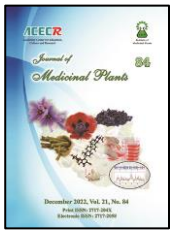
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Review Article

Persian medicine anti-dandruff topical remedies: a narrative review

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ABSTRACT

Background: Dandruff is a common and important scalp disorder affecting almost half of the population at the pre-pubertal age. Various studies have shown that using herbs can be a good option for improving dandruff. There is a way to search for effective herbal and natural remedies that, in addition to being scientifically valid, is a quick path in the process of discovering, designing, and obtaining natural remedies. This method is based on the knowledge of traditional medicine. Persian medicine contains vast knowledge in diagnosing, preventing and treating diseases, including valuable information from the experiences of scientists. **Objective:** This article introduces materia medica mentioned in Persian medicine used for dandruff. **Methods:** The present study is a review based on the study of traditional Persian medicine books. Hereon, effective drugs for improving dandruff mentioned in the second volume of Ibn Sina's book (*Al Qanun-fi al-Tibb*) have been listed, and then four reference books of traditional medicine (*al-Abnieh an Haghayegh al-advieh*, *Tazkare Ulul Al-bab*, *Tohfat al-Momenin*, and *Makhzan al-Advieh*) are reviewed. **Results:** Twenty-one materia medica were found as anti-dandruff remedies. Based on the scores, *Trigonella foenum-graecum* L. and *Beta vulgaris* L. earned the best points respectively, and *Prunus amygdalus* Batsch, *Sesamum indicum* L., *Ziziphus spina-christi* (L.) Desf., and sodium tetraborate decahydrate got the next orders with equal scores. **Conclusion:** The list of drugs collected in this study can be considered as a basis for further studies to design and make new effective drugs for treating dandruff.

1. Introduction

Dandruff is a common and important scalp disorder that affects almost half of the population at the pre-pubertal age, regardless of gender or nation [1, 2]. In this disease, the epidermal layers of the scalp are constantly changed, and the cells are pushed outwards and their white or gray patches appear on the scalp, skin, and clothes, creating an unpleasant appearance that can negatively affect the self-esteem of a person [3-5]. Dandruff is a skin disorder that has been the most commercially exploited [6]. Today, due to the

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lack of proper performance as well as the side effects of synthetic products, the popularity of natural skin and hair products is constantly increasing [7]. Various studies have shown that plant extracts can be good options for treating dandruff. Several herbal shampoos and hair oils have shown excellent results on dandruff due to their synergistic, antifungal, anti-inflammatory, and immune-stimulating action [4]. There is a way to search and discover effective herbal and natural remedies that, in addition to being scientifically valid, can be a quick way to obtain natural remedies. The basis of this method is the knowledge of traditional medicine. Today, the process of discovery, design, and development of drugs can be evolved using traditional knowledge along with modern technology [8, 9]. Ibn Sina, a pioneer of Persian medicine, described in his book "*Al Qanun-fi al-Tibb*", medicines used for the treatment of hair diseases: "effective anti-dandruff drugs are presented in the second volume of the book in the list of materia medica, and in Qarabadeen book, useful combination drugs are described." The second volume of the book "*Al Qanun-fi al-Tibb*" is related to medical content and the study of the effects of herbal, animal, and mineral drugs on the human body. In this book, the effects of drugs are described in 12 separate sections [10, 11]. In the sixth section, "the organs related to the head", the names of drugs for the treatment of dandruff are listed. In the fifth volume of the book "*Al Qanun-fi al-Tibb*", various hair diseases are described. In the same book, in the first article about hair and dandruff, the chapter on dandruff, he says: "The discussion about dandruff is also a kind of discussion about hair. Dandruff is formed on the head in the form of fine scales. It is caused by a disorder that occurs on the upper surface of the scalp, and the worst kind of it leads to wounds and damage to the hair follicles. Treatment for dandruff depends on the severity of the disease. If dandruff is mild, the treatment is easy, and violet oil and all kinds of glazes can be rubbed on the head. But the most severe type needs strong analysis. Exfoliating drugs are used to treat it, while the hair should be kept moist to prevent side effects of these drugs. A type of infectious dandruff leads to scalp ulcers, and to treat it, the body must first be cleared by phlebotomy or other cleansing methods (if necessary). After this stage, the treatment should be continued using herbal oils" [11]. Alī ibn al-Husayn ibn Hindū says: "Dandruff is a delicate substance that spreads from the scalp. It contains shells and rubbish without causing wounds, and in Arabic, it is called Al-Habriya, Al-Abriya, and Al-Hazaz" [12]. The present study aimed to introduce suitable options for basic and clinical studies through searching and prioritizing effective materia medica in the treatment of dandruff in reputable sources of Persian medicine.

