



Contents lists available at ScienceDirect

Asian Pacific Journal of Tropical Disease

journal homepage: www.elsevier.com/locate/apjtd

Document heading

doi: 10.1016/S2222-1808(14)60754-4

© 2014 by the Asian Pacific Journal of Tropical Disease. All rights reserved.

The most common native medicinal plants used for psychiatric and neurological disorders in Urmia city, northwest of Iran

Kourosh Saki¹, Mahmoud Bahmani^{2*}, Mahmoud Rafeian-Kopaei³, Hassan Hassanzadazar⁴, Kamran Dehghan⁴, Fariba Bahmani⁵, Jafar Asadzadeh⁶

¹Shahid Beheshti University of Medical Sciences, Tehran, Iran

²Razi Herbal Medicines Research Center, Lorestan University of Medical Sciences, Khorramabad, Iran

³Medical Plants Research Center, Shahrekord University of Medical Sciences, Shahrekord, Iran

⁴Deputy for Food and Drug, Urmia University of Medical Sciences, Urmia, Iran

⁵Shohada Hospital of Dehloran City, Ilam University of Medical Sciences, Ilam, Iran

⁶Agri-Bank of Dehloran City, Ilam Province, Iran

ARTICLE INFO

Article history:

Received 24 Feb 2014

Received in revised form 27 Apr 2014

Accepted 24 Jun 2014

Available online 18 Jul 2014

Keywords:

Medicinal plants

Neurological and psychiatric disorders

Urmia

Iran

ABSTRACT

Objective: To determine and introduce medicinal plants used in the treatment of psychological disorders in Urmia city of Iran.

Methods: Direct observation, interviews and collection of herbarium native medicinal herbs were used in this study. Questionnaires included herbalists' personal information, native herbs list to include local name of plant, used organ, application methods and therapeutic effect of the plant. Samples that listed in the questionnaires were collected to determine the genus and species.

Results: By interviews, 22 medicinal plants of 10 families were determined in Urmia city. Asteraceae family had the most therapeutic effects (32%). Seeds of plants were the most used organs and common application method of plants was decoction (80%).

Conclusions: Indigenous knowledge of medicinal plants offers new ideas for modern pharmaceutical science. These study results might be tested experimentally in order to produce new herbal remedies for management of neurological and psychiatric disorders.

1. Introduction

Pain is one of the main problems which for years, humans have been trying to find out a way to get rid of[1]. Pain occurs in acute and chronic forms. Both can be seen as limiting disability causes that prevent individuals of doing daily activities[2]. Trying to find a way to eliminate pain began when the man knew the pain[3]. Pain is one of the main problem of various diseases[4]. Long period pains will lead to adverse psychological outcomes. Therefore, relieving pains or curing of the diseases is essential[5]. Nowadays, analgesics are non-steroidal anti-inflammatory

drugs and opioids that may not be used in all cases due to their probably adverse effects[6].

According to the World Health Organization report, depression as the second reason of disability after cardiovascular diseases resulting causes severe social and economic deficits[7].

Anxiety disorders are the most common mental disorders in communities. Almost 30 million people are suffering of this disorder in the United States[8]. Insomnia is one of the most common disorders that chronically, many people are suffered from it for different reasons[9].

Convulsion is abnormal discharge of a group of neurons in the central nervous system, and may occur in different clinical forms depending on the discharge rate and its spreading. Epilepsy is a chronic disorder which is associated with alteration in mental processes, state

*Corresponding author: Dr. Mahmoud Bahmani, Razi Herbal Medicines Research Center, Lorestan University of Medical Sciences, Khorramabad, Iran.

Tel: 0989186157084

E-mail: mahmood.bahmani@gmail.com

Foundation Project: Supported by Lorestan University of Medical Sciences, Iran (Grant No. 234-5437/2).

of consciousness or involuntary movements. Epilepsy prevalence in different populations is estimated at 0.3 to 0.5 percent and its rate is higher in developing countries[10].

Traditional medicine with its thousands years history gives fundamental and comprehensive solutions to resolve some of the health problems of the community. Recent studies have also shown promising results from the use of these compounds in the treatment of conditions such as pain[11–13], stress and anxiety[14–16], schizophrenia[17], cognition deficit or Alzheimer[18,19] and cardiovascular diseases[20–22].

The uses of plants, always have been popular among Iranians[23–36]. With regard to the incidence and prevalence of neurological and psychiatric disorders in the community, the aim of this study was to determine and introduce medicinal plants used in the treatment of psychological disorders in Urmia city of Iran.

2. Materials and methods

This study was done from October 2013 until December 2013, based on completing provided questionnaires and interviews using non documental folk resources. Data were collected from herbalists of the Urmia city, direct observation and collection of native medicinal plants and asking about usual effectiveness on mental diseases. The questionnaires included personal information of herbalists, native plants therapeutic effects and their used organs with method of using without naming the plants. All collected specimens were prepared separately and labeled with name, therapeutic effects with their traditional use. A total of 42 samples of herbarium plants were collected based on local herbalists information in questionnaires. Samples were sent to Urmia Agricultural Research Center and Agriculture Faculty of Urmia University for genus and species determination using various scientific sources.

