

Pharmacognostic Studies on *Theobroma cacao*

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ABSTRACT

Raw cocoa has the highest antioxidant value of all the natural foods in the world. Fresh cocoa beans are super-rich in the type of bioflavonoid called flavanols, which are strong antioxidants that help maintain healthy blood flow and blood pressure. Cornell University food scientists discovered that cocoa powder has nearly twice the antioxidants of red wine, and up to three times the antioxidants found in green tea. Cocoa also appears to have anti-aging and anti-inflammatory properties. Considering all the health benefits it can be used as a dietary factor in daily life. In light of these scientific evidences, it can be considered as a potential candidate for further study on management of prostate cancer. Hence this detailed Pharmacognosy study of the plant has been performed.

KEYWORDS: *Theobroma cacao*, Physicochemical, TLC, Histological, Microbial limits

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INTRODUCTION

Theobroma cacao L belongs to Family Malvaceae. Cacao is a small, evergreen tree with a globose crown; usually growing about 8 metres tall, though exceptionally it can reach 20 metres. The short lobe is 20 - 30cm in diameter. This species is widely cultivated in lowland tropical areas around the world for its seed, the source of chocolate. It was grown by the Aztecs and Mayans, who considered it a divine plant and even used the seeds as a form of currency. It is rich in polyphenols thus considered as super food, particularly in flavan-3-ols such as epicatechins, catechins, and procyanidins. These polyphenols may contribute to the reduction of lipid peroxidation., inhibit LDL oxidation help maintain healthy blood flow and blood pressure and atherogenesis. Raw cocoa has the highest antioxidant value of all the natural foods in the world,.

Cocoa also appears to have anti-cancer, anti-diabetic, anti-hypertensive, anti-aging and anti-inflammatory properties [1].

In a comparative study of acetone and water extract of cocoa to evaluate anti-oxidant property by DPPH assay, acetone showed higher antioxidant activity (54%) [2]. Anti-microbial activity of green synthesized cocoa pod husk extract when evaluated against clinical isolates

Escherichia coli and *Klebsiella pneumonia*, strongly inhibited the growth of the pathogens. Further, this synthesis was investigated for their anti-microbial potential as a paint additive, led to effective inhibition of the growth *E. coli*, *K. pneumoniae*, *S. pyogenes*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*, *A. flavus*, *A. fumigatus* and *A. niger* [3].cocoa showed dose dependant inhibition of α -amylase, α -glucosidase, and angiotensin-1 converting enzyme thus acting as a management strategy in diabetes [4]. When ethanolic extract of *Theobroma cacao* stem bark and its dichloromethane (DCMF), ethylacetate (EAF) and aqueous (AQF) fractions was investigated for anti-inflammatory activity, Ethanol extract and its ethylacetate fraction demonstrated anti-inflammatory activity [5].

Considering all the health benefits it can be used as a dietary factor in daily life. In light of these scientific evidences, it can be further standardized using pharmacognosy.

MATERIALS AND METHODS

Voucher specimen: The plant material seed of *Theobroma cacao* was procured from the farmers field in Sulia, Mangalore District of Karnataka State and Identity was confirmed with the voucher specimen [6]. **Physico-chemical**

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values such as the percentage of total ash, acid-insoluble ash, and water and alcohol-soluble extractives were calculated [7]. TLC fingerprinting profile was carried out [8]. For the

Anatomical studies, transverse sections (TS) were prepared and stained [9]. A standard, Limit for total microbial count provided by WHO was followed [10]

RESULTS AND DISCUSSIONS

Physicochemical Parameters:

Table 1- showing Physicochemical and organoleptic observations

Physicochemical Constants			Organoleptic Characters	
Parametrs	Values	Limit	Parametrs	Values
TA	3.95%	-	Taste	Sweetish
AIA	0.1%	-	Color	Brown
ASE	8.9%	-	Odour	Strong
WSE	9.5%	-	Texture	Smooth

TA - Total Ash; AIA - Acid Insoluble Ash; ASE - Alcohol Soluble Extractive; WSE - Water Soluble Extractive

The Organoleptic and Physicochemical parameters indicate the purity and authenticity of the plant under study. The colour of the powder is brown with sweetish taste (Table-1).

