



An ethnobotanical study of medicinal plants in Turgutlu (Manisa–Turkey)

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ABSTRACT

Q5 *Ethnopharmacological relevance:* A comprehensive ethnobotanical study was made in Turgutlu. This paper contains folk medicinal plants and ethnopharmacological information of this ethnobotanical study. *Aim of study:* The aim of this study is to collect and identify the plants used in therapy by the local people and to reveal information on traditional herbal medicine. *Materials and methods:* This study was made between 2010 and 2011 and its materials were the plants collected during the field work. The information was obtained through open and semi-structured interviews with the local people. In addition, informant consensus factor (FIC) and use value (UV) were calculated. *Results:* 76 Folk medicinal plants belonging to 44 families were identified in this study. Among them, 68 species are wild and eight species are cultivated plants. The most common families are Asteraceae (11.8%), Rosaceae (9.2%), Lamiaceae (7.9%), Apiaceae (3.9%) and Malvaceae (3.9%); the most common preparations were infusion (37%) and decoction (18.5%). A total of 177 medicinal uses (remedies) was recorded. Digestive system disorders have the highest FIC (0.73). According to use value (UV) the most important plants were *Rosa canina* (0.75), *Ficus carica* subsp. *carica* (0.74), *Tilia platyphyllos* (0.71) and *Vitex agnus-castus* (0.70). *Conclusion:* In the research area the use of traditional folk medicine is still prevalent in the community especially in the villages.

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1. Introduction

Ethnobotanical studies are very important to reveal the past and present culture about plants in the world.

Since ancient times people have used plants as a source of medicine. Around 80% of general population in the world use plants to treat several illnesses (UICN, OMS, WWF, 1993). Medicinal plants are an important source of current drugs and about 25% of the drugs prescribed worldwide come from plants (Rates, 2001).

The study of traditional uses of plants in the world in general and in the Mediterranean region in particular has been progressively increasing during the past few decades (Rivera et al., 2005; De Natale and Pollio, 2007).

The Turkish flora contains 9582 species of vascular plants of which about 3155 are endemic (Özhatay et al. 2012). Turkey has many Anatolian civilizations and therefore this region has various historical and cultural richness. Because of this richness, traditional herbal medicine has an important role in Turkey.

Many ethnobotanical studies have been made by ourselves (Yazıcıoğlu and Tuzlaci, 1996; Tuzlaci and Erol, 1999; Tuzlaci and Tolon, 2000; Tuzlaci and Aymaz, 2001; Tuzlaci, 2005, 2006, 2011; Tuzlaci and Alparslan, 2007; Tuzlaci and Bulut, 2007; Tuzlaci and Sadikoğlu, 2007; Bulut and Tuzlaci, 2009a, 2009b; Tuzlaci and Doğan, 2010; Tuzlaci et al., 2010; Bulut, 2011; Tuzlaci and Şenkardeş, 2011) and by other researchers in Turkey.

The aim of this study is to represent information about the traditional herbal medicine recorded in Turgutlu where there is no such investigation. In addition, Turgutlu is situated in the Aegean Region in Western Anatolia and the flora of this region is very rich and mainly composed of the Mediterranean elements. Therefore, the rich ethnopharmacological knowledge is assumed to be found out.

2. Materials and methods

2.1. Study area

Turgutlu is located (38°19'00"–38°37'00"N, 28°59'24"–27°59'24"E) in the west part of Turkey at an altitude 78 m above sea level (Fig. 1). Turgutlu consists of two subdistricts and 37 villages.

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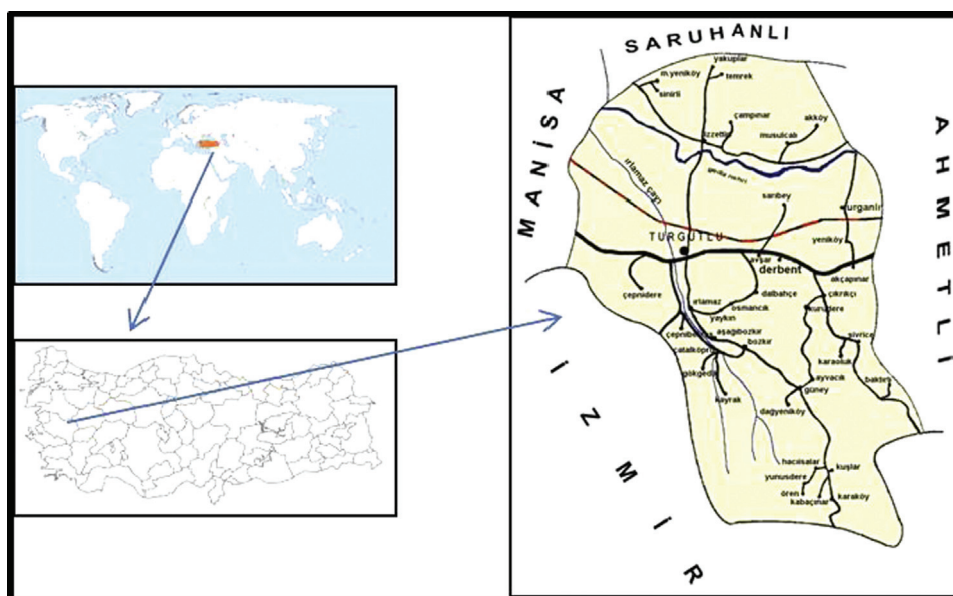


Fig. 1. Geographical location of the study area.

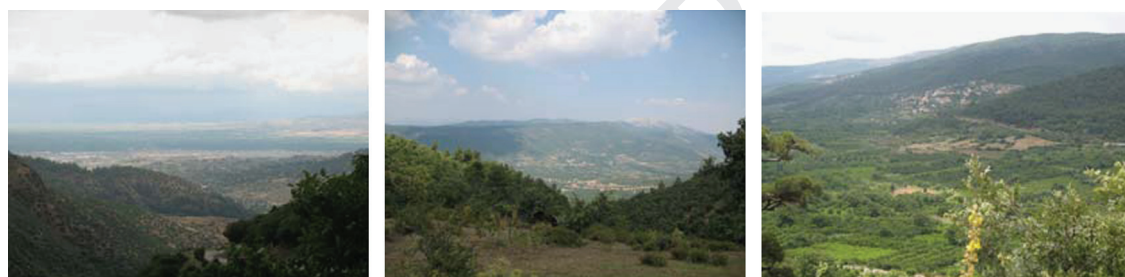


Fig. 2. General view of Turgutlu and villages.

