

Original Research Article

The assessment of the knowledge and awareness about glaucoma in glaucoma patients and general population: a sample from Turkey

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ABSTRACT

Background: The study aimed to evaluate the level of knowledge and awareness of glaucoma and their possible determinants in a group of people diagnosed with glaucoma and in a population based group without glaucoma.

Methods: The study included people with an age range of 40 to 80years; 410 patients without glaucoma who admitted to primary health care service and 113 patients who admitted to hospitals with diagnosis of glaucoma. In addition to Glaucoma Knowledge Level Questionnaire (GKLQ), participants were asked about their socio-demographic characteristics, level of awareness and resources of the information about glaucoma. Multivariate logistic regression and multiple linear regression analyses were used to assess the variants which have impact on the level of the awareness about glaucoma and to evaluate the factors effective on the score of GKLQ, respectively.

Results: The ratio of awareness about glaucoma was found to be 64.1% in people without glaucoma. The knowledge and awareness about glaucoma were found to be higher in glaucoma patients compared to healthy people but not at a desired level. The education level was the only factor effecting both awareness and knowledge about glaucoma.

Conclusions: As awareness about glaucoma can lead to early detection, the assessment of the knowledge and awareness about glaucoma is very important in terms of disease prevention. Health education and preventive health care services should be programmed including for both glaucoma patients and healthy people based on the level of their education.

Keywords: Awareness, Glaucoma, knowledge, Turkey

INTRODUCTION

Early diagnosis and treatment is very important for glaucoma which is a progressive optic neuropathy. Ten percent of glaucoma patients end up with blindness throughout their life, so glaucoma is the second leading cause of blindness and the leading cause of irreversible blindness worldwide.¹⁻³ The prevalence of glaucoma is 3.5% in all over the world, ranging between 2.9% and 4.8% for different populations and it is 1.9% in United

States of America and by aging the prevalence is found to be increasing.^{4,5} The number of people with glaucoma was reported as 2.72 million in United States of America, 60 million worldwide and it is found that 8.4 million of patients experienced glaucoma related visual loss in 2010. It is estimated that these numbers will be doubled by the effect of aging and population increase.²⁻⁴

Glaucoma screening programs comprise regular eye exams for healthy people in order to catch the disease

earlier at asymptomatic stage, evaluation of the people at risk of glaucoma and management of the treatment and follow up.³

The success of the glaucoma screening programs is based on the awareness and knowledge of the glaucoma among the general population and glaucoma patients. The knowledge and awareness about glaucoma influence the patients in terms of understanding the importance of regular eye exams, utilization of health care services and showing a better compliance for treatment.^{3,6-8}

With regards to glaucoma related blindness, lack of awareness and knowledge was found to be an important risk factor.^{9,10}

The studies from many countries reported that the level of the knowledge and awareness about glaucoma was not only found to be low in general population but also in glaucoma patients.^{8,9} For this reason United States of America organizes education programs to increase the knowledge and awareness about glaucoma and the compliance of the patients to the screening programs.³

People aged 40 years and more constitute 29.3% of the population and it is estimated that the percentage will increase up to 50% by 2050 in Turkey.¹¹

Considering the structural dynamics of the population, lack of a glaucoma screening program and low level of knowledge and awareness, glaucoma will be an important public health problem in Turkey similar to the other developing countries.¹²

Assessment of the knowledge and awareness about glaucoma is an important step in the planning of disease prevention and utilization of the health care systems.¹³ Even though the studies are limited in Turkey, the knowledge and awareness about glaucoma was reported to be inadequate.¹⁴

The current study aimed to evaluate the knowledge and awareness about the glaucoma and their determinants in a group of people diagnosed with glaucoma and in a population based group of people without glaucoma.

METHODS

Study group

The study was conducted in the city of Eskisehir in Central Anatolia at 2016.

The population of the Eskisehir province is 826,716 and 36% (248,015) of the population is aged 40years and more.¹¹ It is located to the west of Ankara (capital city of Turkey). The urban area of Eskisehir is similar to well-developed parts of Turkey. The literacy rate in the region is 95%. There is also one medical faculty in this area and the people have access to medical facilities.

Study groups include people aged between 40 and 80years; 410 subjects without glaucoma who admitted to primary health care centers and 113 subjects diagnosed with galucoma who admitted to hospitals.

