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The comparison of anti-diarrhea effects of *Elaeagnus angustifolia* (oleaster) and *Plantago major* powders in dogs

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ABSTRACT

Background & Aim: Increasing the tendency in families for taking care of pets makes people pay more attention to their disease especially the common ones. In recent years the tendency to use herbal drugs has increased in animals. Herbal drugs are plants that one or some of their organs have effective ingredients. We supposed that the *Elaeagnus angustifolia* (oleaster) powder has the plantagel effects. Therefore, the aim of this study is to compare the oleaster powder herbal compounds and plantagel as anti-diarrhea in dogs.

Experimental: This study was done on 12 male dogs collar (3 quadri groups) with the similar approximate weight and similar age in veterinary clinic of Islamic azad university of Shahrekord branch. Sana flower herbal syrup was used to cause the diarrhea in all 3 groups. They received 15 mg/kg every 12 hours and all groups were suffering from diarrhea. Three groups were studied including testifier group without remedy, the first care group that received 5 mg/kg of oleaster and the second care group that received the plantagel powder every day and during this period of time the whole index related to diarrhea were exanimate both on aspect of clinical and mortal factors.

Results: By looking at the mortal indices, it was observed that the percentage of hematocrit in plantagel and oleaster groups in comparison with testifier group in recovery time was significantly different ($P<0.05$), that showed the recovery of mortal hematocrit index. Also the percentage of neutrophils in oleaster group was significantly lower than testifier and plantagel groups ($P<0.05$). In addition, by sampling from excrement, the numbers of the bacteria showed a meaningful difference in oleaster and plantagel group in comparison with testifier group ($P<0.05$).

Recommended applications/ industries: The use of oleaster powder as dose and time dependent reduces the duration of diarrhea because of the prehensile materials in oleaster.

1. Introduction

Diarrhea is a clinical manifestation of many gastrointestinal diseases, and is responsible for millions of deaths annually (Rahman *et al*., 2013). Since ancient times, diarrhea has been recognized as an important clinical problem, and it affects mainly socio-economically challenged populations in developing countries (Awe *et al*., 2011). Diarrheal diseases are characterized by an increase in the number of bowel movements, three or more times per day, with a change in stool consistency accompanied by abdominal pain (Xu *et al*., 2013). The physiological mechanisms leading to diarrheal disease include accelerated intestinal transit, increased amounts of fluid in the intestinal lumen, and decreased absorption of water and electrolytes (Gorkiewicz *et al*., 2013). Currently, the pharmacological treatment of diarrhea is non-specific, and is usually aimed at reducing the inconvenience caused by frequent bowel movements, dehydration, and discomfort (Awe *et al*., 2011; Choi *et al*., 2014).

Medicinal plants have been used for the treatment of various diseases for thousands of years. According to the World Health Organization (WHO, 2003), traditional medicine includes "health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being". Traditional medications and medical techniques are passed down verbally through generations. In most cases the effective doses and combinations proposed by traditional healers differ; as such the effective doses are not fully known, nor is the effectiveness, safety, toxicity, and variation of chemical composition between plant parts (Mpoke and Mathiu, 2005; Katerere and Luseba, 2010; McGaw and Eloff, 2010).

Elaeagnus angustifolia L. (Russian olive), which belongs to the family Elaeagnaceae, is a Eurasian tree native to western and central Asia, from southern Russia and Kazakhstan to Turkey and Iran. It is now also widely established in North America. Species of this family have a variety of medicinal uses. The ripe fruits of *E. philippinsis* have been used to treat amoebic dysentery (Perry, 1980). In traditional medical system, *E. angustifolia* is used for the treatment of asthma, catarrh, diarrhea, fever, flatulence, jaundice, nausea, tetanus, urinary diseases and vomiting (Chopra *et al*., 1986; Asadiar *et al*., 2012). Recently, it has been reported to possess an analgesic effect (Karimi *et al*., 2010).

Plantago major Linn. belonging to the family *Plantaginaceae* is a perennial herb found wild throughout the whole of Europe and temperate Asia (Burkhill, 1966). Every part of the plant has been used in many traditional medicines to treat cough, diarrhea, dysentery, urinary tract calculus (Burkhill, 1966; Mabey**,** 1988;Muhamed and Mustafa, 1994). The genus *Plantago* (Plantaginaceae) encompasses approximately 275 species with a cosmopolitan distribution. Recent studies have confirmed that some *Plantago* species have considerable antiviral, anti-inflammatory, and antioxidant activities (Gálvez *et al*., 2005; Beara*et al*., 2012). Phytochemical studies have also shown that the genus *Plantago* contains a great amount of phenolic compounds (flavonoids and tannins).

Ethnoveterinary medicine observation based on evidence is lacking or has not been documented in Iran. There are also no reports to suggest the use of traditional herbal extracts in animal clinics. As a result, the objective of this research was to compare the oleaster powder herbal compounds and plantagel in anti-nutrition diarrhea in dogs.

