprotective activities and effects on gastrointestinal disorders have been studied previously [39–44].

Many plants were recorded for the first time with this study. Also, the traditional medicinal use of many known plants was recorded for the first time. This is most probably due to the close society in the research area. Moreover, literature survey showed that most of these plants have not been the subject of a phytochemical or pharmacological study yet or there are very limited studies concerning the other usages of these plants. Previously undocumented uses for medicinal plants are discussed below.

Moreover, *Alcea apterocarpa* (Fenzl) Boiss., *Cyclotrichium niveum* (Boiss) Manden. & Scheng, *Tanacetum argenteum* (Lam.) Willd. subsp. *argenteum*, *Tanacetum densum* subsp. *amani* Heywood. were the endemic species recorded.

Alcea apterocarpa (Fenzl) Boiss. known as "hiro" and flowers were reported to be used for various ailments such as wound healing, abscess and asthma consistent with a previous study carried out in Kürecik Mountain which is close to Nemrut [45]. But wound healing usage of roots are recorded for the first time with this study. Anlas et al. showed the antioxidant activity of ethanolic root extract of the plant [46]. Also, essential oil, fatty oil and phenolic compositions and antimicrobial activity of acetone extract of whole plant were demonstrated by Ertas et al [47].

This study is the first report on the abdominal pain use of endemic species *Cyclotrichium niveum* (Boiss). Manden & Scheng. The only other record is reported as antiasthmatic usage of this plant from Malatya [18]. Antimicrobial, antifungal, anticholinesterase, antioxidant and antispasmodic activities of extracts and essential oils of the plant were proved by previous papers especially conducted by Turkish researchers [48–52].

Tanacetum densum subsp. *amani* Heywood is another endemic species of Turkey. Aerial parts were used against gall disorders and abdominal pain as tea. *Tanacetum densum* has four subspecies in Turkish flora and there are not any records about the usages of plants in folk medicine. This is the first record of this plant. Baydoun et al. reported the *Tanacetum densum* subsp. *densum* was used for wounds and skin diseases in Lebanon [53]. Ozbilgin et al. showed *Tanacetum densum* subsp. *sivasicum*; another endemic species of Turkey to have significant wound healing activity by in-vivo studies [54].

Smoking the grinded leaves of endemic *Tanacetum argenteum* (Lam.) Willd. subsp *argenteum* to produce sedation and hallucination was very unusual and interesting information. The villager's description was "when you smoke it, you feel like you're in a ship and swaying calmly". The only previous ethnopharmaceutical data is from Sanlıurfa, (Turkey) which is close to our study field, indicates the infusions prepared from the flowers of plant were used to release pain [55]. Cytotoxic anti-inflammatory, antioxidant and wound healing activities were shown by previous studies [54, 56, 57]. However, considering its record in our study, it would be appropriate to conduct CNS-related pharmacological studies.

In our study *Brunnera orientalis* (Schenk) I. M. Johnst. was called as "Gliziğa" and roots were used for wound healing externally. There are not any other reports on the medicinal usages of this plant. Also literature record about the chemical and bioactivities of this species is also limited with only fatty acid composition of the seeds [58]. It should be a subject of further pharmacological and phytochemical researches.

Infusion of aerial parts of *Sideritis libanotica* subsp. *kurdica* (Bornm.) Hub -Mor. were used against kidney stones, cold and flu and headache in different villages. *Sideritis libanotica* is represented by five subspecies in Turkey. It is well documented the several usages of *S. libanotica* [18] and *S. libanotica* subsp. *linearis* [26, 59, 60] in Anatolian Traditional Medicine but there is not any previous study citing *Sideritis libanotica* subsp. *kurdica* (Bornm.) Hub.-Mor.

Tordylium hasselquistiae DC. leaves were used for humidifier for hands as soap. It was called also as "kus sabunu" which means "bird soap". There are not any other literatures citing this plant for any traditional usage. Only the essential oil compositions of fruits of the plant were investigated by Özek et al. [61].

