Original Article

Risk Factors Associated with Meibomian Gland Dysfunction: A Hospital Based Study

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Abstract

Introduction: Meibomian Gland Dysfunction (MGD) is a chronic diffuse abnormality of the Meibomian glands often found as a result of precipitating factors like dyslipidemia, infections, hypertension, diabetes, etc. This study aims to find the prevalence of various risk factors of Meibomian Gland Dysfunction (MGD) which will ultimately help in managing the disease and explaining the prognosis.

Materials and methods: A hospital based cross-sectional study. A total of 400 patients with MGD over the age of 30 were examined. Patients with a history of taking lipid altering drugs, pre-existing ocular comorbidities were excluded from the study.

Results: Severity of MGD increased with ageing. There was a significant risk of higher grades of MGD in hypertensives, diabetics & post-menopausal women. Higher levels of LDL cholesterol showed significant risk.

Conclusion: Blood sugar, blood pressure, blood cholesterol were seen to be the risk factors in the study and thus, should be kept within normal limits to reduce the severity of disease. Alcohol & cigarette consumption should be avoided even if they didn't show a significant relationship.

Key words: Meibomian gland dysfunction, Hypertension, Diabetes mellitus, Dyslipidemia, Post-menopausal status.

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Introduction

Meibomian gland dysfunction (MGD), a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in the glandular secretion that may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease. (Nelson et al, 2011)

After decades of experience, some clinical studies and case series, and expert clinical impressions candidate risk factors for MGD still remain in its infancy.

Meibomian gland dysfunction (MGD) results from an altered composition of meibum (Bron et al, 2004)or from outflow obstruction of the gland (Bron et al, 2004). Altered composition of the lipid layer results in uneven coverage of the aqueous layer. Obstruction prevents meibum secretion, decreasing the amount of lipid content of the tear film and subsequent protection against early evaporation and early tear breakup causing the unprotected epithelium to become irritated and damaged, leading to ocular surface disease.

Meibomian Gland Dysfunction is often found as a result of certain precipitating factors such as dyslipidemia, infection, raised body mass index (BMI), female sex, hypertension, diabetes mellitus, anti-glaucoma medications, etc.

The study was conducted to know the prevalence of various risk factors of MGD which will ultimately help in managing the disease and explaining the prognosis.

Materials and methods

A hospital based cross sectional study was conducted at the Ophthalmology department of B.P.Koirala Institute of Health Sciences for a year. Ethical clearance was obtained from the Institutional Ethical Review Board prospectively. Written informed consent was obtained from all the patients involved in the study.

A total of 400 patients (quota sampling method) with MGD over the age of 30 were included in our study. Patients with h/o taking lipid altering drugs, pre-existing ocular comorbidities were excluded from the study. The patients were subjected to slit lamp examination and were categorized as Group A (moderate-severe MGD) and Group B (mild MGD) based on the diagnosing criteria.

For diagnosis of MGD, the following diagnostic criteria was used.

1. Identification of signs and symptoms. (Foulks et al, 2003)
   Signs: thickness (measured from posterior lid margin to posterior lash line), rounding of posterior margin, irregularity, notching of margin, vascularity of lid margin, telangiectasia, lash loss, trichiasis, distichiasis, malapposition, anterior blepharitis, muco-cutaneous junction: antero placement, retroplacement, ridging.
   Symptoms: irritation of eyes, burning sensation, itchy eyes, foreign body sensation, watering, increased frequency of blinking, redness of eye, blurred vision
2. Measurement of blink rate. (Khanal et al, 2008)
   Normal blink rate is 15/min, value less than that was considered abnormal.
3. Measurement of tear film break-up time. (Craig et al, 1997)
   TBUT is the interval between the last blink and the appearance of the first randomly distributed dry spot. TBUT< 10 sec was considered abnormal.
4. Schirmer test (I) reading. (Khanal et al, 2008)
   Normal: ≥ 15 mm, Mild: 0-15 mm, Moderate: 5-10 mm, Severe:<5 mm.
5. Grading of MGD was done by combining the above mentioned criteria(Tomlinson, 2011): Grade 0 (Normal), Grade 1 (sub-clinical), Grade 2 (Minimal), Grade 3 (Mild), Grade 4 (Moderate), Grade 5 (Severe).
   The patients were then categorized into Group A (Moderate – severe MGD) and Group B (Mild MGD).