2. Materials and Methods

A library review study was carried out. The primary basis of the research is Ibn Sina's book "*Al Qanun-fi al-Tibb*". Materia medica for hair diseases is presented in the second volume of "*Al Qanun-fi al-Tibb*". The names of anti-dandruff drugs, registered in the sixth section, "the organs related to the head", were collected. Then, the opinions of scientists in selected books of traditional Persian medicine were added to previous tables and information. Table 1 shows the information about the traditional medicine sourcebooks used in this study. The books of *Al-Abnieh an Haghayegh al-advieh*, *Tohfat al-Momenin*, and *Makhzan al-Advieh* are in Persian, and the two books of *Al Qanun-fi al-Tibb* and *Tazkare Ulul al-bab va Jame 'Lajab al-Ajab* are in Arabic.

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Table 1. Sourcebooks of traditional medicine studied

Book Name	Author	Course
Al-Abnieh an Haghayegh al-advieh	Abu Mansur Muwaffaq	Fourth century AH
Al Qanun-fi al-Tibb	Ibn Sina	Fourth and fifth centuries AH
Tazkare Ulul al-bab va Jame 'Lajab al-Ajab	Davood Antaki	Seventh century AH
Tohfat al-Momenin	Mohammad Momen	Eleventh century AH
Makhzan al-Advieh	Mohammad Hussein Aqili	Twelfth century AH

2.1. Summary of steps performed in this study

1. Finding the keywords: This study set to find effective anti-dandruff materia medica. Searching the reliable sources of traditional medicine, keywords related to dandruff drugs were selected, including *Al-Nokhale*, *Al-Hazaz*, *Al-Abriya*, *Al-Abar*, and *Sabusa*.

2. Searching in sources*:* Searching for reliable sources of traditional medicine as the sources studied, anti-dandruff materia medica was recorded along with sentences that were directly or implicitly indicated in each book.

3. Generating unitized lists: After searching the books, the collected contents were examined and information related to all the contents was collected in a unit set.

4. Finding synonyms and scientific names: Since, sometimes, materia medica was nominated with different names; synonyms of each materia medica were found by searching botanical reference books, and similar names were then removed.

5. Summarizing: All collected contents up to this stage were completed and arranged in the form of tables.

6. Scoring: After performing the mentioned steps, the tables were scored. At this stage, a score was assigned based on the sentence in the description of the desired effect (therapeutic effect on dandruff). Materia medica mentioned in combination with other materia medica were removed from the list because they were not assumed within the scope of the study. Considering the criteria in Table 2, for scoring the materia medica used for dandruff, the score of each item was recorded (the score was considered based on the emphasis of different sources on that materia medica).

7. Prioritizing and drawing diagrams: After scoring and prioritizing, the materia medica with the best scores obtained were depicted through a diagram.

Table 2. Description and scoring criteria of the anti-dandruff materia medica mentioned in the sources

Scoring	Terms and descriptions used in traditional medicine references
1	Remedy for dandruff, dandruff cleanser (with various phrases), beneficial for dandruff, keratolytic agent, useful for dandruff,
2	Dandruff removal

3. Results

3.1. Selection of materia medica for dandruff based on the studied sources

The effective materia medica for dandruff were collected according to the keywords and research steps described in the method. The total scores for each materia medica were determined and recorded in Table 3 for all materia medica extracted in this study. The frequency of using dosage forms anti-dandruff materia medica is shown in Fig. 1. After prioritizing and summarizing the scores of the materia medica for dandruff, the materia medica with the best scores were displayed through a diagram (Fig. 2).

