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Antioxidant activity and protein precipitating ability of peel extract of *Nephelium lappaceum* Linn. (Rambutan)

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Nephelium lappaceum Linn. (Rambutan) peels, one of the tropical agricultural wastes, have been identified as a rich source of polyphenols with antioxidant properties. Plant phenolic compounds can interact with protein molecules and the polyphenol-protein complexes enhance the antioxidant capacity of polyphenols and therefore influences the bioaccessibility of phenolics. This study was aimed to determine the antioxidant activity and the bovine serum albumin (BSA) protein precipitating ability of peel extract of Rambutan (*Nephelium lappaceum*). Fresh Rambutan fruits of Malwana special variety were collected from a commercial cultivation in the Western province, Sri Lanka. Chemical constituents in dried, powdered Rambutan peels were extracted using cold extraction (extracting solvents = methanol, ethanol, and ethyl acetate) (6 days, 37° C) and methanolic soxhlet extraction (6 hrs, 60 °C) separately. Antioxidant activity and total phenolic content (TPC) of freeze-dried extracts were determined using 1,1-diphenyl-2-picryl-hydrazyl (DPPH) free radical scavenging assay and Folin-Ciocalteu assay, respectively. The correlation between antioxidant activity and TPC was analyzed using Pearson's correlation. Since the methanolic crude extract obtained from cold extraction was rich in phenolics, it was fractionated into hexane, dichloromethane (DCM), ethylacetate, and aqueous methanol, and their protein precipitation ability was determined using Bradford assay. Among the crude extracts, the highest percentage yield was obtained from soxhlet extraction (34.5 %). Methanolic cold extract had the highest TPC (332.56 ± 1.20 mg GAE / g of extract), and ethylacetate crude extract had the lowest TPC (210.13 ± 3.20 mg GAE / g of extract). Further, antioxidant activity of soxhlet extract (IC_{50} = 9.70 ± 0.50 µg/mL) and methanol (IC_{50} = 8.20 ± 0.35 µg/mL) and ethanol (IC_{50} = 8.31 ± 0.50 µg/mL) cold extract was significantly higher ($p < 0.05$) than that of synthetic antioxidant BHT (IC_{50}=13.92 ± 1.19 µg/mL). Statistically significant ($p < 0.01$), a strong positive correlation was observed between DPPH radical scavenging activity and the TPC with Pearson's correlation coefficient (r) of 0.99. Hence, the results suggested a potential for the utilization of peels *N. lappaceum*, as a nutraceutical enriched with natural antioxidants. According to results of protein precipitation potential of fractions, the highest percentage of BSA precipitate was observed (88.54 ± 0.92 %) in the ethyl acetate fraction. Thus, this study identified that Rambutan peel polyphenols have an affinity to bind with BSA at pH 4.5 *in-vitro* and the antioxidant activity of Rambutan peel extract would be masked by polyphenol–protein precipitation to some extent. Therefore, further studies should be necessary to isolate, purify, and identify polyphenols in Rambutan peels with their protein precipitation potentials to understand the mechanism of phenolic-protein interactions and their industrial applications.

Keywords: Antioxidants, *Nephelium lappaceum* Linn., Polyphenols, Protein precipitating ability

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