



Effects of Preservatives Added in Cookies on Intestinal Bacteria

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Introduction: An essential thing for human survival is food which provides nutritional support for the body or for pleasure. All the food used today has some preservatives, except our own garden plants. Preservatives prevent food spoilage from microorganisms but it will inhibit the growth of bacteria and fungi. Antimicrobial preservatives are the preservatives which inhibit the growth of fungi and bacteria. Methods of preserving foods have been used for centuries and include natural techniques such as smoking fish and meat as well as adding salts.

Aim: The main aim of the study is to find the effects of preservatives added in cookies on intestinal bacteria.

Materials and Method: Take a sample of 10 biscuits. Crush and mix 10 gms in 10 ml of sterile saline. soak for 30 mins and centrifuge and take the supernatant. Transfer 1 ml to each tube and add the selected organisms (*Lactobacilli*). Add 10 microlitre of the selected organism (*Lactobacilli*) to the supernatant. Hold for 30 mins and transfer 10 microlitre to BHI and count the CFU after incubation for 12 hours.

Results and Discussion: After 12 hrs of incubation, colonies are formed. Using colony counter app colonies are counted. Biscuits 4 showed the highest growth of colonies of 797. The control of the bacteria shows confluence growth where the unlimited colonies are formed. This indicates the presence of antimicrobial activity on preservatives added in biscuits. This antimicrobial activity affects the health of the oral cavity and intestine.

Conclusion: From the above study, it is evident that the antimicrobial activity of preservatives that are added in biscuits could affect the health of oral cavity and intestine.

Keywords: Biscuits; preservatives; intestinal bacteria; antimicrobial activity; innovative technique.

1. INTRODUCTION

An essential thing for human survival is food which provides nutritional support for the body or for pleasure[1]. All the food used today has some preservatives, except our own garden plants. Preservatives prevent food spoilage from microorganisms but it will inhibit the growth of bacteria and fungi[2]. Nowadays, each and every packaged food item has some preservatives. Cobalt-30 is a radioactive material used as food preservatives. Some preservatives techniques like fermentation, freezing, vacuum packing, immersion in alcohol, canning, hypobaric packaging etc are used and few food experts are constantly researching new preservation methods to expand our options. Food preservatives aim to preserve the appearance of food and also some food characteristics like odour, taste and food is preserved for a long time [3,4].

Recently, some higher plant products viz. Carvone from *Carum carvi*, allyl isothiocyanate from mustard and Azadirachtin from *Azadirachta indica* have attracted the attention of microbiologists to search for some newer phytochemicals for their exploitation as antimicrobials[5]. This plant product would be safe and biodegradable. PABA, are a class of antimicrobial agents used singly or in combination to exert the intended antimicrobial effects against molds and yeasts. Methyl and propyl parabens have been used as an antimicrobial preservative in foods, drugs and cosmetics for over 50 years. There are three types of food preservatives: natural, artificial and microbial preservatives. Natural food preservatives like sugar, salts, vinegar and rosemary extracts which do not harm your health[4,5]. Artificial preservatives are the chemical substances that stop the growth of the microorganisms and help to preserve the foods for a long time. Microbial preservatives are the preservatives which inhibit the growth of fungi and bacteria or anti-oxidants such as oxygen absorbers[6]. Methods of preserving foods have been used for centuries and include natural techniques such as smoking fish and meat as well as adding salts.

In most countries and societies, bakery products are essential staple foods. Bakery and cereal items are important sources of nutrients in our diet, supplying the majority of our nutritional calories and about half of our protein needs. Cookies should be stored in a tightly closed container or wrapped with plastic wrap to keep out air and other contaminants. For a long-term option, you can freeze your cookies while preserving their taste if you use an air-tight freezer safe container. Some commonly used synthetic antimicrobials or preservatives in baked goods are benzoates and sorbates, specifically the potassium and sodium salts of such compounds[7]. Benzoates are weak antimicrobials that work best against fungi, yeast and some bacteria in foods that are acidic (low pH). Our team has extensive knowledge and research experience that has translated into high quality publications[8–19],[20–24]. [25–29].

The main aim of the study is to prepare and evaluate the effects of preservatives added in cookies on intestinal bacteria.

2. MATERIALS AND METHODS

A sample of 4 biscuits from different brands of standard amount of 10 gm is collected. Each branded biscuit is crushed into small pieces and weighed accurately. Mix 10 gm in 10 ml of sterile saline. Further soak for 30 mins and centrifuge (a device that uses centrifugal force to separate various components of a fluid) and take the supernatant. Transfer 1 ml to each tube and add the selected organisms (lactobacilli). Make a suspension of the organism and add 10 microliter to the supernatant. Hold for 30 mins and transfer 10 microliter to BHI and count the CFU after incubation for 12 hours.

