COMPARISON BETWEEN PHOTO-STRESS RECOVERY TIME ASSESSMENT EQUIPMENT IN NORMAL POPULATION OF PAKISTAN

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ABSTRACT

Background: Photostress test is the procedure to measure the time for restoration of retinal pigments that are bleached with bright light for 10 seconds at specific distance and is used to differentiate macular diseases from optic nerve diseases.

Purpose: The purpose of the study was to compare efficacy of instruments used for photostress recovery time (PSRT) evaluation among normal participants of Pakistan and to find best PSRT assessment instrument.

Methodology: A Descriptive cross-sectional study was conducted at Raja Fateh Muhammad Wonhar Welfare Hospital Dharukna, Kalar Kahar. After informed consent, 150 participants with 15-30 years age group were assessed through Distance and near visual acuity charts and ocular media through slit lamp for inclusion and exclusion criteria. Photostress was given randomly through Direct ophthalmoscope and Slit lamp in both eyes for 10s at 5cm, participants asked to read near chart. Photostress recovery time (PSRT) was measured through stopwatch after 20 minutes recovery time for second instrument. Data collection was done through self-designed Proforma and data analyzed through IBM SPSS 22.

Results: 150 participants (46%) males and (54%) females had most frequently PSRT 10-20 seconds (74%). Mean PSRT (15 seconds) values were assessed between both eyes with Direct Ophthalmoscope and Slit lamp. Both equipments was statistically significant for photostress recovery time evaluation with slight difference between Direct ophthalmoscope and Slit Lamp ($p<0.011$ and $p<0.00$)**.**

Conclusion: Both Ophthalmoscope and Slit Lamp are equally applicable in any clinical settings with ease of the Eye care practitioner.

Keywords: Comparison, Efficacy, Ophthalmoscope, Retinal pigments, Slit lamp

INTRODUCTION

Photostress recovery test is a quick physiological procedure in which high intensity light would result in temporary loss of sensitivity due to bleaching of cone pigments in retinal pigmented epithelium. Dark adaptation would then regain visual sensation to normal pre-exposure level. Normal photostress recovery time has been recorded about 15-30 and after the age of 40 normal values considered to be 50-60 seconds and in case of maculopathies it is extended to 1.5 to 3 minutes (1).

Retina is composed of rod and cone photoreceptors. Rhodopsin is main photo pigment in rods and composed of opsin and 11cis retinal. When rhodopsin is exposed to bright light target 11cis retinal transformed into all trans retinal because of biochemical reaction happened during the process that is called bleaching. When the source of bleaching is extinguished all trans retinal is re-converted into 11cis retinal and revert back into rhodopsin through process called re-synthesis. Bleaching and re-synthesis of rhodopsin has been significant to assess macular function through photo-stress recovery time test PSRT (2).

PSRT is time needed to get back expected baseline best corrected visual acuity either measured at distance or near visual acuity chart due to retinal exposure to bright light target (3). Pre photostress test BCVA is evaluated and it should be 20/80 or better and then PSRT is performed monocularly with patient's gaze directed towards high intensity light that should be 2-3 cm away from the eye for 10 seconds. After bleaching cone pigments light should be immediately removed and then recovery of visual sensitivity (one line above from baseline BCVA should have been achieved) and time needed to get required pre-photostress vision is recorded. It is assumed that maculopathy results due to changes in outer layers of retina and choroid, hence PSRT can be used as indicator for diagnosis (4).

Photostress recovery time assessment test has been used for optic nerve and retinal nerve disease differentiation. Although, prolonged photostress recovery time with reduced vision higher than in normal eye is due to retinal disease. It has been reported that prolonged PSRT or delayed dark adaptation in glaucoma that mainly happened because of ganglion cell layer lesion. It has been suggested that ganglion cell abnormality may be the reason for delayed PSRT and in glaucoma visual pigments may be affected (5). It has been reported that the capability to recognize optotypes after bright light bleaching procedure depends on metabolic activity of macular tissues such as retinal pigmented epithelium and sensory retina. Moreover, photostress recovery time PSRT may be prolonged due alterations in photoreceptors and pigmented epithelium compounds as well photochemical changes that occurred in intra- sub retinal fluids (6).

