

Efficacy of Polyherbal Liquid in Equine Diarrhoea

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Abstract

A study was conducted to assess the efficacy of a polyherbal antidiarrhoeal liquid in equines. Fifteen horses, suffering from acute diarrhoea, were randomly divided into three groups and given different medication. Group T-1 was given metronidazole iv @20mg/kg BD. Group T-2 was given metronidazole iv @ 20mg/kg BD along with an adjunct therapy of polyherbal antidiarrhoeal, Dysen-00, 10ml/100 kg bwt, BD. Third group, T-3, was given the herbal liquid only @10ml/100 kg bwt BD. The fluids and electrolytes were restored as per the hydration status of each horse. It was observed that the efficacy of antibiotic was synergized by the use of herbal antidiarrhoeal. When the herbal liquid (Dysen-00) was used exclusively (T-3), the desired effect was seen within 35- 52 hours of treatment of the first dose. However, when used as a supplement along with standard antibiotic, it substantially decreased the recovery duration thereby reducing the financial burden and excessive usage of antibiotics. It can be concluded that Dysen-00 may be used for treating non-specific diarrhoea.

Keywords: Antidiarrhoeal, Polyherbal, Equines, Dysen-00, non-specific diarrhoea.

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I. Introduction

Diarrhoea may be defined as a syndrome with multifactorial aetiology, ranging from infectious microbes to noxious agents, antibiotic associated to dietary imbalances, capable of initiating an inflammatory response in the bowel/cecum and colon. This disruption in the bowel leads to massive loss of fluids, electrolytes as well as proteins. Owing to its pathogenesis and subsequent complications, diarrhoea requires immediate treatment, which include correction of motility, fluid therapy and appropriate antimicrobials to check infection.

The pathophysiology involves an increased osmotic load within the intestine (resulting in retention of water; hyper secretion of electrolytes and water into the intestinal lumen; exudation of protein and fluid from the mucosa, third spacing) an altered intestinal motility, decreased fluid absorption along with rapid transit. The cumulative effect is increase in faecal volume, frequency and fractional water content, leading to dehydration, imbalance of electrolytes and in severe cases, shock.

Limitations of antimicrobials and their potential role in altering the microbial flora as well as drug abuse have led to an increase in the use of complementary medicine in digestive disorders as well as other systemic disorders. The purpose of the present study was to evaluate the efficacy of a non-synthetic, natural product derived from herbal sources, on equine diarrhoea of varied origin in field conditions, which would reduce the gut inflammation and irritation, limit the biosynthesis of prostaglandins, control gut motility, prevent excessive secretion of electrolytes and water into the intestinal lumen, possess anti-secretory mechanism and anti-electrolyte permeability, at the same, not subjected to drug resistivity and adverse reactions.

II. Materials And Method

The present study included 15 equines with non-specific acute diarrhoea. The equines were randomly divided into 3 groups:

- 1) T1- Consisted of equines (n=5) suffering with acute diarrhoea, given injectable metronidazole @20mg/kg iv BD.
 - 2) T2- Equines (n=5) were given metronidazole @20mg/kg, iv BD along with an adjunct therapy of Dysen-00 liquid (Nutricare Lifesciences, India) @10 ml/100kg bwt BD orally.
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3) T3-Equines (n=5) subjected to exclusively herbal therapy and were given the polyherbal liquid @10ml/100 kg bwtBD orally.

Replenishment of fluids and electrolytes was done as per the dehydration status of the respective animal. All the horses were clinically examined before the onset of medication and blood samples were taken and sent to a veterinary diagnostics lab for haematological analysis. The treatment was continued till the absence of symptoms in case of group T3. In group (T-1) administration of antibiotic lasted for 5 days and in group (T-2) administration of antibiotic lasted for 3 days. The therapy/treatment in all the groups lasted till the frequency and consistency of faeces was reduced to almost normal. The parameters recorded included

- 1) Frequency and consistency of faeces
- 2) Temperature
- 3) Respiration
- 4) TLC (total leucocyte count)
- 5) CRT (capillary refill time)
- 6) Duration of onset of diarrhoea to disappearance of symptoms

III. Results

Most of the cases were attended within 24 hours of commencement of diarrhoea. The animals appeared dull depressed and dehydrated on the first day. Some of the animals were accompanied by pyrexia (Table 1). 4 out of 15 horses under study had mucoid faeces. Majority of the horses in all the groups showed clinical improvement within 2-3 days after commencement of treatment. The frequency and consistency of loose faeces decreased from day two of treatment in all the cases and the animals recovered without any complication. Animals of group T-1, treated with Metronidazole i/v, were quick to respond to treatment, and showed symptomatic relief after 14 hours of infusion. The consistency and frequency of faeces showed improvement after first dose in animals of group T-2, treated with Metronidazole and Dysen-00, both. Animals of T-2 group showed encouraging results after approximately 2 hours of second dose of Dysen-00. Complete recovery was observed on 3-5 days of treatments in group T-2. Equines of group T-3, showed first signs of recovery after 3 consecutive doses of the polyherbal liquid and complete recovery was observed in 7-9 doses. The animals showed decrease in motility and formed faeces after about 35-52 hours of first dose. No mortality was observed in any of the cases.

