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## **Investigation of Tear Osmolarity Using the TearLab Osmolarity System in Normal Adults in Saudi Arabia.**

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### **Abstract**

#### **OBJECTIVES:**

To investigate the repeatability and average tear osmolarity using the new lab-on-chip TearLab technology device in normal subjects living in Saudi Arabia, a hot climate country, and to compare the average readings with data from previous studies.

#### **METHODS:**

Thirty healthy young adults (13 males and 17 females) who ranged in age from 20 to 40 years (mean $\pm$ SD: 28.57 $\pm$ 5.58 years) with no symptoms of dry eyes or ocular disease, who did not wear contact lenses, and were not pregnant or breastfeeding were enrolled in the study. For inclusion criteria, all subjects were examined under a slit-lamp to verify the absence of ocular surface disorders. Moreover, phenol red thread, tear breakup time (TBUT) tests, and McMonnies questionnaire were used to exclude dry eyes. Three measurements of tear osmolarity were performed in 1 eye (at 5-min intervals) using the TearLab osmometer.

#### **RESULTS:**

The mean score on the McMonnies questionnaire was 6 $\pm$ 2.9. The mean values obtained from the phenol red thread and TBUT tests were 22 $\pm$ 7.7 mm (OD), 21.5 $\pm$ 6.6 mm (OS) and 12 $\pm$ 1.7 s (OD), 12.5 $\pm$ 1.6 s (OS), respectively. There were no statistically significant differences between the osmolarity readings (Wilks' lambda; P=0.945). Tear osmolarity results confirmed that 50% of subjects had readings of 299 to 312 mOsm/L, 40% had readings of 288 to 299 mOsm/L, and 10% had readings of 277 to 288 mOsm/L. The overall mean osmolarity was 299.06 $\pm$ 7.65 mOsm/L. There was a medium correlation between osmolarity and the McMonnies questionnaire and a strong negative correlation between osmolarity and TBUT values.

#### **CONCLUSIONS:**

We found that the average osmolarity for subjects living in Saudi Arabia was 299.06 $\pm$ 7.65 mOsm/L, which falls within the reference range and is in agreement with published results (298.0-301.9 $\pm$ 7.2-16.0 mOsm/L). Osmolarity was positively correlated with McMonnies questionnaire and negatively correlated with TBUT values. The TearLab osmolarity system test showed good precision in repeated measurements. This is the first report of use of the TearLab osmolarity system to assess tear film in normal Saudi adults.

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