

The Total Count of CPS on Hand Holding Dog Swab in UNAIR Animal Hospital, Before and After Cleaning based on Islamic Rules and Cleaning Using Soap

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INTRODUCTION

Purify our self from the dirt is highly regarded in Islamic principles because that is one of legitimate requirements of a worship. In Islamic law, dogs are classified including into the severe unclean category, where there are some perspectives against the nature of unclean possess by dog. The way of purification is to wash as much seven times, and one of them using soil (Handi, 2008).

Essentially, the unclean determination for dog saliva is viewed from ritual dimensions, instead of rational, thus there should be no reason logically. Furthermore, we cannot mix the concept of holiness according to the religion with a sterile concept if we relate to the medical side. However, as far as we know the sacred way, surely there is a great secret that Our Creator has saved, thus we need to explore more deeply.

The means of transmitting pathogenic germs has been realized since the 1840s, where proper hand hygiene can reduce or prevent the occurrence of nosocomial infections. Dobson (2003) mentioned that washing hands can prevent more than 1 million deaths per year due to illness diarrhea, while washing hands with soap can reduce diarrhea up to 47%.

Jayne (2002) who compared the number of bacteria that successfully grown from the saliva of dogs, cats and humans, mentioned that bacteria in dog saliva had the largest number with 53 colonies, while cats had 16 and human with 5 colonies. The bacteria derived from dog saliva have the fastest grow and the most varied colonies colors.

Staphylococcus sp. is a normal flora that we can find on the skin, ears, swabs of nasal mucosa and mouth, also saliva of dog. This bacterium includes into opportunistic pathogens bacteria that can cause canine pyoderma, abscesses, otitis externa, infection of wound and urinary tract in dogs. In humans, they can cause external otitis, cardiomyopathy and endocarditis, food poisoning outbreaks, catheterrelated bacteremia, pneumonia and brain abscesses (Borjesson, 2014). *S.intermedius* and *S.aureus* are bacteria belonging to the Coagulase Positive Staphylococci (CPS)

group which plays an important role in cases of skin infections in dogs and they are zoonotic (Hajek, 1967). Tanner et al (2000), reported that this bacterial transmission through pets to humans is a common case at home and inflict various diseases on dog owners.

In Indonesia, limited studies of various causative agents of diseases makes we lack to know whether the cause of the various diseases that are currently emerging. Thus, the efforts of preventive that should be more necessary to do rarely get a serious attention. Whereas very possible, that our lovely pet is one of the source of the various diseases transmissions because of less precise of biosafety.

There is no further proof yet, whether the concept of Islamic purification for saliva of dog also includes the concept of sterility against bacteria based on medical guidance. As an early stage, this paper will be elaborated how the total of CPS from hand swab holder dogs at Animal Hospital of Education, Airlangga University, Surabaya, before and after purification with soil according to Islamic principles and cleaning using soap.

MATERIALS AND METHODS

This research is done by random sampling technique on 12 subjects in Airlangga University Animal Hospital. For the first, they need to make contact with dog, especially with the saliva of dog in 10 minutes, before we took their pre-treatment swab samples. After that, they did purification with soil (based on Islamic law) or cleaning their hand with soap (based on World Health Organization guidance, 2009) for taking the post-treatment swab samples. Swab samples were done in the regional back of their hand with four areas of square, where each square had 33x25 mm. The soil was taken from in front of Airlangga University Animal Hospital area, while the soap was commonly used in the hospital by student. Isolation and identification were done, and then counted of the CPS colony in MSA using TPC technique.



Fig 1. The soil and pH meter used in the research



Fig 2. The liquid hands wash soap used in the research



Fig 3. Swab pattern (4 squares; 33x25 mm each square)

RESULT AND DISCUSSION

Two of three different colonies, shows the characteristics of CPS; yellow with perfectly round colony, flat edge, arising, coccus, arranged like wine, Gram+, produces coagulase, catalase, mannitol fermented and non-fermented also have various types of hemolysis. One other colonies showed characteristics of *Bacillus sp.*; yellow with non-perfectly round colony, non-tare edges, thin, bacil, Gram+ and arranged chain.

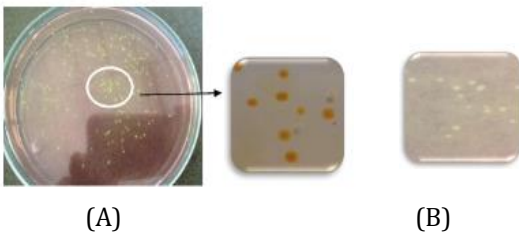


Fig 4. CPS (A) and *Bacillus sp.* (B) colony in MSA

The average values obtained with the bacterial number of pre-soil= 4.58 CFU/ml; post-soil= 2.14 CFU/ml; pre-soap= 4.76 CFU/ml; and post-soap= 3.10 CFU/ml. The results from different test treatments gave a significance value (p) of pre-soap and pre-soil= 0.561; post-soap and post-soil= 0.178, where each $p > \alpha$ (0,025).

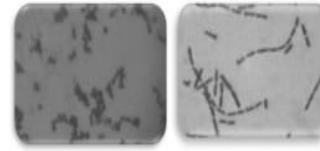


Fig 5. Microscopic of: *Staphylococcus sp.* (A), *Bacillus sp.* (B)

This means that there is no difference between pre and post treatment with soil and soap. The results obtained from different test treatments give significant value of pre-post soil= 0,000; pre-post soap= 0.001, where each significant value $(p) < \alpha$ (0,025). It shows that in addition to having a role as a means of purification based on Islamic principles, the soil can also reduce the number of CPS in the hands of the dog holder after they make contact with the animal.

