IN VITRO ANTIMICROBIAL AND PHYTOCHEMICAL ACTIVITIES OF ACACIA NILOTICA LEAF EXTRACT

*SOLOMON-WISDOM, G. O AND SHITTU, G. A.

DEPARTMENT OF BIOLOGICAL SCIENCES UNIVERSITY OF ABUJA ABUJA, NIGERIA

ABSTRACT: 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 x 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 hours. The basis of this plant extract in the traditional treatment of diarrhea in human is highlighted.

Keywords: Acacia nilotica, antimicrobial activity, chemical constituents, campylobacter coli.

Author(s) agree that this article remain permanently open access under the terms of the Creative Commons Attribution http://creativecommons.org/licenses/by/4.0/

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 Campylobacter enteritis which is a frequently mild to 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 Sokkine 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 infections 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 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). 100g of the powdered leaves were extracted with 95% boiling ethanol using a sexhlet 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 0.1ml of 1% barium chloride was added to 9.9ml 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 0.2ml of the standardized, suspension of the bacterium test growth in Nutrient broth was pipetted into Muller Hinton Agar plates and spread evenly with the aid of a glass rod on the agar. Paper discs of various concentrations of ethanolic extract of leaves was placed on agar. The concentration range of 3mg/ml, 30mg/ml and 70mg/ml of the extract was used. The plates were incubated at 37°C for 24 hours 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 0.2ml 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 hours. 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 3mg/ml and 30mg/ml of growth of C. coli was recorded, but at the concentration of 70mg/ml no growth was observed as shown in table 2. Table 3 shows the diameter of inhibition at different concentrations, the 3mg/ml has a diameter of inhibition of 3mm, 8mm for 30mg/ml concentration and 15mm for 70mg/ml concentration of the extract. 70mg/ml concentration showed the highest zone of inhibition. Therefore it revealed an antimicrobial activity of the leaf extract against the test organism.

**Table 1: Phytochemical Components of A. nilotica ethanolic leaf extract**

<table>
<thead>
<tr>
<th>Secondary metabolites</th>
<th>Ethanolic Leaf Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saponon</td>
<td>+</td>
</tr>
<tr>
<td>Saponin glycosides</td>
<td>+</td>
</tr>
<tr>
<td>Volatile oil</td>
<td>+</td>
</tr>
<tr>
<td>Hydrolysable tannin</td>
<td>+</td>
</tr>
<tr>
<td>Steroids</td>
<td>_</td>
</tr>
<tr>
<td>Triterpenoid</td>
<td>+</td>
</tr>
<tr>
<td>Tannin</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>+</td>
</tr>
<tr>
<td>Phenol</td>
<td>+</td>
</tr>
<tr>
<td>Alkaloid</td>
<td>+</td>
</tr>
</tbody>
</table>

Key:

+ = Presence

_ = Absence
The anti microbial activity of ethanolic leaf extract of *Acacia nilotica* on *Campylobacter 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 70mg/ml against *Campylobacter 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 *Campylobacter 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.

**REFERENCES**


