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## Therapeutic evaluation of guava leaf powder in the management of nonspecific diarrhoea in goats

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### Abstract

The goats with nonspecific diarrhoea (56 goats) were selected for the study. The goats with nonspecific diarrhoea were subjected to detailed clinical, haematobiochemical, dung sample and rumen fluid examination. The goats with nonspecific diarrhoea were grouped into seven groups with eight animals in each. They were administered with guava leaf powder or decoction prepared from guava leaf powder (0.5 g/kg, 1.0 g/kg and 2.0 g/kg bwt). The increased concentration of tannin, saponin and phenol was noticed in the phytochemical analysis of guava leaves. Temperature, heart rate and respiratory rate were within the normal range in goats with nonspecific diarrhoea. No significant difference in haematology and serum biochemistry of affected and control animals. Rumen fluid of affected goats was green to greenish brown colour, semi liquid to liquid consistency, aromatic in odour. The pH, protozoal motility, methylene blue dye reduction test (MBRT) and total acidity of rumen fluid did not show significant difference between affected and control group animals. The treatment of nonspecific diarrhoea in goats with guava leaf powder @ 1-2 g /kg bwt orally either in the form of powder or decoction for 3 to 4 days of administration via orally was effective and the result was comparable with standard astringent treatment protocol using kaolin.

**Keywords:** goats, diarrhoea, guava leaves, rumen fluid

### Introduction

Phytomedicine is used to treat the various disorders and also to improve performance of Livestock. The ethnoveterinary practice is gaining importance in the management of ruminant disorders with least cost. Small ruminants are commonly affected with diarrhoea, anaemia due to ectoparasites and endoparasites, bacterial and viral infections in the field conditions. The diarrhoea is caused by various etiologies like bacteria, virus, protozoa, endoparasites, mineral deficiencies and dietary alterations. Despite improvement in managerial practices and prevention and treatment strategies, enteritis is still the most common and costly disease in small ruminants. Guava plant is a phytotherapeutic plant used in folk medicine and have active components that helps in treatment and management of various diseases (Pandey *et al.*, 2017) <sup>[1]</sup>. The leaves of the Guava are having astringent, anti-diarrhoeal and anthelmintic property due to the presence of flavonoids and tannins. Quercetin is one of the most abundant flavonoids found in guava leaves. Quercetin is thought to contribute to the anti-diarrhoeal effect of guava and is able to relax intestinal smooth muscle and inhibit bowel contractions (Joseph and Priya, 2011) <sup>[2]</sup>. Very few literatures are available about the use of guava leaves administration orally for management of diarrhoea in goats. Hence, the research project was undertaken with objective of management of non-specific diarrhoea in goats by using guava leaf powder and guava leaf decoction.

### Materials and Methods

The research work was carried out in goats presented with diarrhoea to Small Ruminant Medicine Unit, Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal. The goats with nonspecific diarrhoea were selected for the study after excluding the parasitic etiology and coccidiosis by screening the dung samples. The goats with nonspecific diarrhoea were subjected to detailed clinical, haematobiochemical, dung sample and rumen fluid examination. The results were compared with eight apparently healthy goats.

### Haematobiochemical examination

Three milliliter of blood without anticoagulant and two milliliter whole blood with EDTA were collected from goats with nonspecific diarrhoea and healthy goats.

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Examination of complete blood count was done as described by Jain, 1986<sup>[3]</sup>. Total protein and albumin were estimated by Modified Biuret method and Al-Dumas method, respectively (Varley *et al.*, 1980)<sup>[4]</sup> and Aspartate aminotransferase (AST) by Modified IFCC method (Bergmyer, 1986)<sup>[5]</sup>.

#### Rumen fluid examination

100 ml of rumen fluid was collected by passing stomach tube through oral cavity for examination of physical characters (colour, consistency, odour), pH, methylene blue dye reduction test (MBRT) and ruminal protozoal motility.

#### Dung sample examination

Dung samples were collected by using cotton swab and subjected to microscopic examination. Sterile dung samples were collected for cultural examination of organisms.

#### Phytochemical and Proximate analysis of Guava leaf powder

Green Guava leaves were collected and dried under shades. The dried leaves were powdered and stored for the study. The leaves from native guava variety and hybrid variety were analyzed for the phytochemical properties both by aqueous extract and ethanolic extract. The guava leaf powder was subjected to proximate analysis.

