

The effects of probiotics in preventing gastrointestinal disorders of Persian Shepherd Dogs

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Abstract

The present study was conducted to evaluate the effects of probiotics on the prevention of food poisoning and bacterial diarrhea in dogs. A total 15 male dogs from the Persian shepherd dog breed, aging 1 to 2 years and 20 to 25 kg of weight were selected. After thorough physical examination, they were randomly divided into one control and two treatment groups which were fed by healthy, poisoned food containing probiotics (9 grams of Primalac[®] per 10 kg of food) and poisoned food, respectively. In addition to the examination of general symptoms, starting from the 2nd day of the study, the feces of each dog were collected with 12 hour intervals and were examined for the total number of aerobic microbial count. The result of the present study indicated that probiotics have an effective role in the reduction of digestive problems and their addition to the diet of the 1st treatment group significantly decreased the occurrence of food poisoning.

Keywords : Probiotics, gastrointestinal, Persian shepherd dogs, treatment and disorders.

Introduction

Gastrointestinal (GI) disorders are some of the most common health concerns in dogs that are usually caused by a microbial imbalance in the diet. GI disorders manifest themselves as acute or chronic diarrhea or, in some cases, vomiting or anorexia. Probiotics are live microorganisms which should have a positive effect on human or animal health when administered in adequate amounts (FAO/WHO, 2006). A variety of microorganisms, typically lactic acid bacteria (LAB), such as *lactobacilli*, *bifidobacteria*, and *enterococci*, have been evaluated as potential probiotics. A small number of yeast has also been evaluated (Filho-Lima et al., 2000).

Treatment of diarrhea by administering living or dried bacteria to restore a disturbed intestinal micro flora has a long tradition, because the intestinal micro flora play a crucial role in host defense as demonstrated by their ability to modulate both innate and acquired immunity at the local as well as systemic levels (Cebra, 1999; De Vrese and Marteau, 2007). These beliefs have been substantiated by recent research, which indicates that enhancing the beneficial components of the gut microbiota using probiotics represents a realistic therapeutic strategy in the maintenance of human health and in the treatment of various intestinal disorders (Whorwell et al., 2006; O'Hara and Shanahan, 2007). However, the use of probiotics in companion animals has received less

attention. Due to lack of information on the effect of probiotics in preventing food poisoning and bacterial diarrhea in dogs, the main goal of the present case-control study was to evaluate this relationship in Persian shepherd dogs in Iran.

Materials and Methods

Animals and Study design

The experiment was conducted on 15 male Persian shepherd dogs (one to two years old) with 20 - 25 kg average body weights that were divided in three groups (n=5) (All dogs were tested with permission and approved from Iranian Society for the Prevention of Cruelty to Animal).

The test group consisted of two treatment groups and one control group as follows: (i) control group was fed by healthy food during the experiment; (ii) only were fed by poisoned food (microbial load 10^6 CFU/1gr food); (iii) were fed by poisoned food (microbial load 10^6 CFU/1gr food) containing probiotics (9 gr/10kg of food; Primalac[®], USA), including: *Lactobacillus*, *Enterococcus* and *Bifidobacterium*. The following week's dry food ration was calculated and pre-weighed based on the recorded body weight of each animal.

Samples and microbial analysis

Feces collection was done twice (8 Am and 8 Pm) a day over an examination period (0, 2, 3, 4, 5, 6) and ten days before starting the examination. About 10 grams of stool sample of each dog were collected into a sterile plastic bag and 90 ml of Coliform medium was added to make 10^5 dilutions. Ten milliliters of mixture were transferred into a sterile plate with Nutrient agar and then was inoculated in 37 °C for 24 h. The colonies on plates with 30 to 300 colonies were counted.

Results and Discussion

In the present study the total number of aerobic microorganisms per each gram of feces on the 1st day

was measured as the following: 73.4×10^5 in the control group (Group - 1), 77.6×10^5 in the 1st sub treatment group (Group - 2) and 80.1×10^5 in the (Group - 3) 2nd sub treatment group. Following the study, the number of aerobic microorganisms of the feces in the 1st sub treatment group decreased gradually and reached 36.1×10^5 bacteria per 1 gram of feces on the 6th day, which showed a significant difference with the first day ($P < 0.05$). The average aerobic microorganisms of the faeces in the 2nd sub treatment group increased gradually and reached 172.5×10^5 bacteria per 1 gram of faeces on the last day. In this group, there was also a significant difference ($P < 0.05$) between the number of bacteria on the first day and other days of the study. Other signs and changes intensified on 5th and 6th days of the study. The results of Coliform count for each group are summarized in Table -1.

Probiotic therapy is becoming increasingly popular in veterinary medicine; however, few results from objective research are available, particularly for dogs and cats. Therefore, this study was conducted as the first case-control study evaluating the effect of probiotics in the prevention of food poisoning and bacterial diarrhea in Persian shepherd dogs in Iran.

