Fundoscopy among novice users: comparing between direct ophthalmoscope and PEEK Retina

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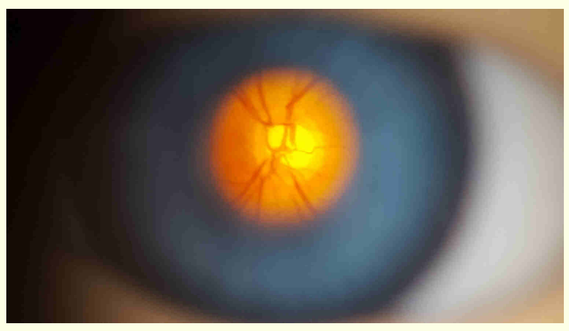
Introduction:

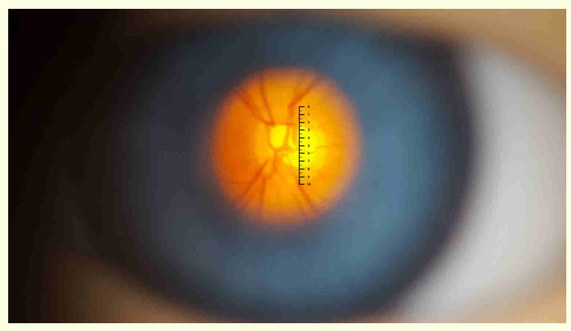
Direct Ophthalmoscopy is an important clinical skill that novice users lack confidence in. Novel devices such as PEEK Retina can utilise modern smartphones to capture fundus images, promising to revolutionise the field of ophthalmoscopy.

Glaucoma is a major cause of sight impairment worldwide and represents a huge burden in morbidity, with over 60 million people estimated to suffer from glaucoma. Part of the diagnostic process of glaucoma includes optic disc assessment and determining its vertical Cup-to-Disc Ratio (vCDR).

Aim:

To compare the performances by novice examiners, when using conventional ophthalmoscope and PEEK Retina to determine vCDR values.





Method:

Medical students received fundoscopy teaching and practical sessions with ophthalmoscopes and 'mannequin heads'.

Questionnaires were used to collect information on demographics, pre-test experiences and confidence.

Each participant was given an ophthalmoscope and asked to determine the vCDR of the fundus image loaded inside the mannequin head, then grade their level of confidence.

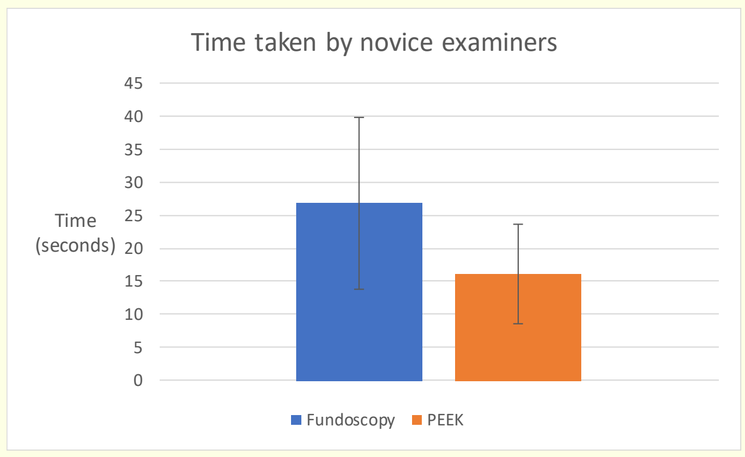
This process was then repeated with a PEEK Retina coupled with a smartphone.

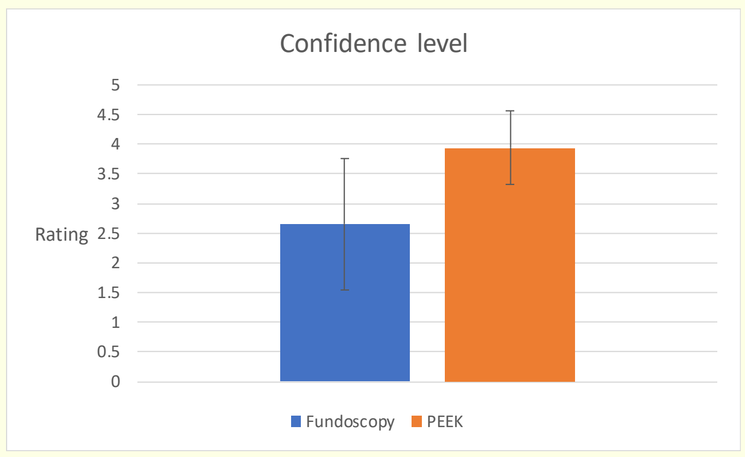
Results:

21 students participated in the study. All had prior experience with DO and none have used smartphone-adaptor devices before. Self-rated pre-test confidence was 2.9±0.8.

A fundus image with a vCDR of 0.6 was used. With direct ophthalmoscopes, participants reported a vCDR of 0.63±0.16 and the time taken was 26.85±13.03 seconds.

Using PEEK Retina, the reported vCDR was 0.59±0.09 and the time taken was 16.10±7.55s. Self-rated confidence ratings were 2.65±1.11 and 3.94±0.62 for the ophthalmoscopes and PEEK Retina, respectively.





Discussion:

The use of smartphone-based fundoscopy in vCDR measurements as part of glaucoma assessment is of great epidemiological interest (1, 2) due to the ever-increasing widespread availability of smartphones with high quality cameras.

Our results compare well with a real-life study in Germany (2) where patients with dilated pupils had their fundal images captured by smartphones coupled with D-EYE devices. Their approach showed high correlation for optic disc assessment, only under-estimating the vCDR by 0.03, when compared against conventional fundus photography.

In this study, teaching manikins with fixed-sized pupils of 5mm diameter were used. This is of course an artificial scenario and does not accurately emulate real-life patients with their associated compliance issues and pupil constriction to strong illuminating light, if mydriatic eyedrops are not used.

References
1. Bastawrous A, Giardini ME, Bolster NM, Peto T, Shah N, Livingstone IA, et al. Clinical Validation of a Smartphone-Based Adapter for Optic Disc Imaging in Kenya. JAMA Ophthalmol. 2016;134(2):151-8.
2. Wintergerst MWM, Brinkmann CK, Holz FG, Finger RP. Undilated versus dilated monoscopic smartphone-based fundus photography for optic nerve head evaluation. Sci Rep. 2018;8(1):10228.

Figures. https://www.peekvision.org https://longitudeprize.org/blog-post/peek-vision-portable-diagnostics-eye-health