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# A STUDY TO EVALUATE OCULAR MORBIDITY AND QUALITY OF LIFE IN PATIENTS WITH THYROID DYSFUNCTION

Ophthalomology

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## ABSTRACT

**Introduction:** Thyroid dysfunction is one of the most common endocrine disorders worldwide, frequently associated with ocular manifestations known as Thyroid Eye Disease (TED) or Thyroid-Associated Ophthalmopathy (TAO). Ocular morbidity ranges from subtle ocular surface discomfort to sight-threatening optic neuropathy. Beyond physical signs, TED causes significant functional disability and psychosocial stress. **Objectives:** This study evaluated the pattern, prevalence, and severity of ocular morbidity in patients with thyroid dysfunction and assessed its impact on health-related quality of life using the Graves' Ophthalmopathy Quality of Life (GO-QOL) questionnaire. **Methodology:** A hospital-based prospective cross-sectional analytical study was conducted at the Department of Ophthalmology in collaboration with General Medicine/Endocrinology at Dr. S.N. Medical College and Associated Mathuradas Mathur Hospital, Jodhpur. Eighty patients aged over 18 years with documented thyroid dysfunction were evaluated clinically and ophthalmologically. Ocular signs, Clinical Activity Score (CAS), EUGOGO severity grading, and GO-QOL scores were documented. Statistical analysis was performed using SPSS, with a p-value<0.05 05considered statistically significant. **Results:** Out of 80 patients, females predominated (76.25%, F:M ratio 3.2:1). Hyperthyroidism was the most common thyroid status (53.75%), followed by hypothyroidism (33.75%) and euthyroid status (12.5%). Ocular morbidity was present in 40% (n=32) of participants, all belonging to the hyperthyroid group. The most common manifestations were dry eye (31.3%), watering (25.0%), lid retraction (22.5%), photophobia (22.5%), and proptosis (18.8%). Mild TED was present in 27.5% of the total cohort (68.75% of affected cases), moderate TED in 10.0%, and sight-threatening TED in 2.5%. Smokers (15.0%) demonstrated higher CAS scores and greater disease severity. GO-QOL scores ranged from 41 to 96, showing a clear linear decline with increasing disease severity ($p<0.05$). **Conclusion:** Thyroid-associated ocular disease causes significant visual and psychosocial impairment. Quality-of-life reduction correlates directly with clinical activity and disease severity. Routine ophthalmic screening, early intervention, smoking cessation, and multidisciplinary management are essential to improve patient outcomes.

## KEYWORDS

Thyroid Eye Disease, Ocular Morbidity, GO-QOL, Proptosis, Dry Eye, Hyperthyroidism.

## INTRODUCTION

Thyroid dysfunction represents one of the most common endocrine disorders encountered in clinical practice worldwide, exerting profound metabolic, cardiovascular, and ocular effects. Vascular endothelial changes and autoimmune cross-reactivity drive systemic morbidity, with Thyroid Eye Disease (TED)—also designated as Graves' Orbitopathy (GO) or Thyroid-Associated Ophthalmopathy (TAO)—representing the most frequent extra-thyroidal manifestation. Bartley et al. established that the incidence of Graves' ophthalmopathy is significantly higher in females compared to males, demonstrating an age-adjusted incidence rate of 16 cases per 100,000 population per year for women and 2.9 per 100,000 for men.

While TED is most strongly linked with hyperthyroidism and Graves' disease, it can occur across the full spectrum of thyroid dysfunction. Kashkouli et al. demonstrated that hypothyroid and euthyroid eye disease often manifest with comparable clinical severity and inflammatory activity to hyperthyroid eye disease, cautioning clinicians against overlooking ocular signs in non-hyperthyroid patients. The natural history of TAO typically follows Rundle's curve, characterized by an initial active inflammatory phase lasting 6 to 18 months, followed by a plateau and a subsequent burnt-out, fibrotic phase.

Ocular involvement in thyroid dysfunction spans a wide spectrum from subtle ocular surface discomfort to sight-threatening visual loss. Dry eye disease (DED) is frequently the earliest and most underdiagnosed presentation. Gupta et al. identified occult thyroid eye disease in a substantial proportion of patients presenting primarily with dry eye complaints, emphasizing that tear film instability often precedes classical signs like proptosis or lid lag. To standardize clinical assessment, Mourits et al. introduced the Clinical Activity Score (CAS), an active inflammation index evaluating pain, redness, chemosis, and eyelid swelling. Cigarette smoking remains the single most influential modifiable risk factor for the development and progression of TAO.

Beyond physical signs, thyroid-related ocular morbidity inflicts significant functional disability and psychological stress. Terwee et al. developed and validated the Graves' Ophthalmopathy Quality of Life (GO-QOL) questionnaire, which measures visual functioning and appearance-related psychosocial distress. Systematic reviews by Rajendram et al. emphasize that visual impairment, chronic pain, and cosmetic disfigurement frequently lead to clinical anxiety, depression, social isolation, and occupational disruption.

