

**An *in vitro* Study on the Oxytocic Action of *Adenia Globosa* Engl.**

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***Adenia* spp. (Passifloraceae) grows widely in many parts of Eastern and Southern Africa. Though some species of the plant are known to be generally toxic, a few of them are used in traditional medical practices. Among the many uses is the claim that when given to goats and cows which have difficulty in giving birth, it hastens the process of giving birth. We found this of interest and set out to investigate it further. We determined the effect of the water extract of *Adenia globosa* on the isolated preparation of the rat uterus and how this action interacts with ergometrine and prostaglandin F<sub>2α</sub>, two well-established uterine stimulants. The crude extract and the other drugs were tested on isolated rat uterus set up in an organ bath under the usual laboratory conditions. The results obtained showed that the plant extract caused a dose-dependent contraction of the rat uterus. The contractile effect was potentiated by small doses of ergometrine and prostaglandin F<sub>2α</sub>. It was therefore postulated that since prostaglandin F-2α also exists as an endogenous hormone which is released at the time of labour, the observed potentiation probably occurs *in vivo* when the plant preparation is given to domestic animals to ease and speed up the process of giving birth as claimed in the traditional use of this plant. These results therefore provide scientific justification for the traditional usage of the plant preparation.**

**Key words:** *Adenia globosa*; traditional medicine; oxytocic action; rat uterus; ergometrine; prostaglandin F<sub>2α</sub>.

**INTRODUCTION**

*Adenia* species (Passifloraceae) grows widely in many areas of Eastern and Southern Africa [1-4]. It is a shrub or climber with stems emerging from above-ground tuber of up to 2.5 m wide. Many of the species are extremely toxic and have been used for homicide, suicide or poisoning wild animals. Nevertheless, some species find use in traditional herbal medicine [1,5-6].

In Kenya, it is claimed that a freshly prepared juice from the tuber of *Adenia globosa* Engl. is given to cattle to ease and speed up parturition. This study was thus undertaken to determine scientific justification for the claim.

The study was designed to investigate the effect of the water extract of *A. globosa* on the isolated preparation of the rat uterus and how this could interact with well-established uterine stimulants such as ergometrine and prostaglandin F<sub>2α</sub>.

**MATERIALS AND METHODS****Drug preparation**

The plant material was collected from Emali in Machakos County, Kenya, and its identity authenticated at the East African Herbarium, Nairobi. The tuber was cut into small pieces, sun-dried and stored in a cool dry place till use. The dried pieces were powdered and extracted in warm water (80°C) for 15 min with stirring. The mixture was vacuum-filtered and the filtrate evaporated *in vacuo* at 40°C to give a brownish hygroscopic residue.

**Rat uterus and tissue preparation**

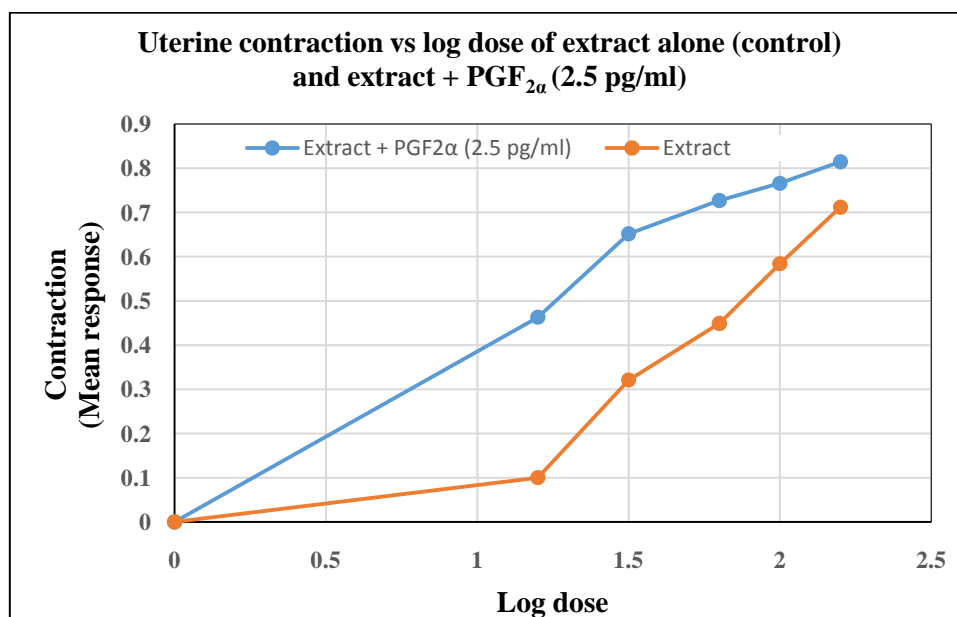
Uteri from young virgin rats weighing 200-400g were used. The uterus was first sensitised by giving the animal a sub-cutaneous injection of oestradiol (0.1 mg/kg) 24-48 hr before sacrifice. The effect on the uterus was determined according to standard methods published in the literature [7, 8].

