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Influence of Nasal Tear Osmolarity on Ocular Symptoms Related to Dry Eye Disease

Ho Chul Yi, Yoon Pyo Lee, Young Joo Shin

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ABSTRACT

Purpose: To investigate relationships between local tear osmolarity and tear film characteristics and dry eye disease (DED) symptoms.

Design: Prospective, cross-sectional, observational study.

Methods: Nasal and temporal tear osmolarity were measured in subjects with DED. The difference between nasal and temporal tears (OSM difference) was then calculated. Ocular symptoms were evaluated and tear break-up time (TBUT), corneal fluorescein staining score (CFSS), eyelid hyperemia, and tear production were measured. Correlations between DED symptoms and nasal tear osmolarity, temporal tear osmolarity, OSM difference, and tear film characteristics were evaluated using Pearson's correlation analyses. Subjects were divided into three groups based on OSM difference: the temporal group had a temporal osmolarity > nasal osmolarity, the nasal group had a temporal osmolarity < nasal osmolarity and the equal group had an OSM difference < 10 mOsm/L.

Results: Forty-eight eyes of 48 subjects were included. Eleven eyes were in the temporal group, 17 eyes were in the equal group, and 20 eyes were in the nasal group. Temporal osmolarity, nasal osmolarity, and OSM difference were not correlated with TBUT, CFSS, lid hyperemia, or tear production. Nasal tear osmolarity was correlated with cold sensitivity frequency ($r = 0.298$, $p = 0.040$), foreign body sensation severity ($r = 0.293$, $p = 0.043$), and light sensitivity severity ($r = 0.293$, $p = 0.043$). Additionally, OSM difference was correlated with daily symptom frequency ($r = 0.339$, $p = 0.019$).

Conclusions: Nasal tear osmolarity and OSM difference play an important role in DED symptoms. Lid hyperemia, TBUT, CFSS, and tear secretion volume are not significantly affected by tear osmolarity. It is important to measure both nasal and temporal tear osmolarity when evaluating patients with DED.

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