

Scientific Evaluation of Medicinal Plants Used for the Treatment of Cervicitis (Qorohe- Rahem) in Iranian Traditional Medicine

Razieh Nabimeybodi^{a,b}, Rahele Zareshahi^c, Mojgan Tansaz^{a*}, Marzieh Vahid Dastjerdi^d and Homa Hajimehdipoor^e

^aDepartment of Traditional Medicine, School of Traditional Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ^bDepartment of Persian Medicine, The School of Persian Medicine, Shahid Sadoughi University of Medical Sciences, Ardakan, Yazd, Iran ^cDepartment of Pharmacognosy, Faculty of Pharmacy, Shahid Sadoughi University of Medical Sciences, Yazd, Iran. ^dDepartment of Obstetrics and Gynecology, Tehran University of Medical Sciences, Tehran, Iran. ^eDepartment of Traditional Pharmacy, School of Traditional Medicine, Traditional Medicine and Materia Medica Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Abstract

Cervicitis is an inflammatory condition of the cervix associated with upper genital tract infection and reproductive complications. Treatment for cervicitis in conventional system is the use of antibiotics and antifungal therapies and surgical interventions, but none of these treatments provides the definite efficacy in spite of high cost and side effect. So there is a need for an alternate therapy which is safe, effective, easily available and free from side effects. This review focuses on medicinal plants mentioned in main Iranian Traditional Medicine reference books. Medicinal plants mentioned in Iranian Traditional Medicine for treatment of Cervicitis were elicited and searched in electronic databases including Pub Med, Scopus, Science direct and Google Scholar to find studies that confirmed their efficacy. The findings included 31 plants belonging to 21 families. Research findings showed that the plants mentioned in Iranian Traditional Medicine resources can contribute to the recovery and treatment of cervicitis through anti-inflammatory, antioxidant, antibacterial and anti-fungal, wound healing and analgesic effects. Finding the medicinal plants effective on cervicitis based on ITM could suggest a better strategy for relieving and management of cervicitis symptoms especially in recurrent or persistent condition.

Keywords: Cervicitis, Qoruh-e- Rahem; Iranian Traditional Medicine; Persian medicine; Medicinal plants; Anti-inflammatory; Antibacterial, Antifungal; Wound healing.

Introduction

Cervicitis is a syndrome of cervical inflammation (1, 2) which is clinically defined

as the presence of either mucopurulent discharge or cervical friability (easily bleeding induced by gentle passage of a swab through the Endocervical os) (1-6). More subtle signs of cervicitis include edema of the cervical ectropion (edematous ectopy) and vaginal pain (1, 3, 4, 6). Sacral backache, lower abdominal

* Corresponding author:

E-mail: tansaz_mojgan@yahoo.com

pain, and dyspareunia are other symptoms of cervicitis (4). Microscopic definitions involving the use of gram stain of cervical secretions includes either more than 10 white blood cells (WBCs) or more than 30 WBCs per high-power field (1, 3, 4, 6). Also, there is an evidence that it is asymptomatic in many cases (1, 2, 4). The incidence of cervicitis is as high as 30–45% in some sexually transmitted infections (STI) among clinic populations (4).

Cervicitis is most often caused by infection (1). Pathogens of *Chlamydia trachomatis* and *Neisseria gonorrhoea* are the usual culprits (2-4). Less commonly, *Mycoplasma genitalium*, *Mycoplasma hominies*, *Ureaplasma urealyticum*, *Trichomona vaginalis*, and *Herpes simplex Virus* are implicated (2, 4). The causes of the rest of the cases remain unknown (3, 4, 7). However, in a few cases it may be attributed to chemical exposure or a foreign body such as a pessary (a device inserted into the vagina to support the uterus), cervical cap (a birth control device), or diaphragm. The condition may also be caused by an allergy to contraceptive spermicides or to latex in condoms (1).

Cervicitis can progress to Pelvic Inflammatory Disease (PID), ectopic pregnancy, chronic pelvic pain, tuboovarian abscess, damage and adhesion of tubal mucosa, and ultimately infertility (4, 5, 8) even in asymptomatic cases (2).

The initial therapy for cervicitis in conventional system is the use of antibiotics and antifungal therapies either orally and topically (4) leading to an imbalance in gut flora due to prolonged use of antibiotics (8). As a side effect, the increased drug resistance has reduced the therapeutic efficacy (4, 8, 9).

The failure of medical treatment (after two or three attempts) needs further surgical interventions by diathermy, cauterization, cryotherapy, and laser ablation which may cause further complications. None of these treatments not only provides a definite efficacy in spite of their relatively high cost, but also can lead to various adverse events. Due to the nature of these wide-ranging adverse effects, it is important to find effective therapies for genital infections which can be safer, more effective, easily available, and minimal adverse effects.

Complementary and Alternative Medicine

(CAM) is progressively accepted and has been interested by the western mainstream medical community because of its less invasive, safer, effective, economical, and convenient therapies. The popularity of CAM has gradually increased, over the last few decades (8). Persian medicine (Iranian traditional medicine (ITM)) with thousands of years of history and hundreds of ancient texts is one of the oldest and richest alternative medicines.

Based on ITM literature, cervicitis is known as "Qoruh- e- Rahem", and characterized by pain and mucopurulent or bloody discharge. Qoruh is plural of Qarhah (Qorhah) which means wound in muscle tissue of the uterus and cervix. It can be developed by external causes such as bumps and falls (Sagtah) or internal causes such as dystocia, and flow of caustic humor (Insibab Khilt Hadd-e-Marari) to the uterus (10-14).

In ITM, Qarhah of the cervix can be diagnosed by inspection of cervix and observing the wound with endocervical discharge. Complications of Qoruh-e- Rahem include infertility and adhesion (10-14).

From ITM perspective, the treatment of cervicitis is a package of interventions, including lifestyle modification, medicinal plant therapies with different pharmacological therapeutic effects, and nondrug techniques such as massage (Dalk) and reflex therapy (Ghamz) used individually or in combination with each other.

The aim of the present study was to review the medicinal plants claimed to be effective on cervicitis based on the Iranian traditional medicine manuscripts that may be used as complementary and/or alternative to conventional treatments, based on the classical medicine, to find out more effective and safer treatment strategies.

Experimental

This study is investigated medicinal plants which were used for the treatment of cervicitis/ Qoruh-e-Rahem with keywords of Qoruh-e-Rahem or Qarhah (Qorhah) in the Iranian Traditional Medicine literature. The herbs were searched and extracted from 7 main traditional medicine reference books including *Liber Continet* (Al-Havi) of Rhazes (*Abubakr*

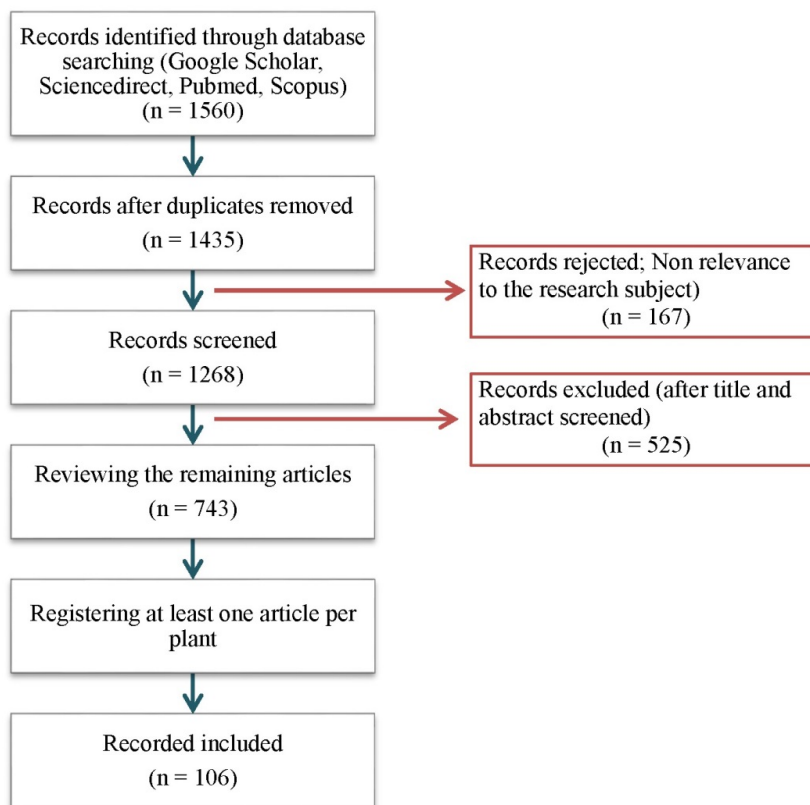


Figure 1. Flow diagram of the study selection.

Muhammad ibn Zakariyya al-Razi, 8th century AD), Canon of Medicine (*Qanun fi al-Teb*) of Avicenna (*Ibn Sina*, 10th and 11th centuries AD) (10), Great Elixir (*Exir Azam*) of Azam Khan (10th century AD) (11), Treasure of the Khwarazm Shah (*Zakhireh Kharazmshahi*) of Jorjani (*Seyyed Ismaeil Jorjani*, 12th century AD) (12), *Tohfat-ol-Momenin* by Hakim Momen Husseini (17th century AD) (15), Storehouse of Medicaments (*Makhzan-ol-Advieh*) of Aghili Khorasani (18th century AD) (16) and *Sharh-ol- Asbab* of Nafis-ibn- Evas-e Kermani (15th century AD) (17) as well as other manuscripts written at various times during 10th- 18th centuries in both Arabic or Persian languages. Medicinal plants were categorized in Mofradat (simple ingredient) and Qarabadin (multi-component ingredient) (10, 11). Then, simple herbal drugs (Mofradat) were selected from extracted treatments

To find matches for old names in modern scientific classification, two botany references (16, 18-21) and electronic databases as well as the plantlist.org suggested by the research team were used. Moreover, the opinions of distinguished scholars of ITM were also taken into consideration (Table 1).

