

Ethnobotanical study on the medicinal plants in the Manyas province (Balıkesir, Turkey)

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The variation in geology, land forms and climate in Anatolia has led to huge plant diversity. This study performed to provide a comprehensive documentation on ethnomedicinal herbs and traditional knowledge in Manyas (Balıkesir) province. Ethnobotanical records were documented using structured and semi-structured interviews (n=115) and focus group discussions (n=17) with key informants. The informant consensus factor (IFC) and use value (UV) were calculated to see the relative importance of species known. Seventy-five medicinal herbs belonging to 69 genera and 40 family used as treatment of human diseases were recorded. Among these taxa, 61 species were wild and 14 species were recorded as cultivated plant. It is revealed that the most frequently used ethnomedicinal plant families were Lamiaceae (>13%), Asteraceae (>12%), Rosaceae (>8%); the most frequently used preparations methods were infusion and decoction. A total of 122 ethnomedicinal practices were recorded. The traditional herbs have been commonly used for the cure of respiratory system disorders (18%), gastro-intestinal complaints such as ulcers and stomachache abdominal pain (13%), wounds and cut (11%), diabetes (7%), hemorrhoids (5%), heart and vascular disorders (4%). The present study showed that the area was rich in medicinal plant knowledge. The traditional knowledge reported by the indigenous people of Manyas region is valuable for further research and protected ethnobotanical heritage.

Keywords: Balıkesir, Ethnobotany, Folk remedies, Manyas, Medicinal plants, Use value

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Ethnobotanical medicine concerns with indigenous practices, cultural heritage, methods, skills and beliefs¹. Majority of the people in traditional communities of the world are still using plants for the primary health care to treatment of common diseases². Nowadays, consumers interest herbal drugs and herbal based food products as an adjuvant or more gentle and holistic way of coping with chronic health problems and self-limiting infectious diseases³. According to the WHO, almost 80% of the world's population in developed countries show interest in traditional drugs, which are generally derived from herbs, for their primary health care⁴. Ethnoveterinary heritage is obtained by communities for decades and verbally transferred among generations but this cultural heritage is on the verge of being lost in recent years with rapid cultural changes⁵.

Turkey covers two continents, Asia and Europe and has been one of the richest countries in the world in terms of plant diversity. Turkey has many Anatolian civilizations and thus this important region has various historical and cultural heritages. Because of this reach heritage, traditional herbal medicine has an important background in Turkey. Medicinal folklore researches about traditional herb drugs in Anatolia have been going on increasingly since Republican period⁶. Historical data demonstrat that a great number of traditional herbal medicines were exported at the time of the Ottoman Empire⁷.

Last periods, traditional herbal medicine have attracted attention of the researchers such as⁸⁻²¹. In Turkey, many wild plants (sometimes together with cultivated herbs) are still used in various traditional regional dishes. In the past decades, economic and social changes have caused the depopulation of rural villages located in the Manyas province. As a result,

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the traditional rural society and way of life is endangered. Nowadays, traditional plants have acquired popularity. In some cases, this regard is generally focused on healthy alternatives or to some important commercial food plants. In fact, in many part of Turkey, and especially in rural areas the local traditional uses of wild herbs are still vivid.

This study demonstrate the result of an ethnobotanical study performed in the Manyas province. The aim of this research study was to document the traditional uses of ethnomedicinal plants. The results illusrtae quantitative data on the diversity of medicinal herbs recorded in the province.

Material and Methods

Study area

The research area (Manyas) is located ($40^{\circ} 02'23''N - 27^{\circ} 57'36''E$) in the western part of Anatolia at an altitude of 55 m above sea level (Fig. 1). It covers an area of 586 km² and its total population is 22 thousand while the rural population is around 15 thousand. Manyas province has 44 villages and 3 towns. Manyas district belongs to the Mediterranean phyto-geographical region and locate within the A1 grid square according to the Grid classification system²².

