Review Article

Ocular Surface Disease Index questionnaire in different languages

Mohammed Aljarousha [1], Waleed M Alghamdi [2], Sara Attaallah [1] and Mohammed Abdelfatah Alhoot [3]

[1] *Department of Optometry and Vision Science, Faculty of Health & Life Sciences, Management and Science University, Malaysia*
[2] *Department of Optometry, College of Applied Medical Sciences, Qassim University, Qassim, Saudi Arabia*
[3] *School of Graduate Studies (SGS), Management & Science University (MSU), Shah Alam, Selangor, Malaysia*

ABSTRACT

Background: The Ocular Surface Disease Index (OSDI) questionnaire was first introduced and developed in 1997 by the Outcomes Research Group, and was adopted by Allergan, Inc. (Irvine, Goleta, CA). While several tools are available for evaluating dry eye syndrome (DES), the OSDI questionnaire is known to have high reliability and validity. Additionally, although more complex questionnaires are available, the goal of the OSDI is to ensure a rapid diagnosis of ocular surface disease. The OSDI consists of a 12-item questionnaire designed to assess the visual disability caused by DES. The OSDI score can range from 0 to 100, with higher scores indicating greater disability. This language-inclusive mini-review aimed to provide a comprehensive overview of previous studies that translated the OSDI into various languages and validated the translated versions.

Methods: OSDI validation studies were identified through a PubMed / MEDLINE and Google Scholar search spanning the 27 years since the establishment of the OSDI, using the broad term "Ocular Surface Disease Index-12 questions" and keywords that is "ocular surface disease index-12," "translation and validation," "transcultural validation," "development," "cross-cultural adaptation," and "reliability and validity." We included original studies that validated the translated version of the OSDI in various languages, presenting the key findings with a focus on reliability and repeatability outcomes.

Results: Thirteen full-text articles were thoroughly reviewed, including those identified through targeted keyword searches and the reference lists of these studies. The papers examined the translation of the English version of the OSDI-12 questionnaire into nine languages: Italian, Arabic, Chinese, Chilean Spanish, Japanese, Filipino, Farsi, Bahasa Melayu, and Brazilian Portuguese. Key details regarding the development, translation, and validation phases were summarized. Most of the included studies adhered to standard guidelines throughout the translation process to create a final version of the OSDI questionnaire. This was followed by clinical validation of the final translated version. The majority of the translated versions were assessed for internal consistency, reliability, test–retest repeatability, and discriminant validity.

Conclusions: The original English version of the OSDI was translated into validated versions to achieve a final version in nine different languages. The majority of the translated versions demonstrated high reproducibility and reliability. The different language versions of the questionnaire removed language barriers in informing the eye-care community, evaluating DES, and assisting physicians in advising and managing their patients more suitably. Therefore, the validated versions of OSDI can be used as tools for clinical practice and DES research. Validating the OSDI questionnaire in various languages is essential to eliminate the language barrier in the assessment of dry eye disease.

KEYWORDS

dry eye disease, questionnaire, validity and reliability, translations, cronbach's alpha

Correspondence: Waleed M Alghamdi, Department of Optometry, College of Applied Medical Sciences, Qassim University, Qassim, Saudi Arabia. Email: Walghamdi@qu.edu.sa. ORCID iD: https://orcid.org/0000-0002-2978-9354.

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INTRODUCTION

Dry eye disease is a common eye condition that, if neglected, can lead to serious complications, such as corneal perforation, necessitating corneal transplantation [1, 2]. Ocular symptoms are the primary concern for patients with dry eye disease [3] and can aid in the earlier diagnosis of this potentially sight-threatening condition [1]. Therefore, practitioners need to apply appropriate validated questionnaires to define this issue [4, 5].

