



## LETTER TO EDITOR

## Seeing the world in colour: the story of vibrant colourblind glass

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Colour blindness, also known as colour vision deficiency, impairs an individual's ability to accurately perceive colours. It is often caused by genetic inheritance or damage to the optical nerves.<sup>1</sup> Approximately 300 million people worldwide are affected by this condition, with a higher prevalence in males.<sup>2</sup> A Bangladeshi invention called vibrant colourblind glasses aims to evaluate their effectiveness in enabling colourblind individuals to see colour.

This study was conducted in November 2022 at a private university in Bangladesh. A group of pharmacy students collaborated to investigate diagnostic methods for individuals with colour blindness. The survey involved 122 randomly selected adult participants who were asked to read Ishihara plates as part of a campus awareness initiative. Those who could not read the plates correctly were identified as potentially colourblind. The study provided vibrant colourblind glasses to individuals diagnosed with colour blindness, and it was observed that upon wearing the glasses, participants demonstrated improvement in reading the Ishihara plates and distinguishing colours more accurately.

Out of 122 participants, 10 individuals were identified with colour blindness, comprising 8.2% of the total which nearer (7.0%) with another research done in Bangladesh.<sup>3</sup> After using "Vibrant" glasses, these individuals reported an improvement in their colour

## LEARNING POINTS

1. Vibrant colourblind glasses improve colour perception in individuals with colour blindness.
2. Bangladeshi invention aims to enhance visual experiences for those with colour vision deficiencies.
3. "Vibrant" colourblind glasses are effective in enhancing colour perception for individuals diagnosed with colour blindness, with an improvement observed from 68% to 84%.

perception. To measure their colour vision, they were given Ishihara plates and were asked to identify as many plates as possible without glasses. Before using the glasses, most colourblind individuals could only identify four to five Ishihara plates, accounting for approximately 13% of the total plates presented. However, after wearing the "Vibrant" glasses, their performance significantly improved, and they were able to correctly identify an average of 32 to 34 plates out of 38, resulting in a success rate of ranges from 68% to 84% (TABLE 1).

The findings from this study supporting the effectiveness of "Vibrant" colourblind glasses in improving colour perception for individuals diagnosed with colour blindness.<sup>4</sup> After using the glasses, the participants reported a noticeable improvement in their ability to see colours. These results suggest that glasses could be a practical solution for those with colour vision deficiencies, allowing them to perceive a wider range of colours and enhance their visual experience in daily life.

**TABLE 1** Ishihara (38 plates) test status of the participants with colour blindness, with and without vibrant glasses

Participants number with colour blindness	Number of plates answered correctly without the vibrant glass (a)	Number of plates answered correctly with Vibrant glass (b)	Colour sensor improved ((b-a)/38 x100) (%)
1	06	32	68
2	04	34	79
3	06	32	68
4	03	35	84
5	06	32	68
6	05	33	74
7	04	34	79
8	06	32	68
9	04	34	79
10	05	33	74

The glasses' mechanism for enhancing colour perception likely involves filtering specific wavelengths of light and improving colour discrimination in individuals with colour blindness by altering the spectral composition of light entering the eye, thus compensating for deficiencies in colour perception.<sup>5</sup> However, the study's small sample size and lack of a control group are limitations that should be addressed in future research through larger-scale studies with randomized controlled designs to confirm the efficacy and applicability of glasses.

In conclusion, this study provides promising evidence supporting the effectiveness of "Vibrant" colourblind glasses in improving colour perception among individuals diagnosed with colour blindness. These results have significant implications for the development of assistive technologies aimed at enhancing visual experiences and quality of life for individuals with colour vision deficiencies. Further research is warranted to elucidate the underlying mechanisms and to optimize the use of such interventions in clinical practice.

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#### Author contributions

*Conception, design:* MSA. *Acquisition, analysis and interpretation of data:* MSA, MWEW, MMHK. *Manuscript drafting and revising it critically:* MSA, MWEW, MMHK. *Approval of the final version of the manuscript:* MSA, MWEW, MMHK. *Guarantor of accuracy and integrity of the work:* MSA, MWEW, MMHK.

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#### Conflict of interest

We do not have any conflict of interest.

#### Ethical approval

Not obtained

#### Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

## REFERENCES

1. L.-Q. C. a. M.-L. W. Huei-Yung Lin, "Improving Discrimination in Color Vision Deficiency by Image Re-Coloring," 15 May 2019. [Online]. Available: <https://pubmed.ncbi.nlm.nih.gov/31096676/>. [Accessed 24 02 2024].
2. "Special filters in glasses can help the color blind see colors better, study finds," 13 July 2020. [Online]. Available: <https://www.sciencedaily.com/releases/2020/07/200713165608.htm?fbclid=IwAR1pioMmxLeThTCz7vYH-5QXDfZEAUiSoLjBpzZuEcuwqH2dPtV9Gnnu1s>. [Accessed 05 02 2024].
3. Islam MS, Roy P, Shehreen S. Prevalence of colour blindness in young Bangladeshis. Dhaka University Journal of Biological Sciences. 2016;25(2):201-205. DOI: <https://doi.org/10.3329/dujbs.v25i2.46342>.
4. "About Colour Blindness," 06 September 2015. [Online]. Available: <https://www.colourblindawareness.org/colour-blindness/>. [Accessed 05 02 2024].
5. Moreland, JD, Westland S, Cheung V, Dain SJ. Quantitative assessment of commercial filter 'aids' for red-green colour defectives, Ophthalmic and Physiological Optics. 2010;30(5):685-692. DOI: <https://doi.org/10.1111/j.1475-1313.2010.00761.x>