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# BRONCHODILATING AND UTERINE ACTIVITIES OF *AGERATUM CONYZOIDES* EXTRACT

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*ABSTRACT*

Ageratum conyzoides *root and aerial part extracts induced relaxation on isolated trachea. There was no significant difference between the activities of root and aerial part extracts. When Histamine (hist) and the plant extract were introduced into the tissue bath simultaneously, 14% of the activity of the plant extract was inhibited. When the same procedure was used, 5-hydroxytryptamine (5-HT) inhibited 21% of the plant extract activity. Conversely, 86% and 79% activities of hist and 5-HT, respectively, were inhibited by the plant extract. This could be the mechanism of its activity as a tracheal relaxant. Acetylcholine (ACh) and 5-HT induced contractions on isolated rat uterus. The treatment of isolated rat uterus with the plant extract inhibited uterine contractions induced by 5-HT, suggesting that the plant extract exhibited specific antiserotonergic activity on isolated uterus. However, the uterine contraction caused by ACh was unaffected by the plant extract.*

## INTRODUCTION

*Ageratum conyzoides* L. (Compositae) is found in many parts of Kenya (Agnew, 1974). The plant is traditionally used for its antispasmodic, haemostatic, antiasthmatic and insecticide activities and for the treatment of wounds and *Staphylococcus aureus* infections (Kokwaro, 1976; Adesogan & Okunade, 1979; Oliver, 1986; Gonzalez et al., 1991a). The plant extract is a cardiodepressant on isolated rabbit heart, a neuromuscular blocker, hypotensive and calcium channel blocker, and has antispasmodic effects on isolated rabbit ileum (Achola et al., 1994).

A number of chromenes and flavones have been isolated from *Ageratum conyzoides* (Gonzales et al., 1991a,b). In our effort to screen Kenya flora for their antiasthmatic activity, we report in this paper the relaxing effects of the plant extract on isolated guinea-pig trachea.

## MATERIALS AND METHODS

### Plant Material

*Ageratum conyzoides* was collected near Kenyatta National Hospital, Nairobi, Kenya in April 1991. The plant was identified by the East African Herbarium, Nairobi, and voucher specimens deposited in the same institution and in the Department of Pharmacology and Pharmacognosy, Faculty of Pharmacy, University of Nairobi, Kenya.

### Plant Extraction

The roots were separated from the aerial parts, dried at room temperature (23–25°C), powdered and separately extracted with 70% methanol by cold percolation. The extracts were filtered and reduced to dryness to yield 487.1 and 26.0 g from 1.6 and 0.5 kg aerial parts and roots, respectively.

### Animals

Guinea-pigs (300–450 g) and Wistar strain rats (200–300 g) of either sex from the National Public Health Laboratories, Nairobi, were used in this study.

*Keywords: Ageratum conyzoides*, compositae, guinea-pig trachea, rat uterus relaxant, relaxant, root and aerial part extract, 5-HT and Hist antagonist.

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**Standard Solutions**

The aerial parts and root extracts (both 100 mg/ml), histamine (Hist) (10 µg/ml), 5-hydroxytryptamine (5-HT) (20 µg/ml) and acetylcholine (ACh) (1 µg/ml) were all prepared in distilled water.

**Isolated Guinea-Pig Trachea**

Guinea-pigs were killed by a blow at the back of the head. The tracheae were removed and immersed in Krebs Henseleit solution in a Petri dish. About 2.5–3 cm of the tissue was mounted on a U-shaped capillary tube on one side and the opposite side connected to a graduated 0.1 ml pipitte, then placed in a 20 ml organ bath aerated with a gas mixture (95% $O_2$ and 5% $CO_2$) at 37°C. The capillary terminal was connected to a 5 ml syringe containing Krebs Henseleit solution to remove air in the isolated trachea (Achola et al., 1995; Achola & Munenge, 1996). The tissue was allowed about 30 min to equilibrate, and was challenged with the aerial part extract (5 µg/ml bath). Reduction in fluid volume inside the pipette (relaxation) was recorded every minute for the first 5 min, then every 5 min for a total of 35 min. The tissue was washed, challenged with hist (0.5 µg/ml bath), and the increase of the fluid volume inside the pipette (constriction) was recorded. The tissue was washed, challenged with the root extract (5 µg/ml bath), and reduction of fluid volume inside the pipette was recorded. The same procedure was used for 5-HT (1 µg/ml bath), as a control for constrictive effects.

