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Ethnobotanical Features and Pharmacological Studies of Some *Nepeta L.* Taxa

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Abstract

Ethnobotany is a multidisciplinary science that studies plant-human relationship and tries to understand human interaction with plants. Ethnobotanical studies aim to record the information about plants that people have passed down from generation to generation for centuries. In recent years, developments in technology, migration from village to city, modern life, relative loss of traditions and customs cause the loss of orally transmitted information about plants. In this respect, ethnobotanical studies are valuable studies that will record “humanity's knowledge of plants”.

The local population has long utilized from *Nepeta* taxa for different purposes. Most of *Nepeta* taxa have important pharmacological and biological activities and *Nepeta* taxa have many traditional usage. The majority of *Nepeta* taxa exhibit significant pharmacological characteristics and potential for pharmacy, cosmetic industry, medicine and etc.

In this study, it is aimed to review ethnobotanical and pharmacological properties of some *Nepeta* taxa to contribute to studies on the subject.

Keywords: *Nepeta*, ethnobotany, pharmacological effect, medicinal plant, aromatic plant.

1. Introduction

Since ethnobotany is a branch of science that examines the human-plant relationship, including the cultural context, it is studied by researchers from many disciplines such as botanists, pharmacists, nutritionists, agriculturalists, environmental scientists, anthropologists, political scientists, historians, geographers, economists and linguists (Ghorbani et al., 2006).

This situation allows each discipline to contribute to ethnobotany in line with their own needs. For example, pharmacists focus more on medicinal plants used by the public, while economists contribute to the registration of ethnobotanical heritage by examining plants with economic value. Today, it is possible to talk about sub-branches of ethnobotany such as archeoethnobotany and economic botany. In addition, ethnobotany is in the intersection cluster with other disciplines researching folklore such as ethnopharmacology, ethnoecology, ethnocosmetic (Saroya, 2017).

Ethnobotanical studies have important contributions to nature, people, economy and protection of cultural heritage. In addition, it allows the identification of species that are collected intensively from nature, the identification and protection of endangered species. Recording ethnobotanical information is also very important for the discovery of new drug molecules. As in the past, plants are undoubtedly important raw material sources for the treatment of diseases today. The production of plants and herbal products is an area that affects nations economically and

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socially, and also directs international relations. It enables the transfer of traditional knowledge to scientific research and thus the development of new treatment agents. It is known that many drugs used in treatment today are derived from ethnobotanical studies (Pandey and Tripathi, 2017).

It can be said that Turkey is an important center in terms of ethnobotany, thanks to its phytogeographic location and the deep-rooted cultural heritage of Anatolia. When the ethnobotanical studies conducted in Turkey are examined, it is seen that the studies mostly focus on medical uses. Although the most focused subject in the studies is the use of medicinal and food purposes, plants are frequently used for various purposes in our country such as shelter, heating, cleaning, paint, musical instruments, agricultural tools, basket-wicker making, and belief.

In this review, ethnobotanical and bioactive properties some *Nepeta* taxa are compiled, to contribute to the studies on the subject.

Table 1. Ethnobotanical and Bioactivital Properties of Some *Nepeta* taxa

Botanical name	Location of the Plant	Parts used in ethnobotany	Method of preparation in ethnobotany	Ethnobotanical uses	Reported bioactivities
<i>N. cataria</i>	Turkey (East Anatolia, Mardin), Chinese	Herb, Aerial part,	Decoction	Stomachic, stimulant, Food, Cold, Sore throat and shortness of breath, Antidepressant, Sedative, Analgesic, Bronchitis (Zhang et al., 2015; Formisano et al., 2011; Sharma et al., 2019; Altundag, Ozturk, 2011; Eksik, 2020; Özer, 2021; Kılıç, 2019; Şahin, Kılıç, 2022)	Antibacterial anti-inflammatory Aphrodisiac antimicrobial, antioxidant, bacteriostatic and fungistatic, puberty retarder (Süntar et al., 2018; Abdalla et al., 1999; Dapkevicius et al., 1998; Bourrel et al., 1993; Bernardi, 1998)
<i>N. ciliaris</i>	Uttarakhand, India	Leaf	Decoction	Flu, cough, respiratory disorders, cold and antipyretic (Joshi et al., 2016; Vohora, 1986)	Anti-inflammatory Analgesic (Hussain et al., 2012; Süntar ve ark., 2018).
<i>N. congesta</i> var. <i>cryptantha</i>	Turkey (Şanlıurfa)	Aerial part	Infusion	Headache, Cold (Abak, 2018)	-----
<i>N. crispa</i>	Iranian (Hamadan)	Aerial part	Infusion	Carminative, relaxant, sedative, restorative tonic for respiratory and nervous disorders (Sonbolia et al., 2004)	Antibacterial Anti-angiogenic Antinociceptive and anti-inflammatory Anti-proliferative (Sonboli et al., 2004; Haseli et al., 2023; Badrhadad et al., 2015; Taskina et al., 2012; Zahirnia et al., 2019)
<i>N. depauperate</i>	Iranian	Whole plant	Unspecified	Wound healing and wasp, scorpion and snake bites, rheumatism (Mousavi et al., 2016)	-----
<i>N. discolor</i>	Uttarakhand - India Leh-Ladakh-	Leaf	Decoction	Leaf decoction: cold, cough and antipyretic. Decoction with honey: tuberculosis	-----

