



BACKGROUND

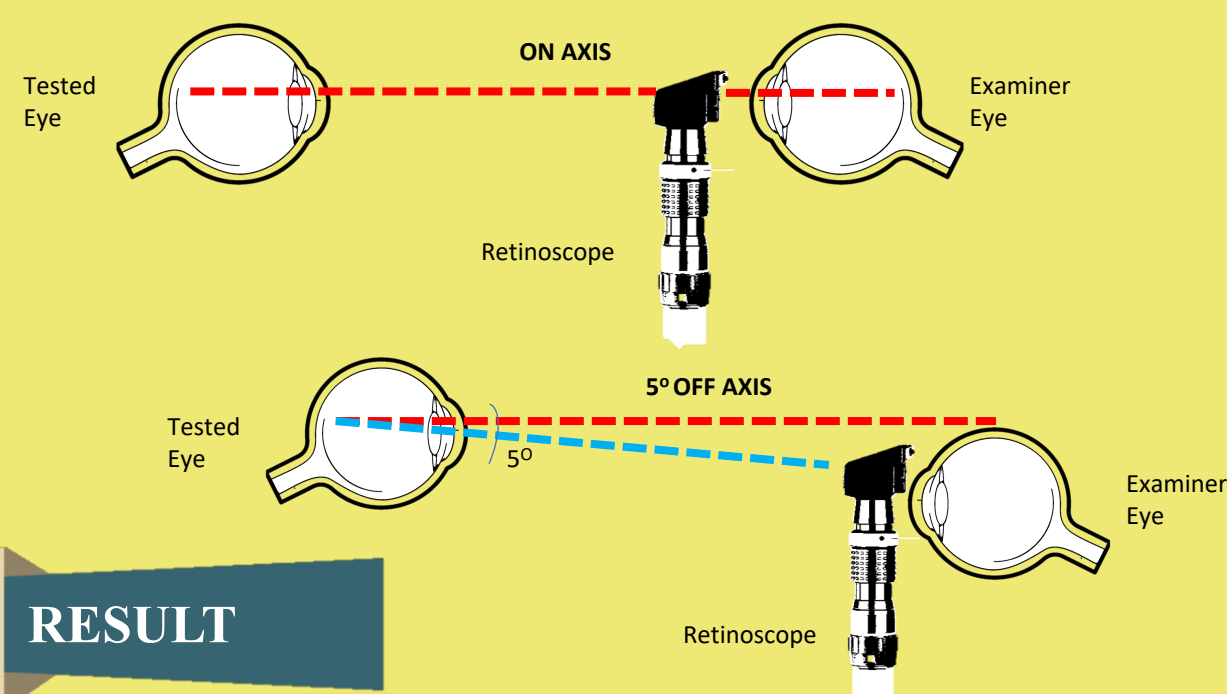
Retinoscopy must be performed on visual axis to obtain an accurate refractive result. However, in unavoidable circumstances such as limited space of refraction room, an off-axis retinoscopy method has been applied.

OBJECTIVE

The main objective of this study was to evaluate the difference of on-axis, horizontal off-axis, and vertical off-axis retinoscopy findings in myopes.

METHOD

This cross-sectional study involved 26 young adult myopes. 9 retinoscopy measurements were performed on-axis, 5- and 10-degree off nasally and temporally along horizontal axis, and 5- and 10-degree off superiorly and inferiorly along vertical axis. All findings were analysed using repeated measure ANOVA.



RESULT

The ANOVA results showed that off-axis retinoscopy give significantly difference finding than on-axis retinoscopy, $F(4.459, 111.472) = 12.418, p < 0.001, \text{partial } \eta^2 = 0.332$.

On-axis vs Off-axis

Examination Angle (I)	Examination Angle (J)	Mean Difference (I-J)	Sig.
On Axis	5° nasal	0.203	<0.001
	10° nasal	0.355	<0.001
	5° temporal	0.230	<0.001
	10° temporal	0.384	<0.001
	5° superior	0.211	<0.001
	10° superior	0.345	<0.001
	5° inferior	0.153	0.002
	10° inferior	0.230	0.016

All angles of displacement give significant difference in retinoscopy findings compared to on-axis refraction with $p < 0.05$.

5° displacement vs 10° displacement

Examination Angle (I)	Examination Angle (J)	Mean Difference (I-J)	Sig.
5° nasal	10° nasal	0.152	0.048
5° temporal	10° temporal	0.154	0.023
5° superior	10° superior	0.134	0.395
5° inferior	10° inferior	0.077	1.000

RESULT (cont.)

There were significant differences ($p < 0.05$) when the angle of displacement increase horizontally.

No significant differences ($p > 0.05$) when the angle of displacement increase vertically.

DISCUSSION

This study confirms, as historically believed, that accuracy of the retinoscopy measurement is reduced during off-axis retinoscopy. Off-axis retinoscopy showed statistically significant difference from on-axis retinoscopy ($p < 0.05$), along all axes and all degree of displacement. However, the errors for 5-degree off were clinically insignificant ($< 0.25D$) along both horizontal and vertical axes. The mean difference less than 0.25D was not clinically significant in objective measurement as 0.25D change in refractive power will not cause reduction in visual acuity^{1,2}.

The error in measurement increased as the angle of displacement increased. The mean difference for 10-degree off were more than 5-degree off. The oblate-shaped globe, which is characteristic for myopic eyes, is expected to have increased myopic refraction in off-axis retinoscopy³.

The effect along horizontal off-axis were greater than vertical off-axis. Myopia gives more effect in peripheral refraction along the horizontal axis compared to vertical axis due to the natural shape of the eyes where the eyes will be flatter along the vertical axis than the horizontal axis. The differences in peripheral refraction between the two visual axis are consistent with what is known about the shapes of emmetropic and myopic eyes⁴.

CONCLUSION

Although off-axis retinoscopy showed statistically significant difference from on-axis retinoscopy, the errors of 5-degree off were clinically minimal ($< 0.25D$) along both horizontal and vertical axes. Vertical off-axis were exposed to less error compared to horizontal off-axis. Off-axis retinoscopy method more than 5-degree and along horizontal axis is not recommended and should be avoided.

REFERENCES

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