

Diagnosis and Management of Constipation and Obstipation in Canine: From Current Practices to Future

S. Sharma¹, S. Pokharel², S. Singh^{3*}

¹Agriculture and Forestry University, Faculty of Animal Science, Veterinary Science and Fisheries, Department of Veterinary Physiology and Biochemistry, Rampur, Chitwan 44200, Nepal

²Department of Livestock Services, Harihar Bhawan, Lalitpur, Nepal

³Agriculture and Forestry University, Faculty of Animal Science, Veterinary Science and Fisheries, Department of Veterinary Medicine and Public Health, Rampur, Chitwan 44200, Nepal

*Corresponding Author: S. Singh, drsubirsingh@gmail.com

ABSTRACT

This study was conducted to understand the present diagnosis and management patterns of constipation and obstipation in dog and accessing about its future holds. A total of 68 dogs both healthy (n=34) and constipated (n=34) brought to a private pet hospital in Kathmandu were included in the study for two-months during Feb-April, 2019 were recorded. The protocol comprised history taking (age, sex, breed and chief complains), physical and clinical examination, hematology/Biochemistry followed by radiography in some cases. Statistical analysis was conducted using MS-Excel 2016 and SPSS v25. We found that starting from the dietary management, rehydration and medical management using laxatives, enemas, antibiotics and supporting liver medications were being followed to manage constipation and obstipation. Anorexia (82.4%) and dehydration were the most common clinical signs. Female dogs (52.9%) were found more affected than male dogs (47.1%). Large and small breed dogs (73.5%) were more prone to constipation than medium sized breeds (26.5%). Older Dogs (>60 months) (34%) were the most affected age groups. Haemato-biochemical blood findings showed significant increase in Total Leucocyte Count (Leukocytosis), Neutrophilia, ALP levels and Blood Urea Nitrogen ($p \leq 0.001$) while there was also an increase in Serum bilirubin and Serum albumin levels ($p \leq 0.05$) in constipated dog. This research showed increased risk of constipation in old and female dogs. Starting from high fiber diets, mild laxatives and enemas, the treatment can be proceeded to fluid therapy, antibiotic therapy and medications managing liver ailments after haemato-biochemical examination. Use of Novel prokinetic drugs practiced in humans like Cisapride and Pruracalopride, can be considered in veterinary practice. In situations of surgical management, most reliable would be the subtotal colectomy to manage idiopathic megacolon causing constipation and obstipation.

Keywords: Constipation, Dog, Management, Novel Drugs

INTRODUCTION

In human medicine, a fecal frequency less than three bowel movements per week is called constipation (Oh et al., 2011; Read, Timms, Barfield, Donnelly, & Bannister, 1986) a constipation induction period, and a fig paste treatment period. We administered fig paste (12 g/kg daily, by gavage. In the dog and cat, it has been more clearly defined as infrequent, difficult or absent defecation with retention of feces within the colon and rectum (Jones, 2000; White, 2002). Obstipation is a form of constipation which is characterized by an inability of animal to evacuate the compacted mass of hard, dry feces where the impaction is observed from rectum to around ileocolic junction, sometimes further beyond that as well (Defarges, 2019). Constipation has a complex etio-pathogenesis resulting from under excretion of toxic gases and gastrointestinal fermentation (Pirkka, Arthur, Erika, & Seppo, 1998). It is also induced by various narcotic analgesics (opioids), anticonvulsants, antihistamines, anticholinergic, calcium channel blocking agents (Elliot, Watts, & Girard, 1983; Enck, 1988; Oh et al., 2011).

Constipation and obstipation are one of common problems in pet dogs in city areas where movement of animals and good fiber diet is compromised. While in developed countries many new technologies and drugs are widely in practice, in developing countries like Nepal, there are limited diagnostic tools and conservative management for handling constipation. Clinical evidence for the use of laxative and dietary management for relieving symptoms of constipation are deficit in both human medicine (Jones, Talley, Nuyts, & Dubois, 2002) although some preparations need to be prescribed by physicians. A meta-analysis was conducted to quantitatively evaluate the published evidence on the efficacy of laxatives in constipation. We found that large, well-controlled, published studies whose data were comparable were lacking. Of 250 articles, 35 met the inclusion criteria but only 11 yielded usable data (N = 375 patients on laxatives, 174 on placebo and veterinary medicine. The way of diagnosing disease using tools like radiographical and hemato-biochemical examination for prompt management varies by cases. Many human labeled products are also used in veterinary medicine to manage secondary organ ailments as veterinary specific drugs are scarce.