Despite extensive international research, data regarding the specific patterns of ocular morbidity, disease severity metrics, and quality-of-life impact among patients with thyroid dysfunction in semi-urban Indian populations remain limited. The present study was undertaken to evaluate the clinical spectrum and severity of thyroid-related ocular morbidity and quantify its direct impact on health-related quality of life.

## MATERIALS AND METHODS

A hospital-based prospective cross-sectional analytical study was conducted at the Department of Ophthalmology in collaboration with the Department of General Medicine/Endocrinology at Dr. S. N. Medical College and associated Mathuradas Mathur Hospital, Jodhpur, Rajasthan, India, after receiving institutional ethical clearance.

### Inclusion and Exclusion Criteria

**nclusion Criteria:**

Patients aged >18years with documented thyroid dysfunction (hyperthyroid, hypothyroid, or euthyroid) willing to provide informed consent.

**Exclusion Criteria:**

Patients with pre-existing unrelated ocular diseases, prior ocular trauma/surgery, systemic co-morbidities affecting ocular status (e.g., diabetes mellitus, systemic hypertension), congenital ocular anomalies, or uncooperative patients.

### Sample Size Calculation

Sample size was calculated at 95% confidence interval and 10% absolute allowable error using the standard proportion formula:

n=(Z^2×p×q)/d^2

Where Z=1.96, expected proportion (p) =0.29(29%), q=0.71, and d=0.10. The calculated minimum sample size of 79.2 was rounded to 80 patients. Consecutive/convenient sampling technique was employed.

**Procedure & Methodology**

All participants underwent detailed clinical history taking (demographic data, thyroid disease type and duration, treatment history, smoking status) and general physical examination. A comprehensive ophthalmic examination was conducted, including:

- Visual Acuity & Refraction: Distance and near visual acuity recorded using Snellen's chart.
- External & Slit Lamp Examination: Assessment of eyelid retraction, lid lag, periorbital edema, lagophthalmos, conjunctival congestion, chemosis, exposure keratopathy, and tear film stability.
- Proptosis Measurement: Measured in millimeters using Hertel's exophthalmometer.
- Ocular Motility & Diplopia: Evaluation of extraocular muscle restriction in cardinal positions of gaze and diplopia charting.
- Dry Eye Evaluation: Evaluated using Schirmer's test (mm) and Tear Film Break-Up Time (TBUT in seconds).
- Intraocular Pressure & Fundus: Goldmann applanation tonometry and direct/indirect ophthalmoscopy for optic nerve evaluation.

**Standard Disease Grading & QOL Metrics**

Clinical Activity Score (CAS): Graded based on Mourits et al. parameters (spontaneous pain, pain on movement, eyelid redness, conjunctival redness, eyelid swelling, chemosis, caruncle inflammation).

- Severity Classification: Classified according to EUGOGO criteria into Mild, Moderate-to-Severe, and Sight-Threatening TED.
- Quality of Life Assessment: Assessed using the validated Graves' Ophthalmopathy Quality of Life (GO-QOL) questionnaire, analyzing Visual Functioning and Psychosocial/Appearance domains. Scores were categorized as: Good (80–100), Mild Impairment (60–79), Moderate Impairment (40–59), and Severe Impairment (<40).

**Statistical Analysis**

Data were analyzed using SPSS version 22. Qualitative variables were reported as proportions/percentages and evaluated using the Chi-Square test ($\chi^2$). Quantitative variables were reported as Mean ±Standard Deviation (SD) and compared using Student's t-test or ANOVA. A p-value <0.05was considered statistically significant.

**RESULTS**

A total of 80 subjects were evaluated. The mean age of participants was distributed across various age groups, with the highest proportion belonging to the 31–40 years age bracket (30.0%). Females comprised 76.25% (n=61) of the cohort, yielding a female-to-male ratio of 3.2:1.

**Table 1: Demographic Distribution of Study Participants (n=80)**

| Parameter | Sub-category | Number of Patients () | Percentage (%) |
|---|---|---|---|
| Age Group (Years) | 18–30 | 14 | 17.5 |
| | 31–40 | 24 | 30.0 |
| | 41–50 | 21 | 26.3 |
| | 51–60 | 13 | 16.2 |
| | | 8 | 10.0 |
| Gender | Male | 19 | 23.75 |
| | Female | 61 | 76.25 |
| | Male : Female Ratio | 1 : 3.2 | — |

Hyperthyroidism was the predominant thyroid dysfunction (53.75%), followed by hypothyroidism (33.75%) and euthyroid status (12.5%). Overall, 40% (n=32) of patients exhibited clinical evidence of TED. Notably, all 32 patients with ocular involvement belonged to the hyperthyroid group.