Plant material

We conducted the field research for approximately over a period of 3 years (2009- 2011). Special regard was paid to carry out the field trips together with the indigenous people on most of the field visits

(Fig. 2). As result of this study, data about traditional medicinal use of 61 wild and 14 cultivated herbs were recorded (Table 1). Plant taxa were identified with the the help of Flora of Turkey²¹ and at the same time, the collected plants were compared with the taxa in Balikesir University Herbarium. The identified list of plant taxa were listed in alphabetical order. Latin names and its families of plant taxa were checked from to the plant list (<http://www.theplantlist.org>).

Surveys at schools

At the beginning of the study, 100 students from 14 villages' schools and two city centre schools were visited and surveyed on "remedy herbs" used in the



Fig. 2 — Field research with villagers



Fig. 1 — Geographical location of the study area

Table 1 — List of wild medicinal plants investigated with their related information.

Plant No.	Family	Plant species, voucher specimen, endemism	Vernacular name of Manyas	Plant part(s) used ^a	Preparations ^b	Utilization method ^c	Use	UV
1.	Amaryllidaceae	<i>*Allium cepa</i> L. NP-353	<i>Soğan</i>	Bul Bul	In Ms	Dgt Eat	Cough Cardiac disorder, milk enhancer	0.62
2.	Anacardiaceae	<i>Pistacia terebinthus</i> L. NP-41	<i>Çitlembik, çetlemik</i>	Bra	As+water	Ext Ceh	Allergy Stomach-ache	0.32
3.	Apiaceae	<i>Conium maculatum</i> L. NP-54	<i>Baldıran otu</i>	Lea	Lc	Com	Rheumatism	0.12
4.		<i>Eryngium campestre</i> L. NP-56	<i>Şeker diken</i>	Bra, Lea	In	Dga	Sedative	0.35
5.		<i>*Petroselinum crispum</i> (Mill.) Nyman NP-58	<i>Maydanoz</i>	Lea	In	Dgt	Anti-inflammation	0.52
6.		<i>Sanicula europaea</i> L. NP-55	<i>Kesik otu</i>	Lea	De	Com	Antiseptic, cuts, styptic	0.46
7.	Apocynaceae	<i>Vinca major</i> L. NP-61	<i>Sarmaşık</i>	Flo, Lea	De	Gar	Mouth sores	0.22
8.	Araliaceae	<i>Hedera helix</i> L. NP-71	<i>Orman sarmaşığı</i>	Lea	Lc	Com	Analgesic	0.26
9.	Asparagaceae	<i>Asparagus acutifolius</i> L. NP-351	<i>Dikencik</i>	Aer	De	Ext	Eczema	0.18
10.		<i>Ruscus aculeatus</i> L. NP-352	<i>Tavşan memesi, değirmencik</i>	Fru	-	Raw	Enuresis nocturnal	0.40
11.	Asteraceae	<i>Achillea coarctata</i> Poir. NP-88	<i>Mayasıl otu</i>	Flo	In	Doc	Hemorrhoids	0.46
12.		<i>Cota altissima</i> L. NP-81	<i>Büyük papatyaya</i>	Flo	In	Dgt	Headache	0.36
13.		<i>Anthemis sp.</i> NP-18	<i>Mayıs papatyası</i>	Flo	In	Ext Dgt	Dandruff, hair care Sore throat, stomach-ache	0.52