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Table 3: Names of anti-dandruff materia medica and their overall score and number of relevant sources

NO.	Scientific name(s)	Family	Dosage forms [11,13]	Final Score	Qty of resources
1	*Trigonella foenum-graecum* L.	Fabaceae	Rubbing oil	10	5
2	*Beta vulgaris* L.	Amaranthaceae	Washing lotion	7	4
3	Sodium Tetraborate Decahydrate	-------	Washing lotion	6	4
4	*Prunus amygdalus* Batsch	Rosaceae	Washing lotion	6	3
5	*Ziziphus spina-christi* (L.) Desf.	Rhamnaceae	Using liniment & Washing lotion	6	3
6	*Sesamum indicum* L.	Pedaliaceae	Washing lotion	6	2
7	*Myrtus communis* L.	Myrtaceae	Washing lotion	5	3
8	*Olea europaea* L.	Oleaceae	using ointment	5	3
9	*Cannabis sativa* L.	Cannabaceae	Washing lotion	5	3
10	*Aloe* spp.	Xanthorrhoeaceae	Washing lotion	4	4
11	*Rosa damascena* Mill.	Rosaceae	Rubbing oil	4	3
12	Silicon dioxide	-------	Washing lotion	4	3
13	*Adiantum capillus-veneris* L.	Pteridaceae	Washing lotion	3	3
14	*Cynara cardunculus* L.	Asteraceae	Washing lotion	3	3
15	*Boswellia sacra* Fluck.	Burseraceae	Using liniment	3	3
16	*Brassica oleracea* L.	Brassicaceae	Washing lotion	2	2
17	*Viola odorata* L.	Violaceae	Rubbing oil	2	1
18	*Muscari comosum* (L.) Mill.	Asparagaceae	using ointment	1	1
19	Camel and cow urine	-------	Washing lotion	1	1
20	Lizard feces	-------	Washing lotion	1	1
21	*Lilium candidum* L.	Liliaceae	Rubbing oil	1	1

