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EFFECT OF SIMPLE CLEANSING METHODS ON MOUTHPIECES DECONTAMINATION OF SHARED WIND INSTRUMENTS

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ABSTRACT

Objective: This study was designed to determine a simple cleansing method that can be applied to decontaminate mouthpieces of shared wind instruments. **Methods:** In this study, 4 kinds of wind instruments, i.e. trumpet, mellophone, trombone and tuba**,** were examined. The total bacteria attached to the instrument was isolated using the swab method and suspended it in a sterile physiological NaCl solution to determine the number of initial bacterial colonies on the instrument. The effect of decontamination was carried out by a simple cleansing method using immersion the mouthpieces in hot water with the temperature of 100 ^{0}C for 5 min and soaked using soap containing 2% of triclosan. The survival colonies were evaluated using plate count method and calculated using a colony counter. **Results:** The cleansing method using immersion in hot water with the temperature of 100 ^{0}C for 5 min significantly decreasing the bacteria number (91.85-99.91%), compared with that of liquid soap (50.30-91.67%). However, tuba mouthpieces were the most easiest to be sterilized using both methods, because it has the largest surface area. **Conclusion:** The immersion using hot water with the temperature of 100 ^{0}C for 5 min can be used as a method of disinfection that is fast, simple and easy to be applied to the mouthpieces of shared wind instruments.

KEYWORDS: disinfection, mouthpieces, musical instruments, hot water, soap, simple.

INTRODUCTION

Microorganisms are closely related to human life, some of which are beneficial and others are harmful. The existence of these microorganisms must be a concern for people who play wind instruments. Shared tools are more likely to be at high risk of germs contamination.

Moreover, the instrument is directly related to the respiratory tract, thus, people who play wind instruments seem to be at greater risk of airway inflammation and chronic sore throats. Based on another study, there are millions of bacteria found in the mouthpieces of several wind instruments when stored or after being played.[1] Some research prompted that microorganisms in saliva might attach in the mouthpieces, then get blown deeper into the wind instruments. Moreover, those wind instruments are usually on loan, thus, the instruments may have been used by other people. The woodwind and brass instruments were reported to be contaminated by several kinds of microbial flora related with allergic and infectious diseases.[2]

The microbial identification demonstrated that those microbial flora were Gram-positive cocci (32.2%), Gram-positive bacilli (44.4%) and Gram-negative bacilli (23.4%). The most frequently isolated microorganism were *Penicillium chrysogenum* and *Brevibacterium spp.*[2] In simulated study using several pathogenic bacteria, showed the survival of *Staphylococcus*, *Escherichia coli*, *Streptococcus*, *Moraxella*, and attenuated *Mycobacterium tuberculosis* when applied to reeds. Thus, it indicated that there's significant growth in the levels of contamination in the period immediately after played. All bacteria species survived for a maximum of 24–48 h on reeds, except *Mycobacterium*, which persisted through 13 d.[3] Therefore, without the proper cleaning or disinfection, bacteria and fungi can evolve for weeks and even for months after the last use. If the instrument is shared or obtained from a commercial source, to reduce germs, it should be disassembled and then cleaned using alcohol wipes, soap and water, or a commercial disinfectant. In this study, we investigate the cleansing method which is easy to be applied, thus, the owner of the wind instruments can clean and disinfect the wind instruments properly.

MATERIALS AND METHODS

Samples

The wind instruments, i.e. trumpet, mellophone, trombone and tuba**,** were examined and used as sources of bacteria isolates. Mouthpiece samples taken were mouthpieces that have been used after played.

Chemical Materials

The chemicals used were 70% ethanol, normal saline solution, commercial soap containing 2% of triclosan and distilled water. The Mueller Hinton Agar (MHA-Oxoid) and Mueller Hinton Broth (MHB-Oxoid) were used as the bacterial growth media.

Bacterial Isolation

The bacterial thrive in the mouthpieces were isolated by swabing the inside of the mouthpieces using a sterile cotton swab, then suspend it into a 10 mL of sterile physiological NaCl.