14.		<i>Artemisia absinthium</i> L. NP-15	<i>Arı otu</i>	Flo	In	Dga	Sedative	0.67
15.		<i>Artemisia santonicum</i> L. NP-86	<i>Süpürge otu, küllüperin</i>	Aer	In	Ext	Hemorrhoids	0.52
16.		<i>Cynara scolymus</i> L. NP-85	<i>Enginar</i>	Aer	Av	Eat	Hepatic diseases	0.43
17.		<i>Imula heterolepis</i> Boiss. NP-20	<i>Ayı kulağı, yaban nanesi</i>	Bra, Lea Aer	In De	Ext Dgt	Hand-foot crack, Hemorrhoids	0.41
18.		<i>Silybum marianum</i> (L.) Gaertner NP-14	<i>Kenger diken</i>	Lat	Lr	Che	Sore throat, tooth whitening	0.32
19.		<i>Tanacetum parthenium</i> (L.) Sch. Bi p. NP-83	<i>Papatya</i>	Flo	In	Ext	Wound healing	0.43
20.	Brassicaceae	<i>Sinapis alba</i> L. NP-141	<i>Yaban turbu, hardal</i>	Lea	-	Raw	Heartburn	0.17
21.		<i>Nasturtium officinale</i> R. Br. NP-144	<i>Gerdeme, su teresi</i>	Aer Flo, Lea	- De	Raw	Kidney stones Cell renewal	0.21
22.	Caprifoliaceae	<i>Sambucus nigra</i> L. NP-162	<i>Mülmer, mürver</i>	Flo	In	Dtt	Cough	0.28
23.	Cistaceae	<i>Cistus creticus</i> L. NP-191	<i>Pamukluk</i>	Lea	De	Dgt	Getter	0.29
24.	Convolvulaceae	<i>Convolvulus arvensis</i> L. NP-211	<i>Tarla sarmaşığı</i>	Lea	De	Dgt	Getter	0.32
25.	Cornaceae	<i>Cornus mas</i> L. NP-201	<i>Kızılçık</i>	Fru	-	Raw	Antidiarrheal	0.41
26.	Crassulaceae	<i>Hylothelephium telephium</i> L. H. Ohba NP-221	<i>Kalın kaymak bitkisi</i>	Lea	Lh	Com	Antiinflammatory	0.52
27.	Cucurbitaceae	<i>Ecballium elaterium</i> (L.) A. Rich. NP-231	<i>Şeytan keleş</i>	Fru	Fc	Nas	Sinusitis	0.48
28.		<i>*Mamordica charantia</i> L. NP-235	<i>Kudret narı</i>	Fru	Fc Fc+olive oil	Raw Ext	Gastritis, ulcers Burn	0.38
29.	Cupressaceae	<i>Juniperus oxycedrus</i> L. NP-241	<i>Ardeş</i>	Bra See See	De In -	Dgt Ext Sed	Itching Hemorrhoids Shortness of breath, somach ache	0.46
30.	Dioscoreaceae	<i>Tamus communis</i> L. NP-251	<i>Tarla sarmaşığı, çetlemik</i>	Lea	Loi	Com	Rheumatism	0.34
31.	Ericaceae	<i>Vaccinium myrtillus</i> L. NP-273	<i>Yaban mersini</i>	Lea	De De+linden	Dgt	Cholesterol Cold	0.32
32.	Fabaceae	<i>*Vicia faba</i> L. NP-281	<i>Bakla</i>	Flo	Dec	Dgt	Asthma, kidney stones, s hortness of breath	0.35
33.	Equisetaceae	<i>Equisetum arvense</i> L. NP-121	<i>Ekli ot</i>	Who	De		Kidney stones, prostate	0.34
34.	Gentianaceae	<i>Centaurium erythraea</i> Rafn. NP-301	<i>Kırmızı kantaron</i>	Flo, Lea	In De Dry	Dtt Dgt Com	Appetizing Somach ache Wound healing	0.46
35.	Geraniaceae	<i>*Pelargonium zonale</i> L. NP-312	<i>Sardunya</i>	Lea	Lh	Com	Anti-inflammatory	0.42

