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## Restoration of electrolytes homeostasis in herbal-probiotics combination regimens in acute gastritis in young dogs

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**Abstract**

The present study was designed to evaluate the efficacy of herbal-probiotics combination regimens in amelioration of acute gastritis in young dogs. The main clinical signs on presentation were vomiting, abdominal pain, anorexia and dehydration. Group 1 served as the healthy control. Affected dogs were treated with *Zingiber officinale* (Hindi 'Adrak') aqueous extract @ 100 mg/kg + *Lactobacillus acidophilus* + *Sacharomyces boulardii* @ 2 g PO, OD for 5 days (group 2), or Fennel (Hindi 'Saunf') seeds aqueous extract @ one teaspoonful + *Lactobacillus acidophilus* + *Sacharomyces boulardii* @ 4 g PO, OD for 5 days (group 3), or *Elettaria cardamomum* (Hindi 'Elaichi') aqueous extract @ one teaspoon + *Lactobacillus acidophilus* + *Sacharomyces boulardii* @ 6 g PO, BID for 5 days (group 4). Statistically significant changes were observed in the circulatory potassium titres. The combination regimen in group 2 was adjudged most effective on restoration of normal serum electrolytes balance.

**Keywords:** Gastritis, serum electrolytes, probiotics

**Introduction**

In dogs, gastritis - representing Inflammation of gastric mucosa - is commonly manifested in vomiting episodes. The gastric disorders include mucosal inflammation, ulceration, obstruction, or neoplasia. The categorization is based on the intensity of gastritis, depending on the nature and magnitude of cellular infiltration and histo-architectural anomalies (Day *et al.*, 2008) [3]. Thus, gastritis is broadly classified into acute and chronic forms. Clinically, acute gastritis is characterized by the sudden onset of vomiting, whereas chronic gastritis involves intermittent vomiting over a period of 1-2 weeks, or more. Gastritis often leads to inappetance, loss of body weight, and recurrent bouts of abdominal pain (Patel *et al.*, 2018) [8]. In most dog patients, the causes include accidental exposure to hazardous toxins, e.g. plant pesticides and insecticides, heavy metals, and bleaching agents, dietary indiscretion, injudicious drug therapy, *viz.* non-steroid anti-inflammatory drugs (NSAIDs), corticosteroids, and antibiotics, (Ettinger and Feldman 2010) [5]. Ingestion of foreign bodies may obstruct the pyloric region of stomach and result in acute clinical symptoms. However, stagnation of the foreign object may precipitate mucosal trauma with acute gastritis, systemic disease, uremia, liver dysfunction or hypo-adrenocorticism (Amorim *et al.*, 2016) [1].

**Material and Methods**

The clinical trial was conducted in the Department of Veterinary Medicine College of Veterinary Science & Animal Husbandry, Nanaji Deshmukh Veterinary Science University (NDVSU), Jabalpur, Madhya Pradesh. Total 328 dogs brought to the hospital with a complaint of vomiting were screened for gastritis. Complete history of each case was recorded on the proforma provided to the pet owners: including the scheduled record of deworming and vaccination, type of diet, clinical signs including abdominal pain, frequency, colour and consistency of the vomitus, ingestion of stale food and duration of illness. About 2 ml blood sample was collected aseptically from the cephalic or saphenous vein on day 0 pre-treatment, and on day 3 and day 6 post-treatment from each dog and transferred into clean, dry EDTA glass vials for routine haematology. One ml aliquot of the blood sample was transferred into clot activator vials and serum was harvested carefully after centrifugation (3000 rpm/ minute, 5 minutes), frozen and stored (-20 °C) for biochemical analysis.

The blood biochemical profile was determined on day 0 pre-treatment and on days 3 and 6 post-treatment. The specified parameters were estimated quantitatively using proven commercially available kits with the Autoanalyser, and the electrolytes was estimated using Electrolyte Analyzer (Aspen Diagnostics).

Serum chloride, sodium and potassium (mEq/l) were estimated on day 0 pre treatment, and on days 3 and 6 post-treatment with the help of semi auto analyzer by using readymade kit manufactured by Erba, Mannheim, Transasia biomedical (India) PVT LTD.

