

RESEARCH ARTICLE

## Görme Engelliliği Nedenleri: Katarakt, Önlenebilir En Önemli Neden

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### Özet

**Amaç:** Bu araştırmanın amacı, görme engelliliğinin nedenlerini ve katarakt sıklığını belirlemektir.

**Yöntemler:** Bu çalışma bir retrospektif kohort çalışmadır. Araştırmaya başlamadan önce etik kurul onayı alınmıştır. Bu çalışmaya katılan tüm katılımcılardan yazılı bilgilendirilmiş onam alınmıştır. Devlet hastanesine 5 yıl süreyle başvuran tüm hastalar çalışmaya dahil edilmiştir. Çalışmaya “engelli raporları” taranarak ve klinik verilere dayalı olarak görme engeli tespit edilen 1325 kişi dahil edilmiştir. Bu kişiler 01 Mayıs 2015 - 31 Aralık 2018 tarihleri arasında evlerinde ziyaret edilerek saha çalışması yapılmıştır. İstatistiksel analizlerde ki kare testi kullanılmıştır.

**Bulgular:** Çalışma grubuna dahil edilen 1325 görme engelli bireyin %51,3’ü erkek, %48,7’si kadındı. Görme engellilerin %48,4’ü 65 yaş ve üzerindedir. Görme engellilerin %46,6’sının okuma yazma bilmediği, sadece %1,0’inin üniversite mezunu olduğu ve %90,5’inin herhangi bir işte çalışmadığı belirlenmiştir. %14,2’sinin görme engelli, %85,8’inin az görmekte olduğu tespit edilmiştir. Görme engelliliğinin ilk beş nedeni sırasıyla katarakt (%31,7), yaşa bağlı maküler dejenerasyon (%15,4), genetik-kalıtsal nedenler (%7,5), kırma kusurları (%5,2) ve kazalar (%5,0) idi. En önemli görme engellik (%37,2) ve az görme (%30,8) nedeninin katarakt olduğu belirlenmiştir. Senil maküler dejenerasyonun görme engellik (%13,8) ve az görmenin (%15,7) ikinci en yaygın nedeni olduğu tespit edilmiştir.

**Sonuç:** Görme engelliliği nedenlerinin çoğunun önlenebilir ve tedavi edilebilir nedenler olduğu ortaya çıkarılmıştır. Görme engelliliğini önlemek veya azaltmak için saha taramaları ile erken teşhis ve tedavi hizmetlerinin yaygınlaştırılması gerekmektedir.

**Anahtar Kelimeler:** Katarakt, Prevalans, Görme engelliliği, Türkiye

### Reasons of visual disability: Cataract, the most important avoidable cause

#### Abstract

**Objective:** The purpose of this research was to determine the causes of visual disability and the frequency of cataract.

**Methods:** This study is a retrospective cohort study. Ethics committee approval was obtained before starting the research. Written informed consent was obtained from all participants who participated in this study. All patients who applied to the state hospital for a period of 5 years were included in the study. 1325 people whose visual disability was detected by scanning “disability reports” and based on clinical data were included in the study. These people were visited at their homes between 01 May 2015 - 31 December 2018 and field work was carried out. Chi square test was used for the statistical analyses.

**Results:** 51.3% of 1325 visually disabled individuals included in the study group were male and 48.7% were female. 48.4% of the visually disabled were aged 65 and over. It has been determined that 46.6% of the visually disabled were illiterate, only 1.0% was university graduates and 90.5% were not working in any job. It was determined that 14.2% were blind and 85.8% had low vision. The first five causes of visual disability were cataract (31.7%), age-related macular degeneration (15.4%), genetic-hereditary causes (7.5%), refractive error (5.2%) and accidents (5.0%) respectively. It was determined that cataract is the most important cause of blindness (37.2%) and low vision (30.8%). Senile macular degeneration was found to be the second most common cause of blindness (13.8%) and low vision (15.7%).

**Conclusion:** It has been revealed that most of the causes of visual disability are preventable and treatable causes. To prevent or reduce visual disability, field scans and early diagnosis and treatment services must be extended.

**Key Words:** Blindness, Cataract, Prevalence, Visual disability, Turkey

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## Introduction

If the person has an anatomical, physiological, or mental deficiency, excess, or dysfunction; he/she is handicapped. Disability is the inability of the person to do the work he/she has to do because of handicap and because of the lack of physical and mental abilities. Visual disability is a term used to refer to the reduction of visual acuity or complete loss (1).

Approximately 15% of the world population is handicapped, 5% is disabled (1). Handicapped rate of the population of Turkey is 12.29%, the disability rate is 2.58% (2).

