

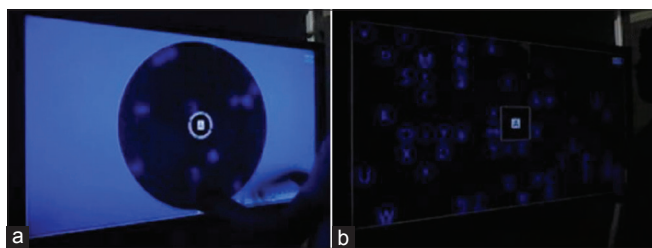
## Effectiveness of combined dichoptic therapy, binocular vision therapy, and part-time patching for the management of amblyopia in adults

Dear Editor,

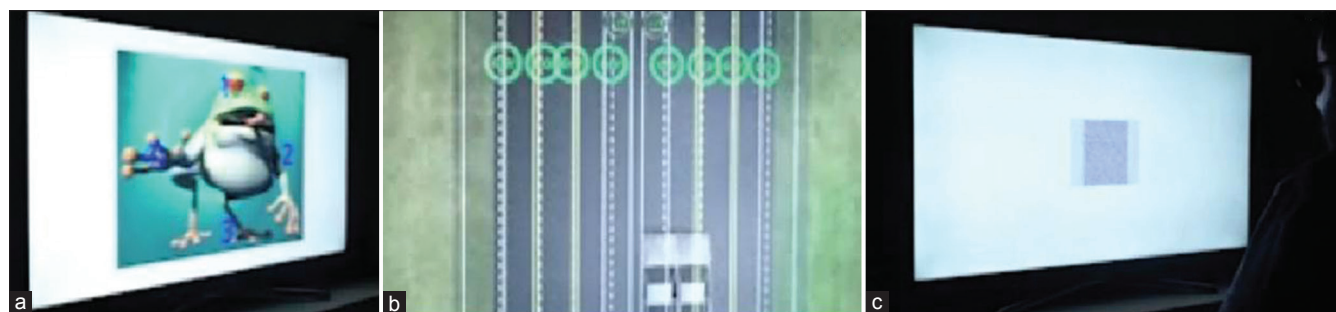
Conventional amblyopia therapy in adults is associated with poor results due to lack of plasticity. Binocular therapies like dichoptic games and dichoptic movies have shown promising results in adults long after the critical period is over.<sup>[1,2]</sup> However, in a recent level 1 high-quality randomized controlled trial,<sup>[3]</sup> dichoptic therapy (DT) as a monotherapy was not effective in unilateral anisometropic and strabismic amblyopia in children.

The use of DT in combination with binocular vision therapy (DT-BVT) and part-time patching has not been investigated. We wanted to report its effectiveness or lack thereof in this pilot study.

We retrospectively reviewed the medical records of the adults with isoametropic or anisometropic amblyopia (astigmatic refractive error  $\geq 2.50$ D, anisometropic refractive error  $\geq 1.50$ D with regard to hyperopia and astigmatism, and  $\geq 2.00$ D of myopic anisometropia)<sup>[4]</sup> in patients  $>20$  years of age who wore full-time refractive correction and were diagnosed with history of occlusion failure (no vision improvement after 6 hours of patching for a period of at least 3 months). Only those patients who completed 20 sessions of DT-BVT with a minimum follow-up of 6 weeks after cessation of therapy were included. Patients with any other ocular comorbidity were excluded.



**Figure 1:** Clinical photographs demonstrating a patient performing antisuppression exercises on Sanet Vision Integrator with moving targets (a) and static targets (b)



**Figure 2:** Clinical photographs demonstrating a patient performing fusional exercises on vision therapy system 4 using kinetic contour stereopsis (a), static contour stereopsis (b), and random dot exercises (c)

Patients underwent a comprehensive eye checkup before therapy, 6 weeks after therapy, and at the last follow-up. All the patients had received 45 min of DT-BVT sessions which included 25 min of DT on Sanet Vision Integrator (HTS Inc., USA) and 20 min of fusional exercise on Vision Therapy System 4 (HTS Inc) along with 2 hours of part-time patching.

