IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 21, Issue 8 Ser.6 (August. 2022), PP 52-55
www.iosrjournals.org

An Observational Study on Association of Various Risk Factors with Meibomian Gland Dysfunction

Dr Satyabrata Jena, Dr Gayatri Devi Palo, Dr Prasanta Kumar Nanda
**Chief Author- Dr Satyabrata Jena, PG Resident, Department of Ophthalmology, Hi-Tech Medical College & Hospital, Bhubaneswar*
**Corresponding author- Dr Gayatri Devi Palo, PG Resident, Department of Ophthalmology, Hi-Tech Medical College & Hospital, Bhubaneswar*

ABSTRACT-
BACKGROUND- *Meibomian gland dysfunction (MGD) is an alteration in the function of meibomian glands, leading to the decreased tear film stability. Here, we aimed to assess the severity of MGD and to correlate with its various risk factors.*
OBJECTIVE*- To study the association of various risk factors with meibomian gland dysfunction.*
MATERIAL AND METHODS- *An observational case-control study was conducted in a tertiary care centre on 125 consecutive patients diagnosed with MGD. After taking informed consent, patients were assessed for the severity of MGD and correlated with risk factors.*
RESULTS- *Prevalence and severity of MGD were more observed in the age group of 41-60 years, while it was found to be significantly more in females as compared to the males. The prolonged computer use and exposure to digital screen is significantly associated with MGD. Diabetes Mellitus (DM), Hypertension (HTN) and Hypercholesterolemia were significantly associated with MGD.*
CONCLUSION- *The observations in the study suggest a positive correlation between the severity of MGD and dyslipidemia, a modifiable cardiovascular risk factor. A thorough systemic workup is advisable in patients presenting to an ophthalmologist with severe MGD. Identifying and removing or modifying risk factors aggravating MGD would help alleviate their symptoms and improve their quality of life.*

Date of Submission: 04-08-2022 Date of Acceptance: 18-08-2022

I. Introduction

Meibomian gland dysfunction (MGD) is a chronic diffuse abnormality of the meibomian glands, characterized by terminal duct obstruction and/or qualitative /quantitative changes in glandular secretion, which may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease[(1)]. Lipids secreted by the meibomian glands in superficial lipid layer of the tear film stabilize the tear film by lowering surface tension. It also prevents evaporation of the aqueous[(2)]. Decrease in tear film lipids due to the destruction of glands in MGD results in increased aqueous tear evaporation, tear osmolality, and unstable tear film, leading to evaporative dry eye disease (DED) and ocular surface changes and blepharitis[(3)].The prevalence of MGD ranges between 39% to 50%, with the incidence increasing with age[(4)(5)]. Meibomian gland dysfunction is classified into two categories: low delivery states (due to hyposecretion or obstruction of the ducts) and high delivery states (due to hypersecretion). Both low delivery and high delivery states of MGD are affected by endogenous factors like age, sex, hormonal disturbances, and exogenous factors like contact lens wear or topical eye drops[(1)]. Obstructive MGD is the most frequent variety[(6)]. The key factor in the pathogenesis of the development of MGD is increased viscosity of the meibum and hyperkeratinization. It results in retention of meibum within the ducts with dilatation and subsequent acing atrophy[(2)]. Meibomian gland (MG) secretions being lipid in nature have a possible association with systemic lipid level abnormalities[(9)]. Studies show that the percentage of constituents of cholesterol in the meibum of MGD patients differs from that of healthy controls[(7)]. The cholesterol esters detected in secretions of the meibomian glands of patients with MGD were not always present in normal controls[(8)]. The objective of the present study was to identify the risk factors associated with meibomian gland dysfunction and correlate them with the severity of MGD.

II. Material and methods

An observational study was undertaken in our department of ophthalmology with prior written consent taken from the patients. Patients of both sexes and above the age of 18 years, visiting the Outpatient Department of Ophthalmology in Hi-Tech Medical College in Odisha with symptoms of feeling of dryness or irritation,

blurry vision, excessive watering or sticky discharge and/or early morning swelling around the eyes were examined. One hundred twenty five patients were enrolled in the study after taking their informed consent in their local language according to the Declaration of Helsinki. Patients with recent ocular surgery, any disease related to a lacrimal drainage system, inflammatory ocular surface disease unrelated to MGD were excluded from the study.

Detailed slit-lamp biomicroscopic examination, including tear film break-up time (TBUT) testing, Schirmer test, examination of meibum expressibility and quality, was performed. The tear film break-up time was estimated by placing a fluorescein strip after wetting it with a drop of normal saline in the inferior fornix. The Schirmer test was performed without topical anesthesia. The meibum quality score (MQS) was assessed in eight glands of the central third of the lower eyelid by applying digital pressure on the lower tarsus and was graded. Meibomian glands with clear fluid were graded as 0; with cloudy fluid — as grade 1; with cloudy meibum with debris — as grade 2; and with thick toothpaste-like meibum — as grade 3. Accordingly, the meibum expressibility score was assessed from five glands of the central third of the lower eyelid. It was graded: grade 0 — with all glands expressible, grade1 — with 3–4 glands, grade 2 — with 1–2 glands, and grade 3 — with no glands expressible.