TLC Finger Printing Profile:

Table 2- showing Rf values

Under Visible Light								
Rf Values	-	-	-	-	-	-	-	-
Sprayed with 10% H ₂ SO ₄								
Rf Values	0.35	0.43		0.93	-	-	-	-
Sprayed with Anisaldehyde								
Rf Values	0.36	0.4	0.46	0.95	-	-	-	-
Under Short UV (254 nm)								
Rf Values	-	-	-	-	-	-	-	-
Under Long UV (366 nm)								
Rf Values	-	-	-	-	-	-	-	-



Fig 1- TLC profile of Cocoa

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The fingerprint profile of the methanolic extract showed 3 bands with almost common R_f values when sprayed with H₂SO₄ and Anisaldehyde respectively and one extra band was

seen when sprayed with anisaldehyde. No bands were seen when observed under visible light, UV light with 254nm and 366 nm (Table-2 Fig-1).

Anatomical Characters:

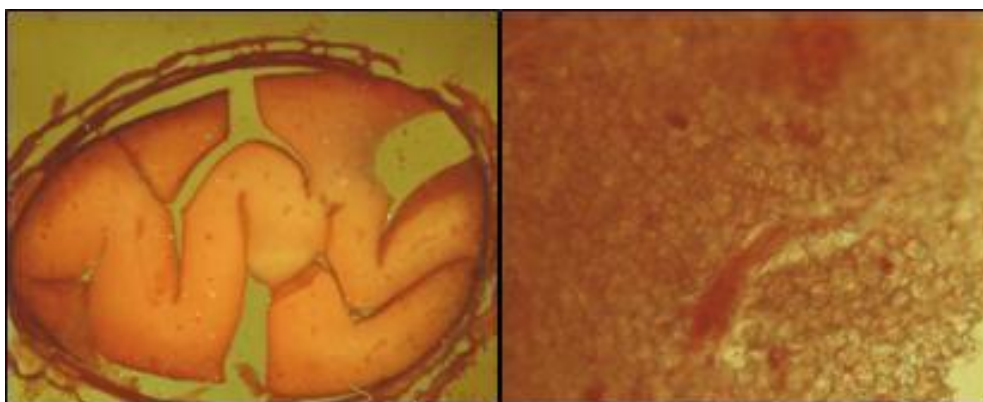


Fig 2- showing Anatomical studies of Cocoa

1. Thin epidermal layer covered with thin cuticle dumbbell shaped cells, 2. Large vacuoles are present on the epidermal layer with which are parenchymatous cells, 3. Inner mesocarp consists of parenchyma cells with large number of oil

globules and starch grains, 4. Endocarps consist of embryo, which is coiled like structure filled with aleurone grains(Fig 2).

Powder Characters: Powder Colour: Brown:

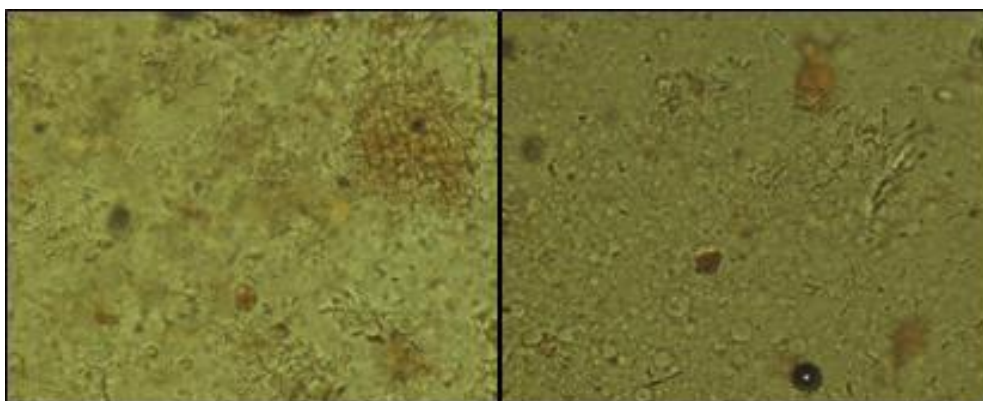


Fig 3- showing powder microscopical studies of Cocoa

1. Polygonal Parenchyma and sclerenchyma cells present, 2. Vessels are present, starch grain and oil globules are seen (Fig

indicated that the results are well within the range of WHO guidelines.

Microbial Limit Test:

Total Aerobic Bacterial Count (TABC): 1.9×10^3

Total Yeast and Mould Count (TYMC): 0.6×10^3

(Microbial contamination limit for raw herbs - TABC: $<10^7$, TYMC: $<10^5$)

The results conform the WHO (1998) guidelines.

CONCLUSION

The pharmacognostic studies on *Theobroma cacao* will help in identifying and authenticating the material when powdered sample is provided. The TLC showed unique fingerprint profile and the histological studies revealed the presence of oil globules in the material. The microbial limit studies

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