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LOW LEVEL LIGHT THERAPY FOR THE TREATMENT OF RECALCITRANT CHALAZIA

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ABSTRACT

To determine efficacy of low level light therapy for the treatment of recalcitrant chalazion, Quasi-experimental study, Military Hospital, Rawalpindi from January to July 2023, 150 patients who had recalcitrant chalazion were included in the study. Baseline demographics were documented. All patients were treated with low level light therapy and efficacy was determined in terms of frequency of resolution of chalazion. Data was analyzed by SPSS 20.00, Mean age of patients was 31.39 ± 8.51 years. There were 81 (54.00%) male and 69 (46.00%) female patients. Mean duration of chalazia was 6.45 ± 1.12 weeks. Mean duration of being admitted at the hospital was 13.22 ± 5.31 days. Left eye was involved in 71 (47.33%), right eye in 55 (36.67%) and both eyes were affected in 24 (16.00%) patients. 101 (67.33%) were smokers. Frequency of patients in which complete resolution was achieved was 116 (77.33%) while 34 (22.67%) patients still had chalazion persisting after therapy, Low level light therapy is an efficacious therapy for management of recalcitrant chalazion with a resolution rate of 77.33%.

Keywords: *Chalazia, Chalazion, Efficacy, Low-level light therapy, Resolution.*

INTRODUCTION

Meibomian glands are important glandular structures of the upper and lower eyelids, found within the tarsal plates, which produce "meibum" that constitutes the outermost lipid part of the tear film. [1] Dysfunction of these glands is common and one of the clinical manifestation of it is the abnormality in the composition of the tear film leading to dry eye disease. [2] Another clinical manifestation of meibomian gland dysfunction is due to its blockage, leading to build up of meibum within the gland which facilitates deep inflammatory process and development of the chalazion. [3] There are several factors that have been reported to increase the propensity of development of chalazia including deficiency of vitamin A, imbalance in the levels of androgen hormones, low levels of ferritin, blephritis and infestation of the eye lids by mites resulting in infection. [4]

It has been reported in previous literature that around 50% of the cases of chalazia heal spontaneously without any medical or surgical intervention requiring only the use of warm compressions and maintenance of ocular hygiene. [5] Alternatively, among cases not resolving spontaneously, ophthalmologist have several therapeutic options that can be utilized in managing chalazia including topical & systemic antibiotics, topical & intra-lesional steroids, surgical encision & curettage and several other novel therapies particularly various modes of light therapy. [6] Generally, when patients are provided with appropriate medical or surgical intervention, their chalazia resolves and does not recur but in

some cases it either becomes chronic or it reappears soon after treatment resulting in formation of recalcitrant chalazion which is often difficult to treat. [7] In such cases, searching for alternative therapies that cannot only treat such chalazia but also avoid the recurrence is essential.

One of the therapy that has been hypothesized to be effective in management of recalcitrant chalazion is "low-level light therapy (LLLT)" due to its presumed ability of inducing cellular photoactivation. [8] Role of LLLT has been well-established in various non-ophthalmological conditions particularly dermatological conditions like alopecia, body contouring and acne vulgaris, [9] however, in management of recalcitrant chalazia, its role is yet to be established which necessitates conductance of further research in this regard. In order to address the research question that whether "low-level light therapy (LLLT)" is useful and efficacious in management of recalcitrant chalazia or not, present study was conducted which is the first study conducted in Pakistan with the aim of determine efficacy of "low level light therapy (LLLT)" for the treatment of recalcitrant chalazion.

$$n = \frac{z^2_{1-\alpha/s} P(1-P)}{d^2}$$

METHODOLOGY

This single arm quasi-experimental study was conducted at "Armed Forces Institute of Ophthalmology (AFIO), Military Hospital (MH), Rawalpindi from January to July 2023 after obtaining approval from ethical committee of institution (IERB #: _____). Appropriate sample size was calculated using "WHO sample size calculator for single population proportions with specified absolute precision" using following formula:

For calculations, following assumptions were used; confidence level = 95%, absolute precision = 8% and anticipated frequency of chalazia resolution = 46%. [10] This gave a sample size of 150.

Inclusion criteria: All patients who were aged 18 years or above, both male and female gender, who had recalcitrant chalazion (defined as "chalazion that recurred repeatedly even after appropriate medical and surgical therapy") were included in this study.