Large number of studies show that PSRT is influenced with aging, ocular pathologies and medicines and aside from being used as a diagnostic kit, it has also been used for monitoring of progression of several diseases like chloroquine maculopathy, nyctalopia on vitamin A therapy, age-related macular degeneration. Higher PSRT has been demonstrated through numerous studies in central serous retinopathy, age related macular degeneration as well as pathologies in retinal pigmented epithelium. In High myopia PSRT has

also been reported to be elevated due to maculopathy and also used to check its progression. Many medicines have also been shown through several studies to have increased PSRT, including the tranquilizers; Melperon, Oxazepam, alcohol, and Chloroquine. Previous studies have also explained that PSRT is increased in males as compared to females and same pattern has been shown in diabetes than in normal participants and PSRT has been significantly associated with Visual acuity but not with age. It has also been described in same study as mentioned before that PSRT is delayed with the age and has been remained unaffected with pupil size, ametropia and visual acuity (1). There is positive correlation reported between visual acuity and photostress recovery time of better or worse eye has been reported in some studies. Hence prolonged PSRT has been evaluated even with good or less severe visual acuity determines that this test could help in early prediction of early functional loss of macular diseases such as in age-related maculopathy ARM (7).

Photostress recovery time can be evaluated through various instruments as shown in many studies such as; Direct ophthalmoscope (9), Indirect Ophthalmoscope (10), 200 W Lamp (11), Pen-torch flash-light (12), Smart phone flash light (6), Aston halometer point source of illumination closely resembles head light glare coming from traffic (13). Annulus adaptometer has also been used for cone photostress recovery time in macular diseases mainly sensitive for diabetic macular edema DME (14). It has also been combined with other tests such as; Electro retinography, Electro oculography and Visual evoked potential (15).

OBJECTIVES

- To assess the Photostress recovery time through Direct Ophthalmoscope and Slit Lamp.
- To compare the efficacy of two instruments for assessment of Photostress recovery time.

METHODOLOGY

The study was conducted at Raja Fateh Muhammad Wonhar Welfare Hospital Dharukna, Kalar kahar, District Chakwal from September, 2022 to May, 2023. Descriptive cross- sectional study design was selected to compare efficacy of photostress recovery time through various equipment on normal participants regardless of male or female gender were selected in a current study with sample size of 150 participants (300 eyes) was selected through Non-probability convenient sampling technique.

Inclusion criteria

- Age group15- 30 years
- Both Genders
- Astigmatism less than 1D
- Hyperopia less than 2.5D
- Myopia less than 5D
- Normal anterior and posterior segment

Exclusion criteria

- Entire diseases of retina e.g. Age related macular degeneration, Diabetic maculopathy etc.
- High refractive error
- Keratoconus
- Presbyopia

Data collection instruments: Instruments used in present research study were as follows: Direct Ophthalmoscope (Welch Allyn NY USA), Slit lamp

(Haag-Streit–Beren 900 USA), Stopwatch (android version 13.50_1d499e5_221230), Log Mar Chart (Brien Holden) and Jaeger Chart.

Present research was performed through self-designed Proforma. After permission obtained from patient on specially designed informed consent as well as ocular and systemic history was obtained. Firstly, visual acuity assessment was done through Log Mar Chart at 4m distance and near visual acuity through Jaeger's Chart at 40cm; complete ocular examination was done on each participant through slit lamp and also detailed fundus examination through direct ophthalmoscope for selection of participants as per inclusion and exclusion criteria. Pre-photostress test near visual acuity was evaluated, then high intensity photo-stress was directly given through Direct ophthalmoscope and Slit lamp randomly one by one in both eyes of each participant and then after photostress again near vision was assessed one line above the best corrected visual acuity to measure photo- stress recovery time. After 20 minutes dark adaptation time again photostress recovery time evaluated in above-mentioned manner. Research data entry and analysis was done through IBM SPSS software 22 with non parametric paired 2 sample test (Wilcoxon test) for comparison between photo- stress recovery time assessment equipment between direct ophthalmoscope and slit lamp.

