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Research Article

THE EFFECT OF ALSTONEA BOONEI STEM BARK PLUS CISPLATININDUCED RENAL INSUFFICIENCY IN RATS

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ABSTRACT

The bark of Alstoniaboonei stem was analysed for the medicinal and the effect of extracts on induced renal insufficiency. The plant material was collected in August-September 2012 and Rats 100-150g body weights were subjected to the study. Normal saline as control, Cisplatin, and cisplatin plus Alstoneiboonei stem bark extract were administered and the result summary for serum creatinine in cisplatin treated Rats (2.69±0.32mg/dl) and in Rats administrates cisplastin plus Alstoniaboonei stem bark extract (2.5±0.01mg/dl) were elevated compared to saline control (1.89±0.89mg/dl). Serum urea in cisplatin treated Rats was (38.4 ±2.98mg/dl) compared to Rats administrates with cisplatin plus the extract (38.4±2.98mg/dl) and saline control (24.94±3.76mg/dl). The study indicates Alstoniaboonei stem bark extract reduced the renal insufficiency in rats.

Keywords: Alstoniaboonei, Normal saline, Cisplatin, Serum Creatinine.

INTRODUCTION

Alstoniaboonei belong to member of the medium sized genus. The tree originated from tropical Asia. The two Nigerian species may be recognized easily by their whorled leaves, the large tree were deeply fluted bole, yielding copious latex when slashed with branches and distinctive leaves in whorls, looked at from below the twigs some what resemble a compound leaf with digitate leaflets. It is commonly called in Yoruba: Awu, Edo: Ukhu, Itsekiri: Okugbo and Igbo [1]. The plant extends from Senegal to Ethiopia and south to Zaria, the two Nigerian species habitat were forest and forest outliers in damp situation. Alstoniaboonie attend a height of 30m to 3m in girth, with whorl branches that are nearly horizontal, the bole often fluted, but sometime right up to the crown, with slight buttresses. The bark is brown in colour fairly rough flaking off in small patches slash light brown with white streaks, exuding copious white latex. The leaves 10-20cm long by 5-7.5cm broad. In whorls of 5-8 oblanceotate to obovate, rounded at the top but with a short blunt tip tapering gradually to the cuneate base with up to 50pairs of thin straight lateral nerve, stalk stout, up to 18mm long, but often very short flowers in October-March yellowish- white, in umbel- like clusters at the ends of the branches of the finely hairy terminal inflorescences [1].

Flowers shortly stalked, calyx forming a shallow cup about 2.5mm deep with 5 lobes, corolla-tube to 12mm long, corolla-lobes to 6mm broad and long. Fruits in (Dec-May) hanging down in a pair of follicles up to 60cm long by 6mm thick, finely with a tuft of long silky hairs at each end. Wood very light in weight, white and soft.[2] reported, the phytochemical analysis, indicate the presences of Alkaloid and Flavonoid. Alkaloids were mainly indole type (alstonine, alstoniline, cillastonine and editamine). Many reported on some preventive and curative role of Alstoniaboonei stem bark, in calcium mediated renal cortex mitochondria damage [3][4]. Vasodilatory, causes a fall in arterial pressure leading to increase cardiac output [5]. It was also reported that Alstoniaboonie stem bark extract has anti-inflammatory, antipyretic and analgesic properties [6], this correlate with the traditional herbal medicine of the bark extract as a remedy for many pathological condition such as malaria, diabetes, arthritis, antidote against insects and animal poisons [5][7]. The potent antioxidant activity of flavonoids, their ability to scavenge hydroxyl radicals, superoxide anions and lipid peroxy radicals and the anti-inflammatory, analgesic, antipyretic activities may be the most important functions of flavonoids, Alkaloids respectively, underlies many of the above actions in the body [8][9][10][11].

MATERIALS AND METHODS

Collection of Plant Materials:

The plant material of Alstoneiboonei bark were collected in August – September 2012, at south of Mambilla in Sardauna Local Government in Taraba State, Nigeria. The stem bark was identified at school of Agriculture, Department of botany Federal University of Technology, Yola.

Collection of Experimental Animals:

Fifteen young male Wister strain albino rats were obtained fromVetenary Institute Vom, Jos. Plateau State. They were maintained on animal feeds until they had grown to adult and attained weight between 105-150kg.

Extraction of Alstoniaboonei:

The plant bark was dried at 60^0c in an air-circulated oven for 24hrs, ground with porcelain mortar and pestle to fine particles and stored in screw-capped plastic containers prior to extraction.

Extraction Analysis:

Powdered sample (1000g) was mixed properly and covered tightly for 72hrs and filtered. The residual was rinsed with 85% Methanol; the filtrate then concentrated to dry in a rotary evaporator and subsequently reduced to constant dry weight over a low temperature water bath and waskept in the desiccator until it was ready for used.

Serum Creatinine Assay:

The assay was done on addition of working reagent (creatinine reagent), components are thoroughly mixed and transferred to cuvette using spectrophotometer (PYE UNICAM). The absorbance was read at 510nm wavelength at 20 and 80 seconds against reagent blank.