(Contd.)

Table 1 — List of wild medicinal plants investigated with their related information (Contd.)

Plant No.	Family	Plant species, voucher specimen, endemism	Vernacular name of Manyas	Plant part(s) used ^a	Preparations ^b	Utilization method ^c	Use	UV
36.	Hypericaceae	<i>Hypericum perforatum</i> L. NP-181	<i>Sarı kantaron</i>	Aer Flo, Lea	Dry De	Ext Doc	Wound healing Diabetes disease, shortness of breath, stomach ache	0.67
37.	Lamiaceae	<i>Clinopodium acinos</i> (L.) Kuntze NP-311	<i>Güve otu</i>	Lea, Flo	De	Dgt	Shortness of breath, sore throat	0.50
38.		<i>Origanum vulgare</i> L. subsp. <i>vulgare</i> NP-314	<i>Dağ kekiği</i>	Lea, Flo	De	Doc	Diabetes, flu	0.55
39.		<i>Lavandula stoechas</i> L. subsp. <i>stoechas</i> NP-331	<i>Karabaş otu</i>	Flo, Lea	De	Dgt	Cardiovascular disorders	0.54
40.		<i>Melissa officinalis</i> L. NP-12	<i>Arı otu, oğul otu</i>	Flo, Lea	De	Dga Doc	Cardiac disorder Diabetes	0.52
41.		<i>Mentha aquatica</i> L. NP-334	<i>Yaban nanesi, kurbağa nanesi</i>	Flo	De+lemon	Dgt	Against nausea	0.53
42.		<i>Mentha x piperita</i> L. NP-313	<i>Nane</i>	Flo, Lea	De	Dgt	Cold and flu	0.50
43.		<i>Salvia tomentosa</i> Miller. NP-339	<i>Adaçayı</i>	Lea	De	Dgt	Cold and flu, shortness of breath, sore throat	0.45
44.		<i>Salvia virgata</i> Jacq. NP-332	<i>Eli kanlı</i>	Lea	Lh	Com	Analgesic, anti-inflammatory	0.32
45.		<i>Teucrium chamaedrys</i> NP-335	<i>Uzun Mahmut</i>	Lea	De	Dgt	Fever, intestinal gas	0.36
46.		<i>Thymus zygoides</i> Griseb. NP-337	<i>Yabani kekik, dağ kekiği</i>	Aer	De	Dgt	Cold and flu, shortness of breath	0.45
47.	Loranthaceae	<i>Viscum album</i> L. subsp. <i>album</i> NP-361	<i>Ökse otu</i>	Lea	Dec	Dtt	Menstrual pain	0.36
48.	Malvaceae	<i>*Hibiscus esculentus</i> L. NP-372	<i>Bamya</i>	Fru	-	Eat	Laxative	0.18
49.		<i>Malva neglecta</i> Wallr. NP-371	<i>Ebegimeci</i>	Flo	De	Dgt	Asthma	0.46
50.	Moraceae	<i>Ficus carica</i> L. subsp. <i>carica</i> NP-381	<i>Yemiş, incir</i>	Flo Lat	- Lr	Raw Ext	Laxative Warts	0.52
51.	Oleaceae	<i>*Olea europaea</i> L. subsp. <i>europaea</i> NP-404	<i>Zeytin</i>	Lea Fru	De Fc	Dgt Com	Cardiovascular disorders Anti-inflammatory	0.48
52.		<i>Phillyrea latifolia</i> L. NP-401	<i>Pıynar dalı</i>	Aer	As	Ext	Urticaria	0.35
53.	Plantaginaceae	<i>Plantago lanceolata</i> L. NP-461	<i>Sinir otu</i>	Lea Flo, Lea	- De	Com Dgt	Abscess, wound healing Urinary inflammations	0.54
54.		<i>Plantago major</i> L. NP-462	<i>Sinir otu, akkarın otu</i>	Lea Flo, Lea	- De	Com Dgt	Wound healing Stomach ache, urinary inflammations	0.54
55.	Poaceae	<i>Agropyron repens</i> L. NP-473	<i>Ayrık otu</i>	Aer	In	Dgt	Reducing	0.22
56.		<i>Hordeum murinum</i> L. NP-471	<i>Kara çimen, yaban arpası</i>	Aer	Boi	Com	Wound healing	0.16
57.		<i>*Triticum aestivum</i> L. NP-473	<i>Buğday</i>	See	Sc+water	Com	Anti-inflammatory	0.19
58.	Polygonaceae	<i>Rumex tuberosus</i> L. NP-481	<i>Kuzu kulağı, ekşi kulak</i>	Lea	-	Raw	Diabetes disease	0.40
59.	Primulaceae	<i>Primula vulgaris</i> subsp. <i>rubra</i> (Sm.) Greuter & Burget NP-501	<i>Yabani menekşe, yaban marulu</i>	Flo, Lea	De	Dgt	Analgesic	0.42
60.	Punicaceae	<i>*Punica granatum</i> L. NP-512	<i>Nar</i>	Fru	Fc	Dtt	Wound healing	0.40
61.	Ranunculaceae	<i>*Nigella sativa</i> L. NP-523	<i>Çörek otu</i>	See	Sc+honey	Sed	Anemia	0.32
62.		<i>Ranunculus dissectus</i> Bieb. NP-522	<i>Pıtrak</i>	Flo, Lea	Fc, Lc	Com	Immune system Rheumatism, wound healing	0.30
63.	Rhamnaceae	<i>Paliurus spina-christi</i> Mill. NP-531	<i>Karaçalı, draga</i>	Flo Roo Flo	De De De	Ext Dtt Dgt	Cracked skin Menstruation Bronchitis	0.24
64.	Rosaceae	<i>*Cydonia oblonga</i> Miller. NP-417	<i>Ayva</i>	Lea Lea	De De+apple scab	Dgt Dtt	Cough Diarrhea	0.46
65.		<i>Rubus canescens</i> DC. var. <i>glabratus</i> (Godr.) Davis & Meikle NP-542	<i>Karamık, karamuk, böğürtlen</i>	Roo	De	Doc	Diabetes disease	0.48
66.		<i>Prunus armeniaca</i> L. NP-414	<i>Kayısı</i>	Fru	Dry	Raw	Constipation	0.28
67.		<i>Pyrus elaeagnifolia</i> Boiss. NP-545	<i>Ahlat, alfat</i>	Fru	Fc+water	Doc	Diabetes disease, worm	0.20
68.		<i>Rosa canina</i> L. NP-541	<i>Kuşburnu, öküz götü</i>	Fru	De	Dtt	Flu	0.60

