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THE IMPACT OF BLACK TEA ON THE HUMAN ORAL MICROBIOTA

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Abstract. *This study investigated the effect of black tea on the quantitative composition of the human oral microbiota. The study involved 12 volunteers, including four smokers. Samples were collected by taking swabs from the oral mucosa before and after black tea consumption.*

The collected specimens were cultured on different nutrient media, followed by incubation and evaluation of microbial growth. The results demonstrated a reduction in the total number of microorganisms as well as members of the staphylococcal microflora after black tea consumption. These findings indicate that the bioactive components of black tea possess antimicrobial properties.

Keywords: *black tea, oral microbiota, staphylococci, microorganisms, culture media, antimicrobial activity.*

Introduction: The oral cavity is a complex ecological environment inhabited by a diverse community of microorganisms. Under normal conditions, the oral microbiota plays an essential role in maintaining biological homeostasis. However, changes in the oral environment may allow certain microorganisms to become opportunistic pathogens, leading to inflammatory and infectious diseases.

Black tea is one of the most widely consumed beverages worldwide. Its chemical composition includes catechins, flavonoids, theaflavins, and tannins, which are known to possess antibacterial properties. Previous studies have shown that the biologically active compounds found in black tea can inhibit the growth of various bacterial species, including members of the opportunistic oral microflora.

Therefore, investigating the effect of black tea on the microbial community of the human oral cavity is of considerable scientific interest.

The aim of this study was to evaluate the effect of black tea consumption on the quantitative composition of the oral mucosal microbiota.

Materials and Methods

The study included 12 volunteers between the ages of 18 and 25 years. Among the participants, four were smokers.

Samples were obtained from the oral mucosa using sterile cotton swabs. Specimen collection was performed in the morning before the participants consumed any food or beverages.

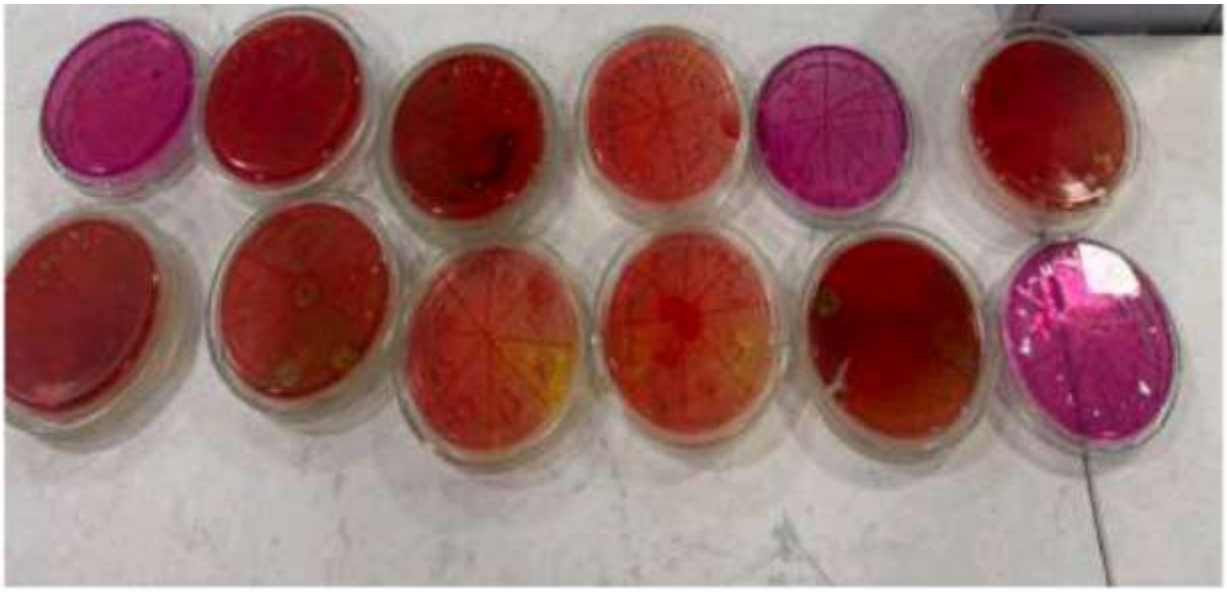
After the initial collection of oral swabs, **six participants** were instructed to consume **50 mL of black tea** during the day. *(If you actually meant the amount of dry tea leaves, clarify this.*

