

Prevalence of Primary Open Angle Glaucoma in Hypothyroidism Patients of a Tertiary Care Hospital

Rumi Gayen¹, Arindam Sur¹, Mita Saha², Subhendu Datta^{3*}, Indranil Chakraborty¹

¹Department of Biochemistry, College of Medicine & Sagore Dutta Hospital, Kamarhat, India

²Department of Ophthalmology, College of Medicine & Sagore Dutta Hospital, Kamarhati, India

³Department of Psychiatry, Medical College, Kolkata, India

ABSTRACT

AIMS & OBJECTIVES

To find out any association between primary open angle glaucoma (POAG) and hypothyroidism, thereby establishing the necessity of routine examination of thyroid function in these patients to test the hypothesis that hypothyroidism leads to POAG.

DESIGN

Observational cross sectional study.

MATERIALS AND METHODS

This is an observational, cross sectional study where 100 hypothyroid patients (TSH > 20 μ IU / ml) were screened to detect presence of Primary Open angle glaucoma. The levels of thyroid - stimulating hormone, free thyroxin and triiodothyronine were measured.

RESULTS

No significant correlation was found between glaucoma and either thyroid - stimulating hormone, free thyroxin or triiodothyronine.

CONCLUSION

This study determined there is no an association between glaucoma and hypothyroidism. Therefore, we believe that the systematic screening for POAG in hypothyroid patients is unnecessary.

KEYWORDS

Primary open angle glaucoma, Hypothyroidism, Thyroid hormones

Corresponding Author:

Subhendu Datta, Department of Psychiatry, Medical College, Kolkata, India;

Email: drsubhendu76@gmail.com

How to Cite This Article:

Datta S, Sur A, Gayen R, et al. Prevalence of Primary Open Angle Glaucoma in Hypothyroidism Patients of a Tertiary Care Hospital. J Evid Based Med Healthc 2022;9(05):9.

Received: 08-Mar-2022;

Manuscript No: JEBMH-22-50995;

Editor assigned: 11-Mar-2022;

PreQC No. JEBMH-22-50995(PQ);

Reviewed: 25-Mar-2022;

QC No. JEBMH-22-50995;

Revised: 30-Mar-2022;

Manuscript No. JEBMH-22-50995;

Published: 05-April-2022;

DOI: 10.18410/jebmh/2022/9.5.9

Copyright © 2022 Gayen. R, et al. This is an open access article distributed under Creative Commons Attribution License [Attribution 4.0 International (CC BY 4.0)]

INTRODUCTION

Glaucoma is the second most frequent cause of blindness in the world.¹ It causes progressive & irreversible visual impairment, hampering daily work. The disease is asymptomatic at the early stage & when ultimately diagnosed, presents with irrecoverable loss of vision. Primary Open Angle Glaucoma (POAG) is defined as a progressive, chronic optic neuropathy where intraocular pressure (IOP) and some other unknown factors contribute to damage resulting in atrophy of the optic nerve and loss of retinal ganglion cells and their axons.² POAG occurs in elderly population and usually has a positive family history. Worldwide around 60 million persons are estimated to be affected by glaucoma. Of these, an estimated 11.2 million cases are from the Indian subcontinent.^{3,4}

Several risk factors like age, gender, family history, obesity/body mass index, use of tobacco/alcohol, systemic steroid intake, hypertension, diabetes mellitus, thyroid disease

Are thought to be associated with development POAG.⁵ But any evidence of association of them with POAG is still lacking. Therefore the study was conducted to find out the presence of POAG in hypothyroid patients to find out if there is any association between these two.

MATERIALS AND METHODS

It was a hospital based, observational, cross sectional study carried out in the Department of Biochemistry in collaboration with Department of Ophthalmology at College of Medicine & Sagore Dutta Hospital, Kamarhati. 100 hypothyroid patients (TSH > 20 µIU / ml) in between 20-60 years, included in the study were screened for presence of POAG. The POAG was defined as: a person having glaucomatous field defect, glaucomatous disc changes or ocular pressure of ≥ 22 mm Hg in the presence of an open angle in either eye. Patients having any history of intraocular surgery were excluded. Persons having diabetes, hypertension, corticosteroid intake, taking thyroid medications were excluded from the study.