Various questionnaires are available to evaluate dry eye symptoms [6]. They are employed to examine the natural history of the disease and in population-based studies [6-13]. The lengths of these tests differ, and they investigate different features of dry eye, ranging from diagnosis alone to the impact of the disease on the day-to-day activities, and determination of risk factors for dry eye [6, 8-13]. However, none of these questionnaires have an advantage over the others; Thus, selection of a specific questionnaire mainly relates to practical factors, such as variation in length, time required to administer the test, and extent of validation [6, 14, 15].

Example of the available tools relating to dry eye are the Ocular Surface Disease Index (OSDI) [7, 16, 17], Schein Questionnaire [18], Dry Eye Questionnaire [6, 19, 20], Contact Lens Dry Eye Questionnaires [5,19, 21, 22], Ocular Comfort Index [5, 23, 24], Women's Health Study [25], and the McMonnies Questionnaire [26]. Among these, the OSDI is among the most commonly used tools for diagnosis of dry eye syndrome and other ocular surface diseases, such as allergic conjunctivitis and blepharitis [22, 27-33].

The Dry Eye Workshop (DEWS) has reviewed and recommended the use of dry eye questionnaires [34]. According to the DEWS, the OSDI questionnaire has been a valuable tool in numerous clinical studies on dry eye syndrome [34]. The questionnaire consists of 12 items that evaluate three subscales of dry eye, consisting of experiencing symptoms of ocular irritation in the eyes, change in functional quality of vision, and environmental factors related to dry eye [7], as detailed in Table 1. Simpson et al. reported that the OSDI met the Rasch analysis criterion of unidimensionality [14]. Furthermore, the OSDI has been utilized in both research and in clinical care as a surveying instrument [35-45].

In this instrument, each question can be answered in a five-point Likert scale from a maximum (grade 4) to a minimum (grade 0) [6, 14, 46]. The five grades are "all of the time (4)," ''most of the time (3)," "half of the time (2)," "some of the time (1)," and "none of the time (0)," referring to experiences during the previous week. The OSDI questionnaire consists of four sections, i.e., the instructions, items, categorical responses, and grading calculation [24]. The total score for all items therefore ranges from 0 to 48 [47], which is then standardized to 100 [7, 47], where 100 reflects the highest disability, using the following equation: Overall OSDI grade = (sum of scores of questions) × 100 / (number of questions answered by the patient) × 4 [46]. The final OSDI score thus ranges from 0–100 (0–12 points reflect having a normal ocular surface, 13–22 points reflect mild dry eye disease, 23–32 points reflect moderate dry eye disease, and 33–100 points reflect severe dry eye disease) [17, 36].

This language-inclusive mini-review aimed to provide a comprehensive overview of previous studies that have translated the OSDI questionnaire into various languages and validated the translated versions.

Table 1. Items of the OSDI questionnaire [7].

Items of OSDI
Symptoms of ocular irritation
1. Eyes that are sensitive to light?
2. Eyes that feel gritty?
3. Painful or sore eyes?
Change in the functional quality of vision
4. Blurred vision?
5. Poor vision?
6. Defects with reading?
7. Defects with driving at night?
8. Defects with working with a computer or bank machine ATM?
9. Defects with watching TV?
Environmental factors stimuli of dry eye
10. Defects in windy conditions?
11. Defects in places or areas with low humidity (very dry)?
12. Defects in areas that are air-conditioned?

Abbreviations: OSDI, ocular surface disease index; ATM, automated teller machine; TV, television.

METHODS

Studies involving translation and validation of the OSDI were identified through a literature search of the PubMed / MEDLINE and Google Scholar databases spanning the 27 years since the establishment of the OSDI questionnaire. We used the keywords "ocular surface disease index-12," "translation and validation," "transcultural validation," "development," "cross-cultural adaptation," and "reliability and validity." We included studies aimed at validating the OSDI in various languages.

