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Isolation of Pimple Causing Bacteria (*Staphylococcus aureus*) And Effect of Some Natural and Chemical Substances on Its Lysis.

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ABSTRACT

The present study aims at isolation of pimple causing bacteria mainly *Staphylococcus aureus* and *P. acnes* and to test the antimicrobial action of various toothpastes including Colgate and Dabur on the pathogenic organisms by identifying the microbial inhibition zones and using the minimal inhibitory concentration of toothpastes. Also, further microbial action of some natural substances like Neem, Aloe vera was observed on pathogens to determine the best combination of natural and chemical substances effective against the bacteria. Since, there are a lot of products available in market which promise to provide the effective cure against this very common skin lesion "Acne" but every time not effectively do it. By this experiment the main aim which arises is to get a proper combination and inhibitory concentrations of some chemical substances like Triclosan and natural substances like honey and citrus to get an effective solution against these bacteria.

Keywords: pimple, *Staphylococcus aureus*, *Propionibacterium acne*.

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INTRODUCTION

Acne vulgaris is a common disease amongst teenagers and people in their early 20s. The very common bacteria causing this are *Staphylococcus aureus* and *Propionibacterium acne*. They are mostly anaerobic and are gram positive in nature. These bacteria are commensal in nature and present with other microbes on skin. They can also be found in sebum and gastrointestinal tract [1,2,8].

Several chemicals like Triclosan which is found in soaps, detergents and toothpaste and also benzoyl peroxide which has antibacterial properties are the key substances which doesn't let these bacteria to induce the resistance. It can be used in combination with several other effective drugs to provide a proper cure [3,4,9].

Also, natural substances like Natural Honey, and some oils like Clove and Citrus, Neem are some of the important remedies for acne.

MATERIALS AND METHODOLOGY

For the confirmation of the bacteria, *Staphylococcus aureus*, certain tests were performed on different materials and they were taken as samples.

Plant material

Different plant materials were taken which can be used as a natural way of treatment like Neem and Aloe vera. The leaves were air dried and extracted with acetone [5-7]

Toothpastes

Two different types of toothpastes, namely Colgate active salt and Dabur red toothpaste were taken as samples.

Fuller's earth

Jovees Ayurveda Cream (Anti pimple and acne cream)

Methods to test the presence of the desired bacteria

Biochemical tests

Oxidase test.

The main purpose of this test is to determine the presence of the oxidase enzyme in the given sample. Oxidase discs were taken, and it was inoculated with a well isolated colony of the pure bacteria. The change in colour was observed as it changes to purple.

Catalase Test.

The main purpose of this test is to determine the presence of the enzyme catalase. On a clean slide, an emulsified part of the colony in saline was taken and a drop of 3% Hydrogen Peroxide was added. The appearance of gas bubbles indicates the presence of *Staphylococcus aureus*.

MIC (Minimum Inhibitory Concentration)

This method is mainly used to determine the activity and the inherent capacity for growth and development in terms of the concentration at which there will be no more growth.

1gram of each sample was taken and was well mixed with broth. The broth used here is, Luria Broth(100ml). All the samples were mixed separately and were placed in 7 different test tubes.

In each test tube at a particular time interval, after every 5 minutes the sample was added in a definite volume in each test tube.

Bacterial cultures were obtained using spread plate technique.

RESULTS

Morphological and biochemical tests were performed on the isolated colonies obtained by streak plating, in order to confirm the presence of the organism of interest, *Staphylococcus aureus*. Simple staining showed the organism to be coccus shaped and the organism took up crystal violet stain, showing that it was a gram positive bacteria. In the biochemical tests that were performed, positive results were shown in Catalase Test (appearance of purple colour) and Oxidase Test (appearance of gas bubbles). The organism was thus proved to be *Staphylococcus aureus*.

In the Minimal Inhibitory Concentration test, the materials used were toothpaste – Colgate + Dabur Red, pimple removing cream – Jovees Ayurvedic Cream, Aloe Vera, Neem, Fuller’s Earth were used. The number of colonies formed was spotted and the numbers of bacteria were counted using the following formula:

