

Full Length Research Paper

Some Iranian medicinal plants to treat paralysis caused by spinal cord injury (SCI)

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Despite amazing advances in treatment of many diseases, man has not yet managed to treat some medical problems. Spinal cord injury (SCI) is one of the problems of today's medicine. Scientists are through various ways of treating SCI. World Health Organization (WHO) has enumerated use of traditional medical treatments authorized for documented and substantiated cases. In Iranian traditional medicine there have been some different treatment methods which have been used. Some of the medical plants have been presented in this paper. These plants (herbs) have as per Iranian traditional medicine been utilized for paralyzed patients, therefore orientation with these herbs may conduce a way out in finding a new path for treatment of SCI.

Key words: Spinal cord injury (SCI), scientists, traditional medical.

INTRODUCTION

One of the oldest diseases of mankind has been related to damages of the motor and sensory organs. There are some injuries, such as spinal cord injury (SCI) which has not been cured yet (Lewis and Timothy, 2010). Man is always looking for ways in solving his problems. He consecutively uses different types of new and old scientific resources. Resources and opinions out of traditional medicine have also proved to be fruitful in solving some of these injuries.

Persian (Iranian) medicine is accounted for as one of the oldest and richest medical schools of the world. Numerous innovations have been offered in this medicine by Iranian scientists, for instance, in the 9th century (3rd Hegira), spinal cord injuries (SCI) with various treatments on them have been touched in the book entitled al-Hawi, compiled by Al-Razi, an Iranian scientist (Abolghasemi, 2012a). In this respect, it should strongly be highlighted that one of the important therapeutic aspects in this school is to rely upon treatments through remedial herbs, thus consequentially many herbs are used in forms of combinations with one another or with non-herbal

materials. Treatments through herbs are publically welcomed in many communities due to its effectiveness, low harm and cost.

In different countries, scientists are conducting researches on some of these plants. In China for example, tetramethylpyrazine (TMP) extracted from *Ligusticum wallichii* Franchat (chuanxiong), on spinal cord ischemia/reperfusion (I/R) injury, had shown protective effects (Jian-Zhong et al., 2013; Li-Hong et al., 2006). In Iran there were numerous papers presented on plants from the family of Lamiaceae (Labiatae). These plants have proved to own neuro-protective effects on central degeneration of motoneurons in spinal cord neurons following sciatic nerve compression (Nazemiyeh et al., 2009; Azizzadeh and Farzan, 2013; Tehranipour et al., 2010; Tehranipour and Ghadamyari, 2009, 2010).

METHODOLOGY

The first step in researching on cure for use derived from traditional medicine is continuous documented application of the treatment in

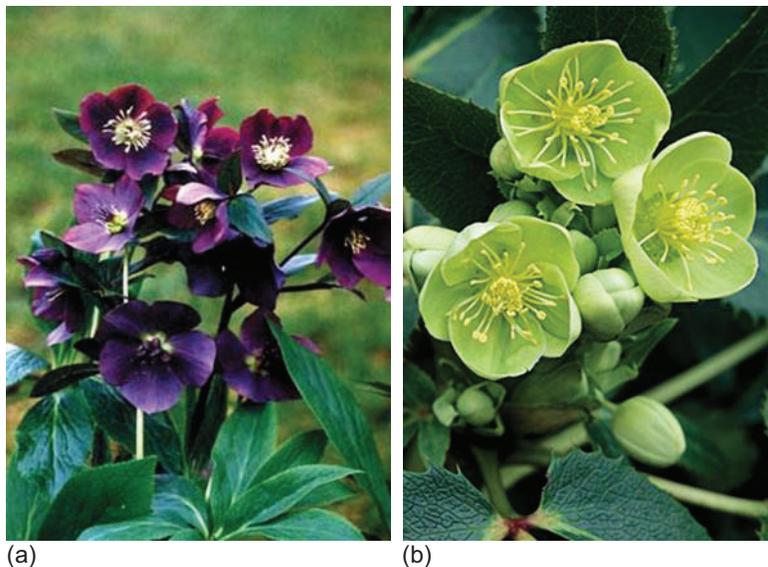


Figure 1. Hellebore (white and black).