RESULTS

The literature search yielded 13 records [24, 48-59] and 12 full-text articles [24, 48-56, 58, 59] thoroughly reviewed, including those found through targeted keyword searches and the reference lists of the identified studies. The papers examined describe how the English version of the OSDI-12 questionnaire was translated into nine languages, including Italian [48], Arabic [49, 50], Chinese [51-53], Chilean Spanish [54], Japanese [55], Filipino [56], Farsi [24], Bahasa Melayu [57], and Brazilian Portuguese [58, 59] as detailed in Table 2. To develop a translated version of the OSDI questionnaire, the translation procedure employed steps recommended in standard guidelines [56, 58, 59], followed by clinical validation of the final version [24, 48-59] as detailed in Table 2.

Table 2. Summary of studies [24, 48-59] on validation of the OSDI questionnaire in different languages

Author (Year)	Language	Translation/Validation Steps
Facchin and Boccardo (2024) [48]	Italian	The Cronbach's alpha values for the OSDI-12 and its shortest form, OSDI-6, were 0.87 (95% confidence interval [CI], 0.84–0.89) and 0.75 (95%CI, 0.69–0.79), respectively. When these values were compared to those published, the relationship between the OSDI-6 and OSDI-12 was not significantly different. The results showed a cutoff of 5 points for the OSDI-6, based on the OSDI-12 as a reference. The diagnostic performance indexes for the OSDI-6 based on this cutoff (sensitivity, specificity, positive-predictive value, negative-predictive value, prevalence, accuracy, and area under the curve) were 0.80, 0.87, 0.83, 0.84, 0.45, 0.84 (0.78–0.88), and 0.92 (0.88–0.95), respectively. The OSDI-12 and OSDI-6 questionnaires were distributed electronically to participants twice, at a 1-week interval. The test–retest repeatability between the two administrations for each questionnaire correlated well, indicating high repeatability for both questionnaires. Item characteristic curves for the first and last item of the OSDI-6 and the OSDI-12 showed disordered and different probabilities for each category. The infit and outfit statistics for the 12 items of the OSDI-12 fell comfortably within the accepted range of 0.79–1.28 and 0.73–1.44, respectively, underscoring its reliability. However, these values for the six items of the OSDI-6 fell within the range of 0.71–0.96 and 0.72–1.02, respectively.
Aljarousha et al. (2023) [49]	Arabic	In phase one, the following steps were taken: 1) Forward translation of the English version of OSDI-12 into Arabic by two independent translators. 2) Revision of both Arabic translations to create a second draft. 3) Backward translation of the Arabic-OSDI draft into English. 4) Comparison of the backward translation to the original OSDI to identify and resolve any inconsistencies. 5) Testing the understanding and interpretation of the pre-final draft with 10 respondents from Gaza, including six men and four women. Cronbach's alpha for all items was above 0.80, except for the "blurred vision" and "deteriorating vision" items, for which the alpha values were 0.77 and 0.74, respectively. The Bland–Altman chart revealed a mean overall score difference of 0.86 between the English-OSDI and Arabic-OSDI. Overall, 260 participants with a mean (SD) age of 33.45 (11.74) years filled out the English and the Arabic-OSDI versions twice to assess the reliability of the translated version and repeatability with a 2-week interval. The internal consistency revealed a Cronbach's alpha value of 0.84, 0.88, and 0.90 for "Ocular symptoms", "Vision-related function", and "Environmental triggers of dry eye symptoms," respectively. No significant difference was found in the single item, subscale, and overall scores between the two sessions of administering the Arabic-OSDI, whereby these items had identical medians (interquartile range) in two sessions, except for items 3, 4, 5, and 10. The overall score for the Arabic-OSDI in sessions 1 and 2 was clinically different, with a positive significant correlation between the two sessions (r = 0.785). Factor analysis of the Arabic-OSDI version using the varimax rotation method found that only three factors, namely Ocular symptoms, Vision-related function, and Environmental triggers had eigenvalues greater than one in the structure of the questionnaire.