3. Results

Due to surveying and data collection based on questionnaires, interviews and plant sampling, a total of 21 medicinal plants of 10 families were identified which were used in the treatment of neurological and psychiatric disorders. Ethno-botanic information of the identified plants is shown in Table 1. Plants of the Asteraceae family were used more than the other families (Figure 1). Herb seeds and flowering shoots were used more often than other parts of medicinal plants (Figure 2). Most of the medicinal

plants were consumed as decoction (Figure 3). Most of the effects of traditional treatment and its number is indicated in Figure 4.

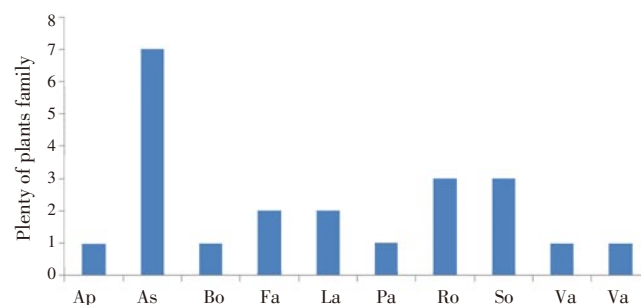


Figure 1. Plenty of plants family with medicinal effects used for neurological and psychiatric disorders treatment.

Ap: Apiaceae, As: Asteraceae, Bo: Boraginaceae, Fa: Fabaceae, La: Lamiaceae, Pa: Papaveraceae, Ro: Rosaceae, So: Solanaceae, Va: Valerianaceae.

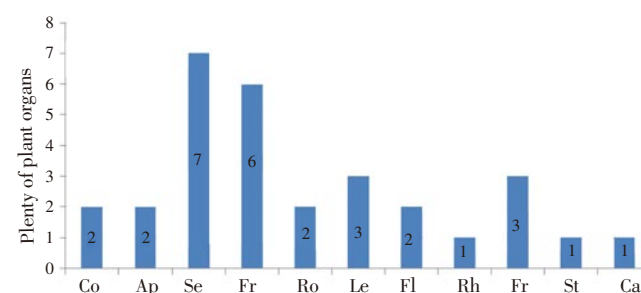


Figure 2. Plenty of plant organs used for neurological and psychiatric disorders treatment.

Co: corymb, Ap: aerial parts, Se: seed, Fr: flowering roots, Ro: root, Le: leaf, Fl: flower, Rh: rhizome, Fr: fruit, St: stem, Ca: capsule.

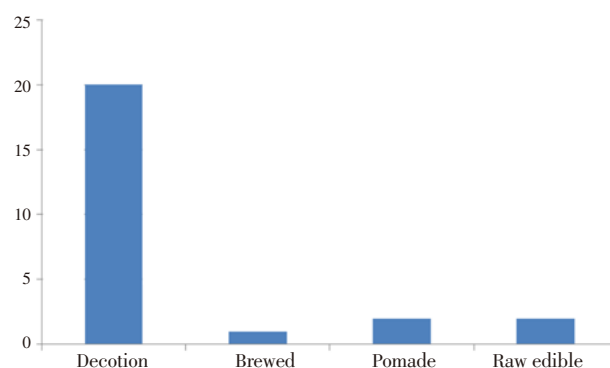


Figure 3. Plenty of traditional using methods of understudying medicinal plants.

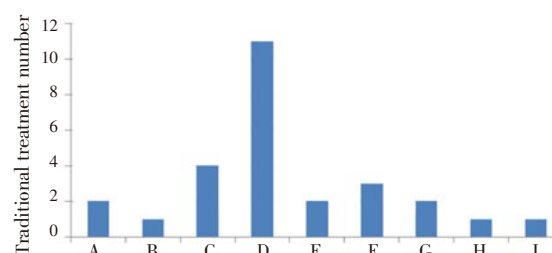


Figure 4. Effects of traditional treatment and its number.

A: relieve chest pain, B: epilepsy, C: sedative, D: tranquilizer, E: headache, F: the nerves restorative, G: depression, H: rheumatism, bone and muscle pain, I: hypnagogic.

Table 1

Ethno-botanic information of medicinal plants used in neurological and psychiatric disorders.