Q8 It covers an area of 530 km² and its population is 143,990. More than 100,000 people live in the city center, while others live in the subdistricts and villages (<http://www.tuik.gov.tr> (accessed: 15.10.12)). Turgutlu is surrounded by Saruhanlı (Manisa) from the north, Ödemiş (İzmir) and Bayındır (İzmir) from the south, Ahmetli (Manisa) from the east and the cities of Manisa and Kemalpaşa (İzmir) from the west. Çal Mountain (1037 m), depositing lateritic iron, nickel–cobalt, is located in the north part of

Q9 Turgutlu (Çağatay et al., 1981) Fig. 2.

Çatma Mountain, a part of the Bozdağ Mountain Range, is the highest (1337 m) elevation in the south of Turgutlu.

The climate in the area is typically Mediterranean with an annual mean temperature of 17 °C, and a mean of rainfall of 660 mm.

The main crops of Turgutlu are grapes, cherries, figs, tomatoes, cotton and wheat. Grape (*Sultani üzüm*) cultivation, as well as cherry cultivation, occupies an important place in terms of 30% of exported grape produced in Turkey.

During our ethnobotanical research, floristic studies were also made and 816 specimens were collected. A total of 355 species belonging to 81 families have been identified from the research area. Asteraceae, 14% of all species, is the most important family there following Lamiaceae (8.2%), Fabaceae (8.2%), Apiaceae (5.3%) and Rosaceae (3.66%) while the other 76 families share 60.7%.

The vegetation of Turgutlu consists of mainly Mediterranean elements (macchie elements). The richest vegetation is in the mountainous areas, ranging from the east to the west direction in the southern part of city center.

Forests including *Pinus nigra* J.F. Arnold subsp. *nigra* var. *caramanica* (Loudon) Rehder (black pine) and *Quercus cerris* L. var. *cerris* (oak) are mostly located on the higher parts of the mountains as pure or mixed forest trees.

Pinus brutia is concentrated particularly in the lower altitudes as pure or mixed with other forest trees.

Shrubs and semi-shrubs were observed particularly on the lower slopes of the mountains. *Cistus creticus* L., *Quercus coccifera* L. and *Spartium junceum* L. are the most common shrubby plants in the vegetation.

As ground vegetation, there are many herbaceous plants, especially belonging to Fabaceae, Asteraceae, Poaceae and Lamiaceae.

2.2. Data collection

Ethnobotanical data were collected through open and semi-structured interviews (Martin, 1995; Alexiades, 1996; Cotton, 1996) with local people Fig. 3.

We also followed previous methodological contributions from Mediterranean ethnobotanical studies (Martínez et al., 1996; Bruni et al., 1997; Blanco et al., 1999; Pieroni, 2000; Agelet and Vallès, 2003; Camejo-Rodriguez et al., 2003; Novais et al., 2004; Guarrera et al., 2005; Rivera et al., 2005; Akerreta et al., 2007a, 2007b; De Natale and Pollio, 2007; Rigat et al., 2007; Cornara et al., 2009; Parada et al., 2009; Benítez et al., 2010; González et al., 2010; Calvo et al., 2011; Cavero et al. 2011a, 2011b; Carrió and Vallès, 2012; Polat and Satil, 2012). Turgutlu area was visited several times in 2004 and 2007. The interviews were made as general



Fig. 3. Ethnobotanical interviews.

conservations with a strict questionnaire (Appendix). We asked the informants to show us the preparation methods of the medicinal plants they used and we usually collected the plants with local people. In some cases, some plants were collected from the same locality before the interviews and then information was obtained.

A total of 162 people were interviewed. 102 of the informants were men (63%) and the remaining 60 were women. The age of informants varied from 25 to 90 and the mean age is 55. The informants were mainly farmers, housewives, shepherds, mukhtar (headmen of villages), laborers (forest, industry etc.) and cafe owners. Interviews were made at various places (coffee houses, gardens, houses, fields, etc.). During the interviews, the information about various data (local names, part(s) of the plants used, the ailments treated, the therapeutic effect, the methods of preparation and the methods of administration) was obtained from local healers (6), experienced adults and patients. In addition, some harmful effects of folk medicine, if declared, were also recorded.

The collected plants were identified by the authors (Bulut and Tuzlaci 2009b) according to "Flora of Turkey and East Aegean Islands" (Davis, 1965–1985; Davis et al., 1988; Güner et al., 2000). Voucher specimens are kept in the Herbarium of Faculty of Pharmacy, University of Marmara (MARE).

2.3. Calculations

Q10 Informant consensus factor (Trotter and Logan, 1986; Heinrich et al., 1998) was calculated according to the following formula: $FIC = \frac{Nur - Nt}{Nur} - 1$, where *Nur* refers to the number of use citations in each category and *Nt* refers to the number of species used. This method is used to check homogeneity of the information: FIC values will be low (close to 0) if plants are chosen randomly or if informants do not exchange information about their use and values will be high (close to 1) if there is a well defined selection criterion in the community and/or if information is given between the informants (Afifi and Abu-Irmaileh, 2000; Abu-Irmaileh and Afifi, 2003). In other words, the medicinal plants that are presumed to be effective in treating a certain disease have higher FIC values (Teklehaymanot and Giday, 2007).

The use value (UV (Trotter and Logan, 1986)), a quantitative method that demonstrates the relative importance of species known locally, was also calculated according to the following formula: $UV = \frac{U}{N}$, where *UV* refers to the use value of a species; *U* to the number of citations per species; and *N* to the number of informants.

3. Results and discussion

3.1. Demographic characteristics of informants

Demographic characteristics of the informants were determined and recorded during the face-to-face interviews. Of the 162 participants taking part in the questionnaire, 4 were between

25 and 35, 15 were between the ages of 36 and 45, 34 were between the ages of 46 and 60, and 109 were over the age of 60. All the informants are natives of Turgutlu. A total of 149 were living in the villages and 13 were living in Turgutlu center. Of the informants, 60 were female, 102 were male.

3.2. Medicinal plants and associated knowledge

The plants used for medicinal purposes in Turgutlu are presented in Tables 1 and 2 arranged according to their botanical names alphabetically with the relevant information. Taxonomical changes according to the plant list (<http://www.theplantlist.org>) are shown in parenthesis in Table 1 together with the popular scientific names. During the study, 219 specimens were collected in the research area. According to the results of identification of the specimens, 76 medicinal plant species belonging to 44 families were found in the research area. Among them 68 species are wild and eight species are cultivated plants. The most common medicinal plant families are Asteraceae (11.8%), Rosaceae (9.2%), Lamiaceae (7.9%), Apiaceae (3.9%) and Malvaceae (3.9%). The most frequently used medicinal plants were *Rosa canina*, *Ficus carica* subsp. *carica*, *Tilia platyphyllos*, *Vitex agnus-castus*, *Olea europaea* var. *europaea*, *Malva sylvestris*, *Teucrium polium*, *Echallium elaterium*, *Morus nigra* and *Urtica dioica* Fig. 4.

