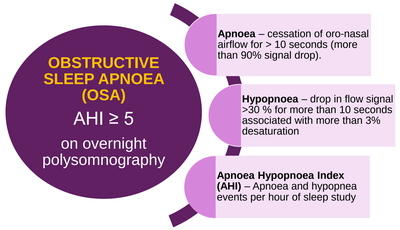
Meibomian Gland Dysfunction and Dry eye specific Quality of Life in Patients with Sleep Disorders

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Introduction

- Meibomian gland dysfunction (MGD) is a chronic diffuse abnormality of the meibomian glands commonly characterised by terminal duct obstruction and/or qualitative/quantitative changes in glandular secretion.
- Obstructive sleep apnoea (OSA) contributes to ocular surface changes not only by causing sleep deprivation, but also by recurrent episodes of hypoxia and oxygen desaturation that are associated with increased level of circulating catecholamines.



Objectives

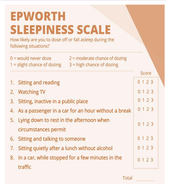
- Assess the occurrence of meibomian gland dysfunction and dry eye disease (DED) in patients with sleep disorders
- Assess dry eye specific quality of life and its impact in these patients

Materials and Methods

- Ethical approval was obtained from Institute Ethics Committee, All India Institute of Medical Sciences (AIIMS), New Delhi, India.

Study Participants

- 150 consecutive patients (300 eyes) with OSA, who underwent polysomnography (sleep study) at Department of Pulmonary Medicine, AIIMS, New Delhi, India
- 150 age and gender matched controls (No sleep disorder/ocular surface disease)
- Ocular surface parameters like Schirmer's test, tear film break up time (TBUT), and Ocular Surface Disease Index (OSDI) scores were recorded.



ESS total score ≥10 indicates possible sleep disorder.

MGD grading was done as per DEWS-MGD Workshop guidelines

Table 3.
Clinical Summary of the MGD Staging Used to Guide Treatment

Stage	MGD Grade	Symptoms	Corneal Staining
1	+ (minimally altered expressibility and secretion quality)	None	None
2	++ (mildly altered expressibility and secretion quality)	Minimal to mild	None to limited
3	+++ (moderately altered expressibility and secretion quality)	Moderate	Mild to moderate; mainly peripheral
4	++++ (severely altered expressibility and secretion quality)	Marked	Marked; central in addition
"Plus" disease	Co-existing or accompanying disorders of the ocular surface and/or eyelids		

Grade	Volume	Viscosity
Grade 1	Normal volume; just covers orifice	Normal, clear, may have a few particles
Grade 2	Increased two to three times normal volume	Opaque with normal viscosity
Grade 3	Increased more than two to three times normal volume	Opaque with increased viscosity
Grade 4	Increased to 10 times the normal volume	Severe thickening (toothpaste like)

- National Eye Institute Visual Functioning Questionnaire (NEIVFQ-25) was used to help determine the effect of MGD on the quality of life (QoL) of the patient.
- Presence of any systemic disease was noted.

Data Analysis

- Analysis done using SPSS version 12.1 software and STATA/SE 12.1 version software.
- Appropriate parametric/ non-parametric tests of significance of difference/ correlation and multivariate regression analysis applied to required qualitative/quantitative parameters.
- P value < 0.05 considered significant

Results

Demographic & Systemic profile

Parameters	OSA	Controls	P value
Age (years) [Mean±SD]	50.18 ± 11.68	51.04 ± 12.08	0.535
Gender (Male/Female)	89/61	91/59	0.869
BMI (kg/m^2) [Median (IQR)]	30.6 (21.31 – 102.62)		
Diabetes Mellitus n (%)	40 (27.4%)	23 (15.4%)	**0.015**
Hypertension n (%)	67 (44.7%)	40 (26.7%)	**0.001**
CAD n (%)	4 (2.7%)	3 (2%)	0.709
Alcohol consumers n (%)	21 (14.1%)	10 (6.7%)	**0.035**
Smokers n (%)	24 (16.1%)	18 (12%)	0.307

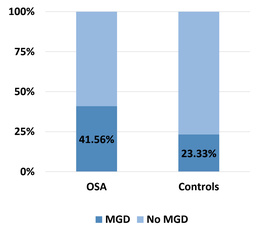
BMI=Body Mass Index; IQR=Interquartile range; SD=Standard Deviation; CAD= Coronary Artery Disease

