

Applied Study on the Protective Effect of NSNP Mouth Health Liquid on Artificial Teeth

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Abstract: Objective: Killing effect of NSNP mouth health liquid of artificial teeth and mouth on bacteria in the surface of artificial teeth. **Material and Methods:** 30 case of full artificial teeth wearers, after dinner, take out the mandibular or maxillary artificial teeth, rinse with tap water, then, put the artificial teeth in 100 ml solution 20NSNP, 40NSNP, 60NSNP, 80NSNP and NS in a 100mm diameter glass beaker, keep the glass beaker at 25-30°C for 4, 6 and 12 hours to take 1ml from the beaker to Evenly coated on the agar Petri dishes with inoculating loop respectively, to be incubating the agar plate in 37°C for overnight, and then to Count the colonies on the Petri dish. **Result:** The NSNP function on the bacteria killing rate of Artificial teeth surface shows that the effect of 60 and 80NSNP, at 4 hours, 6 hours and 12 hours, were more than 90%, significantly higher than 40 and 20NSNP, and showed a statistically significant difference that is with very significant, $P < 0.05$ and $P < 0.01$ respectively. 20 and 40NSNP also showed that more than 60% bacteria killing rate on the surface of the artificial teeth, and there was a significant time and dose depending. **Conclusion:** 1. 60 and 80 NSNP had a killing effect on the surface of artificial teeth with more than 90%, and had good time and dose effect; 2. NSNP through the process of apoptosis induced by programmed cell apoptosis to achieve the bactericidal mechanism, no longer occur resistance; [Kai Qi, Yansong Zhang, Xiao Hao, Wei Sun, Huaijie Zhu. **NSNP mouth health liquid of artificial teeth and Mouth on Study of the Protection of Artificial Teeth.** *Life Sci J* 2017;14(4):117-120]. ISSN: 1097-8135 (Print) / ISSN: 2372-613X (Online). <http://www.lifesciencesite.com>. 15. doi:[10.7537/marslsj140417.15](https://doi.org/10.7537/marslsj140417.15).

Keywords: apoptosis, nitric oxide, NO, sodium nitroprusside, SNP, artificial teeth protection, Mouth Health Liquid,

1. Introduction:

With the rapid development of Chinese economy, the aging population is increasing year by year. The artificial teeth populations are more and more. How to protect against dental bacterial invasion, reduce oral infection, oral medicine is paid more and more attention to the subject^{1, 2}. Some scholars used antibiotics developed the different oral and dental protection liquid, some scholars used nanotechnology to Nano particles as the carrier to carry antibiotic to achieve the dental and oral disinfection and protection. However, due to the continuous emergence of various antibiotics in recent years and the application of some inappropriate, so that the oral flora of the current market sensitivity and efficacy of all antibiotics is very low³, therefore, there is no effective oral and dental health care solution⁴. It has been proved that the application of exogenous nitric oxide (NO) donor to induce apoptosis may be a new direction for the realization of effective oral and oral liquid⁵. In our group, sodium nitroprusside was used as a theory to provide an exogenous nitric oxide (NO) donor to induce apoptosis^{6,7}, NSNP oral liquid was prepared. This study reported the protective effect of NSNP oral liquid on the artificial teeth.

2. Material and Methods:

2.1. NACL powder, chemical pure, Chinese Tianjin Romeo; Sodium Nitroprusside (SNP); molecular formula, $\text{Na}_2\text{Fe}(\text{CN})_5\text{NO}$, Beijing ShungHe pharmaceutical. LB Agar Petri dishes, produced by China (Beijing) chemical Glass Instrument Co., Ltd, and 0.9%NACL Saline (NS), Zhengzhou Chemical Co., Ltd.

