

Experimental evaluation of Diarex Vet in lactose induced diarrhoea in rats

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Diarrhoea is regarded as the characteristic symptom of intestinal disturbances (Rutgers, 1992). Lactose, a disaccharide occurring in mammalian milk, is hydrolysed by β -galactosidase (lactase) localised on the brush border of small intestine (Asp and Dahlqvist, 1972). Lactase hydrolysis lactose to monosaccharides namely, glucose and galactose which are then actively absorbed into the circulation. An accumulation of lactose due to deficiency of lactase enzyme leads to symptoms of lactose malabsorption such as diarrhoea, bloating and flatulence. These symptoms originate from fermentation of undigested lactose entering the colon and resulting in osmotic diarrhoea (Kretchmer, 1972). Osmotic diarrhoea occurs when inadequate absorption results in a collection of solutes in the gut lumen, which cause water to be retained by their osmotic activity. Any condition that results in nutrient malabsorption or maldigestion results in similar diarrhoea (Susan, 1998). This physiological phenomenon of lactase deficiency resulting in lactose intolerance is considered as a model to evaluate antidiarrhoeal drugs (Mir and Alioto, 1982). The present study is planned to evaluate the antidiarrhoeal potential of Diarex Vet.

Materials and Methods

Adult male Wistar rats weighing 250 ± 5 g were selected and housed in individual metabolic cages in controlled laboratory conditions. A total of forty rats were randomly divided into 5 groups each consisting of 8 rats. Group I served as normal control and received standard commercial pellet feed. Group II served as positive control and received lactose mixed diet during the entire period of study. Groups III, IV and V served as treatment groups which were given same diet as group II and in addition were administered with 250, 500 and 750mg/kg body weight of Diarex Vet respectively as an oral aqueous suspension. The total duration of treatment was five days. The rats were fasted overnight and were then fed with a combination diet of commercially available feed and lactose as described by Mir and Alioto (*loc cit*). The treatment was initiated when induction of diarrhoea was observed in rats within 36 hours. To calculate the faecal dry matter content, faecal mass was collected from each of the cage, weighed and kept in hot air oven at 60°C for 8 hours before the dry weight of the faecal mass was taken. The difference of wet to dry weight was calculated and converted to percentile score. The visual examination of the faecal mass was done and the pelleting was rated in the range of 1 to 4 to arrive at pelleting index. The daily feed (g) and water (ml) consumption was recorded. The body weights of the rats were taken in the beginning and at the end of the study. The results were analysed statistically by ANOVA (Snedecor and Cochran, 1967).

Results and Discussions

The daily feed (g) and water (ml) intake, percent dry matter content, pelleting index and body weights were recorded during the study period. The lactose mixed feed to the target groups was given on day 0 and the recordings were made from day 1 onwards. The induction of diarrhoea was observed 24-36 hours after the feed intake by the rats (Mir and Alioto, *loc cit*). The daily feed (g) and water (ml) consumption is presented in Table 1. There were no significant ($p>0.05$) differences in water consumption on day 1 and 2 among the Groups. However differences existed among the groups on days 3-5. Significant ($p>0.05$) differences existed among the groups on day 4 and 5. The consumption of water was proportional to the intensity of diarrhoea. There were no significant ($p>0.05$) differences in the feed consumption among the groups.

Table1: Daily Feed (g) and Water (ml) Consumption in Lactose Induced Diarrhoea in Rats

Groups	Water consumption (on days)				
	1	2	3	4	5
Group I (Control)	16 ± 2.11	16 ± 2.55	19 ± 3.64^a	19 ± 2.09^a	20 ± 2.16^a
Group II (+ve control)	16 ± 2.54	24 ± 2.89	30 ± 2.81^b	29 ± 2.67^{bc}	28 ± 2.16^{ab}
Group III (250 mg/kg)	15 ± 3.42	21 ± 2.56	29 ± 2.62^b	26 ± 2.59^{bc}	30 ± 1.68^b
Group IV (500 mg/kg)	18 ± 1.61	20 ± 1.99	23 ± 2.98^a	23 ± 2.17^{ac}	23 ± 2.13^a

Group V (750 mg/kg)	18 ± 2.05	19 ± 1.97	20 ± 2.78 ^a	20 ± 1.93 ^a	21 ± 2.42 ^a
Feed consumption					
Group I (Control)	24.79 ± 2.92	24.36 ± 2.90	23.14 ± 2.88	23.96 ± 2.28	20.42 ± 2.13
Group II (+ve control)	25.07 ± 2.76	25.02 ± 2.37	24.56 ± 2.64	24.31 ± 2.38	24.22 ± 2.91
Group III (250 mg/kg)	24.44 ± 2.60	22.38 ± 2.81	22.90 ± 2.79	21.36 ± 2.94	21.20 ± 2.67
Group IV (500 mg/kg)	23.64 ± 2.67	21.82 ± 2.57	25.35 ± 2.59	20.32 ± 2.81	21.72 ± 2.74
Group V (750 mg/kg)	24.06 ± 2.07	25.11 ± 2.60	25.42 ± 2.86	20.12 ± 2.06	22.76 ± 2.15
Values are mean ± SE, n = 8					
Means bearing the same superscript between the columns do not vary significantly and those bearing different superscripts (a, b and c) vary significantly (p≤0.05)					