## Results and Discussion

The present investigation was aimed to determine the incidence of acute gastritis in young dogs up to 2 years of age and to compare the therapeutic efficacy of different herbal antiemetics-probiotics regimens in combination with appropriate intravenous fluid therapy in acute gastritis in young dogs at TVCC Jabalpur (August 2018-January 2019). The study was undertaken on total 328 dogs up to 2 years of age, of either sex, irrespective of breed, exhibiting signs of acute gastritis presented to the Teaching Veterinary Clinical Complex (TVCC), College of Veterinary Science and Animal Husbandary, NDVSU, Jabalpur, M.P.

**Table 1:** Mean chloride concentration (mEq/l) in different groups at varying intervals

S. No.	Group	Day 0	Day 3	Day 6
1	T <sub>1</sub>	112.88±1.33	113.02±1.23	112.61±1.19
2	T <sub>2</sub>	105.90±1.53	107.06±1.71	108.56±1.94
3	T <sub>3</sub>	104.98±0.78	105.85±1.30	106.48±1.30
4	T <sub>4</sub>	105.27±0.81	106.03±0.77	107.57±1.03

**Table 2:** Mean sodium (mEq/l) concentration in different groups at varying intervals

S. No.	Group	Day 0	Day 3	Day 6
1	T <sub>1</sub>	141.11±1.09	141.05±1.37	141.60±1.27
2	T <sub>2</sub>	137.89±5.25	139.47±5.05	141.05±4.8
3	T <sub>3</sub>	138.08±2.27	139.02±2.25	139.99±2.30
4	T <sub>4</sub>	139.23±0.55	140.37±0.58	140.89±0.88

**Table 3:** Mean potassium concentration (mEq/l) in different groups at varying intervals

S. No.	Group	Day 0	Day 3	Day 6
1	T <sub>1</sub>	4.31±0.23	4.62±0.20	4.55±0.19
2	T <sub>2</sub>	5.04 <sup>a</sup> ±0.20	4.50 <sup>b</sup> ±0.12	4.43 <sup>b</sup> ±0.07
3	T <sub>3</sub>	4.93±0.31	4.65±0.26	4.63±0.20
4	T <sub>4</sub>	5.03±0.24	4.66±0.19	4.56±0.16

Maintenance of *in vivo* electrolyte balance is of primordial significance. It is well-known that where as sodium Na<sup>+</sup> is mainly extracellular, potassium (K<sup>+</sup>) is mostly intracellular. On the contrary, the serum potassium (K<sup>+</sup>) titre in the gastritis dogs in group T<sub>2</sub> was significantly higher ( $P < 0.05$ ) vs. the healthy control group T<sub>1</sub> (Table 3) pointing to hyperkalemia. This observation is in complete agreement with the earlier report (Sagar, 2016) [9]. Similar observation was reported by Gennari and Weise (2008) [6]. Hyperkalemia observed in the present investigation may be attributed to increased retention of K<sup>+</sup> ions by kidney parenchyma and tubular reabsorption. Hypochloremia is generally associated with hyponatremia in the present study, hypochloremia was a salient feature of vomiting dogs pre-treatment (day 0). Hypochloremia may be due to loss of chloride ions and acid rich gastric secretions through vomiting as suggested by Hoskins *et al.* (1998) [7]. However, the anions imbalance was effectively restored following the combination regimens restored towards normalcy. An overview of the clinico-haemato-biochemical profile of the gastritis affected dogs pre-treatment (day 0) and post-treatment (day 3 and 6) clearly suggests the best therapeutic response is elicited with ginger *Zingiber officinale*, Hindi 'adrak' (group T<sub>2</sub>), closely followed by cardamom *Elettaria cardamomum* Hindi 'elaichi' (group T<sub>4</sub>) Fennel seeds *Foeniculum vulgare* Hindi 'saunf' was also effective though to a less effective as compared to T<sub>2</sub> and T<sub>4</sub>. In gastritis episodes in dogs metabolic acidosis is the outcome of anaerobic micro-environment resulting from hypoxia and subsequent metabolic alkalosis to the accelerated loss of H<sup>+</sup> into the gastric lumen (Broom and Walsh, 2003)[2] further hypovolaemic shock and deranged acid based balance in

metabolic acidosis/ alkalosis may lead to life-threatening situations (Elwood, 2010) [4].

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