

BACTERIOLOGICAL PROFILE OF MEIBOMIAN GLANDS IN MEIBOMIAN GLAND DYSFUNCTION

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ABSTRACT

Background: Meibomian gland dysfunction (MGD) is a common ocular disorder, often underdiagnosed, and is a major contributory factor causing dry eye disease and ocular discomfort due to compromised quality of tears. Oral antibiotics particularly doxycycline and azithromycin are used and observed to provide relief in MGD due to their antibacterial and anti-inflammatory properties, but their exact mechanism of beneficial action in MGD is yet not fully defined. **Aims:** The present study was undertaken to study the bacterial profile of Meibomian glands secretions in cases of MGD and normal subjects (no signs of MGD) by culture for aerobic bacteria to find out the difference between the two groups. **Methods and materials:** In the present study 80 patients attending outpatient department of Ophthalmology, Pacific Medical College and Hospital, Udaipur were included comprising 50 patients clinically diagnosed with MGD and 30 patients without evidence of MGD (control group). Culture tests of manually expressed meibum were performed in the Microbiology Department of Pacific Medical College and Hospital, Udaipur. **Results:** No difference was found in the bacterial profile of MGD and control group. **Conclusions:** The mechanism by which antibiotics provide relief in MGD appear to be due to another mode of action than their antibacterial properties, as the bacterial profile is observed to be similar in MGD and healthy persons.

Key Words: ocular disorder, dry eye disease, Meibomian gland, tears film.

INTRODUCTION

The abnormal tear film is responsible for ocular discomfort, eye strain, blurred vision and irritation in a large number of patients seeking ophthalmic consultation. Constituents of tear film are secreted from lacrimal and accessory lacrimal glands (aqueous part), goblet cells of the conjunctiva (mucin) and Meibomian glands (lipid layer), deficiency or abnormality of any of these results in dry eye disease. Broadly dry eye disease is classified as aqueous deficient or evaporative types. Lipid secretions from

Meibomian glands (meibum) form the anterior-most layer of tear film which prevents evaporation of tears, any abnormal quality or deficiency of which will result in poor tear film stability leading to symptoms of dry eye disease.(1,2) Meibomian gland dysfunction (MGD) is the term used to describe inadequate or abnormal secretions from Meibomian glands and is considered to be a major cause of dry eye disease.(1,3,) MGD often remains underdiagnosed and undertreated condition. Studies

have indicated that antibiotic use particularly doxycycline and azithromycin provide an improvement in functional abnormality of Meibomian glands and relief from MGD symptoms.(4) However it is not sure whether this relief is because of their antibacterial, anti-inflammatory properties or some other mechanism. Hence the present study was undertaken to study the bacteriological profile of meibomian glands in patients clinically diagnosed with MGD.

METHODS AND MATERIALS

In this non-invasive study, 50 subjects suffering from MGD, diagnosed on clinical examination and 30 healthy subjects between 40 to 60 years of age were included following ethical guidelines of declarations of Helsinki 2008 and after taking informed consent. Persons with a history of systemic disease, ocular surgery, use of local or systemic medications and with conditions like pterygium, trichiasis, entropion, ectropion and application of kohl (Kajal) were excluded from the study. A thorough history was taken about the symptoms of dry eye disease such as ocular discomfort, irritation, grittiness, foreign body sensation, dryness, burning, itching, watering, blurring of vision and pain in the eyes. After recording visual acuity and refraction if required slit lamp examination was performed. Lid margins were examined for evidence of capping, stenosis, occlusion of meibomian gland orifices and presence of posterior lid margin telangiectasis. The lower lid margin was compressed/pinched between index finger and thumb to manually express meibum after explaining the procedure to the patient. Volume and viscosity were observed and recorded to assess the quantity and quality of meibum, then a sample with the help of a swab was taken for a bacterial culture test. Culture test was done only for aerobic bacteria.

Subjects were labelled as controls in whom the expressed meibum was clear with few particles and was just covering the orifices of the meibomian glands.