Enzymatic Urea Assay:

Using searchy method (1967), the enzymatic urea assay absorbance was read under 600nm wavelength against blank.

Alkaloid Determination:

Alkaloid was determined by analyses of 0.1g of the Alstoneiboonei stem extract, boiled in 5ml of 20% HCl acid on steam bath. The extract was filtered and the filtrate is subjected to various test, two drops of Mayers reagent was added to 1ml portion of the extract, a creamy colour precipitate was observed.

To the Dragendoffs reagent (Bismuth potassium iodide solution), two drops to 1ml of the filtered, orange precipitate was observed and to the picric acid solution (1%), two drops was added to 1ml filtrate yellow precipitate confirms Alkaloid.

Experimental Grouping:

The Rats were divided into three groups (5 animals each) with an average of the same weight. Group

A was injected with cisplatin 5mg/kg/body weight intraperitoneally. Group B was Administered normal saline 5mg/kg/body weight by gavages daily. Group C was injected cisplatin 5mg/kg/body weight intraperitoneally followed by administration of Alstoniaboonei bark extract (1g/kg) by gavages daily.

Collection of Blood Sample:

Blood sample was collected by cardiac puncture after six days of treatment, the blood samples were centrifuged and serums were used for the analysis.

Statistical Analysis:

Means were compared using student t-test and the level of significant difference was determined at $P<0.05$

RESULT

Sample	GroupA	GroupB	GroupC
1	2.0	2.0	3.0
2	3.0	2.0	3.0
3	3.5	2.5	2.0
4	2.5	1.5	1.5
5	2.5	1.5	2.0

Table 1: Creatinine Assay (mg/dl)

Group A= Cisplatin injected rats, Group B=Normal saline Administered rats, and Group C=Cisplatin +AlstonaiBoonei stem bark extract

Sample	GroupA	GroupB	GroupC
1	40.0	36.0	15.0
2	36.0	20.0	8.0
3	32.0	20.0	4.0
4	48.0	32.0	4.0
5	36.0	20.0	7.0

Table 2: Enzymatic Urea Assay (mg/dl)

Group A= Cisplatin injected rats, Group B=Normal saline Administered rats, and Group C=Cisplatin +AlstonaiBoonei stem bark extract

	Creatinine mg/dl	Urea mg/dl
Saline Control	1.89±0.89	24.94±3.76
Cisplatin	2.69±0.32*	38.0±2.98*
Cisplatin+Extract	2.5±0.01	7.9±2.48**

Table 3: Summary

Value presented Mean ±SD Using student t-test $P<0.05$

* =Significantly different from saline group.

**=Significantly different from saline and cisplatin

DISCUSSION

The phytochemical components (alkaloid, flavoids) were present in the methanolic extracts of the bark of Alstoniaboonia plants, Alkaloids was found to be high in the methanol extract (mainly indole type, Alstoniacillastonine and echitamine), followed by flavonoids [2][12]. It is reported the medicinal properties of extract for many pathological conditions such as malaria, diabetes, arthritis and painkiller, antidote against

insects' Bites, anti-inflammatory, analgesic and antipyretic activities [7].

The flavonoid was known to have anti-bacterial, vasodilatory and anti-inflammatory activity [13]. The potent antioxidant activity of flavonoids underlines many of the above action of Alsttoniaboonei[9][10][11]. Intraperitoneal dose of cisplatin (5mg/kg) in this study agrees with chemotherapeutic levels known to induce relatively mild acute renal failure [4][14]. From the study, the result of serum creatinine in cisplatin treated rats (2.69±0.32mg/dl) and in rats injected with cisplatin and Alstoniaboonei bark extract (2.5±0.01mg/dl). Also serum urea in cisplatin treated rats was (38.4±2.98mg/dl) and saline controls (24.94±3.76mg/dl) Cisplatin-induced nephrotoxicity as reported by [15][16], has variously been associated with proximal tubular impairment. Also the Ca^{2+} mediated renal cortex mitochondria damage [4][14] increased lipid peroxidation [6]. Hence, the ability of Alstoniaboonei extracts to lower serum creatinine and Urea level may be related to its therapeutic potential as a free radical scavenger. The anti-inflammatory, anti-pyretic and Analgesic properties shown to protect against cisplatin-induced nephrotoxiciy through free radical scavenging [6], it also play a role of curative and preventive in Ca^{2+} mediated renal cortex metochondrial damage.

The reduced urea level in the cisplatin plus extracts treated rats compared to saline control may be attributed to vasodilatory of afferent arteriole of a nephron increases the rate of blood flow into the glumeralus and also increases the glomeular pressure and subsequently the glomerular filtration, it has been reported to be effective in mechanism which involve, increasing cyclic nucleotide concentration, phosphodiesterase inhibition and calcium antagonism [17]. Alstonaiboonei extract was used as tradition herbal remedy for hypertension and this may be explained by the vasodilatory property of the extracts.

CONCLUSION

This study confirms that the Alstonaiboonei bark extracts can serve as a therapeutic potential source of correcting renal insufficiency.

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