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Original Article

Ethnobotanical and Phytochemical Study of *Withania coagulans* (Stocks) Dunal in Khash City, Iran

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ABSTRACT

Indigenous knowledge of medicinal plants covers various aspects, including ethnobotany. Ethnobotany means human knowledge of botany and the ecology of plants. In this study, an ethnobotanical and phytochemical evaluation of *Withania coagulans* (Stocks) Dunal was performed in Khash city in Sistan and Baluchestan province. The data collection was performed through a structured questionnaire (150 questionnaires). The data was analyzed using RFC (Relative Frequency of Citation) and CI (Cultural Importance Index). The questions were related to the plant organ used, plant harvest time, type of livestock user and growth place. To investigate which chemical compounds in the plant cause people to use this drug in the treatment of certain diseases, the chemical compounds of the species were analyzed by GC and GC/MS. Results showed that the best season of plant collecting was spring. The most used part of the plant was seeds. The plant grows mainly in plains. Camel (51.40%) and sheep (42.05%) have the maximum use of the plant. The maximum chemical compositions were related to the Ar-tumerone terpene and Pentadecanone with 95.5% and 93.8% probability, respectively. Also, the percentage of saturated fatty acids such as Palmitic acid, Tetradecanoic acid and unsaturated fatty acids such as Oleic acid has the highest percentage. In total, indigenous people use this plant in treating diabetes due to the presence of a compound such as Ar-tumerone, which is consistent with the chemical compounds identified in this study. The importance of plant seeds in cheese making by indigenous peoples is related to acidic compounds such as Palmitic acid, Linoleic acid and Oleic acid.

INTRODUCTION

Iran is one of the ten most important sources of species in the world with more than 8000 plant species and 1727 native species [1,2]. Historical documents show that Iran is one of the most users of medicinal plants among ancient civilizations [3]. In this regard, the rangeland ecosystem is the natural and main origin of medicinal plants that are compatible with their environment and each other [4]. Today, medicinal plants as bio-innovations in medicine are a good alternative to chemical drugs. One of the important reasons for this replacement is the minimal side effects compared to chemical drugs. In the last 10 years, the rate of people's use of medicinal plants has increased from 3% to 50% [5].

Due to the richness of plant species in Iran and the existence of different climates and elevations in different parts of the country, this country has developed different ecosystems and different vegetation. The people of this land have evaluated many plants from ancient times and used them in the treatment of many diseases. Familiarity with these plants and how to use them in different cultures due to the large area of Iran requires comprehensive research in this field. Also, with the expansion of demand for herbal medicines, familiarity with plants used in traditional medicine can pave the way for the production of new medicines in the field of health, health and economy [6].

In this regard, ethnobotany is one of the most effective tools for documenting traditional unwritten information in order to rationally exploit resources and effectively protect biodiversity and cultural

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information [7]. Ethnobotany is made up of two words, ethno meaning ethnicity and botany meaning botany; which is a method of scientific monitoring of information in the public mind. The subject of this science is how to use plants in the life of a people [8]. Ethnobotanical studies document several beneficial plants, medicinal plants, poisonous or used in food. A very important part of the sources of information in an ethnobotanical study is related to data obtained from people's natural lives about their attitudes towards plants [9,10].

According to ancient medicine, prevention is always better than cure and the balance of the body's natures will be provided by consuming natural resources around the body. Therefore, the consumptions of medicinal plants, which are the most important natural resource, will make it possible to achieve this [6]. On the other hand, due to the side effects and destructive effects of some chemical drugs, many patients have turned to herbal medicine for treatment. Despite its capabilities and value, modern medicine also faces problems in the treatment of some diseases, especially chronic diseases [11]. In fact, the statistics of the use of herbal medicines in recent years are significant. As a general rule, these drugs have fewer side effects than other drugs, although there are some exceptions [12,13]. In recent years, many countries around the world have been incorporating traditional medicine and ethnobotanical findings into their health care systems, as they believe these studies could lead to the discovery of new drugs. China, Mexico, Nigeria and Thailand are among these countries. In addition to these countries, the tendency to do so is increasing in many European countries. Many international organizations, including the World Health Organization, have emphasized the preservation of this valuable information [14]. Traditional medicine is based on practice, observations, writings and books that are passed down from generation to generation. Therefore, it can be considered as a mixture of knowledge and understanding of medical issues and scientific and hereditary experiences and cultural beliefs that have been formed and expanded throughout history [15].