**Table 2: Thyroid Status and EUGOGO Severity Classification (n=80)**

| Clinical Parameter | Classification | Number of Patients () | Percentage (%) |
|---|---|---|---|
| Thyroid Status | Hyperthyroid | 43 | 53.75 |
| | Hypothyroid | 27 | 33.75 |
| | Euthyroid | 10 | 12.50 |
| TED Severity (EUGOGO) | No TED | 48 | 60.00 |
| | Mild TED | 22 | 27.50 |
| | Moderate-to- | 8 | 10.00 |
| | Sight- | 2 | 2.50 |

Dry eye disease (31.3%) was the predominant ocular symptom, followed by watering (25.0%), photophobia (22.5%), and ocular redness (20.0%). Lid retraction (22.5%), periorbital edema (20.0%), and proptosis (18.8%) were the primary structural signs. Sight-threatening complications like compressive optic neuropathy were rare (1.3%).

**Table 3: Distribution of Ocular Manifestations**

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| Ocular Manifestation | Number of Patients () | Percentage (%) |
|---|---|---|
| Dry Eye Disease | 25 | 31.3 |
| Watering | 20 | 25.0 |
| Lid Retraction | 18 | 22.5 |
| Photophobia | 18 | 22.5 |
| Eyelid Redness / Congestion | 16 | 20.0 |
| Periorbital Lid Edema | 16 | 20.0 |
| Proptosis | 15 | 18.8 |
| Lagophthalmos | 7 | 8.8 |
| Diplopia | 5 | 6.3 |
| Restriction of EOM | 3 | 3.8 |
| Optic Neuropathy | 1 | 1.3 |

Smoking was documented in 12 patients (15.0%). Smokers exhibited significantly higher baseline Clinical Activity Scores ("mean CAS"≥4) and a greater proportion of moderate-to-severe disease compared to non-smokers.

GO-QOL assessment revealed progressive impairment in quality of life corresponding to increasing clinical severity ($p<0.05$).

**Table 4: Quality of Life (GO-QOL) Scores According to Disease Severity**

| Disease Severity Group | Mean GO-QOL Score ( SD) | QOL Category Distribution () |
|---|---|---|
| No TED | | Good: 32 (40.0%) |
| Mild TED | | Mild Impairment: 28 (35.0%) |
| Moderate TED | | Moderate Impairment: 15 (18.7%) |
| Sight-Threatening TED | | Severe Impairment: 5 (6.3%) |

**DISCUSSION**

**Demographic Profile**

The present study observed a marked female predominance (76.25%, F:M ratio 3.2:1) among thyroid dysfunction patients. This aligns closely with findings by Bartley et al., Wiersinga et al., and Kashkouli et al., who attributed female susceptibility to autoimmune thyroid disorders to hormonal influences and genetic predisposition.

**Ocular Morbidity Spectrum**

Ocular morbidity was identified in 40% of the study cohort, predominantly clustered in hyperthyroid patients. Dry eye disease was the primary complaint (31.3%). Elevated palpebral fissure height, incomplete nocturnal blinking, tear film instability, and increased evaporative loss contribute significantly to ocular surface disruption. These observations parallel those of Bradley et al. and Gupta et al., who highlighted ocular surface dysfunction as the earliest clinical marker of TED. Eyelid retraction (22.5%) and proptosis (18.8%) were the chief physical signs, reflecting inflammatory orbital tissue expansion and levator muscle fibrosis, consistent with data reported by Mourits et al. and Eckstein et al..

**Disease Severity & Smoking**

The majority of TED patients presented with mild disease (68.75% of ocular cases). Sight-threatening optic neuropathy was infrequent (1.3%). Smoking was associated with elevated inflammatory activity (higher CAS) and greater structural involvement. This strongly corroborates the findings of Prummel and Wiersinga, who established smoking as the single most critical modifiable risk factor exacerbating orbital oxidative stress and autoimmune expansion.

**Quality of Life Impact**

GO-QOL assessment demonstrated a significant linear decrease in scores with escalating clinical activity and structural deformity ($p<0.05$). Patients with proptosis, diplopia, and eyelid disfigurement experienced substantial psychosocial distress, social withdrawal, and functional limitations in daily tasks like reading and driving. These findings align with conclusions by Terwee et al., Choi et al., and

Rajendram et al., underscoring that TED inflicts a profound psychosocial burden comparable to chronic systemic illnesses.

## CONCLUSION

Primary thyroid dysfunction, particularly hyperthyroidism, causes significant ocular morbidity that extends beyond physical disfigurement to severely impair patient quality of life. Ocular surface disease (dry eye) and lid abnormalities represent the most common early manifestations. Quality-of-life deterioration correlates directly with higher clinical activity and disease severity. Routine ophthalmic screening of all patients with thyroid dysfunction, early active intervention, counseling on smoking cessation, and a coordinated multidisciplinary approach (combining ophthalmology, endocrinology, and psychology) are crucial for optimizing clinical and psychosocial outcomes.

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