Exclusion criteria: Patients with previous history of "low-level light therapy (LLLT)", active ocular infection, history of severe anaphylaxis and those with claustrophobia were excluded from the study. Patients were selected through non-probability consecutive sampling technique. Prior to inclusion in this study, a written informed consent was signed by patients to become part of this study. After this, baseline characteristics of the patients including the age (in years), gender, duration of chalazion (in weeks), number of recurrences, lid involved (upper/lower) and eye involved (right/left/both) were documented. In addition, other demographic features like area of residence, socioeconomic status, smoking status and occupational history was also documented. After this patients were briefed regarding the "low-level light therapy (LLLT)" to be given in the form of two fifteen minute rounds of LLLT administered three days apart to the patients with recalcitrant chalazion using "Epi-C Treatment mask". After first treatment session, patients were started on topical moxifloxacin + dexamethasone eye drops (DexiMox ®) to be instilled eight hourly and oral capsule doxycycline 100mg (Vibramycin ®) twice daily for 2 weeks. Patients were directed to re-visit ophthalmology outdoor two weeks after completion of oral and topical medications to assess for complete resolution of chalazia. In case of non-resolution, alternative therapy was provided to the patients as per advice of consultant ophthalmologist either through medical or surgical intervention.

"Data analysis was performed using Statistical package for Social Sciences version 20. Quantitative data were represented using mean ± standard deviation. Qualitative data were represented by using percentage and frequency. Frequency of resolution was stratified by age, gender, number of recurrences and smoking status. Post-stratification comparison was performed using Chi-square test. A p-value of ≤ 0.05 was considered statistically significant".

RESULTS

In this study, 150 patients were included who were treated for recalcitrant chalazion using LLLT.

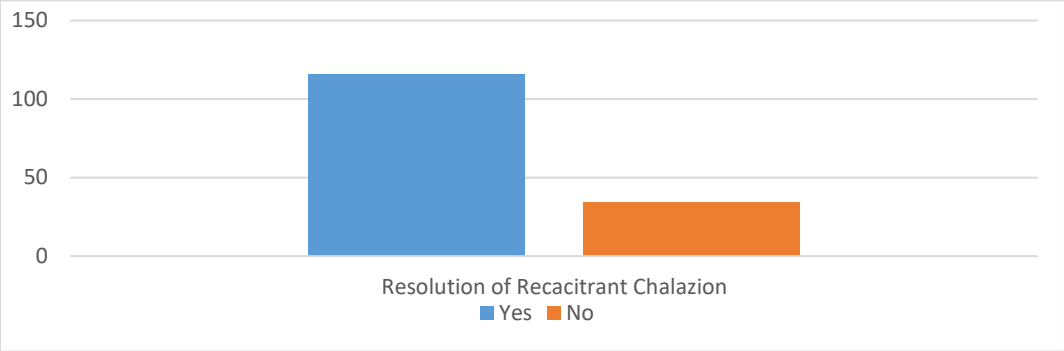
Mean age of patients was 31.39 ± 8.51 years. There were 81 (54.00%) male and 69 (46.00%) female patients. Mean duration of chalazia was 6.45 ± 1.12 weeks. Mean duration of being admitted at the hospital was 13.22 ± 5.31 days. Left eye was involved in 71 (47.33%), right eye in 55 (36.67%) and both eyes were affected in 24 (16.00%) patients. Baseline demographics are given below in detail in table I:

Table I: Baseline characteristics of study participants (n = 150)

Characteristic	**n (%)**
Age (Mean ± SD)	31.39 ± 8.51 years
≤ 30 years	67 (44.67%)
> 30 years	83 (55.33%)
Gender	
Male	81 (54.00%)
Female	69 (46.00%)
Duration of chalazion (Mean ± SD)	6.45 ± 1.12 weeks
Number of recurrences	
≤ 2	76 (50.67%)
> 2	74 (49.33%)
Eye involved	
Left	71 (47.33%)
Right	55 (36.67%)
Both	24 (16.00%)
Lid involved	
Upper	120 (80.00%)
Lower	30 (20.00%)
Smoking status	
Smoker	101 (67.33%)
Non-smoker	49 (32.67%)
Area of residence	
Urban	87 (58.00%)
Rural	63 (42.00%)
Socioeconomic status	
Upper	22 (14.67%)
Middle	56 (37.33%)
low	72 (48.00%)
Occupational history	
Indoor	77 (51.33%)
Outdoor	73 (48.67%)

Frequency of patients in which complete resolution was achieved was 116 (77.33%) while 34 (22.67%) patients still had chalazion persisting after therapy, (figure 1):

Figure 1: Frequency of resolution of recalcitrant chalazia after LLLT (n = 150)



Distribution of frequency of complete resolution across age groups, genders and number of recurrences is given below in table II:

Table II: Distribution of frequency of complete resolution of recalcitrant chalazia across age groups, genders, number of recurrences and smoking status (n = 116)