Patients were investigated for fasting blood sugar, glycated hemoglobin (HbA1c) ,complete thyroid, and lipid profile after overnight fasting.

Meibomian gland dysfunction was divided into four stages according to International Workshop on Meibomian Gland Dysfunction & Management [(1)].

• stage 1: no symptoms of ocular discomfort, itching,or photophobia with minimally altered secretions (greater than or equal to grade 2 toless than grade 4), expressibility: 1 with no ocular surface staining present;

• stage 2: minimal to mild symptoms of ocular discomfort, itching, or photophobia with minimal to mild MGD clinical signs, scattered lid margin features with mildly altered secretions (greater than or equal to grade 4 to less than grade 8), expressibility: 1 with none to limited ocular surface staining (DEWS grade 0–7; Oxford grade 0–3);

• stage 3: moderate symptoms of ocular discomfort, itching, or photophobia with limitations of activities with moderate MGD clinical signs, increased lid margin features: plugging, vascularity with moderately altered secretions (greater than or equal to grade 8 to less than grade 13), and expressibility: 2 with mild-to-moderate conjunctival and peripheral corneal staining, often inferior (DEWS grade 8–23; Oxford grade 4–10);

• stage 4: Marked symptoms of ocular discomfort, itching, or photophobia with definite limitations of activities with severe MGD clinical signs, increased lid margin features: dropout, displacement with severely altered secretions (grade ≥ 13), expressibility: with increased conjunctival and corneal staining, including central staining (DEWS grade 24–33; Oxford grade 11–15).

The prevalence of risk factors in patients with MGD were evaluated.The Chi-square test/unpaired t-test were used for qualitative variables. p-value < 0.05 was considered statistically significant in our study. All data analysis was done with IBM SPSS Statistics.

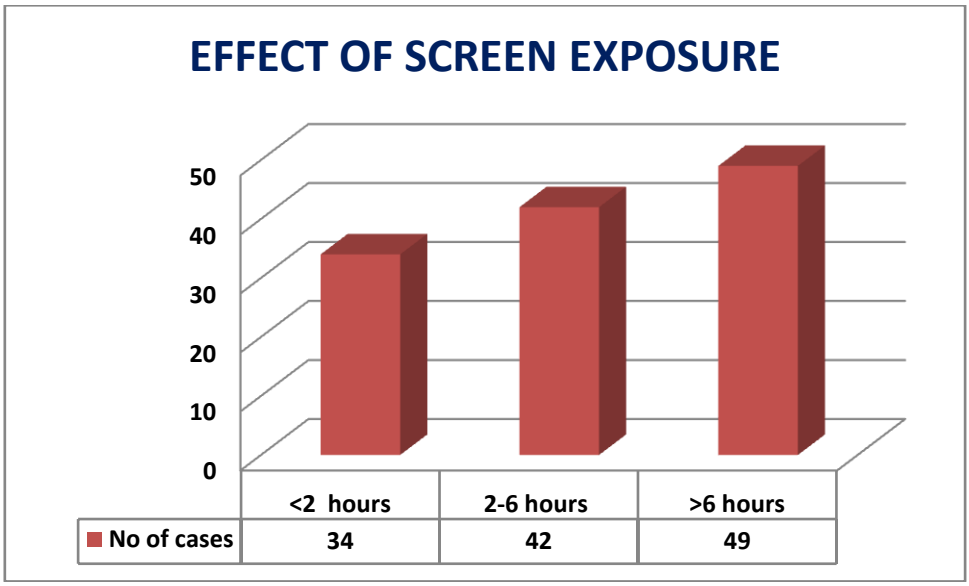
III. Results

In 18–40, 41–60 and 61–80 years age group,it was found that 21.6%,50.4% and 28% cases respectively had MGD. Prevalence and severity of MGD were more observed in the age group of 41-60 years, while it was found to be significantly more in females as compared to males ($p < 0.05$)

Age (in years)	No of patients	Stage I	Stage II	Stage III	Stage IV
18-40	27	2	8	11	6
41-60	63	9	17	27	10
>60	35	4	8	17	6

Sex	18-40 years	41-60 years	>60 years
Male	11	24	14
Female	16	39	21

In our study we found out that, prolonged computer use and exposure to digital screen is significantly associated with MGD.



Diabetes Mellitus (DM), Hypertension (HTN) and Hypercholesterolemia were significantly associated with MGD.

Diseases	Cases
DM	18
HTN	17
Hypercholesterolemia	11
DM with HTN	12
DM with Hypercholesterolemia	08
Hypercholesterolemia with HTN	06

Systemic medications such as anti hypertensive, oral hypoglycaemic agents, anti allergics and oral contraceptive pills(OC Pills) were significantly associated with MGD.

