

Antidiarrhoeal activity of *Arque-Ajeeb*, a compound formulation of Unani medicine in rats

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SUMMARY

The efficacy of *Arque-Ajeeb* (AA), a compound formulation of Unani medicine was investigated for antidiarrhoeal activity against barium sulphate-induced gut motility and castor oil-induced diarrhoea in rats. The control, standard and test groups of experimental animals were administered with distilled water (p.o.), lomotil (p.o.) and AA (0.007 ml and 0.014 ml/100 g, p.o.) respectively. Barium sulphate and castor oil were administered after 15 and 60 min respectively in each group of first and second experiment. The distance traveled by barium sulphate in small intestine was measured after 15 and 30 min of barium sulphate administration and diarrhoea was observed every 30-min for six hour after castor oil administration. Oral administration of AA caused significant reduction in diarrhoea. AA may have the potential to reduce the diarrhoea in rats.

Key words: *Arque-Ajeeb*; Gut motility; Diarrhoea; Rats

INTRODUCTION

Diarrhoea is a major health problem especially for children under the age of 5 year and up to 17% of all death in the indoor pediatrics patient is related to diarrhoea. Worldwide distribution of diarrhoea account for more than 5-8 million deaths each year in infants and small children less than 5 year especially in developing countries (Fauci *et al.*, 1998). According to WHO estimation for the year 1998, there were about 7.1 million deaths due to diarrhoea (Park, 2000).

Arque-Ajeeb (*Arque-e-Hayat*, *Zam Zam*, *Qulzum*, *Akseer-e-Azam*) is a compound formulation of Unani medicine containing *Satt-e-Podina* (plants extract of *Mentha arvensis* Linn), *Satt-e-Ajwain* (seeds extract of *Trachyspermum ammi* Linn) and *Kaphoor* (Camphor) (Khan, 1985). It is reputed for their beneficial effects in treatment of diarrhoea

(Khan, 1995) and cholera (Gilani, 1938), but the claim of the efficacy is yet to be tested. The drug is said to possess antispasmodic, digestive (Qarshi, 1985) and antifatulence (Anon, 1993) properties. Therefore the present study has been planned to investigate the real efficacy of AA in rats. The goal of this study is to find effective dose of AA and its ameliorating potential in diarrhoea as a supporting evidence of its antidiarrhoeal property.

MATERIALS AND METHODS

Drugs

Satt-e-Podina, *Satt-e-Ajwain* and *Kaphoor* were procured from Dawakhana Tibbia College, Aligarh Muslim University, Aligarh, India. Barium Sulphate (E. Merck India Ltd.), castor oil (Pragati Enterprises Ltd., India), carboxymethyl cellulose (CMC) (CDH Ltd., India), lomotil (Diphenoxylate 2.5 mg + Atropin sulphate 0.025 mg) (Searle India Ltd.) were procured from the respective source. The solution of lomotil was prepared in distilled water, while the 15% solution of barium

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sulphate was prepared in 0.5% carboxymethyl cellulose.

Preparation of *Arque-Ajeeb* (AA)

All the three constituents viz: *Satt-e-Podina*, *Satt-e-Ajwain* and *Kaphoor* of solid form were mixed in equal (1:1:1) ratio. After mixing it turns into liquid form which is known as *Arque-Ajeeb*. It was diluted with distilled water before administration.

Animals

Albino rats (150-200 g) of either sex were procured from Laboaid animal house, Meerut, India. The animals were divided in-groups of 6 each and housed under standard laboratory conditions with food and water provided *ad libitum*. The experiments were performed between 09:00 and 17:00 hrs. The animal ethics committee of Aligarh Muslim University approved the study protocol.

Barium sulphate induced gut motility

The experiment includes four groups (pre-treatment/post-treatment): (I) Control (distilled water, 2 ml/rats)/barium sulphate (10 ml/kg); (II) standard (lomotil, 0.7 mg/100 g)/barium sulphate (10 ml/kg); (III) AA (0.007 ml/100 g)/barium sulphate (10 ml/kg) and (IV) AA (0.014 ml/100 g)/barium sulphate (10 ml/kg). All the doses of control, standard and AA were administered orally in non-fasted animals and after 15 min barium sulphate solution was administered by the same route in each group.

All the animals of each group were divided into two subgroups. Half animals of each group were sacrificed after 15 min and another half animals were sacrificed after 30 min of barium sulphate administration. Small intestine of each animal were removed surgically and the distance traveled by barium sulphate was measured and expressed as a percentage of the total length of small intestine (from pylorus to the ileocecal junction).

Caster oil induced diarrhoea

The experiment includes four groups (pre-treatment/post-treatment): (I) Control (distilled water, 2 ml/rats)/caster oil (1 ml/rat); (II) standard (lomotil, 0.7 mg /100 g)/caster oil (1 ml/rat); (III) AA (0.007 ml/100 g)/caster oil (1 ml/rat) and (IV) AA (0.014 ml/100 g)/ caster oil (1 ml/rat). All the doses of

control, standard and AA were administered orally in non-fasted animals and after 60 min castor oil was administered by the same route in each group.