Cleansing Using Hot water

Mouthpiece of a wind instrument is immersed in hot water at a temperature of 100^0C for 5 min. Then the suspended bacteria was diluted (10^{-4}, 10^{-5} and 10^{-6}) for the agar plate count. Then the number of bacteria was calculated to determine the number of survival bacteria after treatment.

Cleansing Using Soap Containing 2% **Of Triclosan**

Mouthpiece of a wind instrument is immersed in water containing soap containing 2% of triclosan. Then the suspended bacteria was diluted (10^{-4}, 10^{-5} and 10^{-6}) for the agar plate count. Then the number of bacteria was calculated to determine the number of survival bacteria after treatment.

RESULTS AND DISCUSSION

Bacterial calculations on the mouthpieces were performed to determine the number of germs contained in the mouthpiece for each treatment. Generally, only plate containing less than 250-300 bacterial colonies can be counted.[4] The effect of cleansing treatment on decreasing the number of survival bacteria, can be seen in table 1.

Table 1: Percentage of Colony Decrease.

Instrument	Cleansing treatment	Initial cfu/mL	Difference of Decrease	Reduction (%)
Trumpet	0	$5.73.\ 10^5$	-	-
	1	$4.67.\ 10^4$	$5.263.\ 10^5$	91.85
	2	$6.7.\ 10^3$	$4.\ 10^4$	85.65
Mellophone	0	$2.027.\ 10^6$	-	-
	1	$0.4.\ 10^5$	$1.987.\ 10^6$	98.03
	2	$6.7.\ 10^3$	$3.33.\ 10^4$	71.31
Trombone	0	$7.2.\ 10^6$	-	-
	1	$6.7.\ 10^3$	$7.1933.\ 10^7$	99.91
	2	$3.33.\ 10^3$	$3.37.\ 10^3$	50.30
Tuba	0	$23.06.\ 10^6$	-	-
	1	$0.4.\ 10^5$	$2.302.\ 10^7$	99.83
	2	$3.33.\ 10^3$	$3.667.\ 10^4$	91.675

Notes: 0 treatment= without treatment; 1= treatment using hot water at a temperature of 100^0C for 5 min; 2= treatment using 2 % soap containing triclosan.

Based on observations, the largest number of bacteria per mL was found in the mouthpiece of tuba. This allegedly happened because the tuba has a larger cross-sectional area than the mouthpieces of other wind instruments. A large mouthpiece cross-sectional area allows a wider area for bacterial growth. The cleansing method using immersion in hot water with the temperature of 100 ^{0}C for 5 min significantly decreasing the bacteria number (91.85-99.91%), compared with that of liquid soap (50.30-91.67%). The percentage of the colonies reduction was the highest in disinfection of trombone mouthpieces. A100^0C hot water is commonly used to kill bacteria, due to the bacterial sensitivity at high temperatures. Washing soap can kill bacteria by reduce the surface tension of bacterial cells.[5] Soaps and other cleansing agents have been around for quite long time to reduce contaminants. Soaps are intended for reduction of the inoculum sizes of both pathogenic and non-pathogenic microorganisms. Soap containing triclosan exhibited the zone of inhibition on the tested bacteria, i.e. *Staphylococcus aureus* and *Candida albicans*.[6] Triclosan (TCS) is an antimicrobial used so ubiquitously that 75% of the U.S.A. population is likely exposed to this compound via consumer goods and personal care products.[7] Recently, it was found that TCS did not reduce the overall number of microbes but decreases the variety of microbial species.[8] However, overutilization of antimicrobial soaps may spell to development of resistance to microbicides. Several studies have purported to show a relationship between the use of triclosan and antibiotic resistance.[9-11] Both treatments can be combined for optimal cleansing the mouthpiece of a wind instrument. The ease of cleansing methods used, making the frequency of cleansing of wind instruments will be more meaningful.

CONCLUSION

It could be concluded that the cleansing method using hot water in the temperature of 100 ^{0}C was the simple conventional cleansing that can be used.

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