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Study of Ocular Manifestations of Hyperthyroidism

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Abstract: ***Background: Grave's Orbitopathy(GO) also known as thyroid eye disease (TED), is the most common extrathyroidal manifestation of Grave's disease. It is the most common cause of unilateral or bilateral proptosis in adults. In this auto-immune endocrine disorder, eye disease is characterized by inflammation of intra-orbital structures. Objective: To Study the prevalence of thyroid eye signs in patients of hyperthyroidism and to look for the most common thyroid eye signs and Symptoms associated with the disease. Materials and Methods: In this cross sectional study, 50 participants (diagnosed cases of hyperthyroidism) were enrolled. After Basic history taking and General physical examination, detailed Ophthalmological examination- ocular symptoms, visual acuity, detailed anterior segment examination, optic disc evaluation was done. Thyroid eye disease specific signs were noted and Hertel's exophthalmometry was done. Frequency of eye symptoms and signs were noted and percentage was calculated. Descriptive analysis (frequency, percentage) was done. Chi square test was used to check statistical significance. Results and conclusion: There was female preponderance in thyroid eye disease in the study. The most common age group involved was 40-49 years. Bilateral involvement was 9 fold more common than unilateral Involvement. Smoking was a significant Risk factor in male patients. Most common eye symptom was foreign body sensation. Most common eye sign was Dalrymple sign.***

Keywords: Hyperthyroidism, Grave's orbitopathy, Smoking

1. Introduction

Grave's Orbitopathy/Ophthalmopathy (GO) also known as thyroid eye disease (TED) is the most common extrathyroidal manifestation of Grave's disease. The name owes to the Irish physician Robert James Graves, who described a case of goitre with exophthalmos in 1835. Grave's disease is an auto-immune endocrine disorder characterized by thyroid hyperplasia and excessive thyroid hormone production. Syndrome comprises of hyperthyroidism with diffuse goitre, eye disease characterized by inflammation of intra-orbital structures, dermopathy referred to as pretibial myxoedema and rare involvement of the nails, fingers and long bones known as acropachy. It occurs more commonly amongst women, smokers and patients with other autoimmune diseases or a family history of thyroid autoimmunity. Peak incidence occurs between 40 and 60 years of age. It is the most common cause of unilateral or bilateral proptosis in adults. [1]

The underlying pathophysiology is thought to be an antibody-mediated reaction against the TSH receptor with orbital fibroblast modulation of T- cell lymphocytes. Up-regulation and production of gylcosaminoglycans and adipogenisis occurs. Orbitopathy results from infiltration of orbit by autoreactive T lymphocytes, proliferative orbital fibroblasts, enlargement of the extraocular muscles and increased orbital fat. [2]

The clinical presentation may vary from very mild self-limiting disease to severe irreversible sight threatening complications. Clinical symptoms and signs can comprise of ocular irritation with redness and tearing, stare due to lid retraction, exophthalmos, periorbital swelling and in few cases -restricted motility leading to diplopia, exposure keratopathy and optic neuropathy. Imaging of the orbits by computed tomography or magnetic resonance imaging is the most valuable diagnostic test, in which multiple muscles can be seen enlarged in both orbits.[3]

Thyroid orbitopathy usually occurs close to or within 18 months of hyperthyroidism; there is a rough correlation between the nature of hyperthyroidism, its management, and the orbitopathy. Control of thyroid dysfunction is usually followed by improvement of eye symptoms over several months. Management of graves orbitopathy is is directed toward abating or controlling the active phase of the disease, prevention of ocular and psychophysical damage, regressing ocular motor abnormalities, and improving the cosmetic disfigurement. The ocular changes in the disease are often difficult to manage and that requires a coordinated approach addressing the thyroid dysfunction and the orbitopathy. Keeping in mind that, the study was done to find ocular manifestations of the disease , assess the common risk factors and determine the risk groups prone for the orbital disease changes.

