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THE ACTION OF NATURAL HONEY ON INFECTED EYE-SWAB MICROBES:(HONEY, THERAPEUTIC FOR EYE INFECTIONS)

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ABSTRACT

The study investigated the action of natural honey on some isolated organisms that cause eye infections. Sixty (60) eye swab samples were obtained from subjects that visited Federal Medical Center (FMC), Owerri for eye care services. The swab samples were cultured and incubated at 37^0C for twenty four (24) hours. The investigations which were conducted in the microbiology department of the hospital were supervised by a senior laboratory scientist. Staphylococcus aureus, streptococcus pyogenes and pseudomonas aeruginosa species of microbes were identified in the swab samples. The staphylococcus aureus specie was most abundant (42. 86%) followed by the streptococcus pyogenes (34.29%). The percentages of the organisms' sensitivity to honey were: staphylococcus aureus-80.00%, streptococcus pyogenes-41.70% and pseudomonas aeruginosa-25.00%. This result was compared with organisms' sensitivity to gentamicin in which staphylococcus aureus was 93.33%, while streptococcus pyogenes was 66.70%. That of pseudomonas aeruginosa was 75.00%. Although the organisms were respectively more sensitive to gentamicin than natural honey, the large extent to which their growth was inhibited by honey is a clear indication that natural honey has antimicrobial effects that could ameliorat, heal or remedy eye infections.

Key words: Eye, honey, microbe, specie, swab.

INTRODUCTION

Honey is the sweet viscid material elaborated out of the nectar of flowers in the honey sacs of various bees [1]. It is essentially made when the nectar and sweet deposits from plants are gathered, modified and stored in the honey comb by the honey bees. The finished product is a heavy syrup with 12 to 20 percent moisture and 80 to 85 percent sugar [2].

The source of honey determines many of its attributes (e.g its aroma, flavour. Colour and composition), and generally honey presents in its original comb before extraction and subsequent storage in liquid, crystallized or partially crystallized forms. The exact composition and appearance of honey depend on source of the nectar, as nectar from different plants and flowers determine the colour and flavour of the honey. Season and wheather are also among the other factors that influence the components of honey. In general, however, fructose, glucose maltose, sucrose, minerals, vitamins and water are the main components of honey. These simple sugars that have already been predigested by the bees are readily absorbed directly into the blood and this explains why honey is a rapid source of energy to the body. Some other phytochemical components of honey include carotene, xanthophylls, anthocyamin, tannin, proteins etc; as well as enzymes such as glucose oxidase, diastase, invertase, catalase, inulase, which contain the antioxidant properties of honey [3]. Honey is also a rich source of essential organic acids such as acetic, malic, citric and glucomic acids. It is the differences in the components of honey that influence the behaviours of honey; example, its reaction to heat, the tendency to crystallize, or the tendency to darken during storage.

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The antibacterial properties of honey have been known for over a century [4]; but another scholar [5], insists there was no recognition of the antibacterial properties of honey in its ancient usage. It is asserted [6], that from the medical perspective, honey was only known to be an effective remedy in ancient times. The osmotic pressure of honey, its acidity and the hydrogen peroxide (produced ezymatically in the honey) component are said to be the most important contributing factors in the antimicrobial properties of honey. As a matter of fact, the antimicrobial spectrum of honey has been investigated [7]. It was observed that most of the fungi and bacteria causing infections were inhibited by unprocessed honey. The effects of honey on the pathogenic bacteria infections of surgical wounds and conjunctiva has also been demonstrated [8]. It was observed that wounds healed faster with local honey application, and that when honey was applied on an inflamed conjunctiva, it reduced redness, swelling, pus discharge and eventually shortened time for eradication of bacterial infections.

It has been shown [9] that the seven species of bacteria that most commonly caused mastitis in diary cattle were completely inhibited by natural honey, just as a study done other researchers [10] unveiled that honey reduced bacterial adherence to epithelial cells. However, of all the bacteria species assayed in his work [11], showed that Staphylococcus Aureus and Sarcina lutea were most sensitive to honey. The controversy on the appropriate rout of administration of honey for most effective therapeutic and or prophylactic results was settled by the findings of a group of researchers [12] in their study on the local application of honey for treatment of neonatal postoperative wound infection. It was observed that honey was useful in the treatment of infected post surgical wounds; but did not respond to conventional systemic antibiotic treatment.