The study group of people without glaucoma were selected from two primary health care centers at the urban parts of the city in order to conduct population based studies. (Education and Research Region in Eskisehir, where community-based research) Public Health Department of Eskisehir Osmangazi at the University Medical School Education and Research Region (ESOGU-ERR)). The study group of patients diagnosed with glaucoma were selected from the hospitals where their follow up take place. The study was reviewed and approved by an ethics committee and relevant institutions. All participants gave informed consent. Study procedures were in accordance with the Helsinki Declaration of 2014.

Procedure

As the first step of the survey, participants were requested to provide information through filling a questionnaire. The participants filled in the questionnaire under supervision of study team in about 25min in this study. The questionnaire included two parts.

The first part of the questionnaire we asked about demographic characteristics including age, sex, educational status, income level, risk factors of glaucoma and sources of the knowledge about glaucoma. The second part of the survey was about Glaucoma Knowledge. Glaucoma Knowledge Level Questionnaire (GKLQ) was developed; it was a subject of another manuscript¹⁵. GKLQ developed by study team was a one-subdimension survey and included 10 items. The expression was incorrect for 1 item. We asked participants to answer "right", "wrong" or "do not know" for each item. Each correct answer was worth 2 points. Cronbach's alpha coefficient was 0.69 for the entire survey. Incorrect statements were encoded inversely to the other items. The maximum and minimum score were 20 and zero, respectively. The level of knowledge about glaucoma was increasing when the GKLQ score increased.¹⁵

Participants who were answered less than 90% of the questionnaire or didn't accept to participate the study were excluded from the study. The socioeconomic status was categorized according to the statement of each participant based on the minimum wage. Having heard about the term glaucoma (karasu hastalığı in Turkish) was considered as awareness.

Statistical analysis

IBM SPSS Statistics for Windows, Version 15.0. (IBM Corp. Armonk, NY) was used for the data analysis. The demographic characteristics of the study group were

reported using descriptive statistics (frequencies, proportions, means, medians) and dispersion measures (standard deviation, min-max). Initially, the normality of the total scores was tested using the Kolmogorov-Smirnov normality test and graphs. Frequency data were analyzed by using chi-square test as a univariate analysis. Therefore, the median scores were compared using Mann-Whitney U tests. The algorithm of the score of the scale was calculated to obtain a normal distribution. Multiple linear regression analyses performed to determine independent factors affecting GKLQ score. Multiple linear regression model was generated with the variables of a significance level of $p < 0.05$ from the single variable linear regression analysis.

RESULTS

The study enrolled 113 patients (21.6%) with glaucoma and 410 patients (78.4%) without glaucoma. The mean age (SD) of the glaucoma patients is 61.6 (9.9) and the mean age (SD) of without glaucoma patients is 57.3 (10.8). The study group of the people with glaucoma the ratio of the males ($p=0.011$), people with moderate level of income status ($p=0.001$), people aged over 65 years ($p=0.002$) are found to be significantly more in the group of people with glaucoma compared to the group of people without glaucoma. The socio-demographic characteristics of the study groups were given in Table 1.

Table 1: Socio-demographic characteristics of the study groups.

Variables		Patients with glaucoma N=113 %	Patients without glaucoma N=410 %	P
Gender	Male	63.7	49.8	0.011
	Female	36.3	50.2	
Age (years)	40-64	59.3	74.1	0.002
	≥ 65	40.7	25.9	
Education level	Illiterate	6.2	10.7	0.212
	Primary school	60.2	52.4	
	High school and university	33.6	36.9	
Income status	Bad	4.4	19.5	0.001
	Moderate	71.7	58.8	
	Good	23.9	21.7	

Table 2: The logistic regression analysis of the glaucoma awareness according to socio-demographic characteristics in the group of people without glaucoma.

Variables		Percentage of the glaucoma awareness	OR 95%CI	P
Gender	Male	64.7	1	0.343
	Female	63.6	1.24 (0.80-1.92)	
Age (years)	40-64	70.1	1	0.693
	≥ 65	47.2	0.90 (0.52-1.55)	
Education level	≤ 8 years	54.4	1	0.022
	> 8 years	80.8	2.78 (1.16-6.65)	
Income status	Bad	4.4	1	0.957
	Moderate	71.7	0.96 (0.51-1.90)	
	Good	23.9	2.27 (0.99-15.19)	