The plant parts used for treating different ailments were fruits (29.2%), leaves (23.6%), aerial parts (11.8%), flowering branches (9.6%), subterranean parts (8.4%) and other parts (17.4%). The local people sometimes also used other ingredients, such as olive oil, vinegar, honey and milk to prepare the remedies.

The preparation methods were infusion (37%), decoction (18.5%), crushing (10.4%) and other ways (19.1%) or they were directly applied (15% without any preparation).

During the study a total of 177 remedies were recorded. Most remedies were for internal application (66.5%) (Tables 1 and 2).

According to the declaration of the informants one of the herbal medicinal plants *Centaurea solstitialis* subsp. *solstitialis* is not used at the present time anymore because malaria has not been seen in the research area.

Among the veterinary folk medicinal plants (Table 2) *Cerasus avium*, *Cistus laurifolius*, and *Lactuca serriola* are used only for animal health. *Cistus laurifolius*, *Fraxinus ornus* subsp. *cilicica*, *Hypericum perforatum* and *Pteridium aquilinum* were also recorded in some other studies (Blanco et al., 1999; Viegli et al., 2003; Bonet and Vallès, 2007; Akerreta et al., 2010; Benitez et al., 2012; Polat and Satil, 2012). However among them only the use of the *Hypericum perforatum* is similar to our records in Turgutlu.

Some of the medicinal plants are also used in multiherbal recipes containing two or more species. These are presented in Table 3. Among them, *Nasturtium officinale* is used only in the multiherbal recipes.

Some different plant species are called under the same vernacular name by the natives. For instance: *Urtica dioica*–*Urtica urens* (isirandalak, isirgan), *Micromeria myrtifolia*–*Origanum onites* (kekik), *Anthemis austriaca*–*Anthemis aciphylla* var.

Table 1
Folk medicinal plants of Turgutlu (Manisa, Turkey).

Botanical name, family and specimen number	Local name	Plant part used	Ailments treated/Therapeutic effect	Preparation	Administration	UV (use value)	Similar usage in literature
<i>Achillea nobilis</i> L. subsp. <i>neilreichii</i> (Kerner) Formánek (Asteraceae), MARE 12750, 13143	Ayvadana	Aerial parts	Diabetes	Infusion	Int.	0.14	^b
<i>Alcea pallida</i> Waldst. et Kit. (Malvaceae), MARE 12819, 13107	Deli fatmaana	Fruits	Diuretic	Decoction	Int.	0.13	
	Fatmaana otu	Fruits	Antifungal	Infusion	Int.	0.07	
	Sığirkuyruğu	Leaves	Wart	Crushed	Wrapped in a cloth, ext.	0.14	
		Leaves	Abdominal pain	Infusion	Int.	0.12	
		Capitulum	Stomachache	Infusion	Int.	0.19	
<i>Anthemis aciphylla</i> Boiss. var. <i>discoidea</i> Boiss. (Asteraceae), MARE 12898, 12906, 13080	Akbaba	Capitulum	Cold	Infusion	Int.	0.12	
<i>Anthemis austriaca</i> Jacq. (Asteraceae), MARE 12078	Papatya	Capitulum					
<i>Anthemis chia</i> L. (Asteraceae), MARE 11969, 12750, 13624, 13655	Akbaba, Akbuba, Bubaça	Capitulum	Stomachache	Infusion	Int.	0.17	
<i>Anthemis coelopoda</i> Boiss. var. <i>bourgaei</i> Boiss. (Cota <i>coelopoda</i> (Boiss.) Boiss.) (Asteraceae), MARE 12151, 12888	Papatya	Capitulum	Stomachache	Infusion	Int.	0.11	
<i>Asparagus acutifolius</i> L. (Liliaceae), MARE 11984	Diken, Dikenli sarmaşık, Kara diken, Kedipisi, Sarmaşık, Tekesakali, Tikenpisiği, Tilkikuyruğu	Root	Lumbago	Sliced	Ext.	0.11	(1) ^b
<i>Asparagus aphyllus</i> L. subsp. <i>orientalis</i> (Baker) P.H.Davis (Liliaceae), MARE 12000, 12990	Dikenli sarmaşık, Dikenpisi, Kara diken, Kedipisi, Sarmaşık, Tekesakali, Tikenpisiği, Tilkikuyruğu	Young shoots	Urinary diseases	Infusion	Int.	0.15	
		Young shoots	Stomach diseases	Infusion	Int.	0.15	
		Young shoots	Skin diseases	Boiled in water (used the day after)	Ext.	0.14	
<i>Capparis ovata</i> Desf. var. <i>canescens</i> (Coss.) Heywood (Capparaceae), MARE 12149, 12851, 13103	Act düvelek, Kapari, Kebere, Köpekteşiği, Yılan bostani, Yılan karpuzu	Immature fruits	Antifungal	–	Eaten	0.1	(3) ^b
<i>Capparis sicula</i> Duhamel (Capparaceae), MARE 12149, 12851, 13103							
<i>Capsella bursa-pastoris</i> (L.) Medik. (Brassicaceae), MARE 12004, 12307	Deli tere, Çıldırak, Çingirdak, Şingirdak otu, Tahtacı otu	Aerial parts	Internal bleeding	Infusion	Int.	0.05	(4) ^b
	Diken, Eşekdikeni	Aerial parts	Wound	Crushed	Ext.	0.12	
		Capitulum	Asthma	Infusion	Int.	0.11	

