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Review

Plants used as painkillers in folk medicine in Turkey IV – TOOTHACHE

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ABSTRACT

Turkey has a rich plant diversity due to its geography and many of these plants are used in the treatment of various diseases. The usage of these medicinal plants has been passed down from generation to generation. Ethnobotanical studies are used to record traditional treatment methods and this information is intended to contribute to drug development studies. This study (which is the fourth article in a series focusing on plants with painkilling properties) details the plants used to combat toothache. In this survey, which was prepared by screening ethnobotanical research, a total of 52 taxa were traditionally used in toothache treatment in Turkey. Scientific and local names, families, parts used, and treatment methods of these plants were recorded. According to the results of the research, the most common families are Lamiaceae, Asteraceae, Solanaceae, Euphorbiaceae, Liliaceae and Rosaceae. The most commonly used taxa in different regions of Turkey are *Cornus mas*, *Dianthus zonatus* var. *zonatus* and *Hyocyamus niger.* These plants contain analgesic and anti-inflammatory compounds. These plants are usually used externally as extracts (infusion/decoction) as well as are used directly. However, a few species are also used externally.

Keywords: Toothache, medicinal plants, traditional treatment, Turkey

INTRODUCTION

Pain is an important health problem that affects most people and develops due to various reasons. Pain has been defined by the International Association for the Study of Pain (IASP) as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage." (Renn and Dorsey 2005). The first step when dealing with a patient experiencing pain is to identify the cause. Whether the pain is due to infection, cancer or any other underlying the disease should be investigated. After the root cause has been identified, both the cause and the resulting pain should be treated (Electronic resource 1).

According to its climate and geographical conditions, Turkey has a rich flora. Approximately eleven thousand plant species, of which three thousand are endemic, grow in Turkey (Güner et al. 2000; Özhatay et al. 2013; Özhatay et al. 2015). Since ancient times, plants have been used by people as food or to resolve health problems. Traditionally used medicinal plants have been recorded in ethnobotanical investigations. These studies are a key source of information for drug research. In this study, plants which have traditionally been used as painkillers in Turkey have been identified by screening ethnobotanical studies. These findings are classified by pain type and published as a series of articles (Erbay et al. 2017; Erbay et al. 2018a; Erbay et al. 2018b). This study, which is the fourth article in a series, deals with the plants used to treat toothache.

Toothache is a condition that everyone has met at least once in their lifetime and is a discomfort that develops due to various reasons. Dental pain is frequently encountered in regular dental practice, and the diagnosis and treatment of primary toothache is not difficult. Nonodontogenic toothache, however, is not routinely studied. Nonodontogenic toothache was categorized into eight groups by primary disorders as follows: 1) myofascial pain referred to tooth/teeth, 2) neuropathic

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toothache, 3) idiopathic toothache, 4) neurovascular toothache, 5) sinus pain referred to tooth/teeth, 6) cardiac pain referred to tooth/teeth, 7) psychogenic toothache or toothache of psychosocial origin, and 8) toothache caused by various other disorders (Yatani et. al. 2014). In these cases, the underlying disease of the toothache should be treated.

Dental pain generally develops in three forms; toothache during or after meals, long-standing toothache, and injuries. A sharp toothache occurs during the meal, or during the first half hour after meals, as food intake builds up in the dental cavities and the acids produced by these foods aggravate the tooth nerves. To relieve toothache, it is first necessary to remove food residues from the tooth surface and while such residues are removed with the help of a toothbrush or dental floss, the toothache persists for a short time.

In the case of progressive tooth decay, the death of the nerve and infection of the tooth causes a swelling around the tooth and in such a situation, it is difficult to relieve toothache. When a painful toothache is experienced, a pain medication or antibiotics recommended by the dentist should be taken to control the infection.

Injuries in the facial region, jawbone and teeth can result from physical trauma. Fractures and cracking may occur in the jawbone or in the teeth as a result of this trauma, and it is even possible that the tooth may become dislodged. In all these cases, dental treatment should be administered by the dentist. (Electronic resource 2).