Table 1: Mean parameters recorded before the onset of medication.

Group	Temperature (Deg F)	Resp. Rate (per min.)	CRT (sec)	TLC (1000/ μ)	Dehydration	Colic	Consistency of faeces
T-1	102.5 \pm 0.02	20	4	11.8	+++	-	+++++
T-2	100.9 \pm 0.04	18	3	12.2	++	+	++++
T-3	102.8 \pm 0.10	24	4	10.9	+++	-	++++

Table 2: Mean parameters recorded on 5th day of medication.

Group	Temp (Deg F)	Resp. Rate (per min.)	CRT (sec)	TLC (1000/ μ)	Consistency of faeces	Time taken for complete absence of symptoms
T-1	100.3 \pm 0.06	15	3	9.1	+	3 Days
T-2	99.7 \pm 0.32	12	2	7.2	+	2-3 Days
T-3	101.1 \pm 0.007	14	2	9.4	+	3-5 days

IV. Discussion

In our study, polyherbal extract consisting of various phyto-bioactives showed effectiveness against acute diarrhoea of varied origin. The active constituents of the liquid (*Punicagranatum*, *Helicteres isona*, *Holarrhena antidysenterica*, *Salmaliamalabarica*, *Calotropis procera*, *Woodfordia fruticosa*, *Aegle marmelos*) seem to have acted synergistically, modulating the motility, inhibiting gastrointestinal secretions, and increasing the transit time.

The gastroprotective as well as antimicrobial and antidiarrheal properties of phytoconstituents such as saponins, tannins, terpenoids, flavonoids and alkaloids have been well studied and documented (Sharma *et al*, 2015; Daswani *et al*, 2012; Gilani A H *et al*, 2010; Sharma *et al*, 2005; Rani & Khullar, 2004)

Aegle marmelos, which is rich in mucilage, seems to have acted as a demulcent and prevented any further damage or colonization of enteric pathogens in the gut. Antidiarrhoeal mechanism of action of *A. marmelos* has been explained by several other authors through reduced bacterial adherence to intestinal wall localized effacement of the epithelium, production of toxin and direct epithelial cell invasion (Rao *et al.*, 2012; Shamkuware *et al.*, 2012; Brijesh *et al.*, 2009; Surve *et al.*, 2008). Dhuley (2003) however linked gastroprotective action of luvangetin present in *A. marmelos* to inhibition of oxidative stress in gastro duodenal mucosa. Similarly, gastroprotective action through antioxidant mechanism has also been postulated for *Punicagranatum* rind extract (Ajaikumare *et al.*, 2005). Tammana *et al.*, (2019) and various other authors (Shamkuware *et al.*, 2012; Qnais *et al.*, 2007; Das *et al.*, 1990) elucidated that *Punicagranatum* peels contain actives that reduce diarrhoea by limiting gut motility, increasing water and NaCl (sodium chloride) reabsorption, reducing mucosal secretion, and inhibition of prostaglandin release from intestinal mucosa. These mechanisms of action may explain the antidiarrhoeal effect of our polyherbal liquid, Dysen-00 too.

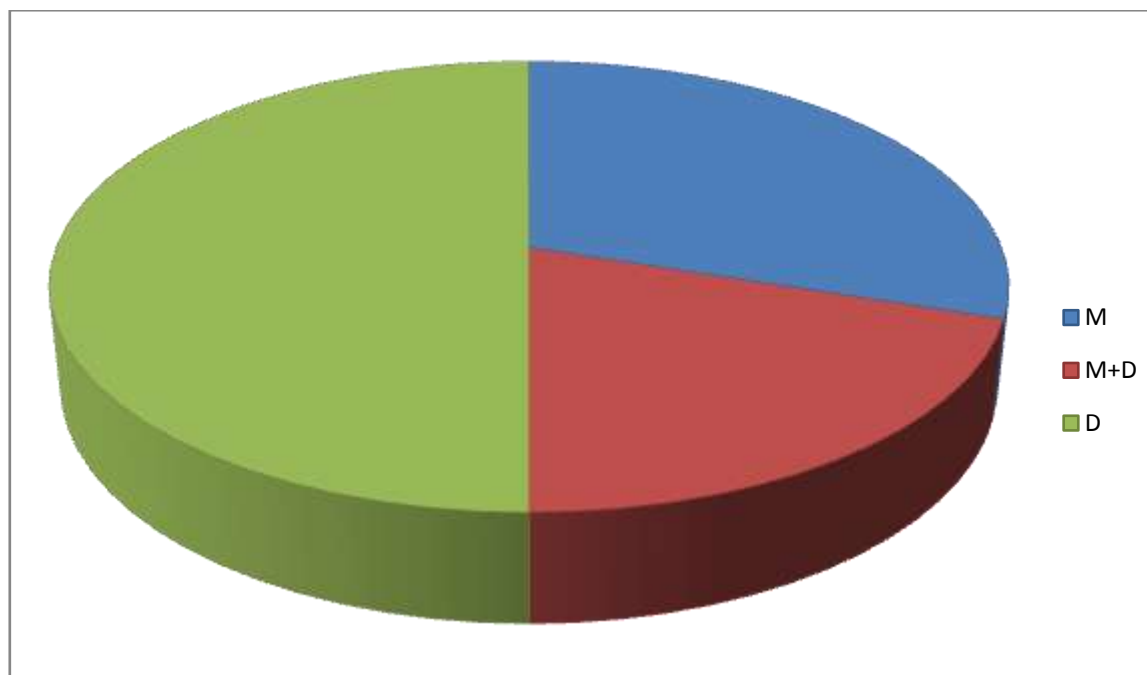
Likewise, *Holarrhena antidysenterica*, rich in alkaloid and flavonoids, has been shown to possess antidiarrhoeal activity comparable to standard loperamide and gentamicin (Sharma *et al.*, 2015; Mahato *et al.*, 2013). Antidiarrhoeal action of *Calotropis procera* has also been researched and well documented (Abhimanyu G *et al.*, 2013; Patil *et al.*, 2011; Das *et al.*, 2011; Kumar S *et al.*, 2001). *C. procera* was observed to decrease intestinal transit time (Kumar *et al.*, 2019), exhibit an anti-inflammatory and antimicrobial effect, by neutralizing prostaglandin mediated inflammation (Kumar *et al.*, 2001) and restrict the microbial counts (Rani & Khullar, 2004). Recent research has correlated antidiarrhoeal activity of *C. procera* to inhibition of enteric pooling by targeting reactive oxygen species and inflammatory responses (Kumar *et al.*, 2019).

