Comparison of Icare Rebound Tonometer and Perkins Applanation Tonometer in Community Eye Screening

Siew Leng Ting, FRCOphth, Lik Thai Lim, FRCOphth,* Chor Yau Ooi, MMed (FamMed),† and Md Mizanur Rahman, PhD‡*

Purpose: To compare the measurement of intraocular pressure (IOP) of Icare rebound tonometer and Perkins applanation tonometer (PAT) during community eye screening and to assess the agreement between these 2 instruments.

Design: A cross-sectional, non-interventional study.

Methods: The IOP measurements by handheld Icare rebound tonometer (Finland) were first performed by a primary care physician. Then the IOP was measured using Perkins Mk3 applanation tonometer (Haag-Streit, UK) by an ophthalmologist who was masked to previous readings from the Icare rebound tonometer. The mean IOP measured by each tonometer was compared. Pearson correlation coefficient was used to explore the correlation between the IOP measurements of the 2 instruments. The level of agreement between them was assessed using the Bland and Altman method.

Results: A total of 420 left eyes were examined. The mean age of subjects was 38.6 ± 18.2 years. Approximately 67% of subjects were female. The mean IOP was 16.3 ± 4.0 mm Hg using Icare and 13.4 ± 2.3 mm Hg using PAT. Pearson correlation coefficient showed a moderate positive correlation between the 2 methods (r = +0.524, P < 0.001). Linear regression analysis revealed a slope of 0.28 with R^2 of 0.255. The mean difference between the 2 methods was 2.90 ± 3.5 mm Hg and the sample t-test revealed a statistically significant mean difference from 0 (P < 0.001). The 95% limits of agreement between the 2 methods were between −9.73 and 3.93 mm Hg.

Conclusions: The handheld Icare rebound tonometer is a reasonably acceptable screening tool in community practices. However, Icare overestimated IOP with a mean of 2.90 mm Hg higher than the PAT. Thus, using Goldmann applanation tonometer as a confirmatory measurement tool of IOP is suggested.

Key Words: Icare rebound; intraocular pressure; Perkins tonometer

(*Asia Pac J Ophthalmol (Phila)* 2019;8:229–232)

Glaucoma is a leading cause of visual impairment. It has been estimated that 76.0 million of world population will suffer from glaucoma by year 2020.[1] Intraocular pressure (IOP) is the crucial modifiable risk factor in the management of glaucoma, but measuring the true IOP clinically can be challenging as it requires direct contact with the eye. Hence, a variety of tonometry devices have been developed to measure IOP. In clinic setting, Goldmann applanation tonometry is widely accepted as the gold standard for IOP measurement. However, the Goldmann applanation tonometer (GAT) must be mounted on a slit lamp, making it less portable to be used in a community setting. Besides, the device requires a trained ophthalmologist/clinician to operate. The Perkins applanation tonometer (PAT) is a handheld device that works on the same principle as the GAT. Established for over 50 years, Perkins is synonymous to the 'gold standard' in handheld applanation tonometers. The PAT yields IOP measurements that are closely comparable to GAT.[2]

The Icare tonometry uses rebound technology, in which a light-weight probe is used to make a momentary contact with the central cornea. The IOP is measured using deceleration rate and contact time of the probe touching the central cornea. The Icare rebound tonometer is used widely in the pediatric and community care practices as a screening tool for IOP measurements because anesthetic is not needed and the probe touch is barely noticed by the patient.

In this study, we aimed to compare the Icare rebound tonometer with the reference handheld method (PAT) in a community eye screening setting and to assess the agreement between these 2 instruments.

METHODS

This was a cross-sectional, non-interventional study. All subjects who attended the community eye screening program organized by the Eye Department of Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Malaysia during January 1, 2017 to December 31, 2017 were recruited. Those with corneal scar, corneal pathology, active ocular infective disease, recent intraocular surgery, and allergy to topical anesthetic drop were excluded. This study was approved by the Medical Ethics Committee of Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak (03/2017). Informed consent was obtained from all recruited subjects.

Relevant demographic data such as age and sex were recorded. The IOP measurement by handheld Icare TA01i tonometer (Finland) was first performed by a primary care physician in a sitting position. Six measurements were done on the right eye followed by the left eye without topical anesthesia drop. The device discarded the highest and lowest IOP reading and displayed the mean of the remaining 4 readings. Disposable probe tip was changed for each subject and used in both eyes of

From the *Department of Ophthalmology; †Department of Family Medicine; and ‡Department of Community Medicine and Public Health, Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Malaysia.
Submitted September 25, 2018; accepted February 11, 2019.
The authors have no funding or conflicts of interest to declare.
Reprints: Ting Siew Leng, Ophthalmology Department, Faculty Medicine and Health Sciences, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. E-mail: slting@unimas.my.

ISSN: 2162-0989
DOI: 10.22608/APO.2018433