The Indian Journal of Veterinary Sciences & Biotechnology *(2016) Volume 12, Issue 2, 66-69*
ISSN (Print) : 2394-0247 : ISSN (Print and online) : 2395-1176, abbreviated as IJVSBT
http://dx.doi.org/10.21887/ijvsbt.v12i2.3741

Submitted : 05-07-2016 ***Accepted : 21-08-2016*** ***Published : 15-10-2016***

Antidiarrhoeal Activity of *Dalbergia Sissoo* Leaves in Goats

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Abstract

Antidiarrhoeal activity of Leaves of *Dalbergia sissoo (D. sissoo) was* evaluated in mice using castor oil induced diarrhoea and gastrointestinal motility test with charcoal meal method and further in clinical cases of goats. The results showed that the *D. sissoo* leaves extract (400 mg/kg and 800 mg/kg) produced significant (p<0.01) reduction in frequency of defecation up to 75.12% compared to control mice in castor oil induced diarrhoea. The inhibition of charcoal meal transit by *D. sissoo* at dose of 400 mg/kg and 800 mg/kg treated groups was found to be 42.95 and 53.20 per cent, respectively as compared to controls. In clinical cases of diarrhoea in goats *D. sissoo* decoction treated group showed complete recovery and normalization of the faeces on 4th day of treatment. The study revealed that D. sissoo possesses potent antidiarrhoeal activity.

Key Words: Antidiarrhoeal, *Dalbergia sissoo,* Castor oil, Charcoal, Mice, Goat

Introduction

Diarrhoea is an important symptom and complication of many diseases (Fernado, *et al.,* 2010). In animals, particularly in ruminants diarrhoea associated with various disease conditions which is one of the leading causes of mortality. It is often caused by enterotoxins which are produced by bacteria and causes influx of water and ions to the intestinal lumen and thus increase the intestinal motility, thereby causing watery stools. Medicinal plants are of greater significance for treating diarrheoa in ruminants because of complex stomach of these animals wherein herbs are better assimilated, safe for rumen microbes, are very effective, readily available, affordable, nicely tolerated and almost without side effects. Etiology of diarrhoea in goats is of multitude in nature which results in high mortality. Rural people in India and Nepal used D*. sissoo* leaves to treat animals suffering from non-specific diarrhoea (Al-Quran, 2008). Keeping in view the above facts ,the present study was planned to evaluate antidiarrhoeal activity of *D. sissoo* in goats.

Materials and Methods

Collection of plant materials and preparation of extract

The mature green leaves of *D. sissoo* (Roxb.) were collected and dried in shade in the Department of pharmacology and Toxicology, PGIVAS, Akola. The shade dried leaves of *D.sissoo* were pulverized to get fine powder with the help of pulverizing machine. One hundred gm freshly prepared powder was immersed in 500 ml of 60% ethanol and kept in orbital shaker at 150 rpm for 48 hrs. The

resultant solvent filtered through Whatman No. 1 filter paper. The filtrate obtained was concentrated to semisolid mass at 45^{0}C in hot air oven. The extract thus obtained is termed as *D. sissoo* ethanolic leaf extracts (DSELE) and was used for further studies in mice.

Animals

Swiss albino mice of either sex obtained from the CPCSEA registered animal house maintained under standard laboratory conditions and had free access to standard diet and drinking water. Studies on animal experiments were approved from IAEC (R.No.312/2000) of the Institute before start of experiment.

Acute toxicity study

Acute toxicity was performed according to the OECD-423 guide lines in Swiss albino female mice (20 – 25 g). The animals were administered with extract of *D.sissoo* orally at 500, 1000 and 2000 mg/kg B.W. The animals were observed for 24 hr. for further 14 days if any death occurs and for manifestation of toxic effects.

Castor oil induced diarrhea

24 Swiss albino mice were divided into four groups comprising six in each group. The mice were fasted for 18 hrs prior to experiment. Castor oil at a dose of 0.5 ml/mouse orally was given to all groups of animals for the induction of diarrhoea. One hour after castor oil administration, the first group (vehicle control) received normal saline, while the second and third groups were given *DSELE* extract at 400 and 800 mg/kg body weight respectively by oral route. The fourth group received the reference antidiarrhoeal drug, loperamide (3 mg/kg body weight). Mice of all groups were placed separately in individual cages lined with filter paper. The filter papers were changed every hour and the presence of characteristic wet and dry diarrhoeal dropping was assessed hourly for four hours. The total number of faeces excreted and the total weight of faeces were recorded within a period of four hour and compared with the control group. The total number of diarrhoeal faeces of the control group was considered 100%. The results were expressed as percent of inhibition of diarrhea (Kalaskar, 2010).

Gastric intestinal motility test

Twenty four Swiss albino mice were divided into four groups of six each and fasted for 18 hours before the experiment. The first group (vehicle control) orally received the normal saline. The second group received the standard drug, atropine sulphate (1 mg/kg body weight intra-peritoneally). The third and fourth groups orally received hydroethanolic extract at doses of 400 and 800 mg/kg body weight, respectively. Thirty minutes later each animal was given 1 ml of charcoal meal (3% activated charcoal in 2% aqueous gum acacia) orally. Each mouse was sacrificed thirty minutes after administration of charcoal meal. The distance (cm) covered by the charcoal meal in the intestine was expressed as a per cent of the total distance travelled from the pylorus to the caecum (Pathak and Argal, 2005).