Ophthalmological examination including Best Corrected visual acuity (BCVA) using Snellen’s Chart, measurement of Intra Ocular Pressure (IOP) using Goldman’s Applanation Tonometer, Gonioscopy for angle& Fundus examination using slip lamp biomicroscopy were done. General examination included anthropometric measurements – height and weight, blood pressure,

blood sugar estimation (Fasting & Post prandial) and thyroid function test.

The diagnosis of hypothyroidism was based on TSH (Normal Range: 0.27 - 4.2 µIU / mL), FT4 value (Normal Range: 0.93 - 1.7 ng / dl) and clinical symptoms of hypothyroidism. Thyroid profile was done by Cobas e411, by chemiluminescence immunoassay method.

RESULTS

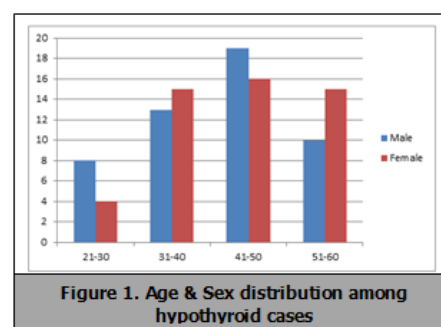
There were total 100 hypothyroid patients (Male: 50 & female: 50), all of them having TSH > 20 µIU/ml (Figure 1). The patients were sent to ophthalmology OPD for screening of POAG. Routine eye examination was carried out. Best Corrected visual acuity was tested using Snellen’s chart. Among cases, 78 persons had visual acuity of 6/6 & 22 persons had visual acuity of 6 / 9. Following that, measurement of Intra Ocular Pressure (IOP) using Goldman’s Applanation Tonometer. All the patients had IOP within normal range between 12 - 21 mm of Hg (Table 1). Then Gonioscopy was done to see the angle. All the cases had open angle (Table 2).

IOP(Intra Ocular Pressure)	Normal(11-21mm of Hg)	High(>22) mm of Hg
Male	50	0
Female	50	0

Table 1. Distribution of IOP among cases

Drainage Angle	Open	Closed
Male	50	0
Female	50	0

Table 2. Gonioscopy findings among cases



Slit lamp biomicroscopy was done to see the vertical disc to cup ratio(VCDR). All the patients had cup disc ratio ranging from 0.3 - 0.5, with normal neuroretinal rim not exceeding 0.5 (Table 3).

VCDR	0.3	0.4	0.5	>0.5
Male	8	28	14	0
Female	5	26	19	0

Table 3. Fundus Examination findings (Vertical Cup to Disc Ratio)

As none of the patients had findings suggestive of Primary Open Angle Glaucoma, optical coherence tomography and Humphrey's automated perimeter were not done

DISCUSSION

Of 100 hypothyroid patients, it was more prominent among females compared to males. Mean duration of thyroid disorder was 5.2 years with SD 1.32. Of 100 hypothyroid patients, no patient had primary open angle glaucoma. Of hypothyroidism patients, 0 % (0 of 100) patients were found to have ocular hypertension with IOP > 21 mmHg and no optic disc or visual field changes.

Bilous and Tunbridg stated that hypothyroidism can be found in 5 % of the population, 1 % as previously diagnosed and 4% newly diagnosed, with elevated TSH.⁶

Girkin showed that there was a significantly greater risk of hypothyroidism patients developing glaucoma, compared with normal controls in a large male population from the Veterans Affairs Medical Center in Birmingham, Alabama. Three recent studies of Muñoz-Negrete, Karadimas and Motsko, showed no association between hypothyroidism and POAG. The diagnostic criteria of these entities are similar to the criteria used in the present study.⁷⁻¹⁰