The percentage of the knowledge and awareness about glaucoma was found to be 64.1% (n: 263) for the study group of people without glaucoma whose response 'yes' to the question of 'Have you ever heard of glaucoma or Karasu Hastalığı?' The GKLQ scale did not apply to those who reported that they have not heard of glaucoma. Awareness question was not applied to glaucoma patients as they continued on a glaucoma follow-up and treatment polyclinic. The awareness about glaucoma was found to

be insignificant in terms of gender ($p=0.814$). Participants aged 65 years or less ($p < 0.001$), participants who had an education level over 8 years ($p < 0.001$) and participants with high level of income status ($p < 0.001$) showed a higher level of awareness based on the single variant regression analysis. The education level was found to be only variable which had an impact on the glaucoma awareness by multivariable logistic regression analysis. The logistic regression analysis of the glaucoma

awareness and knowledge according to socio-demographic characteristics in the group of people without glaucoma was shown in Table 2. The mean (SD) and the median (min-max) of the score on GKLQ were 15.27 (2.74) and 16 (5-20), respectively for all of the participants. The scores of GKLQ range between 0 and 20. The group of people diagnosed with glaucoma had the median score (min-max) of 16 (7-20) on GKLQ, significantly higher compared to the median score of 16 (5-20) of the study group without glaucoma ($p=0.002$). The linear regression analysis showed that the GKLQ

score increased as the education level of the participants increased in the group of people diagnosed with glaucoma but no factor was found to have an impact on the awareness score in the group of people without glaucoma.

The awareness score was found to be statistically higher for the participants who was aged 65 or more and had at least high school education. The linear regression analysis of the variables of the glaucoma knowledge and awareness score for the study groups is shown in Table 3.

Table 3: The linear regression analysis of the variables of GKLQ score for the study groups.

Variables	GKLQ Scores					
	The study group of people with glaucoma		The study group of people without glaucoma		All study groups	
	B (95CI%)	P	B (95CI%)	P	B (95CI%)	P
Age	-0.027 (-0.057-0.003)	0.078	-0.010 (-0.043-0.024)	0.567	-0.016 (-0.038-0.007)	0.004
Gender	0.008 (-0.021-0.037)	0.602	-0.003 (-0.026-0.020)	0.795	0.001 (-0.017-0.020)	0.877
Education level	0.031 (0.001-0.062)	0.043	0.022 (-0.001-0.045)	0.057	0.029 (0.012-0.046)	0.001
Income status	-0.018 (-0.048-0.011)	0.225	-0.005 (-0.025-0.014)	0.591	-0.011 (-0.027-0.005)	0.165
Being glaucoma patient					0.039 (0.019-0.059)	0.000
	F=2.853; $p=0.027$		F=1.560; $p=0.185$		F=5.725 $p<0.001$	

Table 4: The distribution of the accurate responses to the statements of GKLQ based on the study groups.

Statements	Participants with glaucoma %	Participants without glaucoma %	P
Glaucoma is a leading cause of blindness	72.6	81.4	0.047
The risk of developing glaucoma is higher for people with a family history	63.7	63.9	0.333
The people over the age of 60 have an increased risk of developing glaucoma	55.8	80.6	<0.001
Glaucoma can be controlled	87.6	66.2	<0.001
Glaucoma requires lifelong treatment	84.1	54.4	<0.001
The people with high intraocular pressure are more prone to develop glaucoma	42.5	59.3	<0.001
If left untreated, glaucoma can lead to significant visual loss	91.2	65.8	<0.001
Increased pressure in glaucoma results in optic nerve damage	87.6	66.2	<0.001
Follow up is not necessary for glaucoma patients	68.1	54.8	<0.001
Some drugs may cause an increase in intraocular pressure	49.6	45.2	0.145

The percentage of the people who gave accurate responses to the GKLQ questions was between 42.5% and 91.2% in the study group of people with glaucoma and between 45.2% and 81.4% in the study group of people without glaucoma. The percentage of the people who were aware of the importance of early detection for glaucoma was 87.6% in the study group of people with glaucoma and 66.2% in the study group of people without

glaucoma. The percentage of people who were aware of glaucoma as a treatable disease was 91.2% and 65.8% in the study group of glaucoma and in the study group of people without glaucoma, respectively.

There was no significant difference between the study groups in terms of the percentage of the accurate responses to the statements of ‘The risk of developing

glaucoma is higher for people with a family history' and 'Some drugs may cause an increase in intraocular pressure'.

The percentage of the accurate responses of glaucoma patients to the GKLQ scale was found to be higher compared to the study group of people without glaucoma with the exception of 3 statements (glaucoma is a leading cause of blindness, people over the age of 60 have an increased risk of developing glaucoma, the people with high intraocular pressure are more prone to develop glaucoma) ($p < 0.001$). The distribution of the accurate responses to the statements of GKLQ based on the study groups was shown in Table 4.

