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Ethnopharmacological survey of medicinal plants used to treat skin diseases among herbal shops in Jahrom, Iran

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Abstract

Ethnopharmacological survey of medicinal plants used to treat skin diseases among herbal shops in Jahrom, Iran.— Among the most common illnesses affecting people's lives are skin disorders, for which a variety of therapeutic approaches has been suggested. Traditional herbal remedies can be counted among the best therapies for such diseases. Herbal shops, or "attaris" (in Persian), play a major role in the traditional therapy of each region. This study investigated the medicinal plants commonly prescribed and traded in herbal shops of Jahrom, Iran, to cure skin diseases. Ethnomedicinal data were collected using the snowball method for 38 plant species belonging to 34 families. A semi-structured questionnaire was used to collect information from herbal shops. Asteraceae, with five species, was the most dominant medicinal family of the prescribed plants, and the fruits, seeds, and leaves of plants are the parts most used. Herbal mask (36%) was the most common mode of herbal drug preparation. The medicinal herbs prescribed by herbal healers are often used for the treatment of acne (36%) as well as for strengthening, clarifying, and giving freshness to the skin (26%). These medicinal plants may be candidates for the development of novel herbal skincare products. The findings of this research revealed that the herbal healers of Jahrom have an outstanding knowledge of traditional treatments for skin diseases.

Key words: acne; Asteraceae; skin disease; traditional herbal medicine.

Resumen

Encuesta etnofarmacológica sobre plantas utilizadas en enfermedades de la piel en herboristerías de Jahrom, Irán.— Entre las enfermedades más comunes que afectan a la vida de las personas se encuentran los trastornos de la piel, para los que se han sugerido diversos enfoques terapéuticos. Los remedios tradicionales a base de plantas pueden contarse entre las mejores terapias para estas enfermedades. Las herboristerías, o "attaris" (en persa), juegan un papel importante en la terapia tradicional de cada región. En este estudio se inventariaron las plantas medicinales comúnmente recetadas y comercializadas en las herboristerías de Jahrom, Irán, para curar enfermedades de la piel. Los datos etnomedicinales se recolectaron mediante el método de bola de nieve para 38 especies de plantas pertenecientes a 34 familias. Se utilizó un cuestionario semiestructurado para recolectar información de las herboristerías. Las *Asteraceae*, con cinco especies, fueron la familia botánica más citada, y los frutos, semillas y hojas de las plantas fueron las partes más utilizadas. La mascarilla a base de plantas (36%) fue la forma más común de preparación. Las plantas medicinales prescritas por los curanderos se utilizan a menudo para el tratamiento del acné (36%), así como para fortalecer, aclarar y dar frescura a la piel (26%). Estas especies pueden ser candidatas para el desarrollo de nuevos productos a base de plantas para el cuidado de la piel. Los resultados de esta investigación revelaron que los curanderos de Jahrom tienen un elevado conocimiento de los tratamientos tradicionales para las enfermedades de la piel.

Palabras clave: acné; *Asteraceae*; enfermedades de la piel; medicina tradicional a base de plantas.

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INTRODUCTION

Skin is a part of the integumentary system of the body and has a total surface area of about two square meters. Being the largest organ of the body, it serves several critical functions such as creating a protective barrier, regulating body temperature, and providing sensation among others (Gebelein, 1997). During an individual's life from infancy to old age, various disorders and diseases may affect the skin. Several factors, including genetics, poor diet, stress, and inner emotions as well as exposure to UV radiation and airborne pollutants, may contribute to the development of skin diseases. It has been estimated that skin diseases account for approximately 34% of all diseases encountered worldwide (Śpiewak, 2000; Abbasi *et al*., 2010). Currently, skin diseases impose major burdens on both developed and developing countries (WHO, 2005; Afsar, 2010).

The search for natural remedies for use in skincare has received a great deal of interest from the scientific community in recent years. According to the World Health Organization (WHO), 80% of the world's population is primarily dependent on indigenous medicine (Robinson & Zhang, 2011). About 33% of all traditional therapies are prescribed for the treatment of dermatological disorders (Annan & Houghton, 2008). Traditional medicinal resources, especially plants, play a major role in the treatment of a variety of dermatological conditions (Saikia *et al*., 2006). Many modern drugs and medicines have originated from ethnic herbal medicine. In recent years, a variety of herbal medicines for the treatment of skin diseases has been marketed globally. Boiron UAS, Cortizone 10®, and Kamillosan® are examples of therapeutic plant products. Other creams, gels, lotions, and ointments are produced from herbal ingredients, including *Aloe vera* (L.) Burm. f. leaf juice, *Boswellia serrata* Roxb. gum, *Zingiber officinale* Roscoe root extract, *Calendula officinalis* L. flower extract, and *Matricaria* L. spp. flower extract. Two creams made with a calendula base are Calendula Burn, applied for minor and moderate burns, and Calendula (*Calendula* L. spp.) and Borage (*Borago officinalis* L.), used to treat eczema. "Cortizone 10®" and "Kamillosan Salbe®" medical ointments are made with *Matricaria chamomilla* L. (Chamomile) extract and are commonly found in markets throughout the world.

Each ethnic culture has a traditional knowledge of plants found in the surrounding environment that are specially used to treat a variety of diseases. Indigenous people of any region, including rural residents, herbal healers, and vendors of medicinal plants, play an important role in collecting ethnobotanical data on medicinal plants. Traditional herbal shops, commonly known as "attaris" in Persian, are deeply involved in the trade and culture of each area and are thus important to ethnopharmacological studies (Mati & De Boer, 2011). Investigating herbal shops and medicinal plant stores can bring to light valuable information about the use of medicinal plants and their natural products for the treatment of various diseases. Ethnobotanical surveys on herbal shops have already been conducted in some parts of the world, including Iraq, West Africa, and Bolivia (Macía *et al*., 2005; Mati & De Boer, 2011; Quiroz *et al*., 2014).

Iran's unique plant diversity makes it one of the world's top ten centers of plant speciation (Noroozi *et al*., 2019). The exceptional plant diversity found in Iran has given rise to differing plant-based traditional remedies across the country. Indigenous people from different parts of Iran use a variety of plant species for the traditional treatment of diseases (Ghorbani, 2005; Khajoei Nasab & Khosravi, 2014). Although different ethnobotanical surveys have documented medicinal plants from several regions of Iran, no systematic investigation has been conducted on the ethnopharmacological application of medicinal plants used to treat skin diseases in the southeast of Iran. Despite the existence of numerous herbal shops in every region of the country, only a few ethnobotanical studies have been conducted in Iran with a particular emphasis on herbal shops (Amiri & Joharchi, 2013). The current research is the first to study the traditional treatment of skin diseases using plants available in herbal shops in southeastern Iran. The region is rich in plant diversity

and has an abundance of medicinal plants; thus, indigenous people of this region have developed a substantial ethno-medical tradition. The aim of the present study was to investigate the plants and plant-based products prescribed and supplied by local herbal healers in Jahrom for the treatment of different skin conditions. Herein we report the ethnobotany of medicinal plants claimed to be effective in treating skin diseases.

