



The effect of aqueous *Elaeagnus angustifolia* extract on acute non-inflammatory diarrhea in 1-5 year old children

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ARTICLE INFO

Article Type:

Original Article

Article History:

Received: 2 May 2014

Accepted: 21 May 2014

ePublished: 1 June 2014

Keywords:

Aqueous extract

Diarrhea

Non-inflammatory diarrhea

Children

Elaeagnus angustifolia

Medical plants

ABSTRACT

Introduction: Acute diarrhea is one of the most important causes of global childhood mortality and morbidity. The most common complication of acute diarrhea is dehydration. The aim of this study was to evaluate the use of aqueous *Elaeagnus angustifolia* extract in controlling non-inflammatory diarrhea in a hospital setting.

Methods: In this case-controlled randomized double blind clinical trial 80 children in age range of 1-5 years were admitted in pediatric ward with diagnosis of non-inflammatory diarrhea. The patients were randomly divided into two equal groups of 40 cases. The subject in the first group received aqueous *Elaeagnus angustifolia* extract, 1.2 ml/Kg single dose for 4 days duration and the second group (control group) 1.2 cm/Kg distilled water single dose for 4 days duration. Data analysis were performed by Chi-square and t-tests, using SPSS software.

Results: The groups were similar regarding gender, mean age, and frequency, and consistency of defecation ($p > 0.05$). Although the children seemed better in regard to frequency and consistency of defecation, however the results showed that aqueous extract of *Elaeagnus angustifolia* was not significantly effective in the treatment of non-inflammatory diarrhea.

Conclusion: The results of this study demonstrated that the use of aqueous extract of *Elaeagnus angustifolia* was not effective in the treatment of non-inflammatory diarrhea in children.

Implication for health policy/practice/research/medical education:

The results of this study demonstrated that the use of aqueous extract of *Elaeagnus angustifolia* might not be significantly beneficial in the treatment of non-inflammatory diarrhea.

Please cite this paper as: Khoshdel A, Famuri F, Keivani E, Lotfizadeh M, Kasiri KA, Rafieian M. The effect of aqueous *Elaeagnus angustifolia* extract on acute non-inflammatory diarrhea in 1-5 year old children. J HerbMed Pharmacol. 2014; 3(1): 53-56.

Introduction

Acute gastroenteritis is a major cause of mortality and morbidity in the world so that more than 2.5 million deaths are reported annually in children younger than five years (1). It is often caused by an infection. Rotavirus causes 75 to 90% of diarrhea infections in children. Bacterial pathogens cause another 10 to 20% and parasites cause less than 5% of infections (2). Acute gastroenteritis in children is presented with or without abdominal pain, fever, nausea or vomiting (3). It is the major cause of hospitalization in children under age of five (1).

Diarrhea is usually defined as increase in vomiting or fluidity of stool, change in consistency, and increased

frequency of defecation. World health organization (WHO) defines diarrhea as the passage of loose or watery stools at least three times in 24 hours period but this definition emphasizes the important of change in stool consistency rather than frequency (4).

Diarrhea disorder can be divided into inflammatory and non-inflammatory ones (5). Inflammatory diarrhea causes bloody stools that are usually full of white blood cells. It involves the large intestine, and may be accompanied by fever, vomiting and colicky abdominal pain or tenderness. But, non inflammatory diarrhea is watery without blood and mucus and usually without fever (6). It often involves small bowel and does not cause destruction of mucosa (7).

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Management of non-inflammatory diarrhea is supportive until the mucosa heals. This support includes fluid therapy and preventing nutritional damage (8).

Medical plants have been used for the management of various conditions for thousands of years (9). *Elaeagnus angustifolia* (Russian olive, Oleander) is one of the traditional medicines used in the management of diarrhea (9). In herbal medicine oleaster fruit or flower extract are used for management of nausea, vomiting, asthma and flatulence (10).

Extract of *Elaeagnus* (*E*) *angustifolia* is used as anti-inflammatory agent, muscular relaxant, antiulcerogenic agent and antipyretic in traditional medicine (11-14). In Iranian traditional medicine, fruit of *E. angustifolia* have been used to relief pain in patients with rheumatoid arthritis (14). Also, it has been reported that the use of the fruit of *E. angustifolia* is beneficial in the treatment of dysentery and diarrhea (15).

In this research we evaluated the effect of aqueous *E. angustifolia* extract on non-inflammatory diarrhea in 1-5 age group children.

Materials and Methods

In this experimental double blind randomized clinical trial 80 children with non-inflammatory diarrhea were divided into two equal groups. The study was conducted in Pediatric ward of Hajar hospital in Shahrekord, Iran, during the period from September 2013 to May 2014.