<i>N. elliptica</i>	India Uttarakhand Cemmu, Keşmir, India	Seed, Shoot, Leaf	Infusion	(Joshi et al., 2016) Digestive disorders, Food (Joshi et al., 2016) (Bhattacharjee, 2005)	Antifungal (Kumar et al., 2014)
<i>N. eriostachys</i>	Uttarakhand, Himachal Pradesh, India	Leaf, Whole plant	Unspecified	Antipyretic, Eye ailments (Joshi et al., 2016)	_____
<i>N. flavida</i>	Turkey	Aerial part	Unspecified	Flu, bronchitis and colds (Demirci, Ozhatay, 2012)	Antioxidant Herbical (Tepe et al., 2007; Bozok, 2019; Shakeri et al., 2016)
<i>N. floccosa</i>	Ladakh, India	Leaf	Decoction	Treat cough, cold and fever (Joshi et al., 2016)	Antioxidant (Ali et al., 2015)
<i>N. glomerulosa</i>	India	Whole plant	Unspecified	Treat itching, digestive problems and pneumonia (Nadkarni, 1976)	Antibacterial Hypnotic Effect Morphine Withdrawal Syndrome (Nezhadali et al., 2013) (Hosseini et al., 2016) (Hosseinzadeh, Ziaee, 2006)
<i>N. glutinosa</i>	Ladakh, India	Leaf	Decoction	Treat fever, pneumonia, and diarrhea (Joshi et al., 2016)	_____
<i>N. govaniiana</i>	Himachal Pradesh, India	Whole plant	Decoction	Treat menstrual cramps, flu, insomnia, cold and diarrhea, Sore throat (Joshi et al., 2016)	Cytotoxicity (Dar et al., 2014)
<i>N. hindostana</i>	India	Whole plant	Decoction	Relieve sore throat, ear and toothach and fever (Nadkarni, 1976)	Effective against myocardial necrosis (provides endothelial mediator relaxation), sedative, tonic, dissolving, hepatotonic, antipyretic, lowers blood cholesterol level. Antiinflammatory Antidiabetic Antimicrobial Antioxidant Antiplatelet Dyslipidemia (Ashraf et al 1999) (Kumar et al 1998; Ahmad et al 1981; Joshi et al., 2021; Pandey et al., 2015; Siddique et al., 2018; Ansari et al., 2016; Devi, Singh, 2016; Devi, Singh, 2018)
<i>N. italica</i>	Turkey (Göller Bölgesi- Yenişarbademli Yöresi/Konya, Pertek/Tunceli, Manisa,	Aerial part, Leaf	Infusion	In addition to being used as a spice, it is used against colds, stomach flu and hair loss. As spice, As tea , Tummy ache, Common cold (Demirci, Ozhatay, 2012; Doğan, Tuzlacı, 2015; Özaydm et al.,	Analgesic Antioxidant Antimicrobial (Aydin et al 1999; Emre et al., 2011; Hasimi et al., 2015)