(Contd.)

Table 1 — List of wild medicinal plants investigated with their related information (*Contd.*)

Plant No.	Family	Plant species, voucher specimen, endemism	Vernacular name of Manyas	Plant part(s) used ^a	Preparations ^b	Utilization method ^c	Use	UV
69.		<i>Rosa sempervirens</i> L. NP-416	<i>Kuşburnu</i>	Fru	De	Dgt	Colds and flu	0.60
70.	Smilacaceae	<i>Smilax aspera</i> L. NP-561	<i>Köpek üzümü</i>	Roo	-	Raw	Hemorrhoids, wound healing	0.30
71.	Solanaceae	* <i>Solanum tuberosum</i> L. NP-571	<i>Patates</i>	Tub	Tc	Com	Burn	0.22
72.	Tiliaceae	* <i>Tilia argentea</i> Desf. Ex Dc. NP-591	<i>İhlamur</i>	Flo, Lea	De	Dgt	Colds and flu	0.60
73.	Urticaceae	<i>Urtica dioica</i> L. NP-601	<i>Isırgan</i>	Lea	Dry+egg	Com	Analgesic	0.62
74.		<i>Urtica urens</i> L. NP-602	<i>Isırgan</i>	See	-	Eat	Immunity	0.62
75.	Vitaceae	* <i>Vitis vinifera</i> L. NP-621	<i>Asma</i>	Bra	Pr	Dgt	Withdrawal cure	0.38

* Cultivated plant.

** Toxic in large quantities

^aPlant part(s) used: Aer, aerial parts; Bra, branches; Bul, bulbous; Flo, flowers; Fru, fruits; Lat, latex; Lea, leaves; Roo, roots; See, seeds; Tub, tuber; Who, whole plant.

^bPreparations: As, ash; Av, Aerial parts cooked as vegetable; Boi, boiled; De, decoction; Dry, drying; Fc, the fruits are crushed; In, infusion; Lc, the leaves are crushed; Lh, leaves are heated; Loi, leaves boiled; Lr, latex is removed; Ms, mash; Pr, plant sap is removed; Sc, the seeds are crushed; Tc, the tuber crushed.