Herbal remedies may be helpful in relieving pain and inflammation in simple cases. To this end, there are a variety of plants used by people in Turkey for treating toothache.

MATERIAL AND METHODS

This study was prepared by analysis of theses at the Council of Higher Education Thesis Center and ethnobotanical studies conducted throughout Turkey with selected plants used for treating toothache.

RESULTS AND DISCUSSION

This study saw a total of 52 taxa traditionally used for treating toothache in Turkey. The details of the plant taxa forming this research (scientific and local names, families, used parts and treatment methods) are given in Table 1.

These plants are mainly from the Lamiaceae (8 taxa), Asteraceae (5 taxa), Solanaceae (4 taxa), Euphorbiaceae (3 taxa), Liliaceae (3 taxa) and Rosaceae (3 taxa) families (Figure 1). The taxa commonly used in different regions of Turkey are *Cornus mas* D*ianthus zonatus* var. *zonatus* and *Hyocyamus niger*. Plants are usually used externally as a mouthwash, prepared infusion/decoction or applied directly. In addition, decoction and infusion are prepared and used internally.

These plants are used in toothache treatments as they contain analgesic, anesthetic, antimicrobial and anti-inflammatory compounds. For example, *Cornus mas* has antimicrobial activity because of its major compounds (anthocyanins, flavonoids and iridoids) (Dindaa et al. 2016). *Dianthus zonatus* var. *zonatus* and *Syzgium aromaticum,* known as 'cloves', is commonly used for toothache. It contains antiseptic and anesthetic compounds (especially eugenol). Clove oil is important for toothache treatment (Baytop 1971). *Hyocyamus niger* has analgesic and anti-inflammatory activity (Beguma et al. 2010). Many other examples exist as well.

Table 1. The plants used in traditional toothache treatments in Turkey

Botanical name	Family	Local name	Plant part used	Preparation, and use	Ref.
Achillea biebersteinii Afan.	Asteraceae	Arı çiçeği, Erkurtaran, Sarı çiçek, Ayvadana, Sancı çiçeği	Aerial part	Inf., Int.	(Balos and Akan 2007; Tuzlacı and Doğan 2010)
A. millefolium L. *subsp. pannonica* (Scheele) Hayek	Asteraceae	Ayvadana, Civanperçemi, Kurpotu, Sporiş	Seed	Ext.	(Vural 2008)
Allium sativum L.	Liliaceae	Sarımsak	Bulb	Crushed, Water, Ext. +Salt, Crushed, Ext.	(Erdoğan 2011) (Özdemir Nath 2016)
Anthemis coelopoda Boiss. *var. bourgaei*	Asteraceae	Bubacça, Papatya	Flower	Inf., Ext.	(Vural 2008)
Cedrus libani A. Rich	Pinaceae	Katran ağacı, Sedir	Tar	Ext.	(Güneş et al. 2017)
Clematis vitalba L.	Ranunculaceae	Karabağ, Deli asma, Diş otu, Sarmaşık, Akçabağ	Stem bark Branch	Ext. Like a cigarette, Ext.	(Ecevit Genç and Özhatay 2006)

Table 1. The plants used in traditional toothache treatments in Turkey (Continued)

