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Correlation between sun protection factor and antioxidant activity, phenol and flavonoid contents of *Ananas comosus* (pineapple) peel

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UV radiation can be categorized into three as UV-A (320 – 410 nm), UV – B (280 – 320 nm) and UV-C (200 – 280 nm) where UV-B radiation is considered as one of the main causes of skin damage leading to sunburn and skin cancers. Skin care products such as sunscreens are commonly used to reduce harmful effects of radiation as they absorb or reflect UV-B radiation and help prevent sunburn. Development of sunscreen formulations containing plant-based photoprotective agents is recently being explored as they also possess antioxidant properties and considered to be safer than the synthetic agents. Therefore, the aims of this study were to explore the possibility of using *Ananas comosus* (Pineapple) peel as source rich in phytochemicals with photoprotective properties and determine the correlation between Sun Protection Factor (SPF) and antioxidant activity, phenol and flavonoid contents of methanolic extract of pineapple peel. Firstly, the chemical constituents of the pineapple peel were extracted into methanol by Soxhlet extraction and it was sequentially partitioned into hexane, dichloromethane (DCM) and 50% methanol. SPF of all three fractions of methanolic extract of pineapple peel was determined by UV-Visible spectrophotometric method and Mansur equation. Antioxidant activity of the fractions were determined by α -diphenyl- β -picrylhydrazyl (DPPH) free radical assay. Total Phenolic Content (TPC) and Total Flavonoid Content (TFC) were assessed by Folin-Ciocalteu method and Aluminium Chloride colorimetric methods, respectively. Correlation between SPF and antioxidant activity, TPC and TFC was determined by the Pearson's method. All the fractions of methanolic extract exhibited UV-B absorption properties and their SPFs were between 4.95 and 29.74. Among them, DCM fraction showed the highest SPF of 29.74 ± 0.03 at 1 mg/mL. The study also revealed that there is a strong positive correlation between SPF and TPC ($r = 0.6366$), a very strong positive correlation between SPF and TFC ($r = 0.9497$) and a very weak positive correlation between SPF and antioxidant activity ($r = 0.095$) suggesting that phenols including flavonoids in pineapple peel may contribute to its strong photoprotective potential. As the DCM fraction showed the highest SPF, it was partially purified by column chromatography and analyzed by GC-MS and the results revealed that the pineapple peel was rich in chemical constituents with known bioactivities including antioxidant activity. Since there is a synergistic act of UV-B protection with radical scavenging activity of phytochemicals, the phenolics in peel of pineapple can be considered as a promising natural additive for enhancing photoprotective properties in sunscreen formulations.

Keywords: GC-MS analysis, Sun protection factor, Sunscreen, UV radiation

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