Bakkar et al. (2021) [50]	Arabic	In phase 1, the English version of the OSDI questionnaire was translated into Arabic, using the following steps: 1) Forward translation, 2) Cultural adaptation of the Arabic translation, 3) Backward translation of the Arabic version, 4) Cognitive debriefing: The pre-final Arabic version was administered to 30 Arabic-speaking participants to test their ability to understand and comprehend the questionnaire. Then, the Arabic version underwent a second review by a focus group consisting of three optometrists, and the final translation was used to test the psychometric properties of the Arabic-OSDI. The range of Cronbach's alpha for the ocular symptoms, vision-related functions, and environmental triggers of dry eye symptoms ranged between 0.881 and 0.891, 0.887 and 0.890, and 0.887 and 0.891, respectively. The Arabic version of the OSDI questionnaire was completed by 200 participants, with a mean (standard deviation) age of 31.21 (13.2) years, of whom 114 (57%) were men. A subgroup of 30 participants completed the questionnaire twice to evaluate the test–retest reliability. The test–retest reliability of the questionnaire was assessed using the Pearson correlation coefficient, which demonstrated excellent reliability, with an r-value of 0.832 ($P < 0.001$). Construct validity was evaluated through exploratory factor analysis of the 12 items in the Arabic-OSDI Scale. The Kaiser–Meyer–Olkin measure yielded a value of 0.85, indicating an adequate sample size. Bartlett's test of sphericity revealed a sufficiently large correlation among the items. Three subclasses had eigenvalues exceeding Kaiser's criterion of 1 and together accounted for 68% of the variance.
Zhang et al. (2021) [51]	Chinese	In a randomized crossover study, paper- and web-based versions of the Chinese-OSDI-12 questionnaires were completed by 254 participants with a mean (standard deviation) age of 27.90 (9.06) years of whom 51% (129) were men. In parallel test–retest reliability for both questionnaires, the item, subscale, and total scores were assessed. Spearman's correlation test revealed the lowest level of agreement for Item scores (r = 0.806, ICC = 0.824). Reliability indexes were within the acceptable range, with Pearson's correlations greatest for item 1 (0.965) and an ICC ranging from 0.824 (item 11) to 0.989 (total score). Most of the responses to the items had the same response in both paper- and web-based versions, indicating a high parallel reliability. Overall, reliability indexes were adequate: Pearson's correlation coefficient exceeded 0.8 and the ICCs were between 0.827 and 0.982. The total score for the Chinese-OSDI was not statistically significantly different between the two versions. The study found no significant associations between the version preference by participants and age, gender, education level, or level of DED severity.
Traipe et al. (2020) [54]	Chilean Spanish	Phase 1 involved the cultural adaptation of the original OSDI questionnaire. This process included translation, back-translation, and review by an expert panel to create a preliminary Chilean Spanish version of the OSDI. This pre-final version was then administered to 12 participants to assess their understanding and comprehension of the questionnaire. Based on their feedback, a final version suitable for the study population was developed. The adapted version was validated through psychometric analyses, which assessed both internal consistency and construct validity. According to the criteria set by the Dry Eye Workshop II, 200 Chilean patients, with a mean age of 53 years (53 [26.5%] men and 147 [73.5%] women), who were diagnosed with dry eye syndrome, were included in the cross-sectional, retrospective, descriptive study. Based on the OSDI scores, 81% (n = 162) of individuals were confirmed to have dry eye syndrome, with 55% (n = 110) experiencing severe symptoms. When examining the correlation between each questionnaire item and the overall score, all items exhibited a correlation exceeding 0.4, indicating that no items needed to be removed. Cronbach's alpha was 0.91, demonstrating excellent internal consistency. Factor analysis revealed three main factors that explained 75.4% of the total variance. These factors were labeled as follows: "Environmental," "Lifestyle," and "Individual/Symptoms." The grouping of items in the translated questionnaire closely resembled that of the original questionnaire, though there were some differences. For example, Factor 1 included the question "Do you feel grit in your eyes?", which was categorized as a symptom in the original version. In Factor 2, which is related to specific daily activities and situations, the item "windy places" was included, aligning with the "Environmental triggers" construct from the original version. Factor 3 displayed the least variability, grouping items similarly to the original questionnaire, except for question 2. The excellent internal consistency and adequate construct validity of the developed Spanish OSDI questionnaire make it a valuable tool for clinical practice and dry eye research.

