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Some Cardiovascular Effects of the Aqueous Extract of the Leaves of *Stachytarpheta jamaicensis* L. Vahl

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Abstract: The effect of the aqueous extract of the leaves of *Stachytarpheta jamaicensis* (L.) Vahl. on blood pressure was investigated in anaesthetized normotensive male rabbits. The extract was administered intravenously at doses ranging from 2.5-80 mg kg^{-1}. The extract caused a dose-dependent fall in blood pressure and heart rate. 2.5 mg kg^{-1} of the extract reduced the Mean Arterial Pressure (MAP) from the initial 102.8±4.2 to 96.6±7.3 mmHg and the Heart Rate (HR) from 398.3±8.3 beats/min to 373.1±9.7 beats/min. 80 mg kg^{-1} reduced MAP and HR to 38.9±3.1 mmHg and 178.3±83.7 beats/min, respectively. Neither atropine nor promethazine inhibited the hypotensive effect of the extract. The acute hypotensive effect of the extract may be partly due to the negative chronotropic effect or to a direct effect on vascular smooth muscle.

Key words: *Stachytarpheta jamaicensis*, aqueous extract, cardiovascular effects, rabbits

INTRODUCTION

It is often said that every plant is a potential medicine for one disease or the other. Traditional healers have put forward many claims about the healing power of the plant world. Some of the claims have been substantiated by scientific investigation. For example, along the West coast, as well as in central and East Africa, hedges of the Neem tree (*Azadirachta indica*) are grown close to houses because this plant is highly esteemed as a fever cure especially of malaria fever, which is endemic in Africa. Also Sofowora (1982) reported the growth inhibitory effect of this leaf extract on *Plasmodium falaparum* culture.

Stachytarpheta jamaicensis (L.) Vahl., commonly called Bastard vervain or Brazilian tea, belongs to the family Verbenaceae. It is an erect or straggling perennial herb of about 60-90 cm in height. The stem is smooth and somewhat woody, especially at the base. The leaves are opposite and whorled, ovate or oblong elliptic and between 4-11 cm long and 2-4.5 cm wide, rounded to broadly acute at the apex, widely toothed at the margins, smooth on both surfaces with short petioles. The florescence is made up of flowers in slender spikes on a long and swollen rachis about 30-40 cm. The flowers are bluish with a white threat and a tubular corolla about 10 mm longand lobes about 3 mm long; they are more or less sparsely grouped along and immersed in the axis of the inflorescence (Akobundu and Agyukwa, 1998).

Ethnobotanically, *S. jamaicensis* is used as antacid, analgesic, antihelmintic, anti-inflammatory, anti-spasmodic, anti-ulcerogenic, diuretic, hypotensive, laxative, lactagogue purgative, sedative, spasmogenic, stomachic tonic, vasodilator and vermifuge (Schapoval, 1998). In ethnoveterinary medicine a decoction of the leaves of *S. jamaicensis* is reported to be used to achieve milk let-down in Trinidad and Tobago (Lans *et al*., 2000).

An extract of the leaves have also been reported to have insecticidal activity against the *Aedes aegyti* mosquito (Chariandy *et al*., 1999). A toxicological evaluation of the aqueous leaf extract of the plant in rats was reported to have produced a reduction in motor activity, ataxia, sedation, analgesia, piloerection, head tremors and significant hypothermia (Melita and Castro, 1996). The cardiovascular effects of extracts of the plant have however not yet been reported.

Traditionally, many herbal doctors claim, some plants are known for their anti-hypertensive effects. The high patronage of sellers of such herbs may be an indication of the plants efficacy. However, their mechanisms of action as well as the active constituents may not have been documented.

The aim of the present communication was to evaluate the claimed hypotensive effect of the aqueous

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extract of *S. jamaicensis* . Hypertension is one of the most common diseases afflicting humans world-wide. As a result of the high morbidity and mortality rates associated with hypertension, it is considered an important public health challenge.

