

Risk Factors for Keratoconus: Atopy and Eye Rubbing

To the Editor:

We read with interest the article by Shajari et al¹ on keratoconus. Initially, they indicated that the disease was non-inflammatory, as it had been classically considered. Later in the article, they acknowledged that recent studies have suggested that low-level inflammatory components are present in keratoconus development. The participation of many proinflammatory mediators is an increasingly evident fact, supported by a significant body of evidence during the last 2 decades.²

Influence of atopic syndrome on keratoconus has been suggested for more than half a century, but it remains an unsettled issue because multiple studies have shown contradictory results.^{3,4} In their now classic study published in 2000, Bawazeer et al found that the most significant risk factor for keratoconus was eye rubbing, although in the univariate associations, they also found an association between keratoconus and atopy, as well as eye rubbing and family history of keratoconus. They concluded that atopy might contribute to keratoconus, but most probably through the eye-rubbing tendency of the patients.⁴

Harrison et al had found some years before that in atopic patients with keratoconus, the disease occurred more frequently on the eye on the same side as their dominant hand. They also found, in a group of 67 patients, no difference in the age at onset, with regard to atopic status.³

According to the recent available information of a possible underlying inflammatory mechanism in keratoconus, it is plausible that the association of keratoconus with atopy may be related to low-level subclinical, chronic inflammation.^{2,5}

Shajari et al indicated that they found a significant difference in the mean age of the group of patients with keratoconus and atopic diseases (110 eyes of 75

patients) versus those without known atopic syndrome (560 eyes of 359 patients), namely 32.8 ± 9.6 years for the atopic group against 36.1 ± 11.7 years for the control group. However, the authors did not mention whether they collected information on the age at onset of keratoconus. It seems that the difference found was related to the age at which the patients consulted with a particular health care institution, but it is not possible to infer the age at onset having only that information. It would be very interesting to obtain information on age at onset of the corneal disease in the 2 groups and conduct an analysis on the eye-rubbing behavior of patients in both groups.

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Reply:

It was with interest that we read the letter to the Editor from Galvis et al,

and we submit this response to their comments. In our study, we analyzed the differences between patients with keratoconus with and without atopic traits. Our focus was on the differences visible on Scheimpflug tomography, but we also evaluated other factors such as the patient's average age. We found that despite both groups being at similar disease stages as evident by Scheimpflug tomography, the average age of patients with atopic syndrome was significantly less. This is different from what was previously described by Harrison et al¹ as they did not find a significant difference in terms of age between both groups. However, we doubt that the sample size of patients (38 vs. 29 eyes) was sufficient to draw such a conclusion. A sample size calculation showed that when we assume a parametric distribution of the variable and set SD to 10 years and the minimal relevant age difference to 4 years, in each group 100 eyes are required to be included for a *t* test with alpha = 0.05. Furthermore, it is interesting that with an increased number of atopic traits, we found that the average age of patients further decreased. Nevertheless, we absolutely agree with the comment by Galvis et al that to better understand the relationship between both diseases, age at onset needs to be investigated in future studies.

Regarding the hypothesis that eye rubbing is the driving force behind the development of keratoconus in patients with atopic syndrome rather than chronic inflammatory processes, we believe at the current stage of knowledge, it is very difficult to answer this. We have to clearly state, however, that this was not a hypothesis evaluated in our study. The focus of our study was on Scheimpflug tomography. Bawazeer et al² found, in a univariate analysis, an association between atopic syndrome and keratoconus as well as eye rubbing and keratoconus. However, in their multivariate analysis, this association remained only significant for eye rubbing. Despite this, we would be careful about rejecting an association between keratoconus and atopic syndrome as the *P* value found by Harrison et al was 0.08 for the