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Review Paper

Ethnomedicinal uses of Orchidaceae Taxa in Turkish traditional medicine

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Abstract

The Orchidaceae family is one of the flowering plants' families with great diversity and widespread worldwide. It is one of the two largest families of flowering plants, along with the Asteraceae. Orchids are preferred as ornamental plants due to their fascinating floral diversity and complex flowers. They also have medicinal uses. Since ancient times, they have been benefited as herbal remedies for the treatment of pain, inflammation, and infectious diseases. In this review, we examined the recent studies to form a compilation of ethnomedicinal uses of Orchidaceae taxa in Traditional Turkish Medicine. As a result of this review, we found that forty-two Orchidaceae taxa are used as herbal medicine in Turkish traditional medicine.

Keywords: Orchidaceae, Ethnomedicinal uses, Turkish traditional medicine, Medicinal plants, Turkey.

Introduction

The awareness of medicinal plants used for therapeutic purposes has increased from past to present. In the Hellenic period, 60 medicinal plants were known. Around 250 herbal medicines were used during the Mesopotamian civilization[1]. During the Arab-Persian civilization, this number increased to about 4,000[2]. At the beginning of the 19th century, the number of known medicinal plants reached 13,000[3].

In a study conducted by the World Health Organization (WHO) in 1979, the number of herbal medicines registered in pharmacopeias used and traded in more than five countries was determined to be 1,900[4].

According to the report prepared by the WHO based on some publications on medicinal plants and pharmacopoeias of 91 countries, the total amount of medicinal plants used for treatment purposes is reported to be around 20,000[4,5]. Of course, this number is far from showing the actual amount. Because, although up to only 140 medicinal plants were recorded for Turkey, which were registered in the Turkish codex of 1948 and 1974[5], the numbers of medicinal plants currently used in the treatment purposes are known to be at least about 500 in Turkey. It is emphasized that the actual amount of medicinal plants used in the world should be around 100.000[6].

In recent years, studies on medicinal plants and active substances derived there from have increased. The main reasons for this are: 1-Developing countries, which do not have a sufficient level of chemical industry, want to obtain an easy and inexpensive treatment opportunity by taking advantage of the plants in their nature. In this area, countries such as Egypt, India and Pakistan are making great efforts and receiving positive results. 2-Hazardous side effects have been observed in some new synthetic substances that have entered the treatment area. Since the herbal drugs have been used for a long time, their side effects are well known. On the other hand, the newly introduced synthetic substances do not have sufficient control time, so some dangerous side effects are understood only after they are used. This situation leads to irreparable damages.

3-Some drug primary substances are obtained from herbal drugs more cheaply and more easily than synthetic ones. Steroid compounds, Cinchona alkaloids, Opium alkaloids, Ergot alkaloids, Atropa alkaloids, Rauvolfia alkaloids, Strychnos alkaloids, Digitalis glycosides are examples of such applications. 4-Another advantage of herbal drugs is that they have several effects. Synthetic compounds usually have a single effect. Some, like antibiotics, require some other medication to prevent side effects. There is no such situation in herbal drugs[7]. According to the WHO data, 80% of the world population is treated with herbal drugs[8].

Turkey, thanks to its important geographical location is one of the most important countries in the aromatic and medicinal plant trade. The superiority provided by its geographical location has brought wealth to Turkey in terms of aromatic and medicinal plants compared to other countries and this has enabled the creation of many industrial inputs[9]. Instead of ignoring the benefits that can be obtained from plants used for centuries, it has been thought that it would be more appropriate to investigate local formulas or recipes with the studies performed[10].

In recent years, the importance given to medicinal plants used for therapeutic purposes and the studies conducted with these plants has increased in our country[11-26].

The Orchidaceae: Family of Mysterious Beauty

The Orchid family is among the flowering plant families that have the most species and they are known for their fascinating floral diversity and structures. It contains about 900 genera and 25,000 to 30,000 species. The amount of species that are defined and added to this family every year is approximately 800[27].

Orchids are spread all over the world except Poles and Deserts. The highest orchid variety is seen in tropical and subtropical regions. Orchids are mostly used as ornamental plants because they have elegant and complicated flowers[28].