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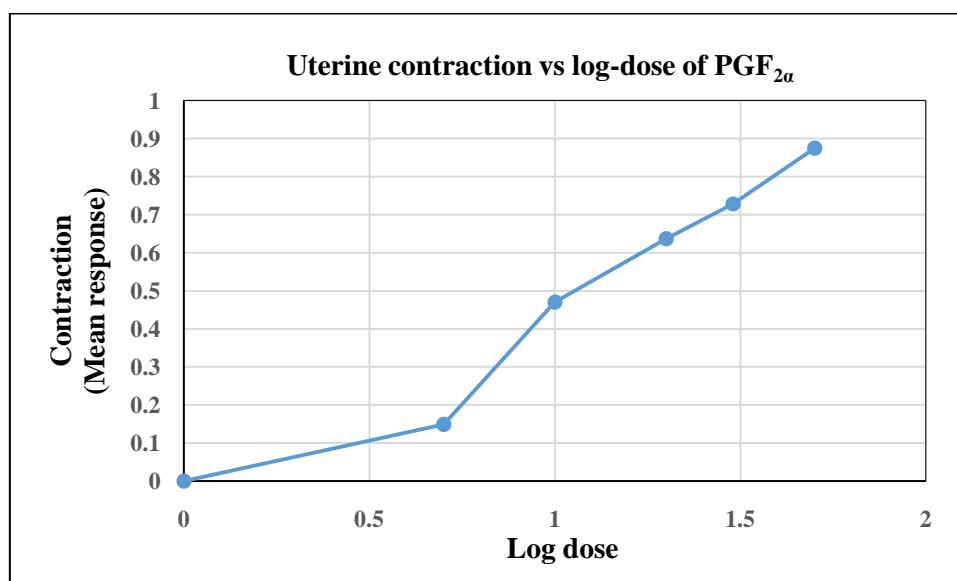
## RESULTS

The contraction of the uterus was measured at each dose of the drug. The difference between the contraction caused by the extract alone (control) and that caused by both the extract and either prostaglandin  $F_{2\alpha}$  or ergometrine was assessed statistically using Student's t-test. Each point in the graph is a mean of responses from 3-4 animals.

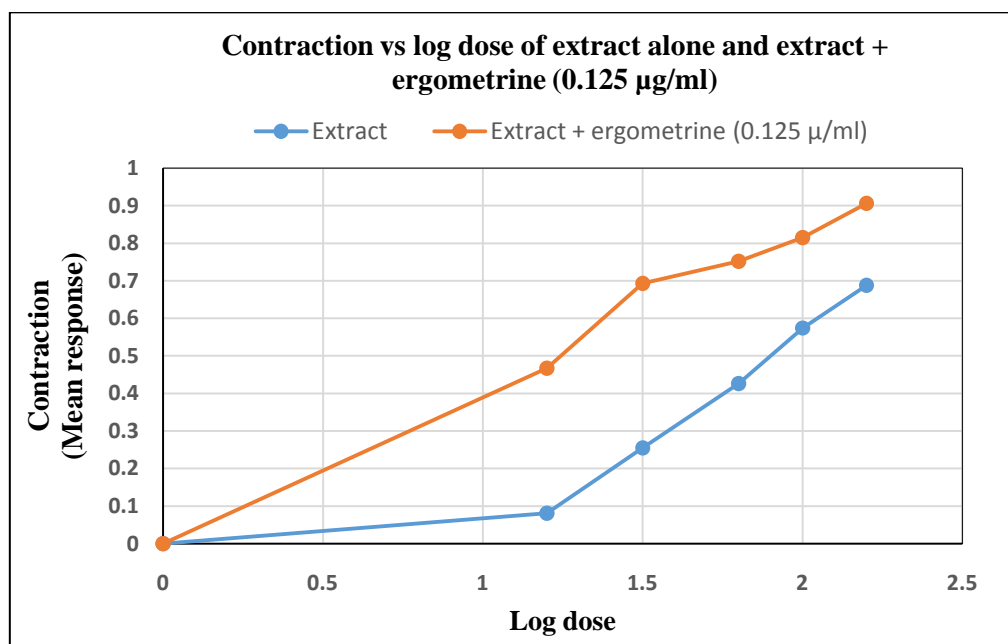
The effect of prostaglandin  $F_{2\alpha}$  and the extract are shown in **Figures 1a** and **1b**. Presence of prostaglandin  $F_{2\alpha}$  (2.5  $\mu\text{g/ml}$ ) potentiated the effect of the extract (**Figure 1a**;  $p < 0.01$  and  $p < 0.02$ ). This dose of prostaglandin  $F_{2\alpha}$  alone caused only about 15% contraction of the uterus (**Figure 1b**). Similarly, a dose of ergometrine (0.125  $\mu\text{g/ml}$ ) which on its own caused only about 5% contraction (**Figure 2b**) enhanced the contractile effect of the extract (**Figure 2a**;  $p < 0.01$ ,  $p < 0.02$ , and  $p < 0.05$ ).