^cUtilization method: Ceh, chew; Com, compress; Dgt, drink one glass of the plant two times a day; Doc, drink one glass of the plant on an empty stomach in the morning; Dga, drink one glass of the plant one times a day; Dtt, drink one glass of the plant three times a day; Eat, Eaten as meal; Ext, externally; Gar, gargle; Nas, nasal drops; Raw, the plant is eaten raw; Sed; the seed is eaten raw.

region²³. As beginning of the study, various local useful plants were introduced to students and local people with slides and then surveys on medicinal herbs were given to the students. The students were asked which medicinal herbs their family (grand parents - parents) use and which parts of the herbs, for which aims, and how local people use plants (Appendix B). According to the results of the survey, some informants were determined. These demonstrations and written surveys also provide a bridge between children and their parents.

Interviews with local people

Field survey was carried out by gathering ethnobotanical data through structured and semi-structured interviews and discussions with indigenous people in 14 villages and city center. Through the interviews, men and women above the middle age, shepherds, healers, agricultural government officers of the district, woodsmen and teachers, a total of 115 people were interviewed as resources. Participants' ages were between 21 and 81 yrs. Discussions were made on the busy hours of the common areas (tea houses, farms, bazaars, gardens etc (Fig. 3). The survey was mostly administered to local people over 40 years who know more knowledge about traditional and local remedies. The data documented through the survey included the names and age of the participants, local names of utilized herbs, herb parts used, preparation methods, ailments treated, and duration of treatments, and complications (Appendix 1).



Fig. 3 — Interviews with native people

Calculations

The ethnoveterinary information collected from the direct interviews with the indigenous people and local healers was investigated by applying different quantitative methods.

The ethnobotanical data was analyzed using different quantitative indices including Informant Consensus Factor (ICF) and Use value (UV)^{24,25}. ICF was calculated for each group to determine the agreement of the participant on the reported treatment. ICF was calculated by following equation (ICF= Nur–Nt / Nur–1) where “Nur” is the number of plant use citations in each group and “Nt” is the number of plant taxa used.

The second approach for information analysis was use value (UV). The UV, a quantitative method that shows the relative importance of species known traditionally, was also calculated with the formula:

$UV=U/N$, where UV refers to the use value of a species; U to the number of citations per species; and N to the number of participants.

Results and Discussion

Demographic characteristics of research informants

Demographic features of the informants were determined and documented through face to face interviews (Table 2). In total, 115 informants who took part in the questionnaire, 32 informants were under 40, 47 informant ages were between of the 40 - 60 and 36 were over the age of 60. Majority of the informants were residing in the province more than 30 years; just 8 were residing in the region for less than 10 years. A total of 82 informants were living in villages, 33 were living in City centers. In total, 115 local informants including 61 females and 54 males (with a sex ratio female/male of 1.12) were interviewed. While considering the education level of the informants, it was determined that the majority (69%) was graduated from primary or secondary school, 22 of them (19%) had a high school degree and only (6%) was graduated from University. Duration of residence in the region of local informants was shown to be 10 years or more (94%). About 51% of informants were farmers, or shepherds. However, housewives designated as the informants are also had quality traditional knowledge about medicinal herbs.

Table 2 — Demographic profil of the informants included in survey (n = 115)

Demographic features		Number of people	%
Gender	Male	54	46
	Female	61	54
Age	<40	32	27
	40-60	47	40
	>60	36	31
Education level	Primary school	49	43
	Secondary school	37	32
	High school	22	19
	University	7	6
Duration of residence in the region	Less than 10 years	8	6
	10 years or more	107	94
Residence place	Village	82	71
	City center	33	29
Working status	Farmer	52	45
	Housewife	43	37
	Herbalist	13	11
	Shepherd	7	6

Ethnomedicinal herbs and associated data

The list of plants used for treatment of diseases by local people (informants) is given in Table 1. Families of the taxa are arranged with respect to alphabetical order. For each taxon, family, Latin name, local names, applications, parts used and medicinal use, herbal formulation, purposes and statistical calculations (ICF, UV) are provided. As a result of the study, 75 medicinal herbs belonging to 40 families were recorded in the region. Among them, 61 taxa were wild and 14 taxa were cultivated herb. It is revealed that the most frequently used medicinal plants families were Lamiaceae (>13%), Asteraceae (>12%), Rosaceae (>8%). The most commonly used medicinal herbs were *Artemisia absinthium* L. (papatya), *Hypericum perforatum* L. (kantaron otu), *Hylotelephium telephium* L. H. Ohba (kalın kaymak otu), *Thymus zygoides* Griseb. (yabani kekik), *Rosa sempervirens* L. (kuşburnu), and *Tilia argentea* DC. (ihlamur).