3. RESULTS

Preservatives are natural or industrial compounds applied to fruits, vegetables, processed foods, cosmetics, and pharmaceuticals to extend shelf life and preserve consistency and protection by inhibiting, delaying, or stopping fermentation, acidification, microbial contamination, and decomposition. After 12 hrs of incubation, colonies are formed. Using colony counter app colonies are counted.

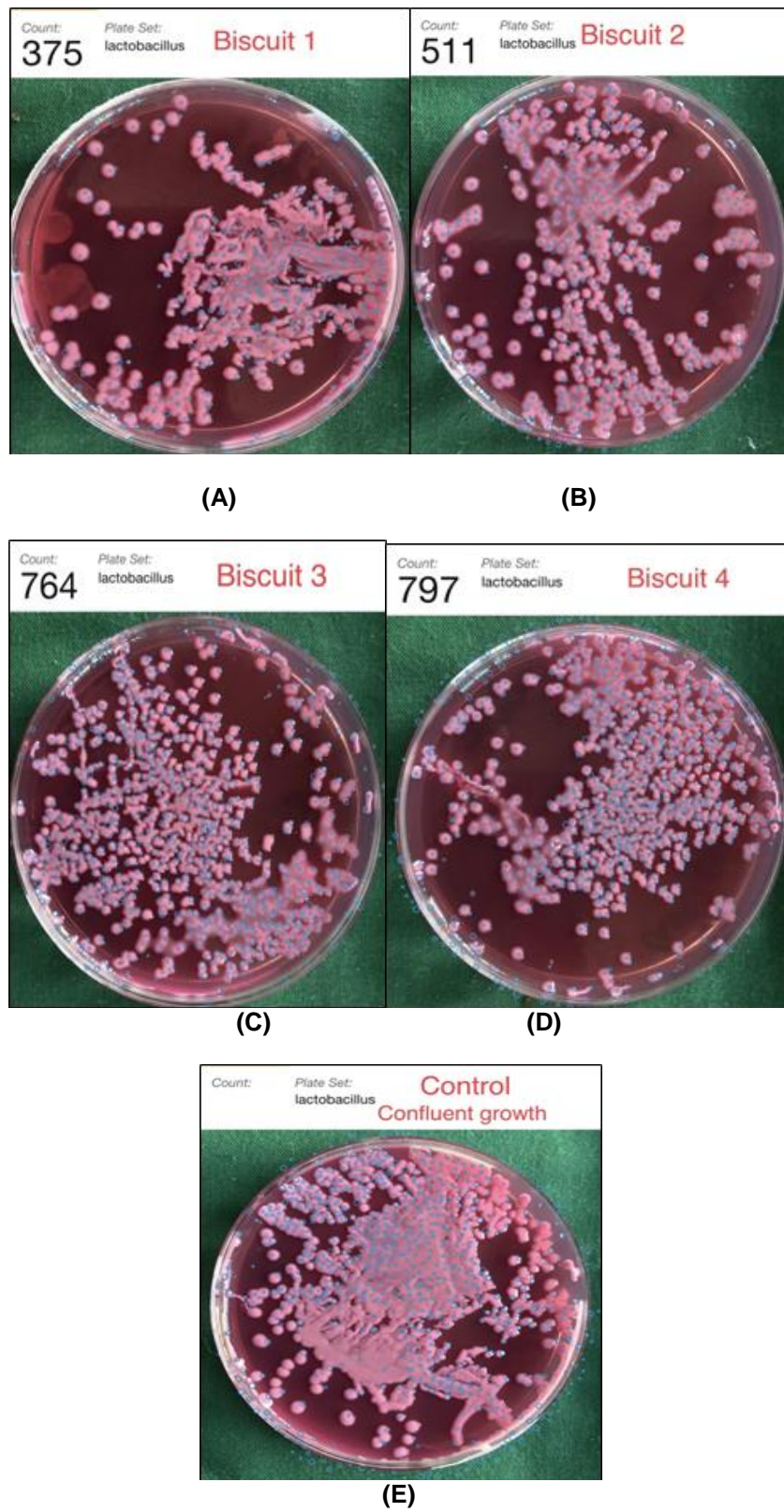


Fig. 1. The picture depicts the colonies that are formed after 24 hrs of incubation. A - branded biscuit 1, B - branded biscuit 2, C - branded biscuit 3 & D - branded biscuit 4