2. Materials and Methods

In this Cross Sectional Study, 50 participants were enrolled who were known cases of hyperthyroidism from SSG Hospital, Vadodara, Gujarat. Cases were selected who have not received immunosuppressive or surgical treatment for their eye diseases excluding patients with acute eye infections/ having ocular or systemic emergencies. Basic details like age, sex, History and duration of thyroid disease, medication, history of smoking were noted. General examination of the patients including Blood pressure, Random Blood Glucose was done. Thyroid profile (free T3, Free T4 and TSH) was assessed. Presence of symptoms of thyroid eye diseases were noted.

Basic Ocular examination Visual Acuity and refractive error assessment was done followed by diffuse examination under torch light. Eye ball movements were checked and intraocular pressure was recorded. Anterior segment detailed examination under slit lamp was carried out and dilated fundus examination will be done. Hertel 's

exophthalmometer was used for Exophthalmometry. Assessment of thyroid eye signs was done. Data was added in Microsoft Excel Sheet and descriptive analysis: Frequency and percentage of eye symptoms/signs was done. Chi Square Test was used to know statistical significance.

3. Results

Following were the observations of cross sectional study of 50 cases of hyperthyroidism out of which 18 cases were male and 32 cases were female patients. There was female preponderance in thyroid eye disease in the study. In *Female, there was 1.8fold risk as compared to male for thyroid ophthalmopathy.*

Table 1: Age distribution

Age Range	Number	Percentage
20-29	5	10
30-39	5	10
40-49	23	46
50-59	13	26
60-69	4	8
>70	0	0

In study, most common age group involved was 40-49 years (46%) followed by 50-59 years .age group (26%). Mean/ average age affected was 43.44 (SD 9.51) years. Mean age affected in female was 42.69 (SD 8.44) years and in male it was 44.5 (SD 11.35) years.. Youngest age affected was 23 years and oldest age affected was 69 years.

Table 2a: Age Distribution (Male)

Age Range	Number	Percentage
20-29	2	11.11
30-39	2	11.11
40-49	6	33.33
50-59	6	33.33
60-69	2	11.11
>70	0	0

Table 2b: Age distribution (Female)

Age Range	Number	Percentage
20-29	3	9.37
30-39	3	9.37
40-49	1	53. 1
50-59		21.87
60-69	2	6.25
70-79	0	0
80-89	0	0

Table 3: Laterality of Eye

Laterality	Number	Percentage
Unilateral	5	10
Bilateral	45	90

Bilateral involvement is 9 fold more common than unilateral Involvement (value P<0.0001 showing high significance of study)

Table 4: Laterality and Sex distribution

Laterality	Male	Female
Unilateral	1 (5.5%)	4(12.5%)
Bilateral	17(94.4%)	28(87.5%)

Table 5: Smokers Vs Non smokers

	Male	Female	Total	Percentage
Smokers	11	0	11	22%
Non smokers	7	32	39	88%
Total	18	32	50	100%

Smoking was a significant Risk factor in male patients. Among total 50 patients, 11 patients (22%) were smokers. *Statistical significance is high (Value P<0.0001)*

Table 6: Prevalence of Eye symptoms
Prevalence of Eye symptoms (in descending order)

Symptom	Present	Percentage
Foreign body sensation	37	74
Lid swelling	34	68
Redness	27	54
Lacrimation	24	48
Pain	23	46
Bulging eyes	18	36
Diplopia	16	32
Photophobia	15	30
Conjunctival swelling	6	12
Dimness of vision	4	8

Most common eye symptom was foreign body sensation (74%) followed by eye lid swelling (68%). Dimness of vision was minimally reported symptom in the study

Table 7: Prevalence of eye signs Prevalence of eye signs (Descending Order)