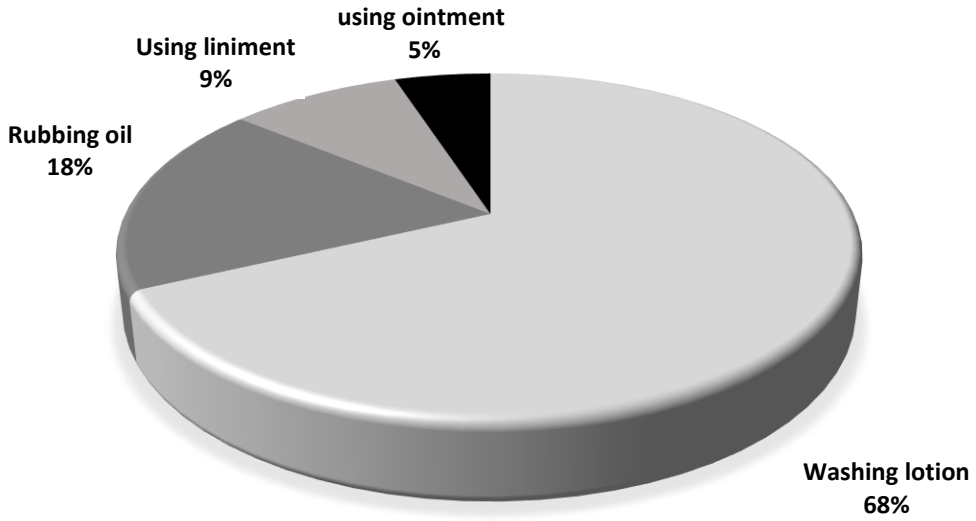


Fig. 1. Frequency of using dosage forms anti-dandruff materia medica

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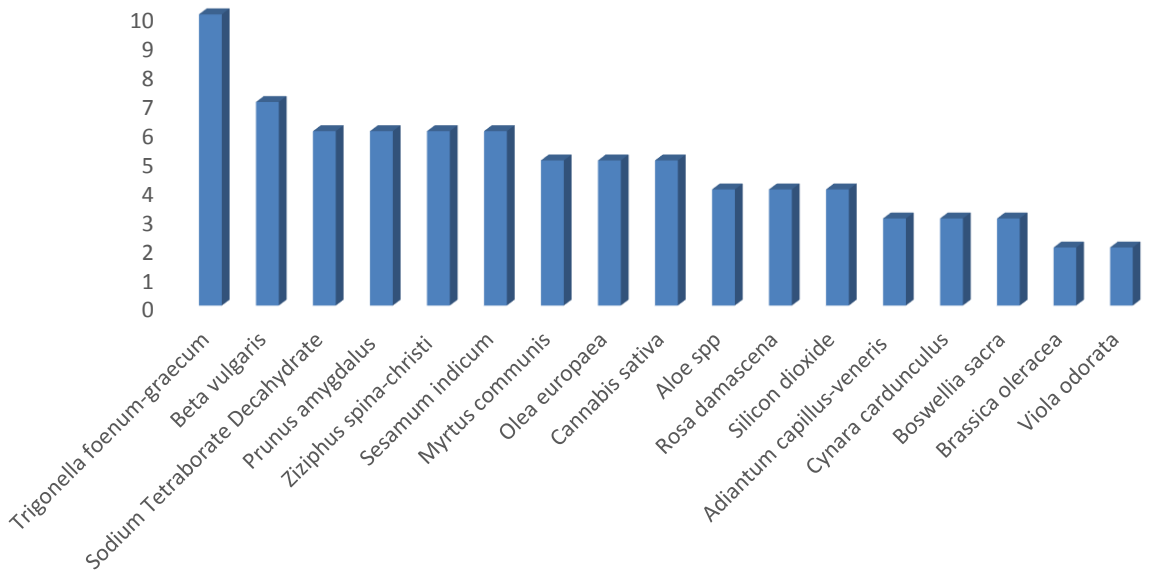


Fig. 2. Scores of the anti-dandruff materia medica

The anti-dandruff materia medica were summarized, scored, and prioritized according to the research stages. Twenty-one materia medica were found as remedies for dandruff from plant, animal, or mineral origin, among which, *Trigonella foenum-graecum* gained the highest score (10 points), followed by *Beta vulgaris* (7 points) and *Prunus amygdalus*, *Ziziphus spina-christi*, *sesamum indicum* and sodium tetraborate decahydrate (6 points). *Myrtus communis*, *Olea europaea*, and *Cannabis sativa* (5 points), *Aloe spp*, *Rosa damascena*, and *Silicon dioxide* (4 points), *Adiantum capillus-veneris*, *Cynara cardunculus*, and *Boswellia sacra* (3 points), *Brassica oleracea* and *Viola odorata* (2 points) gained the next highest scores, respectively. The materia medica *Leopoldia comosa*, camel and cow urine, lizard feces, and *Lilium candidum* obtained the lowest score (1 point).

4. Discussion

The beauty of skin and hair depends primarily on a person's health, diet, working conditions, weather conditions, and skin and hair care [14]. Among the issues related to hair that affect the aesthetic value is dandruff [1, 15]. Flaking of the scalp is called dandruff. Itching due to dandruff makes these people feel embarrassed in the community. The social and psychological problems of dandruff are greater than the medical problems associated with it [5]. and can also exacerbate hair loss in addition to causing social and psychological problems. The results of a study showed that the rate of hair loss, which is about 50 to 100 hair strands per day in normal people, reaches about 100-300 strands in people with dandruff [15].

The cause of this disorder is still unknown. There is still debate as to whether dandruff should be treated as a disease or as a disorder. Conceptually, the formation of dandruff is nothing more than the physiological scaling of the scalp, and it is sometimes said that even inflammation has no role in its formation. Therefore, it can be said that this process of physiological scaling requires more aesthetic

