Diagnostic ability of maximum blink interval with Ocular Surface Disease Index score for dry eye disease

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Problem Statement

This research aims to assess the diagnostic capability of maximum blink interval (MBI) as a substitute for the tear film break up time (TFBUT) used in traditional dry eye disease (DED) diagnosis.

Introduction

- DED is one of the most common ocular surface diseases, leading to decreased visual acuity, work productivity, and quality of life.
- Mainstay of DED diagnosis requires TFBUT measurement, necessitating an in-person visit.
- MBI is positively correlated with TFBUT, which could act as a non-invasive proxy.
- Using DryEyeRhythm®, an in-house app for DED, MBI's performance was compared to traditional diagnosis

Methods

- A retrospective cross-sectional observational study at Juntendo University Hospital, Tokyo, Japan.
- Patients with clinically diagnosed DED (MBI + J-OSDI) were included in the study.
- Participants were assessed for best-corrected visual acuity, intraocular pressure (IOP), and Dry Eye-Related Quality-of-Life Score (DEQS) questionnaire, TFBUT, corneal staining scores (CFS), and Schirmer I test.
- Pearson correlation coefficients were estimated among MBI, DEQS, TFBUT, and Schirmer test I.
- ROC analysis was conducted to examine the diagnostic efficacy of MBI for DED.

Results

- 365 participants were included in this study and 252 (69.0%) were diagnosed with DED through traditional diagnostic standards (Table 2).
- The results indicate that the use of MBI and J-OSDI may be useful in screening purposes, suggested by the high specificity and positive-predictive value (92.9% and 96%; Table 1).
- ROC results for MBI+OSDI was comparable to TFBUT+OSDI (.938 vs .954, respectively) (Fig. 1).

Conclusion

- Concomitant use of MBI and OSDI may be sufficient to substitute TFBUT as a remote screening tool.
- This may have implications in improving the worsening prevalence of DED, particularly through reducing barriers to healthcare.
- Additionally, the implementation of this finding in the context of mHealth may positively affect the outreach of this screening process to younger, working populations.

Table 1. Precision rate detected between MBI with J-OSDI and TFBUT with J-OSDI.

		TFBUT + J-OSDI		
		DED	Non-DED	
MBI + J-OSDI	DED	190	8	198
	Non-DED	62	105	167
		252	113	365

Table 2. Characteristics of study participants.

Classification characteristics	Non-DED n = 113	DED n = 252	P value	Total N = 365
Age, year ± SD	59.8 ± 18.2	60.7 ± 15.4	0.648	60.4 ± 16.3
Female, number (%)	91 (80.5)	220 (87.3)	0.092	311 (85.2)
BCVA, LogMAR ± SD	− 0.021 ± 0.11	− 0.022 ± 0.11	0.934	− 0.021 ± 0.11
IOP, mmHg ± SD	13.9 ± 2.8	14.0 ± 2.7	0.905	14.0 ± 2.8
J-OSDI total score, 0–100 ± SD	9.8 ± 13.1	40.8 ± 19.3	< 0.001	31.2 ± 28.8
TFBUT, s ± SD	2.3 ± 2.4	1.5 ± 0.8	< 0.001	1.7 ± 1.5
CFS score, 0–9 ± SD	1.9 ± 2.4	2.5 ± 2.6	0.031	2.3 ± 2.0
Schirmer I, mm ± SD	6.6 ± 7.7	5.6 ± 6.0	0.195	5.9 ± 6.6
MBI, s ± SD	13.9 ± 7.8	10.2 ± 2.3	< 0.001	11.3 ± 10.6

Fig 1. Receiver operating characteristic (ROC) curve for detection of dry eye disease (DED).