IN VITRO ANALYSIS OF ANTIMICROBIAL PROPERTIES OF HONEY AND TUMERIC ON COTTON WOVEN FABRIC FOR WOUND DRESSING APPLICATION

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ABSTRACT

An attempt has been made to develop anti-microbial textiles by studying the Inhibition zone using honey and turmeric. The concentration of honey and turmeric was as 10:0, 7:3, 5:5, 3:7, and 0:10 and it was applied on to the fabric using direct padding method. The antimicrobial activity of honey and turmeric treated fabric were tested against the infectious bacteria *Staphylococcus aureus.* Both the samples show better results against the bacteria but honey shows the best results by largest Inhibition Zone diameter.

Keywords: *Words: Textiles, Honey, Turmeric*

1.0 INTRODUCTION

Anti-microbial textiles are the textiles which protect the human beings by inhibiting the growth of bacteria, fungi or any other micro-organisms on the surface of products by various means of application on to the fabric. Among the various antimicrobial agents available, natural anti-microbial agents plays a major role in many of the processes especially in wound dressings because of its properties of biodegradability, compatibility with the skin etc. Among the natural agents, honey and turmeric are easy available and well known natural anti microbial agents. Honey, which was used in the ancient days for the treatment of infected wounds, has recently been 'rediscovered' by the medical profession. Honey can be effectively used in wound healing process without any adverse effects and has better antimicrobial property against bacteria and fungi. It is mainly because of its high sugar content, low water content and presence of hydrogen peroxide which is unsuitable for the growth of micro-organisms.

Curcuma longa commonly known as turmeric, a yellow pigmented dried rhizome, is a powerful antioxidant, antiseptic, anti-microbial, anti-inflammatory effect, anti-carcinogenic, anti mutagenic, antithrombotic, hepatoprotective, anti-microbial, anti-viral and anti-parasitic in nature. In this work, honey and turmeric concentration was optimised and applied on cotton woven fabric by means of direct padding method and compared its antimicrobial property against *Staphylococcus aureus.*

2.0 METHODS AND MATERIAL

2.1 Fabric

The fabric selected for the development of antimicrobial textiles using honey and turmeric is cotton woven fabric of 6mm diameter size.

2.2 Finishing Agents
The antimicrobial treatment on fabrics was done using honey and turmeric.

2.3 Extraction of honey and turmeric
Turmeric was blended in a blender and filtered using filter. Then, honey and turmeric juice were taken in 5 different concentrations of 10:0, 7:3, 5:5, 3:7, and 0:10.

2.4 Finishing Technique
Anti-microbial agent was applied on the fabric by pad-dry method. The finishing of anti-microbial agents includes the application of direct padding of turmeric and honey. The fabrics were dipped in the extracted solution, padded and dried at room temperature.

2.5 Sterilization
Fabric samples and instruments used in this experiment were well sterilized at temperature of 121ºC and 1.5 bar pressure in 15 minutes using Autoclave Machine excluding Disc plates which were sterilized at 200ºC in 2 hours. Sterilization process was done in order to kill any bacteria contamination on samples and instruments used in the experiment.

2.6 Bacteria Culture
Media preparation
15.2 grams of Media (Mueller Hinton Agar) were measured and diluted in 400mls of Distilled water. Then, the solution was sterilized at 121ºC and 1.5bar in 15minutes then cooled.

2.7 Bacteria Suspension
The process was done in Laminar Flow Hood Machine in order to avoid any external contamination whereby five disc plates were filled with media contained with 1.5mls of solution with Gram Positive (*Staphylococcus aureus*) bacteria. Then in each of the disc plate, fabric samples padded with ratios of honey and turmeric were placed on top of the media solution with bacteria and the disc plates were covered well such that no any external interference. Then, disc plates were placed in Incubator in order to allow bacteria growth at constant temperature of 37ºC in 18hours.