**Effects of Hist on Plant Extract Activity with Isolated Guinea-Pig Trachea**

Hist was used in the control experiment as a constrictive agent on isolated trachea. Hist (0.5 µg/ml bath) and the plant extract aerial part (5 µg/ml bath) were injected into the tissue bath simultaneously. The relaxing effects of the plant extract on isolated trachea was recorded as above.

**Effects of 5-HT on Plant Extract Activity with Isolated Guinea-Pig Trachea**

In the control experiment, 5-HT was used as a constrictive agent on isolated trachea. The 5-HT (1 µg/ml bath) and the aerial part extract (5 µg/ml bath) were simultaneously introduced into the organ bath. The relaxing effects of the plant extract on the tissue was recorded as above.

**Isolated Sensitized Virgin Rat Uterus**

The uterus was sensitized by subcutaneous injection of estradiol (0.1 mg/kg weight) (Sinei et al., 1994; Gilani et al., 1995) and the animals were sacrificed by a blow at the back of the head after 24–48 h. The abdomens were opened to remove uteri. Pieces of the tissue were mounted in a tissue bath containing De Jalon's solution aerated with a gas mixture (95% $O_2$ and 5% $CO_2$) at 32°C. The tissues were allowed to stabilize for about 30 min then challenged with 5-HT (5 ng/ml bath) and the tissue response was recorded on a kymograph. The tissue was washed, challenged with ACh (5 ng/ml bath), and the uterine contraction was recorded on a kymograph. The tissue was washed, treated with the plant extract (200 µg/ml bath), left for about 3 min, then 5-HT (5 ng/ml bath) was added into the tissue bath. The tissue response was recorded on a kymograph. This was followed by challenge with ACh (5 ng/ml bath), and the tissue response was recorded on a kymograph. The doses above gave the optimum tissue response.

## RESULTS AND DISCUSSION

The root and aerial part extracts of *A. conyzoides*, induced a relaxation on isolated guinea-pig trachea. There was no significant difference between the activity of the root and of the aerial part extract (Fig. 1). Hence, the aerial part extract was used for the later experiments.

Hist (0.5 µg/ml bath) with isolated guinea-pig trachea induced constriction and reached maximum in 6 min; it was used as a negative control experiment (Fig. 2). Hist (0.5 µg/ml bath) and aerial part extract (5 µg/ml bath) were injected simultaneously in the tissue bath. The inhibition of the plant extract activity by histamine was 14% on isolated guinea-pig trachea (Fig. 2).

The 5-HT (1 µg/ml bath) caused constriction on isolated guinea-pig trachea and reached maximum in 20 min; it was used in the experiment as a negative control (Fig. 2). Then 5-HT (1 µg/ml bath) was injected simultaneously with the plant extract (5 µg/ml bath) into the tissue bath. The inhibition of the plant extract activity by 5-HT was 21% on isolated guinea-pig trachea. It was observed that the plant extract also antagonised 5-HT and Hist constrictions on isolated guinea-pig trachea by 79 and 86%, respectively. This may be in part its mechanism as a relaxant on isolated trachea (Fig. 1).

On the isolated sensitized virgin rat uterus, 5-HT and ACh (both 5 ng/ml bath) induced uterine contractions (Fig. 3). Treatment of the tissue with the plant extract (200 µg/ml bath) inhibited uterine contractions induced by 5-HT, indicating that the extract exhibits specific