<i>Carduus pycnocephalus</i> L. subsp. <i>pycnocephalus</i> (Asteraceae), MARE 11977	Çakırdiken,	Capitulum	Malaria	Infusion	Int.	0.31	
<i>Centaurea solstitialis</i> L. subsp. <i>solstitialis</i> (Asteraceae), MARE 12222, 12792,	Kuşkonmaz diken,						
12840, 12933, 13149	Sarı diken						
<i>Cerastium mahaleb</i> (L.) Miller ^a	Delice, Deli kiraz,	Leaves	Cold	Infusion	Int.	0.19	
var. <i>mahaleb</i> (Rosaceae), MARE 12016	İdris						
<i>Cercis siliquastrum</i> L. subsp. <i>siliquastrum</i> (Fabaceae), MARE 11972,	Eğüvan, Elikovan,	Flowering branches	Stomachache	Infusion	Int.	0.15	
12071,	Ergüvan, Gelincik	Flowering branches	Rash	Decoction	Ext.	0.46	
12892, 13101	Altın otu	Whole plants	Constipation	Decoction	Int.	0.07	(1, 3) ^b
<i>Ceterach officinarum</i> DC. (Aspleniaceae), MARE 13001							
<i>Convolvulus arvensis</i> L. (Convolvulaceae), MARE 12814, 12928, 13132	Topalan otu, Toshah otu, Sarmaşık, Yapık otu, Yer sarmaşığı	Leaves	Rheumatism	Crushed	Ext.	0.14	
<i>Cornus mas</i> L. (Cornaceae), MARE 13629	Güren, Kizilcik	Fruits	Diarrhea	–	Eaten	0.43	Diarrhea (1)
<i>Crataegus monogyna</i> Jacq. subsp. <i>monogyna</i> (Rosaceae), MARE 11976, 12273	Deli aliç, Halıç,	Fruits and flowering branches	Urinary diseases	Decoction	Int.	0.14	(1, 3) ^b
	Kızlarçevir,	Fruits and flowering branches	Stomach ailments	Decoction	Int.	0.17	
	Kızıldımçevir,	Fruits and flowering branches	Headache	Decoction	Int.	0.23	
	Kızılcaçögür, Kızılarközü, Kızılarküü, Kızılçögür, Memişen	Fruits	Hemorrhoids	–	Eaten	0.29	
<i>Cupressus sempervirens</i> L. ^a var. <i>sempervirens</i> (Cupressaceae), MARE 13659	Kara selvi, Selvi	Cones	Enuresis nocturna	Decoction	Int.	0.07	(1) ^b
<i>Cuscuta planiflora</i> Ten. (Cuscutaceae), MARE 12896	Bagboğan, Bogmaca, Ürün	Whole plants	Hepatitis	Decoction	Int.	0.03	
<i>Gydonia oblonga</i> Miller (Rosaceae), MARE 12015, 12045, 13004	Ayva	Leaves Leaves	Cold Antitussive	Infusion Infusion	Int. Int.	0.56 0.51	Diabetes (1) Stomach ailments (3)
		Leaves Leaves Leaves	Stomachache Diarrhea Diabetes	Infusion Infusion Infusion	Int. Int. Int.	0.18 0.49 0.11	
		Rhizomes Rhizomes	Diuretic Kidney stones	Infusion Infusion	Int. Int.	0.42 0.27	Diuretic (4, 5) Kidney stones (1)
<i>Gynodon dactylon</i> (L.) Pers. var. <i>dactylon</i> (Poaceae), MARE 12153, 12810	Ayrıık otu	Fruits	Eye disorders	Decoction (used the day after)	Ext.	0.15	(3) ^b
<i>Daucus carota</i> L. (Apiaceae), MARE 12762, 12825, 12927, 13097	Çakalboğan pıtırığı, Pıtırak						

Table 1 (continued)

Botanical name, family and specimen number	Local name	Plant part used	Ailments treated/Therapeutic effect	Preparation	Administration	UV (use value)	Similar usage in literature
<i>Dracunculus vulgaris</i> Schott (Aiaceae), MARE 11970, 12815, 12877	Kara kabak, Yılan burçağı, Yılan burçalığı, Yılan çiçeği, Yılan kabası,	Tuber	Heart diseases	Decoction	Int.	0.06	Hemorrhoids (1, 5)
		Tuber	Scorpion, insect bite	Cutting into small pieces	Swallowed with ayran (yoghurt + water)	0.05	Eczema, rheumatism (3)
		Fruits	Hemorrhoids	–	Eaten, before breakfast	0.49	
		Fruits	Eczema	–	Eaten, before breakfast	0.44	
		Fruits	Mycosis	–	Eaten, before breakfast	0.17	
		Fruits	Hepatitis	–	Eaten, before breakfast	0.06	
		Fruits	Mycosis	Sliced	Eaten, before breakfast	0.09	
		Tuber	Rheumatism	Crushed put into shoes	Ext.	0.23	
		Fruits	Eczema	–	Ext.	0.22	
		Fruits	Abdominal pain	–	Int.	0.1	
		Fruits	Erysipelas	–	Int.	0.09	
		Roots	Abdominal pain	Sliced	Licked	0.12	
<i>Eballium elaterium</i> (L.) A. Rich. (Cucurbitaceae), MARE 12082, 12139	Acidülek, Acidüvelek, Çıtlak,	Fruits juice	Sinusitis	–	Dropped into the nostrils	0.62	Sinusitis (1, 3, 4, 5)
		Fruits juice	Hepatitis	–	Dropped into the nostrils	0.25	Hepatitis (4)
<i>Equisetum ramosissimum</i> Desf. [<i>Equisetum giganteum</i> L.] (Equisetaceae), MARE 12804	Çıtlavuk, Delidülek Çam otu,	Aerial parts	Stomachache	Infusion	Int.	0.14	(3) ^b
<i>Erodium moschatum</i> (L.) Hér. (Geraniaceae), MARE 12043, 12060, 13043	Egzama otu, İğnelik, Leylekayağı, Leylekagasi	Aerial parts	Eczema	Ashes mixed with mud	Ext.	0.14	
<i>Ficus carica</i> L. subsp. <i>carica</i> (Moraceae), MARE 12019, 12972, 13036	Deli yemiş, İncir, Yemiş	Latex	Wart	–	Ext.	0.74	Wart (1, 4)
		Leaves	Eczema	Infusion	Int.	0.09	Hemorrhoids (2)
		Young shoots	Hemorrhoids	Infusion	Int.	0.37	
		Latex	Toothache	–	Applied to teeth	0.12	
		Latex	Earache	–	Dropped into the ear	0.07	
		Dried fruits	Infertility	–	Applied on vaginal area	0.22	
<i>Hyoscyamus albus</i> L. (Solanaceae), MARE 12051, 12176, 13032	Göz otu, Kapaklı ot	Seeds	Toothache	Seeds are spread on dying embers and smoke inhaled through mouth. Small white worms with black head are dropped.	Ext.	0.54	(3) ^b
		Seeds	Against itching in the eyes	Seeds are spread on dying embers and eyes are exposed to fume	Ext.	0.54	
<i>Hypericum perforatum</i> L. (Hypericaceae), MARE 12177, 12862	Kantarot, Kantiran otu, Yara otu	Flowering branches	Wound	Oleat	Ext.	0.23	
<i>Hypericum perforatum</i> L. (Hypericaceae), MARE 12159, 12191,	Kantiran otu, Kızılçik otu	Flowering branches	Wound	Oleat	Ext.	0.57	Wound (1, 2, 4)
		Flowering branches	Hemorrhoids	Oleat	Int., before breakfast	0.15	Ulcer (2)