2.Materials and Methods

2.1. Animals

The study was performed on 12 male dogs (3 quadri groups) with the similar approximate weight and age. All dogs were subjected to clinical examination and housed under uniform environment after being treated for internal parasites. Sana flower herbal syrup was used to cause the diarrhea in all 3 groups. They received 15 mg/kg of syrup every 12 hours and all the groups were suffering from diarrhea. At this moment the testifier group was left without remedy and the first care group received 15 mg/kg of oleaster and the second care group received the plantagel powder every day. During this period of time the whole indices

related to diarrhea were examined whether on aspect of clinical or mortal factors. In third group (control) no medication was used.

2.2. Statistical analysis

The results are presented as mean ± S.E.M. and statistically analyzed by One-way ANOVA and Tukey test at a probability level of 5% ($p< 0.05$) by the SPSS 20 software.

3. Results and discussion

In this study, we evaluated the oleaster powder herbal compounds and plantagel for antidiarrhea effect and to evaluate any changes in blood parameters in dogs. The results showed that oleaster powder reduces the duration of diarrhea as compared with *Plantago major* powders. The overall results of blood parameters before and after intervention in total groups are shown in Table 1 and no significant difference ($p< 0.05$) was observed among three groups.

Table 1. Blood parameters before after intervention in total groups.

Variable	Groups	Before intervention	After intervention	Treatment
Red blood cell count (RBC*10 $^{6}_{\mu l}$)	Oleaster	6.20 ^{a}±0.14	6.75 ^{a}±0.07	6.35 ^{a}±0.70
	Plantagel	5.35 ^{a}±0.63	5.80 ^{a}±0.42	5.50 ^{a}±0.56
	Control	5.80 ^{a}±0.14	6.00 ^{a}±0.42	5.85^{a}±0.21
Haemoglobin (HB $_{gr/dl}$)	Oleaster	12.10 ^{a}±0.28	12.80 ^{a}±0.57	12.40 ^{a}±0.56
	Plantagel	11.25 ^{a}±0.63	11.80 ^{a}±0.00	11.75 ^{a}±0.35
	Control	12.10 ^{a}±0.28	12.20 ^{a}±0.42	12.25 ^{a}±0.35
White blood cell count (WBC $_{\mu l}$)	Oleaster	9250 ^{a}±212.13	10275^{a}±1060.66	10725^{a}±318.19
	Plantagel	9475 ^{a}±1272.80	10550^{a}±1060.66	11525^{a}±1025.30
	Control	9350±1272.80^{a}	11475^{a}±883.89	12200^{a}±1272.80
Phagositose $_{\%}$	Oleaster	14.50 ^{a}±4.95	18.00 ^{a}±4.24	18.00 ^{a}±4.24
	Plantagel	22.00 ^{a}±1.41	22.50 ^{a}±0.70	21.50 ^{a}±0.70
	Control	19.00 ^{a}±2.82	24.00 ^{a}±5.65	24.00 ^{a}±5.65
Band Cell $_{\%}$	Oleaster	1.50 ^{a}±0.71	1.00 ^{a}±0.00	1.00 ^{a}±0.00
	Plantagel	1.56 ^{a}±0.71	1.00 ^{a}±1.41	1.00 ^{a}±1.41
	Control	1.00±0.00^{a}	1.00 ^{a}±1.41	1.50 ^{a}±0.70
Lymphocytes (LYM%)	Oleaster	26.00 ^{a}±4.24	23.50 ^{a}±4.95	24.00 ^{a}±4.24
	Plantagel	25.50 ^{a}±2.12	22.00 ^{a}±1.41	22.50 ^{a}±3.53
	Control	28.00 ^{a}±2.82	24.50 ^{a}±4.95	26.00 ^{a}±1.41
Monocytes (MON $_{\%}$)	Oleaster	2.50 ^{a}±0.71	4.00 ^{a}±0.00	3.50 ^{a}±0.71
	Plantagel	4.00 ^{a}±0.00	3.00 ^{a}±0.00	3.00 ^{a}±0.00
	Control	3.50 ^{a}±0.70	5.00 ^{a}±0.00	4.00 ^{a}±0.00
GERM of bacteria	Oleaster	18.00 ^{a}±1.41	13.50 ^{a}±4.94	11.00 ^{a}±4.24
	Plantagel	17.50 ^{a}±2.12	19.00 ^{a}±1.41	15.50 ^{a}±0.71
	Control	16.50 ^{a}±2.12	23.00 ^{a}±2.83	12.50^{a}±2.12

The numbers with similar letters are not significantly different (P>0.05)

The result of recovery of mortal hematocrit index showed that, the packed cell volume in oleaster, plantagel and control groups before intervention and at the beginning of the intervention was not significantly different (P>0.05), but there is a meaningful difference (P<0.05) between the percentage of hematocrit in plantagel and oleaster groups in comparison with testifier group during recovery time (Table 2).

Table 2. Comparison of the packed cell volume (PCV) in tested groups.