Age groups			
Resolution	**≤ 30 years (n = 67)**	**> 30 years (n = 83)**	**p-value**
Yes	48 (71.64%)	68 (81.93%)	0.135
No	19 (28.36%)	15 (18.07%)	
Genders			
Resolution	**Male (n = 81)**	**Female (n = 69)**	**p-value**
Yes	64 (79.01%)	52 (75.36%)	0.595
No	17 (20.99%)	17 (24.64%)	
Number of Recurrences			
Resolution	**≤ 2 (n = 76)**	**> 2 (n = 74)**	**p-value**
Yes	61 (80.26%)	55 (74.32%)	0.385
No	15 (19.74%)	19 (25.68%)	
Smoking Status			
Resolution	**Smoker (n = 101)**	**Non-smoker (n = 49)**	**p-value**
Yes	70 (69.31%)	46 (93.88%)	0.001
No	31 (30.69%)	3 (6.12%)	

DISCUSSION

Management of chalazion is straightforward with conservative management through warm compressions, ocular hygiene, oral probiotics and use of topical or systemic pharmaceutical agents which provide complete relief in a vast majority of the cases. [11, 12] In chronic or recalcitrant cases, however, this may not be the case and alternative therapies like surgical excision, intra-lesional steroids, use of botulinum toxin, use of CO2 laser, optimal pulse technology (OPT), cryogenic excision and trephination of the tarsal plates may be required. [13, 14] An additional option which was focus of present study is "low-level light therapy (LLLT)". One major reason for conducting this study was complete lack of literature regarding efficacy this therapy in recalcitrant chalazia with only one case series found in this regard after extensive literature search on PubMed, MedLine, Cochrane library and Google scholar.

In present study, average age of the patients suffering from chalazia was just over thirty years

which was similar to the average age of patients who were included in a study conducted by Li et al. suffering from chalazion. [15] This may be due to highest chances of developing chalazion in the third decade of life. [16] Majority of chalazia cases were identified in male population of present study which was similar to multiple studies reporting frequency of chalazia to be much higher in male population as compared to their female counterparts. [16, 17] 80% of the chalazia were found at the upper eyelid which corresponds with the fact the chalazia are more likely to involve the upper eyelid as compared to the lower eyelid. [18] Additionally, more than half of the patients who had chalazion in present study were smokers which has been reported as a major contributor to increased risk of developing chalazion. [19]

When it comes to efficacy of "low-level light therapy (LLLT)" in the ophthalmological cases, literature availability is highly scarce with studies that has been conducted regarding its role in management of dry eye disease due to meibomian gland dysfunction showing promising results. [20, 21] On the other hand, regarding the efficacy of "low level light therapy (LLLT)" for the treatment of recalcitrant chalazion, only one case series has been conducted in the past. [10] In present study, it has been observed that "low-level light therapy (LLLT)" is highly efficacious in management of recalcitrant chalazion with a successful resolution rate exceeding 77%. This was comparable to what has been reported in the only case series conducted in this regard in past. [10] Upon further analysis it was observed that resolution rate was not significantly influenced by age, gender or number of recurrence episodes of chalazia but among smokers, however, significantly higher frequency of non-resolution and treatment failure was observed as compared to non-smokers. This may be due to association of smoking with poor wound healing. [22]

Present study serves as a stepping stone in establishing the efficacy of "low-level light therapy (LLLT)" for the treatment of recalcitrant chalazion. Based on present study, use of "low-level light therapy (LLLT)" is strongly recommended. In addition, it is also strongly recommended that further large sample trials should be conducted in future in this regard to strengthen the evidence regarding the role of "low-level light therapy (LLLT)" in management of recalcitrant chalazion. Lack of availability of comparison trials due to novelty of intervention, limited sample size and lack of control arm were few limitations of present study.

CONCLUSION

Chalazia which are resistant to multiple therapies require use of alternative interventions. One such option is "low-level light therapy (LLLT)" which, based on this study, shows promising results with a resolution rate of 77.33%.

CONFLICT OF INTEREST

None.

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REFERENCES

Dietrich J, Garreis F, Paulsen F. Pathophysiology of meibomian glands - An overview. Ocul Immunol Inflamm. 2021;29(4):803-810. https://doi.org/10.1080/09273948.2021.1905856.

Sheppard JD, Nichols KK. Dry eye disease associated with meibomian gland dysfunction: focus on tear film characteristics and the therapeutic landscape. Ophthalmol Ther. 2023;12(3):1397-1418. https://doi.org/10.1007/s40123-023-00669-1.

Suzuki T, Katsuki N, Tsutsumi R, Uchida K, Ohashi K, Eishi Y, et al. Reconsidering the pathogenesis of chalazion. Ocul Surf. 2022;24:31-33. https://doi.org/10.1016/j.jtos.2021.12.010.

Ouyang L, Chen X, Pi L, Ke N. Multivariate analysis of the effect of Chalazia on astigmatism in children. BMC Ophthalmol. 2022;22(1):310. https://doi.org/10.1186/s12886-022-02529-1.

