



## **A study on *in-vitro* antimicrobial activity of Coconut water and coconut oil on Candida Species**

<sup>1</sup>P. Durai Rajan, <sup>2</sup>G. Sumathi and <sup>2</sup>Sowmya Nasimuddin

<sup>1</sup>Department of Pharmacology, <sup>2</sup>Department of Microbiology, Sri Muthukumaran Medical College Hospital & Research Institute, Chikkarayapuram (Near Mangadu), Chennai – 600 069. Affiliations to the Tamil Nadu Dr. M.G.R Medical University, Chennai, India

*Received: 19-10-2016 / Revised: 03-11-2016 / Accepted: 15-11-2016 / Published: 26-11-2016*

### **ABSTRACT**

A study on *in-vitro* antimicrobial activity of Coconut water and coconut oil on Candida Species. The indiscriminate use of antimicrobial synthetic products has led us to the state of resistance and also provoked the need for natural products. The products from coconut were known to have antibacterial, antiviral, antifungal and antitumor activity from time immemorial. Hence this study was undertaken to find out the antifungal activity of coconut oil and coconut water against Candida Species. Candida isolate from clinical samples numbering 50 were included in our study, varied zones of inhibition were observed to coconut water at different concentrations and also to undiluted coconut oil against the fungal pathogens. In our study the coconut oil and coconut water have shown various zones of inhibition to clinical isolates of Candida species.

**Keywords:** Coconut oil, coconut water, antifungal activity, Candida

### **INTRODUCTION**

*Cocos nucifera* L. (family *Arecaceae*), commonly known as coconut, is considered as an important fruit crop in tropical countries. Coconut is the most extensively grown and used nut in the world, playing a significant role in the economic, cultural, and social life of over 80 tropical countries. Coconut is mainly an oil crop; rich in lauric acid, with a variety of other uses in addition to commercial oil production. The fruit, flower and root of this plant are used as ingredients for many ayurvedic preparations and it is also used in Malay traditional medicine to treat ailments such as fever, headaches, stomach upset and diarrhea (1). The products from coconut were known to have antibacterial, antifungal, antiviral, antitumor activity and as an alternative for oral rehydration and intravenous hydration of patients particularly in remote regions (2). It is also effective in the treatment of kidney and urethral stones, urinary infections and mineral poisonings. It offers protection against myocardial infarction and control of hypertension (3). Hence we intended to do a study to find out the antifungal activity of coconut oil and coconut water against Candida Species, which were isolated from different clinical

samples of patents especially from those who were immuno compromised.

### **METHODOLOGY**

Institutional ethical committee clearance was obtained. This prospective observational study was conducted in the microbiology lab at the Sri Muthukumaran Medical College from November 2015 to April 2016 (6months). The study consists of 50 isolates of Candida Species from clinical samples of patients.. Pure coconut oil was extracted, purified by filtration method and stored in a sterile container at 4 °C. Coconut water was collected, purified by filtration method and stored at 4 °C. Coconut water was diluted to three different concentrations – 100%, 50% and 25%. Before testing they were brought to the room temperature (5). The antifungal susceptibility testing was done using Nystatin & Amphotericin B. Testing with coconut oil and coconut water was carried out.

### **RESULTS**

50 isolates of *Candida albicans* and non albicans from clinical specimens were included in this study.

The zone of inhibition shown by Candida species to coconut water with different concentrations are shown in Table 2. Nystatin (100 units) and Amphotericin B (50 units) were used as control antifungal agents and their zones of inhibition are shown in Table 1.

**DISCUSSION**

Various antibiotics and antifungal agents had been used successfully in treating the infections that once devastated the humans, but their indiscriminate use has led to the development of multidrug-resistant pathogens. Hence, we are in the need to utilize natural extracts in place of synthetics to combat the pathogens. One such commonly available product in our country is coconut oil and coconut water. Studies were done to establish the antifungal activity of coconut products clinically and invitro. We intended to study the effect of coconut oil and coconut water on 50 isolates of Candida species (Candida albicans and other species). Studies done by Rajeev K Singla et al showed different zone of inhibition for coconut extracts (6). Ogbalu et al showed the effect of coconut oil was comparable to the sensitivity of fluconazole in candida species (7). Our study was done with the crude extract of coconut oil and three different concentrations of coconut water.

