

Short Communication

In vitro antimicrobial and phytochemical activities of *Acacia nilotica* leaf extract

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The *in vitro* antimicrobial and phytochemical activities of the crude ethanolic leaf extract of *Acacia nilotica* on *Campylobacter coli* isolated from goats in Gwagwalada Abattoir was investigated. Hydrolysable tannins, saponin, saponin glycosides, volatile oils, phenols, triterpenes, flavonoids and alkaloid were present in the extract. Minimum inhibitory concentration was 70 mg/ml of the extract related to standardized bacteria colony of 3×10^8 organisms per mL. The highest zone of inhibition was observed with the 70 mg/ml concentration, following isolation and inoculation of test organisms on Muller Hinton Agar incubated at 37°C for 24 h. The basis of this plant extract in the traditional treatment of diarrhea in human is highlighted.

Key words: *Acacia nilotica*, antimicrobial activity, chemical constituents, *Campylobacter coli*.

INTRODUCTION

The use of herbs in treatment of animal and human diseases has long been established. Most plant extracts have been shown to possess anti-microbial agents active against micro organisms *in vitro*. These plants contain medicinal properties which make them potent to cure or prevent diseases (Sofowora, 1982). In recent past, some workers in Nigeria have reported results or studies on the effects of sap and bark of *Pycnaathus sangolensis* and *Cassia alata* on the growth of various types of bacteria and fungi such as *Trichophyton* species, *Microsporium* species and *Aspergillus niger* (Sofowora, 1983).

Acacia nilotica has been reported to be very useful in treating diarrhea and cough in human (Guinko, 1991). Despite this richness of *Acacia* species, relatively few appeared to have been investigated. Little is known about the chemistry of most species of the genus *Acacia*. As presently defined, a number of secondary metabolites have been reported from various *Acacia* species (Seigler, 2003).

Acacia is a pantropical and subtropical genus with species abundant throughout Australia, Asia, Africa and America. *Acacia nilotica* occur naturally and it is important in traditional pastoral and agropastoral

systems. It belongs to the sub-family mimosoideae of the family Fabaceae. It is also a phyllodenous species widely recognized in Africa and in Nigeria (Bennison and Paterson, 1994).

Campylobacter spp is the pathogen causing moderate self-limiting illness. The most common of these species are *C. jejuni* and *C. coli* (Raji et al., 2002). The presence of *Campylobacter* species among healthy and diseased farm animals has been reported in many countries. *C. jejuni* and *C. coli* have been reported in a number of farm animals including goats at the Sokoine University of Agriculture Morogoro, Tanzania (Raji et al., 2000).

Three of *campylobacter* Species have also been isolated from sheep in Zaria and Kaduna (Raji et al., 2000). Animals are the commonest reservoir of this species infection and may serve as sources of infection to human through contaminated meat (Raji et al., 1997). This study is aimed at investigating *in vitro* activity of crude ethanolic leaf extract of *Acacia nilotica* against *C. coli* isolated from goats in Gwagwalada Abattoir, Federal Capital Territory and to screen extract for active chemical components.

MATERIALS AND METHODS

Fresh leaves of *A. nilotica* were collected from Gwagwalada behind the University of Abuja Teaching Hospital in 2007. They were taken down to the University of Abuja, Department of Biological Sciences
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Table 1. Phytochemical Components of *A. nilotica ethanolic leaf extract*

Secondary metabolites	Ethanolic leaf extract
Saponon	+
Saponin glycosides	+
Volatile oil	+
Hydrolysable tannin	+
Steroids	–
Triterpenoid	+
Tannin	+
Flavonoids	+
Phenol	+
Alkaloid	+

Key: + = Presence, _ = Absence.

Table 2. Minimum inhibitory concentrations of *A. nilotica* on *C. coli*.

Organism	Concentrations (mg/ml)		
	3	30	70
<i>C. coli</i>	+	+	–

Key: + = (presence of growth), _ = (absence of growth).

herbarium where they were identified by Mr. G. S. Zubairu. The leaves were air dried and made into fine powder.

