Determination of total antioxidant activity in three types of local vegetables shoots and the cytotoxic effect of their ethanolic extracts against different cancer cell lines.

ABSTRACT

Antioxidants play an important role in inhibiting and scavenging radicals, thus providing protection to humans against infections and degenerative diseases. Literature shows that the antioxidant activity is high on herbal and vegetable plants. Realizing the fact, this research was carried out to determine total antioxidant activity and the potential anticancer properties in three types of selected local vegetable shoots such as Diplazium esculentum (paku shoot), Manihot utillissima (tapioca shoot) and Sauropous androgynus (cekur manis). The research was also done to determine the effect of boiling, on total antioxidant activity whereby samples of fresh shoots are compared with samples of boiled shoots. In every case, antioxidant activity is compared to alpha-tocopherol and two methods of extraction used are the organic and the aqueous methods. Besides that, two research methods used were the ferric thiocyanate (FTC) and thiobarbituric acid (TBA) with absorbance of 500nm and 532nm respectively. Oneway ANOVA test at $P < 0.05$ determines significant differences between various samples. In the cytotoxic study, the ethanolic extract and several cell lines i.e. breast cancer (MDA-MB-231 and MCF-7), colon cancer (Caco-2), liver cancer (HepG2) and normal liver (Chang liver) were used. The IC50-value was determined by using the MTT (3-(4,5- dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide) assay. The antioxidant study found that all the samples in both aqueous and organic extraction were significantly different. The total antioxidant activity values of aqueous extract in descending order are as follows : M. utilissima (fresh) > D. esculentum (fresh) > S.androgynus (fresh) > M.utilissima (boiled) > D. esculentum (boiled) > S.androgynus (boiled). It also was found that S.androgynus shoots ethanolic extract was able to inhibit the viability of the breast cancer cell lines, MDA-MB-231 with the IC50 value of 53.33 μg/ml. However, S.androgynus shoots and D. esculentum shoots ethanolic extracts did not inhibit the viability of MDA-MB-231 cell line. While, the tapioca shoot ethanolic extract was able to inhibit the viability of MCF-7 cell line with the IC50 value of 52.49 μg/ml. S.androgynus shoots and D.esculentum shoots ethanolic extracts did not give an IC50 value against the MCF-7 cell line. S.androgynus, tapioca and D.esculentum shoots ethanolic extracts did not show cytotoxic effect against the Caco-2 and HepG2. There was no IC50-value from any sample against Chang Liver cell line. In conclusion, the antioxidant activity of both fresh and boiled samples were higher than alpha-tocopherol, although fresh vegetable shoots were found to be higher in antioxidant activity compared to boiled shoots. This study also suggested that S.androgynus shoots and tapioca shoots have potential as an anticancer agent against certain breast tumours.

Keyword: Antioxidant vegetables; Breast; Cancer; Cekur manis Sauropous androgynus; Colon; Cytotoxic; Liver; Malaysia; Paku shoot Diplazium esculentum; Shoots; Tapioca Manihot utillissima; Tropics.