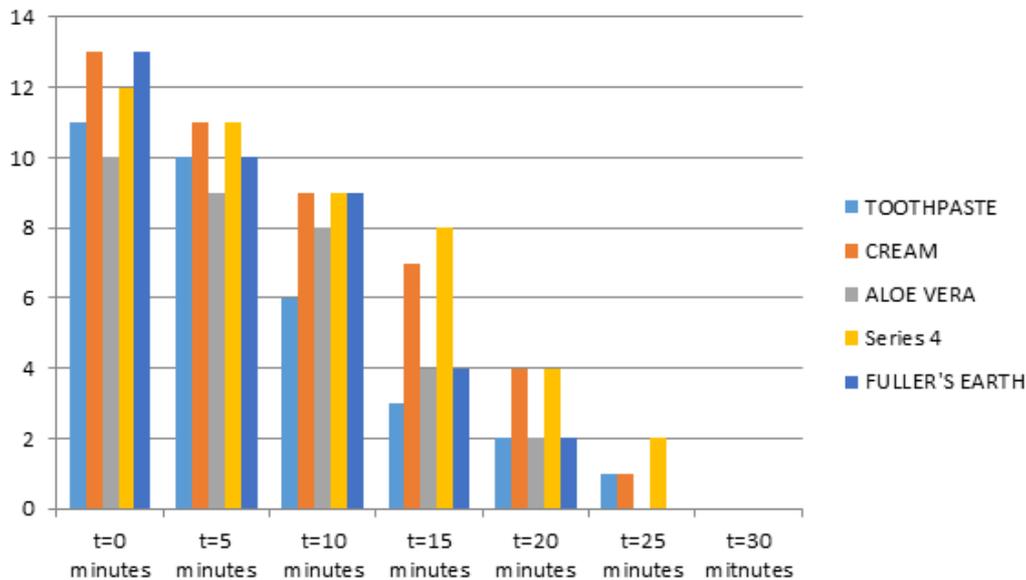
$$\text{No. of bacteria} = \frac{\text{no. of colonies spotted} \times \text{dilution factor}}{\text{Total volume tested}}$$

Table No.1

MATERIAL	TIME FOR WHICH SAMPLE WAS KEPT	NO. OF COLONIES	NO. OF BACTERIAL CELLS
TOOTHPASTE (COLGATE + DABUR RED)	t=0 minutes	11	11
	t=5 minutes	10	10
	t=10 minutes	6	6
	t=15 minutes	3	3
	t=20 minutes	2	2
	t=25 minutes	1	1
PIMPLE REMOVING CREAM (JOVEES AYURVEDIC CREAM)	t=0 minutes	13	13
	t=5 minutes	11	11
	t=10 minutes	9	9
	t=15 minutes	7	7
	t=20 minutes	4	4
	t=25 minutes	1	1
ALOE VERA	t=0 minutes	10	10
	t=5 minutes	9	9
	t=10 minutes	8	8
	t=15 minutes	4	4
	t=20 minutes	2	2
	t=25 minutes	0	0
NEEM	t=0 minutes	12	12
	t=5 minutes	11	11
	t=10 minutes	9	9
	t=15 minutes	8	8
	t=20 minutes	4	4
	t=25 minutes	2	2
FULLER’S EARTH	t=0 minutes	13	13
	t=5 minutes	10	10
	t=10 minutes	9	9
	t=15 minutes	4	4
	t=20 minutes	2	2
	t=25 minutes	0	0
	t=30 minutes	0	0

The observations showed that maximum capacity of lysis was shown by Fuller’s Earth and Aloe Vera, followed by toothpaste and Neem and the least capacity of lysis was that of pimple removal cream. Graphically, the action of these materials can be summarized as:

Graph No.1



DISCUSSION

The observations of the experiment suggested that the antimicrobial action of Fuller’s Earth and Aloe Vera were maximum and hence can effectively be used for lysis of pimple causing bacteria. The action of Neem and toothpaste, although lower than that of Fuller’s Earth and Aloe Vera, were sufficiently significant. The causative agent in toothpaste of the lysis of bacteria was Triclosan. The least antimicrobial action was that of pimple removal cream. The main agent causing the lysis of the bacteria in pimple removing creams is salicylic acid. Fuller’s earth and Aloe Vera took least amount of time to kill the bacteria. However it is observed that after a time span of 30 minutes, all the bacteria were lysed, which showed that whatever the rate of lysis, eventually, all the materials prove to be effective in the lysis of *Staphylococcus aureus*. Another inference that can be drawn from the experiment is that action of material is faster and thereby more effective in their pure form, rather than in the form of a preserved mixture of chemicals, i.e. the cream.

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REFERENCES

- [1] Zainab Dakhil Degiam. An in vitro antimicrobial activity of six commercial toothpastes 2010;4(4):127-133
- [2] Fadi Qa’dan, Abdul-Jalil Thewaini, Dalia A. Ali, Rana Afifi, Abdalla Elkhawad, Khalid Z. Matalka, The American Journal of Chinese Medicine 2005;33(2):197–204
- [3] Hanna S, Sharma J, Klotz J. Dermatol Online J 2003;9(3):8
- [4] Shaheen B, Gonzalez N. J Eur Acad Dermatol Venereol 2013; 27(1): 1-10
- [5] Ashkenazi H, Malik Z, Harth Y, Nitzan Y. FEMS immunol Med Microbio 2003;35(1):17-24.
- [6] Toyoda M, Morohashi M. Dermatol 1998;196(1):130-134.
- [7] Thiboutot D. Fam Med 2000;9(2):179-187
- [8] Cunliffe WJ, Baron SE, Coulson IH. Br J Dermatol 2001;145(3):463-466.
- [9] Noyon V, Legallou F, Richert H, Dreno B. Ann Dermatol Venereol 1998;125(12):885-887.