Among the 50 isolates of Candida albicans 49 were found to be susceptible to the antifungal agents

Nystatin (100 units) and Amphotericin B (50 Units) – Table - 1. The zone of inhibition ranged from 20 – 24 mm for Nystatin and 12 -16 mm for Amphotericin B. As per CLSI guidelines 49 isolated are sensitive to Nystatin and Amphotericin B. One isolate was found to be resistant to both Nystatin and Amphotericin B. Candida species (all 50 isolates) showed less than 5mm inhibition in 100% concentration of coconut water. There was no zone of inhibition of Candida species to 50% and 25% concentration of coconut water (Table - 2).

All 50 Candida species showed less than 5mm of inhibition to undiluted coconut oil (100%) – Table- 3

**CONCLUSION**

Though other studies have shown antifungal activity of coconut extracts, our study has shown very limited activity against candida species. Since the study was done with the pure filtered extracts and with a small sample size, our study has got limitations. Further research can be extended with various extracts of the coconut and with a larger sample size which might help in giving more positive results.

**ACKNOWLEDGEMENT**

I thank our Dean and HOD of Microbiology and faculty of Microbiology for conducting the study in our intuition.

**Table1.** Range of sensitivity pattern of study organisms to control antifungal concentration of Amphotericin B (50 units) and Nystatin (100 units).

Fungus	Concentration of Nystatin (100 units)	Concentration of Amphotericin B (50 units)
Candida species (49 isolates)	Zone of inhibition present (20 to 24mm)	Zone of inhibition present (12 to 16mm)
Candida species (1 isolates)	No zone of inhibition	No one of inhibition

(As per CLSI guidelines)

**Table2.** Susceptibility pattern to coconut water at different concentrations

Fungai included in our study	Susceptibility at given concentration		
	(100%)	(50%)	(25%)
Candida species (50 isolates)	Zone of inhibition present (< than 5mm)	No zone of inhibition	No zone of inhibition

