

Commentary: Agreement and diagnostic accuracy of vision screening in preschool children between vision technicians and spot vision screener

The development of normal vision in human is the result of progression from the rudimentary sensory feedback of lower vertebrates to the advanced binocular cortical vision and conjugate eye movements of higher primates. In ethnologically lesser advanced organisms, the type of binocular vision relies completely upon the dissociated position of the eyes, which are divergent with regard to each other, the body, and the head. Inward development of the orbits and eyes from disparate positions on the head to frontal location in the face has turned

into a single binocular stereo-vision as a acclimation ability in higher vertebrates like humans.^[1]

For the development of normal visual acuity, both the retina needs to be exposed to a focused image from birth to nine years of age. Initially the infants at birth has a visual acuity of 20/1200 and on exposure to regular and equally consistent visual stimuli it improves to a normal visual acuity of 20/20. In the presence of natural visual stimuli blockage by high difference in refractive power between two eyes (anisometropia), hindrance of the visual axis (deprivation), or improperly aligned visual axis (squint), binocular single vision evolution is deterred resulting in amblyopia.^[1,2]

So early visual assessment in children is of utmost importance to rule out any ocular abnormality possibly arresting proper visual acuity development. This also helps in timely management of any treatable pathology. But it is easier said than done, to measure visual acuity in childhood

population is a very challenging and tedious task. It poses lot of problems for everyone involved (parents, ophthalmologists, optometrists, and community eye health workers). These difficulties are mainly un co-operative behavior of children, lack of aptly structured ocular centers in the periphery, ignorant, and uneducated parents, lesser number of pediatric vision—technicians and ophthalmologists, lack of appropriate training to the eye health care workers, multiple time consuming visits and non-availability of modern equipment to examine and treat visually impaired children.^[1,2]

As traditional method of cycloplegic refraction is the ideal and most accurate one to detect refractive power in children but at the same time it is very time consuming and requires multiple visits. So, the researchers and ophthalmologists are looking for amicable alternatives to assess refraction in childhood population. One such automatic and easily operable—refractor available is the Spot handheld photorefractor by Welch Allyn. It is equipped with immediate functionality of software-based referral criteria and also allows user to manually adjust such referral criteria. It needs to be held approximately at a distance of 1 meter from the child who fixes his gaze at the colorful display of attractive lights and sounds. The digital display indicates if the child is too distant or too near and shows a spinning circle and the child's face when data acquisition is processing which completes in usually two seconds only. A comprehensive report on inter pupillary distance, pupillary diameter, eye alignment, measured refraction of both the eyes, and recommendation of referral or non-referral is displayed on the screen. This data is stored in the memory card attached to the device and available for printing. The SVS (Spot vision screener) suggests an interpretation—"all parameters within normal range" or "complete eye examination required." The device on its ability to acquire every measurement of a subject will automatically displays causes like "pupils too miotic" or "pupils not detected," "not in range," or "attempting again to obtain a reading". Now it comes with an updated and advanced software version of the 2.0.16 that makes it user friendly.^[1] So now even a lay person or community health worker can easily measure all the parameters by providing very little training. Rohit C K *et al.* assessed sensitivity and specificity of SVS by CHEW (Community health eye worker) versus refraction by VT (Vision technicians) by single masking in childhood population of two districts. The SVS proves to be equally effective in measuring various parameters in childhood population as by trained pediatric vision technicians with additional advantage of measurement of so many other relevant parameters and referral recommendation option. This makes SVS to be quite a user friendly device for assessment of refraction in the peripheries.^[2]

David I Silbert *et al.* found an underestimation of 1.02 Dioptre (D), SE (Spherical equivalent) refractive error in comparison to the cycloplegic refraction that further increases as the hypermetropia increases.^[3] Peterseim *et al.* reported an underestimation of hyperopia by 1.35 D as compared to the cycloplegic refraction in a cohort of 1–16 year age group of high-risk children. Although their study subjects were children with delayed developmental milestones and of Down syndrome which are known

accommodative dysfunctional subjects.^[1] Plusoptix Inc (Atlanta, GA) photoscreener underestimated hyperopia by 0.64 D only.^[4]

So, as SVS are susceptible to variability and false reading in the presence of accommodation, more so in younger children. Therefore, SVS should be used as a screening device only and cycloplegic refraction is a must for actual assessment of refractive power in the childhood population. As any screening technique is bound to produce false negative results, it is mandatory that parents or caregivers who have even slightest of concerns regarding a child's vision must be recommended a comprehensive eye examination.

Arvind K Morya^{1,2}

¹Associate Professor and Unit-II Head, Cataract, Glaucoma, Refractive, Squint, Paediatric Ophthalmology and Medical Retina Services, ²Department of Ophthalmology, All India Institute of Medical Sciences, Jodhpur, Rajasthan, India

Correspondence to: Dr. Arvind K Morya, Paediatric Ophthalmology and Medical Retina Services, All India Institute of Medical Sciences, Jodhpur, Rajasthan, India. E-mail: moryaak@aiimsjodhpur.edu.in

References

1. Peterseim MM, Papa CE, Wilson ME, Davidson JD, Shtessel M, Husain M, *et al.* The effectiveness of the Spot vision screener in detecting amblyopia risk factors. *J AAPOS* 2014;18:539-42.
2. Misra N, Khanna RC, Mettla AL, Marmamula S, Keeffe JE. Agreement and diagnostic accuracy of vision screening in preschool children between vision technicians and spot vision screener. *Indian J Ophthalmol* 2021;69:117-21.
3. Silbert DI, Matta NS. Performance of the Spot vision screener for the detection of amblyopia risk factors in children. *J AAPOS* 2014;18:169-72.
4. Crescioni M, Miller JM, Harvey EM. Accuracy of the spot and plusoptix photoscreeners for detection of astigmatism. *J AAPOS* 2015;19:435-40.

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