Smith, Unnikrishan AG, Duncan KG, Centanni M suggested that a strong relationship exists between hypothyroidism and POAG. He proposed that in the hypothyroid state, hyaluronic acid accumulates in the trabecular meshwork and/or aqueous humor, causing an obstruction to intraocular drainage and that this accumulation would reverse with treatment of the hypothyroidism. They speculated that the low metabolic condition caused by hypothyroidism would lead to decreased enzymatic activity that hampered aqueous humor dynamics. Another potential mechanism might be the increase of outflow resistance in patients with hypothyroidism.¹¹⁻¹⁴

There are several other studies which showed presence of POAG in hyperthyroid patients too. According to several studies, in hyperthyroidism,

contracture of extra ocular muscles against intraorbital adhesions or orbital congestion due to increased tissue volume is found to increase episcleral venous pressure leading to rise in intraocular pressure. So there is enough controversy regarding the association of thyroid disorder and POAG.^{15,16}

CONCLUSION

In conclusion, we are unable to show the previously reported relationship between hypothyroidism and POAG. Therefore, despite the fact that several studies have reported contradictory results, whether to examine IOP for detection of glaucoma in hypothyroid patients, the outcomes are not yet clear. From the results of our study we cannot recommend the systematic eye screening in hypothyroid patients.

REFERENCES

1. Serge R, Donatella P, Daniel E, et al. Global data on visual impairment in the year 2002. Bull World Health Organ 2004;82:844-851.
2. Karen MJ, Rachel WK. Primary open angle glaucoma (Ch. 200), In: Albert Jakobi. Principle & Practice of Ophthalmology, 3rd Ed., 2008, Saunders Elsevier (Canada), pp. 2543.
3. George R, Ramesh SV, Vijaya L. Glaucoma in India: Estimated burden of disease. J Glaucoma. 2010;19:391-397.
4. George R, Ramesh Sathyamangalam Ve, Lokapavani Velumuri, et al. Importance of population based studies. Indian J Ophthalmol 2011;59(7):11-18.
5. Anhchuong Le. studied 'Risk Factors Associated with the Incidence of Open-Angle Glaucoma: The Visual Impairment Project. Investig Ophthalmol Vis Sci 2003;44(9):3783-3789.
6. Bilous RW, Tunbridge WM. The epidemiology of hypothyroidism: an update. Baillieres Clin Endocrinol Metab. 1988;2(3):531-540.
7. Girkin CA, McGwin G Jr, McNeal SF, et al. Hypothyroidism and the development of open-angle glaucoma in a male population. Ophthalmology 2004;111(9):1649-1652.
8. Muñoz-Negrete FJ, Rebolleda G, Almodóvar F, et al. Hypothyroidism and primary open-angle glaucoma. Ophthalmologica.2000;214(5):347-349.

9. Karadimas P, Bouzas EA, Topouzis F, et al. Hypothyroidism and glaucoma. A study of 100 hypothyroid patients. *Am J Ophthalmol* 2001;131(1):126–128.
10. Motsko SP, Jones JK. Is there an association between hypothyroidism and open-angle glaucoma in an elderly population? An epidemiologic study. *Ophthalmology* 2008;115(9):1581–1584.
11. Smith KD, Arthurs BP, Saheb N. An association between hypothyroidism and primary open-angle glaucoma. *Ophthalmology* 1993;100(10):1580–1584.
12. Unnikrishan AG, Menon UV. Thyroid disorders in India: an epidemiological perspective. *Indian J Endocrinol Metab* 2011;15(Suppl 2):S78-S81.
13. Duncan KG, Jumper MD, Ribeiro RC, et al. Human trabecular meshwork cells as a thyroid hormone target tissue: presence of functional thyroid hormone receptors. *Graefes Arch Clin Exp Ophthalmol* 1999;237(3):231-240.
14. Centanni M, Cesareo R, Verallo O, et al. Reversible increase of intraocular pressure in subclinical hypothyroid patients. *Eur J Endocrinol* 1997;136(6):595-598.
15. Ohtsuka K, Nakamura Y. Open-angle glaucoma associated with Graves' disease. *Am J Ophthalmol* 2000;129(5):613-617.
16. Lee HB, Rodgers IR, Woog JJ. Evaluation and management of Graves' orbitopathy. *Otolaryngol Clin N Am* 2006;39(5):923-942.