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The use of common and exotic teas in managing covid-19 related symptoms

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ABSTRACT

Herbal teas are aromatic beverages commonly prepared by pouring hot water over the cured leaves or by boiling them. They have been used as traditional medicines for decades because of their health benefits. The objective of this study was to evaluate the potency of Lipton tea, Evergreen tea, Green tea, Mountain forest tea, Oolong tea, and Egret river tea in managing dry cough, vomiting, sore throat, pneumonia, diarrhea, and respiratory distress. The selected teas were tested against *Staphylococcus aureus*, *Streptococcus pyogenes*, *Escherichia coli*, and *Candida albicans* using the agar well diffusion method. All plates were inoculated and incubated for 24 hours at 37^{o}C. After incubation, each plate was observed for the formation of clear zones around the well. Our findings revealed that *S. aureus*, *Strep. pyogenes*, and *E. coli* were highly susceptible to green tea extracts. However, all the tea samples showed no activity on *C. albicans*. This result proffers that different varieties of common and exotic herbal teas have a great effect in suppressing related symptoms of covid-19 and therefore, may be used as adjuvants with other anti-viral and antibiotic medications when treating infection.

Keywords: COVID-19; Tea; antimicrobial activity

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INTRODUCTION

Tea (*Camellia sinensis*) is an evergreen shrub native to East Asia [10]. It is an aromatic beverage commonly prepared by pouring hot water over the cured leaves or by boiling them. Tea is a native of China, spread to India and Japan, then to Europe and Russia, arriving in the New World in the late 17th century. It is now cultivated in more than 30 countries worldwide [7]. Teas are classified majorly by their manufacturing processes; Black tea (fermented tea), Green see (unfermented tea) and, Oolong tea (semi-fermented tea) [7].

Commercially, there are three major varieties of *C. sinensis*; the China type (*C. sinensis var. sinensis*), the Assam type (*C. sinensis var. assamica*), and the hybrid type (*C. sinensis var. assamica sp. lasiocalyx*) [8]. Despite their names, they are also called true teas. Produced from young leaves of *Camellia sinensis*, tea is one of the most widely consumed fluids after water [6]. Besides the attractive flavors of teas, their popularity comes from their primary and secondary antioxidant properties, therefore tea is designated as a "health drink" [8].

Plants and derived products have many beneficial properties, which are associated with the presence of secondary metabolites, especially phenolic compounds [14]. For instance, ginger tea with its anti-inflammatory properties is also commonly used to improve digestion and treat nausea. Lemon balm tea has a high concentration of antioxidants that detoxify the body, eliminating free radicals that can cause premature aging and serious illness [7]. The increase of antibiotic resistance is on the high side which is a result of the abuse of antibiotics. This is supported by the availability of antibiotics over the counter despite strict regulation against that [5]. As a failure, the existing antibiotics to fight against infection brought about the need to find new alternatives preferably of plant source [6]. Besides the beverage properties of herbal teas, they are used for the treatment of common diseases worldwide and are being consumed by two-third of the world population next to water [9]. The most studied health benefits of tea are its antibacterial [11], antiviral (Nakayama *et al*., 1993), anticancer [1] and cardiovascular effects [4]. Other studies have shown that tea may possess anti-inflammatory [13] and neuroprotective effects [3]

Herbal teas have also been used as traditional medicines for decades. Mineharu *et al*., [5], enrolled 76,979 participants to determine the relationship between the consumption of coffee, green tea, black tea, oolong tea and the risk of cardiovascular mortality. The study revealed a strong reverse relationship between people who drank more than 6 cups of green tea a day and their risk of cardiovascular mortality. He concluded that drinking more than one cup of oolong tea a day reduced the risk of cardiovascular disease among the study participants [5]. Tea and its polyphenols are

known to have a broad range of antiviral activity. The reported mechanisms of the antiviral action of tea include the ability of phenolic agents to act as antioxidants [7], inhibit adsorption [11], disrupt cell membranes [7], prevent viral binding and penetration into cells [6] and trigger host defense mechanisms [3]. Suganuma *et al*., [7] reported that tea and some of its polyphenols contain anticancer properties and that they can as well can induce apoptosis in cancer cell lines of the prostate, colon and breast [7]. Several other researchers have reported the inhibitory and protective effects of green tea against esophageal, stomach, colon, and bladder cancer [11].