Withania coagulans (Stocks) Dunal (Red pimpernel) is one of the important medicinal species in Sistan and Baluchestan province (Fig. 1). This species belongs to the Solanaceae family. The genus *Withania* has 23 species, of which is medicinally and economically important and is widely cultivated in some countries such as India and Pakistan. This plant is an evergreen plant with a height of 30-120 cm, leaves are dull green and with a yellow flower cup. The fruit in this species is set in a cream or light brown color (Fig. 1) [16,17].

Fig. 1 The plant species of *W. coagulans* (Stocks) Dunal (left) and fruit of the plant (right)

W. coagulans (Stocks) Dunal is a valuable species that is limited in distribution worldwide and grows mainly in the eastern Mediterranean to southern Asia, including Pakistan, northwestern India, Afghanistan and Iran. The distribution of this valuable drug in Iran is limited to a few habitats in Sistan and Baluchestan province and is mainly distributed in habitats around Saravan, Gasht, Khash, Iranshahr, Daman, Nikshahr, Qasr Ghand and Sarbaz city [18]. Indigenous peoples have long used *W. coagulans* (Stocks) Dunal as a sourdough to make local cheese. Indigenous people crushed the seeds or fruits of this plant after it was dried and used its powder as a yeast due to its milk coagulation properties. Red pimpernel seeds and leaves also have anti-cancer properties [19]. In some countries, the use of root extract of this plant as a

dietary supplement has been considered [20]. For this purpose, a study was conducted on the native knowledge of *W. coagulans* (Stocks) Dunal in the Khash region located in southeastern Iran. The objectives of this study were 1-to identify the chemical compounds of the active ingredient of this plant and 2- to evaluate the degree of compatibility between indigenous knowledge and modern knowledge regarding the use of *W. coagulans* (Stocks) Dunal in the Khash region.

MATERIAL AND METHODS

Study area

The study area is located in Sistan and Baluchestan province in Iran, between latitude 27° 50′ 48″–28° 45′ 52″ N and between longitude 60° 5′ 30″–62° 45′ 34″E (Fig. 2). Khash city has two cities, 3 districts and 11 villages and an area of 23105 km^2. The experimental area is characterized by dry summers, a rainy season, and warm autumn and cool winter weather. According to data available for the period 2006–2019 at the study site from the National Meteorological Information Center of Iran, the mean annual rainfall levels reach 180 mm. The mean annual evaporation reaches approximately 60.10 mm, denoting a high water deficit in the region. Khash city has a cold dry climate due to its proximity to Taftan mountain, which is the highest mountain in southeastern Iran. Temperatures fluctuate to 37 °C in summer and to 7 °C in winter. Taftan mountain has vegetation with high species richness that can be divided into pistachio, fragment, almond, mountain fig, barberry, thyme, chicory, mint, tulip, thyme, cheese, artichoke and turpentine. Etc. mentioned [21].

Data collection

This study was conducted using field surveys, the study of beliefs and popular information about the studied species. In this study, frequency of citation, the relative frequency of citation and cultural importance index for *W. coagulans* (Stocks) Dunal were recorded. The number of indigenous knowledgeable individuals who have expressed the use of the plant species is called the frequency of citation. The quantitative relative frequency of citation (RFC=$\frac{FC}{N}$) was obtained by dividing the frequency of citation (FC) by the total number of native knowledgeable individuals in the study (N) [22]. The quantitative index of the relative frequency of citation varies from zero (when no native knowledgeable person has reported the use of the plant) to one (when all native knowledgeable individuals have indicated the medicinal use of the plant).

