

Anxiolytic Activity of Fennel Fruit Soxhlet in Mice

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Summary

Rotarod test was the screening test used to assess the anxiolytic activity of the Fennel fruit soxhlet on mice. Diazepam (4 mg/kg) served as the standard anxiolytic agent. Fennel extract was administered at 250, 500, 750 and 1000mg/kg doses in different groups respectively. Diazepam and Fennel extract shows decrease in fall off time particularly fennel extract at 750 and 1000mg/kg doses ($P < 0.01$). Soxhlet of Fennel fruits produces prominent anxiolytic activity in mice.

Key word: Anxiolytic, Rotarod, *Foeniculum vulgare*.

Introduction

Anxiety is a normal emotional behaviour. When it is severe, it becomes pathological and can aggravate cardiovascular and psychiatric disorders. Although many drugs are available in allopathic medicine to treat anxiety disorders, they produce various systemic side effects or exhibit tolerance upon chronic use. In ayurvedic medicine, many plant products have been claimed to be free from side effects and less toxic than synthetic drugs¹.

Fennel (*Foeniculum vulgare*) is a plant species in the genus *Foeniculum*². Fennel is used for many purposes like digestion, slimming and weight loss, detoxifier, stomach cramps, heartburn, helps with morning sickness, bloating, flushing the kidneys, helpful after chemotherapy and radiation³, hepatoprotective⁴, in asthma⁵ and many more disorders. Fennel oil was found to be genotoxic in the *B. subtilis* DNA-repair test⁶. The fruits (seeds) contain a number of flavonoid compounds, including quercetin 3-glucuronide, isoquercetin, kaempferol 3-glucuronide, and kaempferol 3-arabinoside⁷. The GLC measurements of the fennel volatile oil reveal that the t-anethole is the predominant fraction⁸. Traditionally, fennel was using in ancient for CNS problems and its excess flavonoid content corroborated its anxiolytic effect. Therefore, an attempt has been made to evaluate the anxiolytic effect of fennel in mice.

Material and methods

Animals: Male albino mice weighing 25-30 gm were used in this study. They were divided into different groups, with each group containing 6 animals. All studies were conducted in accordance with the National Institute of Health Guide.

Chemical: Clampose (Diazepam) is obtained commercially, manufactured by Ranbaxy laboratories Ltd., used as reference drug.

Extraction of plant material and Preparation of extract: The fruit of *Foeniculum vulgare* were shade dried. The dried fruits were crushed to a coarse powder (100 gm) and extracted with water under reflux for 36 hours to obtain the aqueous extract of fruit of *Foeniculum vulgare*. The extract was concentrated by evaporation and dried in air. The extract was stored in a refrigerator and reconstituted in 2% aqueous tragacanth just before use.

Dose Fixation: Animal studies have demonstrated toxic effects of fennel essential oil on fetal cells. However, no evidence of teratogenicity was seen⁹. No pathological toxicity was seen in the organs of dead animals, indicating that death may be caused by the effects of metabolite imbalance or nervous system toxicity. The value of LD₅₀ was 1,326 mg/kg¹⁰.

Assessment of anxiolytic activity:

Treatment schedule: The animals were divided into 6 groups, consisting of 6 mice per group. Groups 1 received vehicle saline as control. Groups 2 received Standard anxiolytic drug (Diazepam- 4mg/kg), Groups 3, 4, 5, 6 received different doses of test drug 250mg/kg, 500mg/kg, 750mg/kg, 1000mg/kg respectively.

Rotarod test¹¹: Motor coordination was measured on the seventh day using an automated rotarod (Amni, Rotar Instrumentation, Columbus, OH, USA). The animals were exposed to 10 trials on a rotating rod at 10 rpm at 5 min. intervals with a cut off time of 180 seconds¹². The rotor was divided into two compartments, which could allow two mice at a time. The average retention time on the rod was calculated.

Statistical analysis: One way analysis of variance (One way ANOVA) followed by Scheffe's test was employed for the analysis of anxiolytic property. $P < 0.01$ was considered significant.

Results and discussion

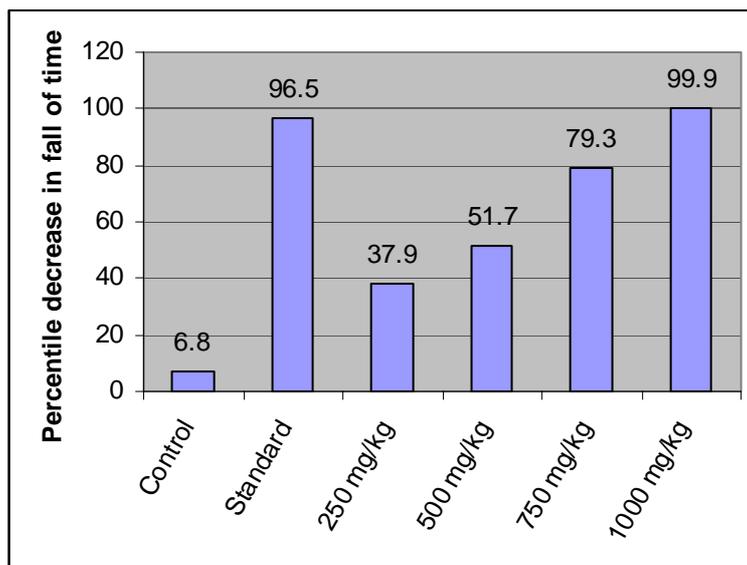
The retention time significantly decreased in the standard (Diazepam, 4mg/kg) and test drug (Soxhlet- 250, 500, 750 and 1000 mg/kg) treated group when compared with the control (Saline) group. Muscle gripping strength significantly ($P < 0.01$) decreases in 250, 500, 750 and 1000 mg/kg of test drug treated groups. Among test drug treated groups, 750 and 1000 mg/kg showed marked improvement ($P < 0.01$) compared to 250 and 500 mg/kg (Table-1). Excess of flavonoid contents of fennel corroborated its anxiolytic effect and also its mechanism of action is not clear but it may be showing its anxiolytic effect by blocking calcium channel similar to nifedipine, The ability of calcium channel blockers (nifedipine) to displace the binding of benzodiazepine ligands was investigated in rat heart, kidney, and brain¹³. In this way, fennel may be a calcium channel blocker and possess Anxiolytic property.

Table-1: Rotarod test

S. No.	Groups	Dose	Fall of time		Percentile decrease in fall time
			Before	After	
1.	Group I (Control)	-----	31.8±0.01*	30.6±0.33*	6.8±0.04*
2.	Group II (Reference)	4mg/kg	35.0±0.00*	5.3±0.33*	96.5±0.02*
3.	Group III (Test)	250mg/kg	32.5±0.16*	22.6±0.02*	37.9±0.02*
4.	Group IV (Test)	500mg/kg	30.8±0.16*	17.2±0.16*	51.7±0.04*
5.	Group V (Test)	750mg/kg	35.2±0.01*	12.4±0.02*	79.3±0.16*
6.	Group VI (Test)	1000mg/kg	38.1±0.33*	8.5±0.16*	99.9±0.27*

Values are provided in Mean±SEM manner.

$P < 0.01$, One way ANOVA statistic was carried out.



Graph-1: Shows comparison among Control, Standard and Test groups for Percentile decrease in fall of time.

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