



Inhibitory Effect of Various Toothpastes Against Acne Causing Bacteria

KEYWORDS

Propionibacterium acne, Staphylococcus aureus, antibacterial activity of toothpaste, acne vulgaris.

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ABSTRACT Generally antibiotics are used to treat acne. The use of antibiotics to treat acne is of major concern as it leads to allergies. The use of antibiotics against staphylococcus aureus and Propionibacterium acne is the matter of issue because of their resistance. So in the current study isolates of Propionibacterium acne and Staphylococcus aureus were taken into consideration. Here instead of antibiotics natural products (Neem, Tulsi, etc) and various brands of toothpastes (Colgate, Pepsodent, etc) were studied for their antibacterial activity. In the current study various brands of toothpaste were used to study the antibacterial activity against acne causing organisms. Promising results were observed against both the organisms. The toothpastes were further studied for MIC. So from the current study, it is concluded that antibiotics can be avoided to cure acne, instead natural products and toothpastes can be used to get rid of it.

INTRODUCTION

Acne is a skin disorder caused by changes in oil glands and hair follicles that occur during puberty. Most teenagers get some blackheads and pimples and some develop more severe, widespread acne. Acne can be effectively controlled with skin cleansers and medicines. The common type of acne is called acne vulgaris. It develops mainly on the face, neck, chest, shoulders and upper back. Skin lesions can be non- inflamed (whiteheads and blackheads), or inflamed (red or pus-filled pimples, nodules, and cysts). Acne may be mild, moderate or severe and lesions sometimes cause scarring (Layton AM, 2010).

In the current study the two organisms namely, Propionibacterium acnes and Staphylococcus aureus were taken into consideration, isolates of the Staphylococcus aureus were studied.

Usually to treat acne heavy dose of antibiotics are prescribed by the dermatologist. Ointments, gels and lotions are also used to treat acnes or pimples. Antibiotics or drugs may lead to side effects or allergies which again is a rise of a problem. If the acne or pimples are left untreated then it may lead to severe conditions which may damage the skin line of the patient.

Due to many side effects of the antibiotics and also their cost, in the current study some household substances are tested to treat the acne. The antibacterial activity of the household substances is tested against the two organisms namely, Propionibacterium acnes and Staphylococcus aureus.

Many studies have been performed previously by various scientists to inhibit the growth of Staphylococcus aureus, by using natural or herbal products. Neem extract, tulsi (ocimum scantum), etc. A research carried out by two

scientists Poonam Mishra and Prabhakar Mishra showed the inhibition of S. aureus by ocimum scantum i.e. Tulsi (Poonam Mishra, et al, 2011). They carried out the experiment by testing the antibacterial activity of tulsi extract on S. aureus. Another research done by a scientist Wendy C Sarmento et al is to test the antibacterial activity of neem extract against S aureus (Wendy C Sarmento et al, 2011). Some articles also suggest the use of fruits, like papaya, pineapple, etc. to treat acne. In one blog of Real Acne Treatment use of fruits to treat acne is mentioned. The antibacterial activity of toothpaste brands has also been tested against various organisms, one of which was Staphylococcus aureus. This work was performed by ZainabDakhilDegiam (ZainabDakhilDegiam, 2010). The antibacterial activity of toothpaste against mouth flora is a well-known fact but against Staphylococcus aureus, a skin infecting organism is a new research.

Some new studies revealed that the Staphylococcus aureus has acquired resistance against many antibiotics, and even to the dermatologists it's the matter of issue how to treat acne caused by Staphylococcus aureus. Propionibacterium acne has found to be resistant against many antibiotics. High level of Propionibacterium acnes resistance to several antibiotics that were nearly used in acne treatment was reported in 1979 from America, England, Australasia and the Far East. Later on, this problem was also reported from many other countries and became a worldwide problem (Cooper AJ, 1998; Ross JI, Snelling AM, Eady EA, et al, 2001) Thus, this study was designed to determine Propionibacterium acnes resistance to antibiotics currently used in acne treatment.

The major advantage of using natural products to treat acne is they are available easily and in cheaper rates, also needed in a very minute quantity. They have no side effects and they do not need any medical prescription. They

are easy to use and can be used by any age group people.