The study protocol was approved by the Ethical Committee of Shahrekord University of Medical Sciences, Iran. Written informed consents were obtained from all parents of children. The children with severe diarrhea, chronic diarrhea and/or intractable vomiting were excluded from the study. For preparation of the aqueous extract of *E. angustifolia* 150 grams of *E. angustifolia* with cores were grinded and added 1200 ml of distilled water. The resulting solution was boiled for 20 minutes. When the volume of the

solution reached to one liter, the solution was filtered after cooling. The extract was frozen in -20°C .

Placebo was made of distilled water in syringes, the same as the extract. After preparation, one code was given for placebo and other code was given to drug by a third person. For diagnosis of non-inflammatory diarrhea, stool exam was done for all the patients. This study was double blind in which the code of the drug or placebo was undefined for the patients or their parents, as well as for the doctor. In case group aqueous extract of *E. angustifolia* with dose of 1.2 ml/Kg, one time per day, was used for 4 days. In control group, the same volume of distilled water was used as placebo. Demographic data, frequency, volume and consistency of stool of both groups were recorded in first and fifth days of admission. The data were analyze using SPSS software, by Chi square and t-tests.

Results

In this study 80 children were enrolled and entered the trial. Seventeen children (8 subjects from the control group and 9 subjects from the case group) were excluded from the study because of non-compliance. The mean age in the study population was 18.65 ± 9.13 years. The mean age in case group was 19.43 ± 10.6 and in control group was 17.83 ± 7.3 years. The mean weight in the study population was 10.76 ± 2.01 Kg (10.93 ± 2.07 Kg, in case group and 10.59 ± 1.9 Kg, in control group) ($p > 0.05$; Table 1).

The mean frequency of defecation in case group before *E. angustifolia* usage was 8.5 ± 4 times and after usage, it was 3.5 ± 1.84 times and in control group it was 7.6 ± 3.5 times and 3.4 ± 2 , respectively. Statistical analysis showed no significant difference in decrease of frequency of defecation between the two groups ($p > 0.05$; Table 2). Also, there was no difference in decrease of volume and consistency of stool in two groups ($p > 0.05$; Table 3).

Table 1. Demographic information of study population

	Weight (Kg)			Age (month)			Gender
	Total	Case	Control	Total	Case	Control	
Mean	10.76	10.93	10.59	18.65	19.43	17.83	-
Std. Deviation	2.01	2.07	1.9	9.13	1.06	7.3	-
Minimum	7	7	8	12	12	12	-
Maximum	16	15	16	60	60	50	-
P-value (Case & Control)		0.63			0.49		0.06

Table 2. Frequency of defecation

Group	Stool (first visit)					Stool (second visit)				
	Mean	Std. Deviation	Minimum	Maximum	P-value	Mean	Std. Deviation	Minimum	Maximum	P-value
	8.5	4	4	20	0.37	3.5	1.84	4	16	0.72
	7.6	3.5	4	16		3.4	2	1	9	

Table 3. Percent of recovery following drug or placebo consumption

	Complete recovery	Relative recovery	Without recovery (no change)	p-value
Extract group	62.5%	34.4%	3.1%	0.31
Control group	51.6%	41.9%	6.5%	

Discussion

Despite widespread use of oral rehydration therapy (ORT) and an increased understanding of the pathogenesis of diarrhea, the illness has still high mortality, especially in developing countries (16).

In folk medicine *E. angustifolia* has been used for diarrhea. The results of this study indicated that aqueous extract of *E. angustifolia* had no effect in improvement of consistency of stool and decreased volume, as well as the frequency of defecation in children with non-inflammatory diarrhea.

The findings of current study are in consistent with those of a previous study which reported that this drug had no effect in decrease of consistency of mice stool (17).

In one study, Galves *et al.* (18) showed that tannins of the *E. angustifolia* decreased motility of gastrointestinal tract of mice and decreased volume of defecation in mice with diarrhea. The discrepancy of this study with our results may be due to the usage of one of the ingredients of *E. angustifolia* but in our study all of components in aqueous extract were used. Also, in another study lactoferrin of *E. angustifolia* had good effect in the treatment of diarrhea (19). But in this study all of the patients had diarrhea with iron deficiency anemia and this improvement probably was due to improvement of anemia.

In Rozhon study on mice infected with vibrio cholera showed that procyanidin, one of the ingredients of *E. angustifolia* was effective in diarrhea (20), but in our study we did not examine specific pathogen and a wide range of viral and bacterial infections that cause non-inflammatory diarrhea were included.

In a study in patients with allergic rhinitis, intradermal injection of extract of *E. angustifolia* caused positive skin test (21). Therefore, children with non-inflammatory diarrhea and simultaneously food allergy might get no beneficial effects and even worsen their conditions.

Authors' contributions

All the authors wrote the manuscript equally.

Conflict of interests

The authors declared no competing interests.

Ethical considerations

Ethical issues (including plagiarism, misconduct, data fabrication, falsification, double publication or submission, redundancy) have been completely observed by the authors.

Funding/Support

None.

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