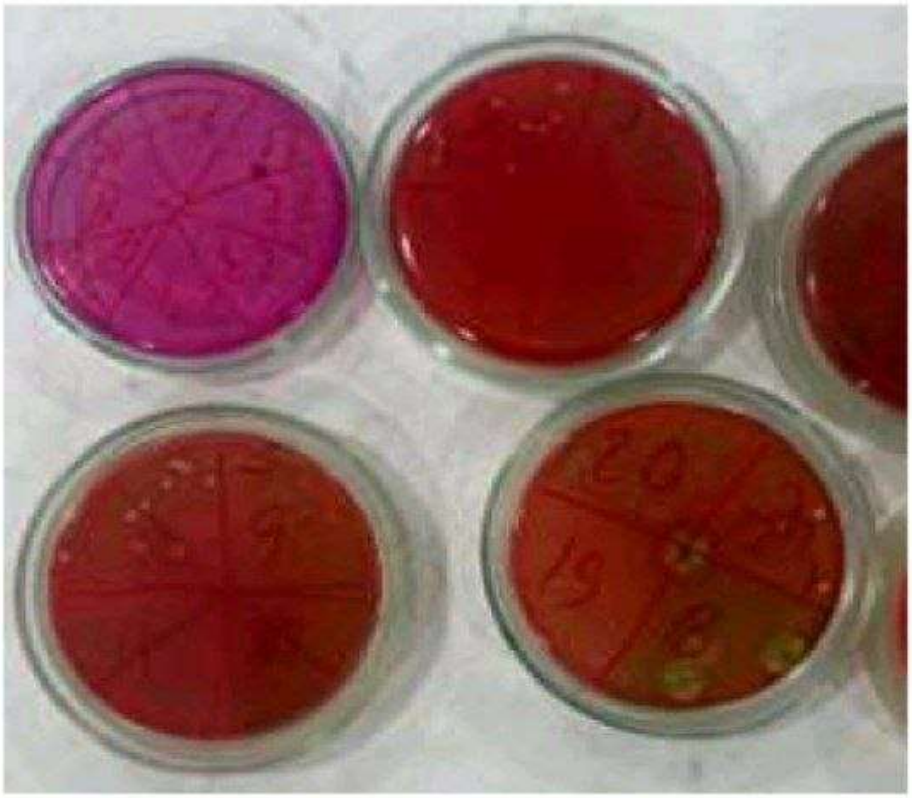
*For a beverage, **50 mL** is appropriate rather than **50 g**.)* At the end of the experimental period, a second set of oral swabs was collected.

Microorganisms were cultured on four different culture media:

- Blood agar;
- Mannitol Salt Agar (MSA);
- Nutrient agar;
- Sabouraud agar.