Several scholars have reported the antibacterial activities of tea and its components. Tea extracts and compounds have also been shown to inactivate bacterial toxins such as anthrax toxin, botulinum neurotoxins and pertussis toxin [15]. Gradisar*et al*. [16] observed that tea catechins inhibit bacterial DNA gyrase by interaction with its ATP binding site. They also found that Epigallocatechin gallate had the largest inhibitory activity followed by Epicatechingallate and Epigallocatechin. Epicatechin was shown to have no inhibitory activity against bacterial DNA gyrase [16]. They concluded that Epigallocatechingallate and Epicatechingallate had the highest inhibitory activity due to the ability of the galloylmoiety to anchor the benzopyran ring into the active site of the enzyme [17]. The aim of this study was to evaluate the potency of Lipton tea, Evergreen tea, Green tea, Thaiwan tea, Oolong tea, and Egret river tea in managing dry cough, vomiting, sore throat, pneumonia, diarrhea, and respiratory distress. These symptoms are common signs of respiratory illnesses including COVID-19. Therefore, findings from this study will help to treat patients with such symptoms.

MATERIALS AND METHOD

Some Herbal teas (Lipton tea, Evergreen tea, Green tea, Thaiwan tea (a gift), Oolong tea, and Egret river tea) were bought from local markets in Abuja, Nigeria. The content of the teas was verified at the Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria.

Extract preparation

The content of each brand of herbal tea was immersed in 200mls of boiled water, left to sip for 12 to 24 hours and the content evaporated to dryness. The extracts were screened for antimicrobial activity against *Staphylococcus aureus*, *Streptococcus pyogenes*, *Bacillus subtillis*, *Escherichia coli* and *Candida albicans* by adopting the agar well diffusion method at a concentration of 50 and 100 mg/ml respectively.

Antimicrobial Assay

Agar well diffusion method was adopted for this study. Muellar Hinton Agar was prepared according to the manufacturer's instruction and 22mls each was dispensed into sterilized bottles. OVC (Organism Viability Control) was carried out by streaking 1/4 of a plate with each test

organism and incubating at 37ºC. MSC (Media Sterility Control) was carried out for the medium. All petri dishes were labeled properly. Pour plate method was used by inoculating 50ul of the organism into bottles containing molten Agar (MHA) and transferring it onto the petri dishes. To obtain 100mg/ml concentration, 0.3g was weighed out into a sample bottle and was diluted in 3mls of water. It was further diluted by half to get a 50mg/ml concentration. This method is termed serial dilution. 6 wells were bored using a 6mm cork-borer labeled A, B, C, D, and E respectively, and the control for the 6th hole. Each hole was further sealed with MHA using a micropipette. The test organisms were contained in each plate following the samples in microliter which was inoculated in each hole at 100mg/ml and 50mg/ml. Duplicates were also made and left to stand out for about 30 minutes at room temperature to enable diffusion. Chloramphenicol and fluconazole served as a positive control for antibacterial and antifungal respectively. A positive control (teravid) was used on the last hole on all the plates except the plates containing *candida albicans* which a negative control was used. All plates were incubated for 24 hours at 37ºC. After incubation, each plate was observed for formation of clear zones around the well.

Zone of inhibition

The zone of inhibition was measured using a divider and a meter rule. The average of the result of the duplicate plate for each organism was calculated and converted to millimeters and the size of the cork borer was subtracted from it.

RESULTS

The results revealed that the herbal teas possessed a concentration-dependent antibacterial activity with zones of inhibition ranging from 11.5 – 18.0 mm. None of the herbal teas possessed any antifungal activity.

