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# ASSOCIATION OF SEVERITY OF MEIBOMIAN GLAND DYSFUNCTION WITH DYSLIPIDEMIA – AN OBSERVATIONAL STUDY

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**ABSTRACT** **Introduction:** Meibomian Gland Dysfunction (MGD) is characterized by terminal duct blockage and/or qualitative/quantitative alterations in glandular production. Since meibomian gland secretion is lipid-based, it seems sense to look for a potential connection between meibomian lipids and abnormalities in systemic lipid levels. **Aim& Objective:** To study the association between severity of MGD with dyslipidemia patients attending OPDs and those admitted at Mandya Institute of Medical Sciences, Mandya. **Methodology:** This observational study conducted among all patients aged 18–60 years, and those diagnosed with MGD based on the signs and symptoms. Meibomian gland status was assessed and MGD is divided into four stages, taking both the symptoms and clinical signs into consideration. **Results:** A total of 85 patients diagnosed with MGD were included in the study. Among them, 44 (52.0%) were females and 41 (48.0%) were males. Found a association between increasing age with respect to increasing severity of stage of MGD ($p < 0.05$). The association between total cholesterol status and MGD stage was statistically significant ($p < 0.001$). **Conclusion:** There is a significant association between being older and having a more severe stage of MGD and also a significant association between rising MGD severity and rising levels of all lipid profile components.

**KEYWORDS :** Meibomian Gland Dysfunction, Dyslipidemia, Meibomian Gland

## INTRODUCTION

Meibomian Gland Dysfunction (MGD) is characterized by terminal duct blockage and/or qualitative/quantitative alterations in glandular production. Changes in the tear film, eye irritation sensations, clinically noticeable inflammation, and ocular surface disease are possible outcomes.[1] Dry eyes, redness, irritation, stinging, burning, unstable, fluctuating vision, and occasionally impaired vision when doing visual activities are some of the symptoms that patients may exhibit. According to researches, the MGD prevalence among general population ranges from 30.5 to 54.1%. [2,3]

**MGD is divided into two categories:** high delivery forms (hypersecretory/seborrheic) and low delivery forms (hyposecretory and obstructive).[4] Since meibomian gland secretion is lipid-based, it seems sense to look for a potential connection between meibomian lipids and abnormalities in systemic lipid levels. So, this research aims to study the association of MGD severity with dyslipidemia patients attending OPDs and those admitted at Mandya Institute of Medical Sciences, Mandya.

## MATERIALS AND METHODS

This observational study conducted among all patients aged 18–60 years, and those diagnosed with MGD based on the signs and symptoms. Baseline assessment included among the study participants were:

- Symptoms scaled according to Ocular Surface Disease Index (OSDI) questionnaire as mild, moderate and severe.
- Measurement of blink rate and blink interval with average taken as 12–15/min.
- Measurement of lower tear meniscus height with cut-off as 1.5 mm.
- Assessment of tear film breakup time with cut-off as 10 seconds.
- Grading of corneal and conjunctival fluorescein staining using Oxford and DEWS scale.
- Schirmer's test cut-off as 10 cm.
- Lacrimal drainage system was assessed for presence of DCR scar, soft/hard blocks, ectropion or entropion.

Meibomian gland status was assessed by the following indices like meibum quality, expressibility of meibum and numerical staining. MGD is divided into four stages, taking both the symptoms and clinical signs into consideration, according to the report submitted by the International Workshop on Meibomian Gland Dysfunction and Management in 2011.

Regarding dyslipidemia the patient's lipid profile were done after overnight fasting and parameters like Triglycerides (TG), Total cholesterol (TC), Low-density lipoprotein (LDL), High-density lipoprotein (HDL). All data were entered in MS Excel spreadsheet and analysis was done using Statistical Package for the Social Sciences (SPSS) version 21.0. Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean ± SD and median. Qualitative variables were correlated using Chi-square test/Fisher's exact test. A p value of value of <0.05 was considered statistically significant.

## RESULTS

A total of 85 patients diagnosed with MGD were included in the study. Among them, 44 (52.0%) were females and 41 (48.0%) were males. The age of the study participants ranged from 18 to 60 years. The largest proportion of participants belonged to the 18–35-year age group (30; 35.3%), followed by 36–45 years (21; 24.7%), 46–55 years (25; 29.4%), 56–60 years (9; 10.6%). Found a association between increasing age with respect to increasing severity of stage of MGD ($p < 0.05$).