Adiantum capillus-veneris L. is fern from Pteridaceae family. The local name of the plant was "Fatima Saçı" that means "Fatima hair" referring to Hz. Fatima, the daughter of prophet in Islam religion and the hair like morphology of plant. It was described to threat the wounds on hair. It is a well-known plant used for hair loss in traditional medicine worldwide [62, 63] It is registered that it is used for hair loss in the Hatay region of Turkey [64] and similar to our records for itching on the scalp in the Şanlıurfa region [65]. In Iran it was evaluated and was shown to have activity against testosterone-induced alopecia [66].

Aristolochia bottae Jaub. & Spach is called as "kundire gusk" and it is new that roots were used internally against diabetes. Another ethnobotanical study which is performed with ethnically Kurdish people in Turkey, reports the local name of this plant as "guhok" and stems were indicated to be eaten [67]. Moreover, Akan et al. reported fruits of this plant to be used for foot sores and swellings in Urfa, which is adjacent to Adıyaman province, where Mount Nemrut is located. They also reported another Kurdish name "goye deve" for the plant [15]. *Aristolochia* species are being used in different cultures of the world, however, due to the toxicity potential of molecules such as aristolochic acid, it is recommended to be careful about the species with lack of scientific evidence [68].

Andrachne telephioides L. was eaten against wart among people in our study area. This species was cited only from Malatya that the leaves were used for acne externally and no name was recorded [18]. The local name "göğbaluga" and the usage is recorded for the first time by our study. This is another plant that needs to be investigated from phytochemical and pharmacological point of view due to the lack of literature records.

Pastinaca sativa subsp. *urens* Celak. is another rare plant that the wound healing usage of roots are indicated for the first time. Even though any usage is reported from Turkish ethnobotanical investigations, the roots were reported the be used against colic in Italia [69]. Any wound healing activity study has net been performed on this plant so it can also be good candidate for further pharmacological researches.

Interestingly although we have been told several different medicinal usages of the gall of *Quercus brantii* Lindl. by the informants from different villages, there is not any ethnopharmaceutical literature record about galls of this oak. Only one usage of fresh fruits for diabetes was indicated in an ethnobotanical study in Midyat which is in the same region with our study area [26]. In our study women especially explained the special usages of the gal in gynecological disorders. For example, they were powdering the gall and put in a sheep wool and use it as emmenagogue. And also they were macerating the gall in olive oil one day and inserting it to vagina like an ovule for vaginal inflammations.

Paliurus spina-christi Mill. seeds were used against diabetes, similarly the same usages were cited from different regions of Turkey as fruits and seeds [70–72]. Our 79-year-old informant from Karadut village, never left the village in his life and told us it should be harvested in autumn, before rain and when the fruits run to seed. Fruits are also recorded in many ethnobotanical researches for bronchitis, stomachache, blood depurative, acne, cold, flu, asthma, carminative, diuretic, kidney stones in Turkey [21, 73–75] and anti-hypertensive, hypocholesterolemic and hypouricemic in other parts of world [76, 77]. Recently significant therapeutic effect of plant on diabetes have been proven by an investigation in which the fruits harvested from our study area, Adıyaman and the activity was associated with phenolic content [78, 79].

In addition, the local name of *Physalis alkekengi* L. was recorded for the first time as "Îsotêmaran", the external use of its roots in rheumatic diseases is also new data. Fruits of the plant were described as diuretic, antipyretic and sedative, and used against hypertension, diabetes and for weight loss in Turkish reports [19, 80, 81] but the plant is especially used in Traditional Iranian and Chinese medicine for various diseases [82–84]

Prangos pabularia Lindl. roots were used for wound healing (especially for blooding wounds) and hemorrhoids externally and also roots were described to be used to strengthen the sexual activity especially among men. Based on this data, we recently published a study in which we showed that the roots of the

plant increase erectile function and isolated effective compounds [85]. *Ferula*, *Ferulago* and *Prangos* species are well-known for aphrodisiac usages among men in Turkey [31, 86, 87], but it is very important to present scientific evidences including real activity, doses and also side effects especially cardiotoxic effects due to the different metabolite groups included in these species. In the other ethnobotanical studies conducted with *P. pabularia* in the world, it is observed that the roots and fruits of the plant are widely used among the people as diuretic, carminative, stimulant, emmenagogue and abortive effects [88–92]. In Hakkari, Turkey, it was stated that the roots were powdered and used as a wound healer consistent with our data [17] so *P. pabularia* may also be a good candidate for scientific researche related to wound healing effect.