Scientific name	Family	Persian name	Used organ	Using method	Traditional therapeutic effect
<i>Achillea millefolium</i> L.	Asteraceae	Boumadaran	Corymb	Decoction	Anticonvulsant, antiepileptic
<i>Alhagi camelorum</i> Fisch	Fabaceae	Khar-shotor	Aerial organs	Decoction	Lumbago
<i>Amygdalus kotschy</i> Boiss.	Rosaceae	Badam	Seed	Decoction	Narcotic
<i>Anthemis tinctoria</i> L.	Asteraceae	Babouneh zard	Flowering shoot	Decoction, pomade	Nerve tonic, sedative
<i>Centaurea cyanus</i> L.	Asteraceae	Gole gandom	Corymb	Decoction	Narcotic
<i>Cichorium intybus</i> L.	Asteraceae	Casni	Root, Leaf, Flower, Seed	Decoction	Nerves tonic
<i>Coronilla varia</i> L.	Fabaceae	Yonja baghi	Leaf	Raw edible, decoction	Sedative
<i>Datura stramonium</i> L.	Solanaceae	Tatoureh	Seed	Decoction, pomade	Sedative
<i>Echium italicum</i> L.	Boraginaceae	Gaw zaban	Flowering shoot	Decoction	Anticonvulsant, sedative
<i>Hypericum perforatum</i> L.	Asteraceae	Alaf chai	Flowering shoot	Decoction	Headache, sedative
<i>Inula oculus-christi</i> L.	Asteraceae	Mosaffaye cheshme masih	Flowering shoot	Decoction	Rheumatism, myalgia, bone, pain
<i>Valeriana officinalis</i> L.	Valerianaceae	Sonbol altaieb	Root, Rhizome	Decoction	Hypnotic, sedative
<i>Papaver rhoeas</i> L.	Papaveraceae	Shaghaiegh	Seed capsule	Decoction	Narcotic, sedative
<i>Pimpinella affinis</i> Ledeb.	Apiaceae	Taretizake baghi	Flowering shoot, Seed	Decoction	Relieving chest pain
<i>Pyrus salicifolia</i> Pall.	Rosaceae	Golabi	Fruit	Fresh food	Nerve tonic
<i>Solanum dulcamara</i> L.	Solanaceae	Taj rizie pich	Stem	Decoction	Sedative
<i>Solanum nigrum</i> L.	Solanaceae	Taj rizi	Fruit, Seed	Decoction	Sedatives, antidepressant
<i>Stachys lavandulifolia</i> Vahi.	Lamiaceae	Chaie alafi	Flowering shoot	Decoction	Narcotic
<i>Tanacetum parthenium</i> (L.) Schultz.	Asteraceae	Babouneyeh kabir	Leaf, Flower	Decoction	Anti-headaches
<i>Ocimum basilicum</i> L.	Lamiaceae	Reihan	Aerial organs	Decoction	Sedative
<i>Cydonia oblonga</i> Mill.	Rosaceae	Beh	Fruit, Seed	Decoction	Sedative

4. Discussion

Results of this study presented the medicinal plants in use for the treatment of neurological and psychiatric disorders. Different parts of the plants and various using methods were applied for this purpose.

Nowadays, chamomile as a herb of the Asteraceae family is used widely with anti-inflammatory, spasmolytic and sedative features[37]. This plant is also capable of inhibiting increase in cyclic adenosine monophosphate, induced by morphine withdrawal[38,39]. Aqueous and ethanol extracts of flowers of this plant have anti-inflammatory, antispasmodic, sedative and anti-agitation effects. It is also applied for neurological digestive disorders, travel disease and colds[40].

Achillea plants are used in numerous cases such as blood hemostasis, menstrual disorders, hemorrhoids, hematuria, insomnia, visual disturbances, epilepsy and acute or chronic gastritis. The most important compounds in *Achillea millefolium* include essential oils, polyphenols, some types of flavons, lactones, betaines, acetylene compounds, resin, tannin, anilin phosphates, nitrates, potassium salts and organic acids[41]. Tannins, aromas and bitter substances of *Achillea* are effective on the nervous system and heart. This medicinal plant is used in other cases such as general fatigue, heart failure, kidney stones and also in neurological diseases such as neurasthenia, hysteria, epilepsy and seizures[42,43].

Datura plant has been recommended as an analgesic in Iranian ancient medicine[44]. In recent years, this

plant is used as hallucinogen in European and American communities. Presence of alkaloids and alkaline compounds is the main cause of these symptoms[45]. Other species of *Datura* scientifically named *Datura innoxia* Miller is used in traditional medicine to treat seizures and nervous pains such as pain in the face and headache[46]. Important alkaloids of *Datura* are hyoscyamine, atropine, scopolamine and hyoscine, which have antagonistic effects on muscarinic receptors[47–49]. *Datura stramonium* is used as an antispasmodic and anticholinergic[49].

Datura fastuosao has analgesic effects[50]. The previous studies indicate that muscarinic alkaloids of *Datura* plants are able to reduce pain through the central nervous system[51,52].

Basil (*Ocimum basilicum*) contain many compounds including monoterpenes (carrone, thujone, and myrcene, linalol, geraniol, fenchone, cineole), tri-terpenoids (ursolic acid), sesqui-terpenoids, farnesol and caryophyllene and flavonoids (apigenin)[53–55]. The brewed form of this plant in traditional medicine used as anticonvulsant, strengthen, tonic, diuretic, digestive amplifier, anti-bloating, anti-dizziness, relievers of abdominal cramps and anti-coughing[56,57]. Basil extract is likely able to interact with the opioid system. Excitatory amino acids are involved in the development of withdrawal syndrome[58]. Linalol of this plant blocks L-glutamate activity in the *in vitro* experiments (as a competitive antagonist of glutamate) and *in vivo* experiments (seizures), Quin, N-methyl-D-aspartic acid and glutamate release is reduced[59,60]. Anticonvulsant effect, removing migraine headache, tension headaches

and treatment of gastrointestinal origin headaches are the basil's therapeutic effects[56].

