



CHRONIC OPEN-ANGLE GLAUCOMA AND ITS ASSOCIATION WITH THE CUP SHAPE IN REFERRAL OPHTHALMOLOGY CENTRE

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ABSTRACT

Purpose: To determine prevalence of chronic open-angle glaucoma and its association with the cup shape among the patients referred to Ophthalmology Clinic.

Methodology: Among those aged over 40 years without inflammatory and congenital ocular diseases referred to Ophthalmology Clinic in two days of week, the subjects were selected for the study during a period of 6 months.

Results: The mean age of 312 subjects was 58.5±11.4 with a maximum and minimum of 110 and 40, respectively. Cup shape in the studied population was mostly flat with a frequency of 62.4% (78 cases) in the left eye and 62.11% (77 cases) in the right eye. Funnel shape of cup observed in 26 cases (20.8% in the left eye and 26 cases (21%) in the right eye. Mean IOP in the left and right eyes was equal to 14.85±2.95 mmHg and 14.9±2.86 mmHg, respectively. In both of eyes, no significant relationship was found between cup shape and normal tension glaucoma (NTG) and open-angle glaucoma (OAG)

Conclusion: Prevalence of open angle glaucoma in the study population was 7.1% that is higher than the rate obtained in other studies. In addition, the prevalence of normal tension glaucoma (NTG) (14.1%) was much higher than prevalence in other studies. There was not significant relationship between the cup shape and prevalence of glaucoma.

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Introduction

Glaucoma is a term describing a group of ocular disorders that result in optic nerve damage. This disease is the number one cause of irreversible and bilateral blindness in the world [1, 2, and 3] and, if left untreated, it would lead to optic nerve damage, visual loss, and eventually blindness [1, 2]. This prevalent disease, because of being chronic and having no clinical symptoms, owns the appropriate conditions for screening. The prevalence of chronic open-angle glaucoma (CPAG), which is the most common form of the disease [1, 4], was determined to be 1.44% in a study conducted on people aged over 40 in Tehran in

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2002 [5]. In addition, the results of a study on people aged over 40 in Urmia in 2003 showed that the prevalence of this disease is 2.5% [2].

80% of individuals with chronic open-angle glaucoma are not aware of their disease, and since this disease is usually not accompanied by pain, and loss of vision occurs slowly and gradually, it cannot be easily detected and usually diagnosed during medical examination.

High intraocular pressure (IOP) does not necessarily mean affliction with glaucoma [4, 6], and affliction or non-affliction with glaucoma caused by high IOP depends on the tolerance of this condition by the optic nerve. This differs in people, and individuals with an IOP higher than normal by 10% may have normal visibility and optic disc [7]. Although the normal IOP is usually between 12 and 21 mmHg, a person with an IOP in this range might be afflicted with glaucoma. This indicates the great importance of periodic eye examination. High IOP is the most important risk factor for open-angle glaucoma and also the only factors which is currently controllable through medication or surgery [8]. In addition, measurement of intraocular pressure and visual field and also checking the appearance of the optic nerve head can be applied for screening [9]. Color photography of the optic disk character is also a diagnostic approach and one of methods used for detecting optic nerve head feature [10]. Previous studies have shown that morphological changes to the optic nerve head (ONH) and thickness of the retinal nerve fiber layer (RNFL) might precede visual field defects. [11]. A change in the appearance of the ONH topography is an important objective sign for diagnosing and managing glaucoma [12].

Color optic disc photography (C-DP) is a standard tool for RNFL evaluation due to its convenient, low-cost, and noninvasive technique [13]. Thus to given the various forms of optic cup, the present research aims to study the relationship between cup shape and affliction with glaucoma.

Methodology

Among the patients referring to ophthalmology Clinic of Vali-asr Hospital, those aged over 40 with no history of ocular inflammatory or congenital diseases were selected as the subjects after obtaining their consent for participation in the study. Complete ophthalmology examination was conducted on all subjects and then demographic data as well as data from eye examination and underlying medical conditions were recorded in a special form. According to random easy non-probabilistic methods, among those aged over 40 referring to the studied centers in two days of week, the subjects were selected for the study during a period of 6 months.

The subjects' IOP measured by TONO-Pulsair device. The possible refractive errors were determined by the optician of the ophthalmology clinic. IOP was determined. After determining the IOP, patients underwent ophthalmologic examination including funduscopy. In addition to recording the cup shape in patients with an IOP of higher than 22 mmHg, patients with changes in glaucomatous disc were referred for para clinical evaluation. The old subjects with the known glaucoma excluded from the data in order to select new and unknown cases of open-angle glaucoma. Questionnaires were prepared and coded. The required data were analyzed by descriptive statistics (tables and charts) and analytic statistics (X2 test, etc.) in SPSS 15 software.

Ethical considerations: Verbal consent obtained from the subjects for filling out the questionnaires and the collected questionnaires filed anonymously. In addition, no additional charge obtained for the desired ophthalmic examinations.

Research problems: Reduced number of patients referred to the clinic because of the limited number system, non-cooperation of subjects for perimetry test, lack of existence of a TONO-PENA device in the clinic, and waste of time of patients for IOP determination in the ophthalmology clinic.

Results

This study was carried out on 312 patients referred to the Ophthalmology Clinic of Vali-asr Hospital. The mean age of the subjects was 58.5±11.4 with a maximum and minimum of 110 and 40, respectively. The Table 1 showed the frequency distribution of demographic information of subjects. Table two shows the Prevalence of open-angle glaucoma status among the subjects.