2.2. NSNP mouth health liquid prepared (SNP, 20, 40, 60 and 80 mmol/L in 1.6% NACL respectively):

2.2. Autoclaving NACL and SNP; using the NACL powder with 0.9% NACL to make 1.6% NACL as the final saline and using SNP with 1.6% saline to make 20, 40, 60 and 80 mmol/L in 1.6% NACL in in Aseptic Operation Table, call 20, 40, 60 and 80 mmol/L in 1.6% NACL as 20, 40, 60, 80NSNP, as the four dose of SNP in this project, NS is as the control.

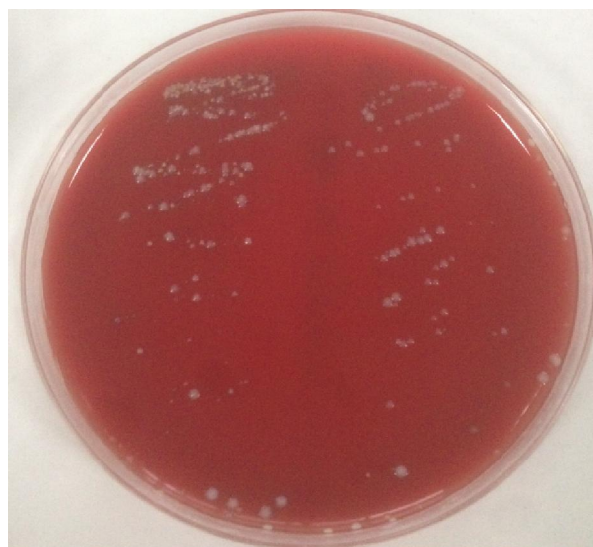
2.3. Object:

2.3.1. Randomly collected in China, the Second Affiliated Hospital of Zhengzhou University, Department of Stomatology and oral cavity hospital in Zhengzhou, 30 cases of all patients, male and female half;

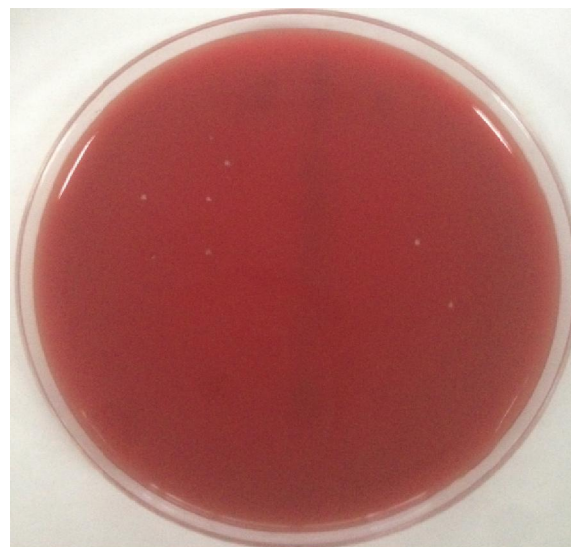
2.3.2. The mandibular or maxillary artificial teeth after water rinsing were placed in a glass beaker with 100 ml of 20NSNP, 40NSNP, 60NSNP, 80NSNP, and

NS (0.9% normal saline) at room temperature (25 °C-28°C) for 4, 6 and 12 hours to take 1 ml respectively, then to Evenly coated on the agar Petri

dishes with inoculating loop respectively too, and to be incubate at 37°C overnight (12-16 hours). Counting colonies on Petri dishes, See below Fig.1, A and B;



A



B

Fig.1: A (NS) and B (60NSNP) were from artificial tooth at 6 hours after soaking in NSNP Solution; There are 96% killing bacteria rate in the comparison between B (60NSNP) and A (NS).

