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Antibacterial Activity of Green Tea (Camellia Sinensis)

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ABSTRACT

The antibacterial activities of tea have been evident for some time and research is continually revealing new bacterial species that are sensitive to its effects. The antibacterial and antifungal tests of the green tea were tested on the test strains using the agar-gel diffusion inhibition test. The results of the study showed that the leaves extract of Camellia sinensis indicates the presence of potent antibacterial activity, which confirms its use against infection. The assessment of antimicrobial activity was based on measurement of inhibition zones formed around the well. The use of green tea extracts presents a great alternative to chemical drugs. The effects green tea has on bacteria could also be determined and to discover interesting and applicable information about green tea and its antimicrobial properties.

Keywords: Antibacterial Activities, Camellia Sinensis And Green Tea.

I. INTRODUCTION

Camellia sinensis is an evergreen shrub belonging to the Theaceae plant family. There are two major varieties of Camellia sinensis: Chinese Camellia sinensis var. sinensis and Camellia sinensis var. assamica (Integrated Taxonomic Information System, 2013). Although numerous claims have been made for the health benefits of green tea, human clinical research has not provided conclusive evidence of any effects (Boehm et al., 2009). In 2011, a panel of scientists published a report on the claims for health effects at the request of the European Commission: in general they found that the claims made for green tea were not supported by sufficient scientific evidence. Although the mean content of flavonoids and catechins in a cup of green tea is higher than that in the same volume of other food and drink items that are traditionally considered to promote health, flavonoids and catechins have no proven biological effect in humans (EFSA, 2010).

The antibacterial activities of tea have been evident for some time and research is continually revealing new bacterial species that are sensitive to its effects. Green tea extract in combination with probiotics significantly reduced the viable count of both pathogens at 4 h and 24 h interval which had completely abolished the recovery of viable Staphylococcus aureus and Streptococcus pyogenes (Ping Su et al., 2008). According to World Health Organization (WHO) report, traditional medicine systems serve the health need of about 80% of the world's population (WHO, 2013). Traditional system of medicine is being followed in preparing novel drug products from medicinally important plants. The increasing concentration of drugs towards green pharmacy may be due to emergence of antibiotic resistance organisms, side effects and economic concern too. The alarming situation on the steady increase of antibiotic resistance microorganisms throughout the world, which resulted increased illness followed by deaths (Levy, 2002) and highlighting the search for a novel antimicrobial agents (Stepanovic et al., 2003). The aim of this study was to investigate the antimicrobial activity of green tea and collect the literature regarding the health benefits of green tea.

II. MATERIAL AND METHODS

Green tea samples were collected from individual home and market. The antibacterial and antifungal tests of the green tea were tested on the test strains using the agar-gel diffusion inhibition test. The Muller Hinton agar was used for the study. Incubate the plates at 37°C for 24 to 48 hrs. After incubation observed the zone of inhibition and measure it with the help of plastic antibiotic zone reader scale. Note down the observations and results (Collins and Lyne, 1980).

III. RESULTS AND DISSCUSSION

The results of the study showed that the leaves extract of Camellia sinensis indicates the presence of potent antibacterial activity, which confirms its use against infection. The assessment of antimicrobial activity was based on measurement of inhibition zones formed around the well. Disk diffusion method did not produce recordable results for all the three type of tea leaves against the pathogens. The aqueous extracts of the test plant produced larger zones of inhibition against the bacteria and fungi. Among these the aqueous extract of fresh green tea exhibited greater antimicrobial activity which was shown in table 4.1.

In the antimicrobial analysis, the sample A of aqueous extract was shown maximum activity against E.coli and C.albicans (12mm) followed by S.aureus (11mm), least against S. typhi and P. aeruginosa (10mm). While the sample B of aqueous extract was shown maximum activity gainst S.aureus (13mm) followed by E.coli and C.albicans (11mm), least against S. typhi and P. aeruginosa (09mm). These observations may be attributed to green tea catechin compounds and polyphenols. Catechin and polyphenols compounds have been found to possess antibacterial action. In continuation with aqueous extract of sample C green tea was shown maximum activity against S.aureus (12mm) followed by S. typhi (10mm), E.coli and C.albicans (10mm) and least against P. aeruginosa (09mm) which was shown in fig. 4.1. While the sample D extract was shown maximum activity gainst S.aureus and E.coli (13mm) followed by S. typhi (12mm), and C.albicans (11mm) and least against P. aeruginosa (09mm).

