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...
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*, *Dianthus 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 Alaf. | Asteraceae     | A. cicegi, Erkurtaran, Sari cicek, Ayvadana, Sanci cicegi | Aerial part | Inf., Int. | (Balos and Akan 2007; Tuzlacı and Doğan 2010) |
| A. millefolium L. subsp. pannonica (Scheele) Hayek | Asteraceae | Ayvadana, Civanperçemi, Kurpotu, Sporis Sarimsak | Seed | Ext. | (Vural 2008) |
| Allium sativum L.          | Liliaceae      | Sarımsak   | Bulb            | Crushed, Water, Ext. +Salt, Crushed, Ext. Inf., Ext. | (Erdoğan 2011) |
| Anthemis coelopoda Boiss. var. bourgaei | Asteraceae     | Bubacca, Papatya, Katran ağaçi, Sadir | Flower | Ext. | (Vural 2008) |
| Cedrus libani A. Rich.     | Pinaceae       | Karabağ, Deli asma, Di otu, Sarmasik, Akçabağ | Stem bark Branch | Ext. Like a cigarette, Ext. | (Ecevit Genç and Özhatay 2006) |
| Clematis vitalba L.        | Ranunculaceae  |                      |                |                      |                                     |
### 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*         | Convolvulaceae          | Sarmaşık            | Flower          | Inf., Mouthwash       | (Tuzlacı and Doğan 2010)       |
| *Cornus mas* L.                | Cornaceae               | Kızılık, Püren      | Branch          | Burned, Immersion in water, Water, Ext. Burned, Cinders, Ext. Paste, Int. | (Sadıkoğlu and Alpinar 2001; Özdemir Nath 2016; Sağiroğlu et al. 2012) |
| *Cupressus sempervirens* L.     | Cupressaceae            | Selvi, Servi, Yiibaşı ağıacı | Fruit         | Dec., Mouthwash       | [Sargin 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 | [Altun dağ and Öztürk 2011; Tuzlacı and Alparslan 2007; Esen 2008; Saday 2009; Vural 2008; Kargoğlu et al. 2010] |
| *Dianthus zonatus* Fenzl var. zonatus | Caryophyllaceae          | Karanfil, Deli karanfil | Seed          | Chewed, Ext. Chewed, Ext. | [Mükemre et al. 2015]           |
| *Eryngium billardieri* Delar    | Apiaceae                | Tüsü                | Root            | Crushed, Sap, Ext.    | [Mükemre et al. 2015]           |
| *Euphorbia anacamperos* Boiss. var. anacamperos | Euphorbiaceae          | Sütleğen            | Latex           | Ext.                  | [Şenkardes 2014]                |
| E. macroclada Boiss.           | Euphorbiaceae           | Sütleğen            | Stem and leaf latex | Ext.                  | [Şenkardes 2014]                |
| *E. stricta* L.                | Euphorbiaceae           | Sütleğen            | Latex           | Ext.                  | [Şenkardes 2014]                |
| *Ficus carica* L. subsp. carica | Moraceae                | İncir               | Latex           | Ext.                  | [Şenkardes 2014]                |
| *Fumaria officinalis* L.       | Fumariaceae             | Sahtere, Nuzla otu  | Aerial part     | Dec., Mouthwash       | [Sezik et al. 1997]             |
| *F. vailantii* Loisel          | Fumariaceae             | Sahtere, Bohça otu  | Aerial part     | Dec., Int. Crushed, Ext. | [Tuzlacı and Tolon 2000]        |
| *Helleborus orientalis* Lam.   | Ranunculaceae           | Mankafa otu, Sağırkulak, Kurluca, Kulak otu, Disotu, Deli batbat | Seed          | Like a cigarette, Ext. Dec., Vapor, Ext., | [Sezik et al. 1997; Bulut and Tuzlacı 2009; Özgen et al. 2012] |
| *H. reticulatus* L.            | Solanaceae              | Dağ künküsü, Küncye, Koçan | Seed          | Like a cigarette, Ext. | [Sezik et al. 2014; Şenkardes 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, Kaboat, Develik, Kedigözü | Aerial part | Inf., Mouthwash       | [Sargin et al. 2013]            |
| *Origanum onites* L.           | Lamiaceae               | Kekik, Eşek kekiği, Beyaz kekik, Deli kekik, Karak kekiği, Taş kekiği | Leaf          | Chewed                | [Polat and Satıl 2012]          |
| 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 koşk | Leaf | Chewed | (Kültür 2007) |
| O. vulgare L. subsp. viride [Boiss.] Hayek | Lamiaceae | Hoş otu, Kaya kekiği, Taş kekik, Sari kekik, Yayla kekiği, Dağ kekiği | Aerial part | Inf., Mouthwash | (Sargin et al. 2013) |
| Ornithogalum armeniacum Baker | Liliaceae | Köpek soğanı, Beyaz sümü, Yoğurtçuk otu | Bulb | Mush, Ext. | (Sargin et al. 2013) |
| Peganum harmala L. | Zygophyllaceae | Üzerlik, Harmal, Nazarlık otu | Root | Dec. | (Balos and Akan 2007) |
| Pistacia khinjuk Stocks | Anacardiaceae | Gezan, Bittim Çınar | 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, | Fruit | Dec., Mouthwash | (Tuzlacı and Eryaşar) |
| Quercus infectoria Olivier | Fagaceae | Aşırı otu, Mazımeşe, Kasnak, Mesa, Petil, Palamut | Root cortex | Crushed, Mouthwash | (Aymaz 2001) |
| Q. robur L. subsp. robur Rhamnus lycioides L. R. oleoides | Fagaceae | Meşe, Meyral Kûrdîken | Cortex | Dec., Mouthwash Ext. | (Aktan 2011) |
| Pelit, Palamut Holmboe | Rhamnaceae | Kûrdîken | Gum | Ext. | (Esen 2008) |
| Quercus robur L. subsp. robur Rhamnus lycioides L. R. oleoides | Rosaceae | Bögürten | Root | Dec., Int. | (Saday 2009) |
| Salvia limbata C.A. Mey. | Lamiaceae | Kedi kuyruğu | Aerial part | Dec., Mouthwash | (Özgen et al. 2012) |
| Solanum nigrum L. subsp. nigrum | Solanaceae | Tiği üzümü, İt üzümü | Leaf and Fruit | Dec., Ext., Vapor | (Balos and Akan 2007) |
| Syzygium aromaticum [L.] Merrill. | Myrtaceae | Karanfil | Flower | Chewed | (Şahin Yiğit 2014) |
| Taraxacum stevenii (Spreng.) DC. | Asteraceae | Çtılık, Hindibağ, Kekil otu, Kil çiçek | Aerial part | Inf., Int. | (Özdemir and Alpınar 2015) |
| Teucrium chamaedrys L. subsp. chamaedrys | Lamiaceae | Bodurca Mahmut, Aerial part | 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 (Rblh.) 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, Leaf and Seed Bayır çayı, Kaya kekiği, Şeker otu, Taş kekiği | Dec., Mouthwash | (Özdemir Nath 2016) |
| Tilia argentea Desf. ex. DC. | Tiliaceae | İhlamur | Flower | Inf., Mouthwash | (Akalin 1998) |
| Viscum album L. subsp. album | Loranthaceae | Ökse otu, Büvelek otu, Burç, Buruc, 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.

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