All animals were screened initially by giving 1.0 ml of castor oil orally and only those animal showing diarrhoea were selected for the main study. After the administration of castor oil each animal were kept in a separate cage and examined every 30 min for the presence of diarrhoea up to 6 hr.

Diarrhoea was defined as the presence of fluid in the stool, which stained the absorbent paper placed beneath the cage. The total number of respondents and the number of stools passed during the 6 hrs period were recorded for each rat. The purging index (PI) was calculated by the following formula:

$$PI = \frac{\% \text{ respondents} \times \text{average number of stool}}{\text{Average latent period}}$$

Statistical analysis

All the values were expressed as mean \pm S.E.M. Students t-test was used to analyze significance of the two means. Probability level of less than 5% was considered as statistically significant.

RESULTS

In the animals of standard group the total length traveled by barium sulphate was found highly significant ($P < 0.001$) at 15 min and moderately significant ($P < 0.01$) at 30 min as compared to control value. Similarly the effect of 0.007 and 0.014 ml/100 g doses of AA were found highly significant ($P < 0.001$) at 15 min and moderately significant ($P < 0.01$) at 30 min interval as compared to control value. The results of the study are shown in Table 1.

The study shows that standard and 0.007 and 0.014 ml/100 g doses of AA markedly reduces the number of respondents from 100% to 16.67%, 33.33% and 33.33% respectively. The mean latent period of standard animals was found highly significant ($P < 0.001$) and both doses of AA were found moderately significant ($P < 0.01$) as compared to control value. The average number of stools of standard and both doses of AA were found non-significant ($P > 0.05$). However the standard and both doses of AA resulted a very low purging index. The results of the study are shown in Table 2.

Table 1. Effect of AA on barium sulphate induced gut motility

Gp.	Dose	n	Length traveled by barium sulphate in cm (Mean \pm S.E.M.)	
			After 15 min	After 30 min
I	2 ml/rat	6	55.45 \pm 5.06	72.97 \pm 11.21
II	0.7 mg/100 gm	6	0.0***	1.52 \pm 1.01**
III	0.007 ml/100 gm	6	9.18 \pm 1.06***	12.61 \pm 4.03**
IV	0.014 ml/100 gm	6	2.42 \pm 0.73***	4.42 \pm 1.42**

** $P < 0.01$ and *** $P < 0.001$ statistically significant as compared to control value.

n, number of animals in each group.

Table 2. Effect of AA on castor oil induced diarrhoea

Gp.	Dose	n	% respondent	Mean latent period in hour \pm S.E.M.	Mean number of stools \pm S.E.M.	Purging index (PI)
I	2 ml/rat	6	100	1.16 \pm 0.07	0.16 \pm 1.52	185.69
II	0.7 mg/100 gm	6	16.67	5.83 \pm 0.15***	0.33 \pm 0.30 ^{NS}	0.95
III	0.007 ml/100 gm	6	33.33	4.83 \pm 0.67**	0.33 \pm 0.19 ^{NS}	2.29
IV	0.014 ml/100 gm	6	33.33	5.00 \pm 0.57**	0.33 \pm 0.19 ^{NS}	2.22

** $P < 0.01$ and *** $P < 0.001$ statistically significant as compared to control value and ^{NS} $P > 0.05$ (non-significant).

n, number of animals in each group.

DISCUSSION

The gastrointestinal tract is innervated by both the parasympathetic and sympathetic fibers of the autonomic nervous system. The peristaltic movement of gastrointestinal tract is myogenic in character and is mainly initiated by the local reflexes and can occur without neural connections to the brain or the spinal cord. The extrinsic nerves to the intestine appear to have only a minor role in modulating the peristaltic activity of the organ (Pierce *et al.*, 1971). Earlier study on barium sulphate show that barium sulphate is a classic osmotic type of purgative (Chatterjee, 1993). Thus gut motility test with barium sulphate was carried out to find the effect of AA on peristaltic movement.

Castor oil, which was used as a purgative in the present study, is degraded by lipase into glycerin and ricinoleic acid. It is known that ricinoleic acid is not absorbed and stimulates secretion from the mucosa of the small intestine leading to diarrhoea. Regarding the mechanism of diarrhoea induced by castor oil, it has been suggested that stimulation of the intestinal mucosa by castor oil enhance prostaglandins and platelet activating factor production, which cause inflammation of the intestinal mucosa leading to enhance intestinal motility and secretion responsible for diarrhoea (Kase *et al.*, 1996). In view

of the above discussion our findings suggest that AA reduces the gut motility and may suppress the above inflammatory parameters thus reduces the secretory components of the gut.

CONCLUSION

All the result taken together show that aqueous extract of AA contains pharmacologically active substance with antidiarrhoeal properties. Thus we presume that AA can be developed for the treatment of diarrhoea. However, more detailed phytochemical studies are necessary to identify the active principle and exact mechanism of action.

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