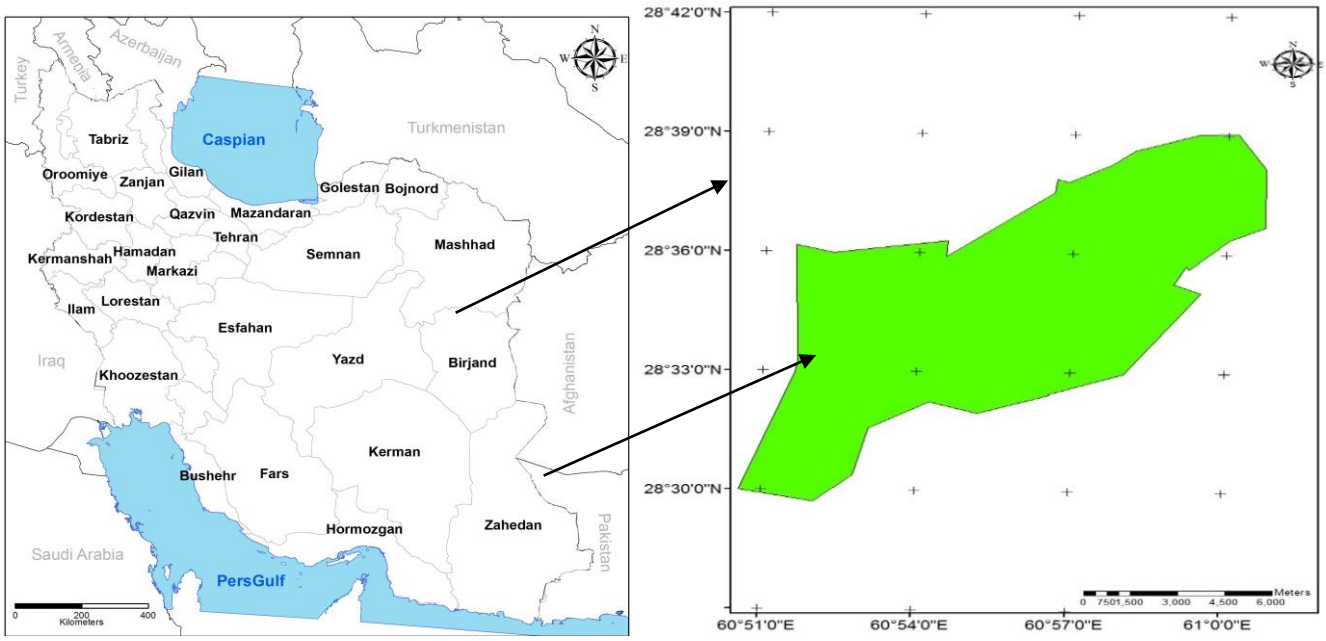

Fig. 2 Study area in Sistan and Baluchestan province, Iran

To calculate the cultural importance index (CI) (Equation 2), a report of the various uses of each particular plant (UR) was obtained by dividing it by the number of Indigenous conscious individuals (N) [23].

$$CI = \sum_{u=u1}^{uNC} \sum_{i=i1}^{iN} URui/N$$

(Eq1)

In this formula UR is a citation of the various uses of a particular plant and N is the number of indigenous aware people. The cultural importance index (CI) indicates the breadth of application (repetition of indigenous people who use the plant) for each plant, taking into account its application diversity. This index deeply presents the results of interviews in a semi-structural way and is very useful in transferring hidden knowledge [24]. The number of questionnaires (150 questionnaires) for this study was designed according to the population of the studied villages and Cochran's formula (Equation 2).

$$n = \frac{\frac{z^2 pq}{d^2}}{1 + \frac{1}{N}\left[\frac{z^2 pq}{d^2} - 1\right]}$$

(Eq2)

In this formula n is the sample size, N is the population size, z is the selected critical value of desired confidence level, p is the estimated proportion of an attribute that is present in the population, q=1-p and d is the desired level of precision [25]. The villages in question were two villages in the south of Khash city called Irandegan with a population of 4232 people and Karvander with a population of 6028 people. The questions presented in the questionnaire were related to the plant organ used, plant harvest time, growth stage, species collection season, type of livestock user and place of growth.

