

# Antibacterial Activity of Young *Cocosnucifera* (Coconut) Water against Oral Infection Causing Bacteria

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## ABSTRACT

The study investigated Antibacterial properties of young *cocosnucifera*. The study adopted a laboratory analysis of the sample. Result of the analysis showed that coconut water extract contain phenol, cardiac, glycoside, flavonoid, saponin, tannin and alkaloid among other. The result showed that the coconut water extract have antibacterial effect on *streptococcus*. Therefore, the study recommended that coconut water be adopted and use in the production of medicine against the oral infection that are caused by some bacterial organisms.

**KEYWORDS:** Antibacterial activity, coconut water, *cocosnucifera*, oral infection

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## INTRODUCTION

*Cocosnucifera*L. is a significant fruit tree in the world, providing nutrition to a large number of people, particularly in humid and subtropical regions. It's often referred to as the "tree of Life" (Subramanian Pet *et al.*, 2017).

Coconut water is a rich Source of nutrients, including key amino acids. (Lysine, leucine, Cysteine, phenylalanine, tyrosine, histidine, and tryptophan), Palmitic, oleic acids and dietary fiber, according to decades of studies. Iron, zinc and manganese are examples of other minerals. Mineral are also present in significant amounts. The most important Sugars are glucose; fructose and sucrose are all present in Coconut water. It prevalent acids are tartaric, Citric and malic acids. Acids that are organic in nature. Vitamins B1, B2, and also present as well as vitamin C (Jose M *et al.*, 2014; Adolf KA *et al.*, 2012).

The liquid endosperm of tender coconut water makes a great soft drink and is high in vitamin B, particularly nicotinic acid (vitamin B3) and pantothenic acid (vitamin B5). Biotin, riboflavin (vitamin B2), folic

acid, traces quantities of thiamine and pyridoxine (vitamin B6). Sugars, Sugar alcohol, vitamin C, folic and, free amino acids, phyto hormones, enzymes, and growth factors are all found in coconut water. Water made from coconuts. Its envelope is sterile and contains both organic and inorganic materials.

Compounds that are not organic (almost all minerals found in food). Coconut water in thought to be natural medication. It was examined in several civilizations to uncover defense mechanisms. Peptides with bactericidal activity (Jose Metal., 2014).

*Cocosnucifera* water has long been used to a wide range of ailments, and it has been utilized Carcinogenic infections since time immemorial. As the Coconut fruit matures, the composition and quantity of its water vary.

## TENDER COCONUT WATER

Tender Coconut water is widely available, reasonable priced, and traditionally acceptable, in addition to

providing a variety of general and oral health benefits with no negative side effects.

Antimicrobial efficiency studies of *s.mutans* are fed tender Coconut water in its natural state.

## USES

Coconut water fills in as a suspension for the endosperm of the coconut during its atomic period of improvement. Afterward, the endosperm develops and stores onto the coconut skin during the phone phase. It is drunk all through the muggy jungles, and has been brought into the retail market as a handled games drink. Mature organic products have altogether less fluid than youthful, juvenile coconuts, notwithstanding waste. Coconut water can be matured to deliver coconut vinegar.

Per 100-gram serving, coconut water contains 19 calories and no critical substance of fundamental supplements. Coconut water can be tipsy new or utilized in cooking as in binakol. (Janick J *et al.*, 2015). It can likewise be matured to deliver a jam like treat known as nata de coco.

Coconut water normally comes from youthful coconuts around 6-7 months old enough, however it's additionally found in mature natural product. A typical green coconut gives around 1/2-1 cup of coconut water.

Coconut water contains 94% water and very little fat. It ought not be mistaken for coconut milk, which is made by adding water to ground coconut meat. Coconut milk contains around half water and is very high in fat (1Trusted Source).

One cup (240 ml) contains 60 calories, as well as (2Trusted Source):

Carbs: 15 grams

Sugar: 8 grams

Calcium: 4% of the everyday worth (DV) Magnesium: 4% of the DV

Phosphorus: 2% of the DV Potassium: 15% of the DV

Giving 79 kilojoules (19 kilocalories) of food energy in a 100-milliliter (3+1/2-US-liquid

ounce) sum, coconut water is 95% water and 4% starches, with protein and absolute fat substance under 1% each (table). Coconut water contains limited quantities of nutrients and dietary minerals, all under 10% of the Daily Value (DV).

