

PREVALENCE OF MEIBOMIAN GLAND DISEASE IN TYPE II DIABETIC PATIENTS & ITS CLINICAL PRESENTATIONS

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ABSTRACT: AIMS: To study the prevalence of the meibomian gland disease in type 2 diabetic patients and its clinical presentations. **SETTING AND DESIGN:** A hospital based cross sectional descriptive study of 100 type 2 diabetic patients attending a medical college was conducted. **METHODS:** Detailed diabetic history was recorded. Assessment of ocular surface i.e. the lid margins, conjunctiva, corneal surface was done via slit lamp biomicroscopy. Meibomian gland disease (MGD) severity was assessed by the quality and expressibility of the meibomian secretion. Dry eye tests like schirmer's test and tear film breakup time were done. **STATISTICAL ANALYSIS USED:** SPSS statistical software version 17 was used. **RESULTS:** 56% of the patients out of 100 diabetic patients had MGD. The most common symptom was burning (46.9%), followed by dryness (23.5%), 5.6% had conjunctival injection, 7.14% had corneal erosions, 25% had mucus debris, 53.65% had dry eye which was statistically significant ($p=0.001$), 56.25% males and 72.2% females had the disease which was not statistically significant. **CONCLUSION:** The prevalence of Meibomian gland disease in the diabetic population was 56% which is more than the general population prevalence. Apart from other disorders diabetics are also more prone for ocular surface diseases like Meibomian gland disease. MGD is an important pre disposer for severe diseases like Dry eye in this subgroup of patients which can lead to complications like conjunctival keratinisations, corneal erosions and perforations. Careful examination of these patients for ocular surface disease and prompt treatment is required.

KEYWORDS: Meibomian gland disease, Diabetes, dry eye.

INTRODUCTION: Meibomian glands are modified sebaceous glands that line the upper and lower eyelids in a single row. They are embedded in the tarsal plate in a single line with 20 to 40 with a median number of 30 in the upper lid. In the lower lid they are about 20-30 with a median of about 26 glands. Their secretory products contain a complex mixture of lipids and proteins and are termed as meibum. Meibum is liquid at room temperature. The secreted lipid is stored in the duct system that terminates in the orifices with a muscular cuff that open onto the lids. Meibum is released on the ocular surface in small amounts with each blink forming a casual reservoir with about 30 times more lipid than needed for each blink. With every down phase of the blink, lipid is squeezed out of the meibomian glands and is compressed into the lid margins. On the up phase of the blink, the lipid rapidly spreads upwards over the aqueous layer, suggesting that the lower eyelid reservoir is the major contributor for spreading of the lipid.

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FUNCTIONS OF THE LIPID LAYER: To lower the surface tension and to prevent the evaporation of the aqueous layer, it acts as an effective bridge between the nonpolar lipid layer and the aqueous mucin layer.

Defects and instability in the lipid layer can be responsible for the tear breakup, with subsequent dry spots leading to dry eye.⁽¹⁾

Meibomian gland alveoli are predominantly innervated by sympathetic and parasympathetic innervations. Parasympathetic is more predominant and contains acetyl choline, vip, and neuropeptideY.⁽²⁾ Hormonal regulation of the meibum is also important. Both androgen and estrogen receptors are present. The ratio of androgen and estrogen receptors is critical for lipid synthesis. The stimulation of androgen receptors stimulates lipid production. Androgen deficiency is associated with meibomian gland dysfunction.⁽³⁾

The term blepharitis refers to a family of inflammatory diseases of the eyelids. The condition most typically has a chronic course with intermittent exacerbations of the symptomatic disease.⁽⁴⁾

Based on the characteristic clinical features, the location of the predominant inflammatory changes and the lid structures involved, blepharitis can be grouped into two general categories: anterior and posterior lid margin blepharitis.⁽⁵⁾

Posterior lid margin blepharitis is characterized by meibomian gland dysfunction. These include types IV to VI McCulley's classification.

McCulley's classification of blepharitis⁽⁴⁾:

Type I - Staphylococcal blepharitis,

Type II - Seborrhic blepharitis,

Type III - Seborrhic blepharitis with staphylococci,

Type IV - Seborrhic blepharitis with meibomian seborrhoea.(profuse meibomian secretions),

Type V - Seborrhic blepharitis with meibomitis (patchy, occluded and inflamed glands)

Type VI - Meibomitis(pouting and plugging of many meibomian glands) .

