

Commentary: Assessment of subjective functional and emotional compromise in Keratoconus patients: Significance, confounders, and future

Keratoconus, as we know, can cause varying levels of visual disturbances. Since the onset and active progressive form of the disease is mostly in young people in the second to fourth decades, keratoconus can significantly impact education and professional performance. It will not be appropriate to restrict the assessment of the impact to simple objective values such as best-corrected visual acuity. Hence, subjective assessment of not just the functional compromise but also the mental impact of the disease gains significance.

Subjective assessment of the above with the help of questionnaires has been ongoing in several fields of ophthalmology, including keratoconus since several years.^[1] There are a few items to ponder while choosing a questionnaire. First, they should be validated in the administered language. Also logically, when they are disease or situation specific, they are more likely to address disease-specific symptoms, than when they are not. To understand the full subjective impact of a disease-like keratoconus, it must involve a probe into the psychological or emotional compromise as well. Lastly, questionnaires based on Rasch analysis are found to be superior compared to others.^[2]

In the field of Keratoconus, the only validated disease-specific questionnaire until recently was "Keratoconus Outcomes Research Questionnaire (KORQ)."^[3] It has 29 questions (18 for activity limitation and 11 for symptoms). The activity limitation subscale was found to have a strong correlation to visual acuity ($r = 0.63$) and contrast sensitivity ($r = 0.76$) in keratoconus patients.^[3] However, this questionnaire did not have a component for the assessment of the emotional or psychological impact of keratoconus.

The Impact of Vision Impairment (IVI) questionnaire, though initially developed as a non-disease-specific tool, has been modified, tested, and validated for keratoconus in 2019.^[4] The validated version is a 28-item tool evaluating three subscales, namely, reading, mobility, and emotional

impact. BCVA in the better eye was found to have a significant correlation with reading and mobility ($r = 0.51$ and 0.55 , respectively), while BCVA in the worse eye was significantly correlated with emotional scores ($r = 0.37$).^[4]

The latest questionnaire, Keratoconus End Point Assessment Questionnaire (KEPAQ) is a validated keratoconus specific tool, which incorporates both functional (KEPAQ-F: 9 questions) and emotional compromise (KEPAQ-E: 7 questions) assessment.^[5,6] The two subscales of this tool have been correlated with the ABCD staging of keratoconus and the ABCD parameters of only the worse eye have had correlation with both KEPAQ- E and F subscales. KEPAQ-E and F have correlated best with B (posterior radius of curvature) with r of -0.38 and -0.27 , respectively, and the strengths of correlation with BCVA were weaker, although significant.^[5] The latest paper has studied the test-retest repeatability of these parameters, and both subscales were found to have an ICC of more than 0.95 suggesting excellent repeatability.^[7] However, Bland Altman analysis could have also been performed, which apart from providing fixed differences, could have checked for the presence of proportional differences (PD), and limits of agreement (LoA) for each subscale as well. This could have added information to the readers about the strength of repeatability in different ranges (PD) of the two subscales and the extent of possible variability (LoA).

Based on the above studies assessing subjective parameters, there are a few broad ideas we could generate. Treating the worse eye in keratoconus patients may be as important as treating the better eye to achieve better patient satisfaction. Using these subjective scales pre- and postprocedures, we could plan a comparison of different known methods of visual rehabilitation, ranging from Intacs, cross linking, topography-guided treatments to contact lenses alone or in different combinations. This could help customize procedures, also based on the subjective functional or emotional compromise, in addition to the known objective parameters.

The factor with the strongest correlation with functional impairment identified in the above studies has been contrast sensitivity.^[3] More factors need to be studied and correlated with these subjective scales to understand which factor or group of factors need to be treated to attain maximum

functional and emotional improvement in keratoconus patients. One such factor that could be studied is the different lower- and higher-order aberrations. With the advent of newer topography-guided laser platforms, it is possible to customize correction of selective aberrations to minimize tissue ablation. If we can identify which aberrations correlate best with functional or emotional subscales, a selective treatment could be on offer. Overall, more studies are needed in future, comparing the different questionnaires in a single larger sample of heterogeneous patients longitudinally over time, and studying more parameters, and performing univariate and multivariate analysis to identify a set of factors, treating which could possibly improve subjective parameters, rather than just objective ones.

