

Investigating the Relationship Between Tear Osmolarity and Meibomian Gland Expression

David Kading, OD, FAAO, FCLSA; Sarah Henderson, OD; Andrew Fischer, OD
Specialty Dry Eye and Contact Lens Research Center, Seattle, WA

Introduction

Tear film osmolarity has long been a vital measurement in the evaluation of dry eye disease; a high tear osmolarity is commonly associated with tear film instability, inflammation, and symptoms of dry eye.

Meibomian gland dysfunction is a significant cause of dry eye due to the meibomian glands not functioning properly to express oils onto the ocular surface. This causes tear film instability, inflammation, and dry eye symptoms. A primary goal of clinicians treating dry eye disease secondary to meibomian gland dysfunction is to reestablish proper meibomian gland function.

In this study, two pivotal dry eye tests, tear osmolarity and meibomian gland expression, are investigated to determine if a correlation exists between them.

Methods

In this retrospective analysis, subjects who presented to the clinic for a dry eye evaluation or dry eye follow up were chosen at random. Tear osmolarity was obtained by using the TearLab Osmolarity System; tear samples were collected from the lateral portion of the inferior eyelid as outlined by TearLab. Meibomian gland function was evaluated by utilizing a TearScience meibomian Gland Evaluator (MGE) and counting the number of functional meibomian glands. In this study, 74 eyes were evaluated. Data from two eyes were not included as the osmolarity score was "Below Range." Functional meibomian glands were plotted as a function of osmolarity in the correlating eye.

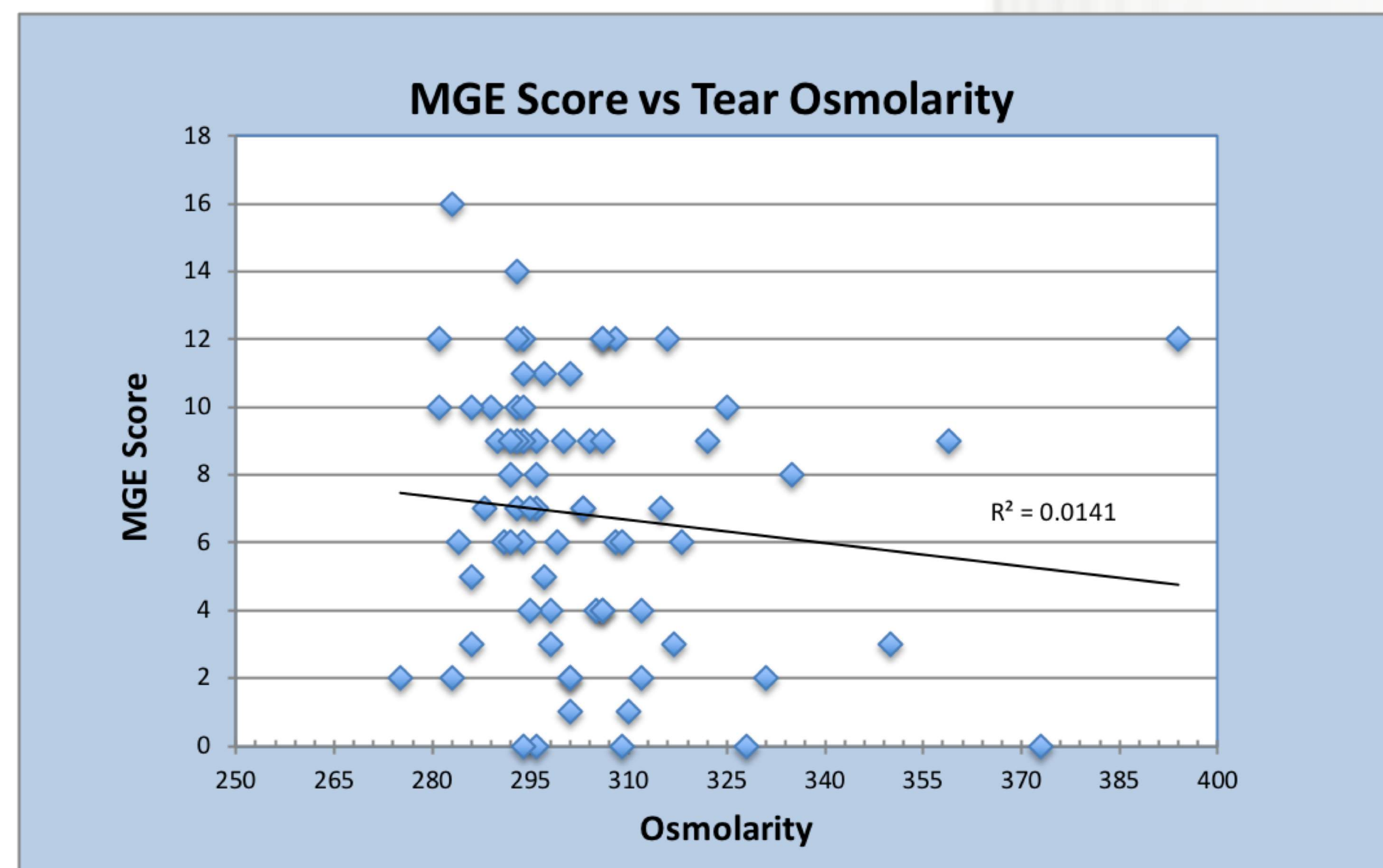


Results

The average MGE score was 6.80 functioning glands. The average Tear Osmolarity value was 303.76 mosm/L. Graphical analysis is presented in the graph below. Linear regression analysis of MGE Scores vs Tear Osmolarity scores resulted in an R^2 value of 0.014.

Conclusion

While tear osmolarity has a higher positive predictive value for the presence of dry eye (87%)¹ than many other well-known clinical tests (31%, 25%, 31%, 33% for Shirmers, Tear Film Breakup Time, Corneal Staining, and Meniscus height, respectively)², based on the data collected in this study, tear osmolarity does not appear to correlate with the number of functioning meibomian glands.



Limitations

Because subjects from this study were chosen at random from a pool of patients that presented for dry eye evaluations or follow ups, variables such as age, contact lens use, or concurrent treatments were not controlled.

Acknowledgements

1. Tomlinson A., McCann L., Pearce E.I. Comparison of OcuSense and Clifton Nanolitre Osmometers. IOVS ARVO Abstract, 2009
2. Report of the Diagnosis and Classification Subcommittee of the Dry Eye Workshop (DEWS). The Ocular Surface 5(2): 75-92, 2007

Contact Information

Please contact info@specialtyeye.com with any additional questions.