Original Article

Exophthalmometric values and their biometric correlates: The Kandy Eye Study

WengOnn Chan MBChB,[1] Simon N Madge MRCP FRCOphth,[1] Tissa Senaratne MS,[2] Saman Senanayake FRCS,[2] Kapila Edussuriya DCEH,[2] Dinesh Selva FRACS FRANZCO[1] and Robert J Casson DPhil FRANZCO[1]
[1]South Australian Institute of Ophthalmology, Adelaide, South Australia, Australia; and [2]Department of Ophthalmology, General Hospital, Kandy, Sri Lanka

ABSTRACT

Background: To determine normal exophthalmometric values for a Sri Lankan population and investigate their demographic, physical, refractive and ocular biometric correlates.

Methods: The Kandy Eye study was a population-based, cross-sectional study. By randomized cluster sampling, 1721 eligible participants, who were 40 years old and over were identified; 1375 participated. Exophthalmometry was performed with Hertel's exophthalmometer. Participants' demographics including age, gender and ethnicity were recorded. Height, weight, body mass index, non-cycloplegic refraction and ocular biometry were measured with standardized methods. Summary statistical analysis was performed for exophthalmometric values and relationships with other factors were tested using Pearson product–moment correlation coefficient analysis, standard single and multiple linear regression analysis.

Results: A total of 1341 subjects were included in the analysis. Exophthalmometric values for the population had a mean of 15.82 mm, standard deviation of 2.73 mm and range of 10.46–21.28 mm. Exophthalmometric values for men were significantly higher than women. There were no significant differences between the racial groups' exophthalmometric values (Sinhalese, Tamils, Moors). Exophthalmometric values were significantly correlated with age, gender, height, weight, body mass index, base and axial length but not to refractive spherical equivalents. Only gender, weight, base and axial length were independent predictors for exophthalmometric values after adjusting for confounders.

Conclusion: In this Sri Lankan population, our study provided the first reported estimates of a normal exophthalmometric range and determined gender, weight, base and axial length as its correlates. Sri Lankans are the first population to demonstrate this relationship between weight and exophthalmometric values and also showed that refraction is not a cause for pseudo-proptosis.

Key words: exophthalmometry, population, ocular biometry.

INTRODUCTION

Exophthalmometry has become a routine examination for any patients with suspected orbital disease. The exophthalmometric values (EVs) obtained can either serve as a diagnostic guide or be used to monitor progress of orbital disease via serial measurements. Traditionally, in the absence of other clinical signs, orbital pathology is suspected when EVs are outside of the normal range or when there is more than 2 mm difference between the eyes. However, EVs have been shown to vary according to ethnicity, age, gender, height, weight, body mass index (BMI), orbital parameters and refraction.[1–18] These variations necessitate the determination of a normal EV range and its potential correlates for a