Plant species sampling method

Plant species sampling was performed by the clipping and weighing method. Sampling time varies according to the phenological stages of the species in the area and the plant organ used. Voucher specimen of the plant species (SCH-157) has been deposited at the Herbarium of High Education Complex of Saravan, Sistan and Baluchestan, Iran. In *W. coagulanc* (Stocks) Dunal, the organ used is the fruit of the plant and the time of full maturity of the plant seeds is mid-May and early June. To investigate which chemical compounds in the active ingredient of the plant cause people to use this drug in the treatment of certain diseases, the chemical compounds of the studied species were identified. For this purp 280 essential oil of the studied sample was extracted from the Clevenger apparatus by water distillation. The extracted essential oil was stored in the refrigerator for experiments. Gas chromatography-mass spectrometry (GC/MS) was used to identify the essential oil compounds**.**

Essential oil analysis

Dried aerial parts of the plants (70 g) were chopped into small pieces and submitted to hydro distillation for 2h using a Clevenger-type apparatus with a water-cooled receiver, to reduce hydro distillation-overheating artifacts. The oils were obtained using n-pentane as a collecting solvent and subsequently, they were dried over anhydrous sodium sulphate and stored under N_2 atmosphere in amber vials at 4 °C until they were analyzed. All oils were analyzed within 24 h of their production. Considering the moisture percentage, the essential oil efficiency was measured in dry weight (w/w) [26].

Gas chromatography (GC)

Gas chromatographic analysis was carried out on a Perkin-Elmer 8500 gas chromatography with an FID detector and a DB-5 capillary column (30 m × 0.25 mm i.d., film thickness 0.25 μm). The operating conditions were as follows: carrier gas, helium at a flow rate of 2 ml/min; the oven temperature was programmed to 60 °C for 4 min, then 60–220 °C at 4 °C/min; injector and detector temperatures, 240°C. The percentage composition of the oils was computed in each case from GC peak areas without the use of correction factors [26].

GC–MS analysis and Identification of components

A Hewlett-Packard series 6890 instrument was used, with a DB-5 capillary column (30 m × 0.25 mm i.d., film thickness 0.25 μm), progra mmed as follows: 60 °C for 5 min, then 60–220 °C at 4 °C/min. The carrier gas was helium at a flow rate of 2 ml/min. The components of the oils were identified by their retention time relative to C9–C28 n-alkanes, computer matching with the Wiley 275.L library and as well as by comparison of their mass

spectra with those of authentic samples or with data already available in the literature [26].

RESULTS

Profile of the interviewees

Out of 150 questionnaires designed, 107 questionnaires were filled out by local people. The results showed that most of the interviewees were male (63.55%). The mean age of the subjects was 40-60 years (39.25%) and most of them were illiterate (57%). The jobs of most of the respondents were farmer and animal husbandry (42.05%) and the jobs of some others were employees (14.01%) and freelance jobs (8.41%) (Table 1).

Relative frequency of citation and cultural importance index

According to the information obtained from asking questions and answering with local people, RFC and CI indices were calculated for the species in question. The quantitative relative frequency of citation index (RFC) was around 0.71. The Cultural importance index (CI), which indicates the extent of application for each plant along with its application diversity, was 0.041 (Table 2).

Harvest time, plant organs used, growth stage and method of use

According to the information of the indigenous people of the region (Table 3), the best season for collecting *W. coagulans* (Stocks) Dunal is in the spring, and 54.20% of the interviewees agreed on this. The seeds of the cheese plant (88.78%) are the most used plant organs and the least use of the cheese plant is related to the plant roots. The results showed that indigenous people use the plant more in the seed stage than other stages of growth (60.74%) (Table). Most use of the plant in the form of tablets (one seed of fruit) (Table 4).

Growing place and type of livestock user

The results showed that the plant grows mainly in plain areas (Table 5). Most of the interviewees stated that livestock uses the cheese plant (79.43%). Among consuming livestock, sheep (42.05%) and camels (51.40%) have the maximum use of the plant (Table 5).

Table 1 Sex, age, education and occupation character of people interviewed in the study area

	Gender		Age group (Years)			Education		Occupation	
Variable	Female	Male	20-40	40-60	60<	Illiterate	Literate	Farmer and Animal husbandry	42.05
Frequency (%)	36.44	63.55	28.03	39.25	27.10	57.00	41.12	Employee	14.01
-	-	-	-	-	-	-	-	Self-employment	8.41

Table 2 Relative frequency of citation (RFC) and cultural importance index (CI)

RFC	CI
0.71	0.046

Table 3 Information about the time of use and the used organ

Harvest time				Used organ				
Spring	Summer	Autumn	Winter	Stem	Root	Flower	Leaf	Seed or Fruit
54.20	18.69	11.21	4.47	3.73	1.89	3.73	36.44	88.78