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management [1]. Studies have suggested hypotheses such as overgrowth of Malassezia fungi and abnormalities of skin lipids and hormones. Excessive exposure to sunlight also causes the scalp to flake [3, 4, 6]. Studies have reported that factors such as diet, poor health, immune system function, neurogenic factors, and genetic conditions [3, 16] are also involved in the disease. Excessive use of shampoo, frequent combing, dust, and use of some cosmetics can cause dandruff to some extent. However, these reasons have not yet been proven [1]. One of the most important factors is the role of lipophilic fungi belonging to the Malassezia family [4, 6], so the use of antifungal drugs can be an important basis for its treatment. Antifungal drugs decrease the population of Malassezia, but the population of Malassezia increases to the initial level after leaving the treatment [1]. The pathogenesis of dandruff involves the proliferation of keratinocytes, which results in keratinization being out of balance. Many drugs used to treat dandruff act by this mechanism. Zinc pyrithione is a regulator of keratinization and improves scalp disorder by normalizing epithelial keratinization or sebum production or both. Salicylic acid is a keratolytic beta-hydroxy acid substance, which is useful in eliminating skin hyperkeratotic. Sulfur is a non-metallic element that has antimicrobial and keratolytic activity. The drug tar is also effective in the treatment of dandruff and is used for this purpose, but some properties such as the color and odor limit its use [1, 17]. However, these drugs can only slow down the scaling process, and factors such as drug resistance and high dosage, toxicity, and sometimes the high cost of some of these drugs can limit their use [4, 18, and 19]. Currently, the personal care products have focused more on herbal products and this sector is growing rapidly and is expected to expand several times in the coming years. Medicinal plants, with a wide range of bioactive substances, have multiple functions that work with different mechanisms for skin and hair care [14, 20]. The proper use of herbal anti-dandruff products can greatly reduce the side effects of chemicals [20, 8]. Studies have shown that herbal medicines are just as effective in controlling dandruff as synthetic medicines [7, 14]. In recent years, the use of traditional medicines and natural products has augmented. The use of traditional medicine resources can be helpful to find more effective and less complicated herbal medicines in the treatment of diseases such as skin and hair diseases and the preparation of their products [10, 21]. In addition to the fact that texts related to Persian medicine are valuable sources for gaining the experiences of Iranian physicians and their solutions in the field of medical diagnosis, prevention, and treatment of various diseases, Persian sages have also mentioned the use of various plants for cosmetic and skin health and the treatment of diseases related to hair and skin, including dandruff [21, 14].

Zareian et al. [2019] conducted a study on the etiology and treatment of dandruff according to Persian medicine. In this study, 14 plants are introduced for the treatment of dandruff in the form of a table entitled medicinal plants used in the treatment of dandruff in Persian medicine [22].

For the first time, Dr. Naseri, studying the sources of the ancient medicine to find effective natural materia medica, prioritized drugs related to epilepsy considering the two principles of emphasis and repetition in traditional medicine sources of different centuries [21]. This method was then used in several other studies. Prioritization of antidepressants [23], anti-palpitation [24], drugs for hair diseases [21], and effective drugs in the treatment of opium addiction in selected sources of Persian medicine

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[25] are among them. In another article, Mozaffarpour et al. presented this model for prioritizing traditional medicine drugs affecting a symptom or disease defined from the perspective of conventional medicine in nine steps [26]. Therapeutic ideas taken from the texts were verified in laboratory and clinical experiences. The results revealed that the search for reliable and ancient sources of Persian medicine based on the two principles of emphasis and repetition can be used with high efficiency for designing and manufacturing new natural medicines [27-29]. So far, research in the field of hair care has been done on some plants recommended in traditional Persian medicine, which show that the textual evidence is consistent with the basic and clinical evidence in many cases. Some of these studies are mentioned below.

***Trigonella foenum-graecum* L.** helps strengthen hair, prevent hair loss, and eliminates dandruff. The use of this plant helps to control fungal skin infections that are often associated with dandruff [30]. This plant mainly contains flavonoids, quercetin, saponins, proteins, fats, and carbohydrates. The flavonoids of this plant, with their antioxidant activity, inhibit free radicals and damage caused by them [31]. *T. foenum-graecum* also contains several minerals including iron, magnesium, potassium, calcium, and zinc. Minerals are essential for healthy hair growth. Perhaps, the presence of these minerals in *T. foenum-graecum* is one of the effective factors in strengthening the hair [30, 32, 33]. Zinc helps to secrete the scalp. This mineral prevents dandruff by secreting the oil needed by the scalp. Iron also plays a role in providing oxygen to the body and its presence is necessary for hair growth and maintaining healthy hair [33]. *T. foenum-graecum* also has a lipase-inhibiting effect [34]. It may become the main target in the screening of anti-dandruff drugs [35]. This species contains a lot of lecithin, a natural conditioner and plays a role in strengthening, health, and moisture the hair. This plant, which has a high protein content, is effective in hair regrowth. The anti-dandruff effect of this plant may be due to the synergistic function of its anti-fungal and anti-inflammatory effects and improving the immune system [4, 30, 36].