Midorikawa-Inomata et al. (2019) [55]	Japanese	In phase 1, the original OSDI underwent a forward translation by five bilingual ophthalmologists and was culturally adapted to ensure understanding of the translated questionnaire by Japanese patients. The consensus draft was then back-translated into English, and its comprehensibility was assessed, after which the original translated and back-translated versions were compared by a committee of experts for conceptual equivalence, to develop the final Japanese-OSDI. Thus, the Japanese version of the OSDI was developed through cultural adaptation and clinical validation. In a hospital-based cross-sectional observational study, 209 participants, of whom 152 (n = 127 women, 83.6%) had DED and 57 (n = 48 women, 84.2%) were controls, were recruited. Cronbach's alpha of 0.884 provided evidence of good internal consistency, and ICC of 0.910 indicated good test–retest reliability for the Japanese-OSDI total score. The total score, scores for each subclass, and scores for each of the 12 items were significantly higher in individuals with DED than in the controls, except for question 2, which showed no significant difference. These findings indicated that the Japanese-OSDI had good discriminant validity. Factor validity was employed to confirm the presence of three subscales within the Japanese-OSDI questionnaire, in alignment with the original version of the questionnaire. Concurrent validity was evaluated using Pearson's correlation analysis, which revealed a strong positive correlation between the total score of the Japanese-OSDI and the Dry Eye-Related Quality-of-Life Score. The optimal cutoff value for the total score of the Japanese-OSDI was determined to be 36.3, with an area under the curve of 0.744. Overall, the developed Japanese-OSDI questionnaire was validated for reliability and validity, proving to be an effective tool for assessing and monitoring DED in the Japanese population.
Roa-Lingad et al. (2018) [56]	Filipino	The Filipino-adapted version of the OSDI was developed following established guidelines. 1) Forward translation: Two non-ophthalmologists independently translated the OSDI into Filipino, resulting in two similar, but differently worded translations. 2) A review committee then combined these two outputs into a revised forward translation. The review committee was formed by the primary investigator and research adviser; both were ophthalmologists familiar with treating patients with DED. The third member was a lay individual, specifically a non-medical adult female administrative officer, selected to represent the target patient group. This committee revised the translations after evaluating the forward and back-translations, making necessary edits to ensure clarity while maintaining the original concepts. 3) Backward translation from Filipino to English further improved the quality of the final forward-translated version. 4) Final forward translation: The review committee compared the backward translation with the original questionnaire and made additional edits to finalize the Filipino translation. This version was tested on eligible Filipino adults with DED who were capable of answering the questionnaire. In the pre-test phase, 16 patients (n = 15, 93.8% women) participated, all of whom rated their proficiency in Filipino as a perfect 10. Most participants (n = 13, or 81.3%) provided the same answer in at least half of the items across both languages, with similar responses ranging from 41.7% to 91.7%. After the interviews, 13 of the 16 patients (81.3%) stated that they preferred to answer the questionnaire in Filipino; one preferred the English questionnaire, and two had no preference. All patients reported ease and preference when answering the final forward-translated version; thus, no additional revisions were made before administering the tool to participants in the next phase. To test reliability, the final forward-translated version of the Filipino questionnaire was completed by 36 patients with DED (n = 29, 80.6% women). The results were fairly consistent with the original English-OSDI, yielding an overall Cronbach's alpha of 0.5958 indicating fair internal consistency. The authors estimated that removing questions 4, 7, and 8 would increase the overall alpha to greater than 0.6. When the questionnaire in Filipino was retested on 11 patients (n = 8, 72.7% women) without these questions, the overall Cronbach's alpha value increased to 0.7576 indicating moderate internal consistency. No construct validity (factor analysis) was reported.
Lu et al. (2018) [52]	Chinese	A prospective cross-sectional study evaluated the reliability, validity, and accuracy of the Chinese version of the OSDI questionnaire. The study included 98 participants, comprising 52 men and 46 women, with a mean (SD) age of 33.4 (16.8) years. Participants were categorized based on their DED severity: 35 individuals had mild-to-moderate dry eye, 14 had severe dry eye, and 49 had no DED. The study found a Cronbach's alpha of 0.74 and an ICC of 0.90, indicating excellent internal consistency and reliability,

