

# Ocular surface disorders among Warsaw University students: prevalence, tear film instability and lifestyle-related factors

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## Summary

This study investigated ocular surface disturbances among university students using subjective (OSDI) and objective measurements (NIBUT, LLT, TMH, blinking, meibography) obtained with the C.DIAG platform. Among 103 participants, tear film instability was highly prevalent (median NIBUT 2.85 s), while 38.8% reported clinically relevant symptoms (OSDI  $\geq 13$ ). Screen time was high (median 7.5 h/day), but not significantly associated with NIBUT or OSDI. Contact lens wearers showed significantly shorter NIBUT. Weak correlations between symptoms and signs reflected known DED discordance. Findings highlight the need for targeted preventive strategies in academic environments.

**Keywords:** dry eye disease; tear film instability; students; NIBUT; meibography; screen time

## INTRODUCTION

Dry eye disease (DED) is increasingly common among young adults, driven by intensive digital screen use and environmental factors. According to the TFOS DEWS III framework, loss of tear film homeostasis results from mechanisms such as instability, hyper-evaporation, reduced tear volume, inflammation and neurosensory abnormalities. University students represent a high-risk population due to prolonged near-work demands, irregular blinking and contact lens use. This study aims to assess the prevalence and characteristics of ocular surface disturbances in students and to evaluate associations with lifestyle factors.

## METHODS

A cross-sectional study included 103 students (77 F; mean age 21.7 $\pm$ 2.2). Subjective symptoms were assessed with OSDI. Objective measurements were obtained using C.DIAG (non-invasive) - NIBUT, LLT (interferometry), TMH, blinking frequency & completeness, meibography (Pult scale). Values from both eyes were averaged (OD/OS), consistent with guidelines recommending reduction of inter-eye noise for group-level analyses. Following statistical tests used: Shapiro–Wilk, Mann–Whitney U / t-test, chi-square, Spearman correlations,  $\alpha=0.05$ .

## RESULTS

Screen time median: 7.5 h/day, no difference by sex ( $p=0.94$ ). Symptoms: mean OSDI 13.66 $\pm$ 11.22; 38.8%  $\geq 13$  (symptomatic). Stability: median NIBUT 2.85 s; 70.9%  $< 5$  s. LLT median: 4.0 (scale 1–5). Meiboscore median: 1.0.

**Contact lens wear (35/103):** Shorter NIBUT ( $p<0.05$ ), no difference in OSDI ( $p>0.05$ )

**Correlations:** OSDI – NIBUT: showed no significant correlation, LLT – NIBUT: showed no significant correlation Meiboscore – LLT: weak negative trend Blinking frequency – NIBUT:  $\rho = -0.236$ ,  $p = 0.016$

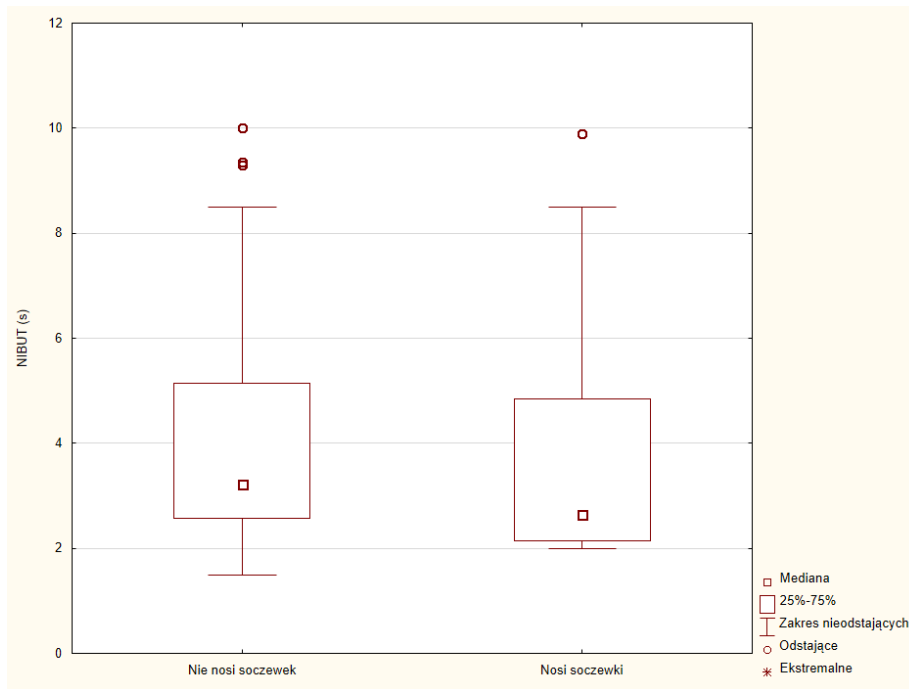


Figure 1. Distribution of NIBUT in contact lens wearers vs non-wearers

Table 1. Key clinical parameters (median [IQR])

Parameter	Value
NIBUT (s)	2.85 [1.9–4.8]
LLT (1–5)	4 [3–4]
TMH (mm)	0.205 [0.17–0.24]
Blink rate (/min)	22.5 [15–31]
Meiboscore (0–3)	1 [1–2]

## CONCLUSIONS

Tear film instability is highly prevalent among students despite moderate symptom levels. Contact lens wear is associated with worse tear stability, though subjective symptoms remain similar. Weak symptom–sign correlation reflects recognised DED discordance. Preventive strategies should target modifiable behavioural drivers: incomplete blinking, prolonged screen use without breaks, eyelid hygiene. Findings support the TFOS DEWS III framework emphasising mechanism-based evaluation.

## REFERENCES

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