The occurrence of diabetes mellitus (P=0.015), hypertension (P=0.001) was found to be significantly higher in the OSA group

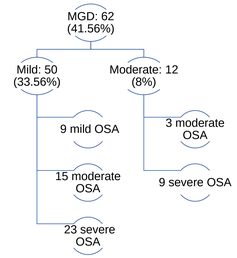
Occurrence of Meibomian Gland Dysfunction (MGD)

- 62 of 300 patients with OSA had Meibomian Gland Dysfunction (MGD) on clinical examination

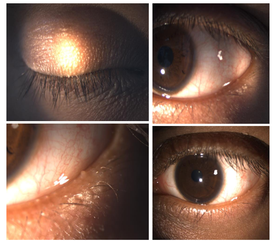
Occurrence of MGD



Magnitude of MGD in OSA group



Patients demonstrating features of MGD



Odds Ratio (95% CI)	OSA	Controls	P value
DED			
Unadjusted	1.52 (0.84, 2.74)	1.0	0.163
Adjusted*	1.77 (0.86, 3.63)	1.0	0.119
MGD			
Unadjusted	2.32 (1.42, 3.80)	1.0	**0.001**
Adjusted*	3.11 (1.67, 5.78)	1.0	**0.001**

*Adjusted for age, diabetes mellitus, hypertension, smoking, alcohol, coronary artery disease, ocular surgery

The occurrence of MGD was found to be significantly higher (P=0.001) in OSA subjects (41.6%) than controls (23.3%) [OR=3.11 (1.67, 5.78) P=0.001]

Ocular surface parameters in patients with varying severity of OSA

	Obstructive sleep apnoea			Controls	P value
	Mild OSA (n=35)	Moderate OSA (n=35)	Severe OSA (n=62)		
MGD **Odds Ratio (95% CI)** **P value**	27.78% 1.26 (0.55, 2.87) 0.577	41.67% 2.34 (1.09, 5.03) **0.028**	50.82% 3.39 (1.81, 6.36) **<0.001**	23.33% 1.0 -	**0.001**
OSDI Score	1.28 ± 2.25	1.32 ± 2.12	1.78 ± 2.85	0.96 ± 2.54	**0.019**
Symptoms **Odds Ratio (95% CI)** **P value**	41.67% 2.12 (1.01, 4.44) **0.045**	50% 1.51 (0.71, 3.20) 0.273	63.93% 3.76 (2.01, 7.03) **<0.001**	32% 1.00 -	**0.001**
Schirmer's test (mm)	7.75 ± 3.5	6.75 ± 2.9	5.32 ± 3.1	19.78 ± 2.3	**<0.001**
TBUT (sec)	10.58 ± 2.3	9.66 ± 2.6	8.01 ± 2.9	12.72 ± 2.3	**0.065**

MGD=Meibomian gland dysfunction; OSDI=Ocular Surface Disease Index; TBUT=Tear film breakup time; OSA= Obstructive Sleep Apnoea

As the severity of OSA increased, the occurrence of MGD was also found to increase significantly (p=0.001).

- OSA subjects with MGD were found to have a significantly higher **Apnoea Hypopnoea Index** (33.6 ± 23.1) compared to OSA subjects without MGD (26.9 ± 24.0) (p=0.036).
- None of the other anthropometry or polysomnography parameters were found to be significantly different.

Dry eye specific quality of life

	OSA		Controls	P value
	MGD	No MGD		
NEIVFQ-25	98.13 ± 2.61	99.32 ± 1.60	99.27 ± 2.09	**0.001***
Most Affected Subscale	• Near activities • Ocular pain	• Near activities		

While the NEIVFQ-25 scores were not significantly different between the OSA and control groups (P=0.073), they were significantly affected in OSA patients with MGD (P=0.001) as compared to those without MGD.

Conclusions & Recommendations

- Higher magnitude of MGD was observed in patients with sleep disorders.
- With increasing severity of OSA, likelihood of occurrence of MGD increases along with worsening of ocular surface symptoms.
- Significant difference in quality of life between MGD patients and controls was noted.
- Ophthalmologists should have an index of suspicion for sleep disorders at the time of evaluating their patients with DED and MGD and the pulmonary physician should be aware of the spectrum of ocular morbidity for which the OSA patient is at risk.

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