



FUCHS ENDOTHELIAL CORNEAL DYSTROPHY-SPECIFIC QUESTIONNAIRE IN CROATIAN: VISUAL FUNCTION AND CORNEAL HEALTH STATUS (V-FUCHS)

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SUMMARY – Fuchs endothelial corneal dystrophy (FECD) is a bilateral dystrophy of the cornea and the most common indication for corneal transplantation procedures. Currently, the clinical assessment of the disease relies on slit-lamp grading, central corneal thickness, endothelial cell analysis and high contrast visual acuity. The Visual Function and Corneal Health Status (V-FUCHS) is a paper questionnaire that measures patient-reported visual disability, unlike classic diagnostic procedures. It contains 8 questions regarding glare and daily fluctuations, and 7 questions regarding visual acuity. The English version of V-FUCHS was developed in cooperation with patients and experts in the field according to recommendations for questionnaire development. Pretesting was performed in patients in different stages of the disease. Each question in the V-FUCHS questionnaire is answered by placing a cross in one of the 5 possible answer categories on a Likert scale.

The aim of this study was to translate the V-FUCHS questionnaire into Croatian and to examine its reliability.

Keywords: *Fuchs endothelial corneal dystrophy; V-FUCHS questionnaire; Cornea; Corneal dystrophies*

Introduction

Fuchs endothelial corneal dystrophy (FECD) is a bilateral dystrophy of the cornea and the most common indication for corneal transplantation procedures¹. Surgical procedures for managing FECD have evolved extensively throughout the last several decades,

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from penetrating keratoplasties originating in the 19th century to modern posterior lamellar keratoplasties starting in the late 1990s². Although the surgical approaches have improved, the indication for surgery itself is not always straightforward. It is based both on objective findings and subjective symptoms³.

Currently, clinical assessment of the disease relies on slit lamp grading, central corneal thickness, endothelial cell analysis and high contrast visual acuity^{4,5}. The disease is characterized by progressive endothelial cell loss with the formation of excrescences known as guttae that may result in corneal decompensation and decreased vision. Although clinical diagnosis using slit lamp examination may be the gold standard, slit lamp examination does not account for the presence of subclinical edema⁶. Corneal thickness, which can be increased in patients with FECD, can be assessed with many methods, including specular microscopy, confocal microscopy, ultrasound pachymetry, ultrasound biomicroscopy, slit-scanning corneal topography, the Scheimpflug system, optical biometry and spectral optical coherence tomography^{6,7}. Regarding specular and confocal microscopy, regional differences between guttate areas and visible cells, and potential sampling errors with a limited field of view, render the corneal measurements imprecise⁶. Even though diagnostic options have improved since the early days of penetrating keratoplasty, the issue of detecting early changes in patients with FECD is still present^{4,8,9}. The Visual Function and Corneal Health Status (V-FUCHS) instrument was developed by Wacker *et al.* to gain a better understanding of the patients' status, to help with the timing of surgical procedures and to provide insight into their outcome^{10,11}.

V-FUCHS is a paper questionnaire that measures patient-reported visual disability, unlike the diagnostic procedures mentioned above. It contains 8 questions regarding glare and daily fluctuations, and 7 questions regarding visual acuity. The English version of V-FUCHS was developed in cooperation with patients and experts in the field according to recommendations for questionnaire development¹². Pretesting was performed in patients in different stages of the disease. Each question in the V-FUCHS questionnaire is answered by placing a cross in one of the 5 possible answer categories on a Likert scale¹⁰.

The aim of this study was to translate the V-FUCHS questionnaire into Croatian and to examine its reliability. The translation was performed according to international recommendations for quality of life questionnaire translations¹³. Patients were also given a critique form for the questionnaire to identify any problematic items in the V-FUCHS instrument.

Methods

Two forward translators with a high level of English language fluency translated the questionnaire into Croatian, independently. The translation coordinator merged the two translations into a single forward translation. Then, two backward translators, native English speakers with a high level of Croatian language fluency, translated the V-FUCHS questionnaire from Croatian back to English. Backward translators did not have any knowledge of the original English V-FUCHS questionnaire. The translation coordinator merged the two backward translations and compared them with the original V-FUCHS instrument. All disagreements between translators in each of the translation phases were discussed with the translation coordinator. After a consensus was achieved between the translators and the translation coordinator, the final version of the Croatian V-FUCHS was created.