Table 4 Growth stage and method of use

Mmethod of use							Growth stage			
Tablet	Cream	Essence	Oil	Ointment	Decoction	Infusion	End of growth	Vegetative stage	Seed Production	Flowering stage
63.55	2.80	11.21	2.80	3.48	50.46	34.57	31.77	3.73	60.74	17.75

Table 5 Growing place and type of livestock user

Growing place				Livestock user (%)			
Plain	Mountain	Near the river	Other places	Sheep	Cow	Goat	Camel
56.07	53.27	32.71	3.73	42.05	1.86	23.36	51.40

Table 6 The percentage composition of the essential oils of *W. coagulanc* (Stocks) Dunal

Compound	Retention time	Molecular formula	% In sample	Relative Citation (%)
1-Octen-3-one	7.55	$C_8H_{14}O$	69.80	3.67
1-Hepten-3-one	7.55	$C_7H_{12}O$	5.47	3.67
1-Decen-3-one	7.55	$C_{10}H_{18}O$	3.86	3.67
Furan, 2-pentyl-	7.96	$C_9H_{14}O$	76.70	0.42
9-Oxabicyclo [4.2.1] non-7-en-3-one	7.96	$C_8H_{10}O_2$	6.11	0.42
Hexanoic acid, ethyl ester	8.20	$C_8H_{16}O_2$	90.50	0.25
Hexanoic acid	9.20	$C_6H_{12}O_2$	90.60	0.24
1-Octanol	10.52	$C_8H_{18}O$	18.00	0.20
Nonanal	11.60	$C_9H_{18}O$	60.50	1.65
2-Nonanone	11.19	$C_9H_{18}O$	87.80	0.56
2-Nonen-4-one	12.30	$C_9H_{16}O$	42.30	1.94
3-Methyl-1-dodecyn-3-o	12.30	$C_{13}H_{24}O$	7.08	1.94
2-Nonenal, (E)-	13.45	$C_9H_{16}O$	63.40	0.20
Naphthalene	14.22	$C_{10}H_8$	45.30	0.78
1H-Indene, 1-methylene-	14.22	$C_{10}H_8$	24.70	0.78
Octanoic acid	15.58	$C_8H_{16}O_2$	86.60	0.35
(-)-Carvone	16.37	$C_{10}H_{14}O$	35.30	1.26
2-Octenoic acid	16.52	$C_8H_{14}O_2$	48	0.69
2-Decenal, (Z)-	16.95	$C_{10}H_{18}O$	23.60	1.12
Anethole	17.74	$C_{10}H_{12}O$	52.60	0.82
Thymol	18.05	$C_{10}H_{14}O$	43.90	0.60
Phenol, 2-methyl-5-(1methylethyl) (Carvacrol)	18.41	$C_{10}H_{14}O$	46.70	2.10
3-Cyclohexene-1-methanol, α,α,4-trimethyl-, acetate	19.86	$C_{12}H_{20}O_2$	34.90	19.63
n-Decanoic acid (Capric acid)	22.08	$C_{10}H_{20}O_2$	80.60	15,68
Trans-2-Decenoic acid	22.58	$C_{10}H_{18}O_2$	7.03	0.41
Dodecanoic acid, 3-hydroxy-	22.58	$C_{12}H_{24}O_3$	5.38	0.41
Oleic Acid	22.58	$C_{18}H_{34}O_2$	4.54	0.41
1H-Benzocyclohepten-7-ol, 2,3,4,4a,5,6,7,8-octahydro-1,1,4a,7-tetramethyl-, cis	24.60	$C_{15}H_{26}O$	26.70	0.24
Benzene, 1-(1,5-dimethyl-4-hexenyl)-4-methyl-	24.07	$C_{15}H_{22}$	81.70	0.84
β-Bisabolene	24.83	$C_{15}H_{24}$	32.60	0.29
1H-Benzocyclohepten-7-ol, 2,3,4,4a,5,6,7,8-Octahydro-1,1,4a,7 tetramethyl-, cis	24.94	$C_{15}H_{26}O$	26.30	0.21
2(5H)-Furanone, 4-methyl-3,5-bis(2-methyl-2-propenyl)-	24.94	$C_{13}H_{18}O_2$	7.73	0.21
Cyclohexene, 3-(1,5-dimethyl-4-hexenyl)-6-Methylene-, [S-(R*,S*)]-	25.30	$C_{15}H_{24}$	8.37	15.17
Dodecanoic acid	28.30	$C_{12}H_{24}O_2$	87.70	4.84
Benzene, 1-(3-cyclopentylpropyl)-2,4-dimethyl-	29.43	$C_{16}H_{24}$	1.71	3.60
Ar-tumerone	29.43	$C_{15}H_{20}O$	95.50	3.60
Caryophyllene oxide	30.51	$C_{15}H_{24}O$	11.90	5.30
Isoaromadendrene epoxide	31.52	$C_{15}H_{24}O$	14.90	0.46
Tetradecanoic acid	33.40	$C_{14}H_{28}O_2$	89.50	1.43
2-Pentadecanone, 6,10,14trimethyl-	34.15	$C_{18}H_{36}O$	93.80	3.81
n-Hexadecanoic acid (Palmitic acid)	37.92	$C_{16}H_{32}O_2$	77.90	1.33
l-(+)-Ascorbic acid 2,6-dihexadecanoate	37.92	$C_{38}H_{68}O_8$	14.10	1.33
9,12-Octadecadienoic acid, methyl ester, (E,E)-	40.04	$C_{19}H_{34}O_2$	10.70	2.46
9,12-Octadecadienoic acid (Z,Z)-(Linoleic acid)	41.71	$C_{18}H_{32}O_2$	34.50	0.21
Oleic Acid	41.71	$C_{18}H_{34}O_2$	9.22	0.21