Types IV, V, and VI: Meibomian Gland Dysfunction. (MGD)

The prevalence of MGD in the general population appears to be relatively high (39%-50%).⁽⁷⁾ It is often associated with many systemic diseases like osteoporosis, diabetes, high blood cholesterol, allergy, atopy and skin diseases. Diabetes is a serious global health problem. With 3.5 crore persons with diabetes in India, it is indeed a disease to reckon with. Cataract and retinopathy are well known as ocular complications of diabetes. Recently problems involving the ocular surface, dry eyes in particular have been reported in diabetic patients. Meibomian Gland Dysfunction is an important predisposing factor for this. This study is undertaken to study the prevalence of Meibomian Gland Dysfunction in type 2 diabetic patients.

Method:

Design of the study: Cross sectional descriptive study.

Inclusion Criteria: All type 2 (diagnosed by the physician) diabetic patients irrespective of age, sex, duration of diabetes.

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Exclusion Criteria: Patients with history of allergy, atopy, skin diseases, use of 5-fluorouracil and vitamin A, contact lens wear were excluded.

Examination: A brief general and systemic examination was carried out.

Ocular examination included recording visual acuity with snellen's chart. Symptoms like dryness, grittiness, burning, redness, watering, matting or crusting, and any other symptom were noted. Diurnal pattern of the disturbance were also noted. (Patients with blepharitis have more complain in the morning). Detailed anterior segment examination was done under slit lamp. Condition of the lid and lid margins, meibomian glands, conjunctival surface, and corneal surface was noted.

Lid margin thickening, notching, rounding, hyperemia was noted.

The meibomian glands openings were noted for pouting, epithelial plugging, narrowing, or scarring.

The expressed secretion was evaluated in terms of quality and expressibility, based on this the Meibomian gland status was graded as follows⁽⁶⁾

- Grade 0 - No disease.
- Grade 1 - Plugging with translucent serous secretion when compressing the lid margins
- Grade 2 - Plugging with viscous or waxy white secretion when compressing the lid margin. (paste like secretion).
- Grade 3 - Plugging with no secretion when compressing the lidmargin.
Tear film examined for froth and mucus debris.

Conjunctival surface was seen for injection more so in the inferior third of the exposed interpalpebral area.

Cornea was evaluated in detail for its sheen, surface (superficial punctate erosions, mucus plaques/filamentary Keratitis) more in the inferior third of the cornea using fluorescein staining.

Dry eye evaluation was also done using TBUT (Tear film break up time) and Schirmer's test.

Statistical Methods Used: The data after coding was entered on excel spread sheet, it was further processed & analysed using spss statistical software version 17.0. The mean standard deviation and proportions were computed based on type of data. The test of significance used was chi-square test based on qualitative & quantitative data respectively. A p value of <0.05 was considered significant & <0.01 as highly significant.

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RESULTS:

Symptoms	N	Percent
Dryness	13	23.5
Grittness	7	13.3
Burning	27	46.9
Sticky	1	2.0
Redness	2	3.1
Crusting	1	2.0
Stuck in morning	3	6.1
watering	2	3.1
Total	56	100

TABLE 1

Table 1 Shows the Frequency of the Symptoms, Burning and Dryness were the most common symptoms.

Meibomian Gland Disease in Eye	Frequency	Percent
Grade 0	25	44
Grade I	20	35
Grade II	6	11
Grade III	5	10
Total	56	100

TABLE 2

Table 2 Shows the Frequency of the Meibomian Gland Disease, 56 Patients out of 100 Type 2 Diabetics had Meibomian Gland Disease.

Conjunctiva	Frequency	Percent
Normal	53	94.64
Congested	3	5.6
Total	56	

TABLE 3

Table 3 Shows the Frequency of the Conjunctival Disease, 5.6% had Conjunctival Congestion.

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Cornea	Frequency	Percent
Normal	52	92.85
SPE	4	7.14
Total	56	

Table 4

Table 4 Shows the Frequency of the Corneal Disease, 7.14% had Superficial Punctate Erosions.

Tear Film	Frequency	Percent
Normal	42	75
Mucus	14	25
Total	56	100

Table 5

Table 5 Shows Frequency of the Tear Film Abnormalities, 14(25%) had Mucus Debris.

Meibomian gland disease	Pts with dry eye	Patients without dry eye	Total
Present	30(53.6%)	26(46.4%)	56
Absent	06(13.6%)	38(86.4%)	44
Total	36(36%)	64	100

Table 6

Table 6 Shows the Frequency of Dry Eye in Patients with Meibomian Gland Disease.

Pearson chi square test = value-17.05, df=1, $p < 0.01$

This table shows that out of 36 patients with dry eye 30 patients had meibomian gland disease. This was statistically significant. ($p < 0.01$)

Gender	No. of subjects	Pts with meibomian gland disease	Percentage
Males	64	36	56.25%
Females	36	26	72.22%
	100	56	

Table 7

Table 7 shows the Frequency of the Disease in Males and Females, 56.25% Males and 72.2% Females had Meibomian Gland Disease.