In traditional medicine, valerian is used for refreshment and relaxation, treatment of seizures, tension pains and muscle cramps. Valerian root and rhizome are used to treat neurological disorders such as epilepsy, insomnia, dizziness, palpitations, traditionally[61]. Valerian root contains tannin, glucose, various salts, oils, acids, valerenic acid (normal valeric acids) (formic acid, acetic acid, propionic acid and valepotriate[61,62]. Valepotriates are terpenoids made in valerian root that was extracted by dichloromethane. The valerian extract induces releasing of GABA in GABAergic nerves and also reduces its reabsorption[63]. According to the report of Yuan *et al.*, valerinic acid can be attached to GABA receptors in GABAergic nerves and can mimic the activity of GABA[64]. Activation of the GABAergic system causes anxiety reduction[65,66], so valpotriate anxiolytic effects can be attributed to activation of this system.

Papaveraceae plants like poppy have various alkaloids such as readine, readic acid, papaveric acid, meconic acid, mucilage and sugar. These plants are useful for insomnia and inflammation reduction and have narcotic and expectorant effects. Due to existence of small amount of morphine in the extract, the extract is called harmless opium[67–71]. Several compounds with biological activities as antidepressants, antimicrobial and anti-inflammatory effects of these species are: hypericin (naphthodianthrone), pseudohypericin, flavonoids like quercetin and phloroglucinol with various effects[72].

In recent years, *Hypericum perforatum* has been used as an alternative treatment for mild to moderate depression[73]. Previous studies considering the positive results of the different species of *Hypericum* are in Indian, Spanish, Pakistani and Egyptian where *Hypericum* has anti-inflammatory and analgesic effects. Iranian native *Hypericum* has similar therapeutic effects[74,75].

Cichorium intybus is another used plant of the traditional medicine in Iran. Pharmaceutical parts of the plant are roots and aerial organs[76]. *Cichorium intybus* has neuroprotective and antioxidant properties and can prevent neurons damage due to free radicals of oxygen[77].

Unsaturated fatty acids are essential for fetus growth and neurons development[78]. Three essential fatty acids known as omega-3 includes: alpha linoleic acid, eicosapentaenoic acid and docosahexaenoic acid[79–81]. A diet rich in almond creates a harmonious environment for maintaining structure of old cell in brain[82].

Docosahexaenoic acid reduction causes human neuronal degenerative diseases like Alzheimer disease.

Docosahexaenoic acid protects rat brain against toxicity and prevents seizure-like activity in the rat hippocampus[79].

Perhaps almond oil prevents interference in fatty acid metabolism in the hippocampus due to change in the synthesis and releasing of central neurotransmitters and diminishing in learning and memory[83].

Indigenous knowledge of medicinal plants has offered new interesting ideas for modern pharmaceutical science[84–93]. This study results should be tested experimentally in order to produce new herbal remedies for the treatment of neurological and psychiatric disorders.

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgements

We are thankful for collaboration of Deputy for Food and Drug of Urmia University of Medical Sciences, Iran. This research work was supported by Lorestan University of Medical Sciences, Iran (Grant No. 234–5437/2).

References

- [1] Taherian AA, Vafaei AA, Rashidi Pour A, Miladi Gorji H, Jarrahi M. Assessment of the role of dexamethasone on modulation of acute and chronic pain and its comparison with stress analgesic effect in formalin test in mice. *Razi J Med Sci* 2004; **11**(39): 91–96.
- [2] Meister A, Bernhardt G, Christoffel V, Buschauer A. Antispasmodic activity of *Thymus vulgaris* extract on the isolated guinea-pig trachea: discrimination between drug and ethanol effects. *Planta Med* 1999; **65**(6): 512–516.
- [3] Goldman L, Bennett JC. *Cecil textbook of medicine*. 21st ed. Philadelphia: W.B. Saunders Co.; 2000, p. 103.
- [4] Chevalier A. *The encyclopedia of medicinal plant: a practical reference guide to over 550 key herbs and their medicinal uses*. London: Dorling Kindersley; 1996, p. 171.
- [5] Lanni C, Becker EL. Inhibition of neutrophil phospholipase A2 by p-bromophenylacetyl bromide, nordihydroguaiaretic acid, 5, 8, 11, 14-eicosatetraenoic acid and quercetin. *Int Arch Allergy Appl Immunol* 1985; **76**(3): 214–217.
- [6] Elisabetsky E, Brum LF, Souza DO. Anticonvulsant properties of linalool in glutamate-related seizure models. *Phytomedicine* 1999; **6**: 107–113.