The source of information about glaucoma was classified as family and friends with glaucoma history, health care providers, mass media (radio, TV, internet). The main source of information was health care providers for the study group with glaucoma (69%) and the study group without glaucoma (43%) ($p < 0.001$). The ratio of family and friends with glaucoma history and mass media as source of information in study group of people with glaucoma was found to be higher compared to the study group of people without glaucoma ($p = 0.002$; $p = 0.016$).

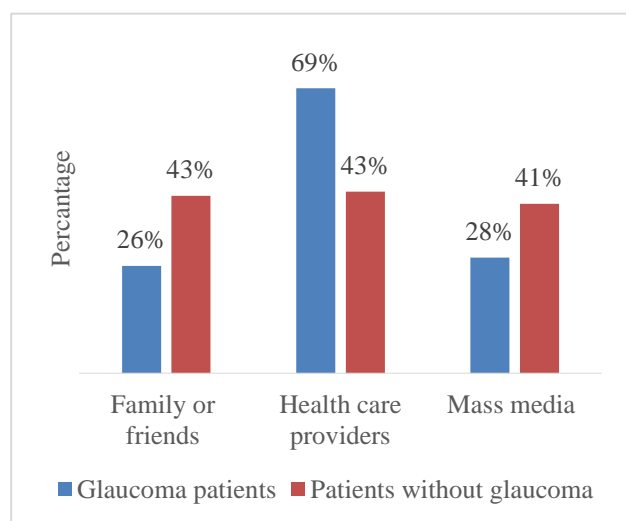


Figure 1: The source of information about glaucoma of the study groups.

DISCUSSION

Present study assessed the glaucoma awareness and knowledge in a population with or without glaucoma by a reliable and efficient scale in Turkish population for the first time. The number of males, people aged over 65 years and moderate level of income status were found to be more in the study group of people with glaucoma compared to the study group without glaucoma. Previous studies reported that patients with glaucoma were seniors and well-educated people.^{14,16} Glaucoma is a chronic disease that can give damage to optic nerve in long term, so it is more likely to be seen in seniors. The glaucoma

awareness was 64% in the study group of people with glaucoma. Although 'having heard of glaucoma' has been defined as awareness, the knowledge needs to access to the sources of information and utilization of education methods.¹³

The percentage of glaucoma awareness of previous studies show dissimilarities due to demographics of the study groups of different countries.¹⁰ The percentage of glaucoma awareness was reported between 93% and 23%.^{17,18} The present study reported the glaucoma awareness percentage between the reported values in the literature. While the elderly population of Turkey increases, it is worth to note that only 3 out of 5 people heard the term of 'glaucoma'.

The determinants increasing the awareness were found to be age, education level and income status by the single variable analysis. The education level was found to be only determinant by multiple variable analysis. As a result, the age is considered as 'confounding' factor and the higher education level was reported the only determinant which increased the awareness. Gender did not show any significant difference for the glaucoma awareness in our study, but previous studies reported many different findings regarding the association of gender and glaucoma awareness.^{6,8} In fact the gender and its impact on glaucoma awareness are related with the gender norms, socio-economic characteristics and cultural factors.

In the current study a newly developed scale was used to assess the glaucoma knowledge and awareness. The reliability and efficiency of the scale were tested previously, and it has a Cronbach alpha value of 0.69 which is a coefficient for inter-correlation, consistency and reliability.¹⁵ National Eye Health Education Program (NEHEP) developed a well-known scale called as NEHEP Eye-Q with a Cronbach alpha coefficient of 0.59.¹⁹ Additionally, many studies were conducted based on the scales with unknown reliability and efficiency.^{7,16}

The GKLQ scale was performed on the glaucoma patients and the people without glaucoma. The median score of glaucoma patients on the scale was found to be higher compared to healthy subjects. People with glaucoma did not have any socio-demographic factor effecting the glaucoma knowledge. The education level was found to be having an impact on the awareness of people without glaucoma. Overall having glaucoma as a disease increased the score for knowledge independently from the education level and age. Danesh Meyer et al also showed that glaucoma patients knowledge level was higher than healthy people.⁹ Fabjani et al reported similar results and additionally indicated that the level of knowledge in glaucoma patients was not at a desired level.²⁰ The education given by medical doctors and interaction of glaucoma patients with each other at health care centers would improve the knowledge and awareness.