Until recently, the number of ethnobotanical studies conducted in the Southeast of Turkey was not high probably due to transportation difficulties and political problems. Since the beginning of the 2000s, the interest in this region has started to increase. East and Southeast regions are in the same floristic region (Irano-Turan) and they also house people of similar ethnicity. For this reason, some common plants have been identified by studies carried out in these regions. *Allium cepa, Allium sativum, Centaurea solstitialis*, *Glycyrrhiza glabra* var. *glabra, Juglans regia, Malva neglecta, Mentha longifolia* subsp. *typhoides, Pistacia terebinthus* L., *Plantago major* L, *Rheum ribes* L., *Rhus coriaria* L., *Rosa canina* L., *Teucrium polium* L. and *Urtica dioica* L. are the species consumed traditionally for medicinal purposes in East and Southeast of Turkey. [18, 26, 27, 32, 45, 55, 93–94, 98]. Malatya, Kahta Narince and Sanliurfa are the closest areas to Nemrut Mountain, Adıyaman. Akan et al. investigated the Kahta, Narince (Adiyaman) which is also one of our research villages. Interestingly they also recorded very few plants with the same usage such as *Glycyrrhiza glabra* var. *glabra*, *Pistacia terebinthus, Tribulus terrestris, Teucrium polium* but most of the species and traditional information are different. That's because most of the species recorded in that literature are not indigenous wild to the Narince natural flora [14]. In our research we mostly recorded the wild types and prepared the herbarium specimens. In another study Tetik et al. reported 108 plants used in folk medicine of Malatya district which is in the North neighbourhood of Nemrut. In our research usages of some herbs such as; latex of *Chondrilla juncea* for wound healing, flowers of *Crataegus monogyna* subsp. *monogyna* for cardiac disorders, roots of *Glycyrrhiza glabra* var. *glabra* as digestive, aerial parts of *Teucrium polium,* as antidiabetic, leaves of *Plantago major* subsp. *major* for wound healing, roots of *Rheum ribes* as antidiabetic and flowers of *Rosa canina* for cold, were recorded same with data in this literature. *Carduus nutans*, *Rubus sanctus*, *Urtica dioica\ Pistacia terebinthus*, *Anthemis cretica, Allium cepa, Satureja hortensis* and *Malva neglecta* were also recorded as the same plants with different usages [18]. Sanlıurfa is located at the Southeast of Adiyaman. Akan et al conducted a study in Kalecik mountain (Sanlıurfa). Our results *Glycyrrhiza glabra* var. *glabra* called as "sus, meyan" used in stomacache and *Teucrium polium* L. called "Meryemxort, talik" used against abdominal pains are consistent with their data. However, *Alcea apterocarpa* (Fenzl) Boiss, *Salvia multicaulis, Tanacetum argenteum* subsp. *argenteum* and *Ficus carica* subsp. *rupestris* are common plants which were used for different medicinal purposes [55].

3. CONCLUSION

Our study performed in rural areas around Nemrut mountain and most indigenous people were quite inclined to self-medicate using biological resources. Due to the distance of mountain villages to the city center, medicinal usages of wild plants were very intense. But during the study, it was realized with regret that as a result of the migration of the young generation in the region to the urban area, the healers could not convey this information to anyone and the deep traditional knowledge that had been inherited for centuries was lost in this generation. This region of Anatolia, which is a part of Mesopotamia, that is described as "the cradle of civilizations", was unfortunately ignored by ethnobotanists until the last period. Accelerating the work in this region and raising awareness among the younger generations is of great importance.