To investigate the pharmacological properties of the medicinal plants, electronic databases including Pub Med, Scopus, Google Scholar, and Scimedirect were explored for each of these herbs. All retrieved articles which demonstrate the direct efficacy of these medicinal herbs or their mechanisms involved in cervicitis alleviation including anti-inflammatory, antioxidant, antimicrobial, antibacterial, antifungal, wound healing and analgesic effects were carefully considered in this study. Bibliography in the electronic databases covered all articles published between

Table 1. Medicinal plants used for cervicitis cited in ITM.

Traditional Name	Common Name	Scientific Name	Family	Part used	Traditional Medicine Dosage Form	Reference
1. saA	Myrtle	<i>Myrtus communis</i>	Myrtaceae	Leaf, Fruit	Abzan	(15, 16)
2. Abhal	Sabine	<i>Juniperus sabina</i>	Cupressaceae	Fruit	Zarour	(23)
3. Bakhour-Al-Akrad	Hog's fennel	<i>Peucedanum officinale</i>	Umbelliferae	Root	Zarour	(16)
4. nasalaB	Balm of Gilead, Balsam of Mecca	<i>Commiphora opobalsamum</i>	Burseraceae	Leaf, Fruit, wood	Ferzajeh	(23)
5. Banj	Henbane	<i>Hyoscyamus niger</i> <i>Hyoscyamus albus</i> <i>Hyoscyamus sp.</i>	Solanaceae	Seed	Ferzajeh, Oral	(13, 15, 16)
6. Berenjasef	Erio Yarrow	<i>Artemisia vulgaris</i>	Compositae	Leaf	Zarour, Abzan	(13, 15)
7. Gharighoon	White Agaric	<i>Polyporus officinalis</i>	Polyporaceae	---	Oral	(15)
8. Henna	Henna	<i>Lawsonia inermis</i>	Lythraceae	Leaf	Ferzajeh	(16)
9. Holbeh	Fenugreek	<i>Trigonella foenum-graecum</i>	Leguminosae	Leaf/Seed	Zemad, Abzan	(15, 23)
10. Javshir	Opopanax	<i>Prangos ferulaceae</i>	Umbelliferae	Gum resin	Hoghneh, Oral	(15, 23)
11. Karafs	Celery	<i>Apium graveolens</i>	Umbelliferae	---	---	(15)
12. Khobhazi	Marsh mallow	<i>Malva sylvestris</i>	Malvaceae	Leaf	---	(16)
13. Khobbeh	Flixweed	<i>Descurainia Sophia</i>	Cruciferae	Seed	Ferzajeh	(15)
14. Korras	Leek	<i>Allium porrum</i>	Liliaceae	Leaf	Homoul	(15, 16)
15. Kondor	Frankincense	<i>Boswellia carteri</i>	Burseraceae	Gheshar	Ferzajeh	(15)
16. Lesan-Al- Asafir	Ash	<i>Fraxinus excelsior</i>	Oleaceae	Leaf	Ferzajeh	(13)
17. Lesan- Al- Hamal	Great Plantain	<i>Plantago major</i>	Plantaginaceae	Fruit/Leaf	Ferzajeh	(15)
18. Loobiya-ye- Sorkh	Bean	<i>Phaseolus vulgaris</i>	Leguminosae	Fruit	---	(15, 23)
19. Mastaki	Lentiskpistache	<i>Pistacia lentiscus</i>	Anacardiaceae	resin	Oral Zemad	(15)
20. Mor	Myrrha	<i>Commiphora myrrha</i>	Burseraceae	oleo-gum resin	Sheiaf	(15, 23)
21. Nankhah	Bishop's Weed Fruit	<i>Trachyspermum copticum</i>	Umbelliferae	Seed	Bakhour, Ferzajeh, Hoghneh	(23)
22. Narjes	Narjes	<i>Narcissus tazetta</i>	Amaralldaceae	Root	Zarour	(15, 16)

Table 1. Continued.

Traditional Name	Common Name	Scientific Name	Family	Part used	Traditional Medicine Dosage Form	Reference
23. Raee-Al-Homam	Vervain	<i>Verbena officinalis</i>	Verbenaceae	Leaf	Zemad	(15, 16)
24. Razianaj	Fennel	<i>Foeniculum vulgare</i>	Umbelliferae	Fruit	---	(15, 16)
25. Safarjal	Quince	<i>Cydonia oblonga</i>	Rosaceae	Fruit	Juice	(16)
26. Shebet	Dill	<i>Anethum graveolens</i>	Umbelliferae	Fruit	Abzan	(15)
27. Teen	Fig	<i>Ficus carica</i>	Moraceae	Fruit	Ferzajeh	(15)
28. Vard-E-Ahmar	Damask Rose	<i>Rosa damascena</i>	Rosaceae	Petal	Ferzajeh	(15)
29. Zaeferan	Saffron	<i>Crocus sativus</i>	Iridaceae	Stigma	Tela, Homool	(15, 16)
30. Zaravandmodahraj, Zaravandaviyl	Snakeroot	<i>Aristolochia longa</i> <i>Aristolochia rotunda</i>	Aristolochiaceae	Root	Zemad	(15, 23)
31. Zeytoon	Olive	<i>Olea europaea</i>	Oleaceae	Fruit	Enema	(16)

years 2000 to 2016. The search terms were “cervicitis”, “cervicitis, uterine”, “uterine cervicitis”, “cervicitides”, “cervicitides, uterine” and “uterine cervicitides” in title and abstract as well as the name of each herb in the whole text (Figure 1).

Results and Discussion

After searching for plants effective against cervicitis (Qorohe-Rahem) in the 7 main Iranian Traditional Medicine texts, we reached 31 plants from 21 different families. Table 1, displays the medicinal plants used for the management of cervicitis in Iranian Traditional Medicine and all evidence confirming their efficacy are described individually in Table 2, 3 and 4.

The medicinal plants were categorized into 2 groups; 1) Mofradat which included simple ingredient herbal medicine, 2) Qarabadin which included multi component ingredient herbal medicines (containing 2 or more bioactive pharmaceutical substances) (10, 11, 22). Some routes of administrations for ITM drugs namely oral and topical included intravaginal administration (vaginal suppositories (Ferzajeh/farzaje, Sheiaf, Homoul, Zarour/Zarur), vaginal lavage/enema (Hoghneh)), external therapy (lotion (Tela), balm (Marham), cleansing (Estenja), steaming washing therapy and sitz bath (Abzan)) and rectal administration (retention enema and rectal infusion with liquid herbal medicine) (8, 22),

Ferzajeh and Homoul are two kinds of vaginal suppositories made of components that are kneaded and get dried in shade. Abzan is a traditional remedial sitz bath that is effective in treating gynecology disorders. In this procedure, the patient should sit in a tub filled with water in which a special plant is boiled before. Tela is a kind of lotion used topically. It is used on lower abdominal surface on uterine, pubic, external genitalia, and lumbosacral regions. The other form of drug administration is balm, which is used topically and is named Zemad in Iranian Traditional Medicine, containing some components and suitable liquid part, which makes it pasty. It needs to be dressed with a soft cloth. Cleansing with watery topical preparations is named Estenja (14, 22).

Table 2. Studies on anti-inflammatory activities of plants used for treatment of cervicitis cited in ITM references.

