

Short Communication

Preliminary studies of the antibacterial activities of processed Kenyan and Nigerian tea

Mbata, T. I.

Department of Applied Microbiology and Brewing, Nnamdi Azikiwe University, P. M. B 5025, Awka, Nigeria.

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The antibacterial activities of extracts in Kenyan and Nigerian tea bags were tested for activity against six organisms; *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Vibrio cholerae*, *Salmonella* sp., *Proteus* sp. and *Escherichia coli* using the agar-gel diffusion method. The result obtained showed that 20% extract of both teas showed antibacterial activities against *S. aureus*, *E. coli*, *Proteus* sp and *V. cholerae* O1. *Salmonella* sp. and *P. aeruginosa* resisted the extracts.

Key words: Antibacteria activity, tea bag, Kenya, Nigeria.

INTRODUCTION

Tea is an infusion of flavorful leaves that has been consumed for centuries as a beverage and is valued for its medicinal properties. The phytochemical screening of tea revealed the presence of alkaloids, saponins, tannins, catechin and polyphenols (Sofowara, 1984; Opara, 1992). Toda et al. (1989a) also showed that moderate daily consumption of green tea killed *Staphylococcus aureus* and other harmful bacteria.

Recent reports however indicate the tea's antibacterial and bactericidal properties on various bacteria strains isolated for patients with infected root canals (Horiba et al., 1991). Subsequently, several studies on the antimicrobial properties of Japanese tea have been reported (Okubo et al., 1989; Sakanaka et al., 1989; Toda et al., 1989a). The antibacterial activity of Turkish tea against *Campylobacter* sp and the protective activity of tea against infection by *Vibrio cholerae* O1 have also been reported (Diker, 1991; Toda et al., 1991). This study is aimed at investigating the antibacterial activities of extract in Kenyan and Nigerian tea bags on selected microorganisms.

MATERIALS AND METHODS

Collection of sample

Two types of tea were used for this study. The Kenyan tea bought

from Kenya industrial Research and Development Institute and the Nigerian Lipton tea produced in the Mambila Plateau Jos. Both tea were purchased in packets of 2 g x 100 bags.

Tea extraction

The tea bags were aseptically opened with a sterile scissor and the extracts were prepared by the method as described by Toda et al. (1989a). Tea extracts were suspended in cold phosphate buffer saline (PBS) at 20, 10 and 5% (w/v) concentrations. The suspension was held at room temperature for 3 h and then centrifuged at 15000 rpm for 10 min.

Test organisms

The organisms *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Vibrio cholerae* O1, *Salmonella* sp., *Proteus* sp. and *Escherichia coli* were obtained from the Federal Institute of Industrial Research, Lagos, Nigeria and it was further characterized and identified according to standard bacteriological methods as described by Cowan and Steel (1965)

Antibacterial susceptibility test

The surface of sterile Mueller-Hinton agar plates was inoculated with 0.2 ml of a 24 h broth culture (10^6 cfu/ml of test organisms and evenly spread using bent sterile glass rod). Three wells of 6.0 mm in diameter were aseptically punched on each agar plate using a sterile cork bore. Fixed volume 0.1 ml of the tea extract was carefully placed in each well. The plates were then covered and incubated at 37°C for 24 h. The zone of inhibition in each well was obtained by measuring the underside of the plate in two planes with a ruler calibrated in millimeters. The control was placed with 0.1 ml of the extracting solvent and incubated.

*Corresponding author. E- mail: theoikyke@yahoo.com.

Table 1. Antibacterial activity (mean inhibition zones in mm) of Kenyan and Nigerian tea on selected organisms.

Organism	Kenyan tea (%)			Nigerian Lipton Tea (%)		
	20	10	5	20	10	5
<i>Escherichia coli</i>	5.1*	3.1	2.0	4.0	2.0	1.0
<i>Proteus sp.</i>	6.1	2.0	1.0	1.0	-	-
<i>Pseudomonas aeruginosa</i>	-	-	-	-	-	-
<i>Staphylococcus aureus</i>	15.0	7.2	5.2	9.0	5.1	3.2
<i>Salmonella sp.</i>	-	-	-	-	-	-
<i>Vibrio cholerae</i> 01	12.0	6.0	4.0	8.2	4.1	2.1

*Mean inhibition zones (mm).

RESULTS AND DISCUSSION

The effect of 5, 10 and 20% concentrations of the Kenyan and Nigerian Lipton tea extracts on selected bacteria are presented in Table 1. It can be seen that at all three concentrations, the Nigerian Lipton tea extract showed inhibitory effects on *S. aureus*, *V. cholerae* 01 and *E. coli* only. The Kenyan tea extract produced appreciable activity (zone of inhibition) against *S. aureus*, *V. cholerae* 01, *E. coli* and *Proteus sp.* There was no zone of inhibition against *Salmonella sp.* and *P. aeruginosa* (Table 1). The antibacterial effect of foreign brands of tea against *S. aureus*, *E. coli* and *V. cholerae* 01 has been reported (Toda et al., 1989a). Also anti mutagenic and anti carcinogenic effect of these teas have also been documented (Komori et al., 1993; Kuroda et al., 1999).

The zone of inhibition produced by Kenyan tea on test organism was generally larger than those produced with the Nigerian Lipton tea. This could be because it contains more active ingredients (phytochemical substances) than the Nigerian tea, which resulted in an inhibitory effect on the test organism. This study has showed that the extracts in the Kenya and Nigerian tea bags have antibacterial properties against a number of bacteria. The potential utilization of these properties especially in relieving stomach cramp and weight loss is the subject of another study.

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