MATERIALS AND METHODS

1. Isolation of acne causing organisms:

In the present investigation, the acne causing *Staphylococcus aureus* and *Propionibacterium acnes* were isolated from different clinical samples of pus procured from Vishakha Pathology laboratory, Lokmat square, Nagpur. All the clinical samples were subjected to morphological, biochemical and cultural characteristics. The results were compared and confirmed according to Bergey's manual of Determinative Bacteriology, 9th Edition. *Staphylococcus aureus* NCIM 502, ATCC 25923 and *Propionibacterium acnes* MTCC 1951 were taken as a control. Total 50 isolates of *Staphylococcus aureus* and 25 isolates of *Propionibacterium acnes* were isolated from the clinical samples of facial swab.

2. Antibacterial activity of natural products and toothpastes:

The well confirmed isolates of both *Staphylococcus aureus* and *Propionibacterium acnes* were further subjected to antimicrobial activity of natural products like pineapple, apple, Pudina, Neem, lemon, chandan powder, potato peel off, tomato- udad dal mixture, papaya and Tulsi. The extracts of various samples were taken and the antimicrobial activity was checked by Well diffusion method. Further all these isolates were subjected to antimicrobial activity of various toothpastes of different brands (Pepsodent, Colgate, Vico, Himalaya, Close – up and Miswak)

RESULT & DISCUSSION

The use of antibiotics to treat acne is of major concern, as it leads to some allergies. The use of antibiotics against *Staphylococcus aureus* and *Propionibacterium acnes* is the matter of issue because of their acquired resistance. So, in the current study, natural products are used to treat acne. The antibacterial activity of natural products was tested against the isolates of *Staphylococcus aureus* and *Propionibacterium acnes*. *Propionibacterium acnes* were found to be resistant against almost all the natural products, except lemon. Few isolates of *Staphylococcus aureus* was found to be resistant and few were found to be susceptible.

Poonam Mishra and Sanjay Mishra performed the study of the antibacterial activity of Tulsi (*ocimum scantum*) against *Staphylococcus aureus*, they found the organism to be susceptible against the Tulsi extract and the growth of the organism was inhibited (Poonam Mishra et al, 2011). But in the current study the isolates of *Staphylococcus aureus* was found to get resistant against Tulsi extract. 25 isolates were found to be resistant and 25 were found to be susceptible (Graph 1). One more study done by scientist Wendy C Sarmiento with Neem extract (Wendy C Sarmiento, 2011). He studied the antibacterial activity of it against many organisms, one of which was *Staphylococcus aureus*. He found the organism to be susceptible against Neem extract. He also used different concentrations of the Neem extract to know the MIC. But in the current study, *Staphylococcus aureus* was found to be quite resistant against Neem extract. Out of the 50 isolates of the *Staphylococcus aureus*, 30 were found to be resistant and 20 isolates were found to be susceptible. *Propionibacterium acnes* were found to be resistant against Neem extract (Graph 2).

From the above two studies it is confirmed that *Staphylococcus aureus* has acquired resistant against Tulsi and Neem, previously it was found to be susceptible but cur-

rently it has acquired resistance. Many other fruits were also used to treat acne. In the current study both the organisms has found to be resistant against the fruit extract or pulp (Graph 2). Yismaw.G, etal tested the antibacterial activity of papaya extract against *Staphylococcus aureus* isolated from wound. He and his subordinates found *Staphylococcus aureus* to be susceptible against papaya. He also used papaya seed extract (Yismaw.G, et al, 2008) In the current study papaya pulp was used as a natural product, its antibacterial activity was tested against acne causing organisms. *Propionibacterium acnes* were found to be resistant, and 40 isolates of *Staphylococcus aureus* were found to be resistant against papaya. Only 10 were found to be susceptible (Graph 1)

In one blog, (2009) Real Acne Treatment use of pineapple is suggested to treat the acne causing organisms. Some results revealed that the organism was found to be susceptible. In the current study, both the acne causing organisms were found to be resistant against the pineapple. 35 isolates of *Staphylococcus aureus* were found to be resistant and 15 isolates to be susceptible against the pineapple Pulp.

