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Cancer patients often attracted to complementary and alternative medicinal practices due to their natural origin, lack of side effects. Roots and rhizomes of *Smilax zeylanica* is an important herb in traditional medicine against arthritis, diabetes and cancer. Hence, this study aimed to evaluate the antioxidant and cytotoxicity activities of root extracts. Air dried roots and rhizome (RR) were refluxed with water and methanol to obtain aqueous (ARRE) and methanol (MRRE) extracts. Both extracts were screened for phytochemicals and confirmed by thin layer chromatography. Total phenols, flavonoids were quantified using Gallic acid and quercetin as the respective standards. Free radical scavenging activity (doses: 2-300 µg/mL) was evaluated by 2,2-diphenyl-1-picrylhydrazyl DPPH assay (n=3), while cytotoxicity (doses: 8, 80, 90, 100, 666 µg/mL) was tested (n=50) using brine shrimp lethality assay. Saponins, flavonoids, proanthocyanidine, tannins and polyphenols were detected in both extracts. Furthermore, MRRE contained unsaturated sterols, tri terpenes, and anthraquinones. Both MRRE and ARRE showed a linear relationship with the total phenol and flavanoid contents with their respect standards. For both extracts, increasing free radical scavenging

activity was observed with increasing concentrations (MRRE IC<sub>50</sub>: 6.53±0.02 µg/mL; ARRE IC<sub>50</sub>: 108±1.2 µg/mL) compared to the standard ascorbic acid (IC<sub>50</sub>: 2.59±0.02 µg/mL). A significant (p<0.05) linear relationship was observed in the cytotoxic assay (MRRE LC<sub>50</sub>: 90.3±2.8 µg/mL; ARRE LC<sub>50</sub>: 84±0.7 µg/mL) compared to the positive control (Potassium dichromate LC<sub>50</sub>: 32±0.0 µg/mL). The present study revealed that the methanol extracts of the RR of *S. zeylanica* possess potent antioxidant and cytotoxic activities. It is concluded that *S. zeylanica* contains potent cytotoxic properties and verifies its ethno-medicinal value.

**Keywords:** *Smilax zeylanica*, roots and rhizomes, antioxidant, cytotoxicity