Table 1: Antimicrobial activity of the samples used for the study

Samples	**Sample A (mm)**		**Sample B (mm)**		**Sample C (mm)**		**Sample D (mm)**		**Sample E (mm)**		**Control (mm)**
Concentration (mg/ml)	100	50	100	50	100	50	100	50	100	50	-
Staphylococcus aureus	16.5	-	17.5	13.5	18	12.5	16.5	12	14.5	-	34
Streptococcus pyogenes	16	12	19.0	17	15.5	14	15	12	14.5	13	31
Bacillus subtillis	16.5	11.5	15.5	13	15	12.5	13.25	12	15.5	12	37
Escherichia coli	-	13.25	-	16	-	14	-	13.5	-	14.5	35
Candida albicans	-	-	-	-	-	-	-	-	-	-	-

Sample A = Lipton tea *Sample B = Evergreen tea* *Sample C = Green tea*

Sample E = oolong tea *Sample F = Egret river tea* *Sample D = Mountain forest tea*

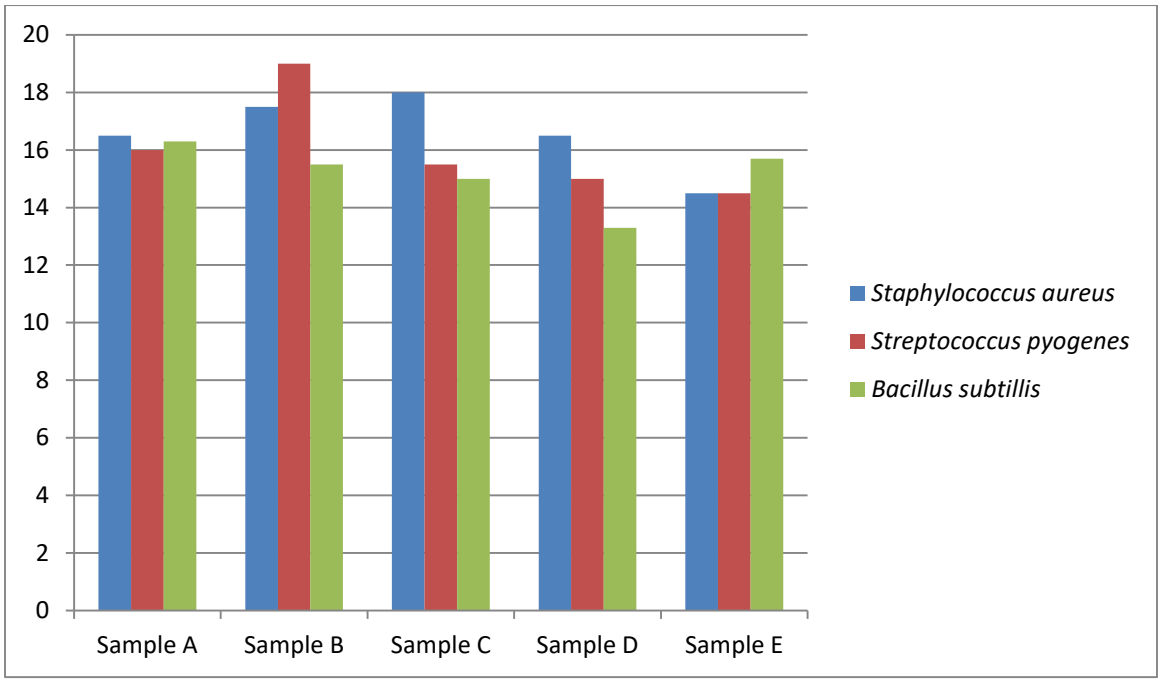

Figure 1: Antimicrobial effects on samples at 100mg/ml

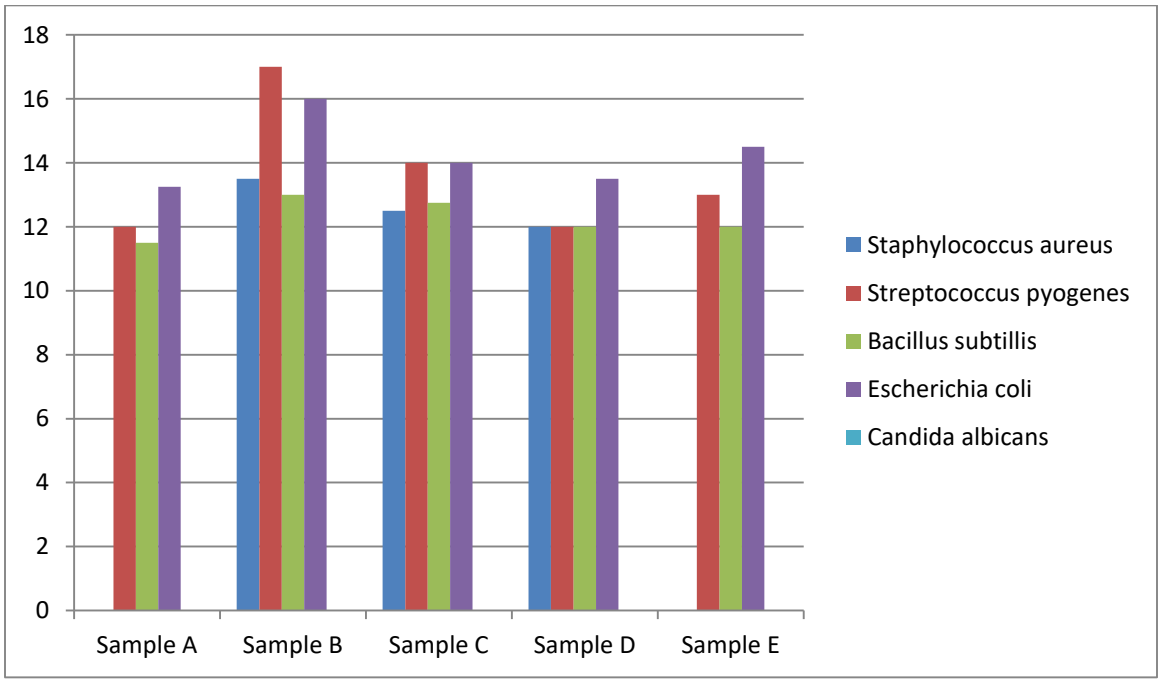

Figure 2: Antimicrobial effects on samples at 50mg/ml

DISCUSSION

Our study evaluated the antimicrobial activity of some selected common and exotic tea extracts against some microbial isolates. Treatment of a disease with modern medicines has been attributed to an increased risk of developing side effects and resistance. Furthermore, plant remedies are cheap alternative to industrially produced antibiotics. Hence, the use of plant products has been increasing worldwide to lower medicinal side effects [9]. Numerous studies have identified the compounds of tea such as flown-3-ols, flavonols, gallic acid, the aflavins (TF), purine alkaloids, and amino acids [4,12].

