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Comparison of Validity, Reliability, and Accuracy of the Indonesian Version Ocular Surface Disease Index Questionnaire with Dry Eye Questionnaire-5 in Enforcement Dry Eye Disease Diagnosis

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Abstract

The Ocular Surface Disease Index (OSDI) questionnaire and Dry Eye Questionnare-5 (DEQ-5) are widely used to evaluate subjective symptoms of dry eye disease (DED) as a primary diagnostic criterion. This study aims to compare the validity, reliability, and accuracy of the Indonesian version of OSDI and DEQ-5 questionnaires. Hospital-based cross-sectional study. A total of 100 participants were enrolled in the study. The Indonesian version of the OSDI and DEQ-5 questionnaires were analyzed to evaluate the validity and reliability of both questionnaires. Then, the accuracy of both questionnaires was compared with the diagnostic test and the receiver operating characteristic curve (AUC) analysis. All the question items on both questionnaires are valid and reliable. The validity test using Pearson's product-moment correlation coefficient, the value exceeds 0.23 (P<0.01) and the reliability test using Cronbach's alpha coefficient test showed good and excellent internal consistency for OSDI and DEQ-5 (Cronbach's alpha of OSDI 0.78 and DEQ-5 0.81). The accuracy of both questionnaires was good and there was no significant difference with AUC OSDI=0.78 and AUC DEQ-5=0.79. The Indonesian version of OSDI and DEQ-5 questionnaires met the validity and reliability requirements so that they were declared valid and reliable as effective instruments for DED assessment in the Indonesian population.

Introduction

Dry eye disease (DED) is a common eye disorder that affects millions of people worldwide, with varying degrees of severity (Kirupaharan et al., 2025; Villani et al., 2025). Dry eye initially only causes discomfort in the eye but can progress to worse causing pain that can impair vision. In the end, dry eye will affect a person's quality of life due to visual impairment that limits daily activities (Clayton, 2018; Morthen et al., 2022; Sayegh et al., 2021; Ocansey et al., 2023).

The diagnosis of DED is based on the quantification of subjective symptoms and objective examinations (Okumura et al., 2020; Basilious et al., 2022; Di Cello et al., 2021; Luboń et al., 2025). Various questionnaires for dry eye cases have been used as a screening tool and measure the severity of the disease. Each questionnaire instrument was validated to ensure consistency in the evaluation of DED (Schiffman, 2000; Recchioni et al., 2021; Rodriguez-Garcia et al.,

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2023; Pinto-Fraga et al., 2021). Validated questionnaires are often used to screen for dry eye symptoms before examining for signs of tear film homeostatic abnormalities. In 2017, TFOS DEWS II recommended the use of the Ocular Surface Disease Index (OSDI) and Dry Eye Questionnaire-5 (DEQ-5) as part of the dry eye diagnostic criteria (Wang et al., 2019; Chatterjee et al., 2021; Turhan et al., 2024; Hirabayashi et al., 2022).

The OSDI and DEQ-5 have undergone transcultural adaptation and validation processes into various languages (Chalmers et al., 2010; Pakdel et al., 2017; Aljarousha et al., 2025; Gross et al., 2023). To date, there is no validated Indonesian-translated dry eye questionnaire to assess dry eye symptomology. The aim of this study was to evaluate and compare the validity, reliability, and accuracy of the Indonesian version of the OSDI and DEQ-5 questionnaires. Using the validated version, it would be beneficial to use for therapeutic and research purposes in the Indonesian population.

Methods

Study Design And Participants

The study protocol was approved by the hospital's ethics committee. All participants were given an information sheet about the study's aims and requirements. Written informed consent was obtained from all participants. This was a cross-sectional observational study. Adult patients who visited the Department of Ophthalmology at the Hasanuddin University Hospital in Makassar, Indonesia between October 2021 to January 2022 were included. Only native Indonesian-speaking subjects who are above 40 years old with normal cognitive ability were recruited in this study. Participants with active ocular disease and recent ocular surgeries were excluded from the study.

Osdi And Deq-5 Questionnaires

Indonesian versions of the OSDI and DEQ-5 questionnaires were adopted from the National Guidelines for Dry Eye Medical Services published by the Ministry of Health of the Republic of Indonesia but the reliability and validity of both questionnaires have not been confirmed in Indonesia. Therefore the forwards-backward translation process doesn't need to be done anymore in this study.