Botanical name	Family	Local name	Plant part used	Preparation, and use	Ref.
Convolvulus galaticus Rostan ex Choisy	Convolvulaceae	Sarmaşık	Flower	Inf., Mouthwash	(Tuzlacı and Doğan 2010)
Cornus mas L.	Cornaceae	Kızılcık, Püren	Branch Fruit	Burned, Immersion in water, Water, Ext. Burned, Cinders, Ext. Paste, Int.	(Sadıkoğlu and Alpınar 2001) (Özdemir Nath 2016) (Sağıroğlu et al. 2012)
Cupressus sempervirens L.	Cupressaceae	Selvi, Servi, Yılbaşı ağacı	Fruit	Dec., Mouthwash	(Sargın et al. 2013)
Daphne mucronata Royle	Thymelaeaceae	Tevri	Branch	Crushed, Ext.	(Mükemre et al. 2015)
Datura stramonium L.	Solanaceae	Deli patpat, Tatala, Mandalak	Seed	Dec., Vapor Dec., Mouthwash	(Altundağ and Öztürk 2011) (Tuzlacı and Alparslan 2007)
Dianthus zonatus Fenzl var. *zonatus*	Caryophyllaceae	Karanfil, Deli karanfil	Seed Flower	Chewed, Ext. Chewed, Ext.	(Eşen 2008; Saday 2009) (Vural 2008; Kargıoğlu et al. 2010)
Eryngium billardieri Delar	Apiaceae	Tüsü	Root	Crushed, Sap, Ext.	(Mükemre et al. 2015)
Euphorbia anacampseros Boiss. var. *anacampseros*	Euphorbiaceae	Sütleğen	Latex	Ext.	(Şenkardeş 2014)
E. macroclada Boiss.	Euphorbiaceae	Sütleğen	Stem and leaf latex	Ext.	(Şenkardeş 2014)
E. stricta L.	Euphorbiaceae	Sütleğen	Latex	Ext.	(Ugulu 2011)
Ficus carica L. *subsp. carica*	Moraceae	İncir	Latex	Ext.	(Saraç et al. 2013)
Fumaria officinalis L.	Fumariaceae	Şahtere, Nuzla otu	Aerial part	Dec., Mouthwash	(Sezik et al. 1997)
F. vailantii Loisel	Fumariaceae	Şahtere	Aerial part	Dec., Int.	(Özgen et al. 2012)
Helleborus orientalis Lam.	Ranunculaceae	Bohça otu	Root	Crushed, Ext.	(Tuzlacı and Tolon 2000)
Hyocyamus niger L.	Solanaceae	Mankafa otu, Sağırkulak, Kurtluca, Kulak otu, Dişotu, Deli batbat	Leaf Seed	Like a cigarette, Ext. Dec., Vapor, Ext.,	(Şenkardeş 2014) (Sezik et al. 1997; Bulut and Tuzlacı 2009; Özgen et al. 2012)
H. reticulatus L.	Solanaceae	Dağ küncüsü, Künciye, Koçan	Seed	Like a cigarette, Ext.	(Özgen et al. 2012; Şenkardeş 2014)
Laurus nobilis L.	Lauraceae	Akdeniz defnesi, Tenel, Defne	Leaf	+Vinegar, Cooked, Mouthwash	(Saraç et al. 2013)
Lilium candidum L.	Liliaceae	Zambak	Leaf	Ext.	(Ugulu 2011)
Malva sylvestris L.	Malvaceae	Ebegümeci, Kabaot, Develik, Kedigözü	Aerial part	Inf., Mouthwash	(Sargın et al. 2013)
Origanum onites L.	Lamiaceae	Kekik, Eşek kekiği, Beyaz kekik, Deli kekik, Kara kekik, Taş kekiği	Leaf	Chewed	(Polat and Satıl 2012)

Table 1. The plants used in traditional toothache treatments in Turkey (Continued)