- [7] Beck AT, Alford BA. *Depression: causes and treatment*. Philadelphia: University of Pennsylvania Press; 2009.
- [8] Sadock BJ, Sadock VA. *Kaplan and Sadock's synopsis of psychiatry: behavioural sciences/clinical psychiatry*. 9th ed. Philadelphia: Lippincott Williams & Wilkins; 2003, p. 579–580.
- [9] Neubauer DN. Pharmacologic approaches for the treatment of chronic insomnia. *Clin Cornerstone* 2003; **5**: 16–27.
- [10] Lownestein DH. Seizure and epilepsy. In: Braunwald E, Hauser SL, Fauci AS, editors. *Harrison's principle of internal medicine*. New York: mCgraw Hill; 2001, p. 2354–2368.
- [11] Mirzaei MG, Azimian M, Moezzi M, Vameghi R, Rafieian-kopaei M. Effect of lamotrigine on prophylaxis of pediatric classic migraine. *Iran J Child Neurol* 2009; **3**: 35–38.
- [12] Shirani M, Alibabaei Z, Kheiri S, Shirzad H, Taji F, Asgari A, et al. Effect of *Euphorbia helioscopia* extract on acute and chronic pain in mice. *J Babol Univ Med Sci* 2011; **13**(4): 14–18.
- [13] Rabiei Z, Rafieian-Kopaei M, Mokhtari S, Alibabaei Z, Shahrani M. The effect of pretreatment with different doses of *Lavandula officinalis* ethanolic extract on memory, learning and nociception. *Biomed Aging Pathol* 2013; **4**(1): 71–76.
- [14] Akhlaghi M, Shabanian G, Rafieian-Koupaei M, Parvin N, Saadat M, Akhlaghi M. *Citrus aurantium* blossom and preoperative anxiety. *Rev Bras Anesthesiol* 2011; **61**(6): 702–712.
- [15] Saki K, Rafieian-Kopaei M, Bahmani M. The study of intensity and frequency of posttraumatic stress disorder (PTSD) resulting from war in Ilam city. *Life Sci J* 2013; **10**(7): 407–417.
- [16] Roohafza H, Sarrafzadegan N, Sadeghi M, Rafieian-Kopaei M, Sajjadi F, Khosravi-Boroujeni H. The association between stress levels and food consumption among Iranian population. *Arch Iran Med* 2013; **16**(3): 145–148.
- [17] Parvin N, Farzane-Dehkordi Sh, Goudarzi I, Nikfarjam M, Rafieian M, Heidarian E, et al. Effects of *Portulaca oleracea* L. (Purslane) on psychological symptoms of chronic schizophrenic patients in sina hospital. *J Mazand Univ Med Sci* 2013; **23**(97): 2–10.
- [18] Rabiei Z, Rafieian-Kopaei M, Heidarian E, Saghaei E, Mokhtari Sh. Effects of *Zizyphus jujube* extract on memory and learning impairment induced by bilateral electric lesions of the nucleus basalis of meynert in rat. *Neurochem Res* 2014; **39**(2): 353–360.
- [19] Rafieian-Kopaei M. Medicinal plants and the human needs. *J HerbMed Pharmacol* 2012; **1**(1): 1–2.
- [20] Khosravi-Boroujeni H, Mohammadifard N, Sarrafzadegan N, Sajjadi F, Maghroun M, Khosravi A, et al. Potato consumption and cardiovascular disease risk factors among Iranian population. *Int J Food Sci Nutr* 2012; **63**(8): 913–920.
- [21] Asgary S, Keshvari M, Sahebkar A, Hashemi M, Rafieian-Kopaei M. Clinical investigation of the acute effects of pomegranate juice on blood pressure and endothelial function in hypertensive individuals. *ARYA Atheroscler* 2013; **9**(6): 326–331.