Ethical consideration: Verbal as well as written consent was acquired from the volunteer participants after giving sufficient amount of information regarding objectives, study design along with procedures to collect research data and ensured that selected participants had understand all given information easily and then enabled them for voluntarily participation in research.

RESULTS

This study is based on comparison between photo-stress recovery time evaluation instruments in age group 15-30 years with normal ocular assessments. Direct Ophthalmoscope and Slit Lamp was used for Photo-stress recovery time assessment and efficacy of both equipments was assessed in this chapter through statistical analysis which was done through Spss software version 22.

4.1: Gender Distribution

Total participants in the present study were one fifty. Sixty nine (46%) participants were male and eighty one (54%) female.

Table 4: Gender Distribution

Gender	Frequency	Percentage
Male	69	46 %
Female	81	54 %
Total	150	100

4.2: Age Distribution:

The age distribution of the participants is categorized as follows: out of 150 participants 63 (42%) were in the age range of 15-20, 63 (42%) were in the age ranges of 21-25 and 24 (16%) were in the age range of 26-30.

Table 4.2: Age Distribution

Age	Frequency	Percent
15-20	63	42 %
21-25	63	42%
26-30	24	16 %
Total	150	100 %

4.3: Photo-stress recovery time PSRT

Photo-stress recovery time is categorized into different ranges according to participant's response regarding to photo-stress recovery time measurement as follows: 111 participants (74%) had a PSRT in the range of 10-20, 27 participants (18%) had a PSRT in the range of 21-30 and 12 participants (8%) had a PSRT in the range of 31-40.

Table 4.3: Photostress recovery time

PSRT	Frequency	Percent
10-20	111	74
21-30	27	18
31-40	12	8
Total	150	100

4.4: Photostress recovery time with Direct Ophthalmoscope and Slit Lamp

The summary for the photostress recovery time (PSRT) mean values for each eye using Direct Ophthalmoscope and Slit Lamp: Direct Ophthalmoscope PSRT of the Right Eye (17.8200 ± 5.57579)**,** Direct Ophthalmoscope PSRT of the Left Eye (17.6400 ± 5.75613)**,** Slit lamp PSRT of the Right Eye (18.7400 ± 5.97549) and Slit lamp PSRT of the Left Eye (18.1600 ± 5.67256) with slight difference in Mean PSRT values in both equipments in right and left eyes of the participants.

Table 4.4: Descriptive statistic of PSRT with Direct Ophthalmoscope and Slit lamp

	Direct Ophthalmoscope PSRT of Right eye	Direct Ophthalmoscope PSRT of Left eye	Slit lamp PSRT of Right eye	Slit lamp PSRT of Left eye
Mean	17.9000	17.6400	18.4667	18.3667
Std. Deviation	5.42768	5.63936	5.72603	5.52774
Minimum	10.00	10.00	10.00	10.00
Maximum	33.00	34.00	35.00	34.00

4.5: Comparison between Direct Ophthalmoscope and Slit Lamp for PSRT assessment

The given table presents the test statistics for comparing the Slit lamp PSRT of Right eye with Direct Ophthalmoscope PSRT of Right eye, as well as the comparison between Slit lamp PSRT of Left eye and Direct Ophthalmoscope PSRT of Left eye. Wilcoxon Signed Ranks Test is used for analysis, a nonparametric statistical test for paired data.

Table 4.5: Wilcoxon Test between Direct Ophthalmoscope and Slit Lamp

		N	Mean rank	Sum of ranks	P value
Slit lamp PSRT of Right Eye - Direct Ophthalmoscope PSRT of Right Eye	Negative Ranks	49	57.41	2813.00	0.011
	Positive Ranks	74	65.04	4813.00	
	Ties	27			
	Total	150			
Slit lamp PSRT of Left Eye - Direct Ophthalmoscope PSRT of Left Eye	Negative Ranks	44	63.09	2776.00	0.000
	Positive Ranks	87	67.47	5870.00	
	Ties	19			
	Total	150			

For the comparison of Slit Lamp PSRT of Right eye and Direct Ophthalmoscope PSRT of Right eye: The Z statistic is -2.554. This value indicates the standardized test statistic for the comparison. It measures the difference between two groups in regards of standard deviations. Asymptotic significance (2-tailed) is given as 0.011. This value represents the p-value associated with the test statistic. In this case, it suggests that the difference between the Slit lamp PSRT of Right eye and Direct Ophthalmoscope PSRT of Right eye is statistically significant at the conventional significance level of .05 (since .011< 0.05).