MATERIALS AND METHODS

Study area

Jahrom is located 170 kilometers southeast of Shiraz, the capital of Fars Province, Iran. It is the largest city in the southern half of the province. The study area is located at 28° 30′ 00″ N and 53° 33′ 38″ E (Fig. 1). With

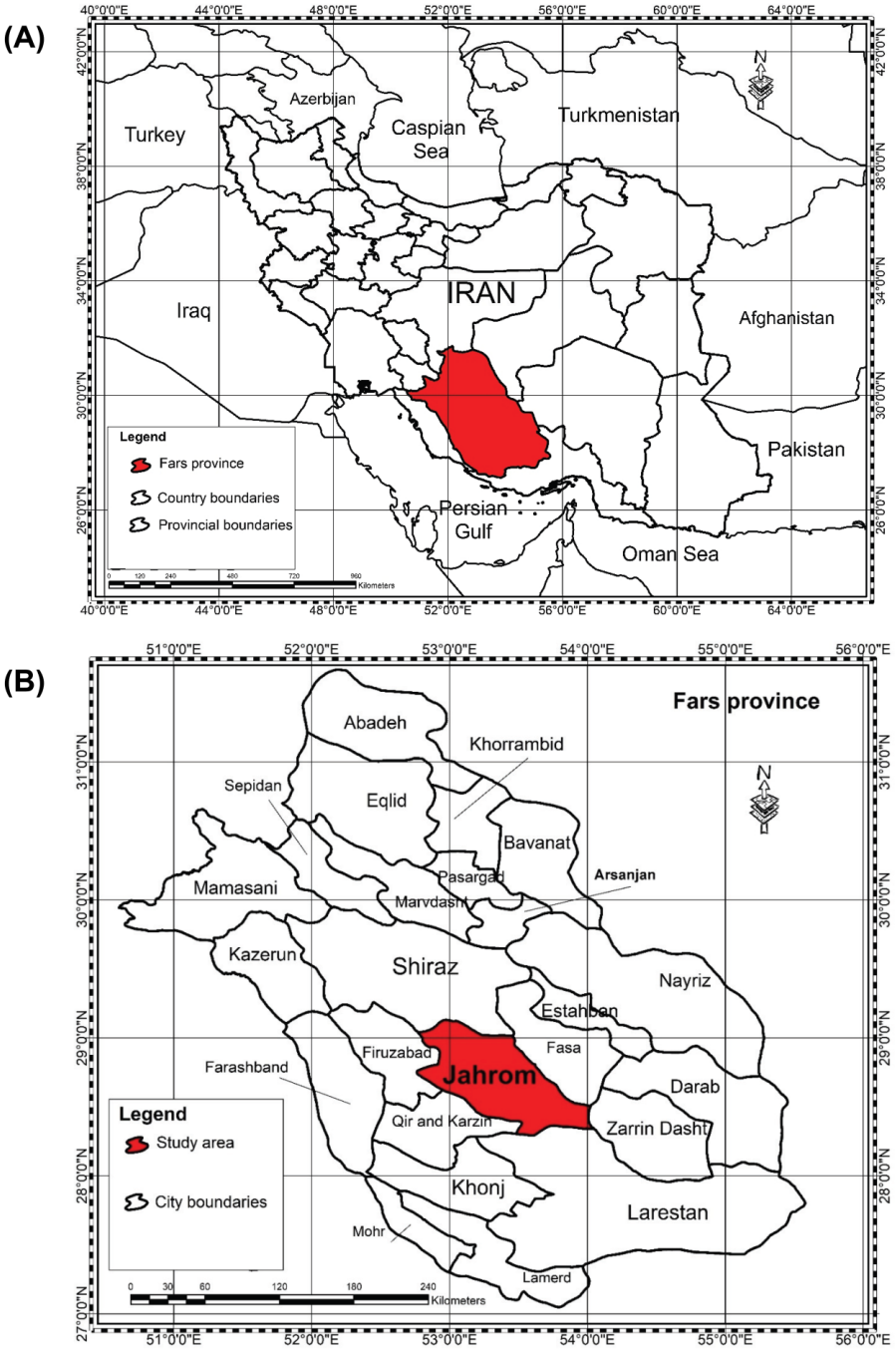

Figure 1. (A), map of Iran showing Fars Province; (B), Jahrom district.

a population of 14,130 inhabitants, Jahrom covers 5498 km^2 and is at an average altitude of 1050 m above sea level. A hot and arid climate with an average temperature around 19.5°C is dominant in this city. January (average temperature = 2°C) and July (average temperature = 40.5°C) are the coldest and hottest months of the year, respectively (Ghanbarian *et al.*, 2011). Average annual rainfall measures about 200–500 mm. Calcareous, clay, and gypsum are the main soil types, and Jahrom's vegetation is classified as woodland, scrubland, and subtropical annual grassland in 1,393,693 ha. Date palms, citrus, and many tropical and sub-tropical plants are grown in Jahrom, and the city's economy is based mainly on agriculture and horticulture.

Collecting ethnopharmacological data

An ethnopharmacological survey of herbal shops in Jahrom city was conducted using the snowball method (Espinosa *et al*., 2014). A total of 21 herbal shops are located in the city, of which 16 agreed to cooperate in the current study. The aims of the present study were described to the participating herbal healers, and consent to participate was obtained from each of them according to the code of ethics of the International Society of Ethnobiology (ISE) (Hardison & Bannister, 2011). Semi-structured questionnaires were applied to systematically collect data on the treatment of skin diseases using herbal medicines (Appendix 1). Interviews were conducted in Persian with the herbal healers in their shops and included questions regarding their knowledge of various skin diseases, demographic characteristics (name, age, sex, years of experience, education), and data on medicinal plants (local names of plants, parts of plants used, methods of preparation and application of drugs). Plant specimens were identified using *Flora of Iran* (Assadi, 1988–2015) and *Flora Iranica* (Rechinger, 1965–2016), and vouchers were deposited in the herbarium of Shahid Beheshti University (HSBU).

RESULTS AND DISCUSSION

Demographic information of herbal healers

Approximately 87% of participants in this study were men; only two participants (about 13%) were women. The age of herbal healers ranged between 24–55 years with an average of 38 years. The highest level of education was a high school diploma (56%). None of the participants had an academic education in a field related to herbal medicine. Most of their knowledge had been obtained only through experience or from the legacy of past generations (68%). Only 32% of participants used traditional medicine books in addition to personal experience.

Ethnomedicinal data

A total of 38 species belonging to 34 genera and 23 families of medicinal plants were obtained in this study (Fig. 2; Table 1). Asteraceae (5), Fabaceae

Figure 2. Some medicinal plants prescribed in skin disease by attars of Jahrom.