Ten patients with various stages of FECD were included in this study. All of the patients gave written and verbal consent to participate in the study. All of the patients filled in the V-FUCHS questionnaire, as well as the critique form for the questionnaire. The study was performed at Sestre milosrdnice University Hospital Center in Zagreb, Croatia. It was approved by the hospital's Ethics committee and carried out in accordance with the Declaration of Helsinki.

The questionnaire consisted of 2 parts. The first part contained 7 questions regarding difficulties with 5 possible answers in the form of a Likert-type scale, ranging from minimum ("never") to maximum ("all the time") difficulty. The second part consisted of 8 questions, also with 5-point Likert-type answers ranging from "no difficulty" to "extreme difficulty". The questions were then combined as previously described⁸ to create a glare and visual acuity factor score. Each response was assigned a point value (ranging from 0 to

4), with the highest point value assigned to “extreme” difficulties and difficulties present “all the time”. An individual’s score was then calculated by adding these point values for all the questions regarding the glare and visual acuity factor, respectively. The Rasch-based scores were calculated via a spreadsheet that was kindly provided to us by the authors of the original questionnaire. These scores were previously validated in the North American and German population.

Statistical analysis

Continuous variables were presented as a median with interquartile range (IQR). Cronbach’s α was calculated and used to assess the reliability of subscales in the questionnaire. GraphPad Prism version 6 for Windows (GraphPad Software Inc., La Jolla, CA) and MedCalc for Windows version 12 software (MedCalc Software, Ostend, Belgium) were used for statistical analysis.

Results

Ten FECD patients were included in the study, 6 of which were female. The median age of the subjects was 75 years of age (IQR=62–82.25 years). The critique of the questionnaire showed that all of the patients found the questions to be clear. One patient stated that question No 13, regarding entering a dark room, is difficult to answer with the responses provided in the instrument. Another patient recommended dismissing question No 15, regarding sunrise and sunset. A total of 90% of the subjects stated that the length of the questionnaire is appropriate, and it took 50% of them 5–10 minutes to finish it.

The test’s reliability was evaluated independently for visual acuity-related questions and glare-related questions by using Cronbach’s α coefficient, which is considered reliable if $\alpha > 0.7$. The α coefficients were 0.961 and 0.911 for the visual acuity factor and the glare factor, respectively.

An analysis of the visual acuity part of the questionnaire and the glare-related part of the questionnaire resulted in relevant scores. The median visual acuity factor score was 14 (IQR=6.25–22.25; Figure 1) and the glare factor score was 16 (IQR=11–24; Figure 2).

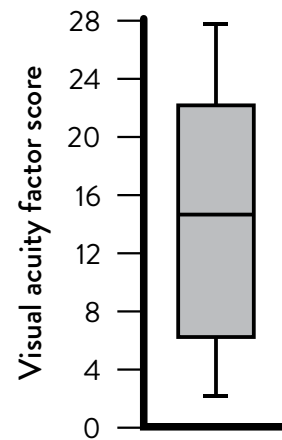


Figure 1. The visual acuity factor score of the Visual Function and Corneal Health Status (V-FUCHS) questionnaire. The box and whisker plot shows the raw visual acuity factor score, calculated from seven items related to visual acuity. The line inside the box represents the median, the box represents the interquartile range, while the lower and upper whisker represent minimum and maximum score, respectively.

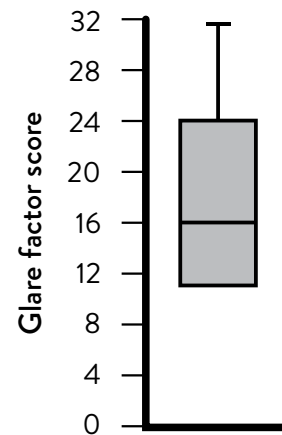


Figure 2. The glare factor score of the Visual Function and Corneal Health Status (V-FUCHS) questionnaire. The box and whisker plot shows the raw glare factor score, calculated from eight items which refer to glare and diurnal variations in vision. The line inside the box represents the median, the box represents the interquartile range, while the lower and upper whisker represent the minimum and maximum score, respectively.

Rasch-based scores were also calculated via the spreadsheet provided by the authors of the original questionnaire; they were 0.765 (IQR = -0.105–1.323) for the visual acuity factor and 0.490 (IQR = 0.175–1.128) for the glare factor (Figure 3).