## PRECAUTIONS

Coconut water is ordinarily protected to drink and supplies regular electrolytes. Be that as it may, there are a couple of special cases for remember.

## PREGNANCY AND BREASTFEEDING

There isn't a lot of information accessible on the security of coconut water and pregnancy. In any case, it very well might be more secure to keep away from it during pregnancy/nursing because of its cooling impact on the body.

## LOW BLOOD PRESSURE

Coconut water can possibly diminish circulatory strain. Nonetheless, converse with your nutritionist prior to drinking coconut water assuming you have circulatory strain issues.

## MEDICAL PROCEDURE

During and after medical procedure, coconut water might influence circulatory strain guideline. In this manner, quit drinking coconut water something like fourteen days before the medical procedure.

## HIGH BLOOD POTASSIUM

Coconut water is plentiful in potassium. Try not to drink coconut water assuming you as of now have high potassium levels in your blood.

## DURING RENAL FAILURE/KIDNEY DISEASE

Counsel your medical services proficient prior to drinking coconut water assuming you experience the ill effects of kidney sickness. It is on the grounds that coconut water is wealthy in potassium. This mineral is ordinarily useful to the body. Nonetheless, when the kidneys fall flat, they can't dispose of additional potassium. Hence, it is fundamental for monitor your potassium consumption assuming you experience the ill effects of renal disappointment.

## CYSTIC FIBROSIS

Cystic fibrosis can cause a lessening in salt levels in the body. A few people with cystic fibrosis require liquids or meds to improve salt levels. It is frequently on account of sodium levels. Coconut water has higher potassium than sodium. Subsequently, drinking it might prompt a lopsidedness of sodium and potassium. Try not to polish off coconut water to build your salt levels assuming that you have cystic fibrosis

## STREPTOCOCCUS

*Streptococcus* is a genus of gram-positive cocas or spherical bacteria that belongs to the family *Streptococcaceae*, within the order Lactobacillales, in the phylum Bacillota. Cell division in *streptococci* occurs along a single axis, so as they grow, they tend to form pairs or chains that may appear bent or twisted.

This bacterium, alongside the firmly related species *Streptococcus sobrinus*, can live together the mouth: Both add to oral illness, and the cost of separating them in lab testing is in many cases not clinically fundamental. Hence, for clinical purposes they are

frequently thought to be all together, called the mutans *Streptococci*

## SCIENTIFIC CLASSIFICATION

**GENUS:** *Streptococcus*; Rosenbach, 1884

**CLASS:** Bacilli

**ORDER:** Lactobacillales

**DOMAIN:** Bacteria

**FAMILY:** *Streptococcaceae*

**PHYLUM:** Bacillota

This differs from *staphylococci*, which divide along multiple axes, thereby generating irregular, grape-like clusters of cell. Most streptococci are oxidase - negative and catalase- negative, and many are facultative anaerobes.

The term was coined in 1877 by Viennese surgeon Albert Theodor Billroth (1829–1894). In 1984, many bacteria formerly grouped in the genus *Streptococcus* were separated out into the genera *Enterococcus* and *Lactococcus* (Facklam Ret al., 2002) currently; over 50 species are recognized in this genus. This genus been found to be part of the salivary microbiome (Wang.kunet al., 2016).

## ORAL INFECTION

Mouth is one of the most important parts of your body, performing a variety of functions ranging from expressing emotions to speaking and singing, as well as initiating the digestive process by ingesting food, water, drinks and breathing in air. Your mouth, like any other body part, is vulnerable to infection. Oral infections, also known as mouth infections, are a variety of infections that affect the mouth and surrounding areas. Any type of oral infection can make it difficult to eat, drink or even talk. Sores, oral thrush, gingivitis, periodontal disease, oral herpes, leukoplakia and other common mouth infections.

## CAUSES

An oral infection can be caused by a range of factors are:

- Biting your tongue, Cheek, or Lips Can Cause injury.
- Mouth burns Cause injury.
- Irritation caused by braces and dentures.
- Brushing your teeth too hard Can Cause injury.
- Infection with viruses such as herpes Simplex.
- Infection Caused by bacteria or fungi.
- Tobacco chewing and smoking.
- Immune system deficiency.
- Vitamin deficiency, such as diet low is viterios B-12 and folate.
- Irritable bowel syndrome is an example of an Intestinal disease (IBS).
- Bleeding disorders, Celic disease, HIV, or cancer are all possibilities.