Groups	Number	Before intervention	Since the beginning of the intervention	Recovery time
		Mean± SD	Mean± SD	Mean± SD
Oleaster	4	34.50 ^{a} ± 0.71	37.50 ^{a} ± 2.12	35.50 ^{b} ± 0.71
Plantagel	4	30.50 ^{a} ± 2.12	23.50 ^{a} ± 2.12	33.50 ^{b} ± 0.71
Control	4	29.50 ^{a} ± 0.71	35.50± ^{a} 0.71	32.00 ^{a} ± 1.41
SIG		0.164	0.142	0.008

The numbers with similar letters are not significantly different (P>0.05).

Also, the percentage of neutrophils in oleaster group was significantly different compared with testifier and plantagel groups (P<0.05) (Table 3). Regarding to the number of eosinophil count in dogs with diharrea, there was a meaningful difference (P<0.05) between the percentage of eosinophils in oleaster, plantagel and control groups before intervention and at the beginning of the intervention (Table 4).

Table 3. Comparison of the neutrophils (Nut) in three groups.

Groups	Number	Before intervention	Since the beginning of the interventio n	Recovery time
		Mean± SD	Mean± SD	Mean± SD
Oleaster	4	56.50 ^{b}± 2.12	59.50^{b}± 2.12	59.50^{b}± 2.12
Plantagel	4	66.50 ^{a}± 2.12	69.50^{a}± 0.71	69.50^{a}± 0.71
Control	4	63.50 ^{a}± 0.71	66.00^{a}± 1.41	66.50^{a}± 0.71
SIG		0.504	0.016	0.011

The numbers with similar letters are not significantly different (P>0.05).

In addition, comparison of the bacteria in feces in oleaster, plantagel and control groups was conducted. The numbers of the bacteria in dogs excrement showed that there was a meaningful difference in oleaster and plantagel group in comparison with testifier group (P<0.05) (Table 5).

Table 4. Comparison of the eosinophils (Eos) in three groups.

Groups	Number	Before intervention	Since the beginning of the intervention	Recovery time
		Mean± SD	Mean± SD	Mean± SD
Oleaster	4	13.50 ^{b}± 0.70	12.00 ^{b}± 0.00	11.50^{b}± 2.12
Plantagel	4	3.50 ^{a}± 0.70	2.5 ^{a}± 0.71	4.00 ^{a}± 1.41
Control	4	4.00 ^{a}± 1.41	2.5 ^{a}± 0.71	4.50 ^{a}± 0.71
SIG		0.004	0.001	0.027

The numbers with similar letters are not significantly different (P>0.05).

Elaeagnus angustifolia and *Plantago major* powders have been used in traditional medicine as a remedy to treat numerous diseases. These plants have been consumed traditionally for the treatment of various diseases, such as arthritis, gastrointestinal disorders, respiratory disease, liver dysfunction and kidney stone, as well as genitourinary disease, among which several ones have been confirmed by recent pharmacological investigations.

Table 5. Comparison of the bacteria in feces (Bac) in three groups.

Groups	Number	Before intervention	Since the beginning of the intervention	Recovery time
		Mean± SD	Mean± SD	Mean± SD
Oleaster	4	592 ^{a}± 26.87	330.5 ^{a}± 17.67	172 ^{b}± 4.24
Plantagel	4	390 ^{a}± 216.37	323.5 ^{a}± 125.15	287.5 ^{b}± 75.66
Control	4	161 ^{a}± 91.92	319 ^{a}± 101.82	491.5 ^{a}± 6.36
SIG		0.111	0.992	0.012

The numbers with similar letters are not significantly different (P>0.05).

E. angustifolia, such as root, branches, leaves, stem bark and root bark contains the aforementioned metals in lower concentrations than the permissibility. The fruit extract could also act as an antacid in animal models of gastric acid secretion (Eliassi *et al*., 2008; Eliassi *et al*., 2009). *E. angustifolia* samples displayed bactericidal effect when tested against the pathogenic bacteria such as *E. coli*, *S. aureus* and *P. aeruginosa*. These bacteria cause infections of skin, soft tissues, ear, respiratory and urinary tracts (Brooks *et al*., 2010; Pommerville, 2011).

Various phytochemical components have been identified and elicited from *E. angustifolia*, which are responsible for the biological effects of this medicinal plant. On the other hand, *P. major* extracts caused strong alterations in the cell wall structure of different gram positive bacteria (Sharifa *et al*., 2008).

The active ingredients in the *Plantago major* are polysaccharides, fat, caffeic acid derivatives, flavonoids, glycosides, irinoid and terpenoids (Samuelson, 2000). Restrictions in the current medical approaches for the treatment of disease have revealed a real necessity for exploring alternative sources of safe and efficacious treatment.

4. Conclusion

In conclusion, our results suggest that *E. angustifolia* powder compared with *Plantago major* powders as dose and time dependent causes reducing the duration of diarrhea. Further investigations are going on to identify active components of the plants, accounting for observed effects.

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