ORIGINAL ARTICLE

EFFICACY OF ENHANCED PREOPERATIVE MANAGEMENT FOR NON-PROGRESSION IN MEIBOMIAN GLAND DYSFUNCTION AFTER CATARACT SURGERY: A RANDOMIZED CONTROLLED TRIAL

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Background: Cataract surgery may alter proper functioning of meibomian glands and result in worsening of glandular dysfunction. The role of combined postop and routine 3 days preoperative treatment of meibomian gland disease (MGD) after cataract surgery has been studied but the role of enhanced 2 weeks preoperative treatment has yet to be evaluated. The objective of this study was to compare the efficacy of enhanced preoperative treatment for 2 weeks and routine preoperative treatment for 3 days alone in non-progression of MGD to severe stages after cataract surgery. **Methods:** This randomized controlled study was conducted at Ophthalmology Department, Ayub Teaching Hospital Abbottabad from 1st March 2022 to 31st July 2023. The sample size was 150 eyes (75 in each group) selected using consecutive sampling. Group A was given enhanced 2 weeks preoperative treatment while the group B was given routine 3 days pre-operative treatment only. Success of pre-operative treatment was regarded as non-progression to severe stages postoperatively from baseline. Data analysis was done using SPSS-24. **Results:** The efficacy of enhanced 2 weeks preoperative treatment was 69 (87.3%) at 1 month, and 67 (82.7%) at 3 months follow-up while efficacy of routine 3 days preoperative treatment alone was 10 (12.7%) and 14 (17.3%) at 1 and 3 months respectively with a significant difference between the groups (p<0.001). **Conclusion:** Enhanced 2 weeks preoperative treatment was superior to routine 3 days preoperative treatment alone in non-progression of MGD to severe stages after cataract surgery.

Keywords: Dysfunction, Meibomian Gland, Preoperative

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INTRODUCTION

Meibomian gland dysfunction (MGD) is the improper functioning of meibomian glands resulting in alteration in tear-film of the eye. It is one of the most common causes (about 86%) of dry eye disease.[1] MGD worsens with age ultimately leading to glandular atrophy in approximately 72% of people.[1,2] Because cataract surgery is commonly performed in older patients, an increased likelihood of MG atrophy in this population can be anticipated.[3] However some studies also report that cataract surgery may itself alter the proper functioning of the meibomian glands without any change in their structure.[4]

Meibomian gland dysfunction can easily be diagnosed on the basis of clinical examination of dry eye symptoms, examination of lid margins, measurement of blinking rate, lower tear meniscus height, tear film break-up time, grading of conjunctival and corneal staining.[5,6] Aggravation of MGD after cataract surgery can be treated by various techniques including medication, lipiflow treatment and vectored thermal pulsation technique.[7–9]

The role of post-op anti-inflammatory and routine 3 days preoperative medications for MGD treatment after cataract surgery has been studied by Song P *et al*[7] who found reduction in mean preoperative ocular symptom score at 1 and 3 months postoperatively respectively. However the role of enhanced 2 weeks preoperative treatment (routine and sulphacetamide-prednisolone-lubricant treatment) alone in such patients has not been evaluated at the global, national and regional level. This study was designed to evaluate the effect of enhanced preoperative therapy to alleviate MGD in cataract patients.

MATERIAL AND METHODS

It was a randomized controlled trial on 150 eyes at Ophthalmology Department of a tertiary care hospital from March 2022 to July 2023 after approval from the Hospital Ethical Review Board. All patients with stage 2 and 3 MGD (mild to moderate disease) were included in the study while patients with history of diabetes, hypertension, and systemic autoimmune diseases such as Sjögren syndrome were excluded. Informed consent was taken from all the participants. Diagnosis and staging of MGD was done prior to operation with recording of findings on the basis of ocular symptoms (dryness, burning, itching, stickiness, watering, redness, crustiness, light sensitivity, foreign body sensation, intermittent blurring, history of styes, history of chalazion) and clinical signs including meibomian gland evaluation, corneal fluorescein staining, fluorescein

break-up time, blink rate and lower tear meniscus height. Sample size (150) was calculated using WHO software for sample size estimation.[7]

Patients were allocated into two groups by means of blocked randomization with 75 patients in each group. Group A was given enhanced two weeks preoperative treatment while the group B was given routine 3 days pre-operative treatment only (Table-1). Success of pre-operative treatment was regarded as non-progression to severe stages postoperatively from baseline.

Table-1: Preoperative interventions for MGD

Group A Enhanced 2 weeks preoperative treatment	Group B Routine 3 days preoperative treatment only
Routine preoperative treatment: Moxifloxacin Hydrochloride 0.5% eye drops QID + Nepafenac 0.1% eye drops TDS (and) **Pre-operative treatment for MGD:** sulphacetamide-prednisolone eye drops QID + hypromellose (0.3%) eye drops QID + sulphacetamide-prednisolone eye ointment at night	Moxifloxacin Hydrochloride 0.5% eye drops QID+Nepafenac 0.1% eye drops TDS

In all the patients, cataract surgery was performed under topical anaesthesia. The patients were examined again postoperatively at 1 month and 3 months for stage of MGD. Collected data were analysed using SPSS-24. Mean±SD was calculated for quantitative variables, and frequencies and percentages were calculated for categorical variables. The comparison of pre-and post-op stage of MGD at 1 month and 3 months in the two groups was done using Chi-square test, and $p \leq 0.05$ was considered significant. Effect modifiers like age, gender and co-morbidities were controlled through stratification of data. Post-stratification Chi-square test was applied at 5% level of significance.