All subjects clinically diagnosed with MGD included in the study were classified into three categories, mild, moderate and severe according to the expressibility and quality of meibum as follows –

Mild MGD – Mildly altered expressibility and secretion quality, slightly turbid meibum

Moderate MGD – Moderately altered expressibility and secretion quality, thickened and cloudy meibum with or without an increase in volume

Severe MGD – Severely altered expressibility and secretion quality, opaque and toothpaste like meibum

The swab samples were processed on blood agar, chocolate agar, and MacConkey agar media and incubated at 37° C under aerobic conditions. The microorganisms were identified by Gram stain, biochemical reactions, and motility testing as per standard guidelines.⁵

RESULTS

A total of 80 persons between the age of 40 to 60 years attending outpatient department of Ophthalmology were included in the present study, of which 50 were clinically diagnosed with MGD and 30 without MGD (control group). Table 1 shows age and sex distribution of all the subjects and their numbers according to the severity of MGD. Table 2 shows the results of culture tests performed from the sample of expressed meibum.

Table1. Age and sex distribution of subjects included in the study

	Normal		Mild MGD		Moderate – Severe MGD	
	n =30		n = 18		n = 32	
Age group	Male	Female	Male	Female	Male	Female
40 - 50 years	10	5	6	4	12	6
51 - 60 years	8	7	5	3	9	5

From the control group, 12 (40%) showed positive cultures as compared to 24 (48%) positive cultures from the MGD group. Staphylococcus was the most common organism isolated on cultures in both the groups with a

high incidence of coagulase-negative Staphylococcus (CN- Staphylococcus) species. On statistical analysis, there was no significant difference in the results (positive culture) from the control group as compared to the results from the MGD group (p-value >0.05).

Table2. Bacteria isolated in normal and MGD patients

Bacteria isolated	Normal	Mild MGD	Moderate-severe MGD	Total MGD
	n = 30	n = 18	n = 32	n = 50
CN - Staphylococcus	5 (16.6%)	3 (16.66%)	6 (18.75%)	9 (18%)
Staphylococcus aureus	3 (10.0%)	2 (11.11%)	4 (12.5%)	6 (12%)
Streptococcus sp.	1 (3.33%)	1 (5.55%)	2 (6.25%)	3 (6%)
Pseudomonas species	1 (3.33%)	1(3.33%)	1 (3.12%)	2 (4%)
E.coli	1 (3.33%)	1 (5.55%)	1 (3.12%)	2 (4%)
Klebsiella	1 (3.33%)	0	1 (3.12%)	1 (2%)
Enterococcus	0	0	1 (3.12%)	1 (2%)

DISCUSSION

Meibomian gland dysfunction is a significant cause of tear film abnormality resulting in symptoms of dry eye disease. The International Workshop has defined it on MGD as "a chronic, diffuse abnormality of the meibomian glands (MG), commonly characterised by terminal duct obstruction and/or qualitative/quantitative

changes in the glandular secretion resulting in alteration of the tear film, inflammation, ocular surface disease and symptoms of eye irritation.”(6,7) MGD has been presumed to be caused by multiple factors: obstructive hyperkeratinisation, abnormal meibomian gland secretion, ocular surface inflammation, and microbial infection.(6,8,9) It has been reported

that MGD improves with systemic antibiotics, particularly with doxycycline and azithromycin treatment.(4,10) Though it is not sure whether the relief is because of their antibacterial, anti-inflammatory or some other mechanism which improves the quality of meibum. It has been reported that the relief in MGD provided by antibiotics is due to their anti-inflammatory properties.(11, 12)

The present study was undertaken to study the microbial profile of meibum from patients suffering from MGD and compare with the results from healthy controls. Coagulase-negative Staphylococcus and Staphylococcus aureus were the major bacteria types found in both the control and MGD group. Other species were isolated in few samples in both groups. There was no significant difference between the bacteria type and percentages in control and MGD group which is similar to the results from other studies. (13) In contradiction, it has been reported that MGD patients show significantly higher positive results for bacterial profile than controls. (14) Another report mentions that there is no conclusive evidence available at present to suggest the usefulness of antibiotics in managing MGD. (15)

Limitations of the study – (1) Small sample size
(2) Cultures were performed only for aerobic bacteria

CONCLUSIONS

No difference in the bacterial profile of meibomian glands was observed between the control and MGD group which suggests that there are other mechanisms involved for the improvement with the use of antibiotics like doxycycline and azithromycin in MGD patients.

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