

## Bacteriostatic Activity of Lemon Juice against Staphylococcal Skin Infections

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### ABSTRACT

Antimicrobial herbs are center of attraction from a very long time back. These herbs can cure variety of the infections including GIT, liver and skin infections. In this conducted study we have analyzed lemon as an antibacterial herb against skin infections. A total of 25 skin lesion samples were collected out of which 14 were *Staphylococcus epidermidis* and 06 were *Staphylococcus aureus* were isolated. By pure culture study method all the species of Staphylococci gives bacteriostatic growth by the activity of lemon juice which was analyzed by Agar well diffusion method. Some other antimicrobial herb are also efficient against skin infections like aloe vera, neem etc. Because of the presence of Vitamin C lemon juices aids some more health effects to the skin and have less side effects than antibiotics.

**Keywords:** Lemon, bacteria, agar well diffusion method, Vitamin C.

### INTRODUCTION

The skin is the outer most protective layer of the body, and considered as the largest organ of the (Health-cares.net, 2005). It protects you from germs and infections. It is composed of water, protein, fat, and other substances. Each layer of skin serves different purposes. Some of these functions include conserving body heat, allowing you to feel pain, and protecting important organs inside your body (Schoenstadt, 2008). Skin is composed of three primary layers, Epidermis (outer layer), Dermis (Middle layer), and Hypodermis (Inner layer) (Free thought forum, 2007). Bacterial and fungal infections is protected by acid mantle of skin. This acid mantle contains lactic acid and various amino acids from sweat, free fatty acids from sebum, and amino acids and pyrrolidine carboxylic acid from the cornification process of skin. Due to this reason the pH of normal skin surface is between 4 and 6.5 in healthy people,

though it varies among the different areas of the skin (Yosipovitch and Hu, 2003). If acid mantle gets disturbed then it leads to the rise of pH to alkaline. These alterations in the pH can prone the skin to be infected with micro organisms. of the is considered as the skin infection which is thereby distinguished from , that is of the skin, but a skin infection can result in skin inflammation. Skin infections may be due to bacteria, fungi and viruses (Wikipedia, 2012). These infections include Dermatophyte infections like (Tinea pedis and Tinea manuum, Tinea cruris, Tinea corporis, Tinea capitis), bacterial infections including Folluculitis, Carbuncles and furuncles, Impetigo, Erysipelas, Cellulitis, Necrotizing fasciitis Blistering distal dactylitis, Botryomycosis, Erythrasma, , yeast infections Candidiasis, Angular Cheleitis, Thrush , and some other skin infections like Cutaneous anthrax, Ecthyma gangrenosum, Acne, Ecthyma (Brannon, 2010). Among all these infections Staphylococcus infections are most

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common among young girls. Uses of antibacterial herbs has been very popular for a very long time back and hence have a positive effects against many of the infections like skin infections, liver infections, intestinal infections etc.

Antibacterial herbs can fight and destroy bacteria includes alfalfa, basil, chamomile, cinnamon, clove, eucalyptus, parsley, peppermint, rhubarb, turmeric, uva ursi and yucca (Word Press, 2012). A number of other herbs also have some antimicrobial effects. Many of these herbs are culinary herbs and spices, such as garlic, ginger, thyme, and cinnamon. Herbs don't act as potently as drugs, also it produce fewer side effects and don't seem to be associated with the microbial resistance that plagues antibiotics (White, 2010). Many herbs and oils are natural antibacterial agents and may be used as teas, skin washes; Herbs that contain essential oils are antibacterial and antiseptic (Annie's Remedy, 2005). Neem, Aloe vera and lemon has antimicrobial effects against skin infections. Lemons are rich in vitamin C but have low sugar content (BBC, 2012). Lemon juice is about 5% to 6% (approximately 0.3 M) citric acid, which gives lemons a sour taste, and a pH of 2–3 (Wikipedia, 2012). The main components are: Flavonoids, Ascorbic Acid, Citric Acid, Minerals & Vitamins (Dugo et al., 2005; AlgaeCal, 2005; Bylka et al., 2004; Penniston et al., 2008; Fit day, 2000; Cheung, 2011).

Most of the Research suggests that lemon juice also has certain antimicrobial properties. Which indicate that lemon juice has antimicrobial activity against Aspergillus mold. This property of lemon juice seems to be tied to its citric acid content, which can break down the cell membranes of bacteria (Ghaemi et al., 2007). Lemon-juice is a powerful antibacterial substance. It has been proved by experiments that the bacteria of malaria, cholera, diphtheria, typhoid and other deadly diseases are destroyed in lemonjuice. Lemon contains citric acid, which can be effective in treating acne. The vitamin C found in citrus fruits is vital for that healthy glowing skin while its alkaline nature kills some types of bacteria known to cause acne. Lemon help to disperse cellulite.

In vitro studies showed that ethanolic extract of Lemon verbena has the ability to prevent the growth of Staphylococcus aureus. This investigation revealed that the ointment prepared from ethanolic extract of Lemon verbena is a proper medication to prevent the skin infection by Staphylococcus aureus in early phase (Answers, 2012). Antimicrobial activity is detected by using Agar well diffusion method. Microbial growth was determined by measuring standard diameter of zone of inhibition.

## MATERIAL & METHODS

### *Sample collection:*

A total of 25 pus samples were collected from skin lesions from young University girls of Karachi.

### *Isolation of sample:*

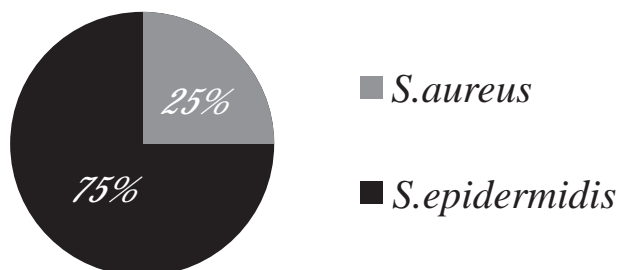
Using streak plate technique samples were isolated on different agar medium like Nutrient agar, Mannitol salt agar and Staphylococcus isolation agar. Spot test further aids in the identification of *Staphylococcus sp.* Like coagulase, catalase and oxidase test.

### *Antibacterial activity:*

Bacteristatic or bacteriocidal activity of lemon juice was analyzed by using Agar well diffusion method. Zone of inhibition is measured and calculated by reference standard ranges.

## RESULT

Lemon extract is use in many of the acne and skin treatment product as an aid in beauty enhancement besides this aspect it has some antibacterial activity against many of the skin infections. In this current study a total of 25 pus samples were observed from which 70% of *Staphylococcus epidermidis* and *Staphylococcus aureus* were isolated and all of the



strains of *Staphylococci* showed bacteriostatic growth by the activity of lemon extract. The present study revealed that lemon extract could be use as an antibacterial product in the treatment of skin infection.

### DISCUSSION

The main objective of the study was to avoid or eliminate the risk or side effects of antibiotics commonly use in skin infections treatment or acne treatment. Antimicrobial herbs and plant shows less side effects to human body but the use of these herbs has been depleted after the discovery of antibiotics because of the side effects of the antibiotics nowadays these herbs getting popular again among the consumers and this study is also an aid in the promotion of the use of antibacterial herbs.

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