In severe cases, constipation often require short time of hospitalization to address and correct metabolic variations. The use of enemas is must for manual clearance of retained feces. Proper use of such techniques is a must in reducing disease severity (Washabau, 2003). The objective of this study is to find various diagnostic and management methods of constipation in current canine practice and novel methods for future practice in Nepal.

METHODOLOGY

The dogs used for this study were those admitted with suspected problems suggesting constipation to the Advanced Pet Hospital and Research Center, Kathmandu. This number included 34 diseased dogs and 34 apparently healthy dogs which were admitted regular veterinary services. The diagnosis protocol sequentially comprised History Taking, Physical and Clinical Examination, followed by Radiography along with Hematology and Biochemistry.

Each cases were registered in Pet Registration Form and Book for date, age, sex, breed, and chief complains of pet owner. The detailed information about complete medical, vaccination, dietary, and environment. History along with clinical signs including recent injuries, surgeries, drug treatment, or any other relevant conditions were noted. Additionally, examination of the distinctive organs and body frameworks was performed along with pulse, heart rate, respiration rate and rectal temperature. Abdominal X-rays in Right/Left Lateral View and Ventro-Medial View (VD) to reveal any form of impacted fecal matter in the bowel were done. Blood was sent to Diagnostic Lab for haemato-biochemical abnormalities and to screen for suspected underlying cause of the constipation or any other infections.

Data that were collected on age, sex, breed along with difference in various hematological and Biochemical Parameters of Normal and Dogs with constipation were recorded and to Microsoft Excel 2016[®] spreadsheet, and exported to SPSS v25 for further analysis. First, in accordance to an established normal reference range, Healthy dogs and Dogs with constipation were categorized into lower than normal reference range, within normal reference range and higher than normal reference range and Pearson-Chi-Square Test along with Fisher Exact text was performed. Values of $p \leq 0.05$ were considered as statistically significant.

Management and Treatment of constipated Dogs

As dehydration is a usual sign seen in constipation, it is one of the important aspect to be considered while managing patient. Fluid therapy can be administered via different route (IV, Subcutaneous, Orally or using feeding tube) to organize the electrolyte balance, in which potassium being of the essential to be corrected. The method referred to the recent publication by Davis et al. (2013) was used for correcting hydration level. High fiber containing diets like Pumpkin Pulps, Carrots, peas or green beans, bran flakes, cooked oats were advised to use after grinding and steaming it altogether if possible. Commercially available Dog diets with high fiber contents with the quantity prescribed by company were also suggested. Along with this, fiber also reduces bile salt concentration which implicit reduction in gut contractibility activity. Along with this, proper hydration and regular exercise were advised to animal owner.(Gonzalez-Martinez, Ortiz-Olvera, & Mendez-Navarro, 2014).Laxatives are the agents that promotes defecation by increasing the frequency of defecation or by enhancing consistency and fecal volume. Osmotic

Laxatives (Lactulose solution, Duphalac®, Polyethylene Glycol, PEGLEC®), Rectal Laxatives; Enemas Surfactant or Stool softener (Solution of Glycerin and Sodium Chloride, EZIVAC®) laxatives are commonly used.

After checking for the increased infection counts via TLC and Neutrophils counts, different type of oral (Clavum®625 mg, Amoxicillin+Clavulanic Acid, Tab.Megapen® 250mg) and systemic antibiotics (Keftragard®1500/1000mg; Ceftriaxone+Sublactam, Megapen® 1000mg; Ampicillin + Cloaxicillin) were used to reduce underlying primary as well as secondary bacterial infections. Along with this, for managing liver ailments Ursodiol;Ursodeoxycholic acid(Livopan ®, Ursocol ®Agalstone ®,) which slows the progression of hepatotoxicity and diminishes intestinal retention of cholesterol along with suppressing hepatic synthesis and secretion of cholesterol. Also, L-ornithine-L-aspartate (Tab. Hepa-Meraz, ® Inj. Hepa-Meraz ®) is most commonly used orally and by needle (by IV) for a liver illness that reduces brain function called hepatic encephalopathy.