3. Result:

3.1. NSNP mouth health liquid showed a significant concentration and time effect on the bacterial killing rate of tooth surface:

The experimental results, the artificial teeth in NSNP mouth health liquid for 4,6, and 12 hour, show that the NSPN on bacteria killing rate of dental surface

at the same time to display with increased with the increase of SNP concentration, that the same is also shown in the same concentration of SNP in NSNP mouth health liquid, bacteria killing rate increased with the prolongation of the artificial teeth in NSNP mouth health liquid to kill the bacteria on the surface of the artificial teeth (see Table 1);

Table 1: Killing Bacteria Rate on 30 cases artificial tooth after soaking in the NSNP mouth health liquid

Hour	20NSNP (%)	40NSNP (%)	60NSNP (%)	80NSNP (%)	NS (%)
4	65±3.1	75±3.6	90±4.1	92±4.6	0±0
6	70±3.5	80±4.1	92±4.3	94±5.1	0±0
12	75±3.6	86±4.5	94±4.5	98±5.3	0±0

20, 40, 60 and 80 mmol/L Sodium Nitroprusside (SNP) in 1.6% NACL respectively.

3.2. Comparison of NSNP mouth health liquid on the killing bacteria effect of on the surface of artificial teeth:

NSNP mouth health liquid functioned to kill bacteria effect show over 90% on 60NSNP and 80 NSNP at 4, 6 and 12 hours, that is higher than 20 and 40 NSNP with statistic significant, $P < 0.05$ and $P < 0.01$ respectively, and that is show over 60 % on 20NSNP and 40 NSNP on the NSNP functioned to kill bacteria effect of the surface on the artificial teeth. See Fig. 1.

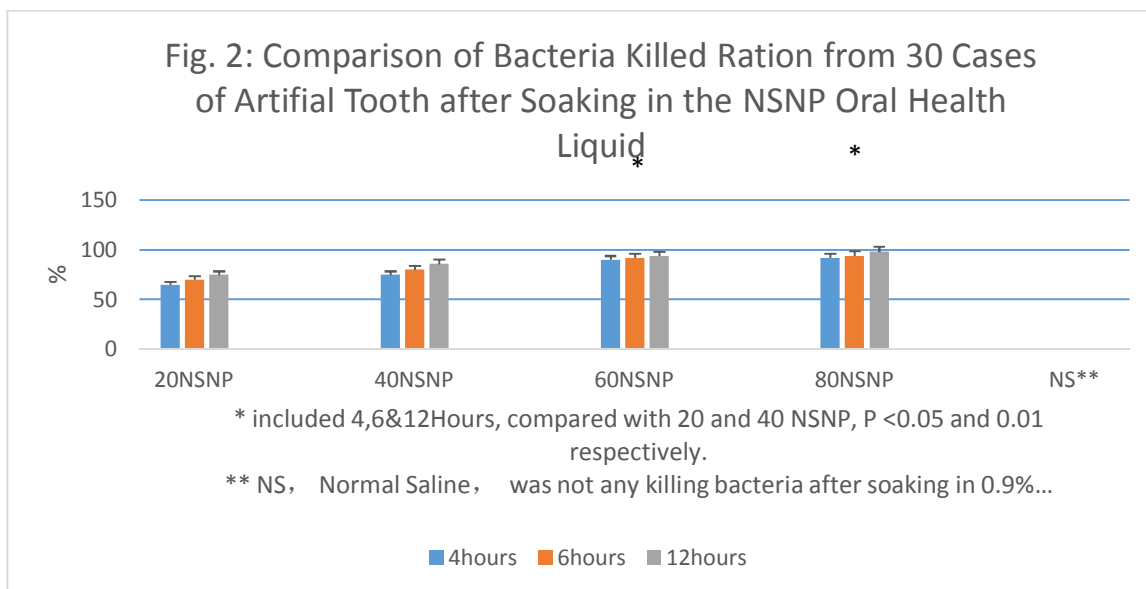
4. Discuss:

4.1. The mechanism and the future of NSNP mouth liquid for the protection of teeth;

As one of the world's Chinese with artificial teeth are the biggest population in the world, how to protect against dental bacterial invasion, reduce oral infection, and oral medical science is China government more and more attention to the subject^{1,2}; With the continuous emergence of different antibiotics, but also has a new antibiotic ingredients containing oral and dental health care newborn.