Botanical name	Family	Local name	Plant part used	Preparation, and use	Ref.
O. vulgare L. *subsp. hirtum* (Link) Ietswaart	Lamiaceae	Kekik, Kekikotu, Deli kekik, Karakekik, Güve kekiği, Yer kekiği, Ak kekik, Mercan köşk	Leaf	Chewed	(Kültür 2007)
O. vulgare L. *subsp. viride* (Boiss.) Hayek	Lamiaceae	Hoş otu, Kaya kekiği, Taş kekik, Sarı kekik, Yayla kekiği, Dağ kekiği	Aerial part	Inf., Mouthwash	(Sargın et al. 2013)
Ornithogalum armeniacum Baker	Liliaceae	Köpek soğanı, Beyaz sümbül, Yoğurtcuk otu	Bulb	Mush, Ext.	(Sargın et al. 2013)
Peganum harmala L.	Zygophyllaceae	Üzerlik, Harmal, Nazarlık otu	Root	Dec.	(Balos and Akan 2007)
Pistacia khinjuk Stocks	Anacardiaceae	Gezan, Bıttım	Stem resin	Chewed	(Akan et al. 2008)
Platanus orientalis L.	Platanaceae	Çınar	Leaf	Dec., Mouthwash	(Tuzlacı and Sadıkoğlu 2007)
Plumbago europaea L.	Plumbaginaceae	Serkel otu	Root	Sap, Ext.	(Oral 2007)
Populus usbekistanica Kom. subsp. *usbekistanica*	Salicaceae	Servi kavağı	Stem bark	A little part, Ext.	(Fujita et al. 1995)
Prunus armeniaca L.	Rosaceae	Zerdali	Fruit	Cooked, Crushed, Ext.	(Mükemre et al. 2015)
P. *spinosa* L. subsp. *dasyphylla* (Schur) Domin.	Rosaceae	Güvemotu, Avşarotu	Fruit	Dec., Mouthwash	(Tuzlacı and Eryaşar Aymaz 2001)
Quercus infectoria Olivier	Fagaceae	Mazımeşe, Kasnak, Meşe, Pelit, Palamut	Root cortex	Crushed, Mouthwash	(Tetik et al. 2013)
Q. robur L. subsp.	Fagaceae	Meşe, Meyral	Cortex	Dec., Mouthwash	(Aktan 2011)
robur Rhamnus	Rhamnaceae	Kördiken	Gum	Ext.	(Eşen 2008)
lycioides L. *R. oleoides*) L. subsp. *graecus* (Boiss. & Ruet.) Holmboe	Rhamnaceae Rosaceae	Kördiken Böğürtlen	Gum Root	Ext. Dec., Int.	(Saday 2009 (Metin 2009)
Salvia limbata C.A. Mey.	Lamiaceae	Kedi kuyruğu	Aerial part	Dec., Mouthwash	(Özgen et al. 2012)
Solanum nigrum L. subsp. *nigrum*	Solanaceae	Tilki üzümü, İt üzümü	Leaf and Fruit	Dec., Ext., Vapor	(Balos and Akan 2007)
Syzgium aromaticum (L.) Merrill.	Myrtaceae	Karanfil	Flower	Chewed	(Şahin Yiğit 2014)
Taraxacum stevenii (Spreng.) DC.	Asteraceae	Çıtlık, Hindibağ, Keklik otu, Kıl çiçek	Aerial part	Inf., Int.	(Özdemir and Alpınar 2015)
Teucrium chamaedrys L. subsp. *chamaedrys*	Lamiaceae	Bodurca Mahmut, Tatarca otu, Sancı otu	Aerial part	Chewed	(Gençay 2007)
Thymbra spicata L. var. *spicata*	Lamiaceae	Kara kekik, Zahter, Kırçayı, Bayır kekiği, Karabaş otu, Şeker otu	Aerial part	Inf.	(Balos and Akan 2007)

Table 1. The plants used in traditional toothache treatments in Turkey (Continued)

Botanical name	Family	Local name	Plant part used	Preparation, and use	Ref.
Thymus longicaulis subsp. *chaubardii* (Rihb.f.) Jalas	Lamiaceae	Kekik, Akbaşlı ot, Güve otu, Yer kekiği	Aerial part	Chewed, Ext. Oil, Ext.	(Özdemir Nath 2016)
T. zygoides Griseb. var. *zygoides*	Lamiaceae	Kekik, Dağ kekiği, Bayır çayı, Kaya kekiği, Şeker otu, Taş kekiği	Leaf and Seed	Chewed, Ext.	(Özdemir Nath 2016)
Tilia argentea Desf. ex. DC.	Tiliaceae	Ihlamur	Flower	Inf., Mouthwash	(Akalın 1998)
Viscum album L. subsp. *album*	Loranthaceae	Ökse otu, Büvelek otu, Burç, Buruç, Güvelek	Aerial part	Dec., Mouthwash	(Sargın et al. 2013)
Xeranthemum annuum L.	Asteraceae	Süpürge otu, Dağ karanfili, Tarak çiçeği	Leaf	+Tobacco, Like a cigarette, Ext.	(Tuzlacı and Doğan 2010; Korkmaz and Alpaslan 2014)

