



**International Journal of Research
in
Pharmaceutical and Nano Sciences**

Journal homepage: www.ijrpns.com

<https://doi.org/10.36673/IJRPNS.2022.v11.i03.A29>



NEPHELIUM LAPPACEUM: A REVIEW ON PHARMACOLOGICAL ACTIVITIES

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ABSTRACT

Nephelium lappaceum (Family- Sapindaceae), popularly known as ‘Rambutan’, is an evergreen tree, native to Malaysia also grown in other parts of the world. The plant has been used as traditional medicine for fevers, antidiabetic, antimicrobial etc. This review designed to point out the various pharmacological activities of this plant.

KEYWORDS

Antioxidant, Antidiabetic, Analgesic, Anti-inflammatory activity, Cardiovascular activity, Antidiarrhoeal activity, Antimicrobial activity and Anticancer activity.

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INTRODUCTION

A herbal medicine is defined as plant derived products, including leaves, stems, root, flowers and seeds, used for medicinal and health purpose. 80% of the world population depends on medicinal herbs as a primary health care system as per the records of WHO. The secondary metabolites produced by the plants are responsible for the biological activities and are used for the synthesis of different drugs. Drugs of natural origin can be safe, cost effective, easily available and more potent¹.

Nephelium lappaceum is a tropical fruit in the Sapindaceae family, mostly located in tropical countries such as Malaysia, Thailand, Indonesia, Singapore. *Nephelium lappaceum* is known as rambutan, which is a word originating from the

Malay “rambut”, which means “hair”. The fruit can be eaten freshly or in processed form².

Rambutan has many traditional uses and all its parts including its leaves, rind and seeds were reported to contain important phytochemical constituents. Phenolic compounds were the most important phytochemical constituent investigated in Rambutan fruit peels and were reported to possess antioxidant, antibacterial, antidiabetic and various other pharmacological activities³.

Scientific classification⁴

Kingdom: Plantae

Subkingdom: Tracheobionta

Super division: Spermatophyta

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Rosidae

Order: Sapindales

Family: Sapindaceae

Genus: *Nephelium*

Species: *Nephelium lappaceum*

PHARMACOLOGICAL ACTIVITIES

Antioxidant activity

The phenolic contents and antioxidant and antibacterial activities of various extracts of the seeds and peel of *Nephelium lappaceum* were studied and the results revealed higher amount of phenolic contents in the methanol extract of peels and demonstrated potential antioxidant activities than the seed extracts.

The antioxidant, cytotoxic, thrombolytic and membrane stabilizing activities of the methanol extracts of leaves of *Nephelium lappaceum*, along with other plant leaves were studied using DPPH radical scavenging activity. The study indicated highest free radical scavenging activity for *Nephelium lappaceum*.

The antioxidant activity of *Nephelium lappaceum* leaves using DPPH and ABTS methods and estimated total flavonoid, phenolic and carotenoid content in the extracts. The results of the study revealed high correlation between total phenolic content in all extracts along with their significant antioxidant activity.

The antioxidant activity of *Nephelium lappaceum* fruit peel extracts was also studied in nanoemulsion gel formulation using DPPH scavenging and Ferric thiocyanate methods. The result revealed promising antioxidant activity of the prepared formulation⁵.

Antidiabetic activity

Antidiabetic activity of the rind extracts was studied on ethanolic extracts, which were effective in inhibiting alpha glucosidase and alpha amylase, the geraniin-enriched ethanolic extracts inhibited aldol reductase, the key enzyme in the polyol pathway. The potent inhibitory effects on both α amylase and α -glucosidase activities *in vitro* suggesting that rambutan rind is useful in the treatment of type 2 diabetes mellitus.

The antidiabetic effects of the ethanol extract from the rind of *Nephelium lappaceum* in a high fat-induced diabetic rat models revealed that the rind extract possess antihyperglycaemic activity without any major toxic effects in high-fat diet induced diabetic rats.