RESULTS AND DISCUSSIONS

The major clinical signs observed were Anorexia (82.4%), Problems in fecal passage (85.2%), Problem in urinary passage (41.2%), Dehydration with various severity (94.1%) and vomiting (52.8%). After manual palpation, Abdominal X-ray in ventro-dorsal view and lateral view, performed in 19 animals showed radiopaque stool mass in colon, large intestine along with radiopaque areas of gases formation inside various bowel areas. Female dogs (52.9%) were shown more affected with constipation than male dogs (47.1%). Older Dogs (>60 months) were found more affected among constipated dogs than other age groups. The occurrence of constipation was found high in large and small mediums (73.5%) than medium breeds (26.5%).

Haemato-biochemical blood findings showed highly significant increase in Total Leucocyte Count (Leukocytosis), Neutrophilia, ALP levels and increased Blood Urea Nitrogen ($p < 0.001$) while increase Serum Bilirubin and Serum albumin was found significant ($p < 0.05$) in constipated dog. Other parameters were not significantly different among healthy and constipated dog. Therapeutic Management started with hydration using DNS or RL after considering glucose level and severity of liver from blood report. Laxatives with high fiber diet were advised in all the cases, while enema was given to 13 cases where the fecal mass was obstructed more towards the colon and rectum areas. The patients with liver problems were given Ursodiol and L-ornithine-L-aspartate in recommended dose. All the cases were managed by therapeutic and dietary management. Surgical management was not practiced in any of the case.

Table 1 Haemato-biochemical profile in Normal and Constipated Dog (Mean \pm S.E.)

Parameters(units)	Healthy Dog	Dog with Constipation	Normal Reference Range
Total Leucocyte Count(units/ μ L)	13369.12 \pm 2950.655	21285.29 \pm 6579.082	5000-16000
Neutrophils (%)	70.12 \pm 9.874	86.5 \pm 6.106	58-85
Hemoglobin(gm/dl)	13.1 \pm 1.5152	14.576 \pm 2.5041	12 to 19
PCV (%)	40.41 \pm 4.593	44.68 \pm 6.79	35 to 57
Glucose (Random) (mg/dl)	101.74 \pm 20.367	95.06 \pm 32.354	70-125
Blood Urea Nitrogen(mg/dl)	21.4118 \pm 6.51859	49.0588 \pm 29.39691	7 to 27
Serum Creatinine(mg/dl)	1.2971 \pm 0.39118	1.6029 \pm 0.73008	0.5-1.8
Serum Bilirubin Total(mg/dl)	0.2529 \pm 0.1022	0.2265 \pm 0.06183	0.1-0.3
Alkaline Phosphatase(U/L)	106.29 \pm 27.967	155.44 \pm 60.916	10-150
Alanine Aminotransferase(SGPT)(U/L)	41.18 \pm 3.247	45.35 \pm 13.865	5 to 60
Serum Protein(Total)(g/dl)	6.626 \pm 0.4231	7.456 \pm 2.4294	6.0-7.5
Serum Albumin(g/dl)	3.344 \pm 0.3457	4.165 \pm 0.5092	2.7-4.4

Table 2 Haemato-biochemical profile in Normal and Constipated Dog in various ranges

Parameters	Type of Dog	No. of Dogs (%)			p-value
		Lower than Normal Reference Range	Normal Reference Range	Higher than Normal Reference Range	
TLC	Healthy Dog	-	29(85.3)	5(14.7)	0.000**
	Dog with Constipation	-	9(26.5)	25(73.5)	
Neutrophils	Healthy Dog	3(8.8)	28(82.4)	3(8.8)	0.001**
	Dog with Constipation	-	18(52.9)	16(47.1)	

Hb	Healthy Dog	8(23.5)	26(76.5)	-	0.287
	Dog with Constipation	4(11.8)	29(85.3)	1(2.9)	
PCV	Healthy Dog	5(14.7)	29(85.3)	-	0.468
	Dog with Constipation	3(8.8)	30(88.2)	1(2.9)	
R.Glucose	Healthy Dog	5(14.7)	25(73.5)	4(11.8)	0.205
	Dog with Constipation	8(23.5)	18(52.9)	8(23.5)	
BUN	Healthy Dog	-	25(73.5)	9(26.5)	0.000**
	Dog with Constipation	-	2(5.9)	32(94.1)	
S.Creatinine	Healthy Dog	-	31(91.2)	3(8.8)	0.171
	Dog with Constipation	-	27(79.4)	7(20.6)	
S.Bilirubin	Healthy Dog	-	26(76.5)	8(23.5)	0.003*
	Dog with Constipation	-	34(100)	-	
ALP	Healthy Dog	-	31(91.2)	3(8.8)	0.000**
	Dog with Constipation	-	14(41.2)	20(58.8)	
ALT	Healthy Dog	-	31(91.2)	3(8.8)	0.452
	Dog with Constipation	-	29(85.3)	5(14.7)	
S.Protein_	Healthy Dog	1(2.9)	33(97.1)	-	0.076
	Dog with Constipation	-	30(88.2)	4(11.8)	
S.Albumin	Healthy Dog	-	34(100)	-	0.020*
	Dog with Constipation	-	29(85.3)	5(14.7)	