Extracted chemical compounds

The results for chemical compounds are given in Table 6. The maximum chemical composition of *W. coagulanc* (Stocks) Dunal is initially related to the Ar-turmerone terpene compound with a 95.5% probability. After that, Pentadecanone from the family of ketones with 93.8% probability is the most common compound in *W. coagulanc* (Stocks) Dunal Also, the percentage of saturated fatty acids such as Palmitic acid, Tetradecanoic acid and unsaturated fatty acids such as Oleic acid showed the highest percentage. However, other compounds such as organic acids, esters, alkaloids and other compounds with different percentages are also present in this species

DISCUSSION

The use of medicinal plants has a special place in Iranian culture. Traditional beliefs of people about the health of using medicinal plants and the existence of extensive origins of these natural resources, have provided a suitable platform for the use of medicinal plants in the Iranian health system [27]. In Iran, the general tendency of society to use herbal medicines and therapies and natural products in general, especially in recent years in traditional medicine has been increasing. The most important reasons are to prove the destructive and side effects of chemical drugs and the creation of environmental pollution that threatens the planet [28]. Considering the importance of the traditional use of medicinal plants for diseases, the use of this valuable information in this regard is necessary [29].

The chemical constituent's seeds of *W. coagulanc* (Stocks) Dunalthat cause milk to coagulate and make cheese include acidic compounds such as saturated fatty acids, unsaturated fatty acids, and organic acids such as palmitic acid, linoleic acid, oleic acid, ascorbic acid. The results showed that these compounds were part of the chemical composition of cheese fruit. Also, esters (28.26%), alkanes (23.91%), terpenes and monoterpenes (10.86%) and aldehydes (2.19%) are other constituents of *W. coagulanc* (Stocks) Dunal seeds. A study by Bakhtawar *et al*. (2010) on the chemical composition of essential oils from the fruit of *W. coagulans* (Stocks) Dunal showed that of the 20 chemical compounds identified, the most composed of esters (21.50%) and alkanes. (9.11%), organic acids (5.5%) and aldehydes (0.32%). Other components identified by these researchers were: Caryophyllene (15%), longifolene (12%), d-cadinene (11.7%), 3-carene (12%), linoleic acid, ethyl ester (8%). Octadecadienoic acid methyl ester 8,11- (7%), undecene-2,5-dimethyl (4.5%), -octadecenoic acid (Z), methyl ester9 (3%), nonanoic acid (3.5%) [30].

By analyzing the fatty acid compounds of *W. coagulans* (Stocks) Dunal fruit by gas chromatography, Ali *et al*. (2017) concluded that the fruit of the plant contains 29 compounds, which were: unsaturated fatty acids, respectively. (22.25%), saturated fatty acids (22.15%), alcohols (5.65%), monoterpenes (3.22%), tropenoids (1.83%) and alkanes (2.7%) and most of the saturated fatty acids and unsaturated fatty acid methyl ester [31].