its original, social and cultural context by large segments of the population for an enduring period of time ("it seems to work") (Francesco et al., 2006). In this respect, we then used keywords for systematic review of Iranian medical texts. Based on Iranian traditional medicine resources, the equivalent word for the paralysis is "FALAJ" (Abolghasemi, 2012a). Therefore "AI-FALEJ" is referred to as a person who becomes FALAJ. Esterkha is weakness and numbness of the organ (Arzani, 2002). The meaning of Khader is a false sense of touch (Jorjani, 2006), meanwhile Tamadod is presented as anti-seizure (Aboalisina, 2007). So as to extract contents, we have made numerous references to Tehran University of Medical Sciences library center for talent. It should be underscored that the library is one of the richest centers of Iran in the field of traditional medicine. Thus, since numerous repetitions of entries and their pleasant results during the past few generations (centuries) based on the same reference are able to indicate validity of application and public general acceptance (World Health Organization, Traditional Medicine Strategy, (2002 to 2005), 2000), we have then been convinced to pick traditional medicine books of mostly three generations (Razi, 1991; Aboalisina, 2007; Jorjani, 2001, 2006)

After having extracted the whole related contents to keywords, the medical texts were then rewritten, different types of treatments separated and a list of plants applied finally produced. There were names of 140 plants registered in the first list, out of which 37 had abounded in all the three afore-mentioned generations of Iranian popular traditional medicine books. Secondly, these plants (herbs) characteristics were extracted from botanical books. In this phase, both old botanical books of Iranian traditional medicine were used (Alavi, 2010) and newly published references (Soltani, 2005; Mirheidar, 1994; Zargari, 1997). Scientific names, plant profile, nature and their therapeutic applications were obtained from these books. In this regard, it should be mentioned that out of the 37 herbs, only 20 were confirmed to be effective for the treatment of FALAJ, and the remaining 17 based on the same botanical books have had no application in treatment of FALAJ. In this paper, 5 of the most important herbs whose applications on treatment of FALAJ had been touched in Iranian traditional medicine and botanical books were introduced. There is also some aura of new researches available on them.

RESULTS

Hellebore (*albus and niger*)

Scientific name: *Veratrum album* L. and *Veratrum nigrum* L.;

Family: Ranunculaceae;

English name: Melampod, Easter rose, Christmas rose;

Persian name: Kharbagh, Khal zanaki, Kondos, Kondosh;

Arabic name: Kharbaq asvad, Kharbaq abyaz, Harqal, Rajol raii, Vard al-sheta, Vard al-milad.

It is a perennial and short grass having a vertical stalk of 20 cm in length which rarely reaches to one meter. Its branches are purple-like green, its leaves are large, oval, lasting, dentate or without dent, sharp and stuck to stalk without leaf tail. A big flower of different colors (depending on the type of plant) grows in late winter and in summer. It bears two types of flowers: black and white (Figure 1). It has thick root of strong blue-like black color whose core is white. Its reproduction is carried out through seeds and underground stalk parts bearing roots. Its chemical composition comprises glucosides such as helleborin and helleborein which are toxic. This grass grows natively on Central Europe's highlands.

Nature

Its temper is very hot and dry which is duly applicable in dropsy and cold humor diseases. It is a strong laxative agent for suda (one of the 4 humors equals to sediment in new medicine), phlegm, dense bile and viscous blending.

