



Antibacterial Activity of Medicinal Plant Extract and Phytochemical Profile

¹Henil Ghanshyambhai Babariya, ²Manish Mehboob Khetani

¹B. Pharmacy Graduate, Faculty of Pharmacy- Marwadi University, Rajkot, Gujarat 360003, INDIA

²B. Pharmacy Graduate, Faculty of Pharmacy- Marwadi University, Rajkot, Gujarat 360003, INDIA

Abstract: According to a research, natural products and their essential components have been used in an old-fashioned traditional medical system. *Cocosnucifera* (L.) (Arecaceae) is commonly called the “coconut tree” and is the most naturally wide spread fruit plant on Earth. According to the World Health Organization (WHO), a plant whose one or more components are used for diagnostic purposes is referred to as a medicinal plant. *Cocosnucifera* belongs to the family Arecaceae. The constituents of *Cocosnucifera* have some biological effects, such as anti-helminthic, anti-inflammatory, antinociceptive, antioxidant, antifungal, antitumor and antibacterial activities. *Caesalpinia bonducella* (L.) belongs to the family Caesalpiniaceae. The present investigation conducting phytochemical profiling of *C. bonducella* seed. The study involved extractions through successive solvent extraction with varying solvents using Soxhlet apparatus followed by phytochemical tests using standard methods.

Key Words - *Cocos Nucifera*, *Caesalpinia Bonducella*, *Acne Vulgaris*, *Propaniobacterium Acne*, Anti- acne activity

I. Introduction

The versatile applications that have recently emerged of great interest on plant derived compounds. The strongest bioactive ancient system of pharmaceuticals, medicine, and food is made up of medicinal plants and other plants. Supplements and other synthetic medicines. According to a research, natural products and their essential components have been used in an old-fashioned traditional medical system^[1-2]

The Arecaceae family, also known as the palm family and sometimes referred to as the "tree of life," includes *Cocosnucifera* (L.). Products made from coconut have long been used in traditional healing. Coconut products like milk, cream, oil, and water are used in ayurvedic medicine to address heart problems, burns, and hair loss^[3]

Traditional uses for *C. nucifera* include treating a variety of pathological diseases with its shell fibers, such as *Diarrhoea*^[13], renal irritation, as an antipyretic, and as a cream for burns, sores, and dermatitis. The fibers are also used to treat diabetes and allergies. Additionally, the leaves and stems are used for stomachaches and *Diarrhoea*. Cocaine's solid albumen is extracted to make milk, pulp, and oil, which are all used as antipyretics, to treat diarrhea, stop hair loss, and to repair wounds^[4,5]

The welfare of people all over the globe is shaped in large part by herbal medicines. In medicine, healing plants are used to treat diseases that affect a person as well as a potential way to keep them healthy. It is essential to comprehend the particular components of plant medicines that are effective in the various treatments. The results of using herbal plants in the typical conventional ways are frequently supported by evidence^[6]

Only 5% of the 300,000 different types of herbs found around the globe have undergone experimental testing for medicinal purposes. Experts have noted that developing countries frequently turn to medicinal plants to treat illnesses, particularly in areas without clinics^[7]

Caesalpinia bonducella (roxb.) is primarily used in the traditional Indian medical system known as Ayurveda for its antimalarial, anthelmintic, calming, antiperiodic, and antipyretic properties. It is also used for a variety of infections including spasms, paralysis, leprosy, skin conditions, hydrocele, orchitis, and analogous nervous grumbles. It is also known to have antidiabetic, antitumor, antimicrobial, and antioxidant properties^[8]

Language	Synonyms/ Vernacular Name
English	Nicker Nut, Nicker Seed, Fever Nut, Bonduc Nut
Sanskrit	Prakiriya, Varini, Krakachika Vitapakaranja, Kakacnika, Valli, Kantakikaranja, Tinagachhika, Karanja Tirini, Kantakari, Putikaranja, Latakaranja, Karanjin

[9]

Table 1: Vernacular Names *Caesalpinia bonducella*

The phytochemical analysis of *Caesalpinia bonducella* seeds and *Cocos nucifera* endocarp powder was carried out by using extraction method and extracts were screened for antibacterial activity against *Propaniobacterium acne*. It may provide scientific justification for their use in indigenous communities and broaden the scope of existing drug discovery programs.