As a result of the literature review, we made in connection with the results of our study, we can suggest that *Alcea apterocarpa, Brunnera orientalis, Pastinaca sativa* subsp. *urens* and *Pistacia terebinthus* gall for wound healing, *Quercus brantii* gall for anti-inflammatory, *Andrachne telephioides* for antiviral, *Tanacetum argenteum* subsp. *argenteum* (Lam.) Willd. for CNC related activities needs attention for further studies.

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4. MATERIALS AND METHODS

4.1. Study area

The Nemrut mountain is located on South-East Anatolia and lies in the north of Kahta district of Adıyaman. It is surrounded by sub-provinces Sincik (Adıyaman) from west, Celikhan (Adıyaman) from north-west, Tepehan and Pötürge (Malatya) from north, Gerger (Adıyaman) from east and Kahta (Adıyaman) from South as shown in the Figure 1. The highest point of the mount is an altitude 2150 above sea level.

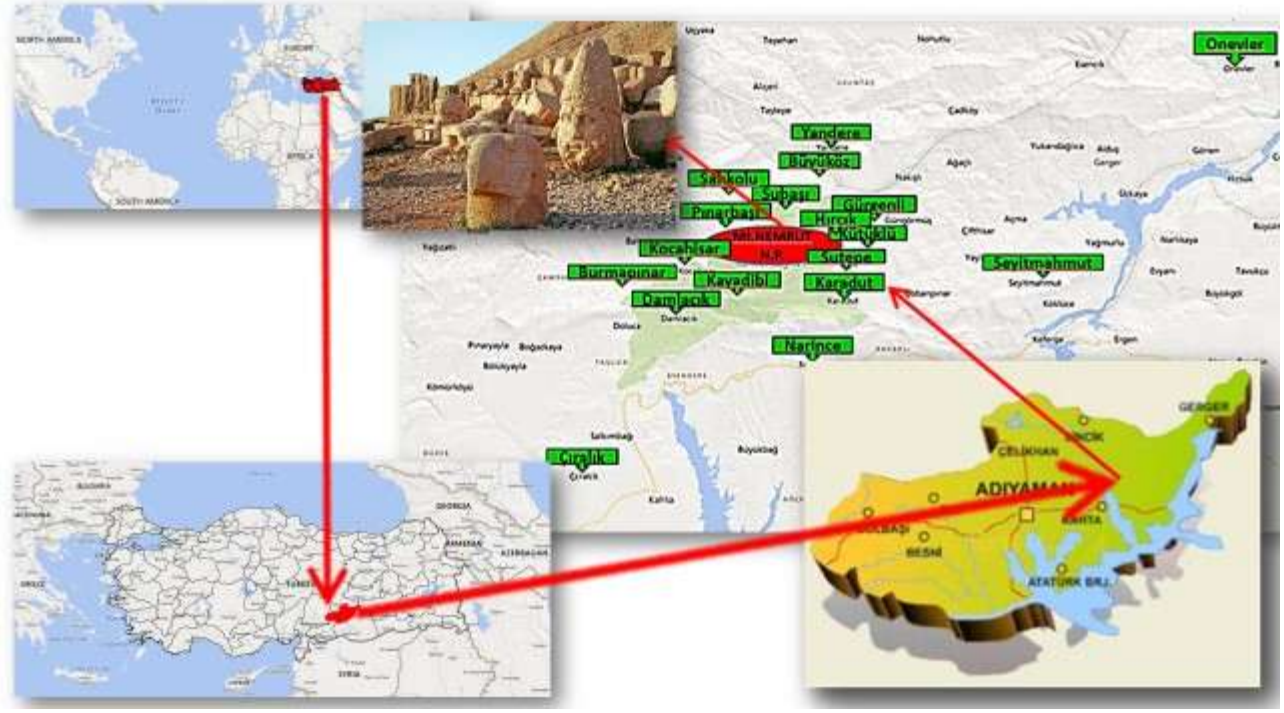

Figure 1. Map of the study area, villages around the Nemrut Mountain

18 villages (Gürgenli, Sutepe, Pınarbaşı, Kocahisar, Hırcık, Burmapınar, Seyitmahmut, Şahkulu, Onevler, Yandere, Kütüklü, Narince, Çıralık, Karadut, Damlacık, Büyüköz, Subaşı, Kayadibi) around the mountain was selected as study area. Villages have been specifically chosen within or on the border of the mountain. Çıralık, Seyitmahut and Onevler added the study in order to guidance of local people in other villages because of still alive valuable informants such as midwifes and old healers. Mount Nemrut area is in between 37° 53'- 38° 01' northern and 38° 36'- 38° 58' eastern longitudes and the surface area of the selected area is 293 km². The livelihoods of the people vary according to the villages. For example, while viticulture is common in villages like Gürgenli, where there is a lot of wetland, livestock and grain cultivation are common in Pınarbaşı, and tourism is common in Kocahisar. While the economy of the region is mainly based on agriculture, especially the young people have created job opportunities in tourism area due to the touristic nature of the Nemrut national park, but a very large part of the young population has migrated to the cities.

Phytogeographically it is in between the Mediterranean and Irano-Turanian floristic regions and it is in C7 grid square according to grid classification system [4]. It is close to Anatolian Diagonal which is rich of endemic plants.

Generally, study area is in continental climate zone of South East Anatolia but because of the closeness to Mediterranean region "semiarid Mediterranean climate" up to 800 m regions and "continental mount climate" in high levels is dominant. In the southern lower parts of the mountain, it is reported that a temperate climate, which can be called a distorted Mediterranean climate, is dominant [5, 6]

Previously a vegetation study was carried out in Nemrut Mountain by Tel A.Z and friends. They were reported forest shrub, steppe and rock vegetations from the area. [96]. Besides 250 taxa were listed by a