(3), and Malvaceae (3) were the most frequently used plant families, respectively (Fig. 3). Asteraceae with 23,600 species is one of the largest families of flowering plants, and most of the medicinal plants reported in many ethnopharmacological studies worldwide belong to this family (Ghorbani, 2005; Leitão *et al.*, 2013). More than 50% of all species are annual herbs (Fig. 4), and 79% of them are native to Iran. The most used parts of plants for treating skin diseases were the fruits, seeds, and leaves (Fig. 5). Herbal mask (36%) was the most common mode of herbal drug preparation (Fig. 6). The use of an herbal mask is a simple and safe method with low complications. Because of the dust and toxic particles suspended in the air of Iran resulting from industrial pollution, exhaust fumes from automobiles, advancing deserts, and forest fires, using an herbal mask can help significantly reduce dermal complications resulting from air-borne pollutants. Medicinal herbs prescribed by herbal healers are often used for the treatment of acne (36%) as well as strengthening, clarifying, and adding freshness to the skin (26%) (Fig. 7). Acne is the 8th most common disease around the world affecting many people in their

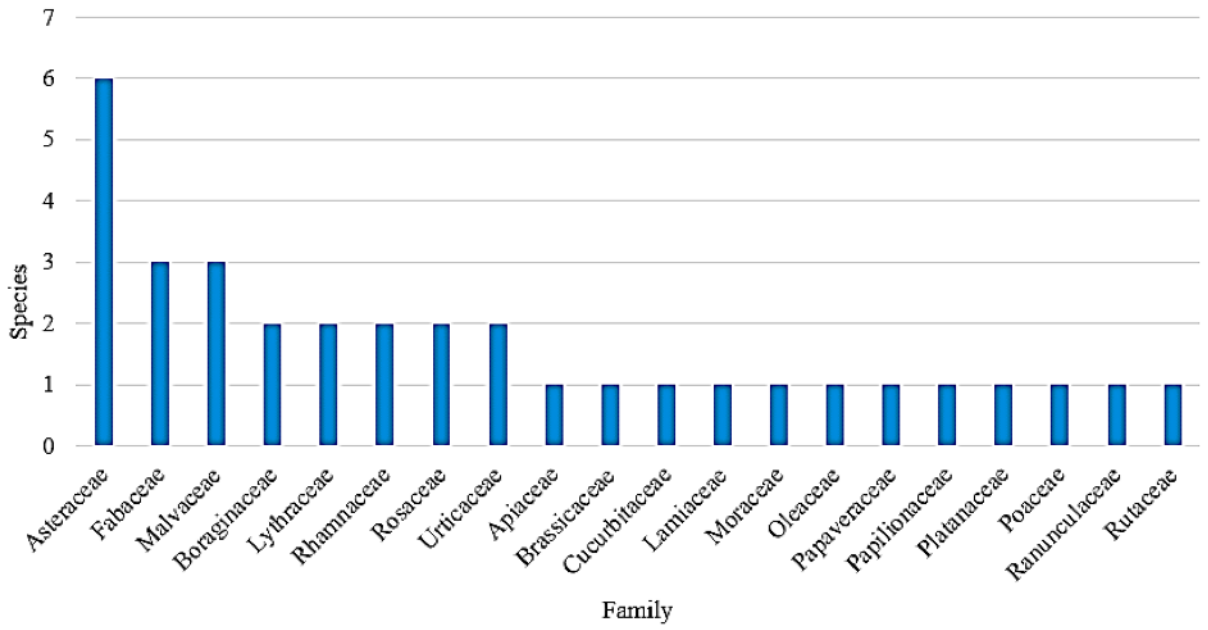

Figure 3. Medicinal plant families used for skin diseases in Jahrom region, Fars province.

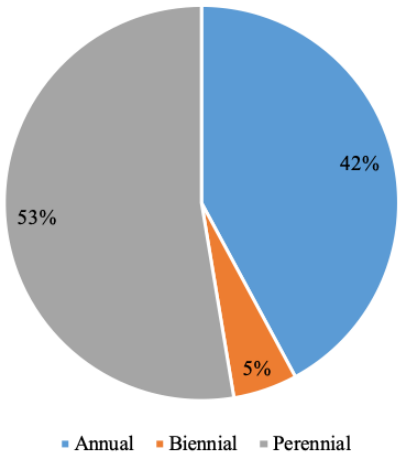

Figure 4. Percentage of biological forms of plants use for skin diseases in Jahrom region, Fars province.

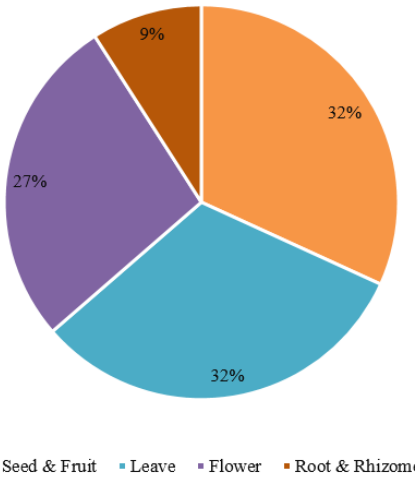

Figure 5. Plant part use of plants use for skin diseases in Jahrom region, Fars province.

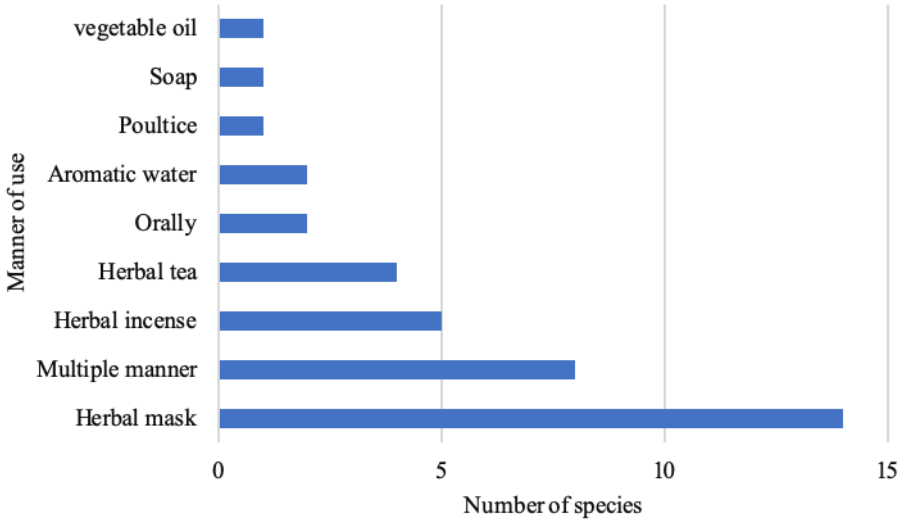

Figure 6. Number of plant species in each medicinal manner of use for skin diseases in Jahrom region, Fars province.

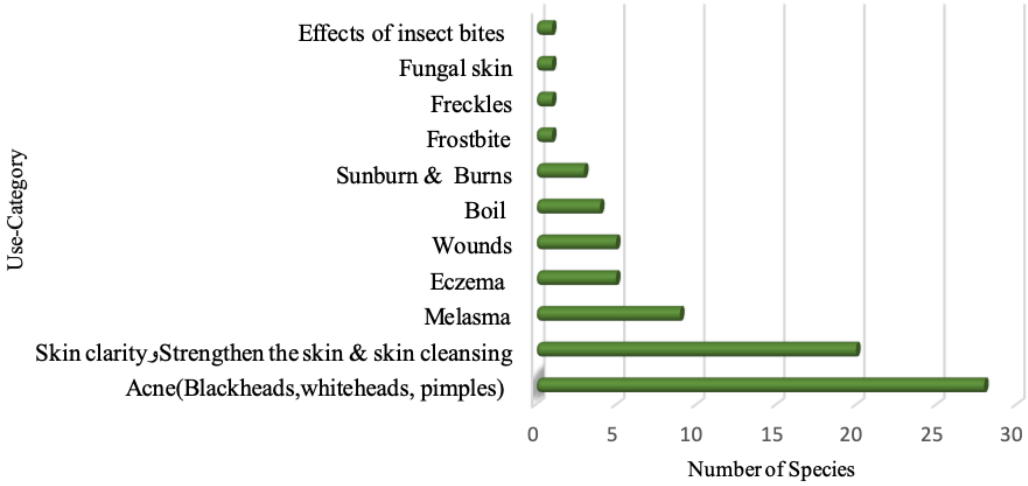

Figure 7. Number of species in each medicinal use category of plants use for skin diseases in Jahrom region, Fars province.

lifetimes (Tan & Bhate, 2015). Poor diet, hormonal changes, genetic factors, and inadequate cleansing of the skin are factors in acne. Considering the profusion of acne cases among the world's population, the utilization of herbal medicine is a cheap but effective method to treat this condition, especially in developing countries.

