

POSTER PRESENTATIONS

DEVELOPMENT AND PRECLINICAL EVALUATION OF A PLANT-DERIVED ENZYMATIC PREPARATION FOR TARGETED MODIFICATION OF ATHEROSCLEROTIC PLAQUES

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Atherosclerosis remains one of the leading causes of cardiovascular morbidity and mortality worldwide. Plaque stability largely depends on the structural integrity of the collagen-rich protein–lipid matrix forming the fibrous cap. Controlled enzymatic remodeling of this matrix has emerged as a promising strategy for studying plaque structure and developing novel therapeutic approaches. The aim of this study was to develop a plant-derived enzymatic preparation from *Carica papaya* latex and to evaluate its physicochemical characteristics, biological activity, and potential for targeted modification of atherosclerotic plaques.

A proteolytic enzyme complex was isolated from fresh *Carica papaya* latex by lyophilization followed by partial purification using ammonium sulfate fractionation. Atherosclerotic plaque samples were incubated with the enzyme preparation under controlled conditions (pH 8.0, 50°C). Structural alterations of the protein–lipid matrix were evaluated using Fourier-transform infrared spectroscopy (FTIR), SDS-PAGE electrophoresis, thin-layer chromatography, and HPLC amino acid analysis. The biological activity of the developed preparation was further assessed in a preclinical model of experimental atherosclerosis by determining serum total cholesterol, triglycerides, and low-density lipoprotein levels after treatment.

The developed enzymatic preparation demonstrated high stability after lyophilization and retained significant proteolytic activity under optimized experimental conditions. FTIR spectroscopy revealed pronounced modifications of the protein–lipid matrix after enzymatic treatment, including changes in the intensity and position of the Amide I, Amide II, and Amide III bands, indicating controlled remodeling of collagen structures. Alterations in absorption bands corresponding to lipid methylene groups and carbohydrate-associated vibrations suggested that enzymatic treatment affected multiple structural components of the extracellular matrix. Electrophoretic and chromatographic analyses confirmed partial hydrolysis of high-molecular-weight protein fractions while preserving the overall structural organization of the matrix. Experimental studies demonstrated that unstable atherosclerotic plaques exhibited greater sensitivity to enzymatic treatment than stable plaques, reflecting differences in their biochemical organization. In vivo preclinical evaluation showed a significant reduction in serum total cholesterol, triglycerides, and low-density lipoproteins after administration of the developed preparation, with the most pronounced effect observed when treatment was combined with electrophoretic delivery. These findings indicate that the developed enzyme preparation is capable of inducing controlled biochemical remodeling of plaque components while maintaining favorable biological compatibility.

The enzyme preparation from *Carica papaya* latex demonstrated potential for modifying collagen-containing atherosclerotic plaques and improving lipid metabolism, providing a scientific basis for further optimization and development of enzyme-based pharmaceuticals for atherosclerosis.