Application

Its underground stalk parts, thick and lightweight, have therapeutic effects. Its taste is sweet, then spicy, bitter and nauseant. Its dosage is 1 to 2 g and toxic to be used in more than 10 g due to harming of kidneys. It should be used with tragacanth, pennyroyal and mastic. Its enema has low harm. For eating, it should first be roasted, meaning to be corrected and moderated by heat, then it can this way be cooked in pasty cave either mixed with barley flour and almond oil or mixed with thyme and mastic. Damping it in sugary materials for a few days or boiling in water with either peeled barley or lentil and drinking the resulting extract are efficient which bears lower harm. It should be used after meal, not fasting. Its black type is prescribed for accidental FALAJ due to cerebral hemorrhage. Its white type extract, mixed with vinegar, is applied for treatment of FALAJ caused by mechanical and physical factors. Bitterness of black type steam is lower than white type but black type is spicier and more hazardous. It should also be added that a novel natural product isolated from *Helleborus purpurascens* is able to inhibit the expression of typical molecules of mature dendritic cells (DC) such as CD80, CD86, and especially of CD83 subsequently leading to a clear and dose-dependent inhibition of the DC-mediated T-cell stimulation. It almost completely reduced leukocyte infiltration in the brain and in the spinal cord. In conclusion, using *in vitro* as well *in vivo* assays, we were able to show that MCS-18 exerts a strong immunosuppressive activity with remarkable potential for the therapy of diseases characterized by a pathologically over-activated immune system (Horstmann et al., 2007).

Ferula

Scientific name: *Ferula persica* wild;
 Family: Umbelliferae;
 English name: Sagaoenum;
 Persian name: Sagbineh;
 Arabic name: Sagbinj, Saghafion, Aftarion;

It is a perennial plant. This plant is one to two meters in length. It has thick cylindrical stalk with yellow integrated umbrella-like flowers at the end of its stalk (Figure 2). Its leaves are wide with deep notch. It has a small oval fruit measuring 5 to 8 mm. This is a native plant of Iran which grows in Alborz mountain hillsides and the mountains located in north of Iran. This plant gum is useful; thus in its extraction, the stalk near the leaf should be scratched with a sharp object. The result is an extract which grows rigid in air. The surface of the gum is red or yellow whose inside is white. Its odor is similar to garlic and *Ferula assafoetida*. Its taste is a little sour and bitter. It burns with much smoke while exposed to flame. The gum maintains property for 20 years.

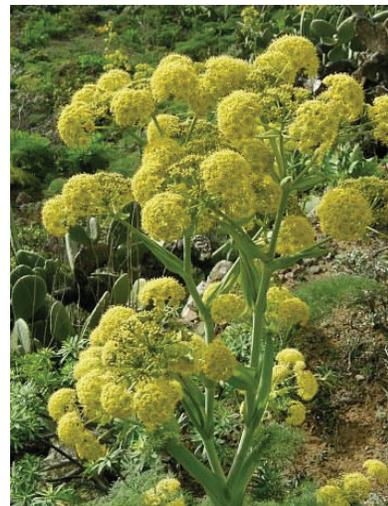


Figure 2. *Ferula persica* wild.

Nature

Its temper is dry and hot, lessens gasses and laxative to bile and dense sticky phlegm. For use, the gum is softened and dissolved in either bitter almond oil or Sodab (*Ruta graveolens*) sap and or Farasion (*Morruhiu vulgare*) sap.

Application

Drinking its juice is useful to the paralyzed in feeling and movement. The amount of syrup should be maximum (1 g). *F. assafoetida* extracts display neuroprotective effects in glutamate-induced neurotoxicity. These extracts exert anti-apoptotic activity in cerebellar granule neurons due to cell cycle arrest in G0G1 phase, which explain the beneficial effects of *F. assafoetida* extracts as therapies for neurologic disorders (Tayeboon et al., 2013).

Euphorbia

Scientific name: *Euphorbia helioscopia*;
 Family: Euphorbiaceae;
 English name: Euphorbio, Tree spurge, Milkwort, Delives milk;
 Persian name: Farfion, Afarbion, Rizetareh;
 Arabic name: Furfakh, Jelisa, Labineh, Vadineh, Tin al-arz, Sooghi, Anjed, Parsion, Akel al-nafseh, Shirsak, shirvareh.