Ded Diagnosis

The criteria for diagnosis of DED complied with those defined by the DEWS II which is based on the presence of subjective symptoms and one positive item: decreased TFBUT (≤10 s) and staining (>5 corneal spots). Positive symptomatology showed by a dry eye questionnaire score with a positive symptom score requiring either a DEQ-5 score ≥6 or an OSDI score ≥13 (Shimazaki, 2018; Wolffsohn et al., 2024; Akowuah et al., 2022; Chidi-Egboka et al., 2021; Guo et al., 2024).

Statistical Analysis

Statistical analysis of data was done with the Statistical Package for the Social Sciences (SPSS) software version 22. The validity test used is Pearson's product-moment correlation coefficient and the reliability test with internal consistency. According to Priyatno (2010), a questionnaire is said to be valid if it meets the requirements r count ≥ r table (2-sided test with sig. 0.01), and is said to be reliable if the Cronbach's alpha value is above acceptable limits ($\alpha \geq 0.7$) (Dwi, 2010). The criteria for interpreting an internal consistency reliability coefficient of an instrument are presented in Table 1 (Oktavia et al., 2018).

Table 1. Interpretations of internal consistency reliability coefficients

Internal consistency reliability coefficient value	Interpretation
Greater than or equal to 0.90	Excellent

0.80-0.90	Good
0.70-0.79	Adequate
Below 0.7	Less applicable

The main values used to assess the accuracy in detecting DED included sensitivity, specificity, and AUC (Dwi, 2010).

Result and Discussion

Participant characteristics

Table 2 shows the general characteristics of the study participants. All subjects responded to the questionnaires, completed the examination, and were eligible for the study. Overall, 100 participants were included. Using the diagnostic criteria by DEWS II, 61 and 39 patients were classified as DED(61%) and non-DED (31%).

Table 2. Characteristics of study participants

Participant characteristics	Frequency (n /%)
Age group (Years)	
40-49	42
50-59	34
60-69	20
70-79	4
Gender	
Male	18
Female	82
Occupation	
Civil servant	15
Entrepreneur	31
Housewives	44
Pensioner	10
Education level	
Elementary school	9
Middle school	8
High school	39
Collage	9
University	29
Postgraduate degree	4

Validity

The validity test was performed using Pearson's product-moment correlation coefficient to assess the construct validity of both questionnaires shown in the following table:

Table 3. Validity of Indonesian version OSDI Questionnaire

No.	Question	r count	r table	p value	Interpretation
1	Are your eyes sensitive to light?	0.66	0.23	<0,01	Strongly Valid
2	Do your eyes feel gritty or sandy?	0.59		<0,01	Strongly Valid
3	Do your eyes feel painful?	0.44		<0,01	Strongly Valid

4	Do you experience mild visual disturbances (blurred or hazy vision)?	0.74		<0,01	Strongly Valid
5	Do you experience severe visual disturbances?	0.48		<0,01	Strongly Valid
6	Do you have difficulty reading?	0.40		<0,01	Strongly Valid
7	Do you have difficulty driving at night?	0.46		<0,01	Strongly Valid
8	Do you have difficulty working on a computer or using an ATM (Automatic Teller Machine)?	0.41		<0,01	Strongly Valid
9	Do you have difficulty watching television?	0.52		<0,01	Strongly Valid
10	Do your symptoms worsen in windy conditions?	0.72		<0,01	Strongly Valid
11	Do your symptoms worsen in low humidity environments (very dry places)?	0.48		<0,01	Strongly Valid
12	Do your symptoms worsen in air-conditioned environments?	0.51		<0,01	Strongly Valid

Table 4. Validity of Indonesian version DEQ-5 Questionnaire

No.	Question	r count	r table	p value	Interpretation
1	How often do you feel discomfort?	0.80	0.23	<0,01	Strongly Valid
2	How severe is the discomfort during the two hours before you go to bed at night?	0.77		<0,01	Strongly Valid
3	How often do your eyes feel dry?	0.82		<0,01	Strongly Valid
4	How severe is the eye dryness during the two hours before you go to bed at night?	0.69		<0,01	Strongly Valid
5	How often do your eyes look or feel excessively watery?	0.70		<0,01	Strongly Valid

Based on Table 2 and Table 3 showed the r count in each question of OSDI and DEQ-5 questionnaires. The validity test in this study was carried out by measuring the r count of each question then it will be compared with the r table at a significance level of 0.01 to assess the

validity of both questionnaires. A higher r count compare to the r table for each question indicates that the question is valid.