** p < 0.001 (highly significant)

* p < 0.05 (significant)

Dehydration and Anorexia was common problem in humans as well, supported by Brosshard, Dreber & Schnegg (2004). Radiographic findings were similar to reported by (Lee & Leowijk, 1982; Rakha et al., 2015). Hydration using DNS or RL after considering glucose level and severity of liver were supported by Allen & Holm (2008) and Davis et

al., (2013) chief complaint, physical exam findings, and indicated additional testing will determine the need for fluid therapy. Fluid selection is dictated by the patient's needs, including volume, rate, fluid composition required, and location the fluid is needed (e.g., interstitial versus intravascular. Laxatives with high fiber diet advised in managing constipation were supported by Kanauchi et al. (2010). Female were found to be more affected with constipation which was similar to (Rakha et al., 2015). Although the pet owners usually prefer male dog, so constipated female were not significantly higher. Age group greater than 60 months (or 5 years) developed constipation more frequently, also (Rakha et al., 2015) showed similar findings for digestive problems, primarily constipation. It is also supported by Higgins & Johanson (2004) and Brosshard, Dreber & Schnegg (2004), where researches mentioned constipation is seen mostly in female and old humans. Also (Knowles et al., 2001) mentioned about increased risk of constipation after childbirths. This might owe due to sedentary and lazy lifestyle in old age as well as in female dog.

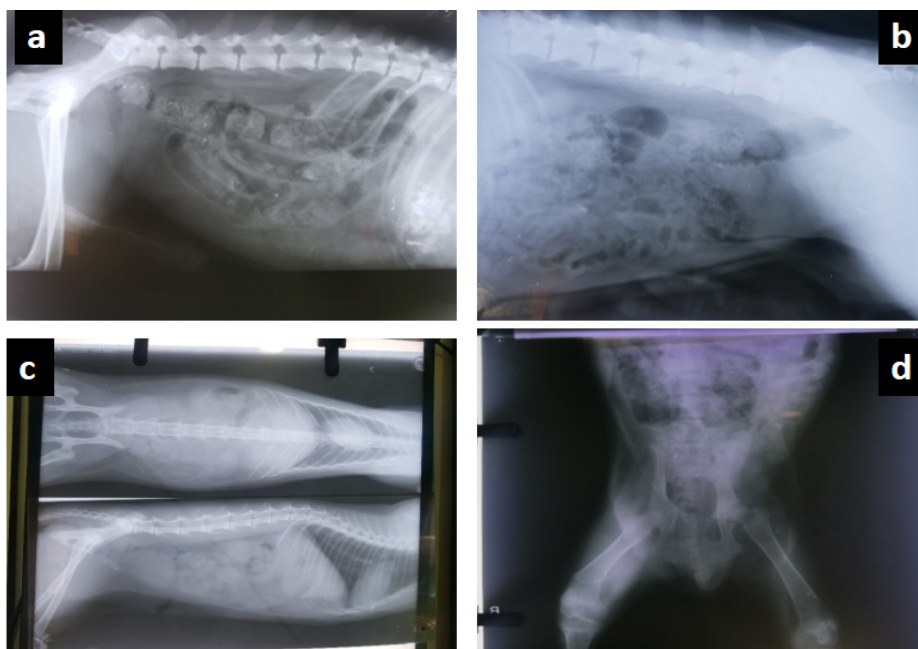


Figure 1 Radiographic Images of various constipated dogs.

a) Right lateral radiographic views (RL view) showing radiopaque stool mass in the colon of 5 years old German Shepherd with severe constipation. (b) Left lateral radiographic views (LL view) with radiopaque areas with gases formation inside the colon and large intestine of 2 years old Japanese Spitz dog. (c) RL view and VD view showing radiopaque stool mass in maximum bowel length of 6 years old Dachshund Dog. (d) VD view showing areas of gases and stool in 9 months old Lhasa Apso dog.

