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SERUM LIPID PROFILE IN MEIBOMIAN GLAND DYSFUNCTION

Ophthalmology

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ABSTRACT

Objectives: To analyse association of dyslipidemia with meibomian gland dysfunction. **Methods:** This study was conducted over a period extending from November 2020 -June 2021 in the Upgraded Department of Ophthalmology, Government Medical College Jammu (J&K) after taking permission from the Institute Ethic Committee, GMC Jammu. The study enrolled 200 patients in the age group of 45 to 70 years. MGD was diagnosed among the patients via clinical examinations and then the patients were allocated to two groups- cases and controls. Lipid profile was done from an overnight fasting blood sample and evaluated for total cholesterol, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, and triglycerides (Tgs). **Results:** 93% of the cases had serum total cholesterol levels >200 mg/dL while it was within the normal range in the control group. 100% of the cases had serum triglycerides >150 mg/dL compared to 1% in the control group. 17% of the cases had serum LDL levels > 130 mg/dL. A significant association was also observed between decreased HDL levels and MGD. **Conclusion:** The study found a strong association between dyslipidemia and meibomian gland dysfunction.

KEYWORDS

Dyslipidemia, Lipid profile, Meibomian gland dysfunction

INTRODUCTION

The meibomian glands, also called tarsal glands, are holocrine exocrine glands that run along the edges of the eyelids within the tarsal glands. They produce an oily substance called meibum that prevents the tear film from evaporating, prevents tears from flowing to the cheeks, and makes the closed lid airtight. The upper eyelid has about 25 tarsal glands and the lower eyelid has 20 tarsal glands. Lipids form the main component of meibum, followed by proteins[1].

International workshops on meibomian gland dysfunction often define MGD as a chronic diffuse abnormality of the meibomian glands, characterized by ductal obstruction and qualitative / quantitative changes in glandular discharge. This can lead to changes in the tear film, symptoms of eye irritation, clinically apparent inflammation and ocular surface disorders[2].

MGD is traditionally classified according to the rate of glandular secretion. A low-delivery condition is defined as a condition with decreased or obstructed meibomian glands (scarring or non-scarring), and a high-delivery condition is defined as a condition with hypersecretion of the meibomian glands. All of these entities are further subdivided into primary and secondary causes[3].

Decreased primary secretion is characterized by a decrease in secretion without obstruction and is clinically associated with glandular atrophy. Meibomian gland obstruction is the most common form of MGD and is caused by ductal obstruction or altered secretion due to hypertrophy of the ductal epithelium and keratinization of the open epithelium.[4].

High-delivery MGD is distinguished by escalated discharge of lipids from MG in response to pressure[2].

Lipid dysfunction, a major component of metabolic syndrome, is also associated with the development of MGD, but there is no direct evidence to support this relationship. Lipid dysfunction is a disorder of systemic lipid metabolism characterized by elevated levels of total cholesterol (TC), triglycerides (TG), low-density lipoprotein (LDL), and/or decreased high-density lipoprotein (HDL) [5]. Lipid disorders are recognized as an important risk factor for cardiovascular disease. Dyslipidemia includes fasting total cholesterol ≥200 mg/dL, triglyceride ≥150 mg/dL, LDL ≥130 mg/dL, or HDL ≤ 40 mg/dL[6].

Since meibomian gland secretion is lipid in nature, it is logical to look for possible associations between systemic lipid level abnormalities and meibomian gland dysfunction. The main purpose of this study was to determine if there was a link between dyslipidemia and meibomian gland dysfunction (MGD).

MATERIALS AND METHODS

This study was approved by the Institute Ethic Committee, GMC Jammu and was conducted over a period extending from November 2020 - June 2021 in the Upgraded Department of Ophthalmology, GMC Jammu (J&K). MGD was diagnosed among the patients via clinical examinations based on descriptions of glandular obstruction and meibum quality. Lipid profile was done from an overnight fasting blood sample and evaluated for total cholesterol, high-density lipoproteins (HDL), low density lipoprotein (LDL) and triglycerides (TGs). The inclusion criteria included patients aged 18–54 years, and those diagnosed with MGD based on the signs and symptoms. Exclusion criteria included (1) patients with age <18 and >54 years, (2) any known history of dyslipidemia, (3) any signs of ocular infection (4) recent ocular surgery within one month of initiation of this study, (5) alterations of lacrimal drainage system, (6) concomitant use of topical medications.

The meibomian gland expression was performed under slit lamp biomicroscopy by firm digital pressure over the central third of the upper and lower eyelid. The lid was compressed against the globe until the excreta was expressed from the orifice. The meibomian gland function was assessed by examining the volume and the thickness or viscosity of the excreta. The grade assigned for meibomian gland obstruction was as follows: 0 (no obstruction, meibum easily expressed), 1 (mild obstruction, meibum expressible with mild pressure), 2 (moderate obstruction, meibum expressible with moderate pressure), and 3 (complete obstruction, no glands expressible, even with hard pressure). The quality of gland secretion was observed via slit lamp biomicroscopy exam and graded as follows: 0 (clear fluid), 1 (cloudy fluid), 2 (cloudy particulate fluid), and 3 (toothpaste-like).

Controls were enlisted in order to match the cases by age, gender, and socioeconomic standing. All controls underwent ophthalmic examination and only those without MGD (i.e., grade 0—no gland obstruction, clear expressed meibum) were included. Serum lipid profile which included fasting total cholesterol, LDL, HDL, triglycerides were obtained from all the participants.