#### Treatment

Based on the dung sample examination, serum biochemical analysis, rumen fluid analysis, the goats with nonspecific diarrhoea were selected for the study. They were grouped into seven treatment groups with eight in each and one control group with healthy eight goats (Table 1). The data were statistically analyzed as described by Snedecor and Cochran (1994)<sup>[6]</sup>.

**Table 1:** Treatment groups of Goats with nonspecific diarrhoea

S. No.	Groups	Details
1.	Group I	Eight goats with nonspecific diarrhoea were administered with dried guava leaf powder @ 0.5 g/kg bwt orally until recovery.
2.	Group II	Eight goats with nonspecific diarrhoea were administered with decoction prepared from guava leaf powder @ 0.5 g/kg bwt orally until recovery.
3.	Group III	Eight goats with nonspecific diarrhoea were administered with dried guava leaf powder @ 1.0 g/kg bwt orally until recovery.
4.	Group IV	Eight goats with nonspecific diarrhoea were administered with decoction prepared from guava leaf powder @ 1.0 g/kg bwt orally until recovery.
5.	Group V	Eight goats with nonspecific diarrhoea were administered with dried guava leaf powder @ 2.0 g/kg bwt orally until recovery.
6.	Group VI	Eight goats with nonspecific diarrhoea were administered with decoction prepared from guava leaf powder @ 2.0 g/kg bwt orally until recovery.
7.	Group VII	Eight goats with nonspecific diarrhoea were selected for standard antidiarrhoeal treatment with kaolin @ 1 g /kg bwt orally until recovery.
8.	Group VIII (Control Group)	Eight apparently healthy goats

#### Results and Discussion

In the present study, total numbers of goats screened for diarrhoea were 127. Out of 127 goats with diarrhoea during the study period of one year, 56 goats with nonspecific diarrhoea, 59 goats with diarrhoea due to helminthic infestations and 14 goats diarrhoea with coccidiosis were recorded. The vital signs like temperature (38.6 to 39.4° C), pulse rate (62 to 69/min) and respiratory rate (24 to 28/min) were within the normal range. Dung was in semisolid to semiliquid in consistency and soiled the perineal region. Feed and water intake and rumination were normal.

There was no significant difference in haemoglobin, packed cell volume, red blood cell count, white blood cell count, differential count, total protein, albumin and aspartate aminotransferase in between treatment groups and with control group. There was no significant difference in rumen fluid examination between treatment groups and with control group (Table 2). The examination of dung samples revealed greenish to greenish brown colour, semisolid to semiliquid in consistency in all the goats with non-specific diarrhoea. No parasitic ova could be observed on microscopic examination of dung samples of different treatment groups.

**Table 2:** Rumen fluid examination

S. No.	Parameters	Group I	Group II	Group III	Group IV	Group V	Group VI	Group VII	Control
1.	Colour	Green to greenish brown	Green to greenish brown	Green to greenish brown	Green to greenish brown	Green to greenish brown	Green to greenish brown	Green to greenish brown	Green to Greenish brown
2.	Consistency	Semi liquid to liquid	Semi liquid to liquid	Semi liquid to liquid	Semi liquid to liquid	Semi liquid to liquid	Semi liquid to liquid	Semi liquid to liquid	Semi liquid to liquid
3.	Odour	Aromatic	Aromatic	Aromatic	Aromatic	Aromatic	Aromatic	Aromatic	Aromatic
4.	Protozoa motility	++ to +++	++ to +++	++ to +++	++ to +++	++ to +++	++ to +++	++ to +++	++ to +++
5.	MBRT (time)	4.00 ±0.38 <sup>a</sup>	4.88 ±0.44 <sup>a</sup>	4.71 ±0.60 <sup>a</sup>	4.38 ±0.38 <sup>a</sup>	4.00 ±0.27 <sup>a</sup>	4.88 ±0.44 <sup>a</sup>	5.00 ±0.53 <sup>a</sup>	4.00 ±0.43 <sup>a</sup>
6.	Total acidity (Units)	25.75 ±1.68 <sup>a</sup>	24.88 ±2.62 <sup>a</sup>	26.75 ±2.42 <sup>a</sup>	25.63 ±3.12 <sup>a</sup>	25.50 ±2.98 <sup>a</sup>	28.50 ±2.07 <sup>a</sup>	24.38 ±1.60 <sup>a</sup>	24.54 ±1.62 <sup>a</sup>
7.	pH	6.86 ±0.09 <sup>a</sup>	6.88 ±0.09 <sup>a</sup>	6.81 ±0.13 <sup>a</sup>	6.73 ±0.09 <sup>a</sup>	6.95 ±0.07 <sup>a</sup>	6.76 ±0.10 <sup>a</sup>	6.65 ±0.08 <sup>a</sup>	6.80 ±0.10 <sup>a</sup>