		respectively. Significant differences in OSDI scores were observed among the different participant groups. The cutoff value for an abnormal OSDI score was determined to be 27.2, demonstrating good diagnostic accuracy for dry eye. Overall, the questionnaire displayed fair accuracy in diagnosing dry eye, and the findings suggested that the cutoff values for OSDI may need to be adjusted for Chinese populations.
Pakdel et al. (2017) [24]	Farsi	The OSDI questionnaire underwent both forward and backward translation to ensure accuracy. The finalized version was tested among 15 participants to assess their understanding, which led to necessary revisions. The final questionnaire was then administered to 44 individuals, consisting of 32 males (72.7%) and 12 females (27.3%), with a mean (SD) age of 45.5 (15.97) years. The most commonly reported symptoms were discomfort when exposed to wind (76.7%) and discomfort in dry conditions (76.1%). The internal consistency of the questionnaire was evaluated using Cronbach's alpha, which yielded a value of 0.807. Test–retest reliability was assessed through weighted kappa analysis, conducted between two evaluations spaced 7 days apart. The kappa analysis for intra-observer agreement revealed nearly perfect agreement for questions 1, 3, 7, 8, and 9; substantial agreement for questions 2, 6, 10, 11, and 12; and moderate agreement for questions 4 and 5. Respondents aged ≥ 45 years showed a higher level of agreement on questions 1, 2, 3, 7, 8, and 9. The Farsi version of the OSDI demonstrated satisfactory test–retest reliability, internal consistency, and validity for evaluating dry eye symptoms and quality-of-life among Farsi-speaking patients. The content validity of the Farsi version of the OSDI questionnaire has not been reported. The authors suggested that its content validity could be assessed by administering the OSDI alongside a diagnosis of dysfunctional tear syndrome, as outlined by the criteria established by the Dry Eye Workshop.
Abd Rahman et al. (2017) [57]	Bahasa Melayu*	The original OSDI questionnaire was translated into Bahasa Melayu through five phases: forward translation, synthesis of the translation, backward translation, refinement of the translation, and quality evaluation. In the validation step, the final Bahasa Melayu-OSDI version was administered to 230 bilingual participants, who answered both English and Bahasa Melayu versions of the OSDI questionnaire. The resulting Cronbach's alpha was 0.77, which indicated good reliability, as a coefficient of 0.7 and above is considered acceptable. The authors concluded that the OSDI in Bahasa Melayu is a valid instrument for assessing DED symptoms.
Zhao et al. (2015) [53]	Chinese	This study aimed to develop and assess the Chinese 12-item dry eye questionnaire applicable to the Chinese population with dry eye patients using appropriate language expression and considering the cultural background, by including 78 patients with dry eye and 82 controls. Participants completed the Chinese dry eye and OSDI questionnaires with a response rate of 100% and 91.25%, respectively. Cronbach's alpha values for the Chinese dry eye and OSDI questionnaires were 0.794 and 0.925, respectively. Both questionnaires had an ICC of 0.99, indicating good to excellent reliability. Factor analysis revealed a good construct validity for both questionnaires. Spearman's correlation analysis revealed a significant and positive strong correlation between the scores of the two questionnaires. The Chinese 12-item dry eye questionnaire had a significantly greater correlation with the clinical evaluations than did the Chinese-OSDI score. The discriminant validity analysis found a significant difference in the Chinese dry eye questionnaire score between individuals with DED and controls; indicating good discriminant validity. A cutoff score of 7 points on the Chinese version of the dry eye questionnaire revealed sensitivity and specificity values of 83.33% and 70.73%, respectively. The area under the receiver-operating characteristic curve was significantly higher for the Chinese 12-item dry eye questionnaire (0.814) than the OSDI (0.772). These findings suggested the applicability of the new questionnaire for the Chinese population with Chinese cultural characteristics. This tool had higher reliability, validity, specificity, and sensitivity for the diagnosis of DEDs in Chinese patients than did the OSDI.
Santo et al. (2015) [58]	Brazilian Portuguese	The original OSDI questionnaire was cross-culturally adapted for Brazilian Portuguese. A synthesis of translations underwent two testing phases for face and content validity through focus groups and cognitive interviews with different participants. An expert committee provided valuable contributions throughout several steps of this process. Back-translations were based on the final version of the questionnaire, rather than on a pre-final version. For validation, the adapted OSDI was administered to 101 patients with