For the comparison of Slit lamp PSRT of Left eye and Direct Ophthalmoscope PSRT of Left rye: The Z statistic is -3.589. Similar to the previous case; this value measures the difference between two groups in regards of standard deviations. The asymptotic significance (2-tailed) is given as 0.000. This p-value suggests that the difference between the Slit lamp PSRT of Left eye and Ophthalmoscope PSRT of Left eye is also statistically significant at the conventional significance level of 0.05 (since 0.000< 0.05).

In both cases, the p-values are less than .05 indicates that there is strong evidence to reject null hypothesis. The alternate hypothesis in this context would be that there is significant but slight difference between the two methods of measurement (Slit lamp PSRT and Ophthalmoscope PSRT) for the respective eyes.

DISCUSSION

Comparative study was carried to assess substituent end point of macula through OraLux system and Eger Macular stressometer on 8 participants (16 eyes) with mean age 39.3 ± 16 at different distances and illuminations such as: 90LUX and 700 LUX. Photo-stress had been given randomly at 6 inches through thyristor photoflash of Eger Macular Stressometer for 10 minutes and by diffuse illumination of 40,000candela/m^2 via ORALUX System at 12 inches for 90 seconds and near chart were used at 40 cm for baseline visual acuity assessment before and after photo bleach. Mean photo stress recovery time for ORALUX system was increased at 90 LUX with age of participant (p

value= 0.02) and at 700 LUX (p value= 0.26). Mean recovery time at 90 LUX was found higher significantly for individual over 40 years (98.2 seconds) than for younger individual (61.4 seconds). However, Eger Macular Stressometer had not been found frequent with participants age both at 90 LUX (p value= 0.094) and 700 LUX (0.22). Therefore, mean comparison between equipments was found non-significant with p value >0.11 (15). Present study was also based on comparison between two equipments such: Direct Ophthalmoscope and Slit Lamp which performed at same distance 5 cm and exposure time 10 seconds. High intensity illumination of both equipments was used for photo bleaching purpose. Participant's age was also different from abovementioned study and near vision was also assessed in current study. Result of this study are not agreed with present study results as both equipment were reported to be significant with p value < 0.05 and there was slight difference between Direct Ophthalmoscope and Slit Lamp and both are equally applicable for quick evaluation of macula.

A study was held with new web application of macular recovery time MRT assessment through photo-stress on two age groups such as; 30 participants of (18-25 years) and 22 (58-68 years) with normal ocular media and 20/20 distance and near visual acuity with best spectacle correction with ocular dominance. Different examination test was performed in that study such as visual acuity evaluation, refraction, slit lamp examination, Amsler's Grid as well as MRT evaluation after glare source through web application on Laptop screen. MRT was evaluated after glare source with 2 levels of illumination of examination room on successive 2 visits with interval of 1 week. Results had shown that there was significant difference between 2 visits of MRT evaluation. MRT on second visit reported to decreased due to learning effect. Younger participants were shown shorter MRT and minimum dispersion of the results (16). My study was on single group with 150 participants (15-30 years) on single visit with 20 minutes dark adaptation time two equipments was used such as; Direct ophthalmoscope and Slit lamp in both eyes. Current study results show that there was no statistical difference between PSRT assessment readings for both eyes with abovementioned both eyes. Although, there is no previous study found regarding photostress evaluation on Slit Lamp. Recent study shows Slit Lamp statistically significant for photo-stress recovery time evaluation. Moreover, another study that was done with new technique with smart phone camera flash light 48 visually compromised and 47 normal age-matched participants in 2 week visit follow-ups for test – retest reliability evaluation. Co-efficient of reliability has been found to be acceptable due to increased repeatability and consistency in evaluation of PSRT. Hence, this equipment was proven to be easily implemented in clinical settings and indicator for macular pathology (6). Present study was done on normal 150 participants appeared single visit with 20 minutes for dark adaptation. My study results somehow matched with abovementioned study as both Direct Ophthalmoscope and Slit lamp are significantly applicable for photostress evaluation.