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Table 1 (continued)

Botanical name, family and specimen number	Local name	Plant part used	Ailments treated/Therapeutic effect	Preparation	Administration	UV (use value)	Similar usage in literature
<i>Nerium oleander</i> L. (Apocynaceae), MARE 12168, 12852	Acı ağaç, Ağı çalısı, Zakkum, Zikkim	Flowers	Rheumatism	Crushed	Wrapped in a cloth, ext.	0.04	Rheumatism (1) (3) ^b
<i>Olea europaea</i> L. var. <i>europaea</i> ^a (Oleaceae), MARE 11981, 13109	Zeytin	Leaves	Diabetes	Infusion	Int.	0.27	Diabetes (1, 3)
		Leaves	Antihypertensive	Infusion	Int.	0.16	(2) ^b
		Leaves	Wound	Cooked in olive oil for a while the olive oil is used	Ext.	0.13	
		Fruit	Carminative (for baby)	Oil	Ext.	0.31	
		Fruit	Scorpion bite	Oil	Int.	0.27	
		Fruit	Eye diseases	Oil	Ext.	0.11	
		Fruit	Earache	Oil	Dropped into the ear	0.43	
		Fruit	Constipation	Oil	Eaten before breakfast	0.68	
<i>Origanum onites</i> L. (Lamiaceae), MARE 11985, 12076, 12075, 12292, 12914, 13015, 13109	İncir kekigi, Kekik, Yemiş kekigi	Aerial parts	Stomach diseases	Infusion	Int., before breakfast for 1 week	0.3	Stomach diseases, digestive (3)
		Aerial parts	Digestive	Infusion	Int., after meals	0.31	(1, 4, 5) ^b
<i>Orobancha minor</i> Sm. (Orobanchaceae), MARE 12169	Bahçe canavarı, Canavar otu	Aerial parts	Cancer	Infusion	Int.	0.05	
<i>Palitrus spina-christi</i> Miller (Rhamnaceae), MARE 12087, 12166, 12954, 13010	Çalti, Çalti dikenli, Kara çalti	Fruits	Kidney stones	Decoction	Int.	0.27	(1, 2, 3, 4, 5) ^b
<i>Peganum harmala</i> L. (Zygophyllaceae), MARE 12088	Üzerlik	Fruits	Urinary diseases	Decoction	Int.	0.19	
<i>Pinus brutia</i> Ten. (Pinaceae), MARE 12867	Akçam, Kızılcım	Immature cones	Stomachache	Decoction	Int.	0.17	
		Immature cones	Bronchitis	Crushed with honey (used the day after)	Eaten, before breakfast, one spoonfull	0.17	(1, 2, 4, 5) ^b
<i>Pistacia terebinthus</i> L. subsp. <i>palaestina</i> (Boiss.) Engler (Anacardiaceae), MARE 12070, 12234, 12311, 12809, 12875, 12897, 12958, 13124	Çitlenbik, Çitlengiç, Melengeç, Sakizlik	Immature cones	Bronchitis	Decoction	Int.	0.11	
		Immature cones	Bronchitis	Put into water for 5–10 days	Int., one glass of water	0.07	
<i>Plantago lanceolata</i> L. (Plantaginaceae), MARE 12055, 12179, 12271, 12738, 12834	Damar otu, Kırkdamar otu	Fruits	Stomachache	–	Eaten	0.22	Stomachache (2) (5) ^b
<i>Platanus orientalis</i> L. (Platanaceae), MARE 11978, 12794, 12998	Ak kavak, Çınar, Kavak	Leaves	Wound	–	Ext.	0.52	Wound (1, 2)
		Leaves	Atherosclerosis	Decoction	Int.	0.09	(4) ^b
		Leaves	Wound	Crushed then mixed olive oil	Ext.	0.3	
		Fruits	Menstrual regulator	Decoction	Int.	0.06	(1, 2, 3, 4, 5) ^b
		Leaves	Calcification	Infusion	Int. one glass of water, for 2 months	0.27	
		Leaves	Diabetes	Decoction	Int.	0.14	
		Leaves	Hemorrhoids	Infusion	Int.	0.12	

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Table 1 (continued)

Botanical name, family and specimen number	Local name	Plant part used	Ailments treated/Therapeutic effect	Preparation	Administration	UV (use value)	Similar usage in literature
<i>Thymbra spicata</i> L. var. <i>spicata</i> (Lamiaceae), MARE 12031, 12161, 13157	Dag kekigi, Kirkekigi	Aerial parts	Cold	Infusion	Int.	0.22	Cold (1)
<i>Tilia platyphyllos</i> Scop. ^a (Tiliaceae), MARE 12160	Ihlamur	Aerial parts	Abdominal pain	Infusion	Int.	0.18	(2, 4) ^b
<i>Tribulus terrestris</i> L. (Zygophyllaceae), MARE 12820, 12942, 13133, 13197	Çobançökerten, Demir pitirak, Domuz pitirağı, Pitirak, Üçdişi pitirak	Flowers	Cold	Decoction	Int.	0.71	Kidney stones (1, 3)
<i>Urtica dioica</i> L. (Urticaceae), MARE 11971, 12288, 12777, 12799	Dalğan, Dalagan, Deli isirgan, Isirandalak, Isirgan	Aerial parts	Eczema	Infusion	Int.	0.28	(5) ^b
<i>Urtica urens</i> L. (Urticaceae), MARE 12052, 12063, 12306	Isirgan, Isirandalak	Leaves	Cancer	Infusion	Int.	0.52	Cancer (1, 4)
<i>Viscum album</i> L. subsp. <i>album</i> (Loranthaceae), MARE 12918	Sarıllık otu, Ökse otu	Whole plants	Rheumatism	–	Ext.	0.62	Rheumatism (2, 4, 5)
<i>Vitex agnus-castus</i> L. (Vitaceae), MARE 12181, 12822, 13121	Hayit	Leaves	Stomachache	Infusion	Int.	0.21	Stomach ailments (3)
		Leaves	Lumbago	Infusion	Int., one glass of water, for 1 month	0.18	
		Leaves	Rheumatism	Crushed	Wrapped in a cloth, ext.	0.39	
		Roots	Cancer	Infusion	Int.	0.52	(2, 3) ^b
		Whole plants	Hemorrhoids	Infusion	Int.	0.06	Hemorrhoids (2)
		Whole plants	Heart diseases	Infusion	Int.	0.08	(1, 4, 5) ^b
		Whole plants	Hepatitis	Added into warm water	Ext.	0.24	
		Leaves	Abdominal pain	Crushed	Wrapped in a cloth, ext.	0.7	Abdominal pain, stomach ailments (3)
		Leaves	Stomach ailments	Decoction	Int.	0.25	(1, 4, 5) ^b
		Fruits	Abdominal pain	Crushed	Wrapped in a cloth, ext.	0.62	
		Fruits	Bronchitis	Infusion	Int.	0.16	
		Fruits	Hemorrhoids	–	Swallowed	0.15	
<i>Vitis vinifera</i> L. ^a (Vitaceae), MARE 13035	Üzüm	Fruits	Calcification	Crushed	Wrapped in a cloth, ext.	0.21	(1) ^b