RESULTS

Mean age of the participants was 61.5±9.4 years ranging from 45–80 years. Out of the total 150 patients, 67 (44.7%) were males while 83 (55.3%) were females. Most (87, 58%) of the patients were from poor socioeconomic background. Preoperatively, majority 103 (68.7%) of the patients were in stage 2 and 47 (31.3%) in stage 3 disease. Females had moderate stage 3 disease significantly more frequent 33 (70.2%) as compared to the males 14 (29.8%) before the operation (p=0.01).

Postoperatively, the efficacy of pre-op treatment in group A at 1 month was 69 (88.5%) while it was 9 (11.5%) in group B. The difference was found to be statistically significant (p<0.001). The efficacy of pre-op medication at 3 months follow-up was significantly different from that of group B (p<0.001) (Table-2).

Table-3 illustrates the stage of disease postoperatively in both of the treatment groups. At 1 month follow-up, out of 16 eyes, 13 (81.2%) in group A and 3 (18.8%) in group B had stage 1 disease; out of 47 eyes, 44 (93.6%) in group A and 3 (6.4%) in group B had mild stage 2 MGD; out of 66 eyes, only 18 (27.3%) in group A and 48 (72.7%) in group B had moderate stage 3 MGD; and out of 21 eyes, no patients progressed to stage 4 MGD in group A while all in group B (21, 100%) progressed to stage 4 (p<0.001). At 3 month follow-up, most of the patients in group A had stage 1 and 2 MGD while in group B most had stage 2 and 3, and some also progressed to stage 4 MGD (p<0.001).

Table-2: Comparison of Efficacy [n (%)]

Efficacy		Group A	Group B	*p*
At 1 month	**Yes**	69 (88.5)	9 (11.5)	<0.001*
	No	6 (8.3)	66 (91.7)	
At 3 months	**Yes**	67 (83.8)	13 (16.2)	<0.001*
	No	8 (11.4)	62 (88.6)	

Table-3: Comparison of post-op stages of MGD [n (%)]

Post op stages		Group A	Group B	*p*
At 1 month	**Stage 1**	13 (81.2)	3 (18.8)	<0.001*
	Stage 2	44 (93.6)	3 (6.4)	
	Stage 3	18 (27.3)	48 (72.7)	
	Stage 4	0 (0)	21 (100)	
At 3 months	**Stage 1**	22 (88)	3 (12)	<0.001*
	Stage 2	40 (81.6)	9 (18.4)	
	Stage 3	13 (28.3)	33 (71.7)	
	Stage 4	0 (0)	30 (100)	

DISCUSSION

Distressing symptoms of dry eye disease as a result of aggravation of MGD after cataract surgery warrants seeking measures to alleviate it. Our findings highlight significant differences in outcomes of the two groups and suggest that preoperative management can substantially impact the progression and severity of MGD postoperatively.

In our study, mean age of the patients was 61.5±9.4 years indicating middle to older age group, which aligns with the typical age range for cataract surgery candidates. It was more frequent among the females making it consistent with the understanding that MGD prevalence tends to be higher in women. Many other studies report that MGD is more common above 60 years of age and is common in females.[10,11] In our study, the females had stage 3 MGD significantly higher than the males. Gender differences as reported by the studies may be due to hormonal and autoimmune states which are more prevalent among the females. The majority of the participants had poor socioeconomic backgrounds, limiting access to healthcare and early intervention in this demographic.

Stage 3 disease was more prevalent in females as compared to males highlighting a potential gender-related predisposition to more severe MGD, which is

supported by existing literature indicating that hormonal differences can affect the severity of MGD.[10,11]

The efficacy of preoperative treatment was strikingly different between the two groups. In Group A, which received preoperative treatment much improvement was noted at one month after surgery in comparison to Group B, which did not receive preoperative treatment. However at 3 months follow-up, the trend remained consistent. These findings are in line with previous work that demonstrated the effectiveness of preoperative MGD management in reducing postoperative complications and improving surgical outcomes.[7]

It was revealed in this study that postoperatively both at 1 and 3 months follow-up, MGs parameters did not progress to severe stages in the enhanced preoperative treatment group as compared to routine preoperative treatment alone group with a statistically significant differences. Hence the most outstanding finding in the present study was that the preoperative enhanced treatment group had significantly better outcomes of MGs function in terms of non-progression to severe stages of disease than the routine treatment. This indicates that the suggested preoperative management may prove an effective measure to improve glandular dysfunction and thus alleviate the discomforting symptoms in dry eye disease induced by cataract surgery. The results of this study are augmented by results of a research conducted by Song P *et al*[7] who obtained similar effect of preoperative plus postoperative anti-inflammatory treatment in which there was reduction in the ocular symptom score postoperatively at 1 and 3 months after the treatment.

Data for this study was gathered from a single tertiary care hospital which may limit its generalizability or compromise the external validity. More researches covering multiple healthcare centres is suggested.

CONCLUSION

Enhanced preoperative treatment for two weeks before cataract surgery was found to be superior to routine preoperative treatment alone for 3 days in preventing aggravation of MGD. It is suggested that enhanced preoperative treatment with routine treatment plus sulphacetamide-prednisolone-lubricant should be used for prevention of aggravation of MGD.

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