- Hormonal shifts.
- Chemotherapy and radiation.
- OTC medication side effects.

Oral bacteria are serious issue. Oral bacteria produce acids that erode your enamel, resulting in decay and cavities. Bacteria can be found in dental plague, which hardens on the teeth and can lead to gum disease. Fortunately, Coconut water be of assistance. Coconut aid in the removal bacteria from the mouth. Bacteria that cause gum disease are among them.

## ANTIBACTERIAL ACTIVITY

The antimicrobial property of Coconut is dare to its high harine and Content, which has been und medication for certain oral infections, such as According to Some Studies the Sucrose monolactate and glucolipid component found in Coconut has anticaries properties. As a result, the current study was carried out to evaluate the antibacterial activity of young *Cocosnucifera* water against oral infection Causes bacteria.

## MATERIALS AND METHODS

### COLLECTION OF COCONUT WATER

A young green, medium-sized coconut was obtained from the local market of Thiruvannamalai. Fresh tender coconut water was extracted and collected in its natural form in a sterile conical flask.

### COLLECTION OF TEST SAMPLE

The samples from oral swab were collected from patients by brushing a swab on a surface with in the mouth, such as the tongue dorsum or buccal mucosa.

### ISOLATION BACTERIA

The samples were inoculated on to the brain heart infusion [BHI] broth, which was used as the transport media. Then the samples were placed on a selective or non selective media and incubated for 24 hours at 37°C. Each colony was isolated in a pure form by sub culturing for further studies and identification of bacteria.

Further microbial identification was based on the following methods such as Gram`s staining and Biochemical tests including Indole, Methyl red, VogesProskauers ,Citrate,Catalase and Oxidase,TSI and Urease.

## CHARACTERIZATION AND IDENTIFICATION OF BACTERIA

To identify the isolates were carried to cultural, morphological and biochemical characters of the isolates to observe confirm the organism.

### COLONY CHARACTERISTICS

Based on the morphological characteristics.

The organisms were inoculated on the selective media.

**SELECTIVE MEDIA**

1. The blood agar was prepared and poured into petri plates and allowed to get solidify.
2. The samples were streaked on the agar plates and incubated at 37°C for 24 hours.
3. After incubation, the plates were observed for bacterial growth and formation of haemolysis.

**ANTIBACTERIAL ACTIVITY OF AGAR WELL DIFFUSION METHOD**

- Muller hinton agar was prepared, sterilized and into petriplates and allowed to get solidify.
- The test organism was swabbed on the MHA plate.
- The MHA plates was punched with sterile cork borer 4 mm.
- Using a sterile micropipette 125µl of sample was poured in the wells.
- The plates were allowed to stand by 30 minutes.
- The plates were incubated at 37°C for 48 hours.
- The zone of inhibition was measured using a

scale.

- The zone of inhibition were compared with zone formed by streptomycin antibiotic as standard control.

**RESULTS AND DISCUSSION**

In the present investigation was made to prove the antibacterial activity of young coconut water against oral infection causing bacteria.

The colony morphology of complex medium shows oval shaped colonies. Gram staining shows purple coloured cocci in chains. So it is gram positive cocci, colony morphology of bacterial was recorded.

Biochemical characters were shows Indole-Negative, Methyl red – positive, Voges Proskauer- Negative, Citrate - Positive, TSI- Positive, Urease – Negative, Catalase- Positive, Oxidase- Negative. The result of the agar diffusion assay showed that the extract have with antibacterial effect against the Gram-Positive bacterium.

**TABLE I BIOCHEMICAL IDENTIFICATION FOR BACTERIAL ISOLATES**

| S.NO | ORGANISMS     | I | MR | VP | Cit | Ure | TSI | Oxi | Gram staining | Motility |
|------|---------------|---|----|----|-----|-----|-----|-----|---------------|----------|
| 1.   | Streptococcus | - | +  | -  | +   | -   | +   | -   | +             | -        |

The present study of *cocos nucifera* was found to be effective against, the gram positive organism with 11.7 to 17.1 in agar well diffusion method.