Phytochemicals of collected plants effective on the skin

Phytochemicals are chemical compounds found naturally in plants. Each plant species contains a variety of chemical compounds which, in most cases, are unique to the species. These compounds are produced and stored in different parts of the plant and can be used as pharmaceutical raw materials. Antioxidant, anticancer, and antimicrobial activities, stimulating the immune system, and affecting hormone metabolism are among some of the known properties of secondary plant compounds, which make phytochemicals suitable for preventing or treating a diverse range of diseases. Alkaloids, terpenoids, fatty acids, phenolic compounds are among the most important phytochemicals existing in medicinal plants. Interestingly, many phytochemicals which are known to contribute to the treatment of dermatological diseases and skincare were found in the plants collected in the current study (Table 1).

Table 1. Medicinal plants prescribed in skin disease by herbal healers of Jahrom region, Fars province.

Family	Scientific name	Vernacular name (in Persian)	Application	Preparation	Parts used	Voucher number	Phytochemicals
Apiaceae	*Foeniculum vulgare* Mill.	Razianeh (رازیانه)	Strengthen the skin, cleanser	Herbal incense	Fruit	HSBU-201513	**Limonene** (Gruenwald *et al*., 2000); **saponins, saccharides, flavonoids** (Kole *et al*., 2005)
Asteraceae	*Calendula officinalis* L.	Hamishe Bahar (همیشه بهار)	Treatment of eczema rashes, healing the wounds superficial skin, burns, frostbite	Poultice (fresh marigold extract mixed with oil)	Flower	HSBU-201514	**Flavonoids, saponins, carotenoids** (Fotouhi *et al*., 2007; Ghahramani Dehbokri *et al*., 2010; Eslami *et al*., 2011; Ameri *et al*., 2012; Nasiri *et al*., 2013); **mucilage** (Fotouhi *et al*., 2007; Ghahramani Dehbokri *et al*., 2010; Ameri *et al*., 2012); **calendulin** (Ghahramani Dehbokri *et al*., 2010; Eslami *et al*., 2011; Ameri *et al*., 2012); **triterpenoids** (Bedi & Shenefelt, 2002; Nasiri *et al*., 2013); **sterols** (Ameri *et al*., 2012; Ghahramani Dehbokri *et al*., 2010); **tannins** (Ghahramani Dehbokri *et al*., 2010; Eslami *et al*., 2011); **vitamin E** (Ameri *et al*., 2012); **esterase**, **antioxidant** (Nasiri *et al*., 2013)
Asteraceae	*Cichorium intybus* L.	Kasni (کاسنی)	Treatment of pimples and melasma caused by liver disease	Aromatic water, orally (the raw leaf)	Leaf	HSBU-201515	**Inoline** (Nasiri *et al*., 2013); **essential oil**, **mucilage**, **tannins**, **minerals**, **manganese**, **magnesium**, **alkaloids**, **carvacrol** (Hassani Moghadam *et al*., 2010); **sesquiterpenes**, **flavonoid**, **lactones**, **cinnamic acid** (Gruenwald *et al*., 2000); **sesquiterpenes**, **lactones** (Kole *et al*., 2005)
Asteraceae	*Matricaria aurea* (Loefl.) Sch. Bip.	Babooneh (بابونه)	Eczema and acne treatment, anti-swelling and redness of the skin, wound healing, Strengthens the skin, Constrictor skin pores, melasma, removing the boil	Herbal incense	The aerial parts of the plant	HSBU-201516	**Chamazulene** (Kraft, 2007; Maleki *et al*., 2007); **inositol**, **flavonoids** (Maleki *et al*., 2007); **saponins**, **bisabolol** (Kraft, 2007)
Asteraceae	*Matricaria chamomilla* L.	Babooneh (بابونه)	Eczema and acne treatment, anti-swelling and redness of the skin, wound healing, Strengthens the skin, Constrictor skin pores, melasma, removing the boil	Herbal incense, herbal mask (wheat flour & *Matricaria chamomilla*: treatment of boils)	Flower	HSBU-201517	**Flavonoids**, **bisabolol** (Wagner *et al*., 1986; Safahyi *et al*., 1994; Bedi & Shenefelt, 2002; Ghassemi Dehkordi *et al*., 2007; Maleki *et al*., 2007); **chamazulene** (Wagner *et al*., 1986; Safahyi *et al*., 1994; Bedi & Shenefelt, 2002; Maleki *et al*., 2007); **sesquiterpene alcohol** (Bedi & Shenefelt, 2002); **inositol**, **tannins** (Maleki *et al*., 2007); **apigenin glycosides** (Wagner *et al*., 1986; Safahyi *et al*., 1994); **choline** (Kole *et al*., 2005)
Asteraceae	*Silybum marianum* (L.) Gaertn.	Khar-e Maryam (خارمریم)	Improvements and fixes of pimples, boils and wounds	Orally, herbal mask	Fruit	HSBU-201518	**Silymarin** (Yaghmaei *et al*., 2011; Madani *et al*., 2007; Bedi & Shenefelt, 2002); **sterols**, **fumaric acid**, **flavonoids** (Gruenwald *et al*., 2000)

Table 1. Medicinal plants prescribed in skin disease by herbal healers of Jahrom region, Fars province. (cont.)

