RELIABILITY OF TEAR BREAK UP PATTERNS USING SMART EYE CAMERA AS NOVEL DRY EYE DISEASE SCREENING MODALITY

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Introduction

Challenges in Dry Eye Disease (DED) screening:
Often overlooked and unavailibility of advanced diagnostic methods

Tear Break Up Pattern (TBUP) ✚ **Smart Eye Camera (SEC)**

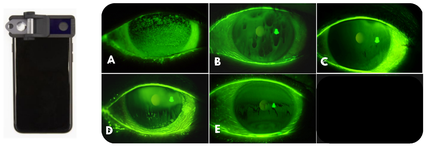
Enables DED screening using telemedicine concept

Research Outcomes

To investigate **intra- and inter-rater reliability** of TBUPs screening using SEC as a novel DED screening modality

Methods

A cross-sectional research was conducted by recording TBUPs with SEC from patients aged >17 y.o., then analysed by two independent observers on two different occasions, seven days apart.



TBUPs were categorized into one of five following break types (Yokoi *et al.*, 2017): Area (Fig. A; AB), Spot (Fig. B; SB), Random (Fig. C; RB), Line (Fig. D; LB), and Dimple (Fig. E; DB). The results from each observer were compared and analysed using Cohen's Kappa reliability test, and was considered as "good agreement" if K>0.60 (p <0.05).

Results

Table 1: Reviewer A Disagreement Heatmap

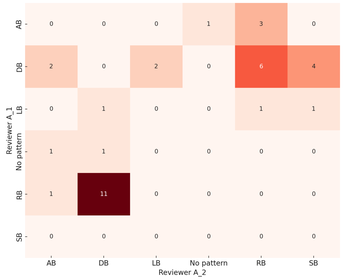
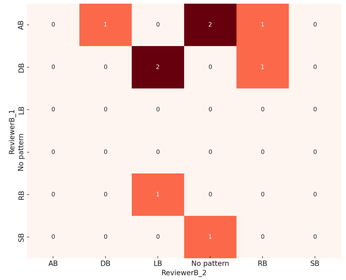


Table 2: Reviewer B Disagreement Heatmap



Between two reviews from 161 eyes of 83 subjects involved, reviewer A showed struggle to differentiate categories RB and DB (Table 1), which was shown in 17 cases (10.56%). Reviewer B showed very good consistency with only minor disagreements between categories (Table 2).

Table 3: First Review Disagreement Heatmap

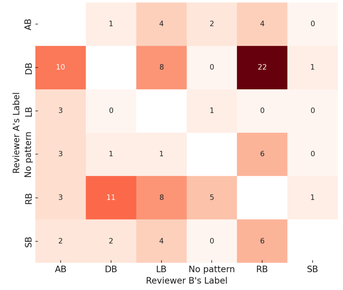
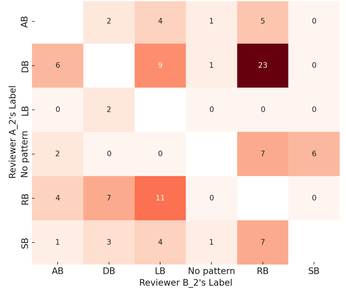


Table 4: Second Review Disagreement Heatmap



Both reviewers were hard to achieve agreement during both reviews conducted. Out of 161 cases analysed (Table 3 and 4), most disagreement scenarios happened between categories DB and RB, with 33 cases (20.49%) and 30 cases (18.63%) showing discrepancy in each respective review conducted. Furthermore, both reviewers found difficulties in distinguishing between categories DB, RB, and LB.

Statistical Analysis

Good agreement <u>within</u> observers
(K_A = 0.703; K_B = 0.917; p<0.001)
→ **Reviewers can conduct TBUPs screening <u>consistently</u>**

Lack of agreement <u>between</u> observers
(K_1 = 0.202; K_2 = 0.218; p<0.001)
→ **<u>Lack of generalised criteria</u> to ensure agreement.**

K_A: reviewer A's intra-rater Kappa value; K_B: reviewer B's intra-rater Kappa value; K_1: first review's inter-rater Kappa value; K_2: second review's inter-rater Kappa value

Conclusion

TBUPs review with SEC has shown potential by its consistent results, yet further research is needed to overcome the lack of agreement between physicians.

References

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