Figure 1: *Cocos nucifera* fruitFigure 2: *Caesalpinia bonducella* seeds

II. Material and Method

COLLECTION OF PLANT MATERIALS AND PREPARATION OF SAMPLE

The moist endocarp of *Cocos nucifera* was collected from the Balak Hanuman temple in the Pedak road local area of Rajkot, India and The *C. bonducella* seeds were procured in February 2023 from Panchtalavda in the Amreli District of Gujarat, India. Professor Sonal Kanani of the Department of Pharmacognosy, Faculty of Pharmacy at Marwadi University, Rajkot Gujarat subsequently confirmed the authenticity of the sample.

i. Method of Extraction: -

The Whatman filter was packed with the granules (50g). Using a Soxhlet extractor, coarse powder of the crude drug was sequentially extracted for 8 hours with 70% Methanol (250ml) solvents. With the help of a funnel and tripod platform, it was then filtered using Whatman filter paper No.1 The resulting solution was then heated in a hot air oven to 50 °C and evaporated to produce the methanol crude extract (1.62g) with the yield of 3.24%. The products were kept safe at 37 °C until they were needed again and Using a Soxhlet apparatus, 50g of air-dried *Caesalpinia bonducella* seeds were extracted

with 300ml of methanol. The crude extract was filtered and evaporated under Hot air Oven about 3hrs respectively for both the plant. The viscous jelly extract was found to be (6.04g) with the yield of 12.08%.

ii. Phytochemical Screening: -

Take 5 gm of drug and dissolve in 25 ml of water and stand on water bath for few minutes. filtrate is subjected to the following test

MOLISCH TEST: -

The test is positive with soluble as well as insoluble carbohydrates. It consists of treating the compounds with α -naphthol and concentrated sulphuric acid which gives purple colour. With a soluble carbohydrate this appears as a ring if the sulphuric acid is gently poured in to form a layer below the aqueous solution. With an insoluble, carbohydrate such as cotton wool (cellulose), the colour will not appear until the acid layer is shaken to bring it in contact with the material.

BARFOED'S TEST: -

1 ml of filtrate, 1 ml of Barfoed's reagent is added and heated on a boiling water bath for 2 minutes. Red precipitate indicates the presence of sugar.

GLYCOSIDES

For detection of glycoside, take 5 gm of powder dissolve in 25 ml of water, add 5ml dilute HCl on water bath for few minutes (15 minutes), filter and filtrate are subjected to the following test.

Chemical Tests for Saponin Glycoside: -

FOAM TEST: -

Take 1ml of extract, add 2–5 ml of water, shake for few minutes, formation frothing which persists for 60–120 s in presence of saponins.

Chemical Tests for Flavonoid: -

VANILLIN HCL TEST: -

Vanillin HCl was added to the alcoholic solution of drug, formation of pink colour due to presence of flavonoids.

FERRIC CHLORIDE TEST: -

Ferric chloride was added to the alcoholic solution of drug, Formation of yellow color which changed to colorless on acid addition

TANNINS: -

Take 5 gm of drug and dissolve in 25 ml of water and stand on water bath for few minutes. filtrate is subjected to the following test.

GELATIN TEST: -

To a 1% gelatin solution, add little 10% sodium chloride. If a 1% solution of tannin is added to the gelatin solution, tannins cause precipitation of gelatin from solution.

VANILLIN-HYDROCHLORIC ACID TEST: -

Drug shows pink or red colour with a mixture of vanillin: alcohol: dilute HCl in the ratio 1:10:10. The reaction produces phloroglucinol which along with vanillin gives pink or red colour.

ALKALOIDS

Take 5 gm of drug and dissolve in separately water, methanol and chloroform. Stand in water bath for few minutes. Filter, evaporate to dryness. Dry residue, add dilute hydrochloric acid and stand on water bath and filter again. filtrate is subjected to the following test.

DRAGENDORFF'S TEST: -

Drug solution + Dragendorff's reagent (Potassium Bismuth Iodide), formation of Orangish red colour.