Soil contains several elements that can be potentially as an antibacterial. Antibacterial is a compound used to control the growth of harmful bacteria aims to prevent the spread of disease and infection, eradicate microorganisms in infected host and prevent the decay and destruction of materials by microorganisms. The mechanism of inhibition of antibacterial compounds can be the destruction of a cell wall by inhibiting its formation or altering it after it is formed, changes in the permeability of the cytoplasmic membrane resulting in the removal of food from the cell, the change of protein molecules and nucleic acids, the inhibition of enzyme action and the inhibition of acidic synthesis nucleic and protein (Pelczar and Chan, 1988).

The principal composition of the soil consists of five groups; mineral particles, plant and animal remains, living systems, water and various gases or soil atmosphere, where the percentage of composition and concentration of essential elements in the soil at a particular point will be different with another point (Handi, 2008). This is evidenced by the measurement of soil acidity degree using soil meter pH carried out in this study which took several points, indicating that at different points had different degrees of acidity; although the points taken were very close each other. However, all points that have been measured had an acidic degree, with the pH 3.5-5. *Staphylococcus sp.* can grow well on neutral and alkaline pH, while at acidic pH, this bacterium will be inhibited. It is proved by the absence of CPS in the soil, which is implanted on MSA media. The soil pH value indicates the concentration of hydrogen ions (H^+) present in the soil; higher of H^+ ion level, then more acidic the soil is (Hardjowigeno, 2003).

Kurniawan (2011) said that macro chemical elements present in the soil include chloride, boron, sulfate and nitrogen, in which the chloride element has been known to act as

antibacterial. Chlorine activity against bacteria can increase with increasing concentration of hydrogen ions. Based on Bitton (1994), chlorine compounds can cause damage to bacterial cells, with two mechanisms, namely the destruction of the cell permeability capability, where chlorine can damage the cell membrane of bacteria, causing the cell to lose its permeability, and ultimately impair cell function. Chlorine exposure can lead to leakage of proteins, RNA and DNA cell. Dead cells are a result of the release of some important cell materials, reduction of potassium uptake, or reduction of protein and DNA synthesis. The second mechanism, chlorine can do a destruction of nucleic acid and enzymes in bacteria.

Yilmaz et al (2006) proved that some microorganisms derived from the soil can be utilized as a source to produce various antibacterial substances called bacteriocin. It is an antimicrobial protein synthesized by ribosomes from a bacterium that can inhibit the growth of other bacteria. Most bacteriocin-like substances (BLIS) are produced by bacteria from the genus *Bacillus* derived from the soil, including *B.cereus*, *B.subtilis*, *B.licheniformis*, where these substances have a broad spectrum of antibacterial effect. The mechanism of action of bacteriocin is making indirect contact with a cell membrane by forming several pores in the microbial cell so that the cell membrane will leak and the cell cannot survive. The occurrence of leakage will lead to disruption of cell membrane stability so that the growth of microbial cells is inhibited and eventually experience death. In another hand, Handi (2008) said that soil can reduce the bacteria because the structure of the soil can function like a scrub, which has a size of large particles and a rough surface.

The soap used in this research is hand washing liquid soap with active ingredients, such as biodegradable surfactants and emollient. Both of biodegradable surfactants and emollient is not an antibacterial agent. However, in the study it has been known that the soap can act as good hand sanitizers, indicated by reduced amounts CPS. Biodegradable surfactants can reduce a surface tension of hands at the moment used, so that bacteria have attached to keratinocyte cells the back skin of the dog's holder can release his bond and can fall along with the water rinse.

From the analysis, it was found that the level of significance (p) of pre-post soil treatment= 0,000; with an average value decrease in CPS number= 2.44 CFU/ml. Level of significant of pre-post soap treatment is 0.001; with an average value of a decrease in CPS number= 1.66 CFU/ml. The significant value of two treatments are less than the predetermined degree of 0.025 ($p < \alpha$). It shows that both soil and soap can reduce the number of CPS.

It was found that hand washing using soil can reduce the number of CPS by 2.44 CFU/ml,

greater with difference of 0.78 CFU/ml when compared with decreased CPS by soap, i.e. 1.66 CFU/ml. It shows that in this study, the soil has a better ability than soap in reducing the amount of CPS.

It can happen with soap because it has been made with certain formulations and manufacturing techniques, in order to function as a good cleanser. This phenomenon is different with soil, which has been known generally just as a sacred means of Islamic guidance. Furthermore, it is important to do a review, which soil can act as a good cleanser. Because it is possible that soil will add the amount of CPS instead of reduce it. Then, it needs to be observed first when we will clean our hand with soil, such as an acidic condition of the soil, due to CPS does not tolerate with acidic environmental conditions; and clean soil which is free from animal feces, carrion, and so on. In addition, if we associate with Islamic principles, the soil functioned as a purified and cleanser agent must be holy and can purify, with an indicator of the absence of an unclean object existing in the soil environment, which can be captured by the sense of sight and smell, such as free from animal dung, carrion and blood, also the soil need have an acidic conditions.

CONCLUSION

As like as soap, soil also has a capability to reduce CPS in the hands of the dog's holder, with the reducing by soil is bigger than soap. In addition, soil functions as a means of purification according to Islamic rules also include the concept of cleansing according to medical guidance.

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