

**VIABILITY OF LIPOSOMAL-NANOENCAPSULATED *AVICENNIA
MARINA* ROOTS ETHYL ACETATE EXTRACT AS POTENTIAL
ANTICANCER DRUG**

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.




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ABSTRACT

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Cancer is a group of diseases characterized by its rapid spread and growth. Currently available cancer treatments come with harmful side effects, prompting an interest in naturally-derived drugs as a possible alternative treatment. The Mangrove consists of a number of species and is found to have anticancer properties due to its phytochemical content. In this thesis work, *Avicennia marina* roots is extracted with ethyl acetate and enclosed within liposome to be studied as a potential anticancer drug. The encapsulation of extract is expected to preserve its quality. The extract is found to contain phenolics in a moderate amount (392.84 mg/g) and flavonoids in a large amount (2960.4 mg/g). The antioxidant activity of extract before and after encapsulation is found to be inactive ($IC_{50} = 1351.82 \pm 2.23$ ppm and 1702.89 ± 3.37 ppm, respectively). The encapsulation is calculated to be 73.86 ± 0.02 % efficient and encapsulated extract has a particle size of 436.27 nm, PI of 0.627, and zeta potential of -63.27 mV. The anticancer activity of both encapsulated and non-encapsulated extract against MCF-7, HeLa, and Hep G2 cells is categorized as active-highly active. The BLST method also proved that both encapsulated and non-encapsulated extracts are non-toxic towards normal cells ($LC_{50} > 1000$ ppm).

Keywords: Avicennia marina, anticancer, compound, encapsulation, extract



DEDICATION

I dedicate this thesis to myself and all the people who have supported me, as well as to the future of cancer research.



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