Inf: Infusion, Dec: Decoction, Int: Internal, Ext: External

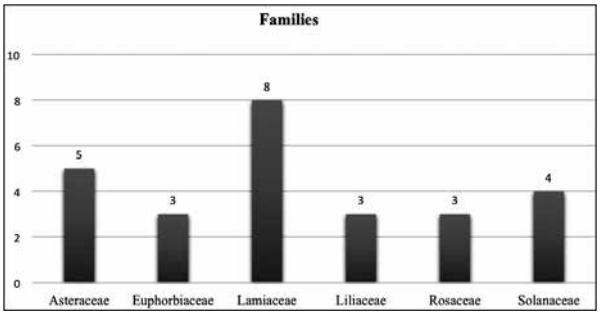

Figure 1. Graph of main families used in traditional toothache treatment in Turkey.

We hope that this study will contribute to the development of new medicines used in the treatment of toothache.

References

- Akalın E (1998). The plants of Tekirdag region that are used as medicinal purposes and food. *J Tradit Folk Drugs* **5(1)**: 1-96.
- Akan H, Korkut MM, Balos MM (2008) Arat Dağı ve çevresinde (Birecik, Şanlıurfa) etnobotanik bir araştırma. *Science and Eng J of Fırat Univ* **20 (1)**: 67-81.
- Aktan T (2011). The Ethnobotanical examine in the villages of Yenisehir (Bursa). Unpublished MSc Thesis, Celal Bayar University, Manisa.
- Altundağ E, Öztürk M (2011). Ethnomedicinal studies on the plant resources of east Anatolia Turkey, *Procedia Soc Behav Sci* **19**: 756-777. [CrossRef]
- Balos MM, Akan H (2007). Zeytinbahçe - Akarçay (Birecik, Şanlıurfa) arasında kalan bölgenin etnobotanik özellikleri. *Selçuk Üniversitesi Fen Fakültesi Fen Dergisi* **29**: 155-171.
- Baytop T (1971). Farmakognozi Ders Kitabı Cilt 2. Baha Matbaası, Istanbul.
- Beguma S, Saxenaa B, Goyala M, Ranjanb R, Joshia VB, Raoc CV, Krishnamurthya S, Sahaib M (2010). Study of anti-inflammatory, analgesic and antipyretic activities of seeds of *Hyoscyamus niger* and isolation of a new coumarinolignan. *Fitoterapia* **81(3)**: 178-184. [CrossRef]
- Bulut G, Tuzlacı E (2009). Folk medicinal plants of Bayramiç (Çanakkale-Turkey). *J Fac Pharm Istanbul* **40**: 87-100.
- Dindaa B, Kyriakopoulosb AM, Dindac S, Zoumpourlisd V, Thomaidise NS, Velegrakif A, Markopoulosg C, Dindah M (2016). *Cornus mas* L. (cornelian cherry), an important European and Asian traditional food and medicine: Ethnomedicine, phytochemistry and pharmacology for its commercial utilization in drug industry. *J Ethnopharmacol* **193**: 670-690. [CrossRef]
- Ecevit Genç G, Özhatay N (2006). An ethnobotanical study in Çatalca (European part of Istanbul) II. *Turkish J Pharm Sci* **3 (2)**: 73-89.
- Electronic resource 1. İstanbul Ağrı Merkezi. www.agritr.com/html/algoloji.html Accessed: 14.04.2017.
- Electronic resource 2. Diş Ağrılarının Nedenleri ve Çözümleri. https://www.hospitadent.com/dis-sagligi/dis-agrilarinin-nedenleri-ve-cozumleri.html Accessed: 14.04.2017.
- Erbay MŞ, Anıl S, Melikoğlu G (2017). Plants used as painkiller in folk medicine in Turkey-I Stomachache. *J Res Pharm* **21(4)**: 741-755.
- Erbay MŞ, Anıl S, Melikoğlu G (2018a). Plants used as painkiller in folk medicine in Turkey-II Headache. *J Res Pharm* **22(1)**: 29-36.
- Erbay MŞ, Anıl S, Melikoğlu G (2018b). Plants used as painkiller in folk medicine in Turkey-III Rheumatic pain. *J Res Pharm* **22(2)**: 133-141. [CrossRef]
- Erdoğan R (2011). Ethnobotanical features some of the wild on the Sariveliler (Karaman) and its environment ethnobotanic. Unpublished MSc Thesis, Selcuk University, Konya.
- Eşen B (2008). The ethnobotanical properties of Aydınlar village and its vicinity (Erdemli/Mersin). Unpublished MSc Thesis, Selcuk University, Konya.
- Fujita T, Sezik E, Tabata M, Yeşilada E, Honda G, Takeda Y, Tanaka T, Takaishi Y (1995). Traditional medicine in Turkey VII. Folk medicine and west Black Sea regions. *Econ Bot* **49(7)**: 406-422. [CrossRef]
- Gençay A (2007). Ethnobotanical aspects of Cizre (Sirnak). Unpublished MSc Thesis, Yuzuncu Yil University, Van.
- Güner A, Özhatay N, Ekim T, Başer KHC (2000). Flora of Turkey and the East Islands. vol. 11. Edinburgh University Press, Edinburgh.
- Güneş S, Savran A, Paksoy MY, Koşar M, Çakılcıoğlu U (2017). Ethnopharmacological survey of medicinal plants in Karaisalı and its surrounding (Adana-Turkey). *J Herb Med* **8**: 68-75. [CrossRef]
- Kargıoğlu M, Cenkci S, Serteser A, Konuk M, Vural G (2010). Traditional uses of wild plants in the Middle Aegean Region of Turkey. *Hum Ecol.* **38**: 429-450. [CrossRef]