Family	Scientific name	Vernacular name (in Persian)	Application	Preparation	Parts used	Voucher number	Phytochemicals
Boraginaceae	*Borago officinalis* L.	Gol-e Gavzaban (گل گاوزبان)	Fixes the acne caused by stress	Herbal tea	Flower	HSBU-201519	**Mucilage**, **tannins** (Gruenwald *et al*., 2000; Farhadi *et al*., 2012;); **saponins**, **essential oil**, **alkaloid** (**pyrrolizidine**), **vitamin C**, **calcium**, **potassium**, **essential fatty acids** (**gamma linolenic acids**, **linoleic acids**), **phenolic compounds** (Farhadi *et al*., 2012)
Boraginaceae	*Echium amoenum* Fisch. & C. A. Mey.	Gol-e Gavzaban (گل گاوزبان)	Fixes the acne caused by stress	Herbal tea	Flower	HSBU-201520	**Flavonoid**, **alkaloids** (Ghassemi *et al*., 2003; Ranjbar *et al*., 2006); **rosmarinic acid**, **saponins**, **terpenoids**, **gamma-linolenic acid** (Ranjbar *et al*., 2006); **anthocyanidins** (Ghassemi *et al*., 2003); **rosmarinic acid**, **palmitic acid**, **flavonoid**, **oleic acid**, **linolenic acid** (Mojab *et al*., 2009)
Brassicaceae	*Descurainia sophia* (L.) Webb ex Prantl	Khakshir (خاکشیر)	Strengthen the skin	Orally, herbal mask	Seed	HSBU-201521	**Oleic acid**, **linoleic acid**, **glycosides**, **flavonoids**, **phenols**, **zinc**, **manganese**, **copper**, **mucilage**, **monoterpenes**, **cis-β-ocimene**, **volatile oils** (Nimrouzi & Zarshenas, 2016)
Cucurbitaceae	*Cucumis sativus* L.	Khiyar (خیار)	Acne fixes, sunburn cure, skin refreshing	Herbal mask	Fruit	HSBU-201522	**Antioxidant**, **superoxide dismutase** (Kim *et al*., 1998); **flavonoid**, **catechin** (Budhiraja *et al*., 2014); **cucurbitacins** (Kole *et al*., 2005)
Fabaceae	*Glycyrrhiza glabra* L.	Shirin Bayan, Mahk (شیرین بیان، مهک)	Acne fixes, strengthens the skin, skin refreshing	Herbal mask	Rhizome	HSBU-201523	**Flavonoids** (Marzi *et al*., 1993; Nezamabadi *et al*., 2006; Matoorian pour *et al*., 2010); **glycyrrhizin**, **resin** (Marzi *et al*., 1993; Kole *et al*., 2005; Nezamabadi *et al*., 2006; Matoorian pour *et al*., 2010); **sterols**, **amino acids**, **triterpenoids**, **resin**, **essential oil** (Marzi *et al*., 1993; Nezamabadi *et al*., 2006); **saponins**, **antioxidant** (Marzi *et al*., 1993; Nezamabadi *et al*. 2006; Hojjati Bonab & Nikkhah, 2012); **glabridin** (Matoorian pour *et al*., 2010); **glycyrrhetinic acid** (Kole *et al*., 2005)
Fabaceae	*Trigonella foenum-graecum* L.	Shanbalileh (شنبلیله)	Fungal skin therapy, strengthen the skin, healing the wounds, abrasions, sunburn and burns	Herbal mask (fenugreek seed powder with milk or yoghurt)	Seed	HSBU-201524	**Mucilage** (Gruenwald *et al*., 2000; Bedi & Shenefelt, 2002; Muhammed & Salih, 2012); **flavonoids** (Gruenwald *et al*., 2000; Muhammed & Salih, 2012); **proteins**, **proteinase inhibitors**, **steroid**, **saponins**, **sterols** (Gruenwald *et al*., 2000); **vitamin E**, **vitamin A**, **vitamin B1** and **vitamin C**, **polysaccharide**, **galactomannan**, **saponins**, **amino acids**, **alkaloids**, **4-hydroxyisoleucine**, **fatty acids**, **triterpenoids**, **antioxidants** (Muhammed & Salih, 2012)
Fabaceae	*Senna alexandrina* Mill.	Barg-e Sana (برگ سنا)	Treatment of blackheads, pimples and skin rashes	Herbal incense	Leaf	-	**Coumarin**, **carotenoids**, **tannins**, **mucilage**, **sterols**, **triterpenoids**, **flavonoids**, **saponins** (Parizan *et al*., 2011); **antioxidant** (Hojjati Bonab & Nikkhah, 2012)

Table 1. Medicinal plants prescribed in skin disease by herbal healers of Jahrom region, Fars province. (cont.)

Family	Scientific name	Vernacular name (in Persian)	Application	Preparation	Parts used	Voucher number	Phytochemicals
Lamiaceae	*Zataria multiflora* Boiss.	Abshen (آبشن)	Elimination of the effects of insect bites on the skin, skin refreshing	Herbal incense	Leaf and flower	HSBU-201526	**Thymol** (Moghimipour *et al*., 2007; Khanavi *et al*., 2010; Nasiri *et al*., 2013; Najafpour Navaei & Mirza, 2015); **flavonoids** (Jaffary *et al*., 2000; Khanavi *et al*., 2010); **triterpenoids** (Khanavi *et al*., 2010); Nasiri *et al*., 2013); **rosmarinic acid** (Jaffary *et al*., 2000; Hasanpour *et al*., 2007; Khanavi *et al*., 2010(; **carvacrol** (Moghimipour *et al*., 2007; Khanavi *et al*., 2010; Najafpour Navaei & Mirza, 2015); **sesquiterpenes** (Jaffary *et al*., 2000; Khanavi *et al*., 2010); **limonene** (Najafpour Navaei & Mirza, 2015); **triterpenoids** (Khanavi *et al*., 2010); **essential oil**, **tannins**, **resin**, **saponins**, **sterols**, **steroids**, **carotenoids**, **tannins** (Jaffary *et al*., 2000)
Lythraceae	*Punica granatum* L.	Golnar (گلنار)	Fixes acne and freckles	Herbal mask	Flower	HSBU-201527	**Flavonoids** (Mazandarani *et al*., 2010; Emamyan *et al*., 2012); **ellagic acid**, **anthocyanin** (Mazandarani *et al*., 2010); **luteolin**, **pronthocyanin** (Mazandarani *et al*., 2010; Emamyan *et al*., 2012); **folic acid**, **vitamin B1**, **vitamin B2** and **vitamin C**, **alkaloids**, **tannins**, **ellagitannin** (Emamyan *et al*., 2012); **citric acid**, **sorbitol**, **mannitol**, **pelletierine**, **isoquercetrin**, **sitosterol**, **eriedelin**, **D-mannitol**, **estrone**, **glucose**, **fructose**, **sucrose**, **maltose**, **oxalic acid**, **organic acid** (Abbasi *et al*., 2010); **tannins**, **piperidine alkaloids** (Gruenwald *et al*., 2000)
Lythraceae	*Lawsonia inermis* L.	Hana (حنا)	Acne fixes	Herbal mask (*Fumaria* spp. powder mixed with henna)	Leaf	HSBU-201528	**Lawsone** (Babaei-ravandi *et al*., 2006; Maleki *et al*., 2007; Hojjati Bonab & Nikkhah, 2010; Shiravi *et al*., 2011); **tannins** (Gruenwald *et al*., 2000; Maleki *et al*., 2007; Hojjati Bonab & Nikkhah, 2010; Shiravi *et al*., 2011); **vitamin A**, **vitamin B** and **vitamin C**, **polysaccharide** (Maleki *et al*., 2007); **xanthin**, **flavonoids**, **resin**, **alkaloids** (Babaei-ravandi *et al*., 2006; Hojjati Bonab & Nikkhah, 2010); **terpinene**, **resin** (**xanthone**), **alkaloids** (Shiravi *et al*., 2011); **hanno-tannic acid**, **glucoside** (Kole *et al*., 2005)
Malvaceae	*Alcea rosea* L.	Khatmi-e Sefid (ختمی سفید)	Skin refreshing, eliminating acne and boils	Herbal incense	Flower and fruit	HSBU-201529	**Mucilage** (Gruenwald *et al*., 2000; Bedi & Shenefelt, 2002); **mucilage**, **proteins**, **alkaloids**, **flavonoids**, **minerals**, **carbohydrates**, **glycosides**, **amino acids**, **n-hexane** (Blumenthal *et al*., 2000; Fahamiya, 2011)

Table 1. Medicinal plants prescribed in skin disease by herbal healers of Jahrom region, Fars province. (cont.)