Table 1: Frequency distribution of demographic information of subjects

Variable		Frequency	Percentage
Gender	Male	110	35/3
	Female	202	64/7
Place of residence	Village	91	29/2
	City	221	70/8
Education background	Illiterate	117	43
	Elementary school	80	29/4
	Guidance school	32	11/8
	High school	21	7/7
	University	22	8/1

According to the above table, 64.7% of subjects were female, 70.8% live in urban areas, most of them (43%) were illiterate. The 55.1% (179 subjects) have aged 69 or younger, and 44.9% of them (140 subjects) aged were older than 70.

Table 2: Prevalence of open-angle glaucoma among the subjects

Status of glaucoma Type of glaucoma	Afflicted		Not afflicted		Total	
	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency
Old glaucoma	4.48	14	95.5	298	100	312
New glaucoma	2.5	8	97.43	304	100	312

Table 3: Comparison of prevalence of open-angle glaucoma in terms of the shape of the left eye cup

Status of glaucoma Cup shape	Afflicted		Not afflicted		Total	
	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency
Flat	7.7	6	92.3	72	100	78
Funnel	3.8	1	96.2	25	100	26
Oval	0	0	100	14	100	14
Amorphous	0	0	100	3	100	3
Glaucomatous	100	1	0	0	100	1
Cylindrical	0	0	100	2	100	2
Slope	0	0	100	1	100	1
Total	6.4	8	93.6	117	100	125

Table 4: Comparison of prevalence of open-angle glaucoma in terms of the shape of the right eye cup

Status of glaucoma Cup shape	Afflicted		Not afflicted		Total	
	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency
Flat	9.1	7	90.9	70	100	77
Funnel	3.8	1	96.2	25	100	26
Oval	0	0	100	14	100	14
Amorphous	0	0	100	4	100	4
Glaucomatous	0	0	0	0	0	0
Cylindrical	0	0	100	2	100	2
Slope	0	0	100	1	100	1
Total	6.5	8	93.5	116	100	124

In the studied population, cup shape in most of the subjects with open-angle glaucoma was flat (7.7% in the left eye and 9.1% in the right eye). Then, funnel was the most prevalent shape of cup (3.8% in each of the eyes).

Cup shape in the studied population was mostly flat with a frequency of 62.4% (78 cases) in the left eye and 62.11% (77 cases) in the right eye. Funnel shape of cup was observed in 26 cases (20.8%) in the left eye and 26 cases (21%) in the right eye. (Table 3&4)

Mean IOP in the left and right eyes were equal to 14.85 ± 2.95 mmHg and 14.9 ± 2.86 mmHg, respectively. The lowest and the highest IOP in both left and right eyes were 9 mmHg and 25 mmHg, respectively. The lowest and highest cup-disc ratio in both left and right eyes, respectively, were 0 and 1, with a mean of 0.32.

Discussion

In the present study, no significant relationship was found between OAG and gender (8.2% male and 6.4% female) and also between NTG and gender (18.2% male and 11.9% female). However, according to the results of similar studies, prevalence of glaucoma in men is more than women [14, 15, and 16]. In addition, there was no significant relationship between OAG and education background, place of residence, and smoking in subjects. Most of the subjects were Fars, 2 were Afghan, and only one was Arab. The highest and the lowest cup-disc ratio in both right and left eyes were 1 and 0, respectively, with a mean of 0.32. High cup-disc ratio is a major criterion for glaucoma and if this ratio is above 0.5, the risk of glaucomatous damage is high [17- 21].

The cup shapes observed in examination of the subjects included funnel, flat, oval, and amorphous, with a majority of flat shape (62%). Among those with glaucoma (open-angle and normal pressure), 25 cases (37%) had a flat-shaped cup, 4.5% had a funnel cup, others showed other shapes of cup. In subjects with NTG, cup shape in the left eye was flat in 20.5% and funnel in 7.7%, and in the right eye it was flat in 22.1% and funnel in 7.7%. In those with OAG, the cup shape in the left eye was flat in 7.7% and funnel in 3.8%, and in the right eye it was flat in 9.1% and funnel in 3.8%. As a result, no significant relationship found in terms of cup shape. In a comparative study on two groups conducted by Okimoto et al. [22], a significant relationship was found between the cup's shape, surface, and volume and thickness of nerve head layer in patients with chronic open-angle glaucoma compared to the control group. In another study performed by Kybartaitė-ziliene, the shape of the optic disc did not differ between the study groups, i.e., normal and glaucomatous case groups, but the disc area of the primary open angle glaucoma group was significantly larger. The shape of the small disc was significantly different, but the shape of the medium and the large disc did not differ between the study groups [23]

Yun SC also compared the lamina cribrosa depth of the optic nerve head in normal and glaucomatous eyes over a wide range length which suggested that glaucomatous optic disc cupping would manifest differently based on the level of axial length [24]. Thus, classification of glaucomatous optic neuropathy study by optic disc appearance have represented different pathologic mechanisms of glaucoma and might facilitate more accurate diagnoses and better disease management [25]. Therefore, they have done objective cup/disc measurement versus our subjective assessment so, using the imaging of disc cup, which is not possible in comparison of disc cup changes to simple and quick ophthalmoscopy examination in glaucoma

screening. We hope to take effective steps towards prevention and treatment of this eye disease, which is silent, and a gradual threat to the loss of vision.

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