- [22] Gharipour M, Ramezani MA, Sadeghi M, Khosravi A, Masjedi M, Khosravi-Boroujeni H, et al. Sex based levels of C reactive protein and white blood cell count in subjects with metabolic syndrome: Isfahan Healthy Heart Program. *J Res Med Sci* 2013; **18**: 467–472.
- [23] Bahmani M, Abbasi J, Mohsenzadegan A, Sadeghian S, Gholami-Ahangaran M. *Allium sativum* L.: the anti-ammatore leech (*Limnatis nilotica*) activity compared to Niclosomide. *Comp Clin Path* 2011; doi: 10.1007/s00580-011-1380-7.
- [24] Bahmani M, Rafieian-Kopaei M, Avijgan M, Hosseini S, Golshahi H, Eftekhari Z, et al. Ethnobotanical studies of medicinal plants used by Kurdish owner's in south range of Ilam province, west of Iran. *Am-Euras J Agric Environ Sci* 2012; **12**(9): 1128–1133.
- [25] Bahmani M, Eftekhari Z. An ethnoveterinary study of medicinal plants in treatment of diseases and syndromes of herd dog in southern regions of Ilam province, Iran. *Comp Clin Path* 2012; **22**: 403–407.
- [26] Eftekhari Z, Bahmani M, Mohsenzadegan A, Gholami-Ahangaran M, Abbasi J, Alighazi N. Evaluating the anti-leech (*Limnatis nilotica*) activity of methanolic extract of *Allium sativum* L. compared with levamisole and metronidazole. *Comp Clin Path* 2012; **21**: 1219–1222.
- [27] Gholami-Ahangaran M, Bahmani M, Zia-Jahrom N. *In vitro* antileech effects of *Vitis vinifera* L., niclosamide and ivermectin on mature and immature forms of leech *Limnatis nilotica*. *Glob Vet* 2012; **8**: 229–232.
- [28] Bahmani M, Golshahi H, Mohsenzadegan A, Gholami-Ahangaran M, Ghasemi E. Comparative assessment of the anti-*Limnatis nilotica* activities of *Zingiber officinale* methanolic extract with levamisole. *Comp Clin Path* 2013; **22**(4): 667–670.
- [29] Gholami-Ahangaran M, Bahmani M, Zia-Jahromi N. Comparative and evaluation of anti-leech (*Limnatis nilotica*) effect of olive (*Olea europaea* L.) with levamisole and tiabendazole. *Asian Pac J Trop Dis* 2012; **2**(1): 101–103.
- [30] Bahmani M, Banihabib E, Saki K, Kazemi-Ghoshji B, Heydari A, Hashemi M. Anti-leech and disinfection activities of methanolic extracts of walnut (*Juglans regida* L.) and oleander (*Nerium oleander* L.) on *Limnatis nilotica*. *World J Zool* 2012; **7**(3): 267–272.
- [31] Bahmani M, Karamati SA, Banihabib EK, Saki K. Comparison of effect of nicotine and levamisole and ivermectin on mortality of leech. *Asian Pac J Trop Dis* 2014; **4**(1): 477–480.
- [32] Forouzan S, Bahmani M, Parsaei P, Mohsenzadegan A, Gholami-Ahangaran M, Sadeghi E, et al. Anti-parasitic activities of *Zingiber officinale* methanolic extract on *Limnatis nilotica*. *Glob Vet* 2012; **9**(2): 144–148.
- [33] Amirmohammadi M, Khajoenia SH, Bahmani M, Rafieian-Kopaei M, Eftekhari Z, Qorbani M. *In vivo* evaluation of antiparasitic effects of *Artemisia abrotanum* and *Salvia*