After the categorization of patients into two groups, they were asked to follow up with their lipid profile reports to rule out dyslipidemia.

The following parameters were studied: Age, Hypertension/ Diabetes history, Smoking/ Alcohol intake, Post-menopausal status, Dyslipidemia.

Statistical Analysis

The two groups were compared to find out the difference in the variables. Collected information was entered in EXCEL computer software. SPSS version 17.0 was used for statistical analysis.Chi-Square test, relative risk and 95% confidence intervals were calculated to test the significance difference between the variables using the Epi info program (version 1.0, 2000). The "p" value less than 0.05 was considered statistically significant.

Results

A total of 400 patients having MGD were taken for this study. The patients with MGD were categorized as Group A (moderate-severe MGD) and Group B (mild MGD).Among the 400 patients enrolled in the study, 237 (59%) had moderate-severe MGD and 163 (41%) had mild MGD.

The line diagram (figure.1) showed that the frequency of moderate-severe MGD increased as the age increased. The relative risk of having moderate-severe MGD in patient's ≥50 years of age was 1.40 with a p-value of 0.0003 and 95% CI of 1.14-1.72.

The relative risk of having moderate-severe MGD in hypertensives was 1.36 with a 95% CI of 1.15-1.60 with a significant p-value of <0.001 (Table1).

335 of patients enrolled were having diabetes, of which 211 had moderate-severe MGD and 124 had mild MGD with a significant p-value of 0.0005. The relative risk of having moderate-severe disease among the diabetics was 1.57 with a 95% CI of 1.482-4.395 (Table 2).

Alcohol and cigarette consumption did not show significant risk of having moderate-severe MGD

The relative risk of having moderate-severe MGD in post-menopausal compared to premenopausal was 1.53 with a 95% CI of 1.16-2.02 with a significant p-value of 0.0008.

The relative risk of having moderate-severe MGD in patients who had raised LDL level was 1.20 with a significant p-value of 0.046 and 95% CI of 1.02-1.43. Raised total cholesterol, triglycerides and decreased HDL did not show significant risk with relative risk of 1.18, 1.07 and 1.13 respectively, and 95% CI of 0.99-1.41, 0.91-1.26 and 0.96-1.33 respectively (Table3).

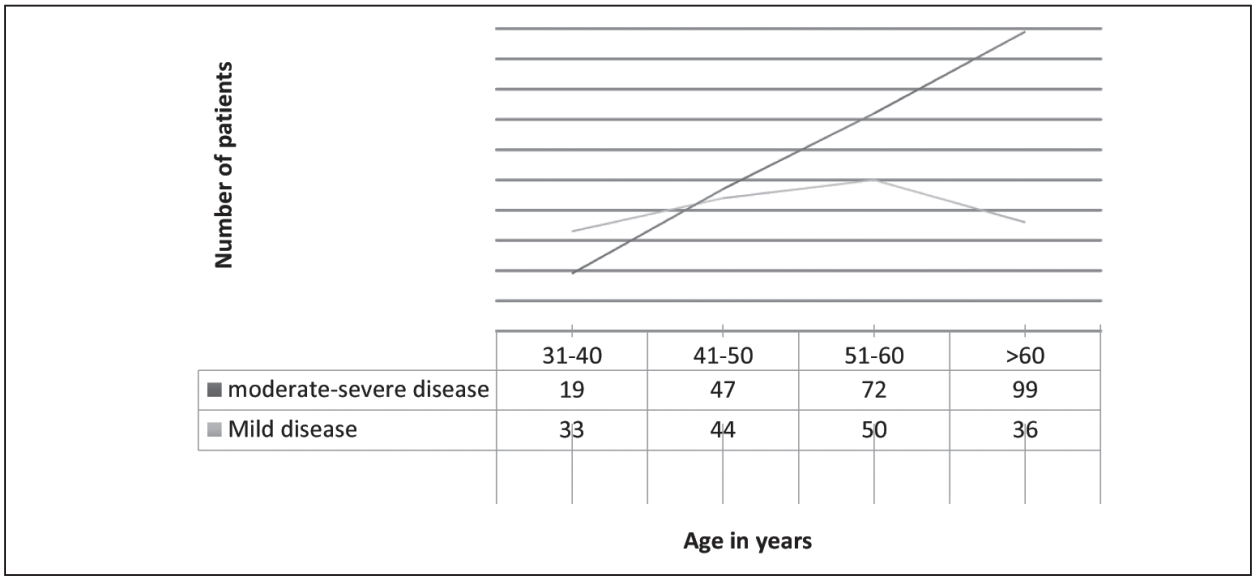

Figure 1: Frequency distribution of MGD in different age groups

Table 1: Distribution of MGD in Hypertensives

HTN	Group A	Group B	Total frequency	P-value	Relative risk	95% CI
Yes	130	59	189	0.0002	1.36	1.15-1.60
No	107	104	211			