	Çermik/Diya rbakır)			2005; Dođanođlu et al., 2006; Bařer et al., 2006; Özdemir, Alpinar, 2015)	
<i>N. laevigata</i>	Pakistan, Keřmir Ladakh, India (Uttarakhand)	Seed, whole plant	Infusion	Dysentery, fever, colds and headaches, sore throat (Bhattacharjee, 2005)	Antioxidant Antimicrobial (Joshi, 2014; Shinwari et al., 2013)
<i>N. lagopsis</i>	Pakistan	Whole plant	Incineration (ash) and/or mist	Yara iyileřtirici (Rehman et al., 2015)	_____
<i>N. leucophylla</i>	Baglud district, Nepal	Root juice, Leaf	Root juice, Paste	Cure fever (Root juice), Malaria (Paste) (Joshi et al., 2016)	Antifungal Antioxidant (Saxena, Mathela, 1996; Singh, Dhaliwal, 2018; Sharma et al., 2018; Sharma, Cannoo, 2016)
<i>N. longibractea</i>	Ladakh, India	Whole plant	Unspecified	Stomach ailments (Joshi et al., 2016)	Antimicrobial (Avasthi et al., 2017)
<i>N. menthoides</i>	Iranian	Unspecified	Unspecified	Febrifuge and sedative, antidepressant and anxiolytic, Carminative (Amin, 1991)	Antimicrobial Anticholinesterase Cytotoxic Anti-Inflammatory Antinociceptive Neuroprotective Memory enhancing Antioxidant (Kahkeshani et al., 2017; Ghandchi, Jamzad, 2015; Memariani et al., 2019; Sonboli et al., 2009; Süntar et al., 2018)
<i>N. nuda</i> subsp. <i>albiflora</i>	Turkey (Pertek/Tunceli)	Leaf	Unspecified	As tea (Dođan, Tuzlacı, 2015)	Antioxidant Antimicrobial (Alim et al., 2009; Mancini et al., 2009; Teber, Bursal, 2020)
<i>N. nuda</i> subsp. <i>lydia</i>	Turkey (Bingöl)	Aerial parts, Leaves	Infusion	Common cold, used as tea (Kılıç, 2016)	_____
<i>N. nuda</i> subsp. <i>glandulifera</i>	Turkey (Çivril/Denizli)	Unspecified	Unspecified	Tummy ache (Özaydın et al., 2005)	Antioxidant Antidiabetic (Sarıkurkcu et al., 2018) (Al-Kahraman et al., 2012)
<i>N. racemosa</i>	Turkey (Erzurum)	Aerial parts	Infusion	As tea (Aksakal, Kaya, 2018)	Antimicrobial Antioxidant Anti-plasmodial (Lungoci et al., 2023; Afshar et al., 2021; Zazharsky et al., 2020)
<i>N. septemcrenata</i>	Egypt, Israel, Iraq, Syria and Jordan	Unspecified	Unspecified	Cardiotonic, sedative and sore throat (Tachholm, 1974)	Antimicrobial Toxicity Antipyretic Antiinflammatory Analgesic (El-Moaty, 2010; El-Hamouly, El-Hela, 2004; Moustafa et al., 2015)

<i>N. trachonitica</i>	Turkey (Pertek/Tunceli)	Aerial part	Unspecified	As tea (Doğan, Tuzlacı, 2015)	Antimicrobial Antioxidant (Köksal et al., 2017; Gökbulut, Yılmaz, 2020; Köksal et al., 2017)
<i>N. bracteata</i>	Iranian	Unspecified	Unspecified	Febrifuge and sedative, antidepressant and anxiolytic, Carminative (Amin, 1991)	Antibacterial Anti-proliferative Antiinflammatory (Süntar et al., 2018; Zhang et al., 2021)

2. Results and discussion

Continually, plant taxa have long been regarded as possessing the principal ingredients used in widely disseminated ethnomedical and pharmacological practices. Many studies have revealed that the traditional medicinal and aromatic plant taxa utilized by the local people to treat various illnesses, have not been sufficiently examined for their therapeutic/preventive potential, pharmacological, ethnobotanical and phytochemical aspects. Traditional medicinal plant taxa provide a renewable and natural source of secondary metabolites that can be exploited to create novel medications and cure a variety of human illnesses.

Many members of the Lamiaceae (Labiatae) family are widely planted for their economical qualities. *Nepeta* is among the most known genus of Lamiaceae family, include more than 285 taxa that are significant to humans as culinary, aesthetic, and medicinal plants; many *Nepeta* taxa are widely used in traditional medicine and in ethnobotany. Among many aromatic and medicinal plants, taxa belonging to the genus *Nepeta* L. are widely used in traditional medicine and have different important effects in respect to human health. Therapeutic impacts of the *Nepeta* taxa are also due to the high contents of secondary metabolites; especially flavonoids and essentials. According to the *Nepeta* taxa essential oil composition, there exist two main essential oil chemotypes (nepetolactone and 1,8-cineole and/or linalool).

Many *Nepeta* taxa have pharmacological and biological effects as sedative, antimicrobial, cytotoxic activities and anticancerous activities, apoptotic induction antioxidant, anti-inflammatory and antinociceptive effects, antidepressive, cholesterol lowering, vermifuge, antifungal, antiasthmatic, carminative, antidiabetes, acetylcholinesterase inhibition, analgesic, diuretic, diaphoretic, febrifuge, neuropharmacological activity, herbicidal, insecticidal, cardioprotective effects, angiotensin-converting enzyme inhibitory activity and insect repellent.

3. Conclusion

Due to the important effects of *Nepeta* taxa on improving the complications of various diseases, ethnobotanical and pharmacological effects the need for doing more comprehensive clinical trials for the use of *Nepeta* taxa.

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