**TABLE II: CLEARLY INDICATES THE ZONE OF INHIBITION VALUES OF COCONUT WATER SAMPLES**

| ORGANISM             | Agar well diffusion of coconut water (125 µl each) |      |      |       |       |
|----------------------|--|------|------|-------|-------|
|                      | 25µl   | 50µl | 75µl | 100µl | 125µl |
| <i>Streptococcus</i> | 12.4   | 13.5 | 14.2 | 15.2  | 16.1  |

**CONCLUSION**

The study has showed that coconut water can be used as a treatment against bacteria causing oral infection. Some benefits of drinking tender coconut water is fulfils nutrient requirements, keeps heart healthy, decreases blood pressure, controls blood sugar, protects from oxidative stress and prevents kidney stones. It can be used as medicine to help treat people with oral infection. Coconut water can help to remove bacteria from the mouth. These include bacteria that cause gum disease. Another great oral health benefit of coconut water is that it works to replace electrolytes in our body. Hence, it can be concluded that extract coconut water if a good source of medicine for the treatment of oral infection.

**BIBLIOGRAPHY**

- [1] Adolf KA, Edna DD, Rebecca A. Potential Bacterial Health Risk Posed to Consumers of Fresh Coconut (*Cocosnucifera L.*) Water. *Food Nutr Sci.* 2012; 3:1136–43
- [2] Costa CT, Bevilaqua CM, Morais SM, Camurca-Vasconcelos AL, Maciel MV, Braga RR, et al. Anthelmintic activity of *Cocosnucifera L.* on intestinal nematodes of mice. *Res Vet Sci*2010; 88: 101–103, doi: 10.1016/j.rvsc.2009.05.008.
- [3] E.B.C. Lima<sup>1</sup>, C.N.S. Sousa<sup>1</sup>, L.N. Meneses<sup>1</sup> *Brazilian Journal of Medical and Biological Research* (2015) 48(11): 953–964, <http://dx.doi.org/10.1590/1414-431X20154773> ISSN 1414431X
- [4] *Facklam R (October 2002). "What happened to the streptococci: overview of taxonomic and nomenclature changes" Clin. Microbiol. Rev. 15 (4): 613–30. Doi: 10.1128/CMR.15.4.613630.2002. PMC 126867. PMID 12364372*
- [5] Ja-Hyung L, Young-WookJ (2016) Antimicrobial effect of a lauric acid on *Streptococcus mutans* Biofilm. *Ann Int med Dent Res* 2: 21.
- [6] Jose M. Antimicrobial properties of *Cocosnucifera* (coconut) husk: An extrapolation

- to oral health. *J Nat Sci Biol Med.* 2014; 5:359–64.
- [7] Kabara JJ, Swieczkowski DM, Conley AJ, Truant JP (1972) Fatty acids and derivatives as antimicrobial agents. *Antimicrobial Agent Chemother* 2: 23-28.
- [8] Kirszberg C, Esquenazi D, Alviano CS, Rumjanek VM: The effect of a catechin-rich extract of *Cocosnucifera* on lymphocytes proliferation. *Phytother Res.* 2003, 17: 1054-1058. 10.1002/ptr.1297.
- [9] Ramirez VR, Mostacero LJ, Garcia AE, Mejia CF, Pelaez PF, Medina CD et al. *VegetalesempleadosmedicinatradicionalNorperuana.* Trujillo: Banco Agrario del Peru & NACL Univ Trujillo; 1988
- [10] Silva RR, Oliveira e Silva, Fontes HR, Alviano CS, Fernandes PD, Alviano DS. Antiinflammatory, antioxidant, and antimicrobial activities of *Cocosnucifera* var. typical. *BMC Complement Altern Med* 2013; 13: 107.
- [11] Subramanian P, Dwivedi S, Uma E, Babu KG. Effect of pomegranate and aloe Vera extract on *Streptococcus mutans*. *Dent Hypothesis.* 2012;3:99–105
- [12] Venkataraman S, Ramanujam TR, Venkatasubbu VS. Antifungal activity of the alcoholic extract of coconut shell - *Cocosnucifera* Linn. *J Ethnopharmacol* 1980; 2: 291–293, doi: 10.1016/S0378-8741(80)81007-5. 52. Borate PP, Disale SD, Ghalme RS. St
- [13] Yong JW, Ge L, Ng YF, Tan SN. The chemical composition and biological properties of coconut (*Cocosnucifera* L.) water. *Molecules* 2009; 14: 5144–5164, doi: 10.3390/molecules14125144.