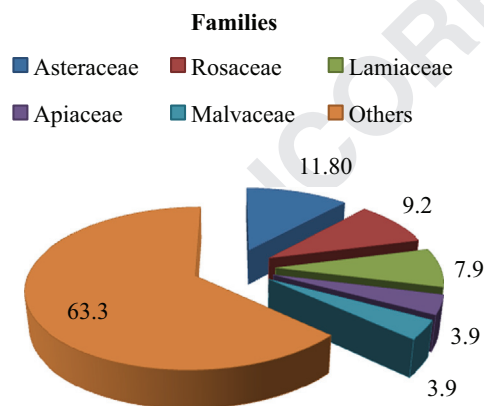
Int.: internal use and Ext.: external use. ^a Cultivated plant: (1) Polat and Satil (2012), (2) Tuzlaci and Aymaz (2001), (3) Tuzlaci and Sadikoglu (2007), (4) Ugulu et al. (2009), and (5) Ugulu and Secmen (2008).^b Different usage; the new plant uses were marked as bold.

Table 2

The plants used in veterinary medicine.

Botanical name, family and specimen number	Local name	Plant part used	Ailments treated/therapeutic effect	Preparation	Administration	UV (use value)	Similar usage in literature
<i>Cerasus avium</i> (L.) Moench (Rosaceae), MARE 12023, 12997 ^a	Kiraz	Fruit's stalk	Intestinal disease	Infusion	Int.	0.22	
<i>Cistus laurifolius</i> L. (Cistaceae), MARE 12221, 12751	Domuzpamuklusu, Domuzpamukluğu	Flowering branches	Antidiarrhea	Infusion	Int.	0.09	(2, 4) ^b
<i>Cydonia oblonga</i> Miller (Rosaceae), MARE 12015, 12045, 13004	Ayva	Leaves	Diarrhea	Infusion	Int.	0.44	
<i>Dracunculus vulgaris</i> Schott (Araceae), MARE MARE 11970, 12815, 12877	Kara kabak, Yılan burçağı, Yılan burçalağı, Yılan çiçeği, Yılan kabasi, Yılan otu, Yılanbirçağı, Yılanbirçağı	Roots	Abdominal pain	–	Eaten	0.16	
<i>Fraxinus ornus</i> L. subsp. <i>cilicica</i> (Lingelsh.) Yalt. (Oleaceae), MARE 12034, 12961	Boyalık otu, İşbudak, Karadal, Uçbudak	Stem bark	Eye diseases	Waited in water	Ext.	0.12	(6) ^b
		Young shoots	Eye diseases	Decoction	Ext.	0.14	
<i>Lactuca serriola</i> L. (Asteraceae), MARE 11996, 12005, 12039, 12803, 12828, 12926	Çekme, Dikenli eşekhelvasi, Karakavuk, Sakiz otu	Aerial parts	Cold	Infusion	Int.	0.13	
<i>Hypericum perforatum</i> L. (Hypericaceae), MARE 12159, 12191, 12282, 12769, 12950, 12988, 13016, 13120, 13151	Kantiran otu, Kizilcık otu	Flowering branches	Wound	Oleat	Ext.	0.44	Wound (1, 2, 6), (3, 5) ^b
<i>Platanus orientalis</i> L. (Platanaceae), MARE 11978, 12794, 12998	Ak kavak, Çınar, Kavak	Fruits	Antitussive	Mixed with wheat and straw	Int.	0.20	
<i>Pteridium aquilinum</i> (L.) Kuhn. (Hypolepidaceae), MARE 11982, 12220, 12265, 12730, 12805	Ayi otu, Eğer otu, Eğrelti otu, Kizgin otu, Kuzgun otu	Dried whole plants	Urinary diseases	Burned then its smoke applied	Ext.	0.27	(6) ^b
		Rhizomes	Analgesic	Decoction	Int.	0.19	
<i>Teucrium polium</i> L. (Lamiaceae), MARE 12150, 12861, 13045, 13142, 13154, 13165	Bodurmahmut, Bodurmahmut otu	Aerial parts	Analgesic	Infusion	Int.	0.11	

Int.: internal use and Ext.: external use.

^a Cultivated plant: (1) Akerreta et al. (2010), (2) Benitez et al. (2012), (3) Blanco et al. (1999), (4) Bonet and Vallès (2007), (5) Polat and Satil (2012), and (6) Viegi et al. (2003).^b Different usage.**Fig. 4.** Number of plant species by family used for medicinal purposes in the study area.

dioscoidea–*Anthemis coelopoda* var. *bourgaei* (papatya), *Anthemis aciphylla* var. *dioscoidea*–*Anthemis chia* (akbaba), *Tamus communis* subsp. *communis*–*Asparagus aphyllus* subsp. *orientalis*–*Asparagus acutifolius*–*Convolvulus arvensis* (isarmaşık), *Hypericum perforatum*–*Hypericum perforatum* (kantiran otu), *Asparagus aphyllus* subsp. *orientalis*–*Asparagus acutifolius*–*Carduus pycnocephalus* subsp. *pycnocephalus* (diken), *Asparagus aphyllus* subsp. *orientalis*–*Asparagus acutifolius* (dikenli sarmaşık, karadiken, kedipisi, tekesakali, tikenpisiği, tilikikuyruğu) and *Malva sylvestris*–*Malva neglecta* (ebe gümece, ebe gömeç, gömeç).

