

A review of the most important native medicinal plants of Iran with ileum antispasmodic effect

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ABSTRACT

Gastrointestinal diseases are a main cause of mortality in developing countries. In phytomedicine and phytotherapy, medicinal plants are used to treat various gastrointestinal diseases including spasm. The aim of this review article is to report the native medicinal plants of Iran that are effective on ileum spasms. The key words--ileum, intestinal spasm, medicinal plants, extract, essential oil, and Iran were used to search for the relevant articles in some databases such as Google Scholar and Scientific Information Databases. According to the findings of reviewing the selected articles, *Teucrium polium*, *Zataria multiflora*, *Physalis alkekengi* L., *Thymus vulgaris*, *Glycyrrhiza glabra*, *Allium cepa*, *Trachyspermum Ammi*, *Anethum graveolens*, *Valeriana officinalis*, *Mentha piperita*, *Apium graveolens*, *Allium ampeloprasum*, and *Pycnocycla spinosa* were found to be the most important ileum antispasmodic medicinal plants of Iran. Given the effectiveness of these plants on ileum spasms and the chemical compounds which have been definitely identified in them, the effective and chemical compounds of the presented plants can be investigated to see whether they can be used to produce the drugs effective on diarrhea and ileum spasms.

KEY WORDS: Gastrointestinal diseases, Ileum spasms, Medicinal plants, Folk medicine, Iran.

1. INTRODUCTION

Diarrhea is an important cause of mortality in developing countries (Black, 1982). In some cases, diarrhea is due to increased bowel movements (Yegnanarayanan, 1982). Some of gastrointestinal diseases are caused by muscle spasm. Spasm refers to involuntary and sudden contraction of a muscle which can cause pain in stomach, duodenum, biliary duct, bowels, or any other organs inside the body (Guyton and Hall Gan, 2011). Decreased muscle blood flow, cardiovascular diseases, and migraine headaches are some of the complications due to spasm (Yasue, 1983).

Since many years ago when there was no chemical drugs and treatments were based mainly on traditional medicine and the use of medicinal plants, physicians used only nature-based compounds and medicinal plants to treat diseases (Bahmani, 2012; 2015; Jivad, 2016; Delfan, 2015; Baharvand-Ahmadi, 2015; Parsaei, 2016; Rouhi-Boroujeni, 2016; Sarrafchi, 2015), and the doctors and therapists of traditional medicine sought to treat people by identifying medicinal plants according to traditional approaches (Ebrahimie, 2015; Baharvand-Ahmadi, 2016; Mohsenzadeh, 2016; Parsaei, 2016; Asadi-Samani, 2016; Bahmani, 2015; 2016; Kooti, 2015; Azadpour, 2016). Since medicinal plants are a nature-based, inexpensive, and cheap resource and cause fewer side effects than chemical drugs, it is necessary to make plant-based products publicly available in more acceptable and healthier packages than traditional ones (Asadi-Samani, 2015; Nasri, 2015; Mohsenzadeh, 2016; Parsaei, 2016; Bahmani, 2015; Delfan, 2015; Baharvand-Ahmadi, 2015). Therefore, many studies have been and continue to be conducted to investigate and determine the effects of medicinal plants and their derivatives to prevent and treat diseases (Rouhi-Boroujeni, 2015; 2016; Samarghandian, 2016; Mahmoudian Sani, 2016; Bahmani, 2014; Rabiei, 2013; Darani, 2009; Shirani, 2011). In this regard, many studies have found many nature-based compounds and medicinal plants to be effective on gastrointestinal diseases including spasm (Ahmadipour, 2016; Gasemi, 2002). Regarding the necessity of preventing and treating gastrointestinal diseases including spasm and diarrhea, and the importance of medicinal plants to production of nature-based herbal drugs, the aim of this review article is to report the most important native medicinal plants of Iran effective on ileum spasms.

2. MATERIALS AND METHODS

The data were searched in some databases including Scientific Information Database, Magiran, Google Scholar, and some other databases indexing the publications in Persian language. The articles without accessible full texts and those reporting the works that did not investigate the effects of native medicinal plants of Iran on ileum spasms and diarrhea directly were excluded.

3. RESULTS

The findings indicate that *Teucrium polium*, *Zataria multiflora*, *Physalis alkekengi* L., *Thymus vulgaris*, *Glycyrrhiza glabra*, *Allium cepa*, *Trachyspermum Ammi*, *Anethum graveolens*, *Valeriana officinalis*, *Mentha piperita*, *Apium graveolens*, *Allium ampeloprasum*, and *Pycnocycla spinosa* are the most important native medicinal

plants of Iran with ileum antispasmodic (anti-diarrheal) effect. Table 1 gives more details about native medicinal plants of Iran with antispasmodic effects on ileum.