MATERIALS AND METHODS

Plant material: The leaves of *Stachytarpheta jamaicensis* (L.) Vahl., were collected around the premises of the University of Benin, Nigeria in February 2004 and identified by Mr. Henry Akinnibosun and authenticated by Prof. MacDonald Idu, both of Botany Department, University of Benin, Benin City, Nigeria. A herbarium specimen (No.A103) has been deposited at Botany Department, University of Benin, Benin City, Nigeria. The leaves were washed free of debris and dried under the sun for three days after which they were kept in the oven at 40°C for five days. Six hundred gram of the powdered leaves was subjected to hot water extraction using soxhlet apparatus. The extract was concentrated to dryness and it gave a yield of 19.2%.

Animals: Adult male rabbits weighing 1.2-2.0 kg were used in the experiments. They were housed in the Department of Pharmacology and Toxicology Animal House, fed with rabbit pellets (Livestock feeds) and provided with water *ad libitum*. Each rabbit was anaesthetized with pentobarbitone sodium (40 mg kg^{-1}) intravenously. The marginal ear vein was cannulated with a butterfly cannula for the administration of drugs and extract. The carotid artery was cannulated and connected via a Bently pressure transducer to a twin-channel Ugo Basile recorder (Gemini 7070) for recording blood pressure and heart rate. The aqueous extract was administered to the anaesthetised rabbits at doses of 2.5, 5.0, 10.0, 20.0, 40.0 and 80.0 mg kg^{-1}. In some cases the extract was administered in graded doses after atropine or promethazine (1.0 mg kg^{-1}).

RESULTS AND DISCUSSION

The results show that the extract dose-dependently reduced blood pressure and heart rate. The Mean Arterial Pressure (MAP) of the anaesthetised rabbits was 102.8±4.2 mmHg. This was progressively reduced by increasing doses of the extract to 96.6±7.3 mmHg by 2.5 mg kg^{-1} and to 38.9±3.1 mmHg by 80 mg kg^{-1}, the highest dose used. The heart rate was also correspondingly reduced from the post-anaesthetic rate of 398.3±8.3 beats/min. 2.5 mg $kg^{-1}$of the extract reduced the heart rate to 373.1±9.7 beats/min and the maximum dose of 80 mg kg^{-1} lowered it to 178±83.7 (Table 1). Neither atropine nor promethazine had any effect on the extract-induced hypotensive effect.

Table 1: The effect of the aqueous extract of the leaves of *Stachytarpheta jamaicensis* on rabbit blood pressure

Dose of extract (mg kg^{-1})	Mean Arterial Pressure (MAP) (mmHg)	Heart rate (beats/min)
0	102.8±4.2	398.3±8.30
2.5	96.6±7.3	373.1±9.70
5	92.3±5.2	331.5±2.60
10	85.5±5.9	305.5±2.60
20	74.7±8.7	302.0±8.50
40	66.2±5.6	276.0±25.9
80	38.9±3.1	178.0±83.7

The results show that the water extract has a significant dose-dependent hypotensive effect. While some plant components like alkaloids are capable of producing hypotension in whole animals by releasing histamine from mast cells others may stimulate muscarinic receptors causing endothelium-derived relaxing factor-mediated vasodilatation and hence hypotension (Ayinde *et al*., 2003). Some components may lower blood pressure by acting directly on vascular smooth muscle while some others have myocardial effects. It has been shown in this study that the extract may not be acting through histamine release or through the stimulation of muscarinic receptors. Stimulation of endothelial muscarinic receptors generates vasorelaxant nitric oxide but it has been reported that an ethyl acetate extract of the leaves of *S. jamaicensis* inhibited the production of nitric oxide in macrophages (Alvarez *et al*., 2004).

It is concluded that the hypotensive effect of the extract may be due to either a yet to be identified direct effect on vascular smooth muscle or by an effect on the heart since there was a dose-dependent negative chronotropic effect or indeed a combination of both.

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