Apart from having direct antimicrobial actions honey may also clear infections by stimulating the body's immune system to fight infections [13]. It has also been reported [14] that honey stimulates monocytes in the cell cultures to release the cytokines which are a broad and loose category of small proteins that are important in cell signaling, affecting the behaviour of the cells, and are especially useful in the immune system, modulating the balance between humoral and cell based immune responses and regulate the maturation, growth and responsiveness of particular cell populations [15 , 16]. Furthermore, it is believed that honey provides substrates for glycolysis which is the major mechanism for energy production in the macrophages and thus allows them to function in damaged tissues and exudates where the oxygen supply is often poor. It is all these antimicrobial activities associated with honey that might have led to the use of honey in the treatment of some common eye infections right from time immemorial. Such infections like conjunctivitis, blepharitis, canaliculitis, dacryocystitis etc, usually caused by staphylococcus aureus, streptococcus pyogens, pseudomonas aeruginosa, etc have been demonstrated to respond to honey therapy.

MATERIALS AND METHODS

The study which was conducted at the microbiology department of Federal Medical Centre Owerri, Nigeria, involved laboratory investigations carried out on samples obtained by swabbing infected eyes of patients who came to the hospital for eye care services. Sixty eye swab samples were collected and cultured on agar plates where the sensitivity tests were done. Blood agar, nutrient agar, chocolate agar and pure honey and gantamicine eye drop were among the culture media used to carry out the study. The organisms were identified by their morphological appearance and conformation of isolates was made by gram-staining microscopy and oxidase test. After culture and isolation of organisms, the disc diffusion method for antibiotic sensitivity test was adopted for the susceptibility test. Sensitivity test was then conducted on all the different organisms with the honey which was obtained from Uturu Okigwe, of Abia State. The organisms were also tested for sensitivity with gentamicin eye drop.

RESULTS

A total of sixty eye swab samples were collected and subjected to several laboratory investigations. Thirty five (58.3%) yielded bacterial growth as against twenty five (41.7%) that yielded no bacterial growth. The test results obtained are as shown in tables 1,2 and 3.

DISCUSSION

The purpose of the study was to ascertain the efficacy of the antimicrobial properties of honey in the treatment of some eye infections (conjunctivitis, blepharitis and canaliculities). As a matter of fact, as much as 58.30% of the eye infections investigated was caused by different bacterial species. *Staphylococcus aureus* was revealed to be the lead cause of most eye infections investigated. About 42.86% of the infections were caused primarily by *staphylococcus aureus* which was bountifully isolated in the eye swab samples collected from the subjects (table 1).

Table 1. Percentage infection caused by the different organisms investigated

Organism identified	No of samples collected	Percentage (%)
Staphylococcus aureus	15	42.86
Streptococcus Pyogenes	12	34.29
Pseudomonas aeruginosa	8	22.85
Total	35	100

Table 2. Investigated organisms' sensitivity to honey

Organism	No of infected samples sensitive to honey	Percentage (%)
Staphylococcus aureus	12	80.00
Streptococcus Pyogenes	5	41.70
Pseudomonas aeruginosa	2	25.00

Table 3. Investigated organisms' sensitivity to gentamicin

Organism	No of infected samples sensitive to gentamicin	Percentage (%)
Staphylococcus aureus	14	93.33
Streptococcus Pyogenes	8	66.70
Pseudomonas aeruginosa	6	75.00

The results also revealed that streptococcus pyogenes ranked second as the cause of the ocular infections of patients that visited federal medical centre Owerri for eye care services between the months of January and march 2014. Not less than 34.29 percent of the studied eye infections were found to be caused by *strephtococcus* pyogenes.

The *pseudomonas aeruginosa*, however was the least cause of the eye infections investigated as only 22.85 percent of the subjects were infected by the organism. A very commendable revelation made by the study was that honey was very effective in the inhibition of growth of all the bacteria species investigated, although the sensitivity

test unveiled that honey was more effective in *staphylo coccus aureus* growth inhibition which means that a remedy could be achieved faster if an eye infection is caused by *staphylococcus aureus.* Honey could therefore be used to treat eye infections, especially in non-severe cases and in areas where eye infections are not endemic. The reason for such a recommendation is because the antimicrobial properties of honey were observed to be more bacteriostatic than bactericidal in the investigations just concluded when compared with gentamicin eye drop whose microbial sensitivity tests were also conducted and investigated.

CONCLUSION

The study demonstrated that natural honey certainly inhibits growth of some microbes such as staphylococcus aureus, streptococcus pyogenes and pseudomonas aeruginosa which are all causative agents of some eye infections like conjunctivitis, blepharitis and canaliculitis. A careful and guided use of honey in the treatment of eye infections especially in the rural areas where orthodox or conventional medicine is either not affordable or unavailable is therefore recommended.

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