Journal of Medical and Biomedical Sciences (2017) 6(3): *23-29*

doi: http://dx.doi.org/10.4314/jmbs.v6i3.4

REVIEW ARTICLE

Phytotherapy for children's nocturnal enuresis

S. H. Ahmadipour[1], M. Vakili[2], and S. Ahmadipour[3]

[1]Pediatric Department, [3]Pharmacy Faculty, Lorestan University of Medical Sciences, Khorramabad, [2]Fellowship of Pediatric Nephrology, Children's Medical Center, Tehran University of Medical Sciences, Tehran, Pediatric Department, Iran

In a period of childhood, one of the issues that annoys the parents is their child's nocturnal enuresis. Nocturnal enuresis is annoying not only for the family but for the children themselves. Conventional treatments for nocturnal enuresis lead to certain complications. Medicinal plants have a special status in the treatment of neonatal and pediatric diseases. In phytomedicine, certain medicinal plants and phytotherapies have been suggested to treat nocturnal enuresis. The purpose of this study is to review the most important medicinal plants for children's nocturnal enuresis. To conduct this review, we searched for relevant articles indexed in certain databases such as PubMed, Scopus, Islamic World Science Citation Center, Scientific Information Database, and Magiran and some data sites using the words nocturnal enuresis, children's urination, medicinal plants, and traditional medicine. Results have shown that *Zingiber officinale*, *Valeriana officinalis*, *Alcea rosea*, *Elettaria cardamomum*, *Cinnamomum verum*, *Ribes uva-crispa*, *Cornus mas*, *Juglans regia*, *Vitis vinifera*, *Sinapis spp.*, *Olea europaea*, and *Prunus cerasus* are a number of important plants that are effective on nocturnal enuresis in traditional medicine and phytomedicine.
Journal of Medical and Biomedical Sciences (2017) 6(3), 23 - 29

Keywords: Pediatric diseases, nocturnal enuresis, treatment

INTRODUCTION

Nocturnal enuresis refers to frequent, intentional, or involuntary excretion of urine into clothes or bed during the day or overnight in children who are at an age that are expected to naturally have bladder control and have no definite physical abnormalities (Farhat *et al.*, 2000). Nocturnal enuresis is one of the most common problems in childhood, which is a disorder characterized by disproportionate amount of urine excreted while asleep (Farhat *et al.*, 2000). Nocturnal enuresis usually occurs at an age when the baby is expected to naturally gain control of his/her bladder (Behrman E.R, 2007).

Nocturnal polyuria, clogged eustachian tube, diabetes, tuberculosis, decreased functional capacity of the bladder, hyperthyroidism, urinary tract infection, parasitic infection, deep sleep, positive family history, constipation, chronic kidney failure, third tonsil, habitual mouth breathing, stress caused by disastrous events of life, genetics, and male gender have been reported to be the causes of this disorder (Behrman E.R, 2007).

Nocturnal enuresis in children manifests in two primary (continuous) and secondary types. In the primary or continuous type, the child will never be dry at night for six months. Secondary enuresis is when a child has been dry overnight for six months or more, but then starts wetting the bed (Cobussen-Boekhorst *et al.*, 2013). When involuntary excretion of urine occurs at least twice a week for three consecutive months and the child's age is at least five years, the diagnosis is nocturnal enuresis (Alkot and Deeb, 2012).

Nocturnal enuresis is also an important and complex problem among elementary school age children that can lead to certain difficulties for both parents and the child itself. If left untreated, it causes behavioral problems in children and worry in parents, and it may even influence the child's communication in adulthood (Howe and Walker, 1992; Gary Benntte, 1999). The prevalence of nocturnal enuresis has been reported 3% and 7% in 5-year-

Correspondence: *Dr. Shokoufeh Ahmadipour; Pediatric Department, Lorestan University of Medical Sciences, Khorramabad, Iran,*
Email: *ahmadipour_sh@yahoo.com*

old girls and boys (Bakx *et al*., 2004), and 2% and 3% in 10-year-old girls and boys, respectively (Sadock and Sadock, 2011). Results of studies have shown that around five million children in the United States suffer from nocturnal enuresis (Haque *et al*., 1981). There are various therapies for treating enuresis. Therapeutic approaches that have led to more effective therapeutic effects include antidepressants (tricyclic antidepressants), desmopressin, conditioning therapy, and behavioral therapy, each of which has its own problems and complications (Glazener and Evans, 2002).