According to the data from DNA studies, it has been determined that the orchid family is one of the oldest flowering plant families that appeared 74 to 84 million years ago. They are often cultivated for beautiful flowers and have great economic importance. They also have medicinal uses[27].

Orchids adapted to different environments during the evolutionary process. As a result of this process, orchids have diversified into epiphytes (70%), geophytes (25), saprophytes or lithophytes (5%) (Figure 1-2) (27). Creeping, reduced, fibrous, fleshy rhizomes or tuberous roots are seen in geophyte orchids (Figure-3)[29].

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Figure-1: Epiphyte orchids. a) *Dracula simia*, b) *Anguloa uniflora*, c) *Caleana major*, d) *Dendrophylax lindenii*, e) *Oncidium altissimum*, f) *Peristeria elata*, g) *Phalaenopsis* sp., h) *Cypripedium calceolus.*

Figure-2: Geophyte orchids. a) *Orchis italica*, b) *O. anthropophora*, c) *O. simia*, d) *O. militaris*, e) *Coeloglossum viride*, f) *Anacamptis papilionacea*, g) *Ophrys insectifera*, h) *O. apifera*.

They generally consist of adventurous roots, rhizomes, roots, leaves, flower ramets, and flowers[30]. Some orchids have developed different pollination strategies using mimicry. For example, *Epidendrum ibaguense* flowers are similar to those of *Lantana camara* and *Asclepias curassavica*, so they are pollinated by Danaus plexippus (Monarch Butterfly) and maybe hummingbirds (Figure-4)[31].

Cephalanthera rubra does not have any nectar, but it mimics *Campanula persicifolia,* thereby cheating the leaf-cutting bee *Chelostoma fuliginosum* visiting it. *C. fuliginosum* cannot notice the difference in the color of these flowers and ensures that both species are pollinated (Figure-5)[32].

In the genus *Ophrys*, which has distribution in Eurasia, the labellum has evolved to have a shape, color, and smell that enrapture male insects by imitating receiving female insects. Pollination occurs when the male insect tries to mate with flowers. All these features enable orchids to be pollinated by deceived pollinators (Figure-6)[33].

Figure-3: Orchid's tubers and rhizomes.

Figure-4: a) *Epidendrum ibaguense*, b) *Lantana camara*, c) *Asclepias curassavica*, d) Monarch Butterflies, e) Hummingbird.

Figure-5: a) *Cephalanthera rubra*, b) *Campanula persicifolia*, c,d) *Chelostoma fuliginosum.*

Figure-6: a) *Ophrys arachnitiformis-Colletes cunicularius*, b) *Ophrys sulcata-Andrena ovatula*, c) *Ophrys insectifera-Argogorytes mystaceus*, d) *Ophrys chestermanii-Bombus vestalis*, e) *Ophrys bilunulata-Andrena flavipes.*

Ethnomedicinal Uses of Orchidaceae

The use of orchids as herbal remedies dates back to ancient times[34]. For ages, orchids have been benefited as herbal remedies for the treatment of pain, inflammation, and infectious diseases, etc[34,35]. Many studies have been conducted on the use of orchids as herbal remedies[34-37].

The 365 plants, including orchids, were listed in Chinese Materia Medica in 2735 BC[38]. The first record of tuberous orchids belonged to the Greek philosopher Theophrastus, who was called the father of botanic in 350 BC. Theophrastus named the plants "orchis" because of their tubers and gave information about their medicinal values[39].

In addition, in the first century, the Greek physician Dioscorides described the orchids by giving information about the flowers, leaves, and colors and stated their use especially for aphrodisiac and venereal diseases in his work Materia Medica (50-70 AD). The ancient Romans used orchid tubers to make the beverages they named "Satyrion" and "Priapiscus", they thought it was a strong aphrodisiac. In Indian markets, sahlep was called and used as "salab misri"[40-42].

Salep is a Turkish word; it is named as "salepi" in Greek, "sahlab" in Arabic and "sahlep" in English. Tuberous orchids and all species related to it are named sahlep. At the same time, hot beverage prepared from powdered orchid tubers is called sahlep[43].

