



# Difference influence of rubbing and soaking tooth extraction instruments in 70% alcohol on total oral bacterial colonisation on clinical students at the Department of Oral Surgery and Maxillofacial March-May 2018

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## Abstract

**Objective:** To compare the effect of rubbing and soaking tooth extraction instrument in 70% alcohol on total oral bacterial colonisation at the Department of Oral Surgery, Faculty of Dentistry, Universitas Sumatera Utara.

**Material and Methods:** This is an experimental research with a post-test only approach. The sampling technique used is Purposive Sampling. In this study, sample were divided into 2 groups consisting of 18 extraction instruments which are lower molar

forceps rubbed with 70% alcohol and soaked in 70% alcohol. Each instrument were pre-cleaned using brush, water and soap prior disinfection process.

**Results:** The results were statistically analyzed using Mann-Whitney Test. The result showed no significant difference to the total bacteria count on rubbing and soaking using 70% alcohol.

**Conclusion:** Soaking in 70% alcohol method showed more effective because it overally kills bacteria.

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**Keyword:** Disinfection, Forceps, 70% alcohol

**Cite this Article:** Riza A, Rusdy H, Isnandar, Sari EN. 2020. Difference influence of rubbing and soaking tooth extraction instruments in 70% alcohol on total oral bacterial colonisation on clinical students at the Department of Oral Surgery and Maxillofacial March-May 2018. *Journal of Dentomaxillofacial Science* 5(2): 74-76. DOI: [10.15562/jdmfs.v5i2.815](https://doi.org/10.15562/jdmfs.v5i2.815)

## Introduction

Infection has been known as a real threat in the dental field. Tooth extraction is one form of dental treatment which has a high risk of transmission of infection. Infection can be directly transmitted through oral fluids, blood, contaminated instruments or respiratory.<sup>1,2</sup> Disinfection is a way to control infection by reducing the microbial load to a level that makes an object safe to use. Disinfection using chemicals material can kill all bacteria and fungi and some viruses however not spores.<sup>3</sup>

Disinfectant are divided into three groups, namely high level disinfectant such as glutaraldehyde, intermediate level disinfectant such as alcohol and low level disinfectant such as chlorine. Alcohol 70% is classified as an intermediate level disinfectant, where it can destroy vegetative bacteria, some fungi and viruses but not spores. Alcohol reacts by denaturing proteins and dissolving fat, as a result cell membranes are damaged and enzymes activated by alcohol.<sup>4,5</sup> Alcohol is bactericidal against vegetative cells, tuberculocidal, but not effective against hydrophilic viruses.<sup>6</sup>

Some researchers explain about disinfection techniques using 70% alcohol solution. Rubbing and rinsing with 70% alcohol can reduce the number of bacteria in the contra angle high speed where

staphylococcus aureus and pseudomonas aeruginosa were found in contra angle high speed used.<sup>7</sup> Another study where the application of rubbing and soaking with 70% alcohol for 2 minutes gave the most optimal results in reducing germ count and giving negative results on the identification of staphylococcus sp. and streptococcus sp. on dental instrument.<sup>4</sup>

From the background described, researcher are interested in examining the difference of rubbing and soaking tooth extraction instruments in alcohol 70% on total oral bacterial colonisation on clinical students at the Department of Oral Surgery and Maxillofacial March-May 2018.

## Material and Methods

This is an experimental study with post test only control group design approach. Sampling method used in this study is purposive sampling and used lower molar extraction forceps in Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, University Sumatera Utara as sample. In this study, sample were divided into 2 groups consisting of 18 extraction instruments which are lower molar forceps rubbed with 70% alcohol and soaked in 70% alcohol.

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Used lower molar extraction forceps were first cleaned with brush, water and soap to eliminate visible blood and saliva on the forceps before disinfection. For rubbing samples, forceps are rubbed with cotton that has been soaked in 70% alcohol. For soaking samples, forceps are put in a container containing 250 ml of 70% alcohol for 2 minutes. Forceps were then removed from disinfectant and dried with sterile gauze and the beak of forceps were afterwards immersed in 50 ml of saline for 5 minutes and the container was closed tightly and sent to the microbiology laboratory for bacterial cultivation and colony bacteria count.

The sample solution were then processed through serial dilution ( $10^{-3}$ ) and cultivated on plate

count agar and incubated for 24 hours. The number of bacterial colonies formed on the plate count agar then counted using Bacteria Colony Counter. From the bacteria colonized on plate count agar 1 ose was taken to make pure culture of the colony on nutrient agar and incubated for 24 hours. Pure culture was used to observe gram type of the bacteria. Data processing was done by computerized analysis using Mann-Whitney test.

