Special Issue (October)

INTERNATIONAL JOURNAL OF APPLIED PHARMACEUTICS

INNOVARE ACADEMIC SCIENCES Knowledge to Innovation

ISSN - 0975-7058

Research Article

EFFECT OF AMMONIUM HEXAFLUOROSILICATE ON INHIBITING GROWTH OF *VEILLONELLA PARVULA*

ASBY NIA ANNISA, TUTWURI ANDAJANI, AGOENG TJAHAJANI SARWONO*

Department of Oral Biology, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia. Email: agoengtjahajani@yahoo.co.id

Received: 21 April 2017, Revised and Accepted: 18 August 2017

ABSTRACT

Objectives: This study analyzes the effects of ammonium hexafluorosilicate (AHF) on *Veillonella parvula*.

Methods: In this *in vitro* study, solutions of NaF (25%, 50%, and 100%), AHF (25%, 50%, and 100%), and SDF (38%) were applied to solid medium cultures of *V. parvula* and *Streptococcus mutans*. The disc diffusion method was used for testing bacterial sensitivity.

Results: AHF was less effective than SDF but more effective than NaF for inhibiting growth of bacteria.

Conclusions: AHF could be effective for inhibiting the growth of *V. parvula* without the side effects of SDF.

Keywords: Arrested caries product, Streptococcus mutans, Veillonella parvula.

 DOI: http://dx.doi.org/10.22159/ijap.2017.v9s1.02

INTRODUCTION

Reports from Basic Health Research (RISKESDAS) state that the prevalence of caries in Indonesia is 72.1% [1]. Dental caries continues to be a global health problem, affecting humans of all ages, particularly children where caries disease is on the rise [2]. The caries process can begin at an early age immediately after a tooth erupts in the oral cavity. Caries suffered by infants and children under 5 years old is defined as early childhood caries (ECC). The prevalence of ECC in the United States is 90%, while in Thailand and Indonesia it is 82.8% and 81.2%, respectively [3]. ECC is caused by prolonged use of baby bottles or breastfeeding. ECC typically occurs in a short period, involves several teeth at once, and causes many teeth to turn a white or yellowish [4]. Previous study found that parents usually do not maintain proper dietary habits for their children which may lead to the increased incidence of caries in childhood [5].

In Indonesia, fluoride has been used to prevent caries. While one fluoride preparation used is natrium fluoride (NaF), previous research has shown that the combination of fluoride and silver in the form of silver diamine fluoride (SDF) is more effective in preventing childhood caries in enamel and stopping the progression of disease to dentin. However, problems have arisen from the use of SDF, such as tooth discoloration and metal aftertaste [6]. Tooth discoloration caused by SDF can be avoided use of an ammonium hexafluorosilicate (AHF) preparation. However, there is no adequate research regarding the effect of AHF on oral bacteria. Therefore, this research will study the effect of AHF on inhibiting the growth of *Veillonella parvula*.

METHODS

The experiments in this research used an *in vitro* method for testing the effects of fluoride solutions on the growth of bacteria. The samples used were *V. parvula* (ATCC 10790) and *Streptococcus mutans* (ATCC 25175). All tools used were prepared and sterilized using an autoclave at 121°C for 15 minutes.

Seeding media preparation

Brain heart infusion (BHI) broth

To prepare the BHI broth, 37 g of BHI was prepared in an Erlenmeyer tube filled with 1000ml aquades. After the BHI completely dissolved, the Erlenmeyer tube was closed with cotton, and the entrance was covered with aluminum foil. The tube was then sterilized using an autoclave for 15 minutes. Finally, 4ml of vitamin K solution was added, and the tube was refrigerated at 4°C. To breed *V. parvula* in the prepared BHI broth medium, a reaction tube, an Eppendorf pipette, and disposable tips sized 1000 µL and 200 µL were sterilized and prepared. The *V. parvula* and *S. mutans* bacteria stock was then moved from an −80°C refrigerator into a cool box filled with ice. Next, 10 ml of BHI broth was moved into two reaction tubes using a micropipette and disposable tips sized 1000 µL. 10 µL each of *V. parvula* and *S. mutans* were taken using disposable tips sized 200 µL and poured into a reaction tube-containing BHI broth. The reaction tube was closed with cotton and sealed in a zipper bag filled with a gas pack. The tube was then incubated for 24 hrs at 37°C.

BHI agar

To prepare the BHI agar, 37 g of BHI powder and 13 g of Bacto agar were used. The BHI and agar were dissolved in an Erlenmeyer tube-containing 1000 ml of aquades. After the solution was completely dissolved, the Erlenmeyer tube was closed with cotton, and the top was covered with aluminum foil. The tube was sterilized using an autoclave and chilled until 50°C. Then, 20 ml of BHI agar solution was poured into a petri dish and set aside until it hardened. It was refrigerated at 4°C. To breed *V. parvula* in the agar medium, the following items were prepared: A sterilized micropipette; the BHI agar medium; inoculating loops; and *V. parvula* and *S. mutans* bacteria. A Bunsen burner was used to maintain the sterility of the working environment. The neck of the tube that contained the bacteria was heated to prevent contamination. Then, the inoculating loops was heated in the Bunsen flame until it began to smolder. The heated hose was then chilled in agar. Once cooled, the hose was used to make a single etching in the BHI agar with the bacteria. Finally, the agar medium that contained the bacteria was incubated at 37°C for 24 hrs in anaerobic conditions.