İbn Sina gave extensive information about sahlep in his work named The Canon of Medicine. In his book, which was used as the main work of medical education in Europe until the 17th century, Ibn Sina has reports the aphrodisiac, appetizing, expectorant, paralysis curative, mind-opening properties of sahlep and has described its use in making reinforcing, and refreshing pastes[44]. Sahlep is also found in the notebook in the "Helvahane" of the Ottoman Palace, where the pastes cooked for the sultans were recorded[43,45].

During the journey of Captain Byron exploring the South Pole in 1764, he drank sahlep or sago instead of watery alcohol in the morning. Sahlep has also been found beneficial for those suffering from scurvy. Captain Cook stored 40 pounds (about 18 kilos) of sahlep powder during the Pacific trip in 1768 to prevent scurvy. A French chocolate maker made "analeptic chocolate" with sahlep in 1800. He recommended this product as mild and nutritious to people with weak, sensitive lungs and chronic diseases[46].

Orchids have many medicinal uses in both modern and traditional medicine: Antibacterial, anticancer, antidiabetic, antidiarrheal, antifungal, anti-inflammatory, antimutagenic, antioxidant, antiplatelet, antispasmodic, antitumor, aphrodisiac, diaphoretic, expectorant, hepatoprotective, sedative, etc[40,47].

Turkey is a rich country of geophyte orchids and represented by 170 taxa. The tubers of geophyte orchids are powdered and are often used in the production of sahlep (hot beverage) or Turkish Maras ice cream[48].

In this review, the authors examined the recent studies to form a compilation of ethnomedicinal uses of orchids and their local names, parts, and usage forms in Traditional Turkish Medicine. As a result of the study, only the most used 41 geophyte and 1 epiphyte taxa from the Orchidaceae family are listed in Table-1.

Table-1: Ethnomedicinal uses of Orchidaceae Taxa in Traditional Turkish Medicine.

Plant species*	Local name**	Parts	Usage form	Intended use	Ref.
Anacamptis pyramidalis (L.) Rich	Sivri salep	Tubers	Decoction	Diarrhea	49
			Powdered	Sahlep	49,50
			Powdered, Infusion (with milk)	Cold, Flu, Body warmers, Vasodilator, Tonic, Sahlep	51
			Infusion, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
			-	Sahlep	53
			-	Miscarriage, Sahlep	54
		Whole plant	-	Ornamental plant	55
Barlia robertiana (Loisel.) Greuter	Patpatanak	Tubers	Powdered	Sahlep	56
			Infusion	Medicinal tea	56

Cephalanthera epipactoides Fisch. & C.A.Mey.	Ana çamçiçeği	Whole plant	White oil is obtained by standing in olive oil	Medicinal	57
C. rubra (L.) Rich.	Çamçiçeği	Whole plant	-	Ornamental plant	58
Dactylorhiza euxina (Nevski) H. Baumann & Künkele	Laz salebi	Tubers	Infusion	Strengthening, Wound, Abscess, Inflammation, Heart strengthener, Mental fatigue	59
D. iberica (M.Bieb. ex Willd.) Soó	Kırım salebi	Tubers	Raw	Digestive diseases	49
			Powdered	Sahlep	50,60
				Sahlep, Cough	49,61
				Upper respiratory tract infections	60
			Powdered, Infusion	Cold, Flu, Body warmers, Sahlep	51
			Powdered, Infusion (with milk)	Sahlep	62
			Infusion, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
			Infusion, Spice	Sahlep	54
			Crushed	Rheumatism	63
D. osmanica (Klinge) P.F.Hunt & Summerh.	Osmanlı salebi	Tubers	Powdered, Infusion	Body warmers, Cold, Flu, Sahlep	51
		Tubers	Powdered, Infusion	Cold, Flu, Strengthening, Anti-inflammatory, Wound, Abscess, Heart-strengthening, Mind developer	64
*** *D. osmanica* var. *osmanica* (Klinge) P.F.Hunt & Summerh.	Osmanlı salebi	Tubers	Raw	Digestive diseases	49
			Powdered	Sahlep	49,50
			Infusion	Strengthening, Wound, Abscess, Inflammation, Heart strengthener, Mental fatigue	59
			Raw	Psychedelics, Body warmers	54
			Powdered, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
			-	Stomach ulcer	65
D. saccifera (Brongn.) Soó	Keseli salep	Tubers	Decoction	Panacea, Breath shortness	75
D. umbrosa (Karelin & Kirilow) Nevski	Gövdeli salep	Tubers	-	Ice-cream	76
			Infusion	Strengthening, Wound, Abscess, Inflammation, Heart strengthener, Mental fatigue	59
			Powdered	Sahlep	61
D. umbrosa var. *umbrosa* (Karelin & Kirilow) Nevski	Gövdeli salep	Tubers	Powdered, Infusion (with milk)	Sahlep	62