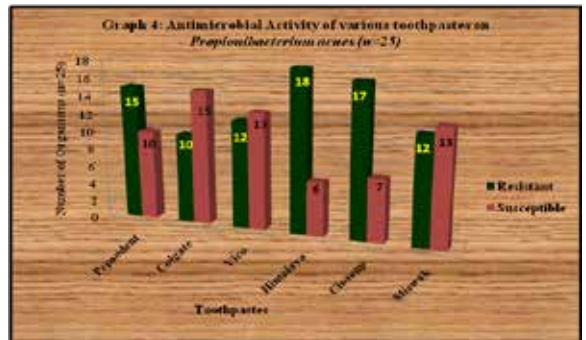
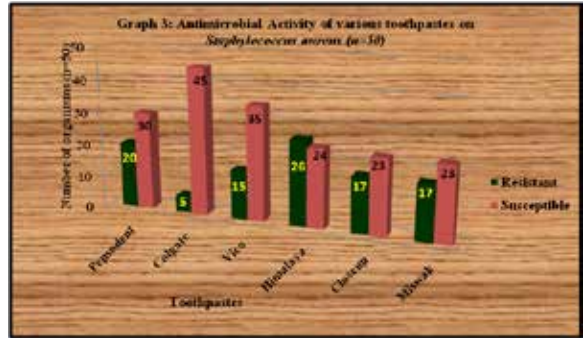
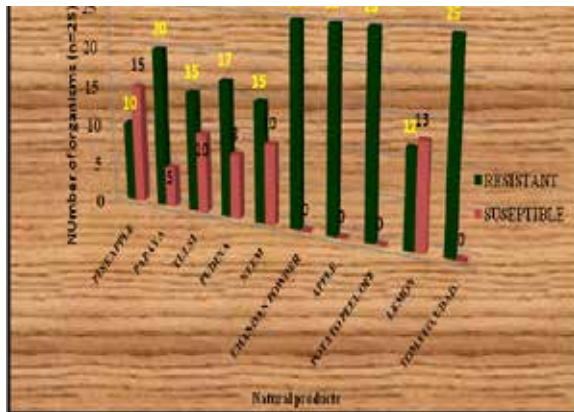
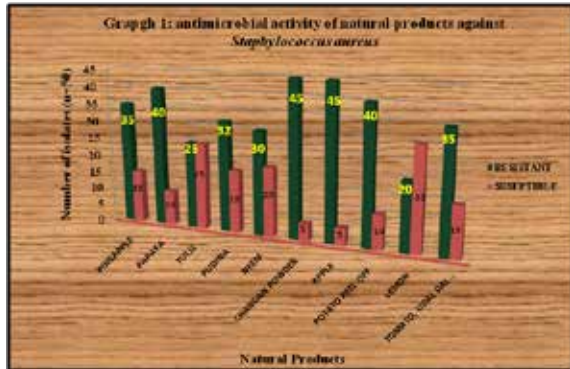
From the above studies and researches, it is sure that *Staphylococcus aureus* and *Propionibacterium acnes* have acquired resistance against most of the natural products. Hence in the current investigation, an attempt was made to search a new anti acne product to get rid of acne. For this initially 50 isolates of *Staphylococcus aureus* and 25 of *Propionibacterium acnes* were isolated from clinical pus samples. They were biochemically and morphologically characterized and further confirmed by comparing with Bergey's manual of Determinative Bacteriology. All these isolates were subjected to antimicrobial activity of various toothpastes. Promising results were observed against both the organisms.

Among the tooth pastes used, Colgate showed pronounced antimicrobial activity against *Staphylococcus aureus* whereas, majority of the pastes showed promising results against *Propionibacterium acnes* (Graph 3 & 4). Zainabdakhildeigam one scientist studied the antibacterial activity of various toothpaste brands against many organisms, one of which was *Staphylococcus aureus* (Zainabdakhildeigam, 2010). The organism was found to be susceptible. In the current study, *Propionibacterium acnes* was found to be susceptible against the toothpaste brand Colgate and resistant towards other brands namely, Pepsodent, Vico, Miswak, Close-up and Himalaya. Isolates of *Staphylococcus aureus* were found to be resistant against all the toothpaste, for Pepsodent 20 isolates were found to be resistant and 30 isolates were found to be susceptible. For Colgate, 5 isolates were found to be resistant and 45 isolates were found to be susceptible. The most promising results were found on Colgate, so it was further used for MIC. Fausto Rodrigo Victorino, et.al (2008) studied the antibacterial activity of propolis based toothpaste against *Staphylococcus aureus*, and found it to be susceptible.

CONCLUSION

Acne is a skin disorder caused by changes in oil glands and hair follicles and with prevalence about 70-87%. To get rid of acne antibiotics is the first choice of people but it has side effects such as allergy and rashes. So in the current study, natural products and toothpaste were used to inhibit the growth of acne causing organisms *Staphylococcus aureus* and *Propionibacterium acnes*. Most promising results were obtained with toothpastes. So from the cur-

rent study, it is concluded that antibiotics can be avoided to cure acne, instead natural products and toothpastes can be used to get rid of it. Further in future natural products or toothpastes can be the first choice of treatment to cure acne. Natural products are cheaper, easy to use, and required in minute quantity and have no side effects.



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