

# LEVELS OF INFLAMMATORY PROTEINS IN THE TEAR FILM IN PATIENTS WITH KERATOCONUS AND DRY EYE

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Architectural and histopathological alterations in the cornea of patients with keratoconus lead to increased tear film instability. Dry eye syndrome (DES) affects 81.5% of patients with keratoconus, and 70% of these patients exhibit hyperosmolarity and inflammation resulting from disrupted ocular homeostasis. Recent studies highlight the involvement of inflammatory factors and protein changes in the tear film in the progression of keratoconus.

**Objectives:** To determine the level of various proteins in the tear film and assess their correlation with dry eye syndrome parameters in patients diagnosed with keratoconus.

**Material. Method.** All patients underwent keratoconus screening program. History/presence of any systemic or ocular disorder, contact lens wear, current or recent use of topical or systemic medication represented **exclusion criteria**.

DES was established after analysis of the ocular surface disease index (OSDI), Schirmer test I and tear break-up time (TBUT).

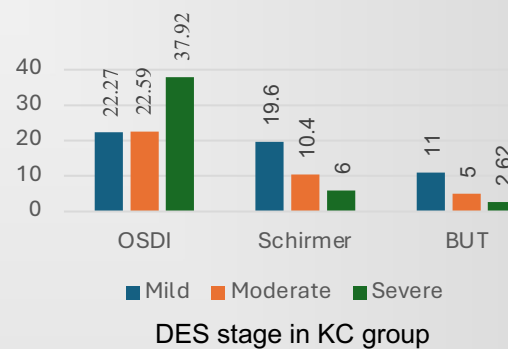
The levels of **albumin, lysozyme, lactoferrin, total protein (TP) and cytokines (IL 6, IL 10 and TNF $\alpha$ )** were measured using specific ELISAs and x Map array after basal tears were collected using a capillary tube.

## Results.

Mean age of the 18 keratoconus cases (KC) analyzed was  $25,94 \pm 8,31$  years old while that of the 18 cases in the control group was  $31,84 \pm 11.6$  years. Of the keratoconus cases, three were classified as mild, eight as moderate, and seven as severe. Severe degree of DES was recorded in 8 cases, moderate in 5 cases and mild in 5 cases of KC

KC present a higher mean value of OSDI  $29.32 \pm 13.78$  and lower mean value of TBUT  $5.61 \pm 3.92$  than control group  $15.77 \pm 9.99$ , respectively  $11.46 \pm 2.36$  and for Schirmer test the mean value was  $11 \pm 6.87$  comparative with  $16.15 \pm 4.96$ .

Proteomic	KC group	Control group
Albumin ( $\mu\text{g/ml}$ )	$6.81 \pm 4.6$	$4.32 \pm 2.53$
Lysozyme ( $\text{mg/ml}$ )	$2.58 \pm 2.05$	$1.94 \pm 0.6$
Lactoferrin ( $\text{mg/ml}$ )	$0.18 \pm 0.2$	$1.29 \pm 1.62$
TP ( $\text{mg/ml}$ )	$6.93 \pm 1.5$	$6.81 \pm 0.96$
IL 10 ( $\text{pg/ml}$ )	$177.28 \pm 80.87$	$151 \pm 57.99$
IL 6 ( $\text{pg/ml}$ )	$131.23 \pm 29.33$	$118.61 \pm 29.53$
TNF $\alpha$ ( $\text{pg/ml}$ )	$135.46 \pm 30.01$	$113 \pm 37.4$



Statistically significant negative correlations were recorded between TBUT and albumin (-0,394), lactoferrin (-0,28) and IL6 (-0,467) and positive correlation between IL10, IL6, TNF and albumin level (0,448, 0,397, 0,486) and negative with lactoferrin concentration (-0,533, -0,089, -0,335).

DES	Albumin	Lysozyme	Lactoferrin	TP	IL 10	IL 6	TNF $\alpha$
Mild	$4.86 \pm 1.6$	$1.6 \pm 0.51$	$0.25 \pm 0.28$	$6.08 \pm 1.08$	$198.22 \pm 69.88$	$127.02 \pm 17.67$	$136.32 \pm 26.75$
Moderate	$4.49 \pm 1.4$	$2.81 \pm 0.83$	$0.13 \pm 0.14$	$7.07 \pm 0.76$	$188 \pm 35.22$	$111.08 \pm 13.38$	$128.16 \pm 21.12$
Severe	$9.36 \pm 5.9$	$3.29 \pm 2.84$	$0.13 \pm 0.04$	$7.37 \pm 1.94$	$159.12 \pm 47.01$	$146.46 \pm 35.2$	$139.48 \pm 38.3$

**Conclusions.** Quantitative analysis of the protein composition of the tear film is essential for establishing a proper correlation with ophthalmologic parameters. High levels of albumin and low levels of lactoferrin are correlated with inflammatory cytokines levels. Specific changes in the molecular markers can have diagnostic value, aiding in prognosis and the establishment of treatment. This study was carried out within the project PN-III-P2-2.1-PED-2016-0187, financed by CNCS-UEFISCDI Romania.