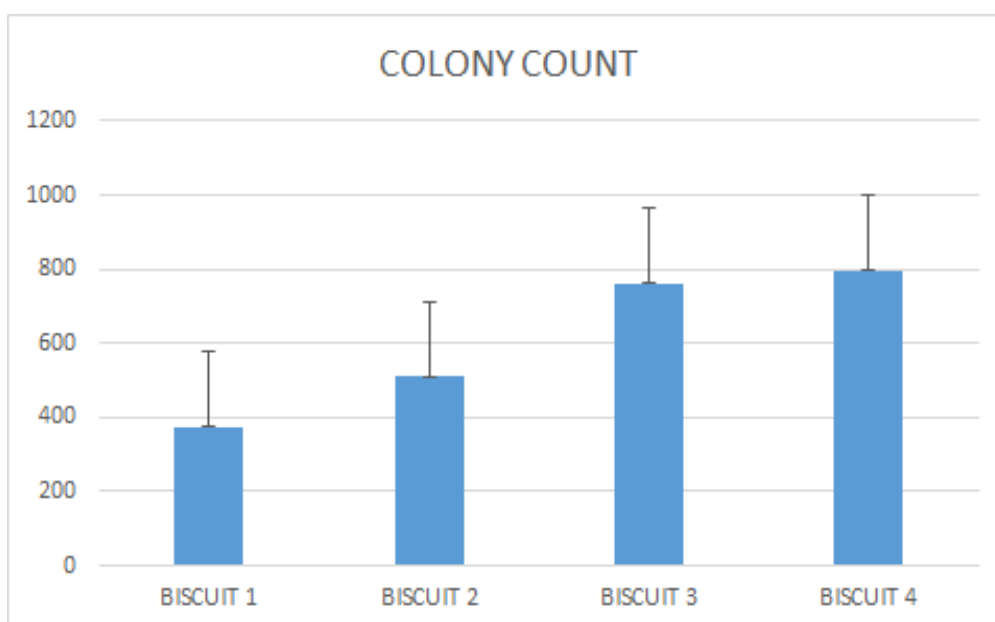


Fig. 2. The colony count of the branded biscuits

Table 1. It shows branded biscuits and their corresponding colony count

Branded Biscuits	Mean colony count
Brand 1	375
Brand 2	511
Brand 3	763
Brand 4	797
Control	Confluent growth

From table 1, biscuits of brand 1 show 375 colonies; Brand 2 shows 511; Brand 3 shows 763 colonies and further Brand 4 shows 797 colonies. The control of the bacteria shows confluence growth where the unlimited colonies are formed. This indicates the presence of antimicrobial activity on preservatives added in biscuits. Some preservatives that are admissible by food safety standards are E330 - citric acid, E260 - Acetic acid, E211- Sodium benzoate which has high risk when overexposed. So the permissible limits of sodium benzoate is 1000 ppm and for potassium sorbate is 1000 ppm given by WHO. This antimicrobial activity affects the health of the oral cavity and intestine.

4. DISCUSSION

Preservatives are natural or industrial compounds applied to fruits, vegetables, processed foods, cosmetics, and pharmaceuticals to extend shelf life and preserve consistency and protection by inhibiting, delaying, or stopping fermentation, acidification, microbial contamination, and decomposition.

Food used to be packed in containers like this before preservatives were invented. ynot et al. (2004) Guynot et al applied a hurdle technology approach to control common mold species causing spoilage of intermediate moisture bakery products (*Eurotium* sp., *Aspergillus* sp., and *Penicillium corylophilum*), growing on a fermented bakery product analogue.

Much research has been done on preservatives and their effects on intestinal bacteria. Tsai GJ et al discussed antibacterial activity of shrimp chitosan against some intestinal bacteria in which they show similar results and antibacterial activity on intestinal bacteria[30]. The previous study helps us to know about antimicrobial activity of different compounds on intestinal bacteria which further affect the health of the oral cavity and intestine[31]. Studies regarding the antimicrobial activity of preservatives done by Cho KH et al[32] describe antimicrobial activity of nanoparticles. Further study experiments done on antimicrobial activity, conclude that citral is highly effective in the control of the three phytopathogenic fungi tested, and indicate its

potential use for post-harvest disease control [33]. From our study, we came to know that standard limits for the preservatives like sodium benzoate and potassium sorbate that are added in factory or branded biscuits companies which show the antimicrobial activity. If the limits are exceeded then it could affect the oral and intestinal health. Its mechanism may be related to the high pH of the oral cavity and low pH of the intestine. Hence due to increase and reduction in pH, it affects the health of the oral cavity and intestine.

5. CONCLUSION

From the above study, it is evident that the antimicrobial activity of preservatives that are added in biscuits could affect the health of the oral cavity and intestine and thus may prolong the shelf life of food products when it is used as a packaging material.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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