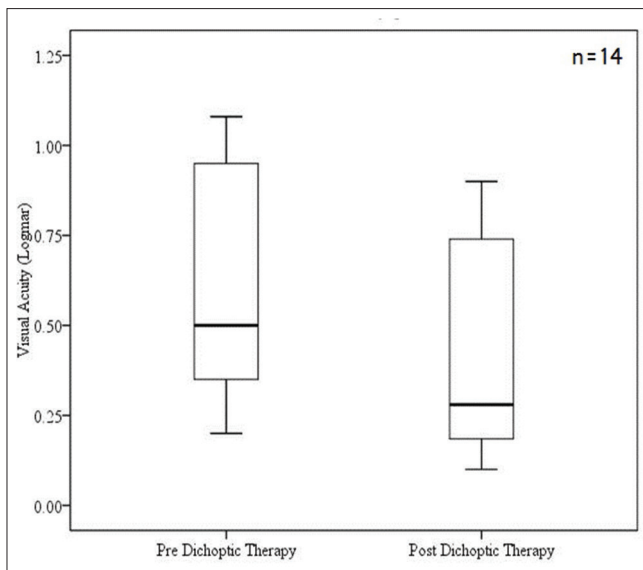
In the Sanet Vision Integrator, the patients wore a red-blue anaglyph goggles or clip-on goggle along with the spectacle correction and sat in front of a 32" touch screen computer. During the session, the patients had to identify and touch the targets projected on the screen [Fig. 1]. The moving targets create monocular fixation in the binocular field.<sup>[5]</sup> In vision therapy system 4, the patient sat in front of a 3D screen and wore a liquid crystal display-type polaroid goggle to perform fusional activities using contour stereopsis targets and random dot stereopsis targets [Fig. 2].

Best-corrected distance visual acuity measured on logMAR chart was analyzed. Shapiro–Wilk normality test was performed and the data were found to be not normally distributed. Nonparametric statistical tests were applied for data analysis.

Of 18 patients, the median age was 26.5 years [interquartile range (IQR) 20.25–34.75 years], and 9 were males and 10 were females. Fourteen patients had unilateral amblyopia and demonstrated a median improvement of 2.0logMAR lines in the amblyopic eye (range 2.60–2.20) ( $P = 0.001$ , Wilcoxon signed rank test) [Fig. 3]. The median follow-up was 4 months (2.3–16.5 months) and the magnitude of anisometropia was 3.9 D (1.1D–4.5D).

Four patients had bilateral amblyopia, and the median spherical equivalent was  $-4.38$  D ( $-2.5$ D to  $-5.5$ D) in the right eye and  $-4.9$ D (IQR  $-2.12$ D to  $-6.8$ D) in the left eye who experienced a median improvement of 2.5logMAR line (range 2.25–2.00) ( $P = 0.041$ , Wilcoxon signed rank test) in the right eye and 2.5logMAR lines (range 3.00–2.2) in the left eye ( $P = 0.043$ , Wilcoxon signed rank test) [Fig. 4]. The median follow-up in months was 15 months (IQR 4.50–24 months). In the follow-up visit, no regression in visual acuity was observed in any patient.

Our study has three limitations: (1) small sample size, (2) lack of data regarding binocularity, and (3) lack of comparison group. Nevertheless, our observations are sufficient to conclude that DT-BVT combined with part-time patching may be effective for adult amblyopia and a randomized controlled clinical trial of adequate sample size is warranted.



**Figure 3:** Box plot demonstrating the interquartile range and the median improvement (2 lines) in the visual acuity of the amblyopic eye in adults with unilateral anisometropic amblyopia treated with combined DT-BVT and part-time patching

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Nil.

#### Conflicts of interest

There are no conflicts of interest.

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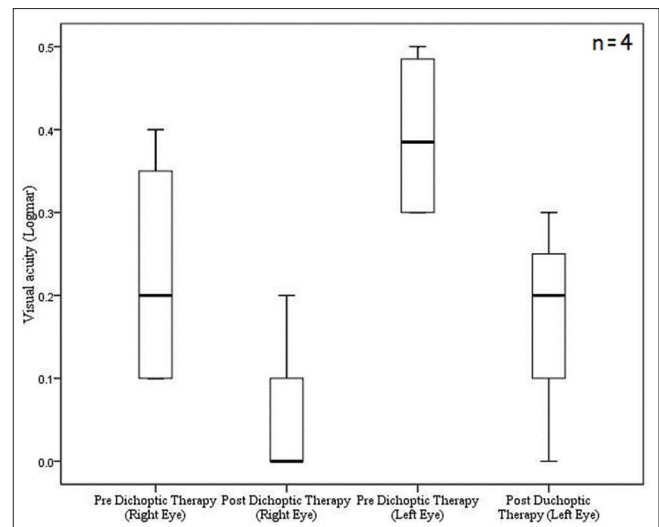
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**Figure 4:** Box plot demonstrating the interquartile range and the median improvement (2.5 lines) in the visual acuity in each eye of adults with bilateral isoametropic amblyopia treated with combined DT-BVT and part-time patching

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