D. umbrosa var. *chuhensis* (Renz & Taubenheim) Kreutz	Gövdeli salep	Tubers	Powdered, Infusion (with milk)	Common colds, Bronchitis, Diarrhoea	66
D. urvilleana (Steudel) Baumann & Künkele	Balkaymak	Tubers	Infusion	Strengthening	59,67
				Wound, Abscess, Inflammation, Heart strengthener, Mental fatigue	59
Himantoglossum comperianum (Steven) P.Delforge	Meşe keşkeşi	Tubers	-	Sahlep	53
Ophrys fusca Link	Kedigözü	Tubers	Powdered, Infusion (with milk)	Sahlep	62
O. lutea ssp. *minor* (Guss.) O. & E. Danesch	Sarı salep	Tubers	Powdered	Sahlep	56
			Infusion	Medicinal tea	56
O. mammosa Desf.	Kedikulağı	Tubers	Powdered	Strengthening	68
O. reinholdii ssp. *straussii* (H.Fleischm.) E.Nelson	Sidikli salep	Tubers	Powdered, Infusion, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
O. scolopax ssp. *cornuta* (Steven) E.G.Camus	Salep	Tubers	Powdered, Infusion, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
O. umbilicata subsp. *attica* (Boiss. & Orph.) J.J.Wood	Kösegöbekli	Tubers	Powdered, Infusion (with milk)	Sahlep	62
Orchis sp.	Salep	Tubers	Crushed	Sahlep, Ice-cream	69
			Powdered	Tonic, Aphrodiasic, Diarrhea	70
			Infusion	Strengthening, Wound, Abscess, Inflammation, Heart strengthener, Mental fatigue	59
			Decoction	Cough, Bronchitis, Pharyngitis, Laxative, Hemorrhoids, Anthelminthic, Cardiac deficiency, Bronchitis, Diarrhea	71
O. anatolica Boiss.	Dildamak	Tubers	Beverage	Digestive diseases	72
			-	Sahlep	53
			Powdered	Sahlep	62
				Diarrhea	73
			Infusion, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
			Decoction	Mind developer	74
			Decoction (with milk)	Stomachache, Expectorant, Chest emollient, Cough	77
			-	Expectorant, Emollient, Tonic, Antimicrobial, Lactagogue	78
		Whole plant	-	Ornamental plant	55
		-	-	Pleasure, Throat emollient, Strengthening	79

O. coriophora L.	Pirinççiçeği	Tubers	Powdered	Cough	49
				Sahlep	49,50 61,80 81
				Ice-cream	49
			Decoction	Diarrhea	49
				Mind developer	74
			Powdered, Infusion (with milk)	Sahlep	82
		Flowers	Decoction	Strengthening, Wound, Abscess, Inflammation, Heart strengthener, Mental fatigue	83
				Digestive diseases	80
O. italica Poir.	Teketaşağı	Tubers	Powdered, Infusion, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
			Powdered, Infusion	Cold, Flu, Body warmers, Sahlep	51
O. laxiflora Lam.	Salep sümbülü	Tubers	-	Sahlep	53
O. laxiflora subsp. *laxiflora* Lam.	Salep sümbülü	Tubers	Infusion (with honey)	Cold, Cough	84
O. mascula (L.) L.	Ersalebi	Tubers	Powdered, Infusion, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
				Sahlep	54
			Decoction	Chest emollient	85
O. mascula L. ssp. *pinetorum* (Boiss. & Kotschy) G. Camus	Çam salebi	Tubers	Powdered	Sahlep, Digestive diseases, Throat ache, Cough	86
			Infusion	Strengthening, Wound, Abscess, Inflammation, Heart strengthener, Mental fatigue	59
			-	Ice-cream	76
			-	Sahlep	87
		Leaves	-	Cooked with onion and egg	87
O. morio L.	Gelincik salebi	Under ground parts	Powdered	Ice-cream	88
		Tubers	Decoction	Ulcer, Viral infections, Intestinal diseases	89
O. pallens L.	Solgun salep	Tubers	Decoction	Chest emollient	85
O. palustris Jacq.	Çayır salebi	Tubers	Powdered	Cough	49
				Sahlep	49,50
			Decoction	Diarrhea	49