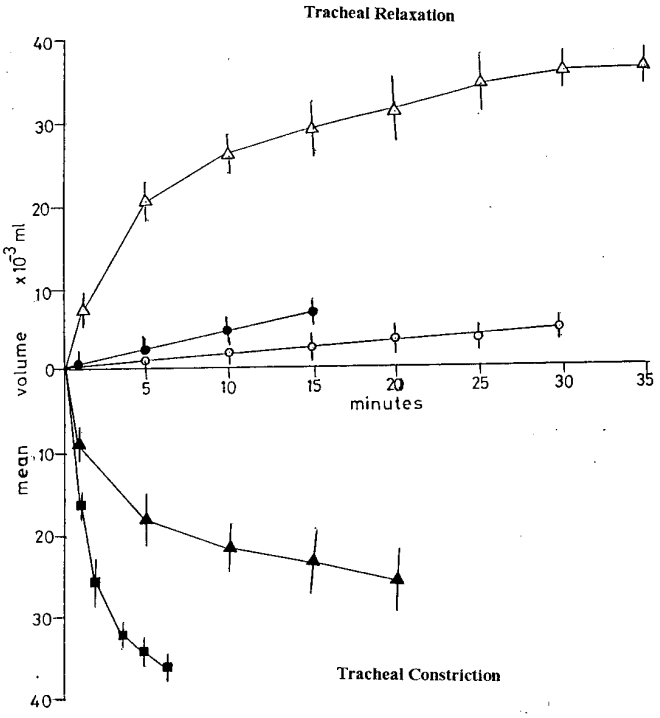


Fig. 1. Inhibition of the relaxing activity of the plant extract on isolated trachea by Hist and 5-HT ($n$ = 8 mean SEM). —●— = plant extract (5 µg/ml bath); —Δ— = plant extract (5 µg/ml bath) + 5-HT (1 µg/ml bath); —○— = plant extract (5 µg/ml bath) + Hist (0.5 µg/ml bath); —▲— = 5-HT (1 µg/ml bath); —■— Hist (0.5 µg/ml bath).

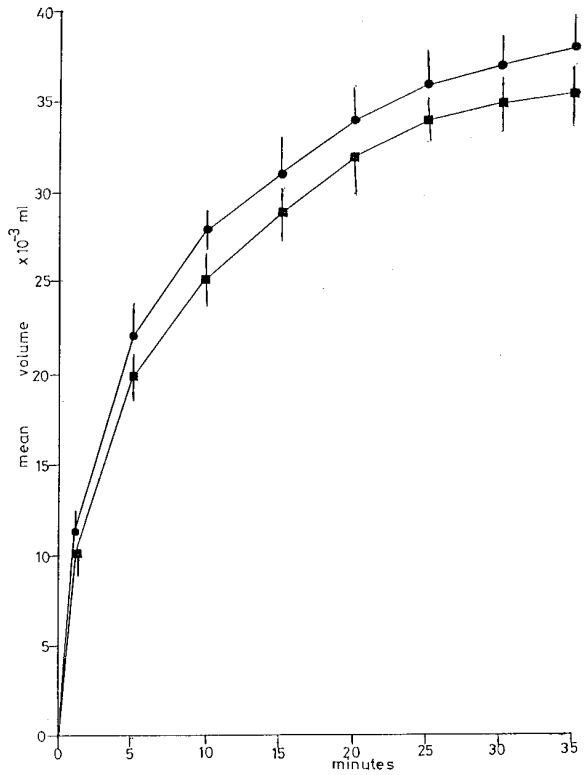


Fig. 2. Activities of root and aerial part extracts on isolated guinea pig trachea ($n$ = 8 mean SEM). —●— = root extract (5 µg/ml bath); —■— = aerial part extract (5 µg/ml bath).

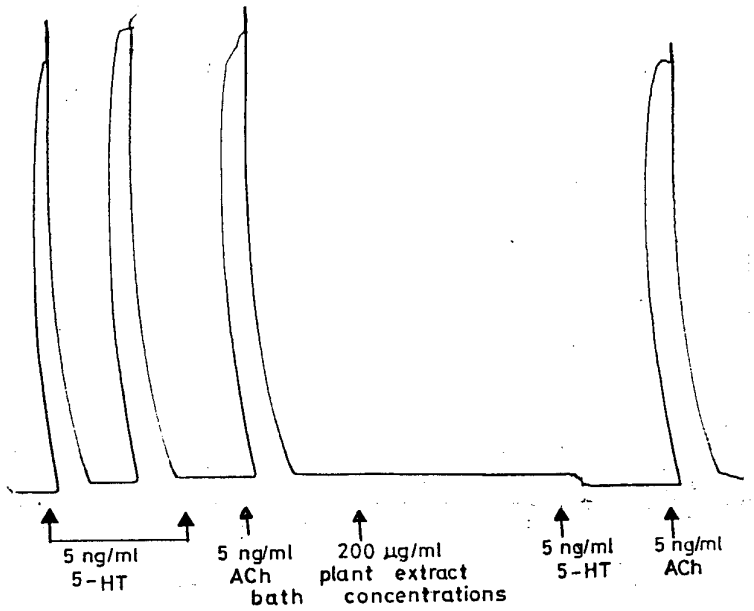


Fig. 3. Effect of *Ageratum conyzoides* extract on 5-HT and Ach induced contractions with isolated rat uterus ($n = 5$).

antiserotonergic activity, while the plant extract had no effect on uterine contractions induced by ACh (Fig. 3).

## CONCLUSION

The results indicated that there is a scientific basis of the traditional use of the extract in the treatment of asthma. The plant extract is an antagonist of 5-HT and Hist activities on isolated trachea.

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