The Agar well diffusion method was adopted for our study. The zones of inhibition on each well containing extracts used at 50 and 100mg/ml concentration were clearly observed. However, after incubation, it became apparent that some of the tea extracts showed a level of antimicrobial activity on some of the tested organisms at both concentrations. For instance, Tea extracts of Evergreen tea, Green tea, and Mountain forest tea showed a great level of activity on *Staphylococcus aureus, Streptococcus pyogenes,* and *Bacillus subtillis*. On the other hand, tea extracts of Lipton tea and Oolong tea showed effect only at 100mg/ml on *Staphylococcus aureus* and *Escherichia coli* at 50mg/ml. However, all the selected tea extracts showed no activity on *candida albicans.* Due to the antimicrobial properties of these teas, they can be useful in treating infections such as pneumonia, osteomyelitis, streptococcal toxic shock syndrome, dry cough, vomiting, sore throat, pneumonia, diarrhea, and respiratory distress. Therefore, it can be used as an adjuvant to chemotherapy.

The herbal tea extracts used in this study do not possess any antifungal activity. Our finding is in line with the report from Chakraborty and Chakraborti [1] who assigned antifungal activity against two *Aspergillus spp*. by measuring ZDI and MIC at four different concentrations (10, 25, 25, and 100 mg/ml) of the methanolic extract of green tea leaves. However, they reported no activity of both species at any concentration.

Conclusion

This study has proved that different varieties of common and exotic herbal teas have a great effect in suppressing symptoms of covid-19 and therefore, can be used in combination with other anti-viral medications when treating infection.

We recommend that drinking herbal teas should form part of our lifestyle here, especially in this Covid 19 times.

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