***Beta vulgaris* L.** is a plant that is considered a natural dye in the food and cosmetics industries, which not only has dyeing properties but also a wide range of medicinal features [37]. This plant has an immunomodulatory effect [38] and has good antimicrobial activity, antioxidant [37], and anti-inflammatory effects [38]. Phytochemically, *B. vulgaris* is a rich source of flavonoids [37]. Researchers have identified two new proteins from the gamma-thionine family in *B. vulgaris* that have strong antifungal effects [39]. The anti-dandruff effect of this plant can be due to its anti-inflammatory, immune function stimulation, and its strong antifungal effect [4].

***Prunus amygdalus* Batsch** (almond) is rich in nutrients. The seeds of this plant are an excellent source of vitamin E and a good source of manganese, magnesium, copper, phosphorus, fiber, and riboflavin. Recent studies have shown that almond contains a diverse set of phenolic and polyphenolic compounds. Only 8% of the fatty acids in almond oil are saturated fats. The main fatty acid in almond oil is oleic acid. Other ingredients in almond oil include sterols, tocopherols (mainly α-tocopherols), and squalene. Almond oil is used in the cosmetics industry, especially in skin moisturizing creams, anti-wrinkle, and anti-aging products. Historically, almond oil has long been used because of its numerous health and beauty benefits. Since sweet almond oil is rich in free fatty acids, vitamins, and antioxidants, it is used in skin and hair products. Sweet almond oil

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contains large amounts of vitamins E and K, which help regenerate the skin and maintain elasticity. Hence, this oil is used in many cosmetic products. Almond oil is one of the most popular oils because it is suitable for all skin types. Bitter almond oil also contains three essential components, benzaldehyde, amygdalin, and hydrogen cyanide, which limit its use for external applications [40]. Bitter almond oil is used to nourish hair and is also used in the treatment of hair loss and as a hair conditioner [41]. The high antioxidant properties of this plant are attributed to the polyphenolic compounds of almonds. Also, the anti-inflammatory and antimicrobial effects of almonds have been reported [42].

***Ziziphus spina-christi* (L.) Desf.** has valuable medicinal benefits and can be used to achieve several goals in maintaining hair health. Flavonoids, alkaloids, and saponins are among the most important phytochemicals reported from this plant to date [43-45]. For centuries, the leaves of this plant have been used to wash hair and skin. Its saponin content can help absorb excess sebum. In addition to its antibacterial effect on gram-positive and gram-negative bacteria, cedar is also considered a strong antifungal agent. This plant has high antioxidant activity and anti-inflammatory effects due to the presence of flavonoid compounds. It is also used as anti-dandruff. It is rich in vitamin E. Vitamin E can repair damaged hair and help improve the health of the scalp and add shine to the hair. Various studies have reported Antibacterial, antifungal, antioxidant, and anti-inflammatory activities [43-46] and lipase inhibitory effect [47] of this plant. The mentioned effects and possibly their synergistic impact can be a reason for the anti-dandruff performance of this plant [4].

***Sesamum indicum* L.** nourishes the scalp and improves its dryness and eliminates the microbial agents that cause dandruff [48]. It also acts as a lipase inhibitor [49]. Sesame seeds are an excellent source of copper and calcium and are rich in phosphorus, iron, magnesium, manganese, zinc, and vitamin B1. It also contains chlorosesamone which has been reported to have antifungal activity [48]. Sesame seed has antibacterial activity against skin pathogens such as Staphylococcus and Streptococcus and also has antifungal, antiviral, and anti-inflammatory effects [50]. The mentioned effects and their synergism impact can be effective in the treatment of dandruff [4].