In a period of childhood, one of the issues that annoys the parents is their child's nocturnal time. Many families go to the doctor to treat this disorder. Nocturnal enuresis is annoying not only for the family but for the child himself/herself. Common treatments lead to certain complications. Currently, people are paying special attention to traditional medicine and herbal medicine. Medicinal plants have a special status with respect to the treatment of infants' and children's illnesses (Owumi *et al*., 2016). In phytomedicine, certain medicinal plants and phytotherapies have been suggested to treat nocturnal enuresis. This review is to investigate the most important medicinal plants for children's nocturnal enuresis.

MATERIALS AND METHODS

Relevant articles indexed in certain databases such as PubMed, Scopus, Islamic World Science Citation Center, Scientific Information Database, and Magiran and some data sites were retrieved using the words nocturnal enuresis, children's urination, medicinal plants, and traditional medicine.

RESULTS AND DISCUSSION

Research findings have shown that *Zingiber officinale*, *Valeriana officinalis*, *Alcea rosea*, *Elettaria cardamomum*, *Cinnamomum verum*, *Ribes uva-crispa*, *Cornus mas*, *Juglans regia*, *Vitis vinifera*, *Sinapis* spp., *Olea europaea*, *Prunus cerasus* are a number of important effective plants on nocturnal enuresis in traditional medicine and phytomedicine (Tables 1 and 2).

Nocturnal enuresis occurs when a person is unable to control his/her urine while asleep overnight. There are two main (primary and secondary) types nocturnal enuresis.
The primary type is present from the beginning and continues, but in the secondary type, the person later became ill. Nocturnal enuresis is a widespread topic and its diagnosis requires additional studies.

Children's nocturnal enuresis is due to the lack of development of the urinary drainage center in the brain, but this condition is expected to end until the age of 6 years in boys and the age of 7 years in girls.

However, many causes can lead to nocturnal enuresis, such as neurological diseases, inadequate secretion of anti-diuretic hormone, neurogenic bladder, environmental stresses, underlying diseases, and urinary tract infections, but therapeutic approaches to treat it have also been proposed (Tjendraputra *et*

Table 1. Medicinal plants, active compounds, and photos of effective medicinal plants on noc-

Botanical name	Active compounds	Photo
Zingiber officinale	6-gingerol and 6-shogaol, 5-lipoxygenase (Tjendraputra *et al.,* 2001; Van Breemen *et al.,* 2011)	

Botanical name	Active compounds	Photo
Valeriana officinalis	Calarene, aristolone, α-selinene, β-maaliene, patchoulol, α-pinene, and β-humulene (Wang *et al.,* 2010).	
Alcea rosea	Flavonoids, terpenes, and various terpenoids, phytosterols, and phenolic compounds (Elmastas *et al.,* 2004; Stogdale, 2008).	
Elettaria cardamomum	Alpha 1-terpineone, menthone, alpha-phellandrene, cineone, Sitostanone, beta-nerolidole, myrcene, limonene, sabinene, heptane, and phytal (Shaban *et al.,* 1987; Okugawa H, 1988; Gopalakrishnan *et al.,* 1990; Duke, 1992)	
Cinnamomum verum	Caryophyllene, eugenol, coumarin, and cineol (Mohammad Beigi, 2008)	
Ribes uva-crispa	Anthocyanin (Moyer *et al.,* 2002)	

Cornus mas	Quercetin (Neto, 2007)	
Juglans regia	Ascorbic acid, flavonoids, caffeic acid, and p-coumaric acid, 5- Hydroxy-1,4-naphthoquinone, and juglone (Jaymand *et al.,* 2004; Fathi *et al.,* 2006)	
Vitis vinifera	Monomeric procyanidin (Jayaprakasha *et al.,* 2003)	
Sinapis spp.	Allyl isothiocyanate (Peng *et al.,* 2014)	
Olea europaea	Oleuropein (Benavente-Garcıa *et al.,* 2000)	
Prunus cerasus	1-(4-Hydroxyphenyl)-1,2-ethanediol-1,2-bis-1-O-β-d-glucopyranoside (Piccolella *et al.,* 2008)	