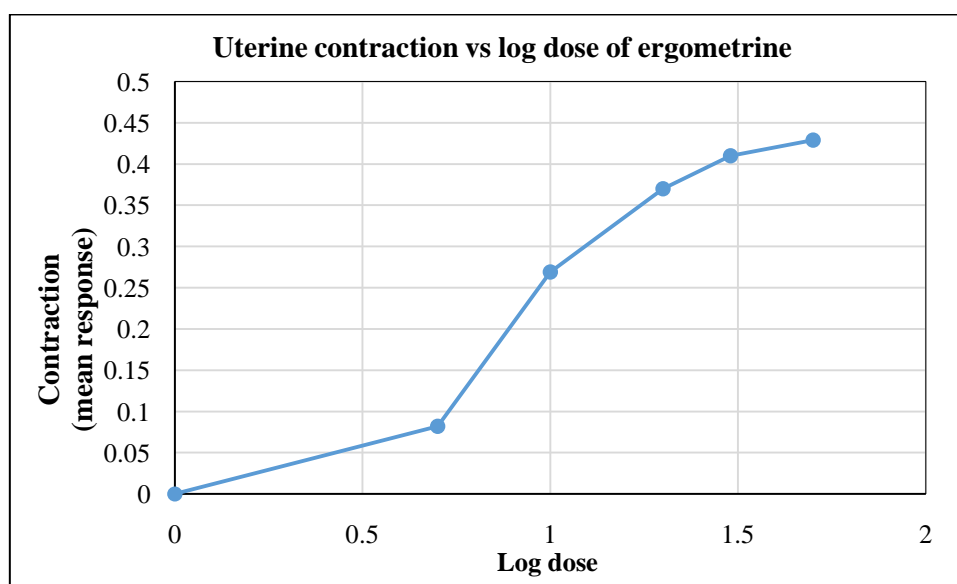
**Figure 1a.** Dose-response curve showing uterine contraction versus extract alone (control) and extract and prostaglandin  $F_{2\alpha}$  at conc. of 2.5  $\mu\text{g/ml}$ . ( $p < 0.05$ ;  $p < 0.02$ ;  $p < 0.01$ ) when contraction in presence of  $\text{PGF}_{2\alpha}$  was compared to control values by Student's t test).  $n=3$



**Figure 1b.** Dose-response curve showing the contraction of the uterus against concentration of prostaglandin  $F_{2\alpha}$  ( $\text{PGF}_{2\alpha}$ );  $n=3$



**Figure 2a.** Dose-response curve of uterine contraction versus extract concentration alone (control) and extract and ergometrine (0.125 µg/ml),  $p < 0.05$ ;  $p < 0.02$ ;  $p < 0.01$  when contractions in presence of ergometrine were compared to control values by Student's t-test.  $n = 4$



**Figure 2b.** Dose-response curve of the uterine contraction versus the concentration of ergometrine;  $n = 3$

## DISCUSSION

Our results indicated that an aqueous extract of the tuber of *Adenia globosa* caused a significant and a dose-dependent contraction of isolated rat uterus. This action was potentiated by small doses of ergometrine and prostaglandin  $F_{2\alpha}$ . This is an interesting finding because ergometrine and prostaglandin  $F_{2\alpha}$  have powerful stimulant action on the

uterus and they are routinely used clinically because of this action. We had also reported earlier that oxytocin potentiates the stimulatory action of the extract on the rat uterus [9]. Oxytocin and prostaglandin  $F_{2\alpha}$  are also endogenous hormones that are released in large amounts at the time of parturition. It is well documented that they initiate and maintain myometrial contractions during labour [8]. It can therefore be speculated that

the synergistic effect observed in the present study probably occurs *in vivo* when the plant preparation is administered to animals and this may explain its action in hastening delivery in domestic animals as claimed in the traditional use of this plant. The mechanism of the contractile action or that of synergism with oxytocin, PGF<sub>2</sub> $\alpha$  or ergometrine remains to be elucidated.

## CONCLUSION

*Adenia globosa* appears to contain oxytocic principle(s), whose identities, to the best of our knowledge, are unknown. We speculate that if these compounds can be isolated, identified and purified, they may have potential clinical application in obstetrics, especially since the plant, as indicated in the introduction, already has a similar traditional use in veterinary practice. The observations obtained in the present study have therefore provided scientific justification for the said traditional use.

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