



Phytochemical Screening and Gram-Negative Antibacterial Activity of *Carica Papaya* leaves extracts



^{*1,2}Isah, H. A. and ²Aliyu, M. D.

1. Chemistry Department, Faculty of Sciences, Nigerian Defence Academy, Kaduna Sttate, Nigeria. 2. Department of Pure and Industrial Chemistry, Faculty of Natural and Applied Sciences, Umaru Musa Yar’adua University, Katsina, Nigeria. *Corresponding Author: hadizaaminu246@gmail.com, +2347047818643

1. Introduction

Cases of multi-drug resistance were being reported soon after antibiotics were first introduced for clinical use [1]. Treatment of patients with antibiotic resistant infectious diseases is often considerably less successful than would be normally anticipated, thus the rise of antibiotic resistant pathogens has a significant impact on healthcare [2], [3], [4]. Gram-negative bacteria has been described as pathogens with higher level of resistance and posse more serious threat to the healthcare system by the Center for Disease Control[4], [5]. Thus, we are exploring *C. papaya* as possible source for Gram-negative antibiotic. Therefore, the present study was designed to investigate the bioactive phytochemical of *C. papaya* leaves against Gram-negative antibacterial with higher antibiotic resistance.

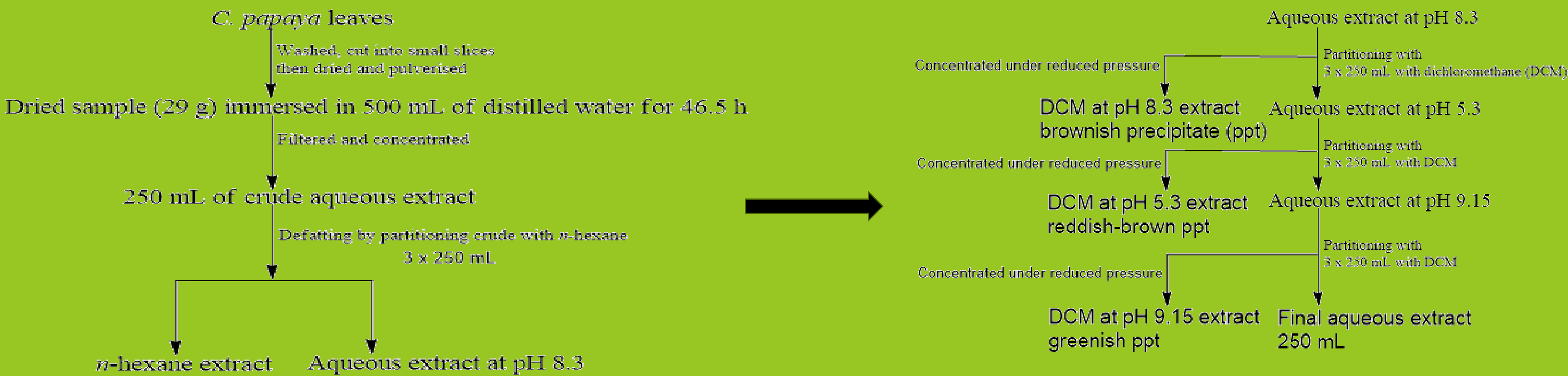
2. *Carica Papaya*

Carica papaya is a small fruit tree up to 2 to 10 meters high with straight bole, the leaves are grouped towards the top, all parts of the plant contain latex, the papaya is mostly dioecious and the fruit is fleshy, is an ovoid berry of varying size, shape and color according to variety (pictured below).



C. papaya leaves have been used as anti-inflammatory, dengue, and malaria, antimicrobial among traditional medicine in Africa. Leaves from *Carica papaya*, were collected from Shagari Lowcost, Katsina Local Government, Katsina State. The leaves were identified and authenticated as *Carica Papaya* at the Biology Department of Umaru Musa Yar’adua University (UMYU), Katsina state, Nigeria.

3. Extraction of *C. papaya* leaves



4. Phytochemical Screening

Table 1 – Qualitative phytochemical analysis of *C. papaya* leaf extracts

Phytochemicals	Crude Extracts			
	<i>n</i> -Hexane	DCM 1	DCM 2	DCM 3
Saponins	-	-	+	+
Flavonoids	+	-	+	+
Terpenoids	+	-	+	-
Alkaloids	+	+	-	+
Steroids	+	+	+	+

+ = present, - = absent; DCM 1=DCM at pH 5.3; DCM 2= DCM at pH 8.3; DCM 3= DCM at pH 9.15

5. Antibacterial Screening

Table 2- Antibacterial screening of crude extracts of *C. papaya* leaves against *P. aeruginosa* Gram-negative bacteria

Crude Extracts	Zone of inhibition (mm)
n-hexane	9
DCM at pH 5.3	7
DCM at pH 8.3	22
DCM at pH 9.15	0
Positive control (ciprofloxacin)	28
Negative control (blank disk)	0

6. Minimum Inhibitory Concentration

Table 3- Minimum Inhibitory Concentrations of crude extracts

Extracts	Concentrations mgmL ⁻¹				MIC
	250	125	62.5	31.25	
n-hexane	9	7	0	0	250 mgmL ⁻¹
DCM at pH 5.3	7	0	0	0	250 mgmL ⁻¹
DCM at pH 8.3	22	15	12	11	31.25 mgmL ⁻¹
DCM at pH 9.15	-	-	-	-	NA
Control	28				8 -32 µgmL ⁻¹

7. Conclusion

The phytochemical screening of *C. papaya* leaves extracts shows the presence of steroids, alkaloids, terpenoids, saponins and flavonoids, the antibacterial activity of the extracts against *P. aeruginosa* bacteria shows DCM at pH 8.3 extract exhibit the highest bioactivity against *P. aeruginosa*. From the phytochemical screening, the presence of terpenoids phytochemical may be responsible for the Gram-negative antibacterial activity observed. These findings indicate that *C. papaya* leaves extract may be used in the treatment against resistant *P. aeruginosa* Gram-negative bacteria.

References

[1] World Health Organisation WHO global strategy for containment of antimicrobial resistance. Geneva: WHO; 2001. [2] World Health Organisation The evolving threat of antimicrobial resistance. Options for action. Geneva: WHO Library Cataloguing-in-Publication Data; 2012. [3] Singh V. “Antimicrobial Pathogens and Strategies for Combating Them: Science, Technology and Education.” Vol. 1, pp 291-296, 2013. [4] Centres for Disease Control and Prevention, Healthcare-Associated Infections (HAIs), Gram-negative Bacteria, 2011. [5] J. O’Neill. “Review on Antimicrobial Resistance.” 2014, 1-20. [6] Pontefract BA, Ho HT, Crain A, Kharel MK and Nybo SE. “Drugs for Gram-Negative Bugs From 2010-2019: A Decade in Review.” *Open Forum Infect. Dis.*, Vol. 7 no. 7, pp 1-10, 2020, doi.org/10.1093/ofid/ofaa276.