- officinalis* extracts on *Syphacia obvelata*, *Aspicularis tetrapetra* and *Hymenolepis nana* parasites. *Asian Pac J Trop Dis* 2014; **4**(1): 250–254.
- [34] Saki K, Kazemi-Ghoshchi B, Asadzadeh J, Kheiri A, Hajigholizadeh G, Sotoudeh A, et al. Quran medicine: studying from modern science perspective. *J Nov Appl Sci* 2014; **3**(1): 1298–1302.
- [35] Ghasemi Pirbalouti A, Momeni M, Bahmani M. Ethnobotanical study of medicinal plants used by Kurd tribe in Dehloran and Abdanan districts, Ilam province, Iran. *Afr J Tradit Complement Altern Med* 2013; **10**(2): 368–385.
- [36] Bahmani M, Vakili-Saatloo N, Gholami-Ahangaran M, Karamati SA, Banihabib EK, Hajigholizadeh GH, et al. A comparison study on the anti-leech effects of onion (*Allium cepa* L) and ginger (*Zingiber officinale*) with levamisole and triclabendazole. *J HerbMed Pharmacol* 2013; **2**(1): 1–3.
- [37] Nmecz G. Herbal pharmacy: chamomile—this widely available herb has diverse therapeutic uses, including antiphlogistic, sedative and antimicrobial effects. U.S. Pharmacist; 2000. [Online] Available from: http://web.campbell.edu/faculty/nmecz/George_home/references/Chamomile.html [Accessed on 17th March, 2014]
- [38] Kuppusamy UR, Das NP. Effects of flavonoids on cyclic AMP phosphodiesterase and lipid mobilization in rat adipocytes. *Biochem Pharmacol* 1992; **44**(7): 1307–1315.
- [39] Revuelta MP, Hidalgo A, Cantabrana B. Involvement of cAMP and beta-adrenoceptors in the relaxing effect elicited by flavonoids on rat uterine smooth muscle. *J Auton Pharmacol* 1999; **19**(6): 353–358.
- [40] Barene I, Daberte I, Zvirgzdina L, Iriste V. The complex technology on products of German chamomile. *Medicina (Kaunas)* 2003; **39**(Suppl 2): 127–131.
- [41] Emami A, Shams-Ardakani MR, Nekoe N. *Therapeutic plant, treatment plant diseases*. 1st ed. Tehran: Rahe Kamal Press; 2002, p. 255.
- [42] Moradi M, Rafieian-Koupaei M, Imani-Rastabi R, Nasiri J, Shahrani M, Rabiei Z, et al. Antispasmodic effects of yarrow (*Achillea millefolium* L.) extract in the isolated ileum of rat. *Afr J Tradit Complement Altern Med* 2013; **10**(6): 499–503.
- [43] Zargari A. *Medicinal plants*. Tehran: Institute of Tehran University Press; 1998.
- [44] Khorasani E. *The store medicines*. Tehran: Publications Educational Islamic Revolution; 1992, p. 324–325.
- [45] Schulman ML, Bolton LA. Datura seed intoxication in two horses. *J S Afr Vet Assoc* 1998; **69**(1): 27–29.
- [46] Zargari A. *Medicinal plants*. 3rd ed. Tehran: Tehran University Publication; 1989, p. 567.
- [47] Kursinszki L, Hank H, László I, Szoke E. Chromatography A, simultaneous analysis of hyoscyamine, scopolamine, 6B-hydroxy hyoscyamine and apotropane in solanaceous hairy roots by reversed-phase high-performance liquid chromatography. *J Chromatogr A* 2005; **1091**(1–2): 32–39.
- [48] Samsamshariat H. *Analyse and characterization of plant products with chromatography and microscopic methods*. Isfahan: Mani; 1989, p. 70–74.
- [49] Pappano AJ, Bertram G. *Basic and clinical pharmacology*. New York: McGraw-Hill; 2004, p. 109–113.
- [50] Abena AA, Miguel M, Mouanga A, Hondi Assah TH, Diatwa M. Evaluation of analgesic effects of *Datura fastuosa* leaves and seed extracts. *Fitoterapia* 2003; **74**(5): 486–488.
- [51] Xu G, Duannu Z, Yin Q. [The role of Ach in central nerve system on pain modulation and analgesic]. *Zhen Ci Yan Jiu* 1993; **18**: 1–5, 7. Chinese.
- [52] Ahmadiani A, Semnanian S, Hoseini J. Antinociceptive effect of fruit extract of *Elaeagnus angustifolia* in both acute and chronic pain. *Trauma Monthly* 1998; **3**(1): 25–30.
- [53] Sajjadi SE. Analysis of the essential oils of two cultivated basil (*Ocimum basilicum* L.) from Iran. *DARU* 2006; **14**: 128–130.
- [54] Telci I, Bayram E, Yilmaz G, Avci B. Variability in essential oil composition of Turkish basil (*Ocimum basilicum* L.). *Biochem Syst Ecol* 2006; **34**: 489–497.
- [55] Chiang LC, Ng LT, Cheng PW, Chiang W, Lin CC. Antiviral activities of extracts and selected pure constituents of *Ocimum basilicum*. *Clin Exp Pharmacol Physiol* 2005; **32**: 811–816.
- [56] Zargari A. *Medicinal plants*. 6th ed. Tehran: Tehran University Publication; 1997, p. 47–51.
- [57] Rafieian-Kopaei M, Hosseini-asl K. Effects of *Ocimum basilicum* on functional dyspepsia: a double-blind placebo-controlled study. *Iran J Med Sci* 2005; **30**(3): 134–137.
- [58] Zhu H, Rockhold RW, Ho IK. The role of glutamate in physical dependence on opioids. *Jpn J Pharmacol* 1998; **76**: 1–14.
- [59] Brum LF, Elisabetsky E, Souza DO. Effects of linalool on [(3)H] MK801 and [(3)H] muscimol binding in mouse cortical membranes. *Phytother Res* 2001; **15**: 422–425.
- [60] Elisabetsky E, Amador TA, Albuquerque RR, Nunes DS, Carvalho Ado C. Analgesic activity of *Psychotria colorata* (Willd. ex R. & S.) Muell. Arg. alkaloids. *J Ethnopharmacol* 1995; **48**(2): 77–83.
- [61] Zargarai A. *Medicinal plants*. 5th ed. Tehran: Tehran University publications; 1991.
- [62] Wang HL, Zhang DF, Luo ZF, Luo Y, Li QR, Wang YZ. *In vitro* study on the genotoxicity of dichloromethane extract of valerian (DEV) in human endothelial ECV304 cells and the effect of vitamin E and C attenuating the DEV-induced DNA damages. *Toxicol Appl Pharmacol* 2003; **188**(1): 36–41.
- [63] Santos MS, Ferreira F, Cunha AP, Carvalho AP, Ribeiro CF, Macedo T. Synaptosomal GABA release as influenced by valerian root extract—involvement of the GABA carrier. *Arch Int Pharmacodyn Ther* 1994; **327**(2): 220–231.
- [64] Yuan CS, Mehendale S, Xiao Y, Aung HH, Xie JT, Ang-Lee MK.