- Korkmaz M, Alpaslan Z (2014). Ergan Dağı (Erzincan-Türkiye)'nın etnobotanik özellikleri. *Bağbahçe Bilim Dergisi* **1(3)**: 1-31.
- Kültür Ş (2007). Medicinal plants used in Kirklareli province (Turkey). *J Ethnopharmacol* **111**: 341-364. [CrossRef]
- Metin A (2009). Ethnobotanical features of plants in Mut (Mersin) and its environments. Unpublished MSc Thesis, Selcuk University, Konya.
- Mükemre M, Behçet L, Çakılcıoğlu U (2015). Ethnobotanical study on medicinal plants in villages of Çatak (Van-Turkey). *J Ethnopharmacol* **166**: 361–374. https://doi.org/10.1016/j.jep.2015.03.040 [CrossRef]
- Oral ÇD (2007). Ethnobotanical studies on folk medicines used in Konya. Unpublished MSc Thesis, Gazi University, Ankara.
- Özdemir E, Alpınar K (2015). An ethnobotanical survey of medicinal plants in western part of central Taurus Mountains: Aladaglar (Nigde- Turkey). *J Ethnopharmacol* **166**: 53-65. [CrossRef]
- Özdemir Nath E (2016). An Ethnobotanical Study in Savastepe and Kepsut Region (Balikesir). Unpublished PhD Thesis, Istanbul University, Istanbul.
- Özgen U, Kaya Y, Houghton P (2012). Folk medicines in the villages of Ilica district (Erzurum, Turkey). *Turk J Biol* **36**: 93-106.
- Özhatay N, Kültür Ş, Gürdal B (2013). Check-list of Additional Taxa to the Supplement Flora of Turkey VI. *J Fac Pharm Istanbul* **43(1)**: 33-82.
- Özhatay N, Kültür Ş, Gürdal B (2015). Check-list of Additional Taxa to the Supplement Flora of Turkey VII. *J Fac Pharm Istanbul* **45 (1)**: 61-86.
- Polat R, Satıl F (2012). An ethnobotanical survey of medicinal plants in Edremit Gulf (Balıkesir – Turkey). *J Ethnopharmacol* **139**: 626-641. [CrossRef]
- Renn CL, Dorsey SG (2005). The physiology and processing of pain a review. *AACN Adv Crit Care* **16.3**: 277-290.
- Saday H (2009). Ethnobotanical properties of Güzeloluk village and its vicinity. Unpublished MSc Thesis, Selcuk University, Konya.
- Sadıkoğlu N, Alpınar K (2001). Etnobotanik açıdan Bartın. In: Gürkan E, Tuzlacı E (Eds.) *13. Bitkisel İlaç Hammaddeleri Toplantısı Bildiri Kitabı*. M.Ü.Ecz. Fak. Yay. No: 17, pp.87. Istanbul, Turkey.
- Sağıroğlu M, Arslantürk A, Akdemir ZK, Turna M (2012). An ethnobotanical from Hayrat (Trabzon) and Kalkandere (Rize/Turkey) *Bio Di Con* **5/1**: 31-43.