Some of the vernacular names of the herbal medicinal plants are recorded in this study for the first time (Baytop, 2007; Tuzlaci, 2011). They are as follows: Akbaba (*Anthemis chia*), karadiken,

kedipisi, tikenpisiği (*Asparagus acutifolius*, *Asparagus aphyllus* subsp. *orientalis*), dikenpisi (*Asparagus aphyllus* subsp. *orientalis*), yılan bostani, yılan karpuzu (*Capparis ovata* var. *canescens*), çildirak, deli tere, şingirdak otu (*Capsella bursa-pastoris*), deli kiraz, idris (*Cerasus mahaleb* var. *mahaleb*), elguvan, elikovan (*Cercis siliquastrum* subsp. *siliquastrum*), domuzpamuklusu (*Cistus laurifolius*), topalan ot, yapık otu, yer sarmaşığı (*Convolvulus arvensis*), güren (*Cornus mas*), deli aliç, haliç, kızlarçevir, kizildimçevir, kizilca çöğür, kızlarkörü, kızlar kürü, kızıl çöğür, memişen (*Crataegus monogyna* subsp. *monogyna*), bağboğan, boğmaca, ürün (*Cuscuta planiflora*), yılan burçalağı, yılan kabasi, yılanbirçağı (*Dracunculus vulgaris*), çirtlak, çirtlavuk, delidülele (*Ecballium elaterium*), kargı otu (*Equisetum ramosissimum*), egzama otu (*Erodium moschatum*), boyalık otu, işudak, uçbudak (*Fraxinus ornus* subsp. *cilicica*), kapaklı ot (*Hyoscyamus albus*), kantiran (*Hypericum perforatum*–*Hypericum perforatum*), dikenli eşekhelvasi (*Lactuca serriola*), şam dutu (*Morus nigra*), zikkim (*Nerium oleander*), yemiş kekiği (*Origanum onites*), bahçe canavari (*Orobancha minor*), kara çaltı (*Paliurus spina-christi*), eğer otu, kizgin otu (*Pteridium aquilinum*), somalik (*Rhus coriaria*), köpek kürü (*Rosa canina*), kür üzümü (*Rubus sanctus*), kurtluca otu (*Salvia tomentosa*), otu kesme otu (*Sanguisorba minor* subsp. *muricata*), kuyruklu ot (*Scolymus hispanicus*), deli kereviz (*Smyrnium olusatrum*), üç dişli pitirak (*Tribulus terrestris*), dalagan (*Urtica dioica*) and isirandalak (*Urtica dioica*, *Urtica urens*).

Some of the plants listed in Tables 1–3 are popular in Turkey and recorded in many ethnobotanical studies (Alpinar 1979, 1985, 1987; Asil et al., 1984; Yildirimli, 1985, 1994; Çubukçu and Özhatay, 1987; Özçelik, 1987; Şar and Asil, 1988; Tabata et al., 1988, 1994; Sezik et al., 1992, 1997, 2001; Yazicioğlu and Alpinar, 1993; Yeşilada et al., 1993, 1999; Akalin and Alpinar, 1994;

Table 3
Multiherbal recipes used as folk medicine in Turgutlu.

Recipe	Plant	Plant part used	Ailments treated, therapeutic effect	Preparation	Administration
1	<i>Nasturtium officinale</i> <i>Malva sylvestris</i> <i>Vitex agnus castus</i>	Aerial parts Leaves Leaves	Abdominal pain	Crushed then added flour, hot water	Ext.
2	<i>Nasturtium officinale</i> <i>Urtica urens</i> <i>Malva sylvestris</i> <i>Foeniculum vulgare</i>	Aerial parts Leaves Leaves Leaves	Stomachache, Abdominal pain	Flour, yogurt, tarhana (traditional soup), olive oil cooked	Ext.
3	<i>Nasturtium officinale</i> <i>Vitex agnus-castus</i> <i>Mentha longifolia</i> subsp. <i>thyphoides</i> var. <i>thyphoides</i>	Aerial parts Leaves Leaves	Abdominal pain	Cooked with tarhana	Ext.
4	<i>Malva sylvestris</i> <i>Teucrium polium</i> <i>Mentha longifolia</i> subsp. <i>thyphoides</i> var. <i>thyphoides</i> <i>Vitex agnus castus</i>	Leaves Aerial parts Leaves	Abdominal pain (babies)	Crushed then yogurt flour added	Ext.
5	<i>Cuscuta planiflora</i> <i>Viscum album</i> subsp. <i>album</i>	Whole plant Whole plant	Gall bladder disease	Infusion	Int.

Table 4
FIC values of category of ailments.

Ailment categories	Informant consensus factor (FIC)
Digestive system	0.73
Skin and subcutaneous tissues	0.70
Respiratory system	0.64
Circulatory system	0.55
Genital–urinary system	0.50
Bones, joints, etc.	0.47
Metabolism	0.43
Infectious diseases	0.36
Sensory organs	0.22
Veterinary uses	0.67

Guarrera et al., 2005; Rivera et al., 2005; Akerreta et al., 2007a, 2007b; De Natale and Pollio, 2007; Rigat et al., 2007; Cornara et al., 2009; Parada et al., 2009; Benítez et al., 2010; González et al., 2010; Calvo et al., 2011; Caverio et al. 2011a, 2011b; Carrió and Vallès, 2012). They are as follows: *Capsella bursa-pastoris*, *Centaurea solstitialis* subsp. *solstitialis*, *Cerasus avium*, *Cornus mas*, *Crataegus monogyna*, *Cydonia oblonga*, *Cynodon dactylon*, *Ecballium elaterium*, *Ficus carica*, *Foeniculum vulgare*, *Hypericum perforatum*, *Juglans regia*, *Laurus nobilis*, *Malva neglecta*, *Malva sylvestris*, *Mentha longifolia*, *Myrtus communis*, *Nasturtium officinale*, *Olea europaea*, *Paliurus spina-christi*, *Peganum harmala*, *Plantago lanceolata*, *Rubus sanctus*, *Rosa canina*, *Salix alba*, *Teucrium polium*, *Thymbra spicata*, *Urtica dioica*, *Urtica urens*, *Viscum album*, *Vitis vinifera* and *Tribulus terrestris*.

A comparison of our study with other comprehensive ethnobotanical studies on folk medicinal plants that have been already done in the neighboring areas (Tuzlaci and Aymaz 2001; Tuzlaci and Sadikoğlu 2007; Uğurlu and Seçmen, 2008; Uğulu et al., 2009; Polat and Satil, 2012) is presented in Table 1. According to this table, *Juniperus oxycedrus* subsp. *oxycedrus*, *Laurus nobilis*, *Paliurus spina-christi*, *Platanus orientalis* and *Urtica dioica*, recorded in five localities, are the most common herbal medicinal plants in Turgutlu and its surroundings.