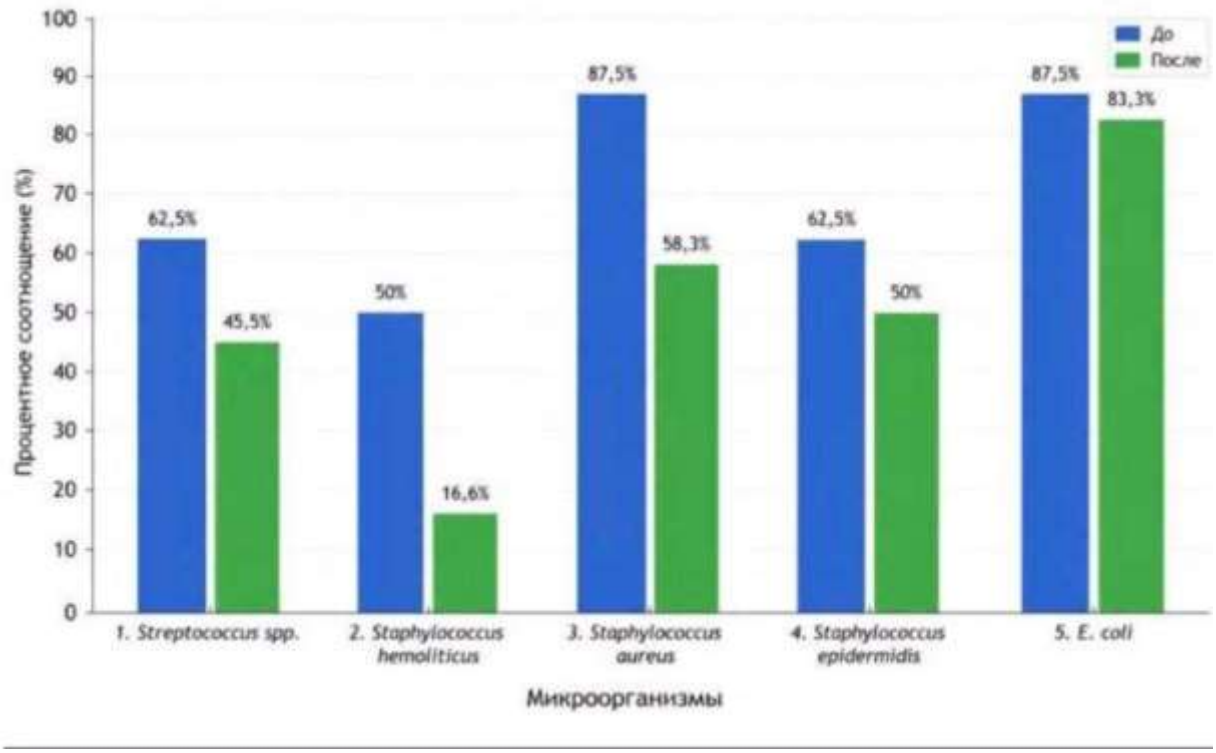
The inoculated media were incubated at **37°C** for **24–48 hours**. Following incubation, microbial growth was assessed visually. Colony morphology and cultural characteristics were examined, and the number of **colony-forming units (CFUs)** was determined.





Growth of microorganisms on nutrient media

The result obtained were compared between the primary and follow-up studies:



Results: Analysis of the obtained data demonstrated a reduction in the number of microorganisms following black tea consumption in the majority of the study participants.

The most pronounced changes were observed among members of the staphylococcal microbiota. After black tea consumption, a decrease in the number of staphylococcal colonies was observed on the culture media, indicating inhibition of their growth.

A reduction in the overall microbial load of the collected samples was also observed.

These findings were evident in both smokers and non-smokers; however, the extent of the reduction varied among individuals.

Discussion: The findings of this study suggest that black tea exhibits antibacterial activity against the oral microbiota. This effect may be attributed to the presence of polyphenolic compounds in black tea, which are known to interfere with bacterial growth and proliferation.

The observed reduction in the number of staphylococci is of particular importance, as members of this genus are considered opportunistic microorganisms and may contribute to the development of oral diseases under certain conditions.

The results of the present study are consistent with previous research reporting that tea polyphenols can inhibit the growth of bacterial cultures and reduce the microbial load within the oral cavity.

Despite these promising findings, the study has several limitations, including the relatively small sample size and the short duration of the observation period.

Conclusion:

Consumption of black tea was associated with a reduction in the number of microorganisms present in the oral cavity.

A decrease in the abundance of the staphylococcal microbiota was observed following black tea consumption.

The most pronounced antibacterial effect was detected against opportunistic microorganisms.

These findings support the antimicrobial properties of the bioactive components of black tea.

Black tea may be considered a complementary factor in maintaining the microbial balance of the oral cavity.

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