According to MGD severity, 20 (23.5%) patients had Stage I MGD, 35 (41.2%) had Stage II MGD, 18 (21.2%) had Stage III MGD and 12 (14.1%) had Stage IV MGD. Among the 85 participants, 46 had normal total cholesterol levels, whereas 39 had elevated total cholesterol levels. Among those 39 patients with elevated total cholesterol, 4 (10.3%) belonged to Stage I MGD, 16 (41.0%) to Stage II MGD, 10 (25.6%) to Stage III MGD and 9 (23.1%) to Stage IV MGD. The association between total cholesterol status and MGD stage was statistically significant ($p < 0.001$).

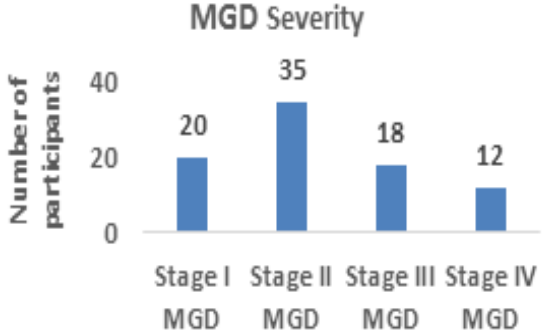


**Figure 1. Severity of MGD**

Similarly, abnormal LDL, VLDL, HDL and triglyceride levels showed

variation across the different stages of MGD. The proportion of patients with abnormal lipid parameters tended to be greater among those with more severe MGD. The associations between MGD stage and TC, LDL, VLDL, HDL and triglycerides were statistically significant ($p < 0.001$ for each).

The mean total cholesterol increased progressively from 183.9 ± 10.8 mg/dL in Stage I MGD to 213.2 ± 9.7 mg/dL in Stage IV MGD. Mean LDL also increased from 116.9 ± 7.3 mg/dL in Stage I to 138.2 ± 8.1 mg/dL in Stage IV. Mean VLDL increased from 17.8 ± 4.6 mg/dL to 27.8 ± 8.0 mg/dL across the respective stages. Mean triglyceride levels increased from 128.9 ± 9.8 mg/dL in Stage I to 143.6 ± 15.5 mg/dL in Stage IV. In contrast, mean HDL levels showed a lower value in Stage IV MGD (35.2 ± 7.3 mg/dL) compared with the earlier stages.

## DISCUSSION

Recent researches states that increased cholesterol in meibum may play a role in the pathology of MGD.[5] Dyslipidemia is a term that represents an abnormal value in one or more of the lipid profiles.[6] The present study was an observational cross section study conducted to find an association between severity of meibomian gland dysfunction and dyslipidemia in 85 patients with MGD. Our study, found a statistically significant association between increasing age and severity of MGD. These findings were similar to a study by Villani et al., Bukhari et al., and Punit Briach et al.[7-9]

The mean total cholesterol increased progressively from Stage I MGD to Stage IV MGD, with a statistically significant association between total cholesterol and MGD severity. Similar associations between hypercholesterolemia and increasing MGD severity have been reported by previous studies, including those by Dao et al. and Bukhari et al. [8,10] Mean LDL, VLDL levels increased from Stage I to Stage IV MGD, showing a significant association with increasing MGD severity. These findings are consistent with previous observations suggesting a possible relationship between altered systemic lipid metabolism and MGD. In contrast, mean HDL decreased progressively from 47.6 ± 5.1 mg/dL in Stage I to 35.2 ± 7.3 mg/dL in Stage IV MGD. The association between dyslipidemia and MGD may be explained by alterations in the lipid composition and physical properties of meibum. Increased serum lipid levels may influence meibum viscosity and melting characteristics, potentially contributing to gland obstruction and progression of MGD.

## CONCLUSIONS

There is a significant association between being older and having a more severe stage of MGD. There is also a significant association between rising MGD severity and rising levels of all lipid profile components, including total cholesterol, HDL, LDL, and triglycerides.

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