AMINO ACIDS: -**NINHYDRIN TEST: -**

Take 3 ml of test solution was heated and three drops of 5% ninhydrin solution is added in boiling water bath and was boiled for 10minutes. Purple or bluish colour appeared.

Chemical Tests for Coumarin Glycosides: -**FLUORESCENCE TEST: -**

The alcoholic extract of drug was mixed with 1N NaOH solution (one ml each). Development of blue-green fluorescence indicates presence of coumarins.

iii. Antibacterial Activity: -

The disc diffusion technique was used to test the antibacterial activity of the prepared herbal gels. The gels were tested against staphylococcus aureus and pseudomonas aeruginosa.

PROCEDURE: -**Preparation of Agar Medium: -**

- In 1000 mL distilled water, dissolve 28.0 grams of agar powder.
- After that, to dissolve the medium completely the mixture is heated with regular stirring until it boils then by autoclaving at 15 lbs for 15 minutes in 121 °C sterilizing occurs.
- After finishing the sterilizing, the mixture was cooled to 45-50 °C and mixed well then pour the agar mixture to a consistent depth into a sterile glass petri dish on a level surface.

Preparation: -

- In the aseptic area the instruments were sterilized in laminar air flow. after sterilizing make some space in the agar mixture to add herbal gel sample. Then using a wire loop, take four or five colonies from a pure bacterial culture (not older than 48 hours, except for slow-growing species). Then Transfer colonies to the agar mixture on petri plate and spread it around the agar mixture.
- After finishing the transferring the petri plate was placed in incubator for 24 hours.

III. Result and Discussion: -**(1) Phytochemical Analysis**

To find out whether secondary plant metabolites were present or not, qualitative phytochemical assays using MeOH-Extract were carried out. According to our results, samples from the plants *Cocos nucifera* endocarp Coumarin and *Caesalpinia bonducella* seed contained Amino acid, the presence of flavonoids, carbohydrates, glycosides, alkaloids, and tannin in the both samples according to the table:

Sr No	Phytochemical	<i>Cocos nucifera</i>	<i>Caesalpinia bonducella</i>
1	Flavonoids	+	+
2	Carbohydrates	+	+
3	Glycosides	+	+
4	Alkaloids	+	+
5	Tannin	+	+
6	Amino acid	-	+
7	Coumarin	+	-

Table 2: Phytochemical screening of *Cocos nucifera* and *Caesalpinia bonducella* plant extract

(2) Antibacterial Assay

Anti-microbial activity of plant extract showed below as in the form of Zone of Inhibition.

ANTIBACTERIAL ACTIVITY OF COCUS NUCIFERA ENDOCARP EXTRACT (WATER AND METHANOL)

The zone of inhibition’s length (measured in millimeters) grew in tandem with the concentration of Cocos nucifera endocarp extract. Notably there was no detectable antibacterial properties in a 2% methanolic extract. A 6% methanolic extract showed the strongest antibacterial activity against Propionibacterium acne, resulting in 23 mm Zone of Inhibition. A 2% water extract, on the other hand, had the least inhibitory impact and produced a 10.5mm Zone of inhibition. The findings are visually summarized in the images below, which graphically depict the results.

Concentration of extract	Zone of Inhibition(mm)		Mean (mm)
2% (Water extract)	D1	11.6	10.5±01.95
	D2	10.0	
	D3	09.9	
4% (Methanolic extract)	C1	14	15.6±02.08
	C2	18	
	C3	15	
6%(Methanolic extract)	E1	22	23±01
	E2	24	
	E3	23	