		a mean (SD) age of 51.53 (14.83) years, with women accounting for 82.2% of participants. Cronbach's alpha was 0.905, indicating excellent internal consistency, and an ICC of 0.801, demonstrating good test–retest reliability. The OSDI scores were significantly higher in individuals diagnosed with DED (mean [SD]: 41.15 [27.40]) than in the control group (17.88 [17.09]), which indicated strong discriminant validity. Additionally, a correlation coefficient of 0.801, which reflected good test–retest reliability over a 1- to 2-week interval, suggested that the reproducibility of this adapted version was comparable to that of the original English version. The varimax rotation technique was used for factor analysis. Overall, a well-established guideline led to the development of a culturally adapted Brazilian Portuguese version of the OSDI, which was tested and validated within a sample of the Brazilian population. This version has proven to be a valid and reliable instrument for assessing patients with dry eye syndrome in Brazil.
Prigol et al. (2012) [59]	Brazilian Portuguese	Following established guidelines, four English teachers, a rheumatologist, an ophthalmologist, two ophthalmology residents, and a Native American who did not speak Portuguese were invited to participate in the study. The procedure involved several steps: 1) Two English teachers translated the original questionnaire into Portuguese. 2) The two translations were consolidated into a single version. 3) This version was administered to 27 patients at an ophthalmology clinic, during which questions were discussed and modified for better understanding by patients. 4) The modified questionnaire was back-translated into English by two English teachers who lived in the United States. 5) The back-translated version was reviewed by a United States native citizen who did not speak Portuguese, to evaluate the comprehensibility of the questionnaire. The validated OSDI questionnaire was then administered to 22 patients to assess inter- and intra-interviewer reliability. Substantial intra-observer agreement was found for questions 1, 2, 3, 4, 7, and 11, with question 8 showing almost perfect agreement, while questions 5, 6, 9, 10, and 12 exhibited moderate agreement. Inter-observer agreement analysis indicated that questions 2 and 7 had an almost perfect agreement, while questions 1, 3, 4, 5, 6, 8, and 9 demonstrated substantial agreement. Questions 10, 11, and 12 showed moderate agreement. Overall, the developed Portuguese version of the OSDI showed good inter- and intra-observer agreement and can be used effectively to evaluate the quality-of-life of Portuguese-speaking individuals with DED.

Abbreviations: OSDI, ocular surface disease index; ICC, intraclass correlation coefficient; DED, dry eye disease; SD, standard deviation. Note:*, the full text of this article was not available.

DISCUSSION

In this language-inclusive mini-review, we identified translated versions of the original English OSDI into nine other languages. The overall scores of the Japanese, Filipino, and Arabic versions of the OSDI questionnaire did not differ by sex or age. Additionally, education level, employment status, and place of residence did not influence the overall scores of the Chinese-OSDI and Arabic-OSDI [49-51, 53, 55, 56]. The item "poor vision" had the lowest mean score in the Brazilian Portuguese-, Farsi-, and Arabic-OSDI versions, and the item "discomfort or sensitivity due to light exposure" had the highest mean score in the Chinese-, Brazilian Portuguese-, Farsi-, and Arabic-OSDI versions [24, 49, 50, 51, 53, 59].

