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STUDY ON ANTIFUNGAL ACTIVITY OF HONEY

Tasiu Mahmud[1], Ibrahim A. Sabo[1], Mukhtar Muhammad Dauda[2], Musbahu Shehu Aminu[3], Hassan Muhammad Ibrahim[3], and Naziru Dahiru[3]

[1]Department of Biotechnology School of Engineering and Technology, Greater Noida, Guatam Budha Nagar, India

[2]Department of Microbiology, Faculty of Science, Bayero University Kano, Nigeria

[3]Department of Biotechnology School of Engineering and Technology, Greater Noida, Guatam Budha Nagar, India

ABSTRACT: Studies on antifungal activity of honey with the objectives of determining the susceptibility of fungal isolate at different dilution of honey was carried out, medically important samples of fungi were collected and isolated from hospital and used in the bioassay following a modified Kirby-bauer technique. The aim of the research was to determine the current level of effectiveness of honey on some humans and animal dermatophyte. The honey was collected from its hunters and vendors in Kano state northern part of Nigeria. Result showed that the higher the concentration of honey the higher the zone diameter of inhibition. Surprisingly, the zones diameter of inhibition at dilution of 20%v/v and 30% v/v induce and increase susceptibility of fungal isolate tested. The finding showed that honey can be used to treat skin infection associated with Trichophyton tonsurans, Microsporum canis and Aspergillus species through topical application.

KEYWORDS: Dermatophyte, *Trichopyton tonsurans, Microsporum canis,* susceptivility, Kirby bauer.

INTRODUCTION

Honey has been used for the treatment of infection of wounds more than hundred years ago even before the discovery of bacteria as a causative agent of infection [1, 12]. It has been used as a medicine since ancient time on many cultures, even then further scientific study on the efficacy of the honey on fungal pathogen are steal recommended[1,2,7]. The increase in the resistance of anti-fungal drugs in use has attracted the attention of the scientific community. Its known that only few specie of fungi have been tested against honey for its activity for example *Candida albicans* (*C. albicans*) is a dimorphic organism that commonly inhabit in oral and vaginal mucosa and gastro- intestinal tract of human beings as one of the commensal organism[3,4,11]. In recent years, there has been an increasing search for new antifungal compound due to the lack of efficacy, side effect and or resistance associated with some of the existing drugs [10] .Most types of honey generate hydrogen peroxide when diluted because of the activation of the enzyme glucose oxidase which oxidizes glucose to glucoronic acid and hydrogen peroxide [7]. Hydrogen peroxidase is the major contributor to the antimicrobial activity of honey, and the different honeys result in their varying antifungal effect [7,9].

AIMS AND OBJECTIVES

The main aim of this research is to study the antifungal activities of honey, with the objective of determining the susceptibility of fungal isolate at different concentration of honey.

Corresponding Author: Tasiu Mahmud

MATERIAL AND METHODS

SAMPLE COLLECTION OF THE TEST ORGANISM

Skin samples were obtained from patient attending Yada kunya leprosy and dermatophyte hospital in Kano state. The affected area were clean each with 70 % ethanol, and then skin scales were collected by scraping the surface of the margin of the lesion using a sterile blunt razor blade[9,2].

HONEY SAMPLE

Honey sample were collected from its vendors and hunters around Kano state of Nigeria. These honey samples were aseptically collected in sterile bottles and kept in a cool and dry place[2,5].

PREPARATION OF HONEY SOLUTION

Honey solution were prepared immediate prior to its testing by diluting with sterile distilled water to the required concentration.

IDENTIFICATION OF FUNGAL ISOLATE

The specimens collected were culture aseptically on the surface of Sabouraud Glucose Agar (SGA) that was prepared according to the manufacture's guide and incubate appropriately at room temperature (25°C) for 1-3- weeks to identify the species of fungi[3]. Each of the interested fungal colonies was identified by observing the colonial morphology and their mycelia macroscopically [8].

ANTIFUNGAL BIOASSAY

The agar well diffusion method was employed. The honey sample was first inoculated separately on standard nutrient media with no test organism so as to evaluate and test for their possible contamination. Thereafter, solidified nutrient agar plate were separately flooded with the liquid inoculums of the different test organism using the spread or plate method[6,8].The plate were drained and allowed to dry at 37°C for 25 minutes. Afterward, six equidistant wells of 5 mm in diametre were punched using sterile cork borer at different side on the plate. About 60 µL of the different concentration (0%, 10%, 15%, 20%, 25% and 30%) v/v of the diluted honey sample were separately placed on the different punched well with 1mL sterile syringe. The plate was allowed to stay for 15 minutes, for pre-diffusion to take place followed by an overnight incubation that lasted for 24- 72 hours at room temperature. The zone diameter of inhibition, including the diameter of the well, was recorded [9].

RESULTS

The result for the investigation is shown in table 3.1 It can be seen that; the growth of all four species of fungi tested was completely inhibited by the concentration of 30%v/v, similarly the result showed a concentration dependent increase in susceptibility of the various dilution of honey. *Aspergillus niger* and *Candida albican* has the highest diameter zones of inhibition of 14mm both at 30% V/V and least being 8.0mm

Table 3.1: Zones diameter of inhibition (mm) at different dilution of honey

Fungal isolate	0%	10%	15%	20%	25%	30%
Trichophyton tonsurans	0.0	0.0	3.0	5.0	10.0	12.0
Microsporum canis	0.0	5.0	5.0	6.0	9.0	11.0
Aspergillus niger	0.0	8.0	9.0	11.0	12.0	14.0
Candida albican	0.0	8.0	10.0	12.0	12.5	14.0

DISCUSSION

T. tonsurans and *M. canis* are all important group of fungi which regularly infect humans [3]. Cutaneous or superficial mycoses cause through host infection by these fungi is one of the most common diseases of humans [11].

The yeast *Candida albican* may live harmlessly among the normal flora of the skin but in some people it invades the deep layers of the skin and subcutaneous tissue, and hence causes candidal skin infection, *aspergillus niger* the most common spoiler of food and other organic compound, normally produces mycotoxins, if this toxin is ingested it can damage the liver, perhaps leading to cancer [10].

The result of this investigation showed that the higher the concentration of honey, the higher the diameter zones of inhibition. The antifungal activity of honey has been attributed to its osmotic pressure, the activity which is very low, for example the water activity of a ripened honey has been reported from 0.562 to 0.62 which is too low to support the growth of any species [9]. Honey is characteristically acidic, its pH being between 3.2 and 4.5 which is enough to be inhibitory to many animal and fungal pathogens [7].

Another major factor that account for inhibition of these specie has been found to be due to hydrogen peroxide produced enzymatically in the honey [4,9]. It is observed that certain activity in honey has been attributed to the phytochemical factors and seven tetracycline derivatives [12].

In a marked departure from the intuitive use of honey as an effective remedy; many reports have associates the effectiveness of honey with its high antimicrobial activity.

Similarly, the results of the investigation were consistently with many reports of researchers for example Jeddar and Molan, 1985 and 1988 respectively. Several chemical with antifungal activity has been identified in honey by various researchers. These include pinocembrin, terpenes, benzyl alcohol, 3, 4-dimethoxy-4-hydroxybenzoic acid (syringic acid) [5,12]

CONCLUSION

This study showed that honey exhibit high antifungal activity against the four pathogenic fungal strains, isolated and tested.

RECOMMENDATION

It is recommended that honey can be used for the treatment of dermatophytic infection.

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