During the research in the region a total of 122 traditional remedies were recorded. Indigenous people are choosing to use traditional herbal remedies mainly for the treatment of respiratory system disorders (18%), gastro-intestinal problems such as stomachach disorders, abdominal pain and ulcers (13%), wounds and cut (11%), diabetes (7%), hemorrhoids (5%), heart and vascular disorders (4%). Intestinal disorders, headache, wounds - cuts, cough and influenza problems were cured with the highest diversity of medicinal herbs.

The most frequently used parts were; leaves (36%), flowers and flowering branches (23%), aerial parts (11%), fruits (10%), roots (3%), however seeds and bulbs of herbs were also for the several traditional remedies. Sometimes the indigenous people also used other ingredients, such as honey or olive oil to prepare the traditional remedies. There are several methods of preparation and usage for different types of diseases. Local people had several preparation methods like decoction, infusion, powdering, crushing, fresh application, chewing, drooping homogenized in water. Decoction and Infusion was the common methods used for the preparation of the traditional remedies. In the study, it has been recorded that some herbs such as *Hypericum perforatum* L. (sarı kantaron), *Centaurium erythraea* Rafn (kırmızı kantaron), and *Momordica charantia* L. (kudret nari) are often kept in olive oil and used as solutions.

It was observed that some medicinal plant taxa were extensively used for commercial purposes in the

Manyas province, *Lavandula stoechas* ssp. *stoechas* (karabaş otu), *Rosa canina* L. (kuşburnu), *Salvia tomentosa* Mill. (adaçayı), *Hypericum perforatum* L. (kantaron), *Origanum vulgare* L. (güve kekiği), *Teucrium polium* L. (kısa mahmut), *Centaurium erythraea* Rafn. (kırmızı kantaron) and *Tilia argentea* Desf (ihlamur) are among the herbs extensively gathered and traded in the study province. Collecting and trading some important plant species that commonly grow in in the region have become the source of income for hundreds of local people.

Data analysis

Indigenous people used medical plants most commonly for the treatment of respiratory system disorders (14%), gastro-intestinal complaints such as stomachache abdominal pain, ulcers (9%), and wounds and cuts (9%), diabetes (5%), hemorrhoids (4%), heart and vascular disorders (3%).

According to the results of the questionnaire of students (Appendix B), the commonly used plant species were *Artemisia absinthium* L. (papatya), *Hypericum perforatum* L. (kantaron otu), *Hylotelephium telephium* L. H. Ohba (kalın kaymak otu), *Ecballium elaterium* (L.) A. Rich. (şeytan kekeği), *Thymus zygoides* Griseb. (yabani kekik), *Ruscus aculeatus* L. (tavşan memesi), *Plantago major* L. (sinir otu), *Rosa sempervirens* L. (kuşburnu), and *Tilia argentea* DC. (ihlamur).

The UV statistical calculations was shown; *Hypericum perforatum* L. (0.67), *Artemisia absinthium* L. (0.67), *Allium sativum* L. (0.62), *Urtica dioica* L. (0.62), *Tilia argentea* DC. (0.60), *Rosa canina* L. (0.60), *Origanum vulgare* L. (0.55), *Plantago major* L. (0.54), *Lavandula stoechas* ssp. *stoechas* (0.54), *Hylotelephium telephium* L. H. Ohba (0.52), and *Ecballium elaterium* (L.) A. Rich. (0.48), *Ruscus aculeatus* L. (0.40) were reported to be of the highest use value (Table 1).

