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Postulations from an Experiment on Microbial and Fungal Diversity

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ABSTRACT

The hand and mouth have regions that are prone to bacterium and fungus contact. Although there are many harmful microbial and fungal species, one being *Candida albicans*, a type of yeast, there are also others that essential to the human body. *E. coli* is an example of a bacterium species needed for digestive wellbeing. An experiment was conducted in the laboratory to make postulations on microbial and fungal diversity using class data. The experiment conducted is subjected to experimental errors.

KEYWORDS: microbial, fungal, TB, HIV, *E. coli*, *Candida albicans*, penicillin, hand, mouth, swabs, colonies

INTRODUCTION

A diversity of microbes and fungi are found on different parts of the body. Although these bacteria are commensals, i.e. they are beneficial and cause no harm to the host, there are also instances where bacteria are invasive and can cause the host to become immunosuppressed. For example, tuberculosis causes host to become ill since it affects the breathing airways of a person (the lungs). Another example of a bacterium which is beneficial to humans is E. coli (Singh, 2013). All mammals have this bacteria and it is important in maintaining optimum digestive health in Homo sapiens. It can be postulated that probiotics – as it is known – promote optimum digestive health in humans by maintaining a healthy diversity of E. coli in the digestive tract of man. However, apart from the diversity of internal microbial and fungal species, there are also external species that thrive on the skin of the body. In the mouth of mammals, a variety of microbial and fungal species can also be expected since the mouth is a moist habitat to harvest fungi and bacterial species (Singh, 2019). However, in healthy people, these are expected to be susceptible to drugs or harmless to the individual who harvests them. This means that in ill hosts, due to immunecompromization or suppression due to the abuse of inactive drugs (due to drug resistance of bacterial species), harmful bacteria of fungal species is thriving on an already weakened host (Singh, 2013). In the experiment conduced, postulations would be made using class data on a diversity and possible number of microbial and fungal colonies that exist on the skin and the mouth. An expectation can't be assumed due to dietary and living conditions of individual persons of the studied class.

MATERIALS AND METHODS

A standardised experiment was conducted with approximately 50-60 students. The students were divided amongst 12 different benches and they were each given 2 plates per bench. The medium on the agar plates were differential as they were not allowed to distinguish between the different types of bacterium and fungus species. This was done in order to allow the swallowed cultures to separate out into clearer colonies in the agar plate. Two area, namely the mouth and hand, was swabbed and

streaked. After the streaking was performed, the plates were labelled on the underside with the name of the student, the demonstrator and are of body that was streaked. The plates were thereafter placed upside down and incubated for 7-12 days (UKZN Practical Manual, 2019). The incubation temperature used was 37 ^{o}C, since this was the body temperature optimum for microbial and fungal growth. After 7-12 days, the blood agar plates were inspected to determine the amount, and different types of bacteria present. The average class data for the hand and mouth swabs were taken, giving four sets of values. One set was an indication of the colonies, and the other the diversity. The experimental results were replicated to give a greater internal accuracy of the obtained result.

RESULTS

Table 1: Mouth and hand swabs showing the number of different microorganisms and number of colonies in duplicate for the class data

Community	Swabbed area	No of colonies	Number of different microorganisms
Colonies	Mouth	+/- 170	+/- 9
	Hand	+/- 150	+/- 8
Diversity	Mouth	+/- 60	+/- 3
	Hand	+/- 75	+/- 4

The results in table one does not conform to any hypothesis, due to the diversity of learners in the first year biology class. The results in table 1 show that there were more mouth bacteria or fungi colonies and that there were a greater number of different microorganisms (+/- 9) than that of the hand, which has +/- 20 less colonies. In terms of the diversity of microorganisms, the inverse relationship was fond in comparison to the mouth and hand colonies of the number of colonies. In the experiment, it was found that more (+/-75) diversity in number of colonies for the hand than mouth. The +/- 15 number difference indicates the less number of different microorganisms (+/- 3) in the mouth. The mouth only had a diversity of +/-60 bacterial/fungal colonies.

DISCUSSION

Microbial and fungal diversity is a field of study within the discipline of microbiology. It is an important field of study since there are a variety of bacterial and fungal species that thrive on healthy and immunosuppressed hosts. Tuberculosis, an example of an illness caused by the bacterium *Mycobacterium tuberculosis*, thrives non both mentioned hosts, and the treatment is dependent on the level of tuberculosis infection. On the other hand, HIV causes the host to lose immunoprotection, eventually leading to death. However, although these are severe illnesses caused by pandemic bacterium and viral species respectively, the human body also houses other harmless types, such as healthy E. coli (Singh, 2013). As mentioned, probiotics enable healthy digestive system functioning by eliminating harmful E. coli bacterium species. *Candida albicans*, a type of yeast often causing mouth and genital infections, is a type of fungi that is harmful to the human body and requires medical attention (Mayer *et al.,* 2013). A medically-important fungi species, resulting from food spoilage, *Penicillium chrysogenum*, is considered useful in the treatment of various infections. This importance is due to penicillin being produced from it (read Najafpour, 2007). In this study, the identification of specific bacterium and/or fungal species was not conducted. This is because it would be an injustice for individuals housing infectious strains like bacteria, such as E. coli. Furthermore, the medium used to detect the number of organisms was a differential, or ordinary (blood) agar. This agar allows for the separation of bacterium and fungal colonies. It was distinct on the plate that both bacteria and fungi thrived on both sampled areas. The number of different microorganisms in the mouth was the highest. This could be the case since the mouth is moist and due to the mucous secretions from the nasal cavities, and food remains, more bacteria – but also fungi – are able to thrive there (Singh, 2019). The number of colonies (+/- 170) for the mouth supports this deduction. Although the hand had a fewer number of colonies (+/- 150), there was only one microorganism difference. However, a deduction could not be made since there's no evidence to say that the 8 microorganisms were the

same as those found for the mouth. The microbial and fungal diversity for the hand was greater by +/- 15 colonies. This could be due to the fact that the hand is in constant contact with the external environment. Due to dusting and lifting of objects, the hand had a greater diversity of microorganisms (Singh, 2019). However, like the previous conclusion, there's little evidence to conclude a difference for the +/- 60 colonies found on the mouth agar plates. There was only an approximate of 1 microorganism difference between the hand and mouth. The mouth had one less microorganism than the mouth, but the difference doesn't exclude the microorganism types being different (Singh, 2019). The present study is conclusive since bacterium and fungi were distinguishable on the plates. The estimate colony count numbers are an approximation of what was observed on diagonally-streaked plates.

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