- Şahin Yiğit S (2014). Medicinal plants sold in Gaziantep herbalists and their ethnobotanical aspects. Unpublished MSc Thesis, Gaziantep University, Gaziantep.
- Saraç DU, Özkan ZC, Akbulut S (2013). Ethnobotanic features of Rize/Turkey province. *Bio Di Con* **6/3**: 57-66.
- Sargın SA, Akçiçek E, Selvi S (2013). An ethnobotanical study of medicinal plants used by the local people of Alaşehir (Manisa) in Turkey. *J Ethnopharmacol* **150 (3)**: 860-874. https://doi.org/10.1016/j.jep.2013.09.040 [CrossRef]
- Şenkardeş İ (2014). Ethnobotanical investigations in southern districts (Acigöl, Derinkuyu, Gulsehir, Nevsehir-Central district, Urgup) of Nevsehir. Unpublished PhD Thesis, Marmara University, Istanbul.
- Sezik E, Yeşilada E, Tabata M, Honda G, Takaishi Y, Fıjita T, Tanaka T, Takeda Y (1997). Traditional medicine in Turkey VIII. Folk medicine in East Anatolia; Erzurum, Erzincan, Agri, Kars, Igdir provinces. *Econ Bot* **51(6)**: 195-211. [CrossRef]
- Tetik F, Civelek S, Cakilcioglu U (2013). Traditional uses of some medicinal plants in Malatya (Turkey). *J Ethnopharmacol* **146**: 331-346. [CrossRef]
- Tuzlacı E, Alparslan DF (2007). Turkish folk medicinal plants, Part V: Babaeski (Kirklareli), *J Fac Pharm Istanbul* **39**: 11-23.
- Tuzlacı E, Doğan A (2010). Turkish folk medicinal plants, IX: Ovacık (Tunceli). *J Res Pharm* **14**: 136-143. [CrossRef]
- Tuzlacı E, Eryaşar Aymaz P (2001). Turkish folk medicinal plants, Part IV: Gonen (Balikesir). *Fitoterapia*. **72**: 323-343. [CrossRef]
- Tuzlacı E, Sadıkoğlu E (2007). Turkish folk medicinal plants, Part VI: Koçarlı (Aydın). *J Fac Pharm Istanbul* **39**: 25-38.
- Tuzlacı E, Tolon E (2000). Turkish folk medicinal plants. Part III: Sile (Istanbul). *Fitoterapia* **71**: 673-685. [CrossRef]
- Ugulu I (2011). Traditional ethnobotanical knowledge about medicinal plants used for external therapies in Alasehir, Turkey. *Int J Med Arom Plants* **1(2)**: 101-106.
- Vural G (2008). Ethnobotanical features some of the willd plants on the Honaz mountain and its environment ethnobotanic. Unpublished MSc Thesis, Afyon Kocatepe University, Afyon.
- Yatani H, Komiyama O, Matsuka Y, Wajima K, Muraoka W, Ikawa M, Sakamoto E, De Laat A, Heir GM (2014). Systematic review and recommendations for nonodontogenic toothache. *J Oral Rehabil* **41(11)**: 843-852.[CrossRef]