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Preliminary Screening of Laxative Effect of Cumin Seeds in Rats

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The laxative effect of cumin seeds was investigated. Seeds from the plant, *cuminium cyminium* were obtained from India. Their aqueous extract (Aq. extract) was prepared and phytochemical analysis confirmed the presence of saponins and glycosidic sugars. The extract of cumin, senna suspension and saline solution (as control) were administered to different groups of rats and the cumulative number of wet faeces passed before and after administration were counted for a period of 24 h. Both the extract of cumin and senna suspension increased the number of wet faeces compared to the control. The effect of 4g kg^{-1} Aq. extract was comparable to 2g kg^{-1} senna suspension. The Aq. extract also contracted the guinea pig ileum in a dose dependent manner. The contraction curve was shifted to the right significant by atropine ($P < 0.05$), but was not significantly affected by dibenzyline, hexamethonium or papaverine. The study has thus demonstrated the laxative effect of cumin seeds. It may be suggested that this effect could be mediated by increase in motility through stimulation of muscurinic receptors. However, further work has to be done on this to prove the mechanism of action.

Key words: Cumin seeds, Laxative effect, Saponins, Glycosidic sugar.

Introduction

The seeds from *Cuminium cyminium* linn (Fam: Umbellifarae) have been used in both medical and veterinary practices for a long time (Trease and Evans 1989). In addition they are commonly used spice in India, North Africa, and coastal areas of East Africa.

Studies on cumin seeds have shown that they contain iron, calcium, and appreciable amounts of amino acids (Uma Pradeep *et al* 1993). They also have medium levels (50-100mg) of flavonoid (Nair *et al*. 1998). Cumin seeds have also been shown to significantly decrease incidence of benzo(a) pyrene-induced neoplasia and 3-methyl-4-dimethylaminoazo benzene induced hepatomas (Aruna and Sivaramakrishnan 1992). These findings are suggestive of their potential as anticarcinogenic compounds. They also increase glutathione-5-transferase in stomach, liver and oesophagus of rats (Aruna and Sivaramakrishnan 1990). Cumin seeds were also found not to be mutagenic (Sivaswamy *et al* 1991), nor do they lower cholesterol levels in rats (Sambaiah and Srinivasan 1991). Furthermore, it has been demonstrated that cumin seeds can stimulate growth and acid production of *Lactobacillus plantarum* and *Leuconostoc mesenteroides* in liquid media (Kivanc *et al* 1991). These seeds can also promote absorption of iron in intestinal segments of rats (El-Shobaki *et al* 1990). Cumin seeds also has potent antimicrobial action. However, their activity as a laxative has not been investigated despite the fact that they are widely used as a laxative in coastal areas of East Africa. In this study efforts were made to investigate their laxative effect and the possible mechanism of action.

Material and Methods

Aqueous extraction. 500g of dry cumin seeds were placed in a round bottom flask and distilled water was poured to cover the material. The flask was heated directly and the solvent refluxed by a reflux condenser attached vertically to the flask. After 1 h the hot mixture was filtered. A series of similar extraction were repeated until the filtrate was colorless. The pooled filtrate was evaporated to dryness.

Phytochemical screening. Tests for the presence of alkaloids, glycosidic sugars, free sugars, anthraquinones and saponins in the extract were carried out by standard methods.

Effects of extract on intact young rats. Wister rats (75- 100g body wt) of 8-9 weeks old of either sex were divided into 5 groups, each group consisting of 4 rats. They were placed in cages lined with blotting paper. The animals were given food and water freely and were observed for wet faeces for 24 h.

A suspension of senna powder in a volume not exceeding 1.8ml was administered orally through a polythene cannula to the rats of group I and II. Group I rats were given 0.5g kg^{-1} while group II rats were given 2g kg^{-1}. In a similar manner rats of group III were given 2g kg^{-1} and group IV 4g kg^{-1} of aqueous extracts of cumin seeds. Group V rats were given normal saline as control. The rats were observed every hour for 6 h and thereafter at the end of 24 h.

Isolated tissue experiment. The guinea pig was sacrificed and the ileum was dissected out. About 2 cm of the ileum was mounted vertically in an organ bath containing Tyrode solution which was aerated with 95% O_2 and 5% CO_2 gas mixture and maintained at tissue Resting tension of 0.5g and constant

recorder sensitivity of 3cm g^{-1} using isometric transducer (Ugo Basil, Italy, Model 7050). After allowing 30 min to equilibrate, the tissue was challenged with graded doses of cumin extract, standard time cycle was used. Other responses of the extract were obtained in the presence of atropin, hexamethonium, papaverine or dibenzyline. The reaction time with the antagonist was 10 min. The antagonist was reintroduced after every wash.

