

Abstract

Cancer is among the leading cause of death across the world. Lifestyle changes, food habits and environmental pollutants have led to the incidences of cancers are on the rise all over the world in the last few decades. More over the present chemotherapeutic modalities often have severe side effects that may lead to patient morbidity and noncompliance. The use of nutraceutical compounds with anticancer property may be of benefit to some of these patients. In the present work anti-cancer property of camel milk and components has been studied and activity of whey, the cytotoxic component, has been further explored in multiple dimensions. It has been observed that camel milk is cytotoxic against HeLa cells at a high concentration. The camel milk whey fraction is cytotoxic at all concentrations studied whereas the casein fraction was not found to be cytotoxic. Camel milk whey has showed the ability to inhibit migration of transformed cells. It induced cell shrinkage and nuclear condensation, characteristic of apoptosis. It was also observed that whey enhances the activity of caspase-3.

After this, the protein profiling of camel whey was done. It showed the presence of many proteins like lactoferrin, camel serum albumin, immunoglobulins, caseins, TRAIL, alpha lactalbumin, etc. The whey fraction was purified by gel filtration chromatography. The protein profile of the fractions obtained was studied by SDS-PAGE and the cytotoxicity of these fractions was studied against HeLa cells. Cytotoxicity was found to be associated with a 20kDa protein. FPLC was also used for protein purification. This also gave a protein at about 20Kda. Literature suggests TRAIL as a protein with this molecular weight present in milk having cytotoxicity against cancer cells. Our study points in a similar direction. In addition to this LCMS-MS was used to identify the other proteins in the cytotoxic whey fraction.

Furthermore, the structural and physical properties of α -lactalbumin, another molecule associated with anti-cancer property of milk was analysed *in silico*. α -lactalbumin-Oleic acid complex derived from milk is well known to have anti-cancer properties in many diverse mammalian species including humans, goats and cows. The objective of the present study in this thesis was to see if α -lactalbumin present in camel's milk too can serve as a potential anti-cancer molecule in its complex form. A comparative analysis of α -lactalbumin structure among four mammalian species, viz, *Camelus ferus*, *Bostaurus*, *Homo sapiens*, and *Capra hircus* has been made. The outcome of the *in-silico* study suggests similarity of camel α -lactalbumin with the same molecule of other three species studied, which already have experimentally well demonstrated anti-cancer property in complexed form. Thereby, implicating the possibility of a similar anti-cancer property in the α -lactalbumin of camel milk. The LCMS-MS analysis conducted by us confirms presence of high levels of α -lactalbumin in camel milk.