\* Values with different superscripts significantly differ

The phytochemical analysis of guava leaves was done in both leaves from native variety and hybrid variety guava. Both the varieties were having similar quantities of saponin, tannin, phenol, terpenoids, flavonoids, hydrolysable tannin and glycosides. Among the parameters tannin, saponin and phenol were present in higher concentration (Table 3). Similar results

were observed in aqueous and alcoholic extracts of Guava leaf (Deepa Philip *et al.*, 2015; Ekeleme *et al.*, 2017) [7, 8]. Guava leaf powder sample contained Crude protein 8.73%, crude fiber 15.78%, ether extract 3.31% and gross energy 3723 Kcal/kg.

**Table 3:** Phytochemical analysis of guava leaves

Photochemical constituents	Leaf of Native Guava tree		Leaf of Hybrid Guava plant	
	Aqueous extract	Ethanollic extract	Aqueous extract	Ethanollic extract
Saponin	+++	+++	+++	+++
Tannin	+++	+++	+++	+++
Phenol	+++	+++	+++	+++
Alkaloids	-	-	-	+
Terpenoids	+	++	+	++
Flavanoids	+	+	+	+
Carbohydrates	-	+	-	++
Volatile acids	-	++	-	++
Hydrolysable tannins	++	+	++	+
Glycosides	++	+	+	+
Cardiac glycosides	+	-	+	-

In Group I, four goats (50%) showed normal consistency of dung on fourth day, two goats (25%) on sixth day and two goats did not show improvement. In Group II, four goats (50%) showed normal consistency of dung on third day, three goats (37.5%) on fifth day and one goat (12.5%) did not show improvement. In Group III, five goats (62.5%) showed normal dung consistency on third day, two goats (25%) on fifth day and one (12.5%) did not improve. In Group IV, six goats (75%) recovered from diarrhoea on third day and two goats (25%) on fourth day. In Group V, five goats (62.5%) showed normal dung consistency on third day and three goats (37.5%) on fourth day. In Group VI, six goats (75%) recovered from diarrhoea on third day and two goats (25%) on fourth day. In Group VII, five goats (62.5%) showed normal dung consistency on third day and three goats (37.5%) on fourth day. The five goats (62.5%) in the control group (Group VIII) which was treated with kaolin powder orally showed normal consistency of dung on third day and the remaining three goats (37.5%) showed normal consistency of dung on fourth day. The treatment of nonspecific diarrhoea in goats with guava leaf powder @ 1-2 g /kg bwt either in the form of paste or decoction for 3 – 4 days of administration via orally was effective and the result was comparable with standard astringent treatment protocol using kaolin. The guava leaves were used to treat diarrhoea in ruminants, and the root and stem of the plant were used in treating diarrhoea in sheep and goats (Mathias-Mundy and Murdiati, 1990) [9]. The guava buds and leaves used as antidiarrheal agents in pet dogs (Lans *et al.*, 2000) [10]. Quercetin present as an active constituents found in guava leaf reduced the capillary permeability in the abdominal cavity and also inhibited intestinal movement in an *in vitro* study (Daswani *et al.*, 2017; Zhang *et al.*, 2003) [11, 12]. The guava could be used for the management of infectious diarrhoea and physiological diarrhoea. Addition of 5% and 10% guava leaf meal (dried and ground) to pig diets reduced diarrhoea in piglets. Ground guava leaves was given to weaned piglets to prevent post weaning diarrhoea (Daswani *et al.*, 2017) [11].

In the present study, the presence of tannin in the guava leaf powder would have caused astringent action in the control of nonspecific diarrhoea in goats. The guava leaf powder could also be used as adjunct therapy in the management of diarrhoea in goats along with primary treatment.

## Conclusion

The nonspecific diarrhoea in goats is effectively treated with guava leaf powder @ 1-2 g /kg bwt either in the form of paste or decoction for 3 – 4 days of administration. The presence of tannin in the guava leaf powder would have caused astringent action in the control of nonspecific diarrhoea in goats. The guava leaf powder could also be used as adjunct therapy in the management of diarrhoea in goats along with primary treatment.

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