

POSTER PRESENTATIONS

PROTEOLYTIC THERAPY OF LOCALIZED SCLERODERMA USING PLANT-DERIVED CYSTEINE PROTEASES

**Sh.Kh. Rakhimova¹, K.A. Abdullakhadzhaev², L.G. Mezhlumyan¹,
F.U. Turaeva³, Sh.Sh. Sagdullaev¹**

¹*S.Y. Yunusov Institute of the Chemistry of Plant Substances, 77, Mirzo-Ulugbek Str.,
Tashkent, 100170, Uzbekistan*

²*Republican Specialized Scientific and Practical Medical Center of Dermatology and
Cosmetology, Tashkent, Uzbekistan*

³*Branch of D.I. Mendeleev Russian University of Chemical Technology, Tashkent,
Uzbekistan*

Localized scleroderma is a chronic connective tissue disease characterized by excessive collagen deposition and progressive fibrosis of the skin, resulting in structural and functional impairment. Current therapeutic approaches mainly suppress inflammatory and immune responses but have limited efficacy in reversing established fibrotic lesions. Plant-derived cysteine proteases from *Carica papaya* latex exhibit pronounced proteolytic activity and represent a promising approach for correcting fibrotic changes; this study aimed to develop a stable protease complex and evaluate its clinical efficacy in localized scleroderma.

A proteolytic enzyme complex was isolated from the latex of immature *Carica papaya* fruits using a technological process including extraction, ultrasonic treatment, centrifugation, salt precipitation, dialysis, and freeze-drying. The extraction parameters were optimized by the Box–Wilson experimental design method to maximize enzyme yield while preserving proteolytic activity. Quality control of the obtained preparation was performed using spectrophotometric analysis. The enzyme complex was formulated as oral tablets containing 4 mg of cysteine proteases and as an ointment containing 25 mg of the active substance. Clinical evaluation included 40 patients with confirmed localized scleroderma treated for 2.5–3 months. Therapeutic efficacy was assessed according to changes in lesion density, skin pigmentation, and subjective symptoms, including skin tightness and discomfort.

The developed technology provided a stable cysteine protease preparation with preserved enzymatic activity and reproducible physicochemical characteristics. Clinical evaluation demonstrated significant improvement in 70% of patients, moderate improvement in 22.5%, and slight improvement in 7.5%, while no deterioration was observed during treatment. The enzyme complex reduced fibrotic lesions, skin induration, pigmentation abnormalities, and subjective symptoms, likely through proteolytic degradation of extracellular matrix proteins, particularly collagen; its combined oral and topical administration enhanced systemic and local effects, supporting further pharmaceutical development.

The developed technology enables the production of a stable plant-derived cysteine protease complex with preserved biological activity suitable for pharmaceutical formulations. Clinical application demonstrated favorable efficacy and good tolerability in patients with localized scleroderma, leading to regression of fibrotic skin lesions and improvement of clinical symptoms. The findings support the potential of plant-derived cysteine proteases as a promising therapeutic approach for the correction of fibrosis-associated disorders and provide a scientific basis for further investigations into their mechanisms of action and broader biomedical applications.