It is a perennial grass. It has short and relatively thick stems and in some cases free of leaves at the base. Leaves are oval and fluffless which go narrow at the base. Its inflorescence verticillate flowers are composed



Figure 3. Euphorbia



Figure 4. Ferula assa foetida L.

of relatively 5 long radii (Figure 3). Its fruit is capsulated, fluffless and round. It grows in relatively humid areas situated at north and south of Iran. Afaebion is a yellow-like gray resinous material with strong taste and smell. Its stale form is red whose stringency and piquancy is less. Its candy is similar to the candy of lettuce, Chicory and Shirdar. The juice has two kinds of candy; one kind is similar to the one of lettuce, branching and prickly, filled with milk, and the other has black leaves, lying on the ground, possessing thin at the same time sharper thorns, filled with more milk. The more pungent and darker, the better it is.

Nature

Its temper is very hot and dry. It is also like polish, subtle, mordacious and acute especially when fresh. It keeps its

medical property for 4 years then grows weak and useless after a 10 year shelf life.

Application

Poultice of the plant with olive oil is suitable to treat paralysis and numbness of extremities. The poultice must not contact the bone because it causes wounds. It is applied in extraction of phlegm residue from nerves, Bell's palsy, Falej, Esterkha, Amtlayy seizures and tremors. Successive smelling of the plant is useful for FALEJ (Paralysis) because it discharges stuff from spine to nose. One rite snuff of the solution with Marjoram juice or fragrance juice of beet is also beneficial to the paralytic person. Drinking it with some adequate spices is also beneficial for Falaj and Esterkha and Tamrykh of Mostarkhyh members in Zyt (olive) oil. In this instruction, there is a three derham amount of Afaebion in one Ratl of Zyt, which can be used for FALEJ and most nervous diseases for a period of minimum 3 and maximum 6 to 7 days. Researches showed that *E. kansui* (Euphorbiaceae) has antioxidative and antifatigue properties and can be given as prophylactic and/or therapeutic supplements for increasing antioxidant enzyme activities and preventing lipid peroxidation during strenuous exercise (Yu et al., 2006)

Stingingassa

Scientific name: *Ferula assa foetida* L.

Family: Umbelliferae.

English name: Ferula, Stingingassa, Assa fetida, Assa foetida, Asant, Gum asafetida.

Persian name: Angdan, Anghouzeh, Angoshtkande, Heltyt, Koulepar, Coma.

Arabic name: Samgh Al-Anjedan, Shajar Al-Heltyt, Shajar Abokabir, Heltyt mentan, Heltyt tayeb

It is a perennial herbaceous plant. Its roots are thick and fleshy. Leaves are much cut and dust-like. Stems are hollow, fleshy and long up to 2 m, owning yellow umbrella-like flowers at the end (Figure 4). For some preliminary years they exist without stems in forms of broad leaves on the ground which is called comah. Sheep love feeding on it. Roots are spread horizontal and parallel to the soil surface serving the soil conservation significantly. Its fruit consists of two dark brown and black oval eggs, which are slightly wide and excessively smelly. Through cutting or pruning either roots or lower parts of stems and or collar of the plant late in spring, some smelly and stench sap will be secreted during the summer which gradually solidifies in the air. The tightened sap is called anghouzeh. This plant is grown in calcareous hot and dry Wastelands in Asia. It is also a native to the steppes of Iran and Afghanistan. The gum is as the size of a bean, smelling like tang of lemon. The

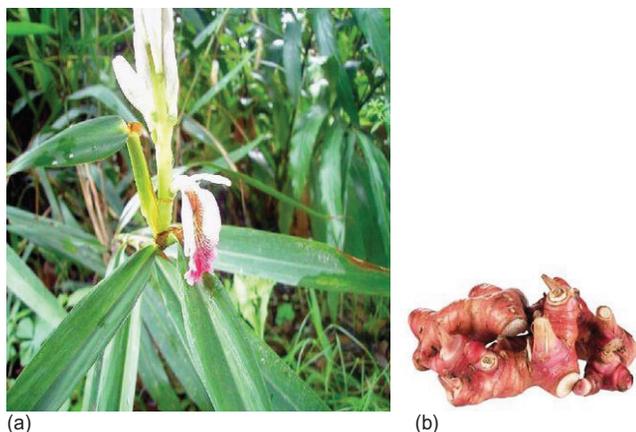


Figure 5. Galangal.