Zhu Y, Huang X, Lin L, Di M, Chen R, Dong J, et al. Efficacy of intense pulsed light in the treatment of recurrent chalaziosis. Front Med. 2022;9:839908. https://doi.org/10.3389/fmed.2022.839908.

Zhu Y, Zhao H, Huang X, Lin L, Huo Y, Qin Z, et al. Novel treatment of chalazion using light-guided-tip intense pulsed light. Sci Rep. 2023;13(1):12393. https://doi.org/10.1038/s41598-023-39332-x.

Evans J, Vo KBH, Schmitt M. Chalazion: racial risk factors for formation, recurrence, and surgical intervention. Can J Ophthalmol. 2022;57(4):242-246. https://doi.org/10.1016/j.jcjo.2021.04.023.

de Freitas LF, Hamblin MR. Proposed mechanisms of photobiomodulation or low-level light therapy. IEEE J Sel Top Quantum Electron. 2016;22(3):7000417. https://doi.org/10.1109/JSTQE.2016.2561201.

Glass GE. Photobiomodulation: The clinical applications of low-level light therapy. Aesthet Surg J. 2021;41(6):723-738. https://doi.org/10.1093/asj/sjab025.

Stonecipher K, Potvin R. Low level light therapy for the treatment of recalcitrant chalazia: a sample case summary. Clin Ophthalmol. 2019;13:1727-1733. https://doi.org/10.2147/OPTH.S225506.

Filippelli M, dell'Omo R, Amoruso A, Paiano I, Pane M, Napolitano P, et al. Effectiveness of oral probiotics supplementation in the treatment of adult small chalazion. Int J Ophthalmol. 2022;15(1):40-44. https://doi.org/10.18240/ijo.2022.01.06.

Wu AY, Gervasio KA, Gergoudis KN, Wei C, Oestreicher JH, Harvey JT. Conservative therapy for chalazia: is it really effective? Acta Ophthalmol. 2018;96(4):e503-e509. https://doi.org/10.1111/aos.13675.

Tashbayev B, Chen X, Utheim TP. Chalazion treatment: A concise review of clinical trials. Curr Eye Res. 2024;49(2):109-118. https://doi.org/10.1080/02713683.2023.2279014.

Song X, Zhang C, Zhang S, He M. Therapeutic efficacy of optimal pulse technology in the treatment of chalazions. Front Med. 2023;10:1286159. https://doi.org/10.3389/fmed.2023.

Li J, Li D, Zhou N, Qi M, Luo Y, Wang Y. Effects of chalazion and its treatments on the meibomian glands: a nonrandomized, prospective observation clinical study. BMC Ophthalmol. 2020;20(1):278. https://doi.org/10.1186/s12886-020-01557-z.

Das AV, Dave TV. Demography and clinical features of chalazion among patients seen at a multi-tier eye care network in India: An electronic medical records driven big data analysis report. Clin Ophthalmol. 2020;14:2163-2168. https://doi.org/10.2147/OPTH.S263146.

Patel S, Tohme N, Gorrin E, Kumar N, Goldhagen B, Galor A. Prevalence and risk factors for chalazion in an older veteran population. Br J Ophthalmol. 2022;106(9):1200-1205. https://doi.org/10.1136/bjophthalmol-2020-318420.

Banerjee P, Koka K, Alam MS, Subramanian N, Biswas J, Krishnakumar S, et al. The spectrum and clinicopathological correlation of eyelid lesions: Twenty years' experience at a tertiary eye care center in South India. Indian J Ophthalmol. 2022;70(1):43-50. https://doi.org/10.4103/ijo.IJO_428_21.

Jin KW, Shin YJ, Hyon JY. Effects of chalazia on corneal astigmatism: Large-sized chalazia in middle upper eyelids compress the cornea and induce the corneal astigmatism. BMC Ophthalmol. 2017;17(1):36. https://doi.org/10.1186/s12886-017-0426-2.

Stonecipher K, Komm C, Potvin R. Low level light therapy as an adjunct treatment for meibomian gland dysfunction. Acta Sci Ophthalmol. 2020;3(11):13-18.

Marques JH, Marta A, Baptista PM, Almeida D, José D, Sousa PJM, et al. Low-level light therapy in association with intense pulsed light for meibomian gland dysfunction. Clin Ophthalmol. 2022;16:4003-4010. https://doi.org/10.2147/OPTH.S384360.

Lassig AAD, Bechtold JE, Lindgren BR, Pisansky A, Itabiyi A, Yueh B, et al. Tobacco exposure and wound healing in head and neck surgical wounds. Laryngoscope. 2018;128(3):618-625. https://doi.org/10.1002/lary.26813.