RESULTS

In this study, the mean age of cases was 59.82±5.20 years and that of control group was 59.72±4.76 years. The mean serum triglyceride level in cases was 166.25±7.92 mg/dL which was higher than the normal cut off value. In the control patients, the mean serum triglyceride level was within the normal range. The mean serum total cholesterol in MGD patients was 236.08±27.80 mg/dL and in control patients was 134±18.83 mg/dL. The mean serum LDL level in cases and control groups was 119.28±8.77 mg/dL and 79.76±6.73 mg/dL respectively. The mean serum HDL level in cases and control group was 33.25±3.33 mg/dL and 51.88±3.06 mg/dL. There was a statistically significant difference between serum triglyceride level,

serum total cholesterol level, serum LDL level and serum HDL level among the two groups.

Table 1 :- Comparison of various parameters between cases (MGD) & control patients

Variable	Cases (n=100)	Controls (n=100)	p value
Gender			
Male, n (%)	45 (45%)	44 (44%)	0.88
Female,n (%)	55 (55%)	56 (56%)	0.88
Age in years (mean ± SD)	59.82 ± 5.20	59.72 ± 4.76	0.88
Range	50 - 70	45 - 70	
Age groups			
≤50 years	4 (4%)	2 (2%)	0.64
51-60 years	50 (50%)	54 (54%)	
61-70 years	46 (46%)	44 (44%)	
OSDI	28.54 ± 5.85	10.01 ± 4.14	< 0.01
TBUT	4.64 ± 2.14	17.73 ± 4.28	< 0.01
S.Triglecerides in mg/dL (mean ± SD)	166.25 ± 7.92	106.99 ± 19.42	< 0.01
S.Total cholesterol in mg/dL (mean ± SD)	236.08 ± 27.80	134 ± 18.83	< 0.01
S.LDL in mg/dL (mean ± SD)	119.28 ± 8.77	79.76 ± 6.73	< 0.01
S.HDL in mg/dL (mean ± SD)	33.25 ± 3.33	51.88 ± 3.08	< 0.01
Prevalence of Dyslipidemia	100 (100%	2 (2%)	< 0.01

Table 2 :- Prevalence of deranged lipid profile among cases vs control patients

	Cases	Controls
Total cholesterol ≥200 mg/dL	93%	0%
Triglycerides ≥150mg/dL	100%	1%
LDL ≥130 mg/dL	17%	0%
HDL ≤ 40mg/dL	100%	1%
Dyslipidemia	100%	2%

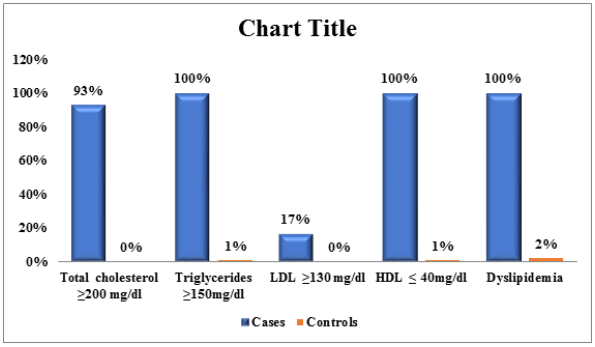

Figure 1 :- Prevalence of deranged lipid profile among cases vs control patients

DISCUSSION

Meibomian gland dysfunction (MGD) is a chronic disease that causes eye irritation and is underreported. Several epidemiological studies have reported an increase in the prevalence of MGD, which varies with population characteristics, to 70% [7,8]. Although the cause of MGD is partially known, changes in meibomian gland content and obstruction of the meibomian duct are thought to be important factors [7,9]. Studies have shown that meibum in MGD patients has different cholesterol components and proportions compared to control meibum [6,10].

Patients with MGD showed significantly higher LDL and lower HDL levels than age- and gender-matched controls. Pina et al. An observational case-control pilot study showed that MGD patients had a higher incidence of hypercholesterolemia than the control group. In addition, mean TC, LDL, and HDL levels in MGD patients were significantly higher [12]. When MGD is affected by serum cholesterol levels, investigating the correlation between elevated serum cholesterol levels and increased severity of the MGD stage is more than assessing the association between cases of meibomian gland dysfunction and controls.

Lipid dysfunction refers to an abnormal level of one or more lipid types in a blood lipid profile. Epidemiological studies show that increased low-density lipoprotein (LDL) and decreased high-density lipoprotein (HDL) in serum play important roles in cardiovascular disease and stroke, with or without other risk factors [7]. As per studies done in past, a notable link between MGD and dyslipidemia have been described. However, the types of cholesterol associated with MGD vary from study to study. In most studies, TC levels were found low in the control group than the MGD group[12].

All parameters of dyslipidemia including serum HDL levels are seen deranged in meibomian gland dysfunction patients in our study. There are statistically significant differences between serum triglyceride levels, serum total cholesterol levels, serum LDL levels, and serum HDL levels between the two groups in our study.

CONCLUSION

An exocrine gland, the meibomian gland, covers the eyelids producing meibum (an oily substance). Meibomian gland dysfunction which is a longterm, diffuse abnormality of meibomian glands that is identified by qualitative/quantitative changes in glandular discharge and ductal obstruction. MGD is also associated with lipid dysfunction. Dyslipidemia; a type of lipid dysfunction includes HDL ≤ 40 mg/dL, LDL ≥130 mg/dL, triglyceride ≥150 mg/dL, or fasting total cholesterol ≥200 mg/dL. The study found increased levels of different parameters of dyslipidemia viz., serum LDL, serum triglyceride and serum total cholesterol in MGD patients while lower levels of serum HDL were reported among them.

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