Commentary: Smart click for amblyogenic risk factor screening

In the article, the authors have evaluated the clinical role of CP TX-1 camera in identifying the amblyogenic risk factors in pediatric age groups.[1] The results are promising and add more practical points to our existing understandings; however, to make it more dynamic and reliable, a special emphasis is needed on the following points.

Early screening for amblyogenic risk factors is essential to avoid greater loads of amblyopia.[2,3] For more than two decades, photo-screening, including old photographs, auto-refractors, and digital cameras, has been highlighted for refractive error screening as it has shown reliable results and prompted itself as proxy-expert for screening purposes.[3] Then,

based on these results, a second opinion is sought for further evaluation/management. However, these tools rarely speak on the magnitude of the disease, and most importantly, they are not automated where current and upcoming technology can be incorporated into them. Thus, to fulfill these needs and to make them even more dynamic, we need screening tools with the following features in near future.

Primarily, the tool/gadget needs to be cost-effective, and it should preferably be available universally, where every ophthalmologist, paramedical staff, and caretaker can afford it. Moreover, the added portability and automated decision-making (artificial intelligence) features can further reduce the burden of not having an expert in the vicinity. Thus, all these features are essential to provide a preliminary opinion as of now and to improve upon the same in near future.

The "smart tool" that can fulfill all these necessities is the "smartphone." Its use is being widely highlighted in different ophthalmic subspecialties, where many anterior and posterior segment diseases can now be screened, diagnosed, and opined easily and without using high-end instruments.[4] Anterior segment imaging, diagnosis of the glaucomatous optic disc, diabetic retinopathy screening, and others are being constantly explored using smartphones.[5] In recent times, integrated artificial intelligence technology has further made promising progress, where it seems to provide a reasonable opinion.[5]

As far as the use of smartphones for amblyogenic risk factor screening is concerned, the smartphone must acquire clear photographs of the eye in primary gaze, preferably after pharmacological dilatation (for better accuracy). Then, by analyzing these images based on their color intensity, crescentic location, and other parameters, various types of refractive errors can be labeled. Nevertheless, by further incorporating a large set of data into it and by tuning it to decide on its own (machine learning), the specific type of amblyopia can be labeled more accurately. Thus, a "smart click" using smartphones can be the future for amblyopia screening.

Furthermore, as previously highlighted by the authors, through those various sites of dedicated pediatric care, smartphone applications can be disseminated for documentation and opinion purposes. In addition, high-risk areas, communities, and ophthalmic hospitals can be emphasized to adopt the same for quick treatment stratification.

Here are some of the examples that we have gathered using a smartphone, where on an iPhone (iPhone 11 Pro max, Apple Inc.; no financial interests) under the camera application with video mode on (with continuous light source on), the following photographs were obtained. [Fig. 1] This exercise follows the classical retro glow or fundal glow visualization, wherein by assessing the color, intensity, and the location of crescentic glow, the possible type of refractive error can be determined. Moreover, over a period with a larger set of cases and diverse clinical scenarios, the depth of refractive error can also be predicted.

To conclude, as smartphones are gaining wider attention with integrated artificial intelligence technology in various subspecialties of ophthalmology, this widely available tool can also be used for amblyogenic risk factor screening in all possible places and scenarios.

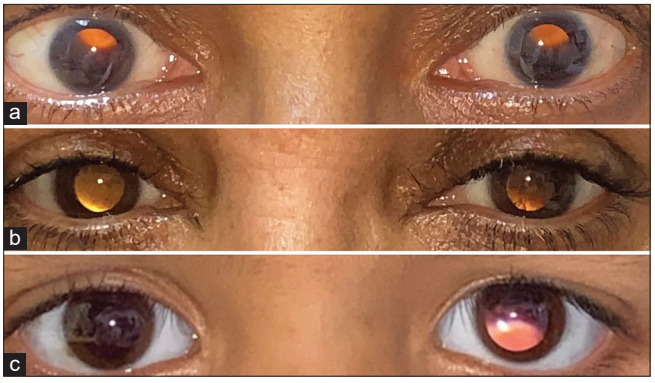

Figure 1: In a high hypermetropic patient, the bilateral superior crescentic glow can be seen (a). Similarly, in a high-my opic patient, the bilateral inferior crescentic glow can be seen (b). In a young patient with left-sided high myopia, an inferior crescentic glow can be seen (c)

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