Similar to the glaucoma awareness, the knowledge also increases with high level of education. Previous studies revealed that as the level of education increased, the knowledge and awareness about glaucoma would increase.^{7,13} People with high level of education are more likely to attend to the health education programs, understand the written and visual documents and approach to the information sources.

The education level of glaucoma patients was high compared to the study group of people without glaucoma. As we evaluated each response of glaucoma patients to the scale, we found out that the knowledge about the glaucoma was inadequate. In the study 73% of the glaucoma patients and 81% of the people without glaucoma were aware of the irreversible feature of visual loss in glaucoma. Rewri and Kakkar reported that 5% of the participants knew that glaucoma causes blindness. Contrary to this finding De Gaulle et al showed that most of their population knew that glaucoma causes blindness.^{13,21} The previous studies which included glaucoma patients, reported the percentage of the knowledge about the irreversible feature of blindness in glaucoma between 51% and 72%.^{14,22}

Approximately 1 out of 4 glaucoma patients did not know the irreversible feature of blindness in glaucoma and this indicates the lack of patient education about glaucoma. Acknowledging the devastating visual prognosis of glaucoma would help enhance the treatment compliance among glaucoma patients. The glaucoma patients were found to be unaware of the fact that they needed to have regular eye examinations. Every 1 out of 3 glaucoma patients did not know the need for the regular eye examinations. The follow up compliance is low in glaucoma patients due to the lack of effective information. Consistent with our finding a study in Turkey reported that only 76% of the glaucoma patients used the glaucoma medication on regular basis finding.¹⁴

The percentage of the accurate response to the statement of 'Some drugs may cause an increase in intraocular pressure' was 50% in glaucoma patients and 45% in the study group of people without glaucoma ($p>0.005$).

A study reported that 49% of glaucoma patients gave information about their glaucoma drugs to their doctors other than ophthalmologists.¹⁴ Hooevenaars et al showed that 67% of glaucoma patients knew the possibility of interaction between some drugs-other than eye drops and intraocular pressure, 69% of them also knew the importance of declaration of the medical drug usage to the ophthalmologists.²² Our findings gave important clues about the level of knowledge and awareness about glaucoma therefore important steps should be taken into account for effective health education on glaucoma.

The knowledge of the risk factors for glaucoma is not only important for the glaucoma patients but also for the general population in order to give support to the disease

prevention. The risk factors evaluated by scale were familial predisposition, age and hypertension. The current study did not find a significant difference between the two study groups (63% for both groups) regarding the knowledge of familial predisposition ($p>0.05$). Our finding was higher compared to the study of Rewri et al (21%) and similar to some other studies.^{13,22}

The percentage of the knowledge of the advanced age as a second important risk factor for glaucoma development was found to be higher in the study group of people without glaucoma. The same percentage was found to be 55% in glaucoma patients which was lower compared to the previous studies in the literature but higher compared to the knowledge of general population.^{20,22} Approximately 1 out of 2 people (45%) was aware of the hypertension as a risk factor for glaucoma in the diseased group. Hypertension is a serious health problem which should be considered as a risk factor not only for glaucoma but also for many systemic diseases and should be kept under control. The knowledge of the risk factors for glaucoma is very important for targeting the population at risk in terms of the screening programs.

The most common source of information on glaucoma was found to be health care providers in diseased group and close acquaintances in the healthy group ($p<0.05$). The study, conducted in a general population, reported that nearly half of the participants were aware of glaucoma with the help of information from family or friends. One third of the population received the information from healthcare providers and one fifth of the population had the information from the mass media.

Another study, conducted in a population of people with glaucoma, reported that the sources of the information were ophthalmologists (80%), family members (25%) and mass media (32%).^{9,13} These findings could be explained by two aspects: 1) Glaucoma patients have increased interaction with health care providers due to the chronic nature of the disease, 2) Glaucoma patients and mass media may have an impact on dissemination of the information about glaucoma.

The current study has some limitations such as the selection of the patients from a single center and selection bias could not be eliminated as we only included the people who agreed to participate. Both study groups were enrolled from the health care centers therefore the knowledge about glaucoma could be estimated lower for the general population.

CONCLUSION

The knowledge and awareness about glaucoma were found to be higher in glaucoma patients compared to healthy people but not at a desired level. The knowledge and awareness are found to be low in the groups of people with low level of education. As awareness about glaucoma can lead to early detection, the assessment of

the knowledge and awareness about glaucoma is very important in terms of disease prevention. Health education and preventive health care services should be programmed including for both glaucoma patients and healthy people based on the level of their education.

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