The antioxidant and hypoglycaemic activities of the ethanol extract of the seeds and its fractions in n-hexane, ethyl acetate, butanol and water. The antioxidant activity was determined by DPPH radical scavenging activity and using superoxide dismutase value. The hypoglycemic activity was estimated by inhibition of α -glucosidase activity. The results of the study revealed highest activity with ethyl acetate and aqueous fractions.

The ethanol extract of the fruit peels was studied in alloxan induced diabetic rats and reported significant reduction in the blood glucose levels in alloxanized rats at doses of 125 to 500mg/kg respectively by the extract.

Analgesic and Anti-inflammatory activity

The ethanol extract of the rind is reported to possess protective effects of against collagen induced arthritis in rats at dose levels of 100 and 200mg/kg. The results of the study demonstrated significant reduction in arthritis induced changes in body weight and paw edema. The extract exhibited potent analgesic and anti-inflammatory activities.

Cardiovascular activity

The acute effects of ethanol extract of rambutan bark on cardiovascular and respiratory responses in rats were studied and the results showed prolonged cardiovascular response⁶.

Antidiarrhoeal activity

The methanol extract of the seeds are reported to possess significant antidiarrhoeal activity of when tested using castor oil induced diarrhoeal model in rats. The extract exhibited significant inhibition of fecal dropping compared to loperamide⁷.

Antimicrobial activity

The antimicrobial activity of the petroleum ether, chloroform and ethanol extracts of peel of *Nephelium lappaceum* against Staphylococcus aureus, Bacillus subtilis, Bacillus cereus, Lactobacillus bulgaricus, Escherichia coli, Proteus vulgaricus, Pseudomonas aeruginosa, Salmonella typhi, Saccharomyces cerevisiae, Candida lypolytica, Rhizopus spp, Aspergillus niger, Vibrio cholerae, Enterococcus faecalis, *S. aureus* and Staphylococcus epidermidis except *E. coli*, *Klebsiella pneumonia* and *Chlamydomucor* spp. The results revealed that the extracts are active against all tested bacteria except *P. aeruginosa*.

The aqueous extract of the whole fruit, outer skin and fruit sap of *Nephelium lappaceum* were studied for possible antimicrobial activity against various organisms. The whole fruit extract showed a high inhibitory action against *A. hydrophila* and minimum effect on *S. aureus*. The skin extract registered a maximum activity against *P. aeruginosa* and minimum activity against *C. tetani*.

Another study confirmed that the aqueous extract of the seeds possess antibacterial activity against *S. aureus*, *Streptococcus pyogenes*, *Bacillus subtilis*, *E. coli* and *P. aeruginosa*.

Anticancer activity

The anticancer activity of the methanol extract of red and yellow varieties of *Nephelium lappaceum* against breast cancer cells (MDA-MB-231), cervical cancer cells (HeLa) and osteosarcoma cancer cells (MG-63) were studied. The results showed promising activity for the yellow variety

against MDA-MB-231 and MG-63 with IC₅₀ value 5.42±1.67µg/ml and 6.97±1.02µg/ml respectively⁸.

CONCLUSION

Nephelium lappaceum is a very useful plant has its application in the traditional medicine for centuries. It is a best source of minerals, nutrients and various essential compounds. This literature review reveals that this plant possesses various biological activities like antioxidant, antidiabetic, analgesic and anti-inflammatory, cardiovascular activity, antidiarrhoeal, antimicrobial and anticancer activity. The plant should be studied thoroughly for finding out other possible biological activities.

ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to their family, friends and college for providing necessary facilities to prepare the review article.

CONFLICT OF INTEREST

We declare that we have no conflict of Interest.

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Please cite this article in press as: Nisheena U A et al. *Nephelium Lappaceum*: A review on pharmacological activities, *International Journal of Research in Pharmaceutical and Nano Sciences*, 11(3), 2022, 246-249.