3.0 DATA ANALYSIS AND RESULTS

Table 1: Total inhibition zone

Concentration Ratio of Samples (H:T)	Diameter of Inhibition Zone (mm)	Circumference of Inhibition Zone (mm)
10:0	34	106.8
7:3	25	78.5
5:5	21	65.9
3:7	23	72.3
0:10	27	84.8
Standard Sample (Antibiotic)	37	116.2

Table 2: Antimicrobial activity at different ratios

Test S/No.	Concentration Ratio of Samples (H:T)	Inhibition Zone	Diameter of Inhibition Zone (mm)
1	10:0		34
2	7:3		25
3	5:5		21
4	3:7		23
5	0:10		27

Standard (Antibiotic)	Cephalexin		37

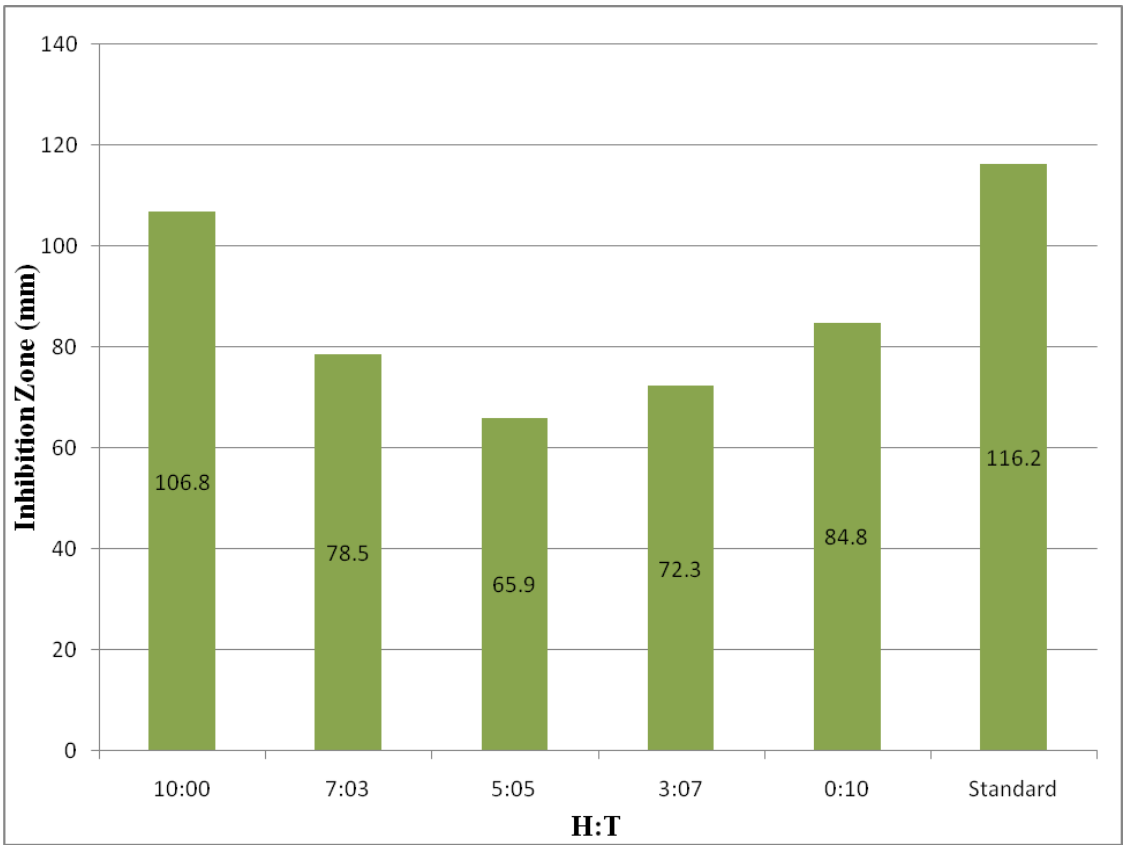


Figure 1:The graph of circumference of Inhibition zone (mm) against Concentration Ratio of Samples (H:T)

From the graph it was observed that H:T(10:0) shows the highest circumference of inhibition zone with 106.8mm. As concentration of honey decreased in the mixture also the circumference of inhibition zone tends to decrease. It is proved that the increase in the concentration of honey improves the anti microbial activity against *S.aureus* because of the presence of hydrogen peroxide which makes it unsuitable for the growth of microorganisms. And the fabric padded with turmeric alone, H:T(0:10) it shows antimicrobial property with high inhibition zone of circumference of 84.8mm than that of mixture concentrations.

4. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

It is observed from the present work that the honey and turmeric has very good antimicrobial activity against *Staphylococcus aureus*. By comparing with Antibiotic Standard, fabric with honey shows the highest antimicrobial property by showing the largest inhibition zone. That means honey have high resistance against microbes and it can be the best to apply in wound dressing for highest healing capacity.

4.2 Recommendation

Since both honey and turmeric proved to be having antimicrobial properties on cotton woven fabric, I recommend for more further studies on different types of honey against different bacteria so as to know which is the exact sample with highest antimicrobial property against different bacteria in order that it can be applied in wound dressings for highest healing capacity.

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