This result is consistent with the results of the identified chemical compounds of *W. coagulans* (Stocks) Dunal seeds in the present study .In Punjab, Pakistan, the fruits of *W. coagulans* (Stocks) Dunal are used as a source of coagulation enzyme for milk clotting, called "paneer" [32]. A study conducted under the heading of medicinal importance in health and diseases in India found that the seeds of this plant are effective for coagulating milk and making cheese; It is also used due to its various compounds including esters, amino acids, fatty acids, alkaloids in gastrointestinal disorders, epilepsy, intestinal infections, antimicrobials and inflammation, Neurotherapy, kidney and liver problems [33]. The study of chemistry and pharmacology of *W. coagulans* (Stocks) Dunal showed that the plant species is well documented for providing many health benefits such as-anti-diabetic, anti-lipidemic, anti-oxidative, antimicrobial, and anti-inflammatory [34].

Studies have shown that this plant has anti-inflammatory, anti-cancer [34], Alzheimer's treatment, blood sugar and cholesterol-lowering, antibacterial, antifungal, immune-boosting, anti-allergic and antioxidant [35]. Biochemical research on the fruit of this plant species has led to the identification of a special group of steroid lactones called vitaminolides, which therapeutic properties are associated with these compounds [36, 37]. The most important vitamin products of the fruit of *W. coagulans* are withacoagulin, withaferin A, withanolide D, withanolide E, withanolide H [38].

Indigenous people of the region believe that the leaves, fruits and roots of *W. coagulans* (Stocks)

Dunal are effective in treating diabetes and controlling blood sugar, which can be attributed to the presence of steroid and terpene compounds such as Ar-turmerone, thymol, carvacrol, which are chemical compounds of *W. coagulans* (Stocks) Dunal identified in this study. *W. coagulans* (Stocks) Dunal is rich in esters, free amino acids, fatty acids, essential acids and essential oils. Also, studies have shown that the presence of compounds such as coagulin C, withanolide F, coagulanolide and coagulin L in the plant has antihyperglycaemic effects [34].

Vitanolides in this species and steroid compounds have important pharmacological activities. This plant not only reduces blood sugar levels, but also reduces the subsequent complications of diabetes such as neuropathy, retinopathy, nephropathy and cardiovascular damage. The plant species also has excellent anti-tumor, anti-tumor, anti-angiogenic, chemotherapeutic and anti-inflammatory properties. Despite its medicinal properties, it is very affordable, easily accessible and easily consumed.

Indigenous people in the study area believed that *W. coagulans* (Stocks) Dunal was effective in treating depression and its seeds were antimicrobial and anti-disease, as well as helping the body's immune system against germs and pathogens. Antifungal and antibacterial effect of this plant is due to the presence of ethanol in the whole plant and also leaves, respectively [34]. Some studies have been reported that *W. coagulans* (Stocks) Dunal has central nervous system depressant activity [34, 38]. This property is due to the presence of Ar-tumerone in seeds of *W. coagulans* (Stocks) Dunal because it is a chemical compound that affects the central nerve cells and causes relaxation [39]. Also, the presence of Alcoholic and total alkaloids in the fruit of plant has calming and relaxing effects [34]. A large number of amino acids, fatty acids, essential oils, alkaloids have been obtained from this plant. *W. coagulans* has anti- inflammatory, antimicrobial, cardiovascular, anti- depressant, immunosuppressive, anti- tumor and cytotoxic properties [39]. The composition of Ar- tumerone is consistent with the results of identifying the compounds of the studied cheese species .

CONCLUSIONS

Different regions of Iran have tribes with culture and customs in the use of medicinal plants, and therefore to collect valuable information about medicinal plants need more research and investigation among these tribes, due to the death of elderly people. Do not forget their valuable information about medicinal plants .Also, through more scientific studies in traditional medicine of different ethnic groups, new sources in the treatment of diseases can be obtained. Also, due to the common use of the traditional plants, it is necessary to conduct more extensive research in various fields of pharmacy and herbal pharmacology in relation to medicinal plants and to provide the correct use of valuable ethnobotanical information of the people.

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