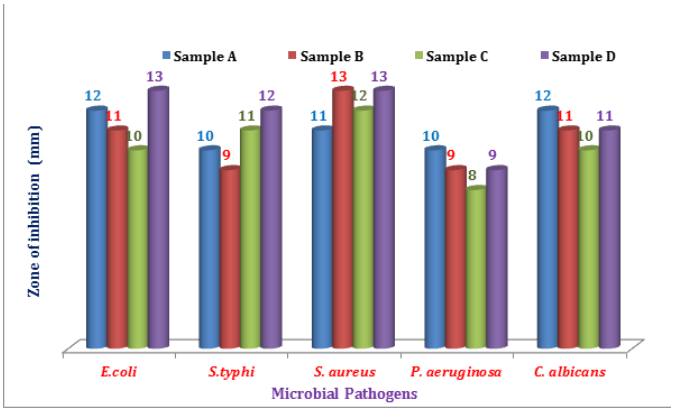

Figure 1. Antimicrobial activity of green tea in aqueous extract.

The ethanol extracts of the green tea produced larger zones of inhibition against the bacteria and fungi. Among these the ethanol extract of fresh green tea exhibited excellent results of antimicrobial activity. In the antimicrobial analysis, the sample A of alcohol extract was shown maximum activity against C.albicans (16mm) followed by E.coli and S.aureus (14mm), least against S. typhi (13mm) and P. aeruginosa (12mm). While the sample B of alcohol extract was shown maximum activity gainst S.aureus and C.albicans (17mm) followed by E.coli (13mm), P. aeruginosa (12mm) and least against S. typhi (11mm) which was shown in fig. 4.2. In next studies of ethanol extract of sample C green tea was shown maximum activity against C.albicans (17mm) followed by S.aureus (16mm), E.coli (15mm) S. typhi (13mm) and least against P. aeruginosa (11mm) which was shown in fig. 4.2. While the sample D ethanol extract was shown maximum activity gainst C.albicans and S.aureus (19mm) followed by E.coli (18mm) followed by S. typhi (15mm), and and least against P. aeruginosa (13mm).

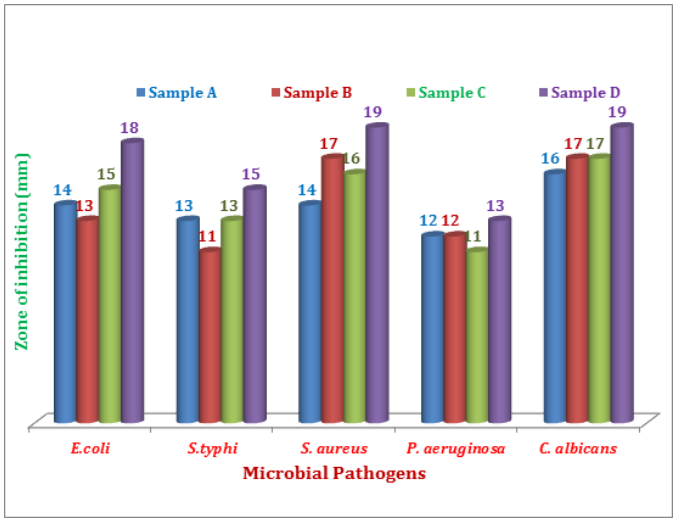

Figure 2. Antimicrobial activity of green tea in ethanol extract.

The antimicrobial activity to the chemical properties of tea infusions, it is clear from this study that trends exist and that polyphenols, most likely catechins, may account for the majority of antimicrobial activity seen. The antibacterial activities of tea have been evident for some time and research is continually revealing new bacterial species that are sensitive to its effects. Some tea extracts and compounds have also been shown to inactivate bacterial toxins such as anthrax toxin, botulinum neurotoxins and pertussis toxin. Toda et al. (1989) show that moderate daily consumption of green tea killed Staphylococcus aureus, Vibrio parahemolyticus, Clostridium perfringens, Bacillus cereus, Pleisomonas shigelloides, etc. Green tea contains between 30 and 40 percent of water extractable polyphenols, while black tea contains between 3 and 10 percent (Archana and Abraham, 2011).

Traditional system of medicine is being followed in preparing novel drug products from medicinally important plants. The increasing concentration of drugs towards green pharmacy may be due to emergence of antibiotic resistance organisms, side effects and economic concern too. The alarming situation on the steady increase of antibiotic resistance microorganisms throughout the world, which resulted increased illness followed by deaths (Levy, 2002)

IV. CONCLUSION

The use of plants extracts presents a great alternative to chemical drugs. The effects green tea has on bacteria could also be determined and to discover interesting and applicable information about green tea and its antimicrobial properties. In future, the combined use of tea and antibiotics could be also useful in fighting emerging drug-resistant problem especially among enteropathogens. On the other hand herbal preparations are comparatively cheaper and have lesser side effects. So, herbal preparations can supplement other systems of medicine for the treatment of diseases caused by bacteria.

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