Table 2. Natural treatments and effective medicinal plants for nocturnal enures

Scientific name	Family plants	Persian name	Therapeutic effect
Zingiber officinale	Zingiberaceae	Zanjabil	Brewed Zingiber officinale is used to treat children's enuresis.
Valeriana officinalis	Caprifoliaceae	Sonboloteib	Brewed Valeriana officinalis is an effective treatment for children's enuresis.
Alcea rosea	Malvaceae	Gole khatmi	Alcea rosea is a cure for treating enuresis, which can be used as brewed twice a day.
Elettaria cardamomum	Zingiberaceae	Hel	A tablespoon of Elettaria cardamomum seed is halved and cooked in a container containing boiling water to brew well. This tea is ready-to-drink after 15 to 20 minutes, and to make it easier for children to drink, some honey, which itself is useful to treat enuresis, can be added to it.
Cinnamomum verum	Lauraceae	Darchin	Cinnamomum verum is helpful in treating children's enuresis. C. verum is warm-natured and keeps the child's body warm and therefore is useful to treat enuresis.
Ribes uva-crispa	Grossulariaceae	Angour farangi	Ribes uva-crispa is used for the treatment of children's enuresis. For this purpose, R. uva-crispa is crushed, a tablespoon of honey and a small amount of turmeric are added to it. Give your child a tablespoon of this combination a day in the morning. You can also give him/her a teaspoon of diced R. uva-crispa with a small amount of black pepper powder on a daily basis.
Cornus mas	Cornaceae	Zoghal akhteh	Cornus mas juice is a good treatment for children with nocturnal enuresis. Taking a cup of C. mas an hour before bedtime for at least a few weeks can be an effective treatment.
Juglans regia	Juglandaceae	Gerdou	Juglans regia is used to reduce the frequency of nocturnal enuresis in children. Give two full J. regia before bedtime. Continue this treatment for a few weeks until positive results appear.
Vitis vinifera	Vitaceae	Angour (keshmesh)	Vitis vinifera is used to rduce the frequency of nocturnal enuresis in children. Give the child five V. vinifera before bedtime. This treatment should be continued for several weeks until positive results appear.
Sinapis spp.	Brassicaceae	Khardal	A great way to treat enuresis is taking Sinapis spp. powder. Sinapis spp. powder is especially effective for nocturnal enuresis due to urinary tract infection. Pour a teaspoon of Sinapis spp. powder into a glass of warm milk and give it to your child one hour before bedtime.
Olea europaea	Oleaceae	Zeytoun	Olea europaea oil is slightly warmed and is slowly applied on the baby's lower belly by massaging. Do this for several consecutive days to be effective.
Prunus cerasus	Rosaceae	Albalou	Prunus cerasus juice helps the bladder and urinary system of the baby function better, and it is better to give it to the baby one hour before bedtime.

al., 2001).

CONCLUSION

In traditional medicine, *Z. officinale*, *V. officinalis*, *A. rosea*, *E. cardamomum*, *C. verum*, R. *uva-crispa*, *C. mas*, *J. regia*, *V. vinifera*, *Sinapis spp.*, *O. europaea*, and *P. cerasus* are among the most important medicinal plants that have been reported, in traditional medicine and phytomedicine, to be effective in treating nocturnal enuresis.

COMPETING INTERESTS

The authors declare that they have no competing interests.

REFERENCES

Alkot M. and Deeb M. (2012) Nocturnal enuresis among school children in Menofia Governorate, Egypt; a hidden problem. *Journal of American Science* 8(1), 327-334.

Bakx R., Busch O., Bemelman W., Veldink G., Slors J. and Van Lanschot J. (2004) Morbidity of temporary loop ileostomies. *Digestive surgery* 21(4), 277-281.

Behrman E.R K.M.R., Jenson, B.H, (2007) *Nelson textbook of pediatrics.* , 18th Edition ed. Philidelphia: Saunders.

Benavente-Garcıa O., Castillo J., Lorente J., Ortuno A. and Del Rio J. (2000) Antioxidant activity of phenolics extracted from Olea europaea L. leaves. *Food chemistry* 68(4), 457-462.

Cobussen-Boekhorst H.J., van Genugten L.J., Postma J., Feitz W.F. and Kortmann B.B. (2013) Treatment response of an outpatient training for children with enuresis in a tertiary health care setting. *Journal of pediatric urology* 9 (4), 516-520.

Duke J.A. (1992) *Handbook of phytochemical constituent grass, herbs and other economic plants*: CRC press.

Elmastas M., Ozturk L., Gokce I., Erenler R. and Aboul-Enein H.Y. (2004) Determination of antioxidant activity of marshmallow flower (Althaea officinalis L.). *Analytical letters* 37(9), 1859-1869.

Farhat W., Bägli D.J., Capolicchio G., O'reilly S., Merguerian P.A., Khoury A. and McLORIE G.A. (2000) The dysfunctional voiding scoring system: quantitative standardization of dysfunctional voiding symptoms in children. *The Journal of urology* 164(3), 1011-1015.

Fathi A.F., Garjani A. and Motevalian N.A. (2006) Study of hypoglycemic activity of the hydroalcoholic extract of juglans regia in normal and diabetic rats.