floristic study conducted by the same researchers. Irano-Turanian and Mediterranean floristic members were 101 and 26 taxa respectively. 104 taxa were widespread [5].

4.2. Interwees and plant materials

In 2012 and 2013 a field study in 18 villages were carried out. Villages were especially selected as isolated and roads of them were improved recently.

Information was obtained from personal conversations and guided fieldtrips with 44 informants (Figure 4). They were villagers and traditional healers of the villages who were well-known by the other people. People affected from communication organs were left out of the study. %80 ethnical background of the people was Kurdish. Most of them didn't know Turkish so interviews were conducted with a native guide who was also very intellectual about plants and traditional uses. The key informants were being visited two times. Demographic characters of people, local names of the plants, parts used, methods of preparations, modes of administration and types of diseases to be cured were documented. Interviews were made at homes and fields and plants in question were requested to indicated.

Figure 4. Interviews with local people

Totally 80 plant specimens were collected and herbarium specimens were prepared. Identifications of plants were done according to "Flora of Turkey and East Aegeans" and also compared with the herbarium specimens of EGE (Ege University Faculty of Science) and IZEF (Ege University, Faculty of Pharmacy). Some material of plant parts especially cultivated plants was collected in special bottles named as SB. Voucher specimens were deposited in IZEF herbarium. Moreover, scientific names of plants were confirmed with International Plant Names Index (IPNI: http://www.ipni.org). The local names of the plants were documented also comparing with Kurdish Plant Names Atlas [95]

4.3. Data analysis

The reported ailments were grouped into 13 categories: Digestive System, Respiratory diseases, Dermatological disorders, Gynaecologic diseases, General pain, Certain infectious and parasitic diseases, Urogenital diseases, Circulatory System Disorders, Diseases of Muscoskeletal system and connective tissue, Poisoning and external causes, Sensory organs, Matabolic diseases and Dental pain.

Informant consensus factor (F_{IC}) measures the agreement of informants concerning the use of plants in specific ailment categories and homogeneity of information collected and it was calculated as follows: $F_{IC} = (n_{ur} - n_t) / (n_{ur} - 1)$ where n_{ur} is number of use report in each category and n_t is number of taxa used [96].

The Use value (UV) demonstrates the relative importance of the species. It was also calculated according to following formula; $UV = U/N$ where U is refers to number of citations per species and N number of informants [97].

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