In the validation studies, Cronbach's alpha for all versions, including those for the Farsi, Bahasa Melayu, Japanese, Arabic, Chinese, Italian, and Brazilian Portuguese versions, was reported to exceed 0.7, but not for the Filipino validation study [24, 48-59]. The findings suggested that the reliability of the validated translated OSDI versions was satisfactory. A significant difference in the values of item 5 ("deteriorating vision"), item 7 (difficulties with driving at night"), and subscale 3 (Environmental triggers) between the original and validated OSDI versions were reported. The Bland–Altman chart revealed a mean difference of -0.25 in overall scores between the web-based Chinese-OSDI and the paper-based Chinese-OSDI [51]. The mean score for the web-based Chinese-OSDI was 29.87, while the paper-based Chinese-OSDI had a mean score of 29.63 on a scale ranging from 0 to 100 [51]. The Chinese version was agreed upon by Aljarousha et al. [49], who validated the Arabic version of OSDI in Gazan participants [49, 51]. Cutoff values for dry eye disease differed across versions, with a threshold of 27.2 [52] and 36.3 [55] points in the Chinese and Japanese versions, respectively. However, Bakkar et al. [50] did not establish a cut-off value for suspecting dry eye disease.

In the Japanese-OSDI [55], internal consistency and test–retest reliability for the total score (0.884 and 0.910,

respectively), the subscale of Ocular symptoms (0.788 and 0.649, respectively), the subscale of Vision-related function (0.669 and 0.817, respectively), and the subscale of Environmental triggers (0.902 and 0.859, respectively) was based on Cronbach's alpha coefficient and the intraclass correlation coefficient, respectively [55]. The three main subscales explained 71.9% of the total variance [55]. These results revealed that the construct validity of the OSDI in the Arabic and Chinese validation studies was comparable to that of the Japanese study [49, 50, 51, 53, 55, 60, 61].

Aljarousha et al. [49] found no significant difference in the overall score between the two sessions [49]. However, a significant difference was found in item 3 ("Painful or sore eyes"), item 4 ("Blurred vision"), item 5 ("Poor vision"), and item 10 ("Difficulties in windy conditions") between the two sessions [49]. In addition, Pakdel et al. noted significant differences in all 12 items [24]. This may be because the items in the series were influenced by external factors, such as work and weather conditions, which contributed to the slight variation in dry eye symptoms observed over a short period.

Indeed, the questionnaire in different languages versions of the OSDI removed language [24, 48-51, 53-56, 58, 59] barriers in informing the eye-care community, evaluating dry eye syndrome, and assisting physicians in advising and managing their subjects more suitably. Additionally, the OSDI questionnaire in its translated versions has been used to identify potential risk factors for dry eye symptoms [62, 63]. These factors include gender, age, smoking habits, use of visual display terminals, prolonged smartphone usage, watching television, diabetes, postmenopausal estrogen therapy, refractive surgery, vitamin A deficiency, antihistamine use, eye conditions, such as pterygium, blepharitis, blinking disorders, allergic conjunctivitis, as well as variations in educational and socioeconomic status, all of which have been studied worldwide [64-68].

We included studies that aimed to validate the OSDI questionnaire across various languages. This review identified validated versions of the OSDI questionnaire in nine different local languages, yet recent or unpublished relevant studies may have been missed. However, the included studies had notable limitations, including small sample sizes in some cases, a lack of assessments for inter- and intra-interviewer reliability, and insufficient details regarding the translation process in certain studies. Therefore, further research is needed on the various language versions of the OSDI questionnaire. Additional studies are essential to validate the OSDI questionnaire in different languages to eliminate the language barrier in evaluating dry eye disease.

CONCLUSIONS

The original English version of the OSDI has been translated into validated final versions in nine languages. Reliability and repeatability testing was conducted on these translated versions. The OSDI questionnaire must be translated and validated in various languages to eliminate the language barrier in the assessment of dry eye disease.

ETHICAL DECLARATIONS

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