			-	Ice-cream	76,90
		Whole plant	-	Ornamental plan	91
O. punctulata Steven ex Lindl.	Selef	Tubers	Powdered	Sahlep	49,50
			Infusion, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
			Decoction	Diarrhea, Jaundice, Hemorrhoid, Respiratory diseases	49
				Hemorrhoid	92
O. purpurea Hudson	Hasancık	Tubers	Decoction	Wart	93,94
			Powdered, Infusion (with milk)	Sahlep	62
		Whole plant	-	Ornamental plant	55
O. sancta L.	Püren salebi	Whole plant	-	Ornamental plant	55
O. simia Lam.	Salep püskülü	Tubers	Powdered, Infusion, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
			Powdered and mixed with oilless yoghurt	Diarrhea	13
			-	Diabetes	95
O. spitzelii Sauter ex W.D.J.Koch.	Dağ salebi	Tubers	Powdered	Sahlep	56
			Infusion	Medicinal tea	56
O. tridentata (Scop.) R.M.Bateman	Katranalacası	Tubers	Powdered, Infusion (with milk)	Sahlep	82
		Whole plant	-	Ornamental plant	55
Serapias bergonii E.G.Camus	İnce sağırkulağı	Tubers	Powdered, Infusion, Spice	Body warmers, Cold, Flu, Pleasure, Psychedelics, Medicinal tea	52
			Powdered, Infusion	Cold, Flu, Body warmers, Sahlep	51
S. politisii Renz	Bodur sağırkulağı	Whole plant	-	Ornamental plant	55
S. orientalis ssp. *orientalis (Greuter) H.Baumann & Künkele*	Dillikulak	Whole plant	-	Ornamental plant	55
*S. vomeracea (*Burm.f.) Briq.	Sağırkulağı	Tubers	Powdered, Infusion (with milk)	Sahlep	82
		Whole plant	-	Ornamental plant	96
****Vanilla planifolia* Jacks. ex Andrews	Vanilya	Fruits	Dried and raw eaten	Energizing, Nervous system stimulant	97
			Essential oil	Antipyretic	97

*[98]; **[99]; *** Endemic taxon; **** Epiphyte orchid; "-": No information

Conclusion

This review includes 41 geophyte and 1 epiphyte orchid taxa, and one of them is endemic. Herbal medicines used by the local people are prepared as powdered, infusion, decoction, spice, etc. Flowers, leaves, and tubers are the most commonly used plant parts. Also, the whole plant and underground parts have been found to have therapeutic effects on many diseases: colds, coughs, diarrhea, digestive diseases, flu, mental fatigue, etc.

However, some herbs traditionally used for therapeutic purposes among local people are known to contain toxic contents that cause various disorders and, in some cases, even decease. Therefore, studies that demonstrate the medicinal characteristics and uses of different plants are just for informational purposes. It is also envisaged that many compounds contained in plants can have different effects on individuals. Herbal remedies have fewer side effects than synthetic drugs, although the application of herbal remedies for therapeutic purposes should be done under the supervision of a specialist.

Furthermore, this review includes some of the orchids that have therapeutic effects on different types of diseases. This review can be a guide for other researchers to further explore plants and their use in various diseases and toxicity studies, along with clinical trials.

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