***Myrtus communis* L.** used in a double-blind clinical study to treat dandruff, was effective in the treatment of dandruff. And its use was reported without any specific side effects [7]. The antibacterial, antifungal, and anti-inflammatory effects of improving the immune parameters of this plant have been proven in some studies [7, 51]. *M. communis* has a lipase-inhibiting effect as well [52], which is important today in the screening of anti-dandruff drugs [35]. It is also rich in minerals such as potassium, calcium, sodium, phosphorus, and magnesium and also contains vitamins A, B_{12}, C, D, and E [53]. Vitamins and minerals play an important role in the normal growth of hair follicles [54]. Vitamin C improves the formation of blood vessels and increases the blood flow to the scalp by stimulating the synthesis of vascular endothelial growth factors [55]. Studies have shown that the effect of modulating the immune system of *M. communis* is due to the presence of biologically active substances such as tannins, flavonoids, saponins, and vitamin C. The antioxidant, anti-inflammatory, and antimicrobial activities of this plant are generally attributed to the presence of the main components (1,8-cineole, α-pinene, eugenol, methyl eugenol, and retinyl acetate) [51].

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5. Conclusion

The present study introduced and prioritized materia medica recommended and confirmed in the reliable sources of Persian medicine for dandruff. The list of drugs collected in this study can be considered as a basis for basic and clinical studies to design and make new effective anti-dandruff drugs.

Author contributions

M. N and Z. B Designed the study; Z. B, M. N, M. I, F.G, V. N, F. E, F. A, A. B drafted the manuscript.

Conflict of interests

The authors declare that there is no conflict of interest.

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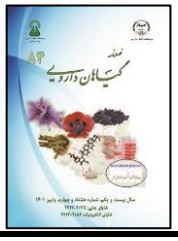
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مقاله مروری

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اطلاعات مقاله

گل‌واژگان:
طب سنتی
مفردات دارویی
ضد شوره سر
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درمان

چکیده

مقدمه: شوره سر اختلالی شایع و مهم مربوط به پوست سر می باشد که تقریباً نیمی از جمعیت دنیا در سنین قبل از بلوغ به آن مبتلا می شوند. مطالعات نشان داده‌اند که استفاده از گیاهان می تواند گزینه‌ی خوبی برای درمان شوره سر باشد. برای جستجوی داروهای موثر گیاهی و طبیعی روشی وجود دارد که علاوه بر اینکه از نظر علمی معتبر است، مسیری سریع در روند کشف، طراحی و دستیابی به داروهای طبیعی می باشد. این روش بر پایه دانش طب سنتی است. طب سنتی ایران متشکل از مجموع دانش‌ها است که در تشخیص طبی، پیشگیری و درمان بیماری‌های مختلف حاوی اطلاعات باارزشی از تجربیات دانشمندان و حکمای این سرزمین می‌باشد. **هدف:** در این مطالعه داروهای مفرده‌ای که در منابع طب ایرانی برای درمان شوره سر توصیه شده‌اند، معرفی شدند. **روش بررسی:** تحقیق حاضر، یک مطالعهٔ مروری بر اساس بررسی متون داروسازی سنتی ایرانی است. در این مطالعه مفردات دارویی ذکر شده برای بهبود شوره سر در جلد دوم کتاب *القانون‌فی‌الطب* جمع‌آوری، سپس این مفردات در کتاب‌های *الابنیه‌عن‌حقایق‌الادویه*، *تذکراولی‌الالباب و الجامع‌للعجب العجاب*، *تحفه‌المومنین* و *مخزن‌الادویه* جستجو شدند. **نتایج:** در این پژوهش ۲۱ مفرده در درمان شوره سر جستجو و معرفی شدند. بر اساس امتیازات به دست آمده، شنبلیله و چغندر به ترتیب بهترین امتیاز را کسب کردند و بادام، کنجد، سدر، و مفرده معدنیِ بورق با امتیازهای مساوی رتبه‌های بعدی را کسب کردند. **نتیجه‌گیری:** لیست مفردات دارویی بدست آمده در این مطالعه می‌تواند مبنای انجام مطالعات بیشتر برای ساخت داروهای مؤثر جدید در درمان شوره سر باشد.

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