In studies using KEPAQ and IVI questionnaires, we can notice that the strength of correlation of keratoconus severity, based on BCVA or ABCD stages, is not high enough with the emotional compromise subscale.^[4,5] There may be confounders, which could be influencing the extent of subjective emotional compromise that patients with keratoconus experience. It is known that the extent of psychological or emotional impact due to a problem could be influenced by the personality of patients.^[8] For example, imagine there are two patients, one who is neurotic with an introverted nature and other who is well sociable and stable. If both these patients develop keratoconus with the exact same topographic/tomographic parameters and similar BCVA in both eyes, the first patient could have a greater subjective emotional compromise compared to the latter, owing to the difference in their personalities. Simple tools for assessing the personality in an ophthalmic setting and the influence of personalities on patients' psychosocial behavior have been published.^[8] Hence, apart from studying various objective indices related to vision, we also need to understand and address patients' personality in a holistic approach, if we must truly help patients improve their subjective functional and emotional components.

Vaitheeswaran Ganesan Lalgudi

Department of Cornea and Refractive Surgery,
University of Ottawa Eye Institute, Ontario, Canada

Correspondence to: Dr. Vaitheeswaran Ganesan Lalgudi,
Department of Cornea and Refractive Surgery,
University of Ottawa Eye Institute, Ontario, Canada.
E-mail: kanthjipmer@gmail.com

References

1. Kandel H, Pesudovs K, Watson SL. Measurement of quality of life in Keratoconus. *Cornea* 2020;39:386-93.

2. Chiam NPY, Mehta JS. Comparing patient-reported outcomes of laser *in situ* Keratomileusis and small-incision lenticule extraction: A review. *Asia Pac J Ophthalmol (Phila)* 2019;8:377-84.
3. Khadka J, Schoneveld PG, Pesudovs K. Development of a Keratoconus-specific questionnaire using rasch analysis. *Optom Vis Sci* 2017;94:395-403.
4. Tan JCK, Nguyen V, Fenwick E, Ferdi A, Dinh A, Watson SL. Vision-related quality of life in Keratoconus: A save sight Keratoconus registry study. *Cornea* 2019;38:600-4.
5. Balparda K, Herrera-Chalarca T, Silva-Quintero LA, Torres-Soto SA, Segura-Munoz L, Vanegas-Ramirez CM. Both subjective emotional distress and visual handicap correlate with Belin ABCD classification in the worse eye as measured with the "Keratoconus end-points assessment questionnaire" (KEPAQ). *Clin Ophthalmol* 2020;14:1839-45.
6. Balparda K, Herrera-Chalarca T, Silva-Quintero LA, Torres-Soto SA, Vanegas-Ramirez CM. Development and validation of the "Keratoconus end-points assessment questionnaire" (KEPAQ), a disease-specific instrument for evaluating subjective emotional distress and visual function through rasch analysis. *Clin Ophthalmol* 2020;14:1287-96.
7. Balparda K, Galarreta DJ, Vanegas-Ramirez CM, Silva-Quintero LA, Botero-Giraldo M, Maya-Naranjo MI, *et al*. Both subscales of the Keratoconus End-Points Assessment Questionnaire have excellent test-retest reliability. *Indian J Ophthalmol* 2021;69:2430-5.
8. Shetty R, Lalgudi VG, Balakrishnan N, Khamar P. Influence of personality on psychosocial manifestations of post-refractive surgery patients during the COVID-19 pandemic. *J Cataract Refract Surg* 2020. doi: 10.1097/j.jcrs.0000000000000460. Online ahead of print.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Quick Response Code:	Website: www.ijo.in
	DOI: 10.4103/ijo.IJO_811_21

Cite this article as: Lalgudi VG. Commentary: Assessment of subjective functional and emotional compromise in Keratoconus patients: Significance, confounders, and future. *Indian J Ophthalmol* 2021;69:2435-6.