Gary Benntte L.M.O.F., De Angelis C, Feigin R, Warshaw (1999) Disorders of elimination. Encopresis and enuresis in principles and practice of pediatrics. *J.B Lippincott Company. Philadelphia.* 21559-1560.

Glazener C. and Evans J.H. (2002) Desmopressin for nocturnal enuresis in children. *The Cochrane Library*.

Gopalakrishnan M., Narayanan C. and Grenz M. (1990) Nonsaponifiable lipid constituents of Cardamom. *Journal of agricultural and food chemistry* 38(12), 2133-2136.

Haque M., Ellerstein N., Gundy J., Shelov S., Weiss J., McIntire M., Olness K., Jones D., Heagarty M. and Starfield B. (1981) Parental perceptions of enuresis. *Am J Dis Child* 135809-811.

Howe A.C. and Walker C.E. (1992) Behavioral management of toilet training, enuresis, and encopresis. *Pediatric Clinics of North America* 39(3), 413-432.

Jayaprakasha G., Selvi T. and Sakariah K. (2003) Antibacterial and antioxidant activities of grape (Vitis vinifera) seed extracts. *Food research international* 36(2), 117-122.

Jaymand K., Rezaei M., Baghaei P., Sajadipoor S. and Nasrabadi M. (2004) Determination of Juglone from leaves and fresh peels of Juglans regia L. by high performance liquid chromatography.

Mohammad Beigi N., Haghighi Asl, A., Hormozi, f. (2008) Investigation of various factors Drasansgyry of cinnamon. . *College of Engineering* 42(2), 199-203.

Moyer R.A., Hummer K.E., Finn C.E., Frei B. and Wrolstad R.E. (2002) Anthocyanins, phenolics, and antioxidant capacity in diverse small fruits: Vaccinium, Rubus, and Ribes.

Journal of agricultural and food chemistry 50(3), 519-525.

Neto C.C. (2007) Cranberry and blueberry: evidence for protective effects against cancer and vascular diseases. *Molecular nutrition & food research* 51(6), 652-664.

Okugawa H O.M., Moriyasu S, Matsushita K, Saiki Y, Hashimotoenfle K, (1988) Evaluation of crude drugs by a combination of enfleurage and chromatography on flavor components in seeds of Amomum cardamomum and Elettaria cardamomum. *Shoyakugaku Zasshi* 4294-97.

Owumi B.E., Eboh A., Owoyemi J.O. and Akpata G.O. (2016) Perceived Causes of Childhood Illnesses and Herbal Medicine Utilization among Mothers of Child-Patients in Lokoja, Kogi State, North-Central, Nigeria. *mortality* 6(23).

Peng C., Zhao S.-Q., Zhang J., Huang G.-Y., Chen L.-Y. and Zhao F.-Y. (2014) Chemical composition, antimicrobial property and microencapsulation of Mustard (Sinapis alba) seed essential oil by complex coacervation. *Food chemistry* 165560-568.

Piccolella S., Fiorentino A., Pacifico S., D'Abrosca B., Uzzo P. and Monaco P. (2008) Antioxidant properties of sour cherries (Prunus cerasus L.): role of colorless phytochemicals from the methanolic extract of ripe fruits. *Journal of agricultural and food chemistry* 56(6), 1928-1935.

Sadock B.J. and Sadock V.A. (2011) *Kaplan and Sadock's synopsis of psychiatry: Behavioral sciences/clinical psychiatry*: Lippincott Williams & Wilkins.

Shaban M., Kandeel K., Yacout G. and Mehaseb S. (1987) The chemical composition of the volatile oil of elettaria cardamomum seeds, pp. 207-208: Govi-Verlag GMBH Pharmazeutischer Verlag Ginnheimer Strasse 26, D-65760 ESCHBORN, Germany.

Stogdale L. (2008) Veterinary herbal medicine. *The Canadian Veterinary Journal* 49(8), 802.

Tjendraputra E., Tran V.H., Liu-Brennan D., Roufogalis B.D. and Duke C.C. (2001) Effect of ginger constituents and synthetic analogues on cyclooxygenase-2 enzyme in intact cells. *Bioorganic chemistry* 29(3), 156-163.

Van Breemen R.B., Tao Y. and Li W. (2011) Cyclooxygenase-2 inhibitors in ginger (Zingiber officinale). *Fitoterapia* 82(1), 38-43.

Wang J., Zhao J., Liu H., Zhou L., Liu Z., Wang J., Han J., Yu Z. and Yang F. (2010) Chemical analysis and biological activity of the essential oils of two valerianaceous species from China: Nardostachys chinensis and Valeriana officinalis. *Molecules* 15(9), 6411-6422.

ISSN 2026-6294