Reliability

For internal consistency reliability, it was found that Cronbach's alpha of the OSDI questionnaire is 0.78; meanwhile, Cronbach's alpha of the DEQ-5 questionnaire is 0.81.

Accuracy of DED Questionnaires

The diagnostic accuracy values of both questionnaires are presented in Table 5, and receiver operating characteristic curves are illustrated in Figure 1.

Table 5. Diagnostic Accuracy Values of 2 Dry Eye Questionnaires

Questionnaires	Sensitivity (%)	Specificity (%)	Accuracy (%)
OSDI	67,21	100	80
DEQ-5	65,56	100	79

The results showed that the Indonesian version of OSDI and DEQ-5 had the ability in detecting dry eye signs which is not much different based on sensitivity, specificity, and accuracy.

The receiver operator characteristic (ROC) curve for the diagnosis of DED in Figure 1 is determined by DEWS II criteria using the Indonesian version OSDI and DEQ-5. The area under the ROC curve (AUC) of OSDI is 0.78 meanwhile, the AUC of DEQ-5 is 0.79.

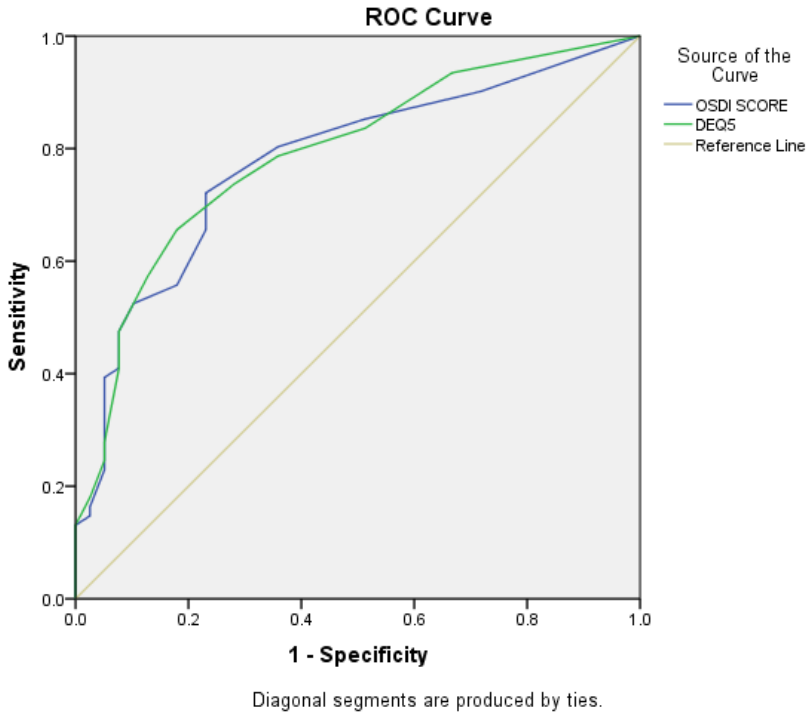

Figure 1. Receiver Operating Characteristic Curves of the 2 Dry Eye Questionnaires

Dry eye disease is a very common ocular surface disease that is accompanied by different symptoms which can be confusing during DED diagnosis. The clinical signs and symptoms do not always correlate. The dry eye questionnaires are one of the most repeatable dry eye diagnostic tests and are useful for diagnosis screening, assessment of treatment efficacy, and grading of disease severity (Dougherty Wood et al., 2016). The aim of this study was to assess the reliability and validity of the the Indonesian version of OSDI and DEQ-5 and to compare the accuracy of both questionnaires in detecting dry eye symptoms.

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The study included 100 subjects; 18 of them were male and 82 were female with age ≥ 40 years which is DED prevalence increased to 50% after 40 years of age (Shah & Jani, 2015). Demographic data including the age, gender, working status, and educational level of the participants are presented in Table 2.

The validity test was performed using Pearson's product-moment correlation coefficient to assess construct validity. The r table value for 100 samples is 0.23. Based on Table 3 reveals the range of OSDI r count value 0.40-0.72, meanwhile based on Table 4 reveals the range of DEQ-5 r count value 0.69-0.82. In the construct validity test, it was found that the value of p <0.01 with r count > r table for all question items of the Indonesian version of OSDI and DEQ-5. The construct validity results for the Indonesian version of the OSDI and DEQ-5 showed very beneficial (strongly valid) with validity coefficient values above 0.35 for all question items (Oktavia et al., 2018).