Extraction of leaves

The procedure was as described by Odebiyi and Sofowora (1979). 100 g of the powdered leaves were extracted with 95% boiling ethanol using a Soxhlet extractor. The extract was filtered and evaporated to dryness using a rotary evaporator to give a dark green gummy residue.

Phytochemical screening of extract

This was as by Odebiyi and Sofowora (1979), Gundiza (1985) and (Ebana et al., 1993). The leaf extract was screened for saponin, saponin glycosides volatile oil, alkaloid, glycosides, steroids and triterpenoids, tannin, flavonoids, phenol and hydrolysable tannin.

Test organism

Test organism was isolated from goats in Gwagwalada Abattoir and was grown in nutrient broth.

Anti-microbial test

This was as described by Odama et al. (1986). An aliquot of 0.1 ml of 1% barium chloride was added to 9.9 ml of 1% H₂SO₄ to give a McFarland turbidity standard suspension No. 1. This turbidity approximates bacterial density of about 3 x 10⁸ organisms per ml. About 0.2 ml of the standardized, suspension of the bacterium test growth in Nutrient broth was pipetted into Muller Hinton Agar plates the extract was used. The plates were incubated at 37°C for 24 h

and the zones of inhibition were then measured to the nearest millimeter using a ruler (Erickson and Sherris, 1971). The minimum inhibitory concentration (MIC) was determined using the agar incorporated method as described by Abdulrahman (1986). This was done by using 0.2 ml of the standardized bacterial density of 3 x 10⁸ organisms per ml. The inoculums were pipetted on the Muller Hinton Agar incorporated with the extracts at various concentrations and incubated at 37°C for 24 h. Following the incubation, the growths of *Campylobacter coli* organism on the agar plates with different concentration of the extracts were observed.

RESULTS AND DISCUSSION

The phytochemical screening of the *A nilotica* leaf extracts has shown that the leaf contains saponins, saponin glycosides, volatile oil, hydrolysable tannin, triterpenoid, tannins, flavonoids, phenol, alkaloids which are very important constituent when looking for pharmacologically active phytochemicals in the plant (Table 1).

At the concentration of 3 and 30 mg/ml of growth of *C. coli* was recorded, but at the concentration of 70 mg/ml no growth was observed as shown in Table 2. Table 3 shows the diameter of inhibition at different concentrations, the 3 mg/ml has a diameter of inhibition of 3, 8 for 30 mg/ml concentration and 15 mm for 70 mg/ml concentration of the extract. 70 mg/ml concentration showed the highest zone of inhibition. Therefore it revealed an antimicrobial activity of the leaf extract against the test organism.

Table 3. Diameter of inhibition at different concentrations.

Organism	3 mg/ml diameter of inhabitation (mm)	30 mg/ml	70 mg/ml
<i>Campylobacter coli</i>	3 mm	8 mm	15 mm

Key: _ (No inhibition)

The anti microbial activity of ethanolic leaf extract of *Acacia nilotica* on *C. coli* may be related to the antibacterial effect of this plant. The findings in this study that the ethanolic leaf extract showed inhibitory effect at a minimum concentration of 70 mg/ml against *C. coli* showed the potentials of the plant in the treatment of bacterial infection due to *Campylobacter organisms*. This is in accordance with the previous findings of Raji et al. (2002). The susceptibility of this organism to the extract of this plant is very interesting considering the widespread phenomena of antibiotic resistance of the organism (Coker and Adefeso, 1994).

Traditionally, plant material is used as a crude extract and such treatments do not aim at using the pure isolate of the extract. The work demonstrated *in vitro* the antimicrobial activity of the crude extract of *A. nilotica* leaves against the organism used in this study. However, it displayed a basis for the use of the extract by practitioners in the treatment of diarrhea in human which could be caused by *Campylobacter* spp. *A. nilotica* crude ethanolic leaf extract showed *in vitro* antibacterial activity against *C. coli* isolated from goats in Gwagwalada, Abattoir, Federal Capital Territory.

It is recommended that further research should be carried out to investigate the bioactive component of this plant. The need for establishment of standard dosage cannot be over emphasized. This is necessary to investigate the toxicity level of the extract resulting from over dosage or from any of the phyto chemical component present in the plant material.

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