Table 2: Distribution of MGD in Diabetics

Diabetes	Group A	Group B	Total frequency	P-value	Relative risk	95% CI
Yes	211	124	335	0.0005	1.57	1.16-2.14
No	26	39	65			

Table 3: Distribution of MGD in Dyslipidemia

Character	Status	Group A	Group B	Total frequency	P-value	Relative risk	95% CI
Dyslipidemia	Yes	179	123	302	0.987	1.00	0.83-1.21
	No	58	40	98			
LDL	Raised	64	30	94	0.046	1.20	1.02-1.43
	Normal	173	133	306			
HDL	Low	102	58	160	0.134	1.13	0.96-1.33
	Normal	135	105	240			
T.cholesterol	Raised	54	26	80	0.093	1.18	0.99-1.41
	Normal	183	137	320			
Triglycerides	Raised	139	89	228	0.421	1.07	0.91-1.26
	Normal	98	74	172			

Discussion

Meibomian Gland Dysfunction is often found to coexist as a result of certain precipitating factors. We conducted this study in the outpatient department of Ophthalmology, BPKIHS with an objective to evaluate the risk factors associated with MGD among the sample population, considering them as the representatives of the Eastern Nepalese population.

In our study, it was seen that mild MGD was seen in younger age groups, and as the age increased, severity of MGD also increased (P-value=0.0003; RR:1.40; 95% CI:1.14-1.72). In a study done by Den et al showed that, with the increasing age, there were increased changes in lid margin anatomy and meibomian gland morphology (P-value<0.001). (Den et al, 2006)

The Singapore Malay Eye Study by Siak et al (2012), concluded that male participants with high diastolic blood pressure had higher MGD prevalence (OR: 1.32, 95% CI: 1.08-1.62). In another study by Schaumberg et al (2009), concluded that high blood pressure was associated with higher risk of dry eye disease (OR:1.29, 95% CI:1.12-1.45). Our study also showed more risk of having higher grade disease among hypertensives compared to the previous studies.

Manaviat et al (2008), concluded that there was significant association between Dry Eye Syndrome and duration of diabetes (P-value=0.01). Diabetic patients with Diabetic Retinopathy frequently presented with dry eye syndrome (P-value=0.02). The findings of our study were consistent with previous studies.

Scot et al (2000), showed that there was

significant risk of having dry eye disease with smoking (OR:1.82, 95% CI:1.36-2.46) and alcohol consumption did not show significant risk. In our study, alcohol consumption and smoking did not show significant risk of having a higher grade of MGD (RR:0.85 and 0.86; 95% CI:0.72-1.00 and 0.73-1.02 respectively).

In a study by Mather's et al (1998), showed abnormal tear function in post-menopausal women (P-value<0.05). Total testosterone correlated positively with tear function in menopausal women, whereas for premenopausal women there was a negative correlation. Serum estradiol levels correlated positively with tear function in premenopausal. In our study 133 women were post-menopausal among 210 females, and there was significant risk of having higher grade disease among menopausal women (P-value=0.0008, RR:1.53, 95% CI:1.16-2.02).

In a study by Pinna et al (2007), logistic regression analysis including gender, B.M.I, triglycerides, total cholesterol and glucose revealed that MGD was significantly associated with higher blood levels of total cholesterol (P-value<0.001, OR:1.07, 95% CI:1.04-1.09), higher blood levels of LDL (P-value<0.001, OR:1.07, 95% CI:1.04-1.09) and higher blood levels of HDL (P-value<0.001, OR:1.11, 95% CI:1.06-1.17). Our study revealed that MGD was significantly associated with higher blood levels of LDL (P-value=0.046, RR:1.20, 95% CI:1.02-1.43) which is consistent with study by Pinna et al.

Conclusion

MGD is associated with aging, HTN, diabetes, post-menopausal status, and dyslipidemia with higher blood levels of LDL.

Limitations

The study was a cross-sectional study so the control group for comparison was lacking.

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