Table 3: Antibacterial activity of Cocos nucifera

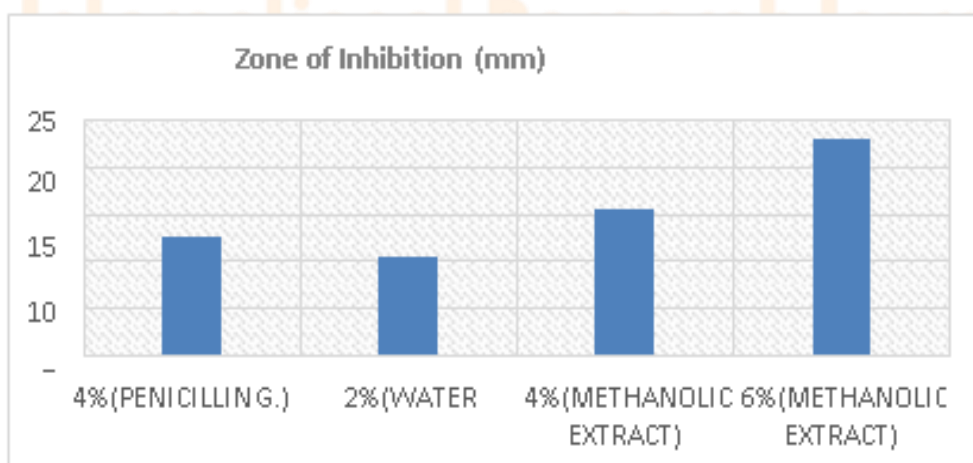


Figure 3: Conc. VS Zone of Inhibition for Cocos nucifera

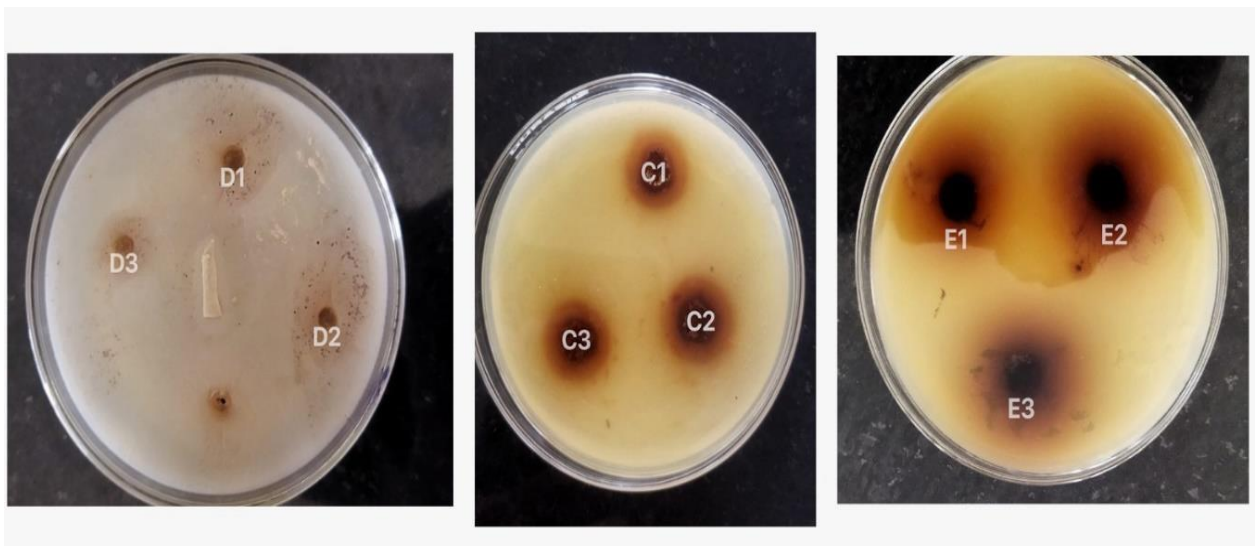


Figure 4: Antibacterial activity for various extract concentration of *Cocos nucifera endocarp*

II. ANTIBACTERIAL ACTIVITY OF CAESALPINIA BUNDUCELLA SEEDS EXTRACT (WATER AND METHANOL)

The extract was tested against *Propaniobacterium acne*, the antibacterial activity of *Caesalpinia bonducella* seed extract revealed that 4% methanolic extract exhibited 14.3 mm Zone of Inhibition and 4% Water extract displayed the greatest activity with 21.3 mm Zone of Inhibition. But both extracts were more active than the reference medication, Penicillin G. the results are vividly represented in the graphic representations below, that graphically illustrate the findings.

