ANALYSIS OF BINDING INTERACTION OF SHEEP ALPHA-2-MACROGLOBULIN AND CURCUMIN: A SPECTROSCOPIC AND THERMODYNAMIC STUDY

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Abstract: Curcumin is used as anti-tumor and anti-inflammatory agent because of its antioxidant properties. Its yellowish in color and the most commonly used spice in India. In the present study we have examined the interaction of curcumin with alpha-2-macroglobulin (α_2M) a pan proteinase inhibitor, by spectroscopic techniques and isothermal titration calorimetry. The change in activity of the native α_2M after its interaction with curcumin was measured by antiproteinase activity assay. UV and flurorescence spectroscopy was explored to analyze the binding of α_2M with curcumin. CD and FT-IR spectroscopy was mainly used to examine the changes in the secondary structure of α_2M following its interaction with curcumin. Thermodynamics parameters of curcumin - α_2M binding was also analyzed to identify the number of binding sites, enthalpy, entropy, Gibbs free energy of this interaction. Thermodynamics signatures reveal the binding is exothermic in nature. The objective of this study was to analyze the interaction of curcumin with α_2M under near physiological conditions. Our results suggest that the binding of curcumin with α_2M induces a conformational change in the native form of protein that compromises its anti-proteinase activity of the protein in the presence of light. This could possibly be due to the fact that the native structure of protein is altered as β-sheet content of the protein is lost after its interaction with curcumin leading to loss of antiproteinase activity.

Keywords- alpha-2-macroglobulin, curcumin, antiproteinase activity, circular dichroism, fourier transform infrared spectroscopy