Loughman et al conducted study on Macular Degeneration Detector Device MDD2 for photostress recovery time assessment. The MDD-2 is a very simple equipment that includes a spectrally broader xenon flash light with UV and IR filter, focusing +8.00 Diopter lens, and high short and long term output stability (approximately 1% and 3%, respectively). Measurement of analysis of variance was assessed statistically revealed $p< .05$ significantly intra-measurement learning effect. Paired t test analysis shown that significant difference in repeated measurement within and between eyes $p<.005$ for all. This device was proven clinically acceptable for measurement of photostress recovery time among individuals and potentially prompt clinical indicator of ocular health of the patients (17). Current study is based on comparison between Direct Ophthalmoscope and Slit Lamp for PSRT evaluation. Results show that both Direct Ophthalmoscope and Slit lamp can be equally implementable for photostress recovery time evaluation in routine clinical setting according to one's ease.

5.1: CONCLUSION

This study concludes that comparison between photostress recovery time assessment equipments was statistically significant.

- Either Direct Ophthalmoscope or Slit Lamp can be used for macular function assessment prior to complete retinal examination for various retinal diseases.
- Direct Ophthalmoscope can be used in Primary Eye care setups for differentiation of macular diseases and optic nerve diseases as well Slit Lamp in Tertiary Eye Care during hectic routine ocular examination in OPD's.
- The application of theses photo-stress recovery time assessment equipments may assist in prompt detection of Age-related macular degeneration intended for reduction of visual impairment.

5.2: LIMITATIONS

- The data for this research was taken only from single hospital on specific age group; so the research required to be conducted on different population and socio demographic background and ethnicity with different group and broader scale and enlarged sample size.
- Instrument reliability check should be done in further studies. The more detailed study should be conducted on other measurement parameters such as visual acuity and other objective assessment for more comprehensive evaluation of efficacy of instruments.
- Stability and consistency of PSRT evaluation can be measured through long- follow ups gives deep insight depth for reliability and reproducibility of the instrument measures.

5.3: RECOMMENDATIONS

- Optometrists and ophthalmologists should perform the photostress recovery time test on every patient in routine eye clinics.
- Photo-stress recovery time assessment test should be incorporated in practices for early detection of age –related macular disease and prompt referral for early treatment.

- Maculopathies optic neuropathies should be differentiated promptly from photostress recovery time assessment equipments according to ease in clinical routine examination either Direct Ophthalmoscope or Slit Lamp.

REFERENCES

(1). Bishwash B, Kumar DT, Kumar SS, et al. Normative value of photostress recovery time among various age groups in southern India. Medical hypothesis, discovery & innovation in optometry. 2020 Aug 31; 1(1): 11-17.

(2). Akujobi AU, Uzomah GO, Ike OO, et al. Photostress Recovery Time Among Welders in Owerri Municipal Council, Southeast, Nigeria. Journal of the Nigerian Optometric Association. 2021 Jun 11; 23(1): 4-10.

(3). Salmon, John. Examination techniques. A systematic approach. Kanski's clinical ophthalmology: 9th Edition. 2019 Oct 31; 6–7.

(4). 2020–2021 Basic and Clinical Science Course **(**BCSC**)** Section 5: Neuro-Ophthalmology**.** Basic and clinical science course. American Academy of Ophthalmology. 2020.

(5). Azuamah YC, Merem CC, Ikoro NC, et al. Assessment of foveal and extra-foveal photostress recovery time in primary open angle glaucoma. Journal of the Nigerian Optometric Association. 2018 Jun 25; 20(2): 31-6.