taste of Anghouzeh is acerb and bitter, smelling like garlic and spicy. In traditional medicine books, Anghouzeh has been called by two names: one of them is acetone or white Anghouzeh or Helyt Tayeb which is an extract from Anjedan Tayeb and the other one is black Anghouzeh or Helyt mentan which is an extract from Anjedan mentan. Anghouzeh contains plenty of tannins around 60%, gum about 20% and oil approximately 4 to 5%. There are some compounds like etylen, forolik acid, zarzytotanol, pinene, azolen, mucilage, and Basoryn as well.

Nature

It is very hot and relatively dry. Due to its unpleasant smell, it is used in capsule or injection. Maximum oral dose of anghouzeh is 2 g within a maximum of one week. Its enema application may be up to 8 g per day. Due to its high heat, it should not be prescribed for people prone to body heat and people having liver disease (Kouye, unpublished)

Application

Anghouzeh is an anti-humidity. Its usage with sakbinj is effective by anointment for Falaj and Khader (false sense of touch). 3 carats of anghouzeh's ingestion mingled with wax is beneficial for paralysis. It is harmful to the brain and liver. Drinking it is applicable for wet diseases of central neuron system such as falej, tremor, khader and tamadod (anti-seizure state). Its syrup amount is ½ to 1 ounce. javshyr, sakbinj and baked makhrou (the root of anjedan) is a substitute for it. If anghouzeh is mixed with pepper and rue, it will be useful for tetanus. If it is eaten with vinegar, it will be very helpful for neurons. It can also be eaten with honey which has a better effect on neurons. For centuries, sages of the orient have prescribed anghouzeh as antiepileptic and anti worms which causes

menses as well. It has been believed that it was at the same time very effective and curative for mental disorders and its relevant issues such as paralysis, tremors, lethargy members, om Al-sebyan (epileptic children) (Iraneman, online)

Galangal

Scientific Name: *Alpinia galanga L*

Family: Zingiberaceae

English name: galingale, galanga, blue ginger, laos, Galangat, Greater Galangal, Siamese-ginger, garengal

Persian name: Ghost, Koshne, Kholanjan

Arabic name: Adkham, Galangal, Kulnjan, Kholongan, Gorengal

It is tender when a few years old and a durable herb, aromatic, up to 2.5 m high with 1.0 m spread; with thick fragrant tuberous rootstocks, resembling the scent of ginger from which the new shoots sprout in the spring. Leaves are linear-lanceolate, alternating, produced on reedy stems with fringed borders 15 to 25 × 3 to 6 cm; white sheath, long ligule rounded. Flowers are in white or green clusters (Figure 5a). Inflorescence racemose, tubular flowers bisexual, produced in pendulous panicles on a separate leafless peduncle, with large ovate white bracts, perianth tremors, one stamen and three carples, red in color with whitish pink or yellow labellum. The fruits are red berries in three types: bitter, sweet and kholanjan (Teb sonata Atari momtaz giah darmani Ghost, online, 2009) and seeds obtusely angular and aromatic. This plant is easily cultivated and propagated through divisions of rhizome. It is a tropical plant from South East Asia, India, China and now widely distributed in the tropical and subtropical regions of the world; more recently it is cultivated in US, India and South East Asia. Galangal was known to the ancient Indians, and has been in the West since the middle ages. Its stimulant and tonic properties are recognized by the Arabs who ginger up their horses with it, and by the Tartars, who take it in tea. In the East, it is taken powdered as a snuff, and is used in perfumery. The plants parts used are Rhizome (Figure 5b). *Alpinia galanga* rhizome contains the flavonol galangin.

Nature

Based on Iranian traditional medicine, its nature is very hot and dry. The bitter type is known to be warmer and drier, causing painful blisters, prescribed for external use.