## Results

The results showed that there were differences in the number of bacterial colonization in the 70% alcohol rubbing group and 70% soaking in alcohol group. In the rubbing group there were still a number of bacterial colonizations [table 1](#).

Based on the average test results indicated the number of bacterial colonies in the rubbing group was 12.5882 with a standard deviation of 38.24601. The average number of bacterial colonies in the soaking group was 0,000 with a standard deviation of 0.000. These results indicate there are differences in the number of bacterial colonies between rubbing and soaking [table 2](#).

Shapiro-Wilk test was used to test data normality. The results show that the data is not normally distributed where  $p$  value =  $0.000 < 0.05$ . The Mann-Whitney test was conducted to determine whether there are significant differences between rubbing with 70% alcohol and soaking in 70% alcohol. The results obtained  $p$  value =  $0.140 > 0.05$ . These results showed that there were no significant differences in the number of bacterial colonies between rubbing and soaking group [table 3](#).

Based on the results and data analysis, it can be concluded that there is no significant difference between of rubbing and soaking the tooth extraction instrument in 70% alcohol on the number of oral bacterial colonization. Beside the number of bacterial colonies, this study also observed the gram type of bacteria remains in the sample and as the result all of them are gram negative bacteria.

## Discussion

The ability of disinfectant to kill bacteria is influenced by its concentration, time, temperature, and environmental conditions. Alcohol kills bacteria in two ways, protein denaturation and fat membrane

**Table 1** Number of bacterial colonies after disinfection

No	Number of bacterial colonies (CFU / ml)	
	Rubbing	Soaking
1	0	0
2	0	0
3	0	0
4	0	0
5	TNTC	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	67	0
16	0	0
17	0	0
18	147	0

**Table 2** The average number of bacterial colonies

Group	Total sample	Mean and Standard Deviation (CFU / mL)
Rubbing	17	12.588 ± 38.246
Soaking	18	0.000 ± 0.000

**Table 3** The results of the normality and significant test of both group

Group	Average and Standard Deviation (CFU / mL)	P-value Normality	P-value (MannWhitney)
Rubbing	12.588 ± 38.246	0.000	0.140
Soaking	0.000 ± 0.000	0.000	

dissolution. Alcohol effectively reacts to bacteria, fungi and viruses quickly at optimal concentrations of 60%-90% in water. Alcohol 70% is used because in the protein mutation alcohol works effectively if there is water, where the water is used as a denatured protein solvent. Alcohol with very high concentrations will only be able to denature proteins outside bacterial cells.<sup>4,8</sup> Vegetative bacteria will die when exposed to 70% alcohol because this concentration is the most optimal in killing microbes.

The effectiveness of alcohol is very much influenced by protein, such as found in blood and saliva. Instruments surface that will be disinfected by 70% alcohol should be cleaned firstly from debris, saliva and blood therefore it could adhere well to the surface.<sup>7</sup> The results showed that there were still a number of bacterial colonization in the rubbing group, where as in the soaking group there was no bacterial colonization. This could be caused by too short contact between the alcohol and the disinfected instrument, consequently causing the alcohol to work not optimally hence the bacteria did not die overall. Disinfecting an instrument using 70% alcohol should be done by soaking the instrument for two minutes or at least one minute of exposure to alcohol.<sup>5,8</sup>

The results of the study also showed the value of TNTC (Too Numerous To Count) in the rubbing group. This could happen due to the dilution which was carried out three times has not been able to separate the dense and abundant bacterial colonization therefore it cannot be calculated. The purpose of dilution is to reduce the number of microbes suspended in the liquid. Determining the amount of dilution depends on the estimated number of microbes in the sample and the type of sample. For liquid sample,  $10^{-1}$ - $10^{-6}$  dilutions are indicated.<sup>9-11</sup>

In this study dilution was carried out three times starting from  $10^{-1}$ ,  $10^{-2}$  until  $10^{-3}$  then counting the number of bacterial colonization in every sample. Another factor that influences the the TNTC value are bacterial contamination during research that increase the number of bacterial colonization. In this study, observation of the gram type bacteria is also done to see bacterial gram type. After the observation of 3 contaminated samples, stained red bacteria were found which is gram negative bacteria.

## Conclusion

There was no significant difference in effect between 70% alcohol rubbing and soaking in 70% alcohol to

the number of oral bacterial colonization. However, soaking tooth extraction instruments in 70% alcohol more effective as it can kill the total amount of bacterial colonization. The number of colonization of bacteria found is gram negative bacteria.

## Acknowledgment

I would like to thank all the Lecturer Department of Oral and Maxillofacial Surgery, Ahyar Riza, Hendry Rusdy and Isnandar for guiding and helping me until the completion of this article.

## Conflict of Interest

The authors report no conflict of interest.

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