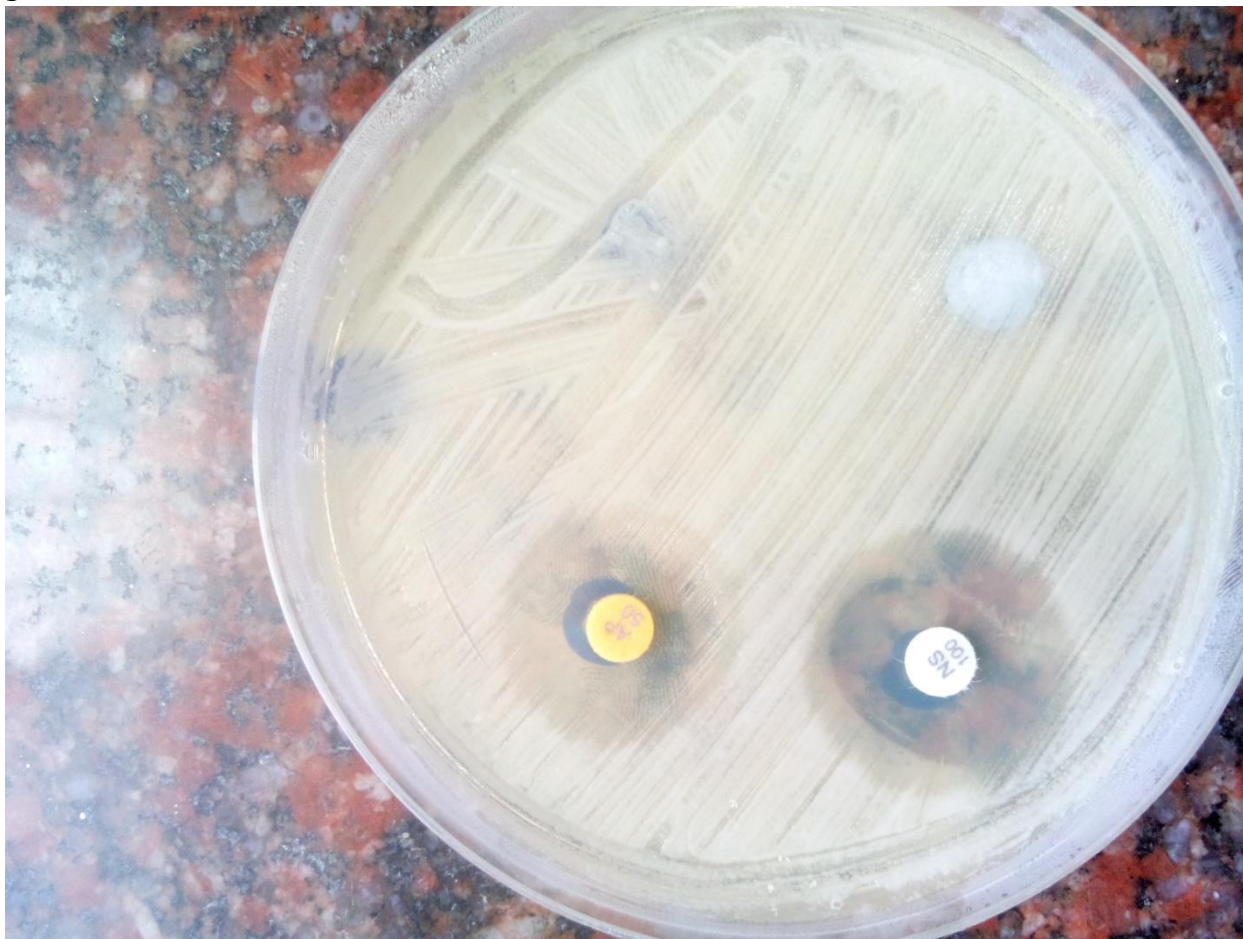
Candida species showed no susceptibility to coconut water at concentrations of 50% and 25%. Zone of inhibition was less than 5mm at 100% concentration.

**Table3.** Susceptibility pattern of candida species to undiluted coconut oil

Fungai	Concentration (100%)
Candida species (50 isolates)	Zone of inhibition present (<5mm)

Candida species showed less than 5 mm of inhibition to coconut oil at 100% concentration.

“Figure 1”



Candida species along with Nystatin and Amphotericin B as control and along with Coconut water & Coconut oil.

## REFERENCES

1. Foale MA. et al., The coconut Odyssey – The bounteous possibilities of the tree of life. ACIAR, Canberra, Australia, 2003.
2. Campbell-Falck D, et al., The intravenous use of coconut water. *American Journal of Emergency Medicines*, 2000 ,18 , 108-111.
3. Anurag P et al., Cardioprotective effect of tender coconut water in experimental myocardial infarction. *Plant Foods for Human Nutrition*, 2003 58, , 1-12.
4. Esquenazi D, et al., Antimicrobial and antiviral activities of polyphenolics from *Cocos nucifera* Linn. (Palmae) husk fiber extract. *Research in Microbiology*, 2002, 153, 647-652.
5. Mackie & et al., 2008. Practical medical Microbiology 14th ed, Elsevier PP 103-5.
6. Rajeev K Singla, et al. Antioxidant & Antimicrobial Activities of *Cocos Nucifera* Linn. (Arecaceae) Endocarp Extracts. *Indo Global Journal of Pharmaceutical Sciences*, 2011; 1(4): 354-361
7. Ogbolu DO, et al., *In Vitro* Antimicrobial Properties of Coconut Oil on *Candida* Species in Ibadan, Nigeria. *J Med Food* 10 (2) 2007, 384–387.
8. CLSI guidelines - 2012