Application

The rhizome is pungent, carminative, stimulant, appetizer, aphrodisiac and carditonic. Rhizomes and

Table 1. Names, families, organs and chemical component of the plants.

Name (genus, species)	Family	Organ of plant	Chemical components
<i>Alpinia Officinerum</i> Hance	Zingiberaceae	Rhizome	Galanjin, galangol, methyl cinamat, aloinin, kampfrid, cineol, pinen, ogenol
<i>Ferula assa-foetida</i>	Umbelliferae	Gum	Isobutylpropanyl disulfide, umbelliferone, ferulic acid asaresinotannol, kadinen, vanilin, oleougum rezin, alfapinen
<i>Veratrum album</i> L. <i>Helleborus niger</i> L.	Ranunculaceae/Liliaceae	Root, stalk Underground stalk	Protoveratrine A, protoveratrine B , jervine, veratridin , cevadine Helleborin , helleborein, hellebrin, cardiotoxic helleborin
<i>Ferula persica</i> wild	Umbelliferae	Gum	Umbelliprenin, Persica ozid, ciskoiterin, komarins ciskoiterin, glicisides komarins ciskoiterin, fitostrol glicosids, sytostrol 3-o-b, sapinen, thuujene alfa
<i>Euphorbia helioscopia</i>	Euphorbiaceae	Sap or latex	Euphoheliosnoid A, B, C, D, euphoscopins, epieuphoscopins euphomins, cuphohelioscopins, helioscopinin A, B

seeds are used against rheumatism, bronchial catarrh, bad breath, and ulcers, whooping colds in children, throat infections, to control incontinence of urine, remedy for fever, dyspepsia, sexual impotency, diabetes; rhizome paste is used for skin problems and acne, used in manufacturing as a fermenting agent. It is widely used in many countries as a food flavoring and a spice. Sweet ghost is a stimulant and heating agent, strengthening nerves, scattering nose winds and curing headaches. If eaten with honey or good spice, it works more. Its poultice with olive oil is beneficial to paralysis and weak members. Eating its thumb screw is useful in weakness of nerves and muscles and fruitful for heating nerves. Eating it with honey is beneficial to dry moisture, to clear mucus and viscous phlegm, and to lessen lucrative winds. It is harmful to the bladder; therefore it is eaten with honey flowers. It is harmful to lungs, so it is eaten with anison (*P. anisum* L.). The feed rate is 4 to 5 g. Regarding khader (false

sense of touch) and wet diseases in brain, it should be used with other appropriate spices. Its successor in terms of properties is a proportion of it whose half is of aghargharha (*Anacyclus pyrethrum* DC). The anti-cancerous compounds of koshne (sweet ghost) were identified out of the numerous studies which had been conducted. The anti-cancerous effects of these compounds result in hunting free radicals, modulation and inhibition of cellular enzymatic activity (Farhangsazan company, online). *Alpinia galanga* (10% ethanolic extract) was found to enhance the sexual activity in mice. No severe toxicity was observed in acute toxicity test. It also has antifungal activity against *Candida albicans* (Cheah and Gan, 2000). Increased intracavernous pressure shows erectile activity (Islam et al., 2001). A mixture of galangal and lime juice is used as tonics in parts of Southeast Asia. The rhizome of lengkuas is used for stomachic properties. An infusion of the rhizome is used for treating rheumatism, fever,

impotency, bronchitis, dyspepsia and diabetes. The juice of the rhizome is given with human urine for cobra-bite poisoning. A paste prepared with a little garlic and vinegar is used as a remedy for herpes. Repeated supplements of it could protect neurons against ischemic damage, showing that DNA damage and lipid peroxidation are attenuated and SODs are increased in the ischemic CA1 region (Li et al., 2013).

DISCUSSION

Based on Iranian traditional medicine notes taken from books at different and successive centuries and botanical old and new books, we have suggested 5 plants (herbs) for the treatment of SCI (Table 1). These 5 plants (herbs) have also been applied in today's researches on laboratory samples of neurological damages. Application of these plants in other laboratories and clinical researches

can lead to new horizons in the treatment of human problems.

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