Systemic medications	Cases
Anti-hypertensive	31
Oral hypoglycaemic agents	33
Anti-allergics	22
OC Pills	09

IV. Discussion

Meibomian gland dysfunction is a prime cause of evaporative dry eye disease (DED). A significant association of increasing severity of MGD was observed in the age group of 41-60 years ($P<0.05\%$)[12].The females were more significantly associated with MGD than males. These results were similar to the observations by Pult et al[11]. (2012). Guliani et al. in 2018 also reported similar findings[10]. It could be due to the negative effect of estrogen on meibomian glands function.

The use of VDTs (television, mobile, computer, and laptop) in our study was observed to have a highly significant correlation with MGD ($p < 0.001$). It was in accordance with a study conducted in 2018, which also confirmed that long-term computer usage causes an evaporative dry eye disease.

The use of anti-allergics, anti-hypertensives, oral hypoglycaemic agents, and oral contraceptive pills were significantly associated with MGD in our study ($p < 0.05$). Though another study performed in 2016 by Machalinska observed a significant association of MGD with the use of anti-allergic drugs but did not find any association with other drugs.

V. Conclusion

In our study, the prevalence of meibomian gland disease was higher in females, diabetics, hypertension, visual display unit excessive users, patients using anti-allergic, anti-hypertensive, oral hypoglycaemic agents & oral contraceptive pills. Therefore, a thorough systemic workup is desirable in patients presenting to an ophthalmologist with MGD. Identification & removal or modification of risk factors aggravating MGD would help alleviate symptoms and improve patient's quality of life.

References

[1]. Nelson JD, Shimazaki J, Benitez-del-Castillo JM, et al. The international workshop on meibomian gland dysfunction: report of the definition and classification subcommittee. Invest Ophthalmol Vis Sci. 2011; 52(4): 1930–1937, doi: 10.1167/iovs.10-6997b, indexed in Pubmed: 21450914.

[2]. Knop E, Knop N, Millar T, et al. The international workshop on meibomian gland dysfunction: report of the subcommittee on anatomy, physiology, and pathophysiology of the meibomian gland. Invest Ophthalmol Vis Sci. 2011; 52(4): 1938–1978, doi: 10.1167/iovs.10-6997c, indexed in Pubmed: 21450915.

[3]. McCulley JP, Sciallis GF. Meibomian keratoconjunctivitis. Am J Ophthalmol. 1977;84(6): 788–793, doi: 10.1016/0002-9394(77)90497-4, indexed in Pubmed: 145804.

[4]. Lemp MA, Nichols KK. Blepharitis in the United States 2009: a surveybased perspective on prevalence and treatment. Ocul Surf. 2009; 7(2 Suppl): S1–S14, doi: 10.1016/s1542-0124(12)70620-1, indexed in Pubmed: 19383269.

[5]. Hom MM, Martinson JR, Knapp LL , et al. Prevalence of Meibomian gland dysfunction. Optom Vis Sci. 1990; 67(9): 710–712, doi: 10.1097/00006324-199009000-00010, indexed in Pubmed: 2234831.

[6]. Rolando M, Zierhut M. The ocular surface and tear film and their dysfunction in dry eye disease. Surv Ophthalmol. 2001; 45 Suppl 2: S203–S210, doi: 10.1016/s00396257(00)00203-4, indexed in Pubmed: 11587144.

[7]. Mc Culley JP, Dougherty JM, Deneau DG. Classification of chronic blepharitis. Ophthalmolog . 1982; 89(10): 1173–1180, doi: 10.1016/ s0161-6420(82)34669-2, indexed in Pubmed: 6218459.

[8]. Shine WE, McCulley JP, Shine WE, et al. The role of cholesterol in chronic blepharitis. Invest Ophthalmol Vis Sci. 1991; 32(8): 2272– 2280, indexed in Pubmed: 2071340

[9]. Pinna A, Blasetti F, Zinellu A, et al. Meibomian gland dysfunction & hypercholesterolemia . Ophthalmology. 2013; 120(12): 2385–2389, doi: 10.1016/j.ophtha.2013.05.002, indexed in Pubmed: 23747164.

[10]. Guliani BP, Bhalla A, Naik MP. Association of the severity of meibomian gland dysfunction with dyslipidemia in Indian population. Indian J Ophthalmol. 2018; 66(10): 1411–1416, doi: 10.4103/ijo.IJO_1256_17, indexed in Pubmed: 30249824.

[11]. Pult H, Riede-Pult BH, Nichols JJ. Relation between upper and lower lids' meibomian gland morphology, tear film, and dry eye. Optom Vis Sci. 2012; 89(3): E310–E315, doi: 10.1097/OP X.0b013e318244e487, indexed in Pubmed: 22246333.

[12]. Arita R, Itoh K, Inoue K, et al. Noncontact infrared meibography to document age-related changes of the meibomian glands in a normal population. Ophthalmology. 2008; 115(5): 911–915, doi: 10.1016/j.ophtha.2007.06.031, indexed in Pubmed: 18452765.

Dr Satyabrata Jena, et. al. "An Observational Study on Association of Various Risk Factors with Meibomian Gland Dysfunction." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 21(08), 2022, pp. 52-55.