ORIGINAL ARTICLE

TO STUDY THE EFFECT OF POSTURAL CHANGES ON INTRAOCULAR PRESSURE AND ITS IMPORTANCE IN GLAUCOMA CONTROL

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ABSTRACT: PURPOSE: To study the changes in IOP on postural variation and thus enable to understand its importance in early detection and treatment of glaucoma. **MATERIALS AND METHODS:** All 90 patients underwent thorough ophthalmological evaluation and divided into the 3 groups as primary open angle glaucoma on treatment, newly diagnosed primary open angle glaucoma and controls and changes in IOP on postural variation noted by measuring in sitting, supine at 0 minute, at 30 minutes and again in sitting position. **RESULTS:** There occurred a significant increase in IOP in newly diagnosed POAG without treatment (3.46 mm Hg) compared to controls (1.92 mm Hg) and POAG on treatment (2.38 mm Hg) at 30 minutes of supine position.

KEYWORDS: IOP, Postural variation, Glaucoma.

INTRODUCTION: Glaucoma is an optic neuropathy characterized by progressive structural and functional damage.[1] Of this, elevated intraocular pressure (IOP) remains the most important and only modifiable risk factor.[2,3,4]

The IOP level and its fluctuation seem to play a role in the disease development and progression, even in cases with statistically normal pressures.[5,6,2,3] Different systemic and local factors are thought to influence an individual's IOP. IOP values are subject to cyclic fluctuations throughout the day[7] and diurnal IOP fluctuation is greater in glaucomatous patients than normal patients and seems to be a significant risk factor for disease progression.

Although diurnal IOP fluctuation has been extensively studied in normal[7]and glaucomatous patients,[7] its mechanism is still unclear. A relationship between adrenocortical steroids and diurnal IOP variation has been suggested. The diurnal fluctuation of IOP has been found to accompany that of the plasma cortisol, peaking a few hours after the latter.

Comparing patients with elevated and normal IOP, Scwartz et al[8] found significant differences in plasma cortisol levels. The higher levels of plasma cortisol occurred in patients with higher IOP. The same group observed that oral administration of metyrapone, an inhibitor of adrenal cortical synthesis, was associated with IOP reduction. Furthermore interruption of the normal daily corticosteroid cycle has been shown to alter the diurnal IOP curve.

Numerous studies have investigated the influence of postural changes –mainly the shift from upright to horizontal (lying down) position, suggesting it as an important contributor for the IOP elevation observed at night time, thus it would enable us in early detection and treatment of glaucoma.

AIM: To study the postural changes of intraocular pressure in:

- Age and sex matched normal persons.
- Primary open angle glaucoma on treatment.
- New patients- primary open angle glaucoma not on treatment.

MATERIALS AND METHODS:

DURATION OF STUDY: SEP 2008- SEP 2010.

STUDY DESIGN: Prospective case control study.

POPULATION: Patients attending O.E.U Institute of Ophthalmology, Kasturba Medical College Hospital, Manipal.

INCLUSION CRITERIA:

Study group includes:

1) Primary open angle glaucoma on treatment.
2) Newly diagnosed primary open angle glaucoma.

Control group includes: Normal persons who are matched for age and gender, not using any systemic or ocular medications which modify intraocular pressure

EXCLUSION CRITERIA:

1) Primary angle closure glaucoma.
2) Exfoliation, pigmentary and secondary glaucoma.
3) Previous refractive surgery or other ocular surgery within 3 months.
4) Present and past contact lens wearers.
5) Present and past history of corneal diseases or injury.

SAMPLE SIZE: 30 in each group- total 90 patients.

METHOD: All 90 patients underwent thorough ophthalmological evaluation including best corrected visual acuity, slit lamp biomicroscopy, tonometry (Perkin's), gonioscopy, HFA 30-2 fields, dilated fundus evaluation and divided into the above mentioned three groups.

The Perkin's tonometer was used to measure IOP in both sitting and supine positions. While supine, patient is asked to lie flat on the bed without a pillow and measurement taken.

Sitting IOP→ Supine IOP (at 0 mins)→ Supine IOP (at 30 mins)→ Sitting IOP.

	Newly Diagnosed Poag(30)	Poag on Treatment (30)	Controls (30)
Mean age	57.07	63.60	57.07
Std dev	5.848	8.783	5.568

Table 1: Mean age and standard deviation of each group

	51-60 yrs	61-70 yrs	>71 yrs
Newly diagnosed POAG	23(76.6%)	5 (16.6%)	2(6.8)
POAG on treatment	14(47%)	8 (26.5%)	8 (26.5%)
Controls	22(66.0%)	8 (34.0%)	0

Table 2: Age cross tabulation

	Newly diagnosed POAG	POAG on treatment	Controls
Males	11(36.7%)	15(50%)	20(66.0%)
Females	19(63.3%)	15(50%)	10(34.0%)

Table 3: Sex distribution of subjects

Diagnosis	Factor	Mean IOP	STD error
1	1	22.832	.621
	2	24.432	.584
	3	26.299	.604
	4	21.799	.596
2	1	19.052	.633
	2	20.241	.593
	3	21.431	.616
	4	18.655	.606
3	1	14.066	.622
	2	15.517	.584
	3	15.982	.605
	4	13.773	.596

Table 4: IOP variations in sitting and supine position at 0 min and 30 minutes

DIAGNOSIS:

1) Newly diagnosed primary open angle glaucoma not on treatment.
2) Primary open angle glaucoma on treatment.
3) Controls.

FACTORS:

1) Sitting position.
2) Supine at 0 min.
3) Supine at 30 min.
4) Sitting position.

Diagnosis	Sit-Sup (0min)	Sup (0min) - Sup (30 min)	Sit- Sup (30 min)
1	1.6 mm Hg	1.86 mm Hg	3.46 mm Hg
2	1.19 mm Hg	1.19 mm Hg	2.38 mm Hg
3	1.46 mm Hg	0.46 mm Hg	1.92 mm Hg

Table 5: Mean increase in IOP in supine(0 min) and supine(30 min)

This table shows a significant increase in IOP in newly diagnosed POAG without treatment (3.46 mm Hg) compared to controls (1.92 mm Hg) and POAG on treatment (2.38 mm Hg) at 30 minutes of supine position.

RESULTS: In the study population, newly diagnosed POAG without treatment showed mean increase in IOP of 1.6 mm Hg in supine position(0 min) and this was further increased by 1.86 mm Hg(at 30 min).

POAG on treatment showed mean increase in IOP of 1.19 mm Hg inn supine position (0 min) and this was further increased by 1.19 mm Hg (at 30 min).

In controls, mean increase in IOP 1.46 mm Hg in supine position (0 min) and this was further increased only by 0.46 mm Hg (at 30 min).

This indicates there was significant increase in mean IOP in newly diagnosed POAG (3.46 mm Hg) compared to POAG with medical treatment (2.38 mm Hg) and controls (1.92 mm Hg) at 30 minutes of supine position.

These changes indicate postural changes of IOP was one of the contributory cause for glaucoma and might be important in early detection and treatment of glaucomatous eye.

SUMMARY: It is observed that both head and body positions may influence IOP through several mechanisms. It is important to consider these facts while managing glaucoma patients, especially those with advanced disease and a more pronounced IOP response in postural changes.

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