The reliability test was performed using Cronbach's alpha to measure internal consistency. The results from the current study suggest that both the OSDI and DEQ-5 questionnaires have good internal consistency, though the DEQ-5 questionnaire had a higher internal consistency than the OSDI questionnaire. The internal consistency of OSDI and DEQ-5 in the current study as estimated by Cronbach 's alpha was similar to that reported by Akowuah et al. Care should however be exercised when interpreting the results of Cronbach's alpha. Cronbach's alpha value is influenced by the number of items on an instrument; the higher the number of items on an in- strument, the greater the probability of obtaining a high Cronbach's alpha coefficient. As such two instruments with different numbers of items can have the same Cronbach's alpha value but the instrument with the fewer number of items will have a better internal consistency (Akowuah et al., 2022; Kennedy, 2022; Jarupunphol et al., 2024; Trabelsi et al., 2024). Based on the interpretation of the internal consistency reliability value in Table 1, from these results, we can confirm that the internal consistency reliability of OSDI is good (0.78) and the internal consistency reliability of DEQ-5 is excellent (0.81).

Conventional analyses consider the sensitivity and specificity of a diagnostic test as the primary indices of accuracy since these indices are considered to be independent of the prior probability of disease (Hajian-Tilaki, 2013; Pascoal et al., 2022; Chow et al., 2023; Silva et al., 2023; Alfalahi et al., 2022). The sensitivity, specificity, and accuracy of both questionnaires determine a sufficient conclusion to decide the feasibility of the questionnaire for diagnosing a disease. Based on Table 6, the sensitivity of OSDI and DEQ-5 was 67.21% and 65.56%, which means the accuracy of OSDI and DEQ-5 is considered good enough as a screening tool to detect DED patients. Meanwhile, the specificity of OSDI and DEQ-5 was 100%, which means that the accuracy of the questionnaire for detecting patients who are not DED is 100% comparable to the clinical examination as a gold standard.

The AUC obtained from ROC curve analysis can be used as a measure of a test's accuracy or diagnostic precision. It can be interpreted as the probability that a randomly selected "diseased" individual is more likely to be classified as diseased by a diagnostic test than a randomly selected "non-diseased" individual (Akowuah et al., 2022). The ROC curve in Figure 1 shows the ability of the OSDI questionnaire to detect dry eye is quite good with an AUC area of 0.78 (78%), while the ability of the DEQ-5 questionnaire to detect dry eye can also be said to be quite good with an AUC area of 0.79 (79%). The AUC of both questionnaires depicted by the ROC curve shows the area that is above 50%. This area is quite large and close to 100% area.

This study is not without limitations. The recruited participants were predominantly women, most participants lived in Makassar, and eligibility required participants to have had no surgical procedures a month before study participation. These limitations possibly introduce selection bias into our sample and may affect the applicability of study findings to other ethnic groups and to persons with iatrogenic postoperative dry eye conditions. Despite these limitations, we

verified the validity, reliability, and accuracy of the Indonesian version of OSDI and DEQ-5 for DED assessment in Indonesia.

Conclusion

This study confirmed that the Indonesian versions of the OSDI and DEQ-5 questionnaires are valid, reliable, and accurate tools for assessing dry eye symptoms in the Indonesian population. All items demonstrated strong construct validity with correlation values exceeding statistical thresholds, while internal consistency showed good reliability for OSDI (Cronbach's alpha 0.78) and excellent reliability for DEQ-5 (Cronbach's alpha 0.81). Their diagnostic performance was also comparable, supported by good sensitivity, perfect specificity, and ROC-AUC values of 0.78 for OSDI and 0.79 for DEQ-5. These findings indicate that both questionnaires can be confidently used in clinical settings as effective instruments for screening and evaluating Dry Eye Disease (DED) symptoms.

The contribution of this research lies in providing standardized, linguistically appropriate, and psychometrically validated DED assessment instruments for Indonesian healthcare, addressing a previous gap in national diagnostic resources. The use of these questionnaires supports more efficient symptom-based identification of DED before further diagnostic confirmation. Nevertheless, the study sample was dominated by female subjects and limited to a single geographic region, indicating the need for broader validation. Future studies should include diverse populations, evaluate postoperative patients, and assess questionnaire responsiveness to therapeutic outcomes to further strengthen applicability across clinical and research contexts in Indonesia.

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