The results of the study showed that probiotics have an effective role in the decrease of digestive problems in a way that their addition to the diet of the 1st sub-treatment group significantly decreased the occurrence of food poisoning in this group. This result is similar to a recent report from human in USA that showed probiotics are effective in the prevention and treatment of a diverse spectrum of gastrointestinal disorders such as antibiotic-associated diarrhea (including *Clostridium difficile*-associated intestinal disease), infectious bacterial and viral diarrhea (including diarrhea caused by *rotavirus*, *Shigella*, *Salmonella*, *enterotoxigenic E. coli*, *Vibrio cholera* and human immunodeficiency virus) acquired immune

Table - 1. Total colony count of feces during the study (Number dogs=5)

Groups	Total colony count (CFU/1gr)						
	Sampling days						
	-10 (ago)	0	2	3	4	5	6
Group 1 (Control groups)	105×10 ⁵	73.4×10 ⁵	73.4×10 ⁵ ^b	71.1×10 ⁵ ^b	73×10 ⁵ ^b	74×10 ⁵ ^b	75×10 ⁵ ^b
SD	21×10 ⁵	7.3×10 ⁵	6.8×10 ⁵	7.9×10 ⁵	8.8×10 ⁵	6.9×10 ⁵	8.9×10 ⁵
Group 2 (Treatment groups 1)	103×10 ⁵	77.6×10 ⁵	54×10 ⁵ ^c	48.1×10 ⁵ ^c	45.2×10 ⁵ ^c	40.8×10 ⁵ ^c	36.1×10 ⁵ ^c
SD	13×10 ⁵	8.2×10 ⁵	10×10 ⁵	9.4×10 ⁵	10×10 ⁵	10.3×10 ⁵	12×10 ⁵
Group 3 (Treatment groups 2)	110×10 ⁵	80.2×10 ⁵	154.5×10 ⁵ ^a	158.3×10 ⁵ ^a	163.2×10 ⁵ ^a	168.8×10 ⁵ ^a	172.5×10 ⁵ ^a
SD	15.3×10 ⁵	6.6×10 ⁵	8.5×10 ⁵	8.7×10 ⁵	11.7×10 ⁵	10.2×10 ⁵	11.8×10 ⁵

a,b,c significant at (P<0.05).

deficiency disorder, enteral feeding diarrhea, *Helicobacter pylori* gastroenteritis, sucrase, maltase deficiency, inflammatory bowel disease, irritable bowel syndrome, small bowel bacterial overgrowth and lactose intolerance (De Rolfe, 2000).

The results of study by Herstad *et al.* (2010), indicated that the intervals between the initiation of treatment to the last abnormal stools were significantly shorter (P=0.04) in the probiotic group compared to the placebo group, the mean time was 1.3 days and 2.2 days, respectively. The two groups were found nearly equal with regard to the interval between the start of the treatment to the last vomiting episode (Herstad *et al.*, 2010). Also in one study probiotic supplementation use in dogs with food responsive diarrhea (FRD) and beneficial effects on intestinal cytokine patterns and on microbiota were evaluated. In this study, twenty-one client-owned dogs with FRD were presented for clinically needed duodeno- and colonoscopy and were enrolled in a prospective placebo (PL)-controlled probiotic trial. Intestinal tissue samples and feces were collected during endoscopy.

Intestinal mRNA abundance of interleukin (IL) - 5, -10, -12p 40 and -13, tumour necrosis factor-alpha, transforming growth factor-beta1 and interferon (IFN)- gamma were analysed and numbers of *Lactobacillus* spp., *Bifidobacterium* spp., *Enterococcus* spp. and *Enterobacteriaceae* and supplemented probiotic bacteria were determined in feces. The Canine Inflammatory Bowel Disease Activity Index, a scoring system comprising general attitude, appetite, fecal consistency, defecation frequency, and vomit, decreased in all dogs (p< 0.0001) (Sauter *et al.*, 2006 and Pascher *et al.*, 2008) studied the effects of probiotic *Lactobacillus acidophilus* strain on food tolerance in dogs with non-specific dietary sensitivity. The results of their study show that *L. acidophilus* DSM 13241 can stabilize the digestive processes in dogs with non-specific dietary sensitivity. This recent study evaluated the effect of supplementation with canine-derived probiotic *Bifidobacterium animalis* strain AHC7 (Iams Proforma, Procter and Gamble Pet care) on the resolution rate of acute idiopathic diarrhea in dogs randomly assigned to receive a placebo (n=18)

or the probiotic (n=13). Nutritional management with the probiotic fed at 2×10^{10} CFU/day significantly reduced the resolution time (3.9 +/- 2.3 versus 6.6 +/- 2.7 days; $P < 0.01$) and reduced the percentage of dogs that were administered metronidazole (38.5% versus 50.0%) compared with placebo (Kelley *et al.*, 2009).

Conclusion

In summary, the present study showed that, the oral administration of probiotic therapies has an effective role in the prevention of food poisoning and bacterial diarrhea in Persian shepherd dogs in Iran. As a result, their addition to the diet of the treatment group enhanced the functioning of the gastrointestinal system.

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