Results and Discussion

Phytochemical analysis showed absence of alkaloids, anthraquinones, free sugars but confirmed the presence of glycosidic sugars and saponins.

Prior to administration of cumin extract and senna suspension, none of the rats passed wet faeces within 1 h of administration of test compounds, wet faeces were noted and the maximum cumulated average number of faeces per rate after 24 h was 9 for senna 2g kg^{-1} and 8 for aq extract of cumin (4g kg^{-1}). The number of wet faeces increased to a point after which there was no further increase. The time taken to reach this point was taken as duration of action of the drug. Both senna suspension and the cumin extract took 5 h to reach this point (Fig 1). The effect of cumin extract and senna was dose dependent.

The cumin extract contracted the guinea pig ileum in a graded manner 0.2 mg ml^{-1} of the extract gave 11% of the maximum response, while 12.8 mg ml^{-1} gave the maximum response. Atropine shifted the dose response curve of the cumin extract to the right significantly ($P < 0.05$). Hexamethonium, dibenzyline and papaverine slightly shifted the dose response curve to the right but the change was not significant ($P > 0.05$) Fig 2.

The laxative effect of cumin seeds has been demonstrated by these experiments. 4g kg^{-1} of cumin extract gave a similar effect to 2g kg^{-1} of senna suspension which indicates that senna was more potent than cumin extract. Even though cumin seeds has a laxative effect they do not affect protein digestability of sorghum (Pradeep *et al* 1991). The fact that there are no studies on the effect of cumin seeds on ileum or other isolated organs make it difficult to conclude whether the effect noted is specific. Never the less this study has shown that cumin seeds contract guinea pig ileum in a dose dependent manner which can account for increase in motility of the intestines and hence its laxative effect. The log dose response curve of the extract of cumin was significantly shifted to the right by Atropine, suggests that the effect of cumin seeds is competitive and through muscurinic receptors. This same curve was not affected significantly by hexamethonium dibenzyline and papaverine shows that perhaps the effect is not through the ganglion, histamine nor direct stimulation respectively.

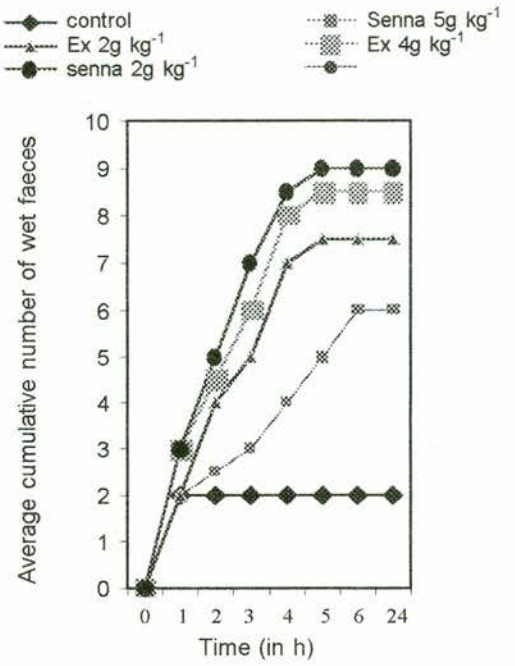

Fig 1. The effect of aqueous extract of cumin seeds and senna suspension on rat faecal output.

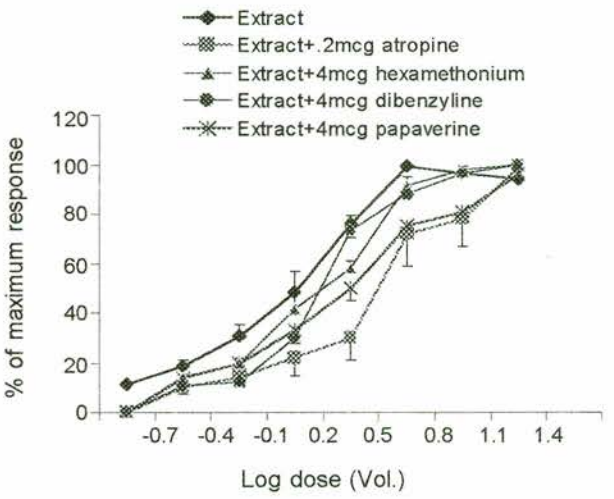

Fig 2. Eeffect of different blockers on the response of the guinea pig ileum to cumin.

Further work need to be done to ascertain the mechanism of action.

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