Table 1. Medicinal plants with antispasmodic effects on ileum used in Iran

| Scientific names | Family name | Persian name | Descriptions |
|------------------------------|--------------------|----------------------|---|
| <i>Teucrium polium</i> | Lamiaceae | Kalpoureh | 0.25, 0.5, 1, 2, 4, and 8 mg/ml of <i>T. polium</i> extract decreased potassium chloride and acetylcholine-induced spasms in a concentration-dependent manner. Moreover, the presence of alpha and beta-adrenergic antagonists did not cause decline in inhibitory activity of the potassium chloride-induced spasms (Gharib Naseri, 2007). |
| <i>Zataria multiflora</i> | Lamiaceae | Avishaneh shirazi | Aqueous <i>Z. multiflora</i> extract decreased potassium chloride-induced ileum spasms in a dose-dependent manner. Moreover, one mg/mL of extract was able to decrease acetylcholine-induced ileum spasms (Gharib Naseri, 2005). |
| <i>Physalis alkekengi L.</i> | Solanaceae | Arusake poshtepardeh | An experimental study on mice demonstrated that different concentrations of <i>P. alkekengi</i> L. could decrease potassium chloride and carbachol-induced ileum spasms in a dose-dependent manner. Furthermore, the activity of one mg/mL of the extract declined after tissue was incubated with propranolol, but tissue incubation with naloxone and L-NAME did not decrease the extract inhibitory effect (Babaei, 2006). |
| <i>Thymus vulgaris</i> | Lamiaceae | Avishane maemouli | <i>T. vulgaris</i> caused inhibition of ileum spasms in a concentration-dependent manner. 0.6 mg/mL of the extract caused a 60% decrease in the range of spasms. This inhibitory effect was blocked by granisetron and inhibited stimulatory effect of acetylcholine. Anticholinergic effects are caused by affecting serotonergic pathway. Regression analysis demonstrated that the extract effect increased with increase in its concentration (Babaei, 2006). |
| <i>Glycyrrhiza glabra</i> | Fabaceae | Shirin baian | <i>G. glabra</i> extract decreased potassium chloride and carbachol-induced spasms in a dose-dependent manner. This caused inhibition of ileum spasm without involvement of beta-adrenergic, opioid, and nitric oxide synthase receptors (Gharib-Naseri, 2007). |
| <i>Allium cepa</i> | Amaryllidaceae | Piaz | Onionskin extract (0.1, 0.2, and 0.4 mg/ml) decreased potassium chloride and carbachol-induced spasms in a dose-dependent manner. This caused inhibition of ileum spasm without involvement of beta-adrenergic, opioid, and nitric oxide synthase receptors (Gharib-Naseri, 2007). |
| <i>Trachyspermum Ammi</i> | Apiaceae | Badian roumi | Methanolic fraction of <i>T. Ammi</i> essential oil (0.002%) led to decrease in acetylcholine-induced spasms (Hejazian, 2014). |
| <i>Anethum graveolens</i> | Apiaceae | Shevid | A study on rat model demonstrated that <i>A. graveolens</i> fruit extract led to decrease in acetylcholine-induced spasms in a dose-dependent manner (0.5, 1, 2, and 4 mg/ml) (Gharib-Naseri, 2005). |
| <i>Valeriana officinalis</i> | Caprifoliaceae | Sonboleib | <i>V. officinalis</i> root extract (5, 15, 50, 150, and 500 mg/ml) caused decrease (by 34.45%, 36.07%, 47.53%, 56.42%, and 76.22% respectively) in ileum spasms length in guinea pigs in a dose-dependent manner (Emami-Abargouei, 2009). |
| <i>Mentha piperita</i> | Lamiaceae | Naena | Root extract (5, 15, 50, 150, and 500 mg/ml) into thyrode solution caused decrease (by 27%, 30.8%, 41%, |

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| | | | 61%, and 75%, respectively) in ileum spasms length in a dose-dependent manner, in addition to stimulating 0.1 Hz (Emami-Abargouei, 2009). |
| <i>Apium graveolens</i> | Apiaceae | Karafse maemouli | The mean removal of ileum spasms increased significantly in the group administered with <i>A. graveolens</i> extract 10% and 20% compared to control (saline) group (Hojjati, 2012). |
| <i>Allium ampeloprasum</i> | Amaryllidaceae | Sire vahshi | <i>A. ampeloprasum</i> extract (100, 200, 400 mg/ml) decreased potassium chlorer-induced ileum spasms in a concentration-dependent manner (Sedighi-Hafshejani, 2014). |
| <i>Pycnocycla spinosa</i> | Apiaceae | Sagdandaneh khardar | Hydroalcoholic <i>P. spinosa</i> decreased KC1-induced spasms in a concentration-dependent manner (Sadraei, 2014). |

DISCUSSION

In traditional medicine and phytomedicine, *T. Ammi* is used to treat asthma and diarrhea and relieve pain (Bairwa, 2012). *A. ampeloprasum* contains cysteine sulfoxide compounds, tannins, saponins, and disulfide compounds (Nguansangiam, 2003). *V. officinalis* root is used to treat neurological disorders especially dizziness, headache, migraine, anxiety, and menopausal disorders, persistent hiccups, and abdominal pain (Fields, 2003). *A. graveolens* is rich in d-carvone, dihydrocarvone, carveol, limonene, d-hydrocarveol, carvacrol, and thymol (Ishikawa, 2002). Hydroalcoholic *P. spinosa* extrac decreased KC1-induced spasms in a concentration-dependent manner (Sadraei, 2014). *G. glabra* contains glyderinine, rutin, and isoquercetin (Azimov, 1988; Hayashi, 2003). Physalins, beta-cryptoxanthin ester, and zeaxanthin ester are some of the main compounds of *P. alkekengi* L. (Weller, 2003). *A. graveolens* contains many phytochemical compounds such as d-carvone, dihydrocarvone, carveol, limonene', d-hydrocarveol, carvacrol thymol (Sultana, 2005). Phytochemical investigations have indicated that *T. polium* contains many compounds such as beta-pinene, linalool, guaiol, and cedrol (Hassan, 1979). In *Mentha* ssp, menthol, limonene, carvone, and menthone are considered active compounds (Zeinali, 2005).

4. CONCLUSION

The effective and chemical compounds of the presented plants can be investigated further in clinical trials to be used to produce effective drugs on diarrhea and introduced into medical arena if their effects are confirmed.

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