Visual disability is very common worldwide, and the rate is increasing gradually as the age increases. According to the World Health Organization (WHO) data; there are 285 million low vision and 39 million blindness cases worldwide, and 82% of the cases are over 50 years old. 90% of the visually disabled live in developing countries (3).

According to Turkey Disability Survey data, the prevalence of visual disability has been reported as 60 per ten thousand across the country (2). The frequency of visual disability worldwide has been reported as 39.4 per ten thousand (1).

According to WHO data, cataract is the leading cause of visual disability (29.9%). Age-related macular degeneration (13%) is the second most common cause. Corneal disease, glaucoma, diabetic retinopathy, and refractive defects are rarer causes (4, 5).

Cataract; is the opacity of the eye lens. In the following stages, the ability to see may be lost altogether. The frequency of congenital cataracts varies between 1 and 6 per 10,000 births (5-7). Acquired cataracts increase with age and the most important reasons are high altitude, malnutrition, diabetes, smoking, alcohol and drug use, occupational risks, cardiovascular diseases, prolonged exposure to ultraviolet light (8). WHO recommends reducing tobacco use and UV light exposure to prevent or delay cataract development and draws attention to combating diabetes (9).

Cataract is the most important cause of treatable visual disability in both developed and developing countries. Cataract is responsible for 51% of blindness and 33% of low vision in the world (9, 5). When the average life expectancy increases the number of cataract patients will increase also (1).

Phacoemulsification (phaco) and intraocular lens implantation is the treatment applied all over the world for cataract. This treatment recovers about 90% of patients (5). However, in developing countries,

cataract patients remain blind as they cannot get healthcare. More than 90% of cataract caused blindness is living in developing countries (5, 9).

While cataract surgery rate is about 1% in developed countries; it is 3-4 per ten thousand in China and less than 5 per hundred thousand in developing countries (5).

There is very few epidemiological research on the causes of visual disability in Turkey. In our country, there is no other study on the prevalence and causes of visual disability apart from a study that was performed about 30 years ago. By far the most important study on this subject is "Turkey Disability Survey" conducted in 2002, representing the whole country. However, in this study, diseases causing visual disability were not specified.

This research is the only one in the country which covers the total of a province based on clinical data and has the capacity to provide comprehensive and accurate information about the medical causes of visual disability in Turkey.

The purpose of this research; was to determine the causes of visual disability and the frequency of cataract, which is the most important preventable cause of visual disability, and to contribute to the determination of correct policies for the measures to be taken to reduce visual disability.

## Methods

This study is a retrospective cohort study. The study was conducted in a province located in the north-east of Turkey, a province of about 160 000 inhabitants. All patients who applied to the state hospital, which is the only hospital in the province for a period of 5 years, were included in the study. 1325 people whose visual disability was detected by scanning "disability reports" and based on clinical data were included in the study. The primary output variable of the study is visual disability. Persons with partial or no vision in one or both eyes, those with colour blindness and/or night blindness, and those using eye prostheses were considered disabled. Inclusion criteria in the study are being visually disabled. Exclusion criteria in the study are not being visually disabled and to refuse to participate in research. The degree of vision was determined according to the criteria determined by WHO (Table 1).

**Table 1.** Categorizations of visual loss based on the better seeing eye (World Health Organization)

Category	Definition
0-Normal vision	20/25 or better
0-Near normal vision	20/30–20/60
1-Moderate low vision	20/70–20/160
2-Severe low vision	20/200–20/400
3-Profound vision loss (blindness)	20/500–20/1000 or visual field <10 degrees
4-Near total vision loss (blindness)	<20/1000 or visual field <5 degrees
5-Total vision loss (blindness)	No light perception

These people were visited at their homes between 01 May 2015 - 31 December 2018 and field work was carried out. Ethics committee approval dated 10.04.2015 and numbered 2015/4 was obtained from Gümüşhane University Scientific Research and Publication Ethics Committee before starting the research. Written informed consent was obtained from all participants who participated in this study. Medical data of the disabled were obtained from the disability report provided by the hospital, and socio-demographic data were obtained through a questionnaire developed by the researchers and was applied by face-to-face interview technique.

### Statistical analysis

All the data obtained were recorded to the computer. The data were analysed with Epi Info™ for Windows Download Version 7.2 on the computer. Chi square test was used for the statistical analyses. The qualitative data has been summarized by descriptive analysis. The main purpose of descriptive analysis is to express and summarize the data set of a variable in quantitative. The descriptive data has been summarised