- The gamma-aminobutyric acidergic effects of valerian and valerianic acid on rat brainstem neuronal activity. *Anesth Analg* 2004; **98**(2): 353–358.
- [65] Löw K, Crestani F, Keist R, Benke D, Brünig I, Benson JA, et al. Molecular and neuronal substrate for the selective attenuation of anxiety. *Science* 2000; **290**(5489): 131–134.
- [66] Sanders SK, Morzorati SL, Shekhar A. Priming of experimental anxiety by repeated subthreshold GABA blockade in the rat amygdala. *Brain Res* 1995; **699**(2): 250–259.
- [67] Kalva YN, Sanyar G. Alkaloids from Turkish *Papaver rhoeas* L. *Planta Med* 1989; **55**: 488.
- [68] Matysik G, Benesz M. Thin-layer chromatography and densitometry of anthocyanins in the petals of red poppy during development of the flowers. *Chromatographia* 1991; **32**: 19–22.
- [69] Rey JP, Levesque J, Kposset JP, Rolot F. Analytical studies of isorhoeadine and rhoegenine in petal extracts of *Papaver rhoeas* L. using high performance liquid chromatography. *J Chromatogr A* 1992; **596**: 276–280.
- [70] Slavik J, Slavikov L, Bochorakova J. Alkaloids from *Papaver rhoeas* var. *chelidonioides* O. Kuntze, *P. confine* Jord and *P. dubium* L. *Collect Czech Chem Commun* 1989; **54**: 1118–1125.
- [71] Zargarai A. [*Medicinal plants*]. 5th ed. Tehran: Tehran University publications; 1996, p. 102–191. Persian.
- [72] Mukherjee PK, Verpoorte R, Suresh B. Evaluation of *in-vivo* wound healing activity of *Hypericum patulum* (family: Hypericaceae) leaf extract on different wound model in rats. *J Ethnopharmacol* 2000; **70**(3): 315–321.
- [73] Jean D, Pouligon M, Henriot AC. Pharmacological activity of three commercial *Hypericum perforatum* preparations in mice. *Phyther Res* 2006; **20**(8): 653–654.
- [74] Abdel-Salam OM. Anti-inflammatory, antinociceptive, and gastric effects of *Hypericum perforatum* in rats. *ScientificWorldJournal* 2005; **5**: 586–595.
- [75] Mirzaei G, Sewell RD, Kheiri S, Rafieian-Kopaei M. A clinical trial of the effect of St. John's wort on migraine headaches in patients receiving sodium valproate. *J Med Plants Res* 2012; **6**(9): 1524–1531.
- [76] Iranian Herbal Pharmacopoea Scientific Committee. *Herbal Pharmacopoeia*. 1st ed. Tehran, Iran: Ministry of Health Publications; 2002, p. 578–587.
- [77] Marteau P, Jacobs H, Cazaubiel M, Signoret C, Prevel JM, Housez B. Effect of chicory inulin in constipated elderly people: a double-blind controlled trial. *Int J Food Sci Nutr* 2011; **62**(2): 164–170.
- [78] Goldin M, Segal M, Avignone E. Functional plasticity trigger formation and pruning of dendritic spines in cultured hippocampal net works. *J Neurosci* 2007; **21**: 186–193.
- [79] Moreira JD, Knorr L, Thomazi AP, Simão F, Battú C, Osés JP, et al. Dietary omega-3 fatty acids attenuate cellular damage after a hippocampal ischemic insult in adult rats. *J Nutr Biochem* 2010; **21**: 351–356.
- [80] Aminpour A. *Nutrition therapy, publication cooperation*. CV Research in AH 6–5138, 2006.
- [81] Jaafarian M. *Long life without disease with omega 3, a new miracle of the century*. Tehran: Nashr Publication; 2003, p. 1–9.
- [82] Fackelmann K. Almonds, daily exercise keep brain healthy. *Health Behav* 2005; [Online] Available from: http://usatoday30.usatoday.com/news/health/2005-11-14-brain-almonds-health_x.htm [Accessed on 22nd April, 2014]
- [83] Jiang PY, Gong JF, Wu XH, Xu XB. [Change of unsaturated fatty acids in hippocampus of mice exposed to lead]. *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi* 2009; **27**(6): 325–328. Chinese.
- [84] Kumar M, Chandel M, Kumar S, Kaur S. Amelioration of oxidative stress by anthraquinones in various *in vitro* assays. *Asian Pac J Trop Dis* 2012; **2**(Suppl 2): S692–S698.
- [85] Baskaran C, Ratha bai V, Velu S, Kumaran k. The efficacy of *Carica papaya* leaf extract on some bacterial and a fungal strain by well diffusion method. *Asian Pac J Trop Dis* 2012; **2**(Suppl 2): S658–S662.
- [86] Chikhi I, Allali H, El Amine Dib M, Medjdoub H, Tabti B. Antidiabetic activity of aqueous leaf extract of *Atriplex halimus* L. (Chenopodiaceae) in streptozotocin-induced diabetic rats. *Asian Pac J Trop Dis* 2014; **4**(3): 181–184.
- [87] Govindasamy C, Kannan R. Pharmacognosy of mangrove plants in the system of unani medicine. *Asian Pac J Trop Dis* 2012; **2**(Suppl 1): S38–S41.
- [88] Tiwari P, Verma R, Ahirwar D, Chandy A, Dwivedi SH. Evaluation of anxiolytic effect of *Syzygium aromaticum*: a traditional herb of India. *Asian Pac J Trop Dis* 2014; **4**(Suppl 1): S77–S80.
- [89] Khan AV, Ahmed QU, Khan MW, Khan AA. Herbal cure for poisons and poisonous bites from Western Uttar Pradesh, India. *Asian Pac J Trop Dis* 2014; **4**(Suppl 1): S116–S120.
- [90] Ghate R, Patil VP, Hugar S, Matha NH, Kalyane NV. Antihyperglycemic activity of *Areca catechu* flowers. *Asian Pac J Trop Dis* 2014; **4**(Suppl 1): S148–S152.
- [91] Haldar S, Kar B, Dolai N, Suresh Kumar RB, Behera B, Haldar PK. *In vivo* anti-nociceptive and anti-inflammatory activities of *Lippia alba*. *Asian Pac J Trop Dis* 2012; **2**(Suppl 2): S667–670.
- [92] Tennyson S, Balaraju K, Park K, Ravindran KJ, Eapen A, William SJ. *In vitro* antioxidant activity of *Ageratum houstonianum* Mill. (Asteraceae). *Asian Pac J Trop Dis* 2012; **2**(Suppl 2): S712–S714.
- [93] Bahmani M, Saki K, Gholami-Ahangaran M, Parsaei P, Mohsenzadegan A, Zia-Jahromi N. Evaluating the anti-leech activity of methanolic extract of *Matricaria chamomilla* L. comparing with ivermectin, mebendasole, praziquantel, rafoxanide, febantel and albendasole. *Middle-East J Sci Res* 2012; **12**(2): 260–263.