The reported diseases were divided into 7 groups based on the information collected from the interviews. Cut and wounds disorders had the highest FIC score (0.81). *Salvia virgata* L., *Pelargonium zonale* L., *Vinca major* L., *Hypericum perforatum* L., *Plantago major* L., *Primula vulgaris* subsp. *Sibthorpii* were reported to be among the traditional remedies indicated for these diseases. Hemorrhoids was noted to have the second highest FIC value (0.72), kidney stones documented by its all images like the third group (FIC was 0.68), while the fourth level of FIC

values (0.62) was recorded for healing diabetes. The last citations of this ranking were documented for plants used to treat gastro-intestinal disorders and respiratory - throat diseases with FIC value of 0.34, 0.32.

Conclusions

75 ethnomedicinal plant species belonging to 40 families were recorded in the resarch area. Among them, 61 plant taxa were wild and 14 taxa were cultivated plants. The results demonstrated ethnomedicinal plants are used in the treatment of many diseases in the region. Leaves, aerial parts, fruits, flowers, seeds, and roots are the most frequently used parts of the medicinal herbs. Sometimes, other ingredients including honey, sugar or flour are also used to prepare the traditional remedies. It is revealed that the most frequently used formulations were infusion and decoctions for the preparation of the folk medicines.

It is revealed that the commonly used medicinal plants were *Artemisia absinthium* L. (papatya), *Hypericum perforatum* L. (kantaron otu), *Hylotelephium telephium* L. H. Ohba (kalın kaymak otu), *Thymus zygoides* Griseb. (yabani kekik), *Rosa sempervirens* L. (kuşburnu), and *Tilia argentea* DC. (ihlamur). The most frequently used parts were; leaves (36%), flowering branches and flowers (23%), aerial parts (11%), fruits (10%), roots (3%), but seeds and bulbs were also used in some of the remedies. Many plants were used for the treatment of respiratory system disorders, gastrointestinal diseases, wounds healing, diabetes, hemorrhoid etc.

UV and FIC statistical methods were used for evaluate ethnomedicinal data. Aegean region is the one of important place in the Turkey for the ethnomedicinal plants. The UV and FIC values of our study contributed to prove that information.

The exciting interests of printed and visual media for the subject increase the interests of the people for the traditional medicinal herbs. Popular herbal medicine, documented through field-studies in Turkey, shows a strong link, including causal relationships, with written herbal knowledge. The number of plant species used successfully in the prevention and treatment of ailments in Anatolia is quite high and their recorded is of great importance for protecting that rich cultural heritage. The ethnomedicinal studies reveal that traditional plant knowledge still exists in the Manyas and its

surroundings, mostly among elder people. As a result of the research, it was clearly seen that; the use of medicinal herbs in the ethnomedicine as a single or combined has a great preventive and therapeutic potential. Therefore, it is necessary to focus on phytochemical, physiological and phytopharmacological research on these plant species that are not sufficiently studied and used in Ethnomedicine.

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Conflict of Interest

Author declare that they do not have any conflict of interest

Author's Contributions

NPK- Collection of data, Data Interpretation and analysis, Editing, GT- Conceptualisation and Editing, Data Interpretation and analysis, Correction, RP- Conceptualisation, Manuscript preparation, Data Interpretation and analysis.

Appendix A

- 1 Surname and name of the informant
- 2 Age and sex of the informant
- 3 Address and telephone of the informant
- 4 Educational level of the informant
- 5 Date of interview
- 6 Place of residence of the informant
- 7 Duration of residence of the informant?
- 8 What is the vernacular name of the herb used?
- 9 For which ailments do you use the herbs?
- 10 Which parts of the herbs do you use? (leaves, flower, root, stem, fruit, etc.)
- 11 How do you prepare the herbs for use?
- 12 When and how do you use the herbs?
- 13 Approximately what dose do you use herbs?
- 14 How long does the recovery period take?
- 15 Did any complication occur from the herbs you used?

Appendix B

- 1 Which medicinal localherbs their family (parents and grand parents) use?
- 2 Which parts of the medicinal herbs they use?
- 3 Which aims they use herbs?
- 4 How they use herbs?

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