The increase in Blood Urea Nitrogen is significantly higher which is seen other gastrointestinal diseases (Prause & Grauer, 1998); Dehydration is also found to increase BUN level (Polzin, 2013) CKD results from loss of functional nephrons; however, the specific disease process responsible for this loss usually cannot be determined due to development of chronic changes (eg, fibrosis. Significant Leukocytosis was also found in (management of elderly patients' constipation), which might be due to increase in bacterial infection due to impaired immune system, also cases were presented to hospital only after more than 2 days of symptoms in maximum instances. This might be due to inflammation and secondary bacterial infections. There was significant rise in AST levels along with serum bilirubin suggesting liver disorder or elevated liver enzymes of idiopathic origin. Use of polyethylene glycol(PEGLEC) was supported by (Portalatin & Winstead, 2012) in managing constipation. Some of the therapeutics used in human medicines that can be considered novel in veterinary practice are:

Pruracalopride Pruracalopride, a first in class dihydro-benzofuran-carboxamide, is used in symptomatic treatment of chronic constipation, in the case where laxatives can't provide intended relief (Camilleri & Deiteren, 2010; Washabau, 2003) It has high affinity with 5-HT₄ receptor, without showing any effect on other 5-HT receptor (Gonzalez-Martinez et al., 2014; Schiller, 2004; Tack, Van Outryve, Beyens, Kerstens, & Vandeplassche, 2009)osmotic laxatives, stimulant laxatives, prokinetic agents, biofeedback training, and surgery. These often are tried sequentially and episodically and have little evidence of long-term efficacy. Patients often report inadequate relief of symptoms. There is room for improvement, therefore, in the therapy of chronic constipation. Future advances largely will be based on insights into the enteric nervous system (ENS. It stimulates defecation via giant contractions (GMC's) in dogs, showing a dose dependent stimulation (0.2-1.25mg/kg).

Cisapride

Cisapride, a gastro prokinetic drug, increases motility of upper gastrointestinal tract. It directly acts serotonin 5-HT₄ receptor agonist. It increases lower esophageal peristalsis along with sphincter pressure which aids in accelerating gastric emptying. Cisapride has been reported to be useful in managing constipation in dogs and megacolon in cats (Plumb,2015). For Cisapride, dose rate of 0.1–0.5 mg/kg PO 2–3 times per day given 30 minutes before meals. Its prokinetic effect is similar to metoclopramide and domperidone, but is a weak antiemetic drug(Washabau, 2003)

Although there was no necessity of performing surgical management in this research, In some severe cases of constipation, primarily idiopathic megacolon, the therapeutic management using laxatives, enemas, fiber diet (dietary management), have not been able to permanently relief clinical signs and sufferings in animals as reported by Hasler & Washabau (1997) and White (2002). Surgical management of the condition of megacolon are described by various authors; including partial colectomy (Webb,1985) and Subtotal

Colectomy (Gregory, Guilford, Berry, Pederson, & Olsen, 1990) physical condition, body weight, blood chemistry panel, fasting and postprandial serum bile acids, serum cobalamin concentration, serum folate concentration, fecal weight, fecal water content, fecal fat content, fecal osmolality and electrolyte concentration, quantitative anaerobic fecal bacterial culture, partial thromboplastin time, prothrombin time, breath hydrogen concentration, urinary calcium, phosphorus and electrolyte concentrations, and abdominal radiographic examination with air contrast studies (Sweet, Hardie, & Stone. 1994) 22 cats with megacolon underwent colectomy by end-to-end anastomosis of the distal colon to either the proximal colon (preserving the ileocolic junction in 14 cats).

CONCLUSION AND RECOMMENDATIONS

As this research showed increased risk of constipation in old and female dogs, owner must pay more attention and care in diet and exercise while rearing such pet. Dehydration should be managed at the initial phase to manage the patients' physical condition. Radiographical and haemato-biochemical examination to search for prompt diagnosis which differs from case to case in management of constipation should be practiced. Starting from high fiber diets, mild laxatives and enemas, the treatment can be proceeded to fluid therapy, antibiotic therapy and medications managing liver ailments after haemato-biochemical examination.

Since, clinical evidence for the efficacy of laxative therapies and their use in long-term is not available in veterinary and even human medicine. Further studies can be performed to know the efficacy of Cisapride and Prucalopride usage in management of constipation in dog at various dose rate. Along with this, surgical management, most reliably Subtotal colectomy, can be used to manage idiopathic megacolon causing constipation and obstipation.

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