

Preliminary Studies Of The Antibacterial Activities Of Processed Kenyan And Nigerian Tea

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Abstract

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 *Staphylococcus aureus*, *Escherichia coli*, *Proteus* sp and *Vibrio cholerae* O1. *Salmonella* sp and *Pseudomonas aeruginosa* were resisted. This study established the need for daily use of this product for medicinal purposes.

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* OI have also been reported [Diker 1991, Toda et al. 1991].

Prompted by these reports, the 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 mambla Plateau Jos. Both tea were purchased in packets of

2g x 100bags.

TEA EXTRACTION

The tea bags were aseptically and open with a sterile scissor and the extracts were prepared by the method as described by Toda et al [9]. Tea extracts were suspended in cold phosphate – buffer saline (PBs) at 202, 10% and 5% W/V concentrations respectively. The suspension was held at room temperature for 3 hours and then centrifuged at 15000 rev/min for 10 minutes.

TEST ORGANISM

The organisms, *Vibrio cholerae* O1, *Escherichia coli*, *Salmonella* sp, *Pseudomonas aeruginosa*, *Proteus* sp and *Staphylococcus aureus* 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: AGAR-GEL DIFFUSION

The surface of sterile Mueller-Hinton agar plates was inoculated with 0.2ml of a 24h broth culture (106 cfu/ml of test organisms and evenly spread using bent sterile glass rod. Three wells of 6.0mm in diameter were aseptically punched on each agar plate using a sterile cork bore. Fixed volume 0.1ml of the tea extract was carefully placed in each well. The plates were then covered and incubated at 37°C for 24h. 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 0.1ml of the extracting solvent and incubated.

RESULTS

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 *Staphylococcus aureus*, *Vibrio cholerae* 01 and *Escherichia coli* only. The Kenyan tea extract produced appreciable activity (zone of inhibition) against *Staphylococcus aureus* *Vibrio cholerae* 01, *Escherichia coli*, and *Proteus* sp. There was no zone of inhibition on *Salmonella* sp and *Pseudomonas aeruginosa* (Table 1).

Figure 1

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

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

DISCUSSION

The antibacterial effect of foreign brands of tea against *Staphylococcus aureus* *Escherichia coli* and *Vibrio cholerae* 01 has been reported (Toda et al. 1989a). Also antimutagenic and anti carcinogenic effect of these teas have also been documented (Komori et al. 1993, Kuroda et al. 1999). The same observation was made in this study using the Kenyan and Nigerian teas. In addition, only the Kenyan tea showed more promise by its inhibitory actions on most of the organisms tested in this study.

It was also observed that the antibacterial activity of tea extract was not demonstrated in all types of tea or in tea grown in all geographical locations for examples 20% extract of the Nigeria Lipton tea showed little or no effect on *Proteus* sp, but the same concentration of Kenya tea

produced a mean zone of inhibition of 6.1mm. The zone of inhibition produced by Kenyan tea on test organism were 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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