(6). Karampatakis V, Amaliotois D, Papadopoulou EP, et al. Design of a novel smart phone-based photostress recovery time test for detecting abnormalities in the macula. A cross-sectional study. Annals of Medicine and Surgery. 2022; 77: 103699.

(7). Bindu S, Pt J and Prabhu PB. Photostress test as a predictor of macular dysfunction in patients with asymmetrical age-related maculopathy. Indian J Clin Exp Ophthalmol. 2017; 3: 61-65.

(8). Avila FJ, Casado P and Ares J. Photostress Recovery Time after Flash-Lighting Is Increased in Myopic Eyes. Photonics. 2023; 10(1): 86.

(9). Lal V editor. A Clinical Approach to Neuro-Ophthalmic Disorders. CRC Press. 2022 Oct 28; 4(3): 34.

(10). Coppola G, Di Lorenzo C, Di Lenola D, et al. Visual Evoked Potential Responses after Photostress in Migraine Patients and Their Correlations with Clinical Features. Journal of clinical medicine. 2021 Mar 2; 10(5): 982.

(11). Agrawal AA and Shetty NK. Evaluation of Macular Function Tests with Diabetic Retinopathy. Journal of Evolution of Medical and Dental Sciences. 2021 May 17; 10(20): 1463-1469.

(12). Boadi-Kusi SB, Austin E, Abu SL, et al. Disability glare and nighttime driving performance among commercial drivers in Ghana. Journal of Occupational Health. 2021; 63(1): 12279.

(13). Weitzman SA, Greenstein V, Bhuiyan A, et al. Rapid retinal functional testing. Annals of eye science. 2021; 6: 26.

(14). Raghuvanshi A and Dutta P. Electrophysiology In Vision. The Official

Scientific Journal of Delhi Ophthalmological Society. 2022 Jul 13; 32(4): 88-96.

(15). Rodriguez JD, Lane KJ and Hollander DA. Photostress Recovery: A comparison of bleaching methods for surrogate maculopathy endpoints. Investigative Ophthalmology & Visual Science. 2017 Jun 23; 58(8): 4715.

(16). Mascort Ferrer M. Repeatability study of a new application for assessing macular photostress recovery time. Bachelor's thesis, Universitat Politècnica de Catalunya 21 May 2015.

(17). Loughman J, Ratzlaff M, Foerg B, et al. Suitability and repeatability of a photostress recovery test device, the macular degeneration detector (MDD-2), for diabetes and diabetic retinopathy assessment. Retina. May 1 2014; 34(5): 1006-1013.

ACKNOWLEDGEMENTS

First of all, I would like to say thanks to almighty Allah for giving me the strength and health to do this study until it was done.

This thesis is dedicated to my family members specially my father, mother, sister **Dr. Samia Kouser**, teachers and friends who have supported me throughout my educational journey. Thank you for sharing words of advice and encouragement to undertake this research. Apart from the efforts of me, the success of my study depends largely on the encouragement and guidelines of many others who have always given their valuable advice or lent a helping hand. I sincerely appreciate the inspiration; support and guidance of all those people who have been instrumental in the successful completion of this study. Now I would like to express my appreciation and thanks to my teachers **Dr. Faisal Saleem**, **Dr Maira Sharafat** and **Dr. Sadia Hassan** for introducing me about what is research and guiding me in different matters regarding the topic as well for their brilliant comments and suggestions, thanks to you. A special gratitude I give to my Research Advisors **Dr. Asadullah Khan** and **Sir Suhail Wahab** as they have been a tremendous mentor for me. I would also like to thank my workplace colleagues specially **Abdul Rehman** for their support throughout the M.Phil Optometry as well as research. I would like to thank them for encouraging my study and offering suggestions and supplying ideas for improving the text. They allowed me to grow as a good researcher. I also thank my Biostatistics teacher Dr. Sidra. Without her guidance and the information they provided, it would have been impossible to complete the task. At last but not least a special thanks to my family. Words cannot express how grateful I am to my father, brothers and sister. Your prayer for me was what sustained me thus far. I will be grateful to all of you forever for your love and support.

Thank you

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