Family	Scientific name	Vernacular name (in Persian)	Application	Preparation	Parts used	Voucher number	Phytochemicals
Malvaceae	*Malva neglecta* Wallr.	Panirak (پنیرک)	Acne fixes	Herbal incense, orally	Leaf, Fruit	HSBU-201530	**Mucilage** (Bedi & Shenefelt, 2002); **flavonoid**, **mucilage**, **amyrin**, **sitosterol**, **linoleic acid**, **linolenic acid**, **palmitic acid**, **arachidonic acid**, **oleic acid** (Abdel-Ghani *et al*., 2013)
Malvaceae	*Malva sylvestris* L.	Khatmi,Gol-e Panirak (ختمی، گل پنیرک)	Acne fixes, skin clarity	Herbal incense, orally	Flower	HSBU-201531	**Mucilage** (Gruenwald *et al*., 2000; Bedi & Shenefelt, 2002; Taha Nejad *et al.*, 2012); **flavonoids**, **tannins** (Gruenwald *et al*., 2000); **monoterpenes**, **mucilage**, **anthocyanin** (Nasiri *et al*., 2013); **vitamins A**, **B**, **C**, **antioxidants**, **anthocyanin**, **flavonoids**, **beta-carotene**, **lycopene** (Taha Nejad *et al*., 2012)
Moraceae	*Ficus carica* L.	Anjir (انجیر)	Acne fixes, skin clarity	Soap (*Matricaria* spp. & figs & oil snail)	Fruit	HSBU-201532	**Flavonoids** (Fatemi *et al*., 2008; Emamyan *et al*., 2012); **vitamins**, **antioxidant**, **carotene**, **lack of saponins** (Emamyan *et al*., 2012); **tannins** (Fatemi *et al*., 2008); **fucoidin** (Abbasi *et al.*, 2010); **citric acid**, **malic acid**, **mucilage**, **vitamin B** and **vitamin C** (Gruenwald *et al*., 2000)
Oleaceae	*Olea europaea* L.	Zeytoon (زیتون)	Treatment of melasma	Herbal mask (olive oil, egg yolk)	Fruit	HSBU-201533	**Vitamin E** and **vitamin A**, **antioxidant** (Sumiyoshi & Kimura, 2010); **triterpenoids** (Nasiri *et al*., 2013); **carotenoids**, **tocopherols**, **flavonoids**, **coumarins**, **tannins**, **vitamin E** (Emamyan *et al*., 2012); **tannins**, **wax**, **esterase** (Jaimand *et al*., 2009); **fatty acids**, **triglycerides**, **tocopherols**, **squalene**, **carotenoids**, **sterols**, **polyphenols**, **chlorophylls**, **volatile** and **flavour compounds, flavonoids**, **steroids** (Gruenwald *et al*., 2000)
Papaveraceae	*Fumaria parviflora* Lam.	Shahtareh (شاهتره)	Treatment of melasma and acne	Orally, aromatic water, powder	The aerial parts of the plant	HSBU-201534	**Flavonoids** (Gruenwald *et al*., 2000; Khalighi Sigaroodi *et al*., 2005; Madani *et al*., 2007; Abbasi *et al*., 2010); **alkaloid** (Madani *et al*., 2007; Khalighi Sigaroodi *et al*., 2005; Gruenwald *et al*., 2000); **citric acid**, **malic acid**, **fumaric acid**, **caffeic acid** (Madani *et al*., 2007; Khalighi Sigaroodi *et al*., 2005); **fumaric acid**, **fumarine** (Abbasi *et al*., 2010); **isoquinoline** (Gruenwald *et al*., 2000)
Papilionaceae	*Alhagi persarum* Boiss. & Buhse	Toranjabin (ترنجبین)	Strengthen the skin	Orally	The aerial parts of the plant	HSBU-201535	**Tannin**, **alkaloids** (Ramezany *et al*., 2013; Al-Snafi, 2015); **flavonoids**, **fatty acids**, **sterols**, **steroids**, **resins**, **vitamins**, **carbohydrates**, **triterpenes** (Al-Snafi, 2015); **mucilage**, **oxalic acid**, **Ca**, **Fe**, **Al**, **P**, **Cl**, **Si** (Ramezany *et al*., 2013)
Platanaceae	*Platanus orientalis* L.	Chenar (چنار)	Treatment of melasma and acne	Aromatic water	Leaf	HSBU-201536	**Tannins**, **flavonoids** (Nasiri *et al*., 2013); **flavonoids**, **pentacyclic triterpenoids**, **tannins**, **lack of alkaloids** (Hajhashemi & Mousavi, 2011)

Table 1. Medicinal plants prescribed in skin disease by herbal healers of Jahrom region, Fars province. (cont.)

Family	Scientific name	Vernacular name (in Persian)	Application	Preparation	Parts used	Voucher number	Phytochemicals
Poaceae	*Triticum aestivum* L.	Javaneh gandom (جوانه گندم)	Treatment of acne, skin clarity	Herbal mask	Seed, root and radicle	HSBU-201536	**Vitamin A** and **vitamin E**, **antioxidant**, **carotene A** (Kapoor & Saraf, 2010); **mucilage**, **soluble silicic acid** (Gruenwald *et al*., 2000); **vitamin E**, **glaiadin** and **glutenin** (Kole *et al*., 2005)
Polygonaceae	*Rheum ribes* L.	Rivas (ریواس)	Treatment of blackheads	Herbal mask (rhubarb extract & honey)	Flower and stem	HSBU-201537	**Flavonoids**, **vitamin A**, **vitamin B**, and **vitamin C**, **chrysophanol**, **physcion**, **rhein**, **aloe-emodin**, **physcion-8-O-glucoside**, **aloe-emodin-8-O-glucoside**, **sennoside A** and **rhaponticin** (Sayyah *et al*., 2009)
Ranunculaceae	*Nigella sativa* L.	Siyah daneh (سیاهدانه)	Treatment of blackheads, skin clarity	Herbal mask (*N. sativa* & vinegar)	Seed	HSBU-201538	**Amino acids**, **mucilage**, **alkaloids** (e.g. **nigellicine**), **organic acids**, **tannins**, **resins**, **saponins**, **minerals**, **ascorbic acid**, **folic acid**, **fatty acids** (e.g. **oleic acid** and **linoleic acid**), **terpenoids**, **volatile oil**, **thymol**, **thymoquinone** (Atta-ur-Rahman *et al*., 1985, 1992, 1995; Menounos *et al*., 1986; Duke, 1992; Al-Gaby, 1998; Takruri & Dameh, 1998; Ramadan & Moersel, 2003)
Rhamnaceae	*Ziziphus spina-christi* (L.) Willd.	Sedr (سدر)	Treatment of acne	Herbal mask (leaf powder of *Z. spina-christi* & lemon juice)	Leaf	HSBU-201539	**Flavonoids**, **comphen** (Maleki *et al*., 2007); **saponins** (Nasiri *et al*., 2013); **flavonoids**, **saponins**, **fatty acid**, **mineral**, **vitamins**, **iron**, **sodium**, **zinc** and **copper**, **alkaloids**, **triterpenoids**, **tannins**, **polysaccharides** (Ahmad Kaleem *et al*., 2014)
Rhamnaceae	*Ziziphus jujuba* Mill.	Annab (عناب)	Treatment of acne	Orally	Fruit	HSBU-201540	**Saponins** (Nasiri *et al*., 2013); **flavonoids**, **alkaloids**, **triterpenoids**, **saponins**, **tannins**, **vitamin C** (Han *et al*., 1989; Salehi Surmaghi, 2010; Ahmad Kaleem *et al*., 2014); **fatty acid**, **mineral**, **polysaccharides** (Ahmad Kaleem *et al*., 2014); **triterpenes**, **mucilage**, **proteins** (Salehi Surmaghi, 2010; Han *et al*., 1989)
Rosaceae	*Prunus dulcis* (Mill.) D. A. Webb	Badam (بادام)	Treatment of blackheads, skin clarity	Herbal mask (bitter almond oil & lemon juice & *Matricaria* spp.), almond oil	Seed	HSBU-201541	**Oleic acid**, **linoleic acid**, **mucilage** (Gruenwald *et al*., 2000)
Rosaceae	*Rosa ×damascena* Herrm.	Gol-e Sorkh (گل سرخ)	Skin clarity	Vegetable oil	Flower	HSBU-201542	**Terpenes**, **glycosides**, **flavonoids**, **anthocyanin**, **vitamin C**, **tannins**, **fatty oil** and **organic acids**, **phenolic compounds**, **essential oil**, **l-ascorbic acid**, **quercetin-3-O-glucoside**, **kaempferol-3-O-rhamnoside**, **kaempferol- 3-O-arabinoside** (Boskabady *et al*., 2011)