However, the clinical dental oral infection because of righteousness has indeed increased, the fundamental reason is from the appearance with antibiotics and some applications of the human body is improper, antibiotic resistance phenomenon is also more and more³. Therefore, with the advent of antibiotics as the teeth and oral care solution, has not been able to effectively prevent and reduce the increase in the number of patients with oral infections due to increased oral infection. In view of the above reasons, it is necessary to find a new method to kill the bacteria in oral cavity. Recent advances in the regulation of programmed cell death (Apoptosis) in organisms^{5,6}, If we can find a solution containing a component is harmless to the human body in the denture and oral protection in the night, but also can achieve programmed apoptosis of oral bacteria, and the realization of denture and the unique "sterilization" effect of oral environment, is a new way to realize the protection of the oral cavity of the denture and mouth. It has been reported that sodium nitroprusside has

been successfully used to provide exogenous nitric oxide (NO) donor in vitro cell culture, which can induce cell apoptosis⁸, and can increase the mortality of cultured cells in vitro⁹. This study is based on the use of nitric oxide (NO) donors, induced apoptosis, and increase the mortality of cultured cells in vitro. Using NSNP mouth health liquid composed with sodium nitroprusside (SNP) and hypertonic NACL made the bacteria on the artificial teeth surface cells in hypertonic saline environment at the same time, and sodium nitroprusside as exogenous nitric oxide (NO) donor program, induce cell apoptosis. Moreover, the dual effects of high salt environment and apoptosis will no longer cause any drug resistance in the mouth and teeth. The results of this study have not only confirmed the NSNP mouth health liquid has a strong bactericidal effect on bacteria dental surface, and its mechanism also suggests that no matter again with the advent of any new antibiotic resistance, are no longer affected NSNP mouth health liquid on the protection of dental and oral protection.



4.2. NSNP mouth health liquid is effective, safe and harmless to human health:

The main components of NSPN mouth liquid are salt and sodium nitroprusside (SNP), and sodium chloride is non-toxic and well known. Sodium nitroprusside as an antihypertensive drug, clinical medicine is commonly used, commonly used dose per minute according to the weight of 3u g/kg. Per minute for a maximum of 10 ug/kg, according to the weight of total weight according to 3.5mg/kg, so NSNP mouth health liquid without any toxic effects on the human body to pay.

4.3. The effective time of NSNP mouth liquid is in accordance with the daily living habits of human beings; Make it easy for people to accept and promote;

The research results show that the study selected 60 and 80 NSNP in 4-12 hours are greater than the bactericidal effect of 90%, As reported in the literature, SNP as an exogenous nitric oxide (NO) donor, programmed cell death (Apoptosis) of low dose induced cells, is consistent with the results of cell death at high doses. And the effect of 4,6 and 12 hours, very attached to the three meals a day in human life, 4-

6 hours interval, as well as the night of the week of 12 hours of living habits.

5. Conclusion:

5.1. The killing effect of 60 and 80 NSNP mouth health liquid on the surface of the artificial teeth is more than 90%, and has a good time and dose effect;

5.2. The mechanism of sterilization of NSNP mouth health liquid by hypertonic and apoptosis induced by programmed cell death, long-term application, no drug resistance, is a new measure and direction for the study of oral and dental protection.

5.3. NSNP mouth health liquid at 4, 6 and 12 hours of the effect, very attached to the daily life of three meals a day, 4-6 hours interval, as well as the night of the week of 12 hours of living habits.

5.4. NSNP mouth health liquid ingredients in the preparation of the NaCl and sodium nitroprusside are many years of clinical commonly used drugs, harmless to human body, non-toxic.

5.5. Sodium chloride and sodium nitroprusside NSNP mouth health liquid are main ingredient, there is a only a single taste of salt in the mouth care, making it easy to accept and apply.

5.6. Sodium chloride and sodium nitroprusside are main ingredient in NSNP mouth health liquid , both is common chemical reagent with low price, and so the NSNP mouth health liquid would be Cheap, easy to promote.

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