Antidiarrhoeal activity in goat

Total eighteen non descript adult goats of either sex presented to Teaching Veterinary Clinical Complex, PGIVAS, Akola with history diarrhoea or pasty faeces, anorexia and with mild to moderate dehydration were selected for evaluation of antidiarrhoeal activity of *Dalbergia sissoo* (*D. sissoo*) in goats. The goats were checked for helminthic infestation by faecal sample examination test and goats with non parasitic diarrhoea were only selected for further treatment. Goats were divided into three groups of six animals each. The animal of group-I received standard drug Ofloxacin @ 100 gm BID for 4 days, group-II received *D. sissoo* leaves decoction @15 ml BID for 4 days, and group-III animals treated with Kaolin (5 gm) BID for 4 days. For preparation of decoction 100 gm plant leaf powder was boiled in 500 ml water for half an hour and the material was filtered through muslin cloth. The filtrate obtained was adjusted to 100 ml with distilled water. The decoction was used in

goats instead of DSELE because it was found that the decoction can be prepared readily, quickly and found to be user friendly for goats. Whereas preparation of large doses of DSELE water suspension for administration in goats was difficult.

Statistical analysis

The data was analyzed by one way ANOVA followed by student *t*-test by standard statistical method. (Snedecor and Cochran 1994).

Results and Discussion

The results on the effect of *DSELE* on mice are presented in Table 1 and 2.

Table: 1 Effect of DSELE and loperamide on castor oil induced diarrhoea in mice

Treatment	Dose	Total no. feces in 4hr	Percent inhibition
Control	N.S	1.258 ± 0.19	-
Loperamide mg/kg	3	0.311 ± 0.07**	75.28
DSELE mg/kg	400	0.575 ± 0.11**	54.29
	800	0.313 ± 0.05**	75.12
One Way Anova : D f= 3,20		F Value =14.057	

*Values are expressed in mean ±S.E (n=6), Student's 't'-test, **P<0.01, compared to control*

Table 2: Effect of *DSELE* and Atropine Sulphate on charcoal meal transit in castor oil induced diarrhoea in mice

Treatment	Dose	Charcoal transit	Percent Inhibition
Control	**N.S.**	24.38 ± 0.75	-
Atropine	**1 mg/kg**	9.03 ± 0.57**	62.96
DSELE	**400 mg/kg**	13.91 ± 0.18**	42.95
	800 mg/kg	11.41 ± 1.77**	53.20
One way Anova : Df= 3,20		**F value : 25.01**	

*Values are expressed in mean ±S.E (n=6), Student's 't'-test,**P<0.01 compared to control*

Castor oil induced diarrhoea in mice

The mice treated with the *DSELE (400* mg/kg and 800 mg/kg), and Loperamide (3 mg/kg) produced significant (p<0.01) reduction in the frequency of defecation compared to controls in castor oil induced diarrhoea. *DSELE* at 800 mg/kg produced marked antidiarrhoeal activity which was found to be comparable to standard reference drug loperamide. The mean per cent inhibition of frequency of defecation by *DSELE* at 400 and 800 mg/kg body weight was found to be 54.29 and 75.12, respectively, while mean per cent inhibition of frequency of defecation by loperamide at 3 mg/kg was 75.28 (Table 1). Thus, *D. sissoo* extract showed potent antidiarrhoeal activity in castor oil induced diarrhoea in mice.

Gastric Intestinal motility test

In castor oil induced diarrhoea the small intestinal transit of charcoal was accelerated. The *DSELE* produced significant (p<0.01) decrease in charcoal meal transit when compared to control group. The DSELE at 400 and 800 mg/kg concentration showed dose dependant inhibition of gastric intestinal motility induced by castor oil (Table 2).

Antidiarrhoeal activity in goat

The animal of group I received standard drug Ofloxacin @ 100 g did not show complete recovery at end of 4 days treatment, however animals were recovered at 6th day, while the animal of group II receiving *D. sissoo* leaves decoction for 4 days exhibited faster recovery from day 2nd of treatment and complete recovery was attained on day 4th. The feacal droping of the goats started solidifying from 2nd day of treatment and completely normalized on 4th day of treatment. Group III animals treated with Kaolin showed modest or incomplete recovery at the end of 4th day of treatment. It is observed that the administration of decoction @15ml per animal BID in goats for 4 days checked the diarrhoea with regain in appetite and overall improvement in the general body condition, hence *D. sissoo* decoction can be used in goats to treat non serious cases of nonparasitic diarrhoea with mild to moderate dehydration.

The reduction of the intestinal transit following administration of the *D. sissoo* extract after the onset of castor oil-induced gut movement demonstrated the ability of the extract to protect the gut from the adverse effect of diarrhoea and the ability to established gut motility. Castor oil brings about changes in electrolyte and water transport and increases peristaltic activity. These changes are associated with prostaglandins that contribute to the patho physiological functions in the gastro intestinal tract. Release of prostaglandins is also a major cause of arachidonic acid-induced diarrhoea. This is characterized by an increase in the secretion of water and electrolytes, an increase in intestinal transit time and an increase in wet faeces (Rahman *et al*., 2012). Suppression of the intestinal fluid accumulation by the extract might also suggest the inhibition of gastrointestinal motility. A high rate of intestinal absorption might lead to a decrease in intestinal accumulation and together with reduced intestinal motility may result in increased transit time. In conclusion, *DSELE* decoction can be used in goats to treat non serious cases of nonparasitic diarrhoea with mild to moderate dehydration.

Conflict of Interest: All authors declare no conflict of interest.

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