Medical Hypothesis, Discovery & Innovation Ophthalmology Journal

Letter to the Editor

# Goldmann Applanation Tonometry: Using a Red-Free Filter for Mass Screening

**Shahram BAMDAD [1], Yalda VATAN [2]**

[1] Assistant Professor of Ophthalmology, Poostchi Eye Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
[2] Social Security Organization Hospital, Shiraz, Iran

## KEY WORDS

Goldmann Applanation Tonometry; Red-Free Filter; Mass Screening; Intraocular Pressure



**Correspondence to:**

Shahram Bamdad, Assistant Professor of Ophthalmology, Poostchi Eye Research Center, Shiraz University of Medical Sciences, Poostchi Street, Shiraz, Iran, Tel: + 98 713 2302830, Fax: + 98 713 2355936, E-mail: shahrambamdad@yahoo.com

**Dear Editor-in-Chief,**

Goldmann applanation tonometry is the gold standard medical instrument for the measurement of intraocular pressure (IOP) for a long time (1, 2). Fluorescein staining (either using a fluorescein-impregnated paper strip or a fluorescein solution) is often conducted prior to IOP measurement. However, following the application of fluorescein, patients often experience a stinging sensation, eyelid discoloration, mucus discharge, or a combination of these side effects. To avoid these side effects, and to thereby improve patient comfort, several researchers have suggested that IOP measurement should be conducted without fluorescein. However, there is no consensus on this proposal, and some of the researchers have proposed using a reduced quantity of fluorescein, while others have suggested completely eliminating it (3,4,6).

Au et al. measured the IOP of 30 subjects using Goldmann applanation tonometry with a small quantity of fluorescein, and they found that this technique was an effective and precise method for measuring IOP prior to fitting soft contact lenses (3). In addition, a recent cross-sectional study by Ghoneim et al. measured the IOP of 250 patients, first with fluorescein (with cobalt blue light) and then without fluorescein (with red-free light). There was no significant difference in the measured IOP between the two measurement methods. The mean IOP using the technique without fluorescein was 15.23 ± 3.3 mmHg, and that associated with the use of fluorescein was 12.8215.78 ± 2.43.7 mmHg (4). The authors concluded that IOP measurement using Goldmann applanation tonometry without fluorescein and with a red-free filter resulted in accurate IOP measurements (4). In contrast, a 1981 study by Bright et al. of 100 patients found that the mean IOP measured without fluorescein

and with white light was lower than that measured with fluorescein and a cobalt blue filter (5).

In our previous cross-sectional study, we measured the IOP of 500 healthy volunteers (mean age 33.69 ± 15.36 years, 57% men). We used a Goldmann applanation tonometer mounted on a Haag-Streit slit lamp (Model BQ 900; Haag-Streit AG, Bern, Switzerland) to measure the IOP in one eye of each volunteer with fluorescein-impregnated paper strips, and then to measure the IOP in the other eyes without fluorescein. To increase the ease of IOP measurement and enhance the images of the tonometer mires (for accurate evaluation of the non-fluorescein results), we used a red-free filter instead of a cobalt blue filter (6). There was no significant difference between the two methods of measurement (6). The mean IOP in the non-fluorescein and fluorescein groups was 12.71 ± 2.10 mmHg and 12.82 ± 2.45 mmHg, respectively ($p = 0.446$) (6). For both measurement groups, the IOP measurements were not statistically associated with the patients' ages and genders. Regardless of whether fluorescein was used, the difference in the mean IOP measurement between men and women was non-significant, as were the differences between different age subgroups (6).

Given the above-mentioned findings and the recent trend in clinical ophthalmology toward simplification of examinations (as evidenced by the growing number of innovative instruments for anterior and posterior segment examinations), we recommend using Goldmann applanation tonometry with a red-free filter for mass screening for ocular hypertension.

In addition, we recommend carrying out further studies with larger samples of individuals assessed with and without fluorescein, narrow exclusion criteria, and the inclusion of patients with glaucoma (to assess the use of this approach in this group).

## DISCLOSURE

Conflicts of Interest: None declared.

No funding or sponsorship was received for this study. All the aforementioned authors met the International Committee of Medical Journal Editors (ICMJE) criteria for authorship for this manuscript, take responsibility for the integrity of the work as a whole, and have provided approval for the revised manuscript to be published.

## REFERENCES

1. Patel KJ, Jain SP, Kapadia PR, Patel NV, Patel S, Patel V. Can higher end tonometers be used interchangeably in routine clinical practice? Indian J Ophthalmol. 2016 Feb;64(2):132-5. PMID: 27050348.

2. Prabhakar SK, Mahesh BS, Shanthamallappa M. A comparative study of intraocular pressure measurement by three tonometers in normal subjects. Nepal J Ophthalmol. 2013 Jul-Dec;5(2):201-6. PMID: 24172555.

3. Au YK, Reynolds M. Goldmann tonometry and fluorescein solution: a way to avoid contact lens staining. CLAO J. 1991 Oct;17(4):256-7. PMID: 17224364.

4. Ghoneim EM. Red-free light for measurement of intraocular pressure using Goldmann applanation tonometer without fluorescein. Eur J Ophthalmol. 2014 Jan-Feb;24(1):84-7. PMID: 23873489.

5. Bright DC, Potter JW, Allen DC, Spruance RD. Goldmann applanation tonometry without fluorescein. Am J OptomPhysiol Opt. 1981 Dec;58(12):1120-6. PMID: 7325201.

6. Bamdad Sh, Roozbehani M, Roozbehani R, NazarianSh, Ghaffarian H, Comparison of Applanation Tonometry with and without Fluorescein, Journal of Isfahan Medical School. 2011; 28(118): 937-942.