INTRODUCTION

With the introduction of new biometry techniques such as the partial coherence interferometry-based (PCI) IOL Master (Carl Zeiss) and the optical low coherence reflectometry-based (OLCR) LENSTAR LS900 (Haag-Streit), accurate, fast and easy measurement of ocular variables is now routine in many eye hospitals. The built-in computer algorithms in these devices allow IOL power calculation over a range of formulas. This greatly extends the usefulness of these devices in both research and consultation work. The new optical biometry devices are essentially “one-stop” compared to traditional methods that use ultrasound principles such as aplanacon and immersion biometry that require several steps during measurement. Consequently, mistakes could occur in each step, and in addition, patients may feel uncomfortable during the procedure, and a small but nonzero risk of contracting infections from apparatus contamination is always present. Nevertheless, ultrasound biometry can be the only means of obtaining suitable biometry in eyes with dense ocular media.

PURPOSE

When different ways of measuring the same variable are available, it is of interest to find out how well two different methods agree, since near perfect agreement implies practical equivalence of methods. To demonstrate method agreement, we need to use proper statistical methods for justification. Several studies1-6,7 that look at LENSTAR-IOLMaster agreement in AL, ACD, IOL power, K1 and K2 measurements of phakic eyes have already been done. All suggest that measurements obtained from LENSTAR and IOLMaster strongly agree. These studies, however, do not tell us how well the agreement between LENSTAR and IOLMaster is relative to those of LENSTAR-Appplanation and LENSTAR-Immersion. Our present study aims to address this issue by performing the above three method agreements analyses for AL, average K and IOL power in the Malaysian population.

METHODS

We conducted the study at the Ophthalmology Clinic, University of Malaya Medical Center, Malaysia. We measured 142 to 147 phakic eyes in 76 consecutive cataract patients using four different methods: IOLMaster, LENSTAR. A scan appplanation and immersion ultrasound biometry. We assessed method agreement in the LENSTAR-IOLMaster, LENSTAR-Appplanation and LENSTAR-Immersion comparisons for axial length (AL) and IOL power using Bland-Altman plots. For average K, we compared LENSTAR with IOLMaster and the TOPCON KR-8100 autorefractor-keratometer. We used the SRK/T formula to compute IOL power, with emmetropia as the target refractive outcome.

RESULT AND DISCUSSION

Table 1 shows the proportion of differences falling within three ranges of IOL power in the three comparisons: LENSTAR-IOLMaster gives the most desirable result, followed by the LENSTAR-Immersion and LENSTAR-Appplanation.

Table 2 The proportion of AL differences falling within 0.33mm range in zero from the LENSTAR-IOLMaster comparison has important discrepancy with that of LENSTAR-Appplanation, and to a much lesser degree with that of LENSTAR-Immersion. The discrepancy is more than 0.1mm.

Table 3 The agreement between methods for IOL power is judged by the proportion of differences falling within clinically acceptable difference ranges from zero to 0.65 to 1.65.

CONCLUSION

AL, average K measurements and IOL power calculations (SRK/T formula) taken from the OLCR device IOLMaster are biometrically equivalent to those of the PCI IOLMaster, in the sense that interchanging measurements of the same variables has clinically negligible effect. This cannot be done between LENSTAR and the appplanation and immersion ultrasound biometry without incurring substantial disagreements in the proportion of IOL power differences falling within 1 D from zero. When we did not perform pre and postoperation comparison of IOL power, the prospect of LENSTAR achieving high accuracy in targeted refraction seems high because of its strong agreement with IOLMaster. Our study suggests that IOL power disagreement between LENSTAR and appplanation and immersion ultrasound biometry is a potential source of error contributing to incidences of postoperative refractive surprise.