Table 1. Medicinal plants prescribed in skin disease by herbal healers of Jahrom region, Fars province. (cont.)

Family	Scientific name	Vernacular name (in Persian)	Application	Preparation	Parts used	Voucher number	Phytochemicals
Rutaceae	*Citrus aurantifolia* Swingle	Limoo-Torsh (لیموترش)	Treatment of blackheads, skin clarity, peeling skin	Herbal mask	Fruit	HSBU-201543	**Limonene**, **alkanes**, **citric acid**, **flavonoids** (Gruenwald *et al*., 2000); **methyl-phytosterol**, **amyrin**, **multiflorenol**, **ethylenecycloartenol**, **cycloartenol**, **tirucallol**, **protein**, **isopentenyl**, **adenosine**, **trialcohol** (Abbasi *et al*., 2010); **flavonoids** (Kole *et al*., 2005)
Salicaceae	*Salix alba* L.	Bid (بید)	Treatment of acne and melasma	Aromatic water	Leaf	HSBU-201544	**Phenol**, **glycosides**, **salicylates**, **tannins**, **flavonoids** (Rezaei *et al*., 2008)
Urticaceae	*Urtica dioica* L.	Gazaneh (گزنه)	Cleanser, treatment of eczema and acne	Herbal tea	Leaf	HSBU-201545	**Chlorophyll**, **carotenoid**, **vitamin B** and **vitamin C**, **triterpenoids**, **sterols**, **flavonoids**, **formic acid** (Hokmabadi *et al*., 2013); **caffeic acid**, **anthocyanins** (Najjarfirozjaee *et al*., 2014); **histamine**, **serotonin**, **acetylcholine**, **formic acid**, **silicic acid** (Gruenwald *et al*., 2000); **flavonoids** (Gruenwald *et al*., 2000; Hokmabadi *et al*., 2013; Najjarfirozjaee *et al*., 2014)
Urticaceae	*Urtica pilulifera* L.	Gazaneh (گزنه)	Cleanser, treatment of eczema and acne	Herbal tea	Leaf	HSBU-201546	**Proteins**, **flavonoids**, **fatty acids**, **vitamins**, **minerals** (Sancaktaroğlu & Bayram, 2008)
Violaceae	*Viola odorata* L.	Banafsheh (بنفشه)	Softeners hand skin and face, freshness and clarity of the skin	Herbal incense, vegetable oil	Flower	HSBU-201547	**Salicylic acid** (Gruenwald *et al*., 2000; Bedi & Shenefelt, 2002; Nasiri *et al*., 2013); **methyl ester**, **saponins**, **alkaloids** (Gruenwald *et al*., 2000); **saponins**, **mucilage** (Bedi & Shenefelt, 2002)
Xanthorrhoeaceae	*Aloe vera* (L.) Burm. f.	Aloe vera (آلوئه ورا)	Fixes acne, skin refreshing	Herbal mask (use of mucilage in the leaves)	Leaf	HSBU-201548	**Polysaccharides**, **flavonoids**, **saponins** (Fallah Huseini *et al*., 2013); **amino acids**, **polysaccharides**, **vitamin A, vitamin B and vitamin C** (Maleki *et al*., 2007); **polysaccharides**, **mucilage**, **vitamins** (Nasiri *et al*., 2013); **magnesium lactate**, **salicylic acid**, **polysaccharides**, **acetylated mannans** (Bedi & Shenefelt, 2002); **chromanol**, **pteroyglutamic acid**, **aloe-emodin**, **quinone**, **d-glucitol**, **glucosamine**, **mono** and **pentasaccharides**, **hexuronic acid**, **casanthranol I** and **II**, **aloetic acid**, **sapogenin**, **glucoside**, **hecogenin**, **2-amino-2-deoxy glucose**, **chrysophanic acid**, **m-protocatechuic aldehyde**, **cellulose**, **proteinase**, **resins**, **imidazole** (Abbasi *et al*., 2010); **flavonoids**, **arachidonic acid**, **carboxypeptidase** (Gruenwald *et al*., 2000)
Zingiberaceae	*Zingiber officinale* Roscoe	Zanjebil (زنجبیل)	Fixes acne, strengthen the skin	Herbal mask	Rhizome	HSBU-201549	**Starch**, **antioxidant** (Gruenwald *et al*., 2000); **volatile oils**, **phenols**, **shogals**, **paradols**, **dihydroparadols**, **gingerols**, **gingerdiols**, **1-dehydrogingerdiones**, **diarylheptanoids**, **methyl ether**, **methyl paradol**, **methyl isogingerol** and **isoshogaol** (Abbasi *et al*., 2010); **antioxidants**, **ascorbic acid**, **terpenoids**, **alkaloids**, **polyphenols** (Ghasemzadeh *et al*., 2010)

Electronic databases including Google Scholar, PubMed, and Web of Science were searched for the scientific names of all species and the keywords "chemical profiling" and "pharmacological properties". An extensive number of studies published in various journals was collected, including research reports, review articles, book chapters, and books. The literature was divided into different sections based on the title and abstract, and all non-relevant and duplicate articles were removed. Finally, some of the newest articles with a comprehensive amount of information were selected.