Signs	Present	Percentage
DALRYMPLE (Upper lid retraction)	45	90
STELLWAG (Infrequent blinking)	44	88
VON GRAFE (Lid lag)	37	74
ENROTH (fullness of eyelids)	37	74
ROSENBACH (tremors over closed eye lids)	34	68
MOIBUS (convergence weakness)	34	68
VIGOROUX (Edema of upper eyelid)	28	56
EXOPHTHALMOS	18	36
JOFFROY (absent forehead crease on upgaze)	15	30
GIFFORD (Difficulty in everting upper lid)	14	28
JELLINEK (increased pigmentation of lid skin)	10	20
EXPOSURE KERATITIS	10	20
BALLET (Restricted extraocular muscle)	08	16
GROVE (Resistant to pull down upper lid)	07	14
GRIFFITH (lower lid lag on up gaze)	06	12
GOLZEIHR (deep injection of conjunctiva)	06	12

CHEMOSIS	05	10
HERTOGE (loss of eyebrows laterally)	04	8
SUKER (inability to maintain extreme lateral fixation)	04	8
BOSTON (jerky eyelid movements)	03	6
KOCHER (convulsive lid retraction on fast upgaze)	02	4
KNIE (Uneven pupillary dilation)	02	4
LOWE (Quick mydriasis with weak adrenaline)	02	4
COWEN (pupillary hippos)	02	4
OPTIC NEUROPATHY	00	0

Most common eye sign was Dalrymple sign (90%) followed by stellwag sign (88%) followed by von grafe sign and enroth sign (74%).

4. Discussions

In this study, Out of 50 patients, 36% patients were male and 64% patients were female. The findings match with the study done by Palikhe Sabita et al[4] which had 31.6 % male patients and 68.4 % female patients. In this study, most common age group involved was 40-49 years (46 %) followed by 50-59 years (26%) which matches to most common age group distribution in studies done by Dr. Dr. M. Vijayaleela M.S. et al.[5] (40-49 years- 53.84 %) and Palikhe Sabita et al (41-50years).Mean/ average age affected in this study was 43.34 (S.D. 9.51) years which matches with mean age found in studies done by Lim NC et al (40.2 years), Palikhe Sabita et al (39.7years) and Dr. M. Vijayaleela M.S. et (40years) et al. whereas it differs from mean age found in Study done by Sara Gharib et al[6], mean age affected was slightly younger 35 years. this study, 10% patients had unilateral eye disease and 90% cases had bilateral Eye involvement. Findings match with study done Dr. M. Vijayaleela (92.3% bilateral and 7.69 % unilateral. n this study, 22% patients were smokers and 88 % patients were non smokers. In male, smoking as a risk factor was seen in 61.11% patients and in females, there was no smoking history. In study done by Lim NC et al, 21.8 % patients were smokers; among males 68.4 % cases had history of smoking as a risk factors. In study done by Dr. M. Vijayaleela, 34.61 % cases were smokers. Foreign body sensation was found to be the most common symptom in this study (74%) and two other studies done by Palikhe Sabita et al (97.6%) and Poonam Lavaju et al. (56%)[7] It differs from the finding in study done by Sara Gharib et al (which had most common symptom- bulging of eyes-63.8%) and Lim NC et al (their study had stare as most common symptom-81.6%) In this study, most common eye sign was Dalrymple sign (90 %). which was most common signs in the studies done by Dr. M. Vijayaleela (88.46%), Poonam Lavaju et al (80 %), PalikheSabita et al (79.8%), Lim NC [8] (62.1%). Sara Gharib et al reported proptosis as most common sign (63.8%). In this study, most common eye sign was Dalrymple sign (90%) followed by stellwag sign (88%) followed by von grafe sign (74%) and enroth sign (74%). Stelwag sign was seenin 51.20% of patients in study done by Palikhe et al. Von grafe sign was more common in studies done by Palikhe et al (76.2 %), Lim NC et al (57.5%), Sarah Gharib et al (55.7%). Enroth sign in this study was 74 % which matches with incidence of enroth sign in study done by Poonam Lavaju et al (75.6%).

5. Conclusions

There was female preponderance in thyroid eye disease in the study with common age group 40-49 years. *Bilateral involvement is 9fold more common than unilateral Involvement.* Cigarettes' smoking is a significant risk factor for thyroid eye disease. [9,10]

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