Pearson chi square test - value is 0.11, the result is not statistically significant.

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DISCUSSION: On the basis of the quality and quantity of the produced and delivered meibum, two basic forms of MGD has been proposed –hypersecretory and obstructive form.

In Hypersecretory form there is excessive meibomian excretion of oil at the orifices in the absence of inflammation. Examination of the eyelid usually reveals dilated meibomian glands full of secretions that are easily expressed. There is frequently excessive foam in the tear film. The main complaint is burning.

Obstructive Meibomian gland disease is characterized by thicker than normal meibomian secretion, low meibum excreta volume and high meibomian gland dropout. The predominant lid margin findings are hyperemia and thickening and irregularity of contour of the posterior lid margin. Meibomian secretions often are more turbid and solidified and inflammation surrounds the orifices with resultant pouting of the orifices. There may be tear film debris, tear film foam, punctate epithelial erosions in the interpalpebral zone and lower third of the cornea. Patients have high rate of tear evaporation and evaporative dry eye. The clinical symptoms include irritation, chalazia, foreign body sensation, matting and crusting.

The keystones for the treatment of MGD include topical antibiotics (erythromycin, tobramycin, or bacitracin)tear substitutes, lid hygiene (melting of the secretion by warm compression, lid massage, lid scrubbing)and systemic tetracycline or its derivatives.

MGD is more associated with certain systemic diseases like hyperlipidemia, skin diseases, and certain drugs like 5 fluorouracil, vitamin A, contact lens wear and diabetes. This study showed that the prevalence of MGD in diabetic patients (type 2) is 56% which is more than the general population (38.9%). The lid flora is important in the development of meibomian gland dysfunction. The normal eyelids are colonized by *S.aureus*, and *S.epidermidis* about 10-95% of the time respectively. The bacteria commonly isolated from eye lids of patients with meibomian gland disease (*Staphylococcus aureus*, *propionibacteriumacne*, *cornybacterium*) produce lipases, cholesterylesterases, lipopolysaccharides that can alter the composition of meibomian lipids. The changes in lipid composition may, inturn, enhance the growth of other local bacteria. Only rarely do genuine bacterial infections play a role. Further evidence for the influence of local bacteria, is that Meibomian Gland Disease often responds favourably to topical and systemic antibiotics.⁽⁷⁾ Diabetic patients maybe at an increased risk for opportunistic colonization of the eyelids, resulting in blepharitic presentations.⁽⁸⁾ These developments lead to a compromised tear film lipid layer with increased evaporation, decreased tear breakup time and increased osmolarity. This hyperosmolarity causes ocular surface damage which further causes increased evaporation and further meibomian gland disease. Thus it i s a vicious cycle with dry eye being the end result. Hor et al in 1990,⁽⁹⁾ estimated the prevalence of Meibomian gland disease in general population is 38.9% with the prevalence increasing with age. Among groups of dry eye patients, the prevalence of Meibomian gland disease is high. According to Ghasemi H et al 2008⁽¹⁰⁾ diabetes may be a possible predisposer for blepharitis. Patients with blepharitis present with typical symptoms of eye irritation. The most common symptom in this study was burning (46.9%) and dryness (23.5%). In most cases, symptoms are worse in the morning, possibly because almost no tears are produced during night so the toxic products of the inflammation are not washed away from the ocular surface. 5.6% of the patients had conjunctival congestion. Conjunctival injection is seen in the early phase of the disease, more in the inferior third of the interpalpebral

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area. Corneal changes include punctate erosions, infiltrates and keratitis. In this study 7.14% had punctate erosions. 25% had mucus debris in the tear film 30 patients that is 53.6% of the patients with MGD had dry eye which shows that MGD is a very important predisposer for dry eye in diabetic patients. Meibomian glands have androgen and estrogen receptors. The ratio of androgen and estrogen receptor is critical for controlling lipid synthesis so androgen deficiency is associated with Meibomian Gland Disease. In this study 56.25% males and 72.2% females showed Meibomian Gland Disease. Though more females showed the disease but this was not statistically significant.

CONCLUSION: This study showed the prevalence of MGD as 56% in diabetic patients. (type 2) which is more than the general population(38%). Apart from other ocular manifestations ocular surface disorders like MGD is also more common in these patients. MGD is a predisposer for severe diseases like Dry eye which can lead to complications like conjunctival keratinisations, corneal erosions and perforations. Careful examination of these patients for ocular surface disease and prompt treatment with systemic antibiotics, lid hygiene and liberal use of tear substitutes should be done to relieve the patient of the symptoms and also to prevent other associated complications. Type 1 diabetic patients were not involved in this study and also other more diagnostic tests for MGD like meibography and meibometry were not used which is a drawback of this study.

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