Activity of *Aloe arborescens* leaf extracts: *in vitro* effects on Human Adenocarcinoma HT-29 cell line and free-radical species

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Aloe arborescens Mill. (syn. *Candelabra Aloe*; Xanthorrhoeaceae) is native to South Africa; in Italy it is grown for ornamental, therapeutic and cosmetic uses. Various *Aloe* spp. have been used since ancient times and have a well-documented history of use as medicines. Nowadays, it is widely studied as potential anticancer, antidiabetic, antimicrobial and for several other uses. The presence of aloin, aloe-emodin, polysaccharides, mannose and acemannan was reported in whole-leaf preparations. The aim of the present research was to study *Aloe arborescens* leaf extracts, also to improve the uses of *Aloe* since many products are marketed also in Western countries. For this purpose, methanolic and ethanolic extracts were obtained from freeze-dried leaves, and then studied using: a) HPLC-DAD analysis to determine aloins and aloe-emodin contents, b) two radical-scavenging assays to assess the radical scavenger activity, and 3) MTT assay on colorectal adenocarcinoma cell line (HT29 cells) to evaluate cell viability. Thus, the antioxidant activity was evaluated using assays based on two different mechanisms: the Oxygen Radical Absorbance Capacity (ORAC) assay, based on HAT reaction, and DPPH radical scavenging capacity assay, based on SET reaction. We also determined the Total Phenolic Content (TPC) and the Total Flavonoid Content (TFC) of *Aloe* extracts because these types of compounds are related to the antioxidant properties of plants.

The *Aloe arborescens* leaves were collected in June 2015 from a cultivated four-year-old plant. The methanolic and ethanolic extracts (ME and EE) were obtained from freeze-dried leaves. Aloe-emodin and aloins were detected at 254 nm with HPLC-DAD analysis and were chosen as markers of the extracts. The identification of these compounds was performed on the basis of the retention time, co-injections, and spectral matching with the own standards. Concerning the plant extracts, the TPC values were of 81.4±3.7 mg_{GAE}/100 g fresh weight of EE, and of 67.1±2.3 mg_{GAE}/100 g fresh weight of ME. Instead, flavonoids were found in lower amounts; the TFC values were of 14.9±2.3 and 16.5 ±1.9 mg_{QE}/g100 g fresh weight of EE and ME, respectively. As regards the scavenging activity detected with DPPH and ORAC assays, the extracts showed moderate antiradical activities as compared to ascorbic acid, used as standard antioxidant. Further, the effects of the extracts on HT29 cell vitality were evaluated. HT29 cells were exposed to the extracts in a concentration range of 0.1 µg/mL-1.0 mg/mL for 24 hours, without any significant inhibition of cell viability. These results indicate the absence of cytotoxicity of the *Aloe arborescens* extracts in a large concentration range.

In conclusion, the present research shows that *Aloe arborescens* leaf extracts have moderate antioxidant activities, and are devoid of any significant cytotoxic effects on HT-29 cells. The results support the use of *Aloe arborescens* in dietary supplements, mainly on the basis of the medicinal traditional use.