Concentration of extract	Zone of inhibition (mm)		Mean (mm)
4% (Methanol extract)	A1	12	14.3±03.21
	A2	13	
	A3	18	
4% (Water extract)	B1	20	21.3±01.52
	B2	21	
	B3	23	

Table 4: Antibacterial activity of *Caesalpinia bonus*

Concentration of extract	Zone of inhibition (mm)			Mean (mm)
Penicillin G.	R1	1%	10	12.6±03.055
	R2	2%	12	
	R3	4%	16	

Table 5: Antibacterial activity of reference drug

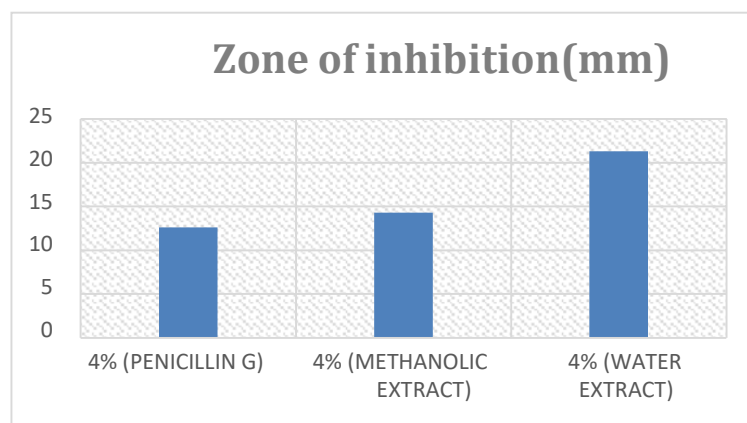


Figure 5: Conc. VS Zone of Inhibition for *Caesalpinia bonduc*

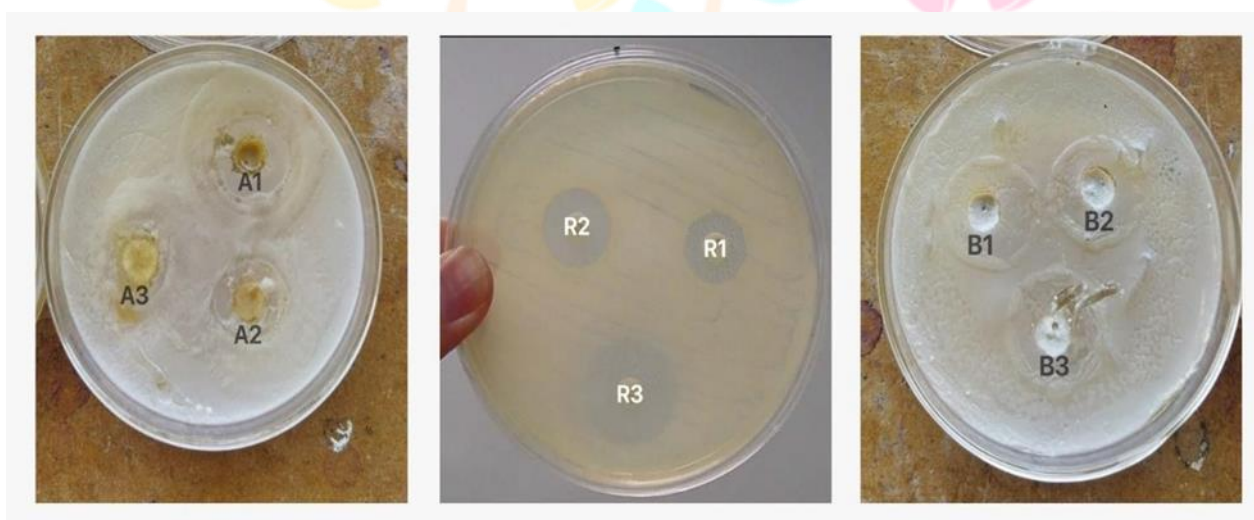


Figure 6: Antibacterial activity for various extract concentration of *Caesalpinia bonduc* seeds and Penicillin G

IV. Conclusion

The current study has uncovered that the anti-acne effects of *Cocos nucifera* endocarp and *Caesalpinia bonduc* seeds extracts, as well as the assessment of physical parameters, produced positive outcomes based on the results of the zone of inhibition. It was observed that the both extracts herbal preparations exhibited significant activity against the tested pathogens, similar to the reference drug sample. Therefore, based on the comprehensive findings, it can be conclusively stated that the developed herbal extracts possess noteworthy anti-acne properties and are thus poised to be a superior, safe and effective option.

V. References

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