Comparing the results of the present study with those of previous works on phytochemicals revealed that herbal medicines prescribed by herbal healers in the Jahrom region comprise the most efficient and suitable natural compounds for the treatment of skin diseases. For example, tannins, which have astringent properties and cause the coagulation of albumin, are found in *Lawsonia inermis* L. (henna) and *Ziziphus spina-christi* (L.) Willd., both of which are rich in tannins and are suitable herbal remedies for the treatment of acne (Maleki *et al*., 2007). The skin softening properties of saponins, mucilage, and salicylic acid which are abundant in the *Viola* L. species make this species a great candidate for remedies to soften and refresh skin (Bedi & Shenefelt, 2002). Amino acids, with their great water holding capacity, can promote freshness in skin and represent an effective treatment for dry skin (e.g. in *Aloe vera*; Maleki *et al*., 2007). Fumaric acid found in *Fumaria* L. is effective in curing skin disorders (Khalighi Sigaroodi *et al*., 2005). Wheat germ (the flour of embryos of wheat grains) is rich in vitamins A and E as well as antioxidants and can be considered a potent softening and moisturizing agent for skincare (Bakhtiyari & Radan, 2013). Moreover, vitamin A is a rejuvenating and anti-aging agent which stimulates the formation of new cells and helps reduce wrinkling (Gediya *et al*., 2011). In *Matricaria chamomilla* (chamomile), linoleic and oleic fatty acids and chamazulene improve the process of wound healing and water retention in the horny layer of the skin (Maleki *et al*., 2007).

Medicinal plants for skin treatment in other parts of Iran and the world

Some of the plant species presented in the current study, such as *Trigonella foenum-graecum* L., *Lawsonia inermis*, *Olea europaea* Wall. & G. Don, *Nigella sativa* L., *Urtica dioica* L., and *Aloe vera*, are also used in other parts of Iran and the world to treat skin disease (Malik *et al*., 2019; Nambejja *et al*., 2019; Sinkar & Samarth, 2019; Tsioutsiou *et al*., 2019). Similar to the indigenous people of Jahrom, the locals of Central Macedonia and Greece use *Matricaria chamomilla*, for wound healing (Ghafari *et al*., 2017; Tsioutsiou *et al*., 2019). *Silybum marianum* (L.) Gaertn., *Alcea rosea* L., *Malva sylvestris* L., *Rosa ×damascena* Herrm., *Urtica dioica*, *Cucumis sativus* L., *Ficus carica* L., and *Trigonella foenum-graecum* are used globally for the treatment of hyperpigmentation (Ghafari *et al*., 2017). *Trigonella foenum-graecum* is used in Jahrom and northern Pakistan to treat wounds (Malik *et al*., 2019). *Cucumis sativus* in Katabi, Uganda (Nambejja *et al*., 2019) and *Calendula officinalis*, in the Warud region of Maharashtra, India (Sinkar & Samarth, 2019) are used to treat different skin diseases. *Cichorium intybus* L. is used traditionally by the indigenous people of Urmia, Iran, for head itching (Baharvand-Ahmadi *et al*., 2015). The indigenous people of Jahrom and Chagharzai Valley (in Pakistan) use *C. officinalis* to treat skin diseases (Sheri *et al*., 2011). *Punica granatum* L. and *C. sativus* have the same therapeutic use for the treatment of skin disorders in Jahrom and the northwest Frontier Province of Pakistan (Abbasi *et al*., 2010). *Senna alexandrina* Mill. is used to treat pimples in Jahrom and northwest Punjab, Pakistan (Gul *et al*., 2012). *Descurainia sophia* (L.) Webb ex Prantl and *L. inermis* (henna) are used as traditional herbal medicines in Jahrom and in the Saravan region of Iran (Sadeghi *et al*., 2014). *Malva sylvestris* is a common medicinal plant for the treatment of skin diseases in Sirjan, Saravan, and Jahrom (Khajoei Nasab & Khosravi, 2014; Sadeghi *et al*., 2014). *Fumaria parviflora* Lam. has the same therapeutic use on the skin in the Hormozgan province of Iran as it does in Jahrom (Safa *et al*., 2013).

CONCLUSIONS

Documentation of traditional medical practices is of a great importance for the preservation the knowledge and possible new drug discoveries. The purpose of the present study was to assess and document the knowledge of herbal healers in the

traditional treatment of skin diseases and ensure the accuracy of traditional herbal remedies recommended by these therapists. This study was the first documentation of herbal medicines prescribed for skincare in southeastern Iran. The results demonstrated that the use of traditional medicinal plants for skincare is still prevalent in this region. Diverse plant-based remedies are prescribed by local herbal shops and healers for the treatment of a variety of skin-related conditions. By reviewing previously published literature on the phytochemical composition of plants included in the present research, it can be concluded that the herbal medicines are being prescribed accurately for the treatment of skin diseases. Further exploration of the phytochemicals of these medicinal plants may lead to the discovery of novel skincare products.

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Appendix 1. Semi-structured questionnaire used in the interviews, in English and the original Persian versions

(In English)

Ethnopharmacological survey of medicinal plants use for the treatment of skin diseases among the herbal shops of Jahrom, southeast of Iran

Satisfaction of the interviewees to participate in the study:

I .... (Name of the interviewee) hereby give my full consent and knowingly agree to participate in this study.

Date ..... (Signature/finger of the interviewee).

Details of informants (interviewees):

Number of questionnaire:

1. Name .....

2. Gender .....

3. Age .....

4. Education level .....

5. Herbal shop address .....

6. Phone number .....

Information about herbs and their use in the treatment of skin diseases:

The questions in the interview:

Are herbs useful in treating skin diseases in this region?

How many plants do you know that are effective in treating skin diseases?

 # herb 1

1- What is the local name of this plant?

2- What skin diseases is it used to treat? (Acne, melasma, eczema, etc.)

3- Which part of the plant do you use?

4-Describe how you prepared the treatment? (decoction, herbal mask, infusion, etc.)

5-Is this plant used in combination with another species? If yes, which plants?

(In Persian)

نظرسنجی اتنوفارماکولوژیکی گیاهان دارویی مورداستفاده در درمان بیماری های پوستی در عطاریهای جهرم، جنوب شرقی ایران

رضایت مصاحبه شوندگان برای شرکت در این مطالعه:

اینجانب .... (نام مصاحبه شونده) بدینوسیله رضایت کامل می دهم و آگاهانه برای شرکت در این مطالعه موافقت می کنم.

تاریخ ..... (امضاء / انگشت از مصاحبه شونده)

اطلاعات مخبران (مصاحبه شوندگان):

شماره پرسشنامه:

1. نام.....

2. جنسیت.....

3. سن .....

4. سطح تحصیلات .....

5. آدرس عطاری.....

6. شماره تلفن.....

اطلاعات در مورد گیاهان دارویی و استفاده از آنها در درمان بیماری های پوستی:

سوالات مصاحبه:

آیا گیاهان دارویی در درمان بیماری های پوستی در این منطقه مفید هستند؟

چند گیاه می شناسید که در درمان بیماری های پوستی موثر باشند؟

 # گیاه 1

1- نام محلی این گیاه چیست؟

2- برای درمان چه بیماریهای پوستی استفاده می شود؟ (آکنه ، ملاسما، اگزما و غیره)

3- از کدام قسمت گیاه استفاده می کنید؟

4-نحوه تهیه درمان را توضیح دهید؟ (جوشانده، ماسک گیاهی، دم کرده و ...)

5-آیا این گیاه در ترکیب با گونه دیگر استفاده می شود؟ اگر بله، کدام گیاهان؟