The astringent action of *Salmali malabarica*, owing to the presence of tannins, helps prevent the corrosion of the gastric wall from excessive acid and promotes the healing of intestinal mucosa (Hussain *et al.*, 2015; Jagtap *et al.*, 2011; Prabhu *et al.*, 2011). Another mechanism of action justified by Arumugam *et al.*, (2011) is that *S. malabarica* acts by inducing protein precipitation, vasoconstriction, and forms a protective layer that protects the mucosa from ulcerogens. Phyto-bioactives of *S. malabarica* are potent scavengers of ROS (reactive oxygen species) which limit the mucosal damage by neutralizing free radicals, and their antimicrobial action prevents further damage from gastric infections (Suther *et al.*, 2009; Rani and Khullar, 2004; Borrelli and Izzo, 2000). Besides this, antisecretory and cytoprotective potential makes it a supplement for the treatment of gastric ulcers in a dose dependent manner (Hussain *et al.*, 2015).

We may say that *S. malabarica* present in Dysen-00, might have helped in repairing the gastric mucosa/prevented further damage in any of the above mechanisms.

Amongst the probable modes of action of various bioactive fractions derived from *Helicteres isora*, demulcent and astringent action account for it being an antidiarrhoeal (Nirmal and Singh AK, 2014; Pandurang, 2010). Since pathogenesis is also linked to the oxidative status, the major therapeutic effect of extract is attributed to free radical scavenging mechanism and the antioxidant potencies of *H. isora* (Daya *et al.*, 2015; Kumar *et al.*, 2013). Tambekar *et al.*, (2008) concluded that the phytoextracts of *H. isora* possessed antibacterial action against enteric and diarrhoeal bacterial pathogens, though the mode of action was not specified. This might explain the antidiarrhoeal effect of our polyherbal formulation against diarrhoea of varied etiology. Similarly, *Woodfordia fruticosa* also exhibits antibacterial, anti-inflammatory and immunomodulatory effects (Mishra *et al.*, 2018; Yogesh *et al.*, 2012; Bhattarai *et al.*, 2011; Das *et al.*, 2007).

Mehesare (2018) and Borah *et al.*, (2014) in their phytopharmacological study, have also recommended use of complementary medicine to avoid antibiotic resistance in diarrhoea in livestock.



Graph 1: M – Metronidazole; M+D-Metronidazole +Dysen-00; D-Dysen-00; Time interval from onset of diarrhoea to recovery was longer in equines treated with Metronidazole or dysen-00 alone as compared to the equines treated with a combination metronidazole along with dysen-00. Here metronidazole was given at a dose rate of 20mg/kg IV, BD and Dysen-00 was given 10ml/100kg bwt twice daily.

V. Conclusion

The results of the present study revealed that the herbal preparation used as an adjunct along with standard antibiotic treatment was notably more efficacious in controlling the non-specific diarrhoea in equines. The phytoactives present in Dysen-00 seem to have succeeded in ameliorating the effects of the commonly used antidiarrhoeal and consequently reducing the duration of treatment. The herbal preparation when used alone, too proved effective against diarrhoea. However, recovery in this case took a slightly longer duration vis-à-vis treatment with antibiotic with/without the polyherbal liquid.

It is suggested that the indiscriminate use of antibiotic can be avoided by switching over to complementary medicine (Dysen-00) and hence the resistivity towards antibiotics can also be limited.

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