In the present study pelleting of faecal mass was found to start when the percentage of the dry matter in the faecal mass was approximately 45%. The degree of diarrhoea was found to be inversely related to percentage dry matter content. There was a marked decrease in the dry matter content in the group II on day 1, after the initiation of the lactose mixed feed intake by the rats. The diarrhoea was consistent and uniform through out the study period in group II. There were no significant (p>0.05) difference observed between the Group II and III through 5 days treatment period, however dose dependent treatment response was seen with the groups IV and V. There was a significant (p<0.05) reduction in diarrhoea in group IV from the 4th day onwards group I and group V on the 5th day. The differences in pelleting of faecal mass could not be visually differentiated among the groups IV and V, though significant (p<0.05) differences existed among the groups II, IV and V (Table 2).

Table 2: Percentage Dry Matter Content and Pelleting Index in Lactose Induced Diarrhoea in Rats					
Groups	Percentage dry matter content (on days)				
	1	2	3	4	5
Group I (Control)	62.15 ± 2.92 ^a	66.55 ± 2.59 ^a	65.74 ± 2.89 ^a	66.78 ± 2.94 ^a	65.9 ± 2.95 ^a
Group II (+ve control)	39.61 ± 3.25 ^b	37.65 ± 2.21 ^b	35.80 ± 3.09 ^b	37.23 ± 3.59 ^b	38.63 ± 4.27 ^b
Group III (250 mg/kg)	40.69 ± 3.01 ^b	37.34 ± 3.19 ^b	37.89 ± 4.65 ^b	40.23 ± 4.82 ^b	39.85 ± 2.64 ^b
Group IV (500 mg/kg)	37.56 ± 3.78 ^b	49.52 ± 3.0 ^b	42.26 ± 3.98 ^b	48.41 ± 3.56 ^c	52.50 ± 2.98 ^c
Group V (750 mg/kg)	38.21 ± 2.78 ^b	42.11 ± 1.86 ^c	55.71 ± 4.12 ^c	59.13 ± 2.51 ^d	60.82 ± 2.07 ^a
Values are mean ± SE, n = 8.					
Means bearing the same superscript between columns do not vary significantly and those bearing different superscripts (a, b, c and d) vary significantly (p≤0.05)					
	Pelleting index				
Group I (Control)	4	4	4	4	4
Group II (+ve control)	1/(2)	1	1	1	1
Group III (250 mg/kg)	1/(2)	1	1	1	1
Group IV (500 mg/kg)	1/(2)	1	1/(2)	3	4
Group V (750 mg/kg)	1/(2)	1/(2)	3/(4)	4	4
1 Watery unformed faecal mass 2 Semisolid unformed faecal mass 3 Soft pelleted faecal mass 4 Normal faecal mass					

The active ingredients of the herbal formulation Diarex Vet such as *Holarrhena antidysenterica*, *Tinospora cordifolia*, *Aegle marmelos*, *Punica granatum*, *Cyperus rotundus*, *Bombax Ceiba* and *Aconitum heterophyllum* have been effectively used in cases of indigestion, flatulence and diarrhoea of varying etiologies including bacterial, fungal and protozoal. Boishya *et. al.*, (1982) reported the use of the drug in

diarrhoeal cases as a symptomatic and supportive treatment in non-parasitic, protozoal infections and other diarrhoeas of nutritional origin. Javalgekar (1982) reported the antidiarrhoeal and antidysenteric properties associated with *Holarrhena antidysenterica*. Chopra (1956) indicated the usefulness of *Tinospora cordifolia* in chronic diarrhoea and dysentery. Sahu (1983) reported the astringent activity of *Punica granatum* in the cases of diarrhoea and dysentery. Antidiarrhoeal property of *Aegle marmelos* in castor oil induced diarrhoea in rats was reported by Pandey (1996). Singh and Chaturvedi (1982) reported the antidiarrhoeal activity of *Aconitum heterophyllum* along with its astringent and tonic properties. In the present study Diarex Vet controlled the lactose induced diarrhoea in rats.

Summary

Diarrhoea was induced in rats by mixing lactose in feed. The induction of lactose induced osmotic diarrhoea was seen within 36 hours after the initiation of the consumption of lactose mixed feed. The rats in different groups were treated with Diarex Vet at the dose of 250, 500 and 750mg/kg-body weight. There was a dose dependent response seen in the treated groups. The animals recovered back to normal on the 5th day in the group given Diarex Vet at the dose of 750mg/kg body weight.

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