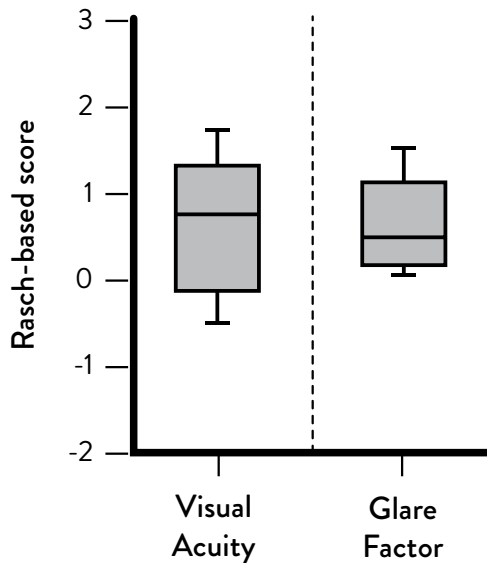


Figure 3. The Rasch-based score of the Visual Function and Corneal Health Status (V-FUCHS) questionnaire. The box and whisker plots show the Rasch-based score of visual acuity and glare factor, respectively. Rasch-based scores were calculated via a spreadsheet provided by the authors of the original instrument. The line inside the box represents the median, the box represents the interquartile range, while the lower and upper whisker represent the minimum and maximum score, respectively.

Discussion

In the present study, we translated and tested the reliability of the V-FUCHS instrument into Croatian.

The validity of V-FUCHS was previously confirmed in the English and German versions of the questionnaire, by comparing V-FUCHS results with the ones obtained by the cataract-specific Catquest-9SF questionnaire^{10,14}. In this study, we used a standardized intraclass correlation coefficient — Cronbach's α — to

examine retest reliability. Standardized α coefficients were higher than 0.9 for both the visual acuity and the glare factor. These results were similar to the ones in obtained with the English and German versions of V-FUCHS and indicate a high level of retest reliability.

As previously reported, the scores were scaled from 0 to 28 for the visual acuity factor, and from 0 to 32 for the glare factor. These results are consistent with the results obtained with the English and German versions of V-FUCHS.

The answers to individual questions may also be analyzed by use of a Rasch-based analysis and presented on a scale according to visual impairment, where lower values represent lower visual disturbances. Rasch-based scores in the present study were similar to the scores previously reported in English and German language subjects^{10,14}.

Conclusion

With the development of novel surgical approaches, indications for corneal transplantation have expanded and require more precise timing³. Among the various techniques that help with the decision to proceed with corneal transplantation, subjective visual impairment is one of the most important. Therefore, the need for a FECD-specific questionnaire that will analyze the visual disturbances beyond high-contrast visual acuity is imperative.

The functional visual impairment of FECD can be standardized, as well as reliably quantified using the V-FUCHS instrument. This was confirmed in both the English and the German version of the questionnaire, and now in the Croatian version as well. Translating V-FUCHS into multiple languages will lead to better care for patients with FECD and contribute to a more precise timing of surgical interventions.

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Supplementary material

Croatian version of the V-FUCHS questionnaire

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Sažetak

UPITNIK NA HRVATSKOM JEZIKU SPECIFIČAN ZA FUCHSOVU ENDOTELNU DISTROFIJU ROŽNICE – FUNKCIJA VIDA I STATUS ZDRAVLJA ROŽNICE (V-FUCHS)

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Fuchsova endotelna distrofija rožnice (FECD) je bilateralna distrofija rožnice i najčešća indikacija za postupke transplantacije rožnice. Trenutno se klinička procjena bolesti oslanja na klinički pregled biomikroskopom, središnju debljinu rožnice, analizu endotelnih stanica i oštrinu vida s visokim kontrastom. Vidna funkcija i stanje zdravlja rožnice (V-FUCHS) je upitnik koji mjeri oštećenje vida prijavljeno od strane pacijenta, za razliku od klasičnih dijagnostičkih postupaka. Sadrži 8 pitanja o odsjaju i dnevnim fluktuacijama te 7 pitanja o oštrini vida. Engleska verzija V-FUCHS upitnika razvijena je u suradnji s bolesnicima i stručnjacima u tom području prema preporukama za razvoj upitnika. Prethodno testiranje provedeno je u bolesnika u različitim stadijima bolesti. Na svako pitanje u V-FUCHS upitniku odgovara se stavljanjem križića u jednu od 5 mogućih kategorija odgovora na Likertovoj ljestvici.

Cilj ovog istraživanja bio je prevesti V-FUCHS upitnik na hrvatski jezik i ispitati njegovu pouzdanost.

Ključne riječi: *Fuchsova endotelna distrofija rožnice; V-FUCHS upitnik; Rožnica; Distrofije rožnice*