According to the results of the comparison of the traditional plant uses in literature *Hypericum perforatum* and *Smyrniolus olusatrum* were recorded in Turkey for the first time. In addition, the new plant uses belonging to 38 species were marked as bold in Table 1.

3.3. Harmful effects of medicinal plants

According to the people using *Ecballium elaterium*, *Tamus communis* subsp. *communis*, *Convolvulus arvensis*, *Dracunculus vulgaris* and *Nerium oleander* these plants should be used carefully since overdosage could be dangerous.

3.4. Data analysis

According to the calculation made on the basis of the use value (UV) (Trotter and Logan, 1986), *Rosa canina* (0.75), *Ficus carica* subsp. *carica* (0.74), *Tilia platyphyllos* (0.71), *Vitex agnus-castus* (0.70), *Olea europaea* var. *europaea* (0.68), *Malva sylvestris* (0.65), *Teucrium polium* (0.64), *Ecballium elaterium* (0.62), *Morus nigra*

Çubukçu et al., 1994; Gümüş, 1994; Fujita et al., 1995; Işık et al., 1995; Sayar et al., 1995; Honda et al., 1996; Koçoğlu Keklik et al., 1996; Saçlı, 1996; Yazicioğlu and Tuzlaci, 1996; Vural et al., 1997; Duran, 1998; Çubukçu and Melikoğlu, 1999; Koçak, 1999; Tuzlaci and Erol, 1999; Bağcı, 2000; Tuzlaci and Tolon, 2000; Yücel and Tülükoğlu, 2000; Abay and Kiliç, 2001; Duran et al., 2001; Karaman and Kocabaş, 2001; Şimşek et al., 2001, 2004; Tuzlaci and Aymaz, 2001; Aslan, 2002; Keskin and Alpınar, 2002; Ezer and Avcı, 2004; Ertuğ et al., 2004; Özgen et al., 2004; Özgökçe and Özçelik, 2004; Uzun et al., 2004; Gençler Özkan and Koyuncu, 2005; Özdemir, 2005; Tuzlaci, 2005, 2006, 2011; Ecevit Genç and Özhatay, 2006; Elçi and Erik, 2006; Ezer and Arisan, 2006; Kiran, 2006; Koçyiğit and Özhatay, 2006; Onar, 2006; Satil et al., 2006; Aslan et al., 2007; Akgül, 2007; Çakılcioglu and Türkoğlu, 2007, 2010; Gençay, 2007; Kültür, 2007; Oral, 2007; Sarikan, 2007; Tuzlaci and Alparslan, 2007; Tuzlaci and Sadikoğlu, 2007; Tuzlaci and Bulut, 2007; Akan et al. 2008, Eşen, 2008; Kargioğlu et al., 2008; Keskin, 2008; Uğurlu and Seçmen, 2008; Uysal, 2008; Bulut and Tuzlaci, 2009a, 2009b; Koyuncu et al., 2009; Saday, 2009; Sarper et al., 2009; Uğulu et al., 2009; Yeşil and Akalin, 2009; Çakılcioglu et al., 2010, 2011; Tuzlaci and Doğan, 2010; Tuzlaci et al., 2010; Ünsal et al., 2010; Uysal et al., 2010; Bulut, 2011; Güneş and Özhatay, 2011; Tuzlaci and Şenkardeş, 2011; Demirci and Özhatay, 2012; Kizilarslan and Özhatay, 2012; Polat and Satil, 2012; Gürdal and Kültür, 2013; Tetik et al., 2013).

These plants are also recorded in the ethnobotanical studies made in some Mediterranean countries (Martínez et al., 1996; Bruni et al., 1997; Blanco et al., 1999; Pieroni, 2000; Agelet and Vallès, 2003; Camejo-Rodrigues et al., 2003; Novais et al., 2004;

(0.62) and *Urtica dioica* (0.62) were reported to be of the highest use value (Table 1).

The results of FIC showed that the digestive category (mainly stomach ailments) had the highest degree of consensus with a value of 0.73, followed by ailments of the skin and subcutaneous tissues (mainly wound) (0.70), respiratory system (mainly cold) (0.64), circulatory system (mainly hemorrhoids) (0.55), urinary/genital system (0.50), bones and joints (mainly rheumatism) (0.47) and metabolism (mainly diabetes) (0.43) (Table 4).

There are two studies (Polat and Satil, 2012; Uğulu et al., 2009) including the informant consensus factor in the western Anatolia. A comparison of the diseases with the highest FIC values are presented in Table 4.

When we compare with regard to the informant consensus factor (FIC), the hypertension stabilizer and anorexia categories have the highest 0.87 FIC, followed by hemorrhoids with 0.80 FIC, healing cuts and wounds have 0.74 FIC, kidney ailments have 0.69 FIC, diabetes has 0.66 FIC, respiratory and throat diseases have 0.33 FIC and gastrointestinal disorders have 0.31 FIC (Polat and Satil, 2012). In another study cold and influenza have the highest FIC with 0.821 followed by cough with 0.73 FIC, stomach ailments have 0.68 FIC, wounds have 0.61 FIC, kidney ailments have 0.51 FIC, gall bladder ailments have 0.44 FIC and hemorrhoids and enteritis have 0.30 FIC (Uğulu et al., 2009).

4. Conclusion

For the first time, information about traditional uses of the medicinal plants in the Turgutlu district has been obtained through this study. Among them, the uses of *Hypericum perforatum* and *Smyrniolus atratum* have not been recorded in Turkey before our study. In addition, the new plant uses belonging to 38 species were revealed. This ethnobotanical study shows that the use of traditional folk medicine is still prevalent in the community especially, in the villages. Therefore, the transmission of this knowledge from generation to generation is provided. In the meantime, this is also the primary information for the scientific studies which will be made on the medicinal plants and health. Traditional medicinal plants are the natural sources of herbal medicines for human health. In addition, they may be a guide for the discovery of modern medicines.

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Appendix

Questionnaire form

1. Name and surname of the participant.
2. Age and sex of the participant.
3. Telephone and address of the participant.
4. Educational level of the participant.
5. Date of interview.
6. Place of residence of the participant.
7. Duration of residence of the participant.
8. Local name of the plant.
9. Human health or Animal health.
10. Ailments treated/therapeutic effect.

11. Plant part used.
12. Preparation.
13. Administration.
14. Dosage.
15. Duration of treatment.
16. 16 Age group of patients (baby, children, adults).
17. Side effect.
18. Different ethnobotanical use.

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