	Scientific name	Part/extract	Active constituent	Reference
1.	<i>Allium porrum</i>	----	-----	---
2.	<i>Anethum graveolens</i>	Essential oil	Sabinen	(84)
3.	<i>Apium graveolens</i>	Ethanollic extract of seeds	-----	(48)
4.	<i>Aristolochia longa</i> <i>Aristolochia rotunda</i>	----	-----	---
5.	<i>Artemisia vulgaris</i>	Hydroalcoholic extract	Rutin, hydroxybenzoic acid and caffeic	(35)
6.	<i>Boswellia carteri</i>	Aquouse extract	----	(57)
7.	<i>Commiphora myrha</i>	Aqeouse extract of resin	sesquiterpene,diterpenen, triterpenic acids	(57)
8.	<i>Commiphora opobalsamum</i>	Petrolatum ether, Chloroform, extract of aerial parts	Triterpens, flavonols, mearnsetin, quersetin, ascorbic acid	(32)
9.	<i>Crocus sativus</i>	Methanolic extract of aerial parts	-----	(24)
10.	<i>Cydonia oblonga</i>	Polyphenol ectract	polyphenols	(52)
11.	<i>Descurainia sophia</i>	Petrolatom extract of seeds	Coumarins	(83)
12.	<i>Ficus carica</i>	---	----	---
13.	<i>Foeniculum vulgare</i>	Methanolic extract of fruites	----	(77)
14.	<i>Fraxinus excelsior</i>	Ethanollic extract of the bark	coumarins	(59)
15.	<i>Hyoscyamus niger</i> <i>Hyoscyamus albus</i> <i>Hyoscyamus sp.</i>	Methanolic extract of seeds	coumarinolignans	(33)
16.	<i>Juniperus sabina</i>	---	----	---
17.	<i>Lawsonia inermis</i>	---	lawsochylin A, lawsonaphthoate	(99)
18.	<i>Malva sylvestris</i>	Ethanollic extract of leaves	malvidin3-glucoside,scopoletin,quercetin	(50)
19.	<i>Myrtus communis</i>	----	----	(25)
20.	<i>Narcissus tazetta</i>	----	----	--
21.	<i>Olea europaea</i>	Chloroformic and methanolic extract of leaves	Iridoids, Flavonoids	(100)
22.	<i>Peucedanum officinale</i>	----	----	(30)
23.	<i>Phaseolus vulgaris</i>	---	---	---
24.	<i>Pistacia lentiscus</i>	Resin	Flavonoids	(65)
25.	<i>Plantago major</i>	Ethanollic and aquase extract of leaves	Phenolic compounds, Polysaccharides and polyphenolic compounds	(60, 61)
26.	<i>Polyporus officinalis</i>	---	---	----
27.	<i>Prangos ferulaceae</i>	----	-----	----
28.	<i>Rosa damascena</i>	Ethanollic extract of air dried and petals	Phenolic compounds	(90)
29.	<i>Trachyspermum copticum</i>	Ethanollic extract of seeds	Flavonoids and glycosides	(72)
30.	<i>Trigonellafoenum-graecum</i>	Methanolic extract of seeds	Glycoside and steroidal moieties	(44)
31.	<i>Verbena officianalis</i> <i>Verbena sp.</i>	Methanolic extract of leaves	Iridoids and caffeoyl derivatives	(75)

Table 3. Studies on antimicrobial activities of plants used for treatment of cervicitis cited in ITM references.

	Scientific name	Part/extract	Active constituent	Activities	Reference
1.	<i>Allium porrum</i>	Essential oil	Dipropyl disulfide, dipropyltrisulfide, methyl propyl disulfide, polyphenols	Antibacterial,	(53)
2.	<i>Anethum graveolens</i>	Ethanol extract of flowers	proanthocyanidins	Antifungal, antibacterial	(85, 86)
3.	<i>Apium graveolens</i>	Essential oil	----	Antibacterial	(47)
4.	<i>Aristolochia longa</i> <i>Aristolochia rotunda</i>	Aqueous extract of root, Hexane and benzene extract of dried root	Flavonoides, Saponins/ Aristolochic acid and aristolactam	Antifungal, Antibacterial	(76)
5.	<i>Artemisia vulgaris</i>	Ethanol Extract of aerial parts	Flavonoids, phenols	Antimicrobial,	(34)
6.	<i>Boswellia carteri</i>	Essential oils	limonene	Antibacterial, antifungal	(54)
7.	<i>Commiphora myrha</i>	Ethanol and ether extracts	----	Antimicrobial	(69, 101)
8.	<i>Commiphora opobalsamum</i>	Petrolatum ether	Triterpens, flavonols	Antimicrobial	(102)
9.	<i>Crocus sativus</i>	Methanolic extract of aerial parts	---	Antimicrobial	(103)
10.	<i>Cydonia oblonga</i>	Fruit aqueous acetone extract	chlorogenic acid	Antimicrobial	(104)
11.	<i>Descurainia sophia</i>	----	----	----	----
12.	<i>Ficus carica</i>	Methanol extract	---	Antibacterial Antifungal	(87)
13.	<i>Foeniculum vulgare</i>	Essential oil, Aquase extract	Anethol	Antimicrobial	(78)
14.	<i>Fraxinus excelsior</i>	dichloromethane of leaves	----	Antibacterial	(105)
15.	<i>Hyoscyamus niger</i> <i>Hyoscyamus albus</i> <i>Hyoscyamus sp.</i>	Ethanol extract of shoot and root	Alkaloids	Antimicrobial	(106)
16.	<i>Juniperus sabina</i>	Essential oil of fruit	Flavonoids	Antimicrobial	(28)
17.	<i>Lawsonia inermis</i>	----	----	Antimicrobial	(38)
18.	<i>Malva sylvestris</i>	Methanolic extract of aerial parts	----	Antibacterial	(104)
19.	<i>Myrtus communis</i>	Essential oil, Ethanol and methanolic and ethylacetat extract of leaves and berries, Ethanol extract	Polyphenolic compounds, phenolic acids, tannins, flavonoids	Antimicrobial	(25)
20.	<i>Narcissus tazetta</i>	Ethanol extract of aerial parts	---	Antimicrobial	(74)
21.	<i>Olea europaea</i>	Aqueous extracts of leaves	Phenolic compounds	Antifungal and antibacterial	(97)
22.	<i>Peucedanum officinale</i>	----	----	Antimicrobial	(31)
23.	<i>Phaseolus vulgaris</i>	Acetonic extract	Tannins	Antibacterial	(64)
24.	<i>Pistacia lentiscus</i>	Mastic	----	Antimicrobial	(67)
25.	<i>Plantago major</i>	Ethanol and aquase extract of leaves	Phenolic compounds, Polysaccharides and polyphenolic compounds	Antibacterial	(60)

Table 3. Continued.

	Scientific name	Part/extract	Active constituent	Activities	Reference
26.	<i>Polyporus officinalis</i>	----	----	----	----
27.	<i>Prangos ferulaceae</i>	Fruit extract	limonene, α -pinen, and humulene	Antibacterial	(45)
28.	<i>Rosa damascena</i>	Essential oil and ethanolic extract	----	Antibacterial and Antifungal	(107)
29.	<i>Trachyspermum copticum</i>	Essential oil	Phenols	Antimicrobial	(71)
30.	<i>Trigonellafoenum-graecum</i>	Ethanolic extract of mucilage	---	Antibacterial	(102)
31.	<i>Verbena officianalis</i> <i>Verbena</i> sp.	Methanolic extract of leaves	Flavonoids and caffeoyl derivatives	Antimicrobial	(75)

Myrtus communis

Leaves and fruits from *Myrtus communis* have been claimed to be effective for the management of cervicitis in different references of ITM. Analgesic (24), Antimicrobial (antibacterial, antifungal and antiviral) and antioxidant properties of compounds produced by *M. communis* have been reported in numerous studies. 1,8-cineole, linalool, eugenol, terpineol and terpinene as myrtle essential oils components have a good antibacterial effects against some gram positive and gram negative bacteria (25).

As demonstrated in several studies, the antioxidant capacity of plant extracts is strongly related to phenolic content.

This activity is not a property of a single phenolic compound, but it is widely attributed to different phenolic phytochemical constituents. Particularly, anthocyanins, flavonoids and phenolic acids seem to be responsible for the antioxidant capacity of *Myrtus communis* (25). Rossi *et al.* in their study revealed that *M. communis* exerts potent anti-inflammatory effects *in-vivo* and offers a novel therapeutic approach for the management of acute inflammation (26).

The effects of the essential oil and methanolic extract of *Myrtus communis* on *Trichomonas vaginalis* have been shown in Abdollahy *et al.* study (27).

Juniperus Sabina

J. Sabina is from Cupressaceae family. Emami *et al.* have reported antioxidant activity of leaves and fruits of *J. Sabina* (abhal). Antimicrobial activity of this plant has been confirmed (28, 29).

Peucedanum officinale

Many phytochemical investigations on this genus have confirmed *Peucedanum* species are rich in essential oils and coumarins. Our review confirmed that some *Peucedanum* species could have therapeutic effects of anti-inflammatory (30), antioxidant, and antimicrobial (31).

Commiphora opobalsamum

C. opobalsamum is a small tree (5 m in height) that is found in abundance and widespread on mountains around the holy places such as Makkah Al-Mukarama, Al-Madina Al-Munawara (Al-hijaz area, KSA), and Al-Quds (Palestine). In addition, it is native to other areas such as Oman, Yemen, and Somaliland. Anti-inflammatory, antioxidant, and analgesic effects of *C. opobalsamum* have been reported by Al-salami *et al.* (32).

Hyoscyamus sp.

Hyoscyamus niger of Solanaceae family, commonly known as henbane, is

Table 4. Studies on antioxidant activities of plants used for treatment of Cervicitis cited in ITM references.

	Scientific name	Part/extract	Active constituent	Reference
1.	<i>Allium porrum</i>	Essential oil	Dipropyl disulfide, dipropyltrisulfide, methyl propyl disulfide, polyphenols	(53)
2.	<i>Anethum graveolens</i>	Essential oil	Tannins, Flavonoid, Alkaloids	(86)
3.	<i>Apium graveolens</i>	Methanolic and ethanolic extract of seeds	flavonoids, phenols	(108)
4.	<i>Aristolochia longa</i> <i>Aristolochia rotunda</i>	-----	-----	--
5.	<i>Artemisia vulgaris</i>	Ethanolic Extract of aerial parts	Flavonoids, phenols	(34)
6.	<i>Boswellia carteri</i>	Aquouse extract	----	(56)
7.	<i>Commiphora myrha</i>	Ethanol and ether extracts	----	(69)
8.	<i>Commiphora opobalsamum</i>	Petrolatum ether, Chloroform, extract of aerial parts	Triterpens, flavonols, mearnsetin, quersetin, ascorbic acid	(102)
9.	<i>Crocus sativus</i>	Methanolic extract of aerial parts	----	(103)
10.	<i>Cydonia oblonga</i>	Methanolic extract of pulp and peel and seed and jam	Phenolic compounds	(82)
11.	<i>Descurainia sophia</i>	Ethanolic extract of seeds	Phenols	(109)
12.	<i>Ficus carica</i>	----	Polyphenols, Flavonoids, Anthocyanins	(87)
13.	<i>Foeniculum vulgare</i>	Ethanolic extract of fruits	----	(77)
14.	<i>Fraxinus excelsior</i>	Ethanolic extract of leaves	Fraxetin, esculetin	(59)
15.	<i>Hyoscyamus niger</i> <i>Hyoscyamus albus</i> <i>Hyoscyamus sp.</i>	----	-----	
16.	<i>Juniperus sabina</i>	Methanolic extract of Leaves and fruits	----	(29)
17.	<i>Lawsonia inermis</i>	Ethanolic extract of leaves	----	(39)
18.	<i>Malva sylvestris</i>	---	----	(104)
19.	<i>Myrtus communis</i>	Ethanolic extracts of berries	Flavonoids, Tannins, α -tocopherol	(25)
20.	<i>Narcissus tazetta</i>	---	---	---
21.	<i>Olea europaea</i>	leaf extract	Flavonols, Flavans-3-ols, Flavones	(93)
22.	<i>Peucedanum officinale</i>	----	----	(31)
23.	<i>Phaseolus vulgaris</i>	Methanolic extract of bean	Phenols	(62)
24.	<i>Pistacia lentiscus</i>	Resin	Flavonoids	(67)
25.	<i>Plantago major</i>	Ethanolic and aquase extract of leaves	Phenolic compounds, Polysaccharides and polyphenolic compounds	(60)
26.	<i>Polyporus officinalis</i>	---	---	---
27.	<i>Prangos ferulaceae</i>	---	Coumarines, Alkaloids, Flavonoids, and Terpenoids	(45)
28.	<i>Rosa damascena</i>	Hydroalcoholic and ethanolic extract, fresh flower, spent flower),Essential oil	Phenolic compounds	(41)

Table 4. Continued.

	Scientific name	Part/extract	Active constituent	Reference
29.	<i>Trachyspermum copticum</i>	Ethanollic extract of seeds	Terpenoids and Flavonoids	(70)
30.	<i>Trigonella foenum-graecum</i>	Ethanollic extract of mucilage	Galactomannan	(110)
31.	<i>Verbena officianalis</i> <i>Verbena</i> sp.	Methanollic extract of leaves	Flavonoids and Caffeyoyl derivatives	(75)

widely distributed in Asia and Europe. The pharmacological evaluation of methanollic extract of the seeds of *H. niger* showed that it possesses potent analgesic and anti-inflammatory activities. The major chemical components, *e.g.* coumarinolignans specifically cleomiscosin, which is present in the seeds of *H. niger* is involved in the anti-inflammatory activity of methanollic extract of the seeds (33).

Artemisia vulgaris

Antimicrobial, antioxidant, and anti-inflammatory effects of this plant have been reported in the previous studies (34-36).

Polyporus officinalis

Laricifomes officinalis (*Polyporus officinalis*) is a wood-rotting fungus that grows on different hosts such as conifers. The mushroom is native to Europe, Asia, and North America. It has been used since the ancient times to treat sciatica, weakness of muscles, bronchitis, constipation, stomach and uterus pain, jaundice, fever, and insect bites. It also has diuretic and emmenagogue effects. The biological effects of *L. officinalis* including anti-viral (especially against smallpox, H5N1 influenza, and hepatitis C virus), anti-tuberculosis, anticoagulant immunomodulatory, and relieving dysmenorrhea, hemorrhoids, cough, and rheumatoid arthritis were confirmed for this fungus by studies performed in the recent decades (37).

Lowsonia inermis

Inhibitory action of henna against both gram negative and gram positive bacteria was proven (38). Chemical components of *L. inermis* have good antioxidant capacities and this species could be used as a potential source of new

natural antioxidants (39).

Trigonella foenum-graecum

Leaves and seeds from *Trigonella foenum-graecum* has been claimed to be effective for management of cervicitis in different references of ITM. The anti-inflammatory, antioxidant, antimicrobial, analgesic, and wound healing effects of *T. foenum-graecum* have been reported (40-43). The presence of saponins and flavonoids as the major compounds in *T. foenum-graecum* may explain the anti-inflammatory activity of this plant (44).

Prangos ferulaceae

Antioxidant effect of *P. ferulaceae* was reported by Coruh *et al.* (45).

Apium graveolens

Anti-inflammatory, antimicrobial and antioxidant effects of *A. graveolens* have been reported. Baananou reported essential oil and extracts of *A. graveolens* aerial parts have antiulcerogenic and antibacterial activities (46-48).

Malva sylvestris

In animal models, *M. sylvestris* presented antinociceptive effects and anti-inflammatory action (49, 50) in mucous membranes and in carrageenan-induced paw edema when applied topically. The antioxidant and radical scavenger properties of this herb (*in-vitro*) were presented by a study of Della Greca *et al.* *M. sylvestris* is effective as an anti-inflammatory agent when used locally in the skin (50). Antimicrobial effects of this plant also have been reported by Gasparetto *et al.* (49).

One study evaluated the effect of *M. sylvestris*

topical cream on burn wound healing in the rats. (51).

Descurainia sophia

Anti-inflammatory, antioxidant, and analgesic activities of *Descurainia sophia* (flixweed) were attributed to the presence of phenolic compounds (52).

Allium porrum

Antimicrobial and antioxidant effects of *A. porrum* were reported by Mnayer *et al.* (53).

Boswellia carteri

The antimicrobial activity of the essential oil of *B. carteri* was individually evaluated against different microorganisms including fungi, gram-positive, and gram-negative bacteria strains (54). In one study *B. carteri* was used as a mixture with three plants for diabetic wound healing. The results of this study revealed this treatment is a promising method for wound healing in diabetic mice (55).

Anti-inflammatory, antifungal, antioxidant activities, and analgesic effects of this plant have been reported (56, 57).

Fraxinus excelsior

Antioxidant, antibacterial, and anti-inflammatory activities of *F. excelsior* were shown in the previous reports (58, 59).

Plantago major

The main caffeic acid derivative in *P. major* is plantamajoside having anti-inflammatory, antioxidant, and antibacterial activities (60). The wound-healing properties of *P. major* were evaluated using an ex-vivo porcine wound healing model. Ethanol and water extracts stimulated wound healing in porcine skin (61).

Phaseolus vulgaris

Antimicrobial and antioxidant activity of *Ph. Vulgaris* have been reported (62-64).

Pistacia lentiscus

Resin of *P. lentiscus* showed 100% inhibition of inflammation at 800 mg/kg i.p. injection, without any toxicity in mice (65). *P. lentiscus* virgin fatty oil promotes significantly wound

contraction and reduces epithelization period in rabbit model (66). Antifungal and antioxidant effects also have been reported (67).

Commiphora myrrha

Pharmacological studies showed that myrrh exhibited analgesic, anti-inflammatory, and antimicrobial activities (57, 68). The analgesic activity of *Commiphora* extract and pure compounds supported the use of myrrh for wound and pain in indigenous medicines (69).

Trachyspermum copticum

Trachyspermum copticum, an annual plant which grows in Iran, has white flowers and small fruits. Some biological effects of the fruits of *T. copticum* such as antiviral, anti-inflammatory, antifungal, analgesic, antinociceptive, and antioxidant activity have been confirmed (70-72).

Narcissus tazetta

Ethanol extracts of aerial parts of this plant showed antimicrobial effects. Aerial parts of *N. tazetta* have flavonoids, terpenoids, and alkaloids (73, 74).

Verbena Officinalis

Casanova *et al.* reported 50% methanolic extract and caffeoyl derivatives could be potentially considered as excellent and readily available sources of natural antifungal and antioxidant compounds (75). A topical preparation containing at least 3% of *V. officinalis* methanolic extract showed an anti-inflammatory and analgesic effects (76).

Foeniculum vulgare

Antioxidant activity of *F. vulgare* was demonstrated by various studies. The fruits have shown antioxidant activity in animal models. In a study investigating antioxidant properties of different parts of *F. vulgare*, the shoots had the highest radical scavenging and lipid peroxidation inhibiting activity. Despite of these positive reports, the results of a study on different fractions of fruit and their major chemical compounds did not show strong antioxidant activities from isolated *F. vulgare* components (77).

Oral administration of a methanol extract of *F. vulgare* fruits exhibited inhibitory effects against acute and subacute inflammatory diseases and showed a central analgesic activity in rat and mice (77).

F. vulgare essential oil possesses a strong antifungal activity against different fungal species (78) and aqueous extract of *F. vulgare* has showed potent antibacterial activity (79).

Cydonia oblonga

Quince is a tree cultivated as a medicinal plant in the Middle East, South Africa, and Central Europe. One study indicates that the mucilage obtained from quince seeds accelerates wound healing in rabbits (80). Polyphenolic compounds of *C. oblonga* were responsible for the antimicrobial effects of this plant (81).

Branca *et al.* reported the antioxidant activities of quince. Evaluation of the antioxidant activity of methanolic extract of *C. oblonga* showed that its peel extract has the highest antioxidant capacity. The half maximal inhibitory concentration (IC₅₀ values) of quince pulp, peel, and jam extracts were correlated with total content of caffeoylquinic acids (82). Essafi-Benkhadir *et al.* reported anti-inflammatory effect of polyphenolic extract of the *C. oblonga* (83).

Anethum graveolens

Many studies were done about *A. graveolens*. In these studies antibacterial, antifungal, and antioxidant activity of *A. graveolens* has been confirmed (84-86).

Ficus carica

Antimicrobial, antioxidant and anti-inflammatory effects of different dosage forms prepared from different parts/extracts of the *F. carica* are well documented (87, 88).

Rosa damascena

In Shohayeb *et al.* study, essential oil and different extracts of petals of the *R. damascena* were evaluated for their antimicrobial activities against three gram-positive and seven gram-negative bacteria, one acid-fast bacterium and three fungi. Rose oil and all tested rose fractions indicated broad spectrum antibacterial activity

against all tested bacteria and fungi (89).

The *R. damascena* similar to many aromatic and medicinal plants exhibits antioxidant properties (41). Hajhashemi *et al.* showed *R. damascena* contains active analgesic ingredients acting both centrally and peripherally. Results of one study showed hydroalcoholic extract of this plant relieved inflammatory pain in an animal model (90).

Crocus sativus (Saffron)

Crocus sativus have many pharmacological properties such as anti-inflammatory, antioxidant, antimicrobial, and wound healing. Extract of pollen of this herb has therapeutic effects on wounds induced by mustard in animals. Chemical constituents of saffron are crocins, crocetin, picrocrocin, β-carotene, and safranal. These compounds have antioxidant activity (91).

Aristolochia longa

Antifungal and antimicrobial effects of this plant have been reported. Aristolochic acids isolated from this plant show antimicrobial activity against some microorganisms (76, 92).

Olea europaea

Anti-inflammatory, antioxidant, and antimicrobial activities of different parts of *O. europaea* have been demonstrated in different studies (93-96).

Pereira *et al.* has reported that low concentrations of olive leaves extract has combined antibacterial and antifungal actions (97). For the first time Koca *et al.* in 2011 reported wound healing activity of the aqueous extract of *O. Europea* leaves. Antioxidant and antimicrobial effects of olive leaves might explain their beneficial effects on wound healing (98).

Conclusion

Overall, we found 31 plants from 21 different families cited in the Iranian Traditional Medicine as therapies for cervicitis. Most of these plants had been shown *in-vitro* and/or *in-vivo* anti-inflammatory, antimicrobial and antioxidant effects (Figure 2).

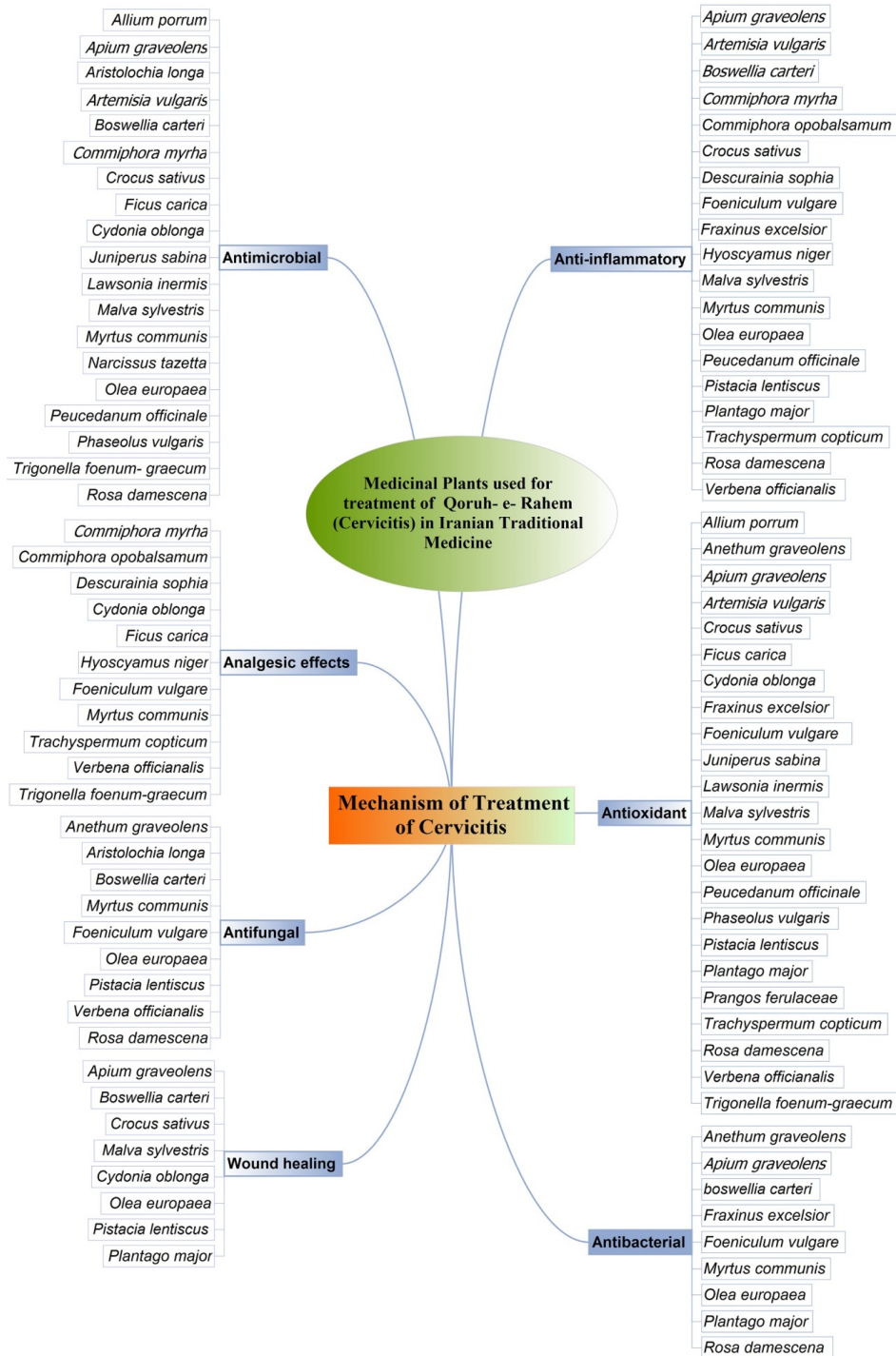


Figure 2. Mechanism of action for medicinal plants used for the treatment of cervicitis.

Treatment with medicinal plants has attracted the attention of scientists and there are throwbacks to the traditional medicine in many countries (111). Medicinal plants used in traditional medicine and ethnopharmacology may be valuable sources for discovering new therapies (112). In Iranian Traditional Medicine manuscripts, various medicinal plants with different pharmacological activities have been introduced. In this article, the medicinal plants claimed to be effective in cervicitis have been collected from Canon of Medicine, Makhzan-Al-advieh, Tohfeh-Al-Momenin, Exire Azam and Sharh-ol-Asbab, Zakhireh Kharazmshahi and their possible efficacy and pharmacodynamics in modern medicine were surveyed. Some of them such as *Cydonia oblonga*, *Olea europaea*, *Ficus carica*, and *Allium porrum* have nutritional value and are routinely used in human diets.

Cervicitis, presenting as inflammation of the uterine cervix, is a syndrome usually caused by infection (113). Oxidative stress, microbial infections, and inflammation are associated with human uterine cervicitis (4, 7, 113). Different mechanisms of action could be considered for these medicinal plants including anti-inflammatory and antimicrobial properties, analgesic, antioxidant activity, and wound healing activities. Finding the medicinal plants effective on cervicitis based on ITM could suggest a better strategy for relieving and management of cervicitis symptoms especially in recurrent or persistent conditions.

It should be contemplated that even though exploring ITM literature may lead to the identification of effective natural medicines for the management of different ailments such as cervicitis; however, confirming clinical trials or supportive high-quality observational studies needs to be accomplished before routine administration of herbal medicines or treatment regimens (Tadabeer) recommended in traditional medicine texts to affirm efficacy and safety of these treatments.

Acknowledgment

The authors wish to thank the Traditional Medicine and Materia Medica Research Center (TMRC), Shahid Beheshti University of Medical

Sciences, Tehran, Iran. We are so very grateful to Esmaeel Nazem, Mohammad Kamalinejad and Sodabeh Bioos.

The article was based on Ph.D. thesis of Traditional Medicine (Razieh Nabimeybodi, 167), granted by School of Traditional Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran (grant number 155 and 157).

References

- (1) Mohite S, Kapoor E and Nagarkar B. Evaluation of efficacy of dashmoolarishta in cervicitis: a proof-of-concept study. *World J. Pharm. Pharm. Sci.* (2014) 3: 1532-26.
- (2) Pollett S, Calderon M, Heitzinger K, Solari V, Montano SM and Zunt J. Prevalence and predictors of cervicitis in female sex workers in Peru: an observational study. *BMC Infect. Dis.* (2013) 13: 195.
- (3) Taylor S. Cervicitis of unknown etiology. *Curr. Infect. Dis. Rep.* (2014) 16: 409.
- (4) Shabnam Z, Hina R, Aysha R and Fahmida K. Effect of Unani Formulation in Cervicitis (Warne-unqurrahm): A Single-blind Randomized Placebo-controlled Trial. *Altern. Integr. Med.* (2016) 5: 213-9.
- (5) Woods JL, Bailey SL, Hensel DJ and Scurlock AM. Cervicitis in Adolescents: Do Clinicians Understand Diagnosis and Treatment? *J. Pediatr. Adolesc. Gynecol.* (2011) 24: 359-64. .
- (6) Marrazzo JM and Martin DH. Management of women with cervicitis. *Clin. Infect. Dis.* (2007) 44 Suppl 3: S102-10.
- (7) Gorgos LM, Sycuro LK, Srinivasan S, Fiedler TL, Morgan MT, Balkus JE, McClelland SR, Fredricks DN and Marrazzo JM. Relationship of specific bacteria in the cervical and vaginal microbiotas with cervicitis. *Sex. Transmitted Dis.* (2015) 42: 475-81.
- (8) Liu C, Zhang Y, Kong S, Tsui I, Yu Y and Han F. Applications and therapeutic actions of complementary and alternative medicine for women with genital infection *Evid. Based Complement Alternat Med.* (2014) 2014: 658624.
- (9) MJ L and P K. Cervicitis: a review. *Curr. Opin. Infect. Dis.* (2008) 21: 49-55.
- (10) Ibn.e.sina HeA. *Al-Qanun fit-teb (The Canon of Medicine)*. Alamle-al-Matbooat institute Beirut (2005) [Arabic].
- (11) Chashti M. *Exir-e Aazam*. Vol. 2,3. Research Institute for Islamic and Complementary Medicine, Tehran (2007) 307- 693 [Persian].
- (12) Jorjani S. Zakhire Kharazmshahi. Jalal al- Din, Qom (2012) 1:654, 2:267-962, 3:56 [Persian].
- (13) Arzani M. *Tibb-e-Akbari*. Jalal al- Din, Qom (2008) 120- 1330 [Persian].
- (14) Heravi M. *Bahroljavaher*. Ehyaye Tebbe Tabie, Qom (2008) 305-6 [Arabic].
- (15) Tonkaboni MH. *Tohfah-ol-Momenin (The Momen's*

- Gift*). , ed. M. ShamsArdakani, R. Rahimi and F. Farjadmand. Vol. 1,2. Tehran Shahid Beheshti University of Medical Sciences, Tehran (2007) 100-830 [Persian].
- (16) AghiliKhorasani M. *Storehouse of Medicaments (Makhzan-ol-Advieh)*. in R. Rahimi, M. ShamsArdakani and F. Farjadmand, Editors. Tehran University of Medical Sciences, Tehran (2009) 80-700 [Persian].
- (17) Kermani Nie. *Sharh-ol-Asbab val Alamat*. Tehran Research Institute for Islamic and Complementary Medicine publication (2008) 23-455 [Arabic].
- (18) Amin G. *The most common medicinal plants of Iran*. 2 ed. Tehran University of Medical sciences and Health Services, Tehran (2005) [Persian].
- (19) Emami A and Ahi A. *Medical Botany*. Iran University of Medical Sciences and Health Services, Tehran (1387).
- (20) Kamalinejad M. *Barge kohan*. chougan, Tehran (2011) 1-120 [Persian].
- (21) Ghahraman A and Okhovvat A. *Matching the old medicinal plant names with scientific terminology*. Tehran University, Tehran (2004) [Persian].
- (22) Tansaz M, Memarzadehzavareh H, Qaraaty M, Eftekhar T, Tabarrai M and Kamalinejad M. Menorrhagia Management in Iranian Traditional Medicine. *J. Evidence-Based Complementary Altern Med.* (2015) 1-6.
- (23) Anoshirvani M and Ghazvini T. Favaed -ol-Ttafie. Almaii, Tehran (2009) 118 [Edited book, Persian].
- (24) Hosseinzadeh H and Younesi HM. Antinociceptive and anti-inflammatory effects of *Crocus sativus* L. stigma and petal extracts in mice. *BMC Pharmacol.* (2002) 2: 7.
- (25) Aleksic V and Knezevic P. Antimicrobial and antioxidative activity of extracts and essential oils of *Myrtus communis* L. *Microbiol. Res.* (2014) 169: 240-54.
- (26) Rossi A, Di Paola R, Mazzon E, Genovese T, Caminiti R, Bramanti P, Pergola C, Koeberle A, Werz O and Sautebin L. Myrtucommulone from *Myrtus communis* exhibits potent anti-inflammatory effectiveness *in-vivo*. *J. Pharmacol. Exp. Ther.* (2009) 329: 76-86.
- (27) Abdollahy F, Ziaei H, Shabankhani B and Azadbakht M. Effect of essential oil and methanolic extract of *Myrtus communis* on *Trichomonas vaginalis*. *Iran. J. Pharm. Res.* (2010) 3: 35.
- (28) Asili J, Emami S, Rahimizadeh M, Fazly-Bazzaz B and Hassanzadeh M. Chemical and antimicrobial studies of *Juniperus sabina* L. and *Juniperus foetidissima* Willd. essential oils. *J. Essent. Oil-Bear. Plants.* (2010) 13: 25-36.
- (29) Emami S, Asili J, Mohagheghi Z and Hassanzadeh M. Antioxidant activity of leaves and fruits of Iranian conifers. *J. Evidence-Based Complementary Altern Med.* (2007) 4: 313-9.
- (30) Sevastre B, Vostinaru O, Mogosan C, Marcus I and Deliu C. Antiinflammatory activity of *Peucedanum officinale* on rats. *Bull. Univ. Agric. Sci. Vet. Med. Cluj. Napoca.* (2008) 64: 295-8.
- (31) Matejic JS, Dzamic AM, Ciric AD, Krivosej Z, Randelović LN and Marin PD. Antioxidant and antimicrobial activities of extracts of four *Peucedanum* L. species. *Dig. J. Nanomater. Biostruct.* (2013) 8: 655-65.
- (32) Al-Salmi AA, Sattar MA, Khan LM and Al-Harathi SE. Comparative study of analgesic and anti-inflammatory effects of *Commiphora opobalsamum* with diclofenac in rodents. *Afr. J. Pharm. Pharmacol.* (2015) 9: 806-17.
- (33) Begum S, Saxena B, Goyal M, Ranjan R, Joshi VB, Rao CV, Krishnamurthy S and Sahai M. Study of anti-inflammatory, analgesic and antipyretic activities of seeds of *Hyoscyamus niger* and isolation of a new coumarinolignan. *Fitoterapia* (2010) 81: 178-84.
- (34) Karabegovic I, Nikolova M, Velickovic D, Stojicevic S, Veljkovic V and Lazić M. Comparison of Antioxidant and Antimicrobial Activities of Methanolic Extracts of the *Artemisia* sp. Recovered by Different Extraction Techniques. *Chin. J. Chem. Eng.* (2011) 19: 504-11.
- (35) Pires JM, Mendes FR, Negri G, Duarte-Almeida JM and Carlini EA. Antinociceptive peripheral effect of *Achillea millefolium* L. and *Artemisia vulgaris* L.: both plants known popularly by brand names of analgesic drugs. *Phytother. Res.* (2009) 23: 212-9.
- (36) Temraz A and El-Tantawy WH. Characterization of Antioxidant Activity of Extract From *Artemisia Vulgaris*. *Pak. J. Pharm. Sci.* (2008) 21: 321- 6.
- (37) Vazirian M, Faridfar S and Eftekhar M. Gharikon/ Agharikon a Valuable Medicinal Mushroom in Iranian Traditional Medicine. *Iran. J. Med. Sci. Supplement* (2016) 41: 34.
- (38) Babu PD and Subhasree R. Antimicrobial activities of *Lawsonia inermis*-a review. *Acad. J. Plant Sci.* (2009) 2: 231-2.
- (39) Hsouna AB, Trigui M, Culioli G, Blache Y and Jaoua S. Antioxidant constituents from *Lawsonia inermis* leaves: Isolation, structure elucidation and antioxidative capacity. *Food Chem.* (2011) 125: 193-200.
- (40) Haouala R, Hawala S, El-Ayeb A, Khanfir R and Boughanmi N. Aqueous and organic extracts of *Trigonella foenum-graecum* L. inhibit the mycelia growth of fungi. *J. Environ. Sci.* (2008) 20: 1453-7.
- (41) Boskabady MH, Shafei MN, Saberi Z and Amini S. Pharmacological effects of *Rosa damascena*. *Iran. J. Basic Med. Sci.* (2011) 14: 295-307.
- (42) Taranalli A and Kuppast I. Study of wound healing activity of seeds of *Trigonella foenum graecum* in rats. *Indian J. Pharm. Sci.* (1996) 58: 117.
- (43) Vyas S, Agrawal RP, Solanki P and Trivedi P. Analgesic and anti-inflammatory activities of *Trigonella foenum-graecum* (seed) extract. *Acta Pol. Pharm.* (2008) 65: 473-6.
- (44) Sharififar F, Khazaeli P, Alli N, Talebian E, Zarehshahi R and Amiri S. Study of antinociceptive and anti-inflammatory activities of certain Iranian medicinal plants. *J. Intercult. Ethnopharmacol.* (2012) 1: 19-24.
- (45) Coruh N, Celep AS and Ozgokçe F. Antioxidant

- properties of *Prangos ferulacea* (L.) Lindl., *Chaerophyllum macropodium* Boiss. and *Heracleum persicum* Desf. from Apiaceae family used as food in Eastern Anatolia and their inhibitory effects on glutathione-S-transferase. *Food Chem.* (2007) 100: 1237-42.
- (46) Goudarzi T, Saharkhiz MJ, and Rowshan V. Ontogenetic variation of essential oil content and constituents in tansy (*Tanacetum vulgare* L.). *Avicenna J. Phytomed.* (2015) 2: 48-53.
- (47) Baananou S, Boufira I, Mahmoud A, Boukef K, Marongiu B and Boughattas NA. Antiulcerogenic and antibacterial activities of *Apium graveolens* essential oil and extract. *Nat. Prod. Res.* (2013) 27: 1075-83.
- (48) Atta A and Alkofahi A. Anti-nociceptive and anti-inflammatory effects of some Jordanian medicinal plant extracts. *J. Ethnopharmacol.* (1998) 60: 117-24.
- (49) Gasparetto JC, Martins CAF, Hayashi SS, Otuky MF and Pontarolo R. Ethnobotanical and scientific aspects of *Malva sylvestris* L.: a millennial herbal medicine. *J. Pharm. Pharmacol.* (2012) 64: 172-89.
- (50) Prudente AS, Loddi AM, Duarte MR, Santos AR, Pochapski MT, Pizzolatti MG, Hayashi SS, Campos FR, Pontarolo R and Santos FA. Pre-clinical anti-inflammatory aspects of a cuisine and medicinal millennial herb: *Malva sylvestris* L. *Food Chem. Toxicol.* (2013) 58: 324-31.
- (51) Nasiri E, Hosseinimehr SJ, Azadbakht M, Akbari J, Enayati-fard R and Azizi S. Effect of *Malva sylvestris* cream on burn injury and wounds in rats. *Avicenna J. Phytomed.* (2015) 5: 341-54.
- (52) Essafi-Benkhadir K, Refai A, Riahi I, Fattouch S, Karoui H and Essafi M. Quince (*Cydonia oblonga* Miller) peel polyphenols modulate LPS-induced inflammation in human THP-1-derived macrophages through NF- κ B, p38MAPK and Akt inhibition. *Biochem. Biophys. Res. Commun.* (2012) 418: 180-5.
- (53) Mnayer D, Fabiano-Tixier A-S, Petitcolas E, Hamieh T, Nehme N, Ferrant C, Fernandez X and Chemat F. Chemical composition, antibacterial and antioxidant activities of six essential oils from the Alliaceae family. *Molecules* (2014) 19: 20034-53.
- (54) Camarda L, Dayton T, Di Stefano V, Pitonzo R and Schillaci D. Chemical composition and antimicrobial activity of some oleogum resin essential oils from *Boswellia* spp.(Burseraceae). *Anal. Chim.* (2007) 97: 837-44.
- (55) Hou Q, He W-J, Chen L, Hao H-J, Liu J-J, Dong L, Tong C, Li M-R, Zhou Z-Z and Han W-D. Effects of the four-herb compound ANBP on wound healing promotion in diabetic mice. *Int. J. Low Extrem. Wounds.* (2015) 14: 335-42.
- (56) Prakash B, Mishra PK, Kedia A and Dubey N. Antifungal, anti aflatoxin and antioxidant potential of chemically characterized *Boswellia carterii* Birdw essential oil and its *in-vivo* practical applicability in preservation of *Piper nigrum* L. fruits. *Lebenson Wiss. Technol.* (2014) 56: 240-7.
- (57) Su S, Hua Y, Wang Y, Gu W, Zhou W, Duan J-a, Jiang H, Chen T and Tang Y. Evaluation of the anti-inflammatory and analgesic properties of individual and combined extracts from *Commiphora myrrha* and *Boswellia carterii*. *J. Ethnopharmacol.* (2012) 139: 649-56.
- (58) Klein-Galczinsky C. Pharmacological and clinical effectiveness of a fixed phytogetic combination trembling poplar (*Populus tremula*), true goldenrod (*Solidago virgaurea*) and ash (*Fraxinus excelsior*) in mild to moderate rheumatic complaints. *Wien Med. Wochenschr.* (1998) 149: 248-53.
- (59) Middleton P, Stewart F, Al-Qahtani S, Egan P, O'Rourke C, Abdulrahman A, Byres M, Middleton M, Kumarasamy Y and Shoeb M. Antioxidant, antibacterial activities and general toxicity of *Alnus glutinosa*, *Fraxinus excelsior* and *Papaver rhoeas*. *Iran. J. Pharm. Res.* (2010) 101-3.
- (60) Stanislavljevic IT, Stojicevic SS, Velickovic DT, Lazić ML and Veljković VB. Screening the antioxidant and antimicrobial properties of the extracts from plantain (*Plantago major* L.) leaves. *Sep. Sci. Technol.* (2008) 43: 3652-62.
- (61) Zubair M, Nybom H, Lindholm C, Brandner JM and Rumpunen K. Promotion of wound healing by *Plantago major* L. leaf extracts—*ex-vivo* experiments confirm experiences from traditional medicine. *Nat. Prod. Res.* (2016) 30: 622-4.
- (62) Cardador-Martínez A, Loarca-Piña G and Oomah BD. Antioxidant Activity in Common Beans (*Phaseolus vulgaris* L.). *J. Agric. Food Chem.* (2002) 50: 6975-80.
- (63) Luna-Vital DA, Mojica L, de Mejía EG, Mendoza S and Loarca-Piña G. Biological potential of protein hydrolysates and peptides from common bean (*Phaseolus vulgaris* L.): A review. *Food Res. Int.* (2015) 76: 39-50.
- (64) Amarowicz R, Dykes GA and Pegg RB. Antibacterial activity of tannin constituents from *Phaseolus vulgaris*, *Fagopyrum esculentum*, *Corylus avellana* and *Juglans nigra*. *Fitoterapia* (2008) 79: 217-9.
- (65) Mahmoudi M, Ebrahimzadeh M, Nabavi S, Hafezi S, Nabavi S and Eslami S. Antiinflammatory and antioxidant activities of gum mastic. *Eur. Rev. Med. Pharmacol. Sci.* (2010) 14: 765-9.
- (66) Djerrou J, Maameri Z, Hamdo-Pacha Y, Serakta M, Riachi F, Djaalab H and Boukeloua A. Effect of virgin fatty oil of *Pistacia lentiscus* on experimental burn wound's healing in rabbits. *Afr. J. Tradit., Complementary Altern. Med.* (2010) 7: 258- 63.
- (67) Paraschos S, Mitakou S and L Skaltsounis A. Chios gum mastic: a review of its biological activities. *Curr. Med. Chem.* (2012) 19: 2292-302.
- (68) Su S-L, Duan J-A, Tang Y-P, Zhang X, Yu L, Jiang F-R, Zhou W, Luo D and Ding A-W. Isolation and biological activities of neomyrrhaol and other terpenes from the resin of *Commiphora myrrha*. *Planta Med.* (2009) 75: 351-5.
- (69) Shen T, Li G-H, Wang X-N and Lou H-X. The genus *Commiphora*: a review of its traditional uses, phytochemistry and pharmacology. *J. Ethnopharmacol.*

- (2012) 142: 319-30.
- (70) Nickavar B and Abolhasani F. Screening of antioxidant properties of seven Umbelliferae fruits from Iran. *Pak. J. Pharm. Sci.* (2009) 22: 30-5.
- (71) Mahboubi M and Kazempour N. Chemical composition and antimicrobial activity of *Satureja hortensis* and *Trachyspermum copticum* essential oil. *Iran. J. Microbiol.* (2011) 3: 194-200.
- (72) Thangam C and Dhananjayan R. Antiinflammatory potential of the seeds of *Carum copticum* Linn. *Indian J. Pharmacol.* (2003) 35: 388-91.
- (73) Çakici I, Ulug HY, Inci S, Tunçtan B, Abacioglu N, Kanzik I and Sener B. Antinociceptive effect of some amaryllidaceae plants in mice. *J. Pharm. Pharmacol.* (1997) 49: 828-30.
- (74) Talib WH and Mahasneh AM. Antimicrobial, cytotoxicity and phytochemical screening of Jordanian plants used in traditional medicine. *Molecules* (2010) 15: 1811-24.
- (75) Casanova E, García-Mina J and Calvo M. Antioxidant and antifungal activity of *Verbena officinalis* L. leaves. *Plant Foods Hum. Nutr.* (2008) 63: 93-7.
- (76) Benarba B and Meddah B. Ethnobotanical study, antifungal activity, phytochemical screening and total phenolic content of *Algerian Aristolochia longa*. *J. Intercult. Ethnopharmacol.* (2014) 3: 150.
- (77) Rahimi R and Ardekani MRS. Medicinal properties of *Foeniculum vulgare* Mill. in traditional Iranian medicine and modern phytotherapy. *Chin. J. Integr. Med.* (2013) 19: 73-9.
- (78) Kaur GJ and Arora DS. Antibacterial and phytochemical screening of *Anethum graveolens*, *Foeniculum vulgare* and *Trachyspermum ammi*. *BMC Complement Altern. Med.* (2009) 9: 30.
- (79) Parejo I, Jauregui O, Sánchez-Rabameda F, Viladomat F, Bastida J and Codina C. Separation and characterization of phenolic compounds in fennel (*Foeniculum vulgare*) using liquid chromatography-negative electrospray ionization tandem mass spectrometry. *J. Agric. Food Chem.* (2004) 52: 3679-87.
- (80) Hemmati AA and Mohammadian F. An investigation into the effects of mucilage of quince seeds on wound healing in rabbit. *J. Herbs. Spices. Med. Plants.* (2000) 7: 41-6.
- (81) Fattouch S, Caboni P, Coroneo V, Tuberoso CI, Angioni A, Dessi S, Marzouki N and Cabras P. Antimicrobial activity of Tunisian quince (*Cydonia oblonga* Miller) pulp and peel polyphenolic extracts. *J. Agric. Food Chem.* (2007) 55: 963-9.
- (82) Silva BM, Andrade PB, Valentão P, Ferreres F, Seabra RM and Ferreira MA. Quince (*Cydonia oblonga* Miller) fruit (pulp, peel and seed) and jam: antioxidant activity. *J. Agric. Food Chem.* (2004) 52: 4705-12.
- (83) Mohamed NH and Mahrous AE. Chemical constituents of *Descurainia sophia* L. and its biological activity. *Rec. Nat. Prod.* (2009) 3: 58-67.
- (84) Naseri M, Mojab F, Khodadoost M, Kamalinejad M, Davati A, Chooapani R, Hasheminejad A, Bararpour Z, Shariatpanahi S and Emtiazzy M. The study of anti-inflammatory activity of oil-based dill (*Anethum graveolens* L.) extract used topically in formalin-induced inflammation male rat paw. *Iran. J. Pharm. Res.* (2012) 11: 1169-74.
- (85) Tian J, Ban X, Zeng H, Huang B, He J and Wang Y. *In-vitro* and *in-vivo* activity of essential oil from dill (*Anethum graveolens* L.) against fungal spoilage of cherry tomatoes. *Food Control.* (2011) 22: 1992-9.
- (86) Shyu Y-S, Lin J-T, Chang Y-T, Chiang C-J and Yang D-J. Evaluation of antioxidant ability of ethanolic extract from dill (*Anethum graveolens* L.) flower. *Food Chem.* (2009) 115: 515-21.
- (87) Joseph B and Raj SJ. Pharmacognostic and phytochemical properties of *Ficus carica* Linn—An overview. *Int. J. Pharmtech. Res.* (2011) 3: 8-12.
- (88) Ali B, Mujeeb M, Aeri V, Mir SR, Faiyazuddin M and Shakeel F. Anti-inflammatory and antioxidant activity of *Ficus carica* Linn. leaves. *Nat. Prod. Res.* (2012) 26: 460-5.
- (89) Sagdiç O, Baydar N and Baydar H. Note: Antioxidant and antibacterial activities of *Rosa damascena* flower extracts. *Food Sci. Technol. Int.* (2004) 10: 277-81.
- (90) Hajhashemi V, Ghannadi A and Hajiloo M. Analgesic and anti-inflammatory effects of *Rosa damascena* hydroalcoholic extract and its essential oil in animal models. *Iran. J. Pharm. Res.* (2010) 163-8.
- (91) Khorasani G, Jalal Hosseinimehr S, Zamani P, Ghasemi M and Ahmadi A. The effect of saffron (*Crocus sativus*) extract for healing of second-degree burn wounds in rats. *Keio J. Med.* (2008) 57: 190-5.
- (92) Hinou J, Demetzos C, Harvala C and Roussakis C. Cytotoxic and antimicrobial principles from the roots of *Aristolochia longa*. *Int. J. Crude Drug Res.* (1990) 28: 149-51.
- (93) Benavente-Garcia O, Castillo J, Lorente J, Ortuno A and Del Rio J. Antioxidant activity of phenolics extracted from *Olea europaea* L. leaves. *Food Chem.* (2000) 68: 457-62.
- (94) Visioli F, Poli A and Gall C. Antioxidant and other biological activities of phenols from olives and olive oil. *Med. Res. Rev.* (2002) 22: 65-75.
- (95) Battinelli L, Daniele C, Cristiani M, Bisignano G, Saija A and Mazzanti G. *In-vitro* antifungal and anti-elastase activity of some aliphatic aldehydes from *Olea europaea* L. fruit. *Phytomedicine* (2006) 13: 558-63.
- (96) Sahranavard S, Kamalinejad M and Faizi M. Evaluation of Anti-Inflammatory and Anti-Nociceptive Effects of Defatted Fruit Extract of *Olea europaea*. *Iran. J. Pharm. Res.* (2014) 13: 119-23.
- (97) Pereira AP, Ferreira IC, Marcelino F, Valentão P, Andrade PB, Seabra R, Estevinho L, Bento A and Pereira JA. Phenolic compounds and antimicrobial activity of olive (*Olea europaea* L. Cv. Cobrançosa) leaves. *Molecules* (2007) 12: 1153-62.
- (98) Koca U, Suntar I, Akkol EK, Yılmaz D and Alper M. Wound repair potential of *Olea europaea* L. leaf extracts revealed by *in-vivo* experimental models and comparative evaluation of the extracts' antioxidant

- activity. *J. Med. Food.* (2011) 14: 140-6.
- (99) Liou J-R, El-Shazly M, Du Y-C, Tseng C-N, Hwang T-L, Chuang Y-L, Hsu Y-M, Hsieh P-W, Wu C-C, Chen S-L, Hou M-F, Chang F-R and Wu Y-C. 1,5-Diphenylpent-3-en-1-ynes and methyl naphthalene carboxylates from *Lawsonia inermis* and their anti-inflammatory activity. *Phytochemistry* (2013) 88: 67- 73.
- (100) Chebbi Mahjoub R, Khemiss M, Dhidah M, Dellaï A, Bouraoui A and Khemiss F. Chloroformic and Methanolic Extracts of *Olea europaea* L. Leaves Present Anti-Inflammatory and Analgesic Activities. *ISRN Pharmacol.* (2011) Article ID 564972: 5.
- (101) Omer S, Adam S and Mohammed O. Antimicrobial activity of *Commiphora myrrha* against some bacteria and *Candida albicans* isolated from gazelles at King Khalid Wildlife Research Centre. *J. Med. Plant.* (2011) 5: 65-71.
- (102) Abbas FA, Al-Massarany SM, Khan S, Al-Howiriny TA, Mossa JS and Abourashed EA. Phytochemical and biological studies on Saudi *Commiphora opobalsamum* L. *Nat. Prod. Res.* (2007) 21: 383-91.
- (103) Sengul M, Yildiz H, Gungor N, Cetin B, Eser Z and Ercisli S. Total phenolic content, antioxidant and antimicrobial activities of some medicinal plants. *Pak. J. Pharm. Sci.* (2009) 22: 102-6.
- (104) Shahidi Bonjar G, Aghighi S and Karimi Nik A. Antibacterial and antifungal survey in plants used in indigenous herbal-medicine of south east regions of Iran. *J. Biol. Sci.* (2004) 4: 405-12.
- (105) Kostova I and Iossifova T. Chemical components of *Fraxinus* species. *Fitoterapia* (2007) 78: 85-106.
- (106) Kadi K, Yahia A, Hamli S, Auidane L, Khabthane H and Ali WK. *In-vitro* antibacterial activity and phytochemical analysis of White Henbane treated by phytohormones. *Pak. J. Biol. Sci.* (2013) 16: 984.
- (107) Shohayeb M, Abdel-Hameed S, Bazaid SA and Maghrabi I. Antibacterial and antifungal activity of *Rosa damascena* MILL. essential oil, different extracts of rose petals. *Global J. Pharmacol.* (2014) 8: 01-7.
- (108) Ud Din Z, Shad AA, Bakht J, Ullah I and Jan S. *In-vitro* antimicrobial, antioxidant activity and phytochemical screening of *Apium graveolens*. *Pak. J. Pharm. Sci.* (2015) 28: 1699-704.
- (109) Mirzaei A, Mohammadi J, Mirzaei N and Mirzaei M. The antioxidant capacities and total phenolic contents of some medicinal plants in Iran. *J. Fasa Univ. Med. Sci.* (2011) 1: 160-7.
- (110) Srinivasan K. Fenugreek (*Trigonella foenum-graecum*): A review of health beneficial physiological effects. *Food Rev. Int.* (2006) 22: 203-24.
- (111) Babaeian M, Naseri M, Kamalinejad M, Ghaffari F, Emadi F, Feizi A, Yekta NH and Adibi P. Herbal Remedies for Functional Dyspepsia and Traditional Iranian Medicine Perspective. *Iran Red. Crescent Med. J.* (2015) 17: e20741.
- (112) Mobli M, Qaraaty M, Amin G, Haririan I, Hajimahmoodi M and Rahimi R. Scientific evaluation of medicinal plants used for the treatment of abnormal uterine bleeding by Avicenna. *Arch. Gynecol. Obstet.* (2015) 291: 21-35.
- (113) Chiou J-F and Hu M-L. Elevated lipid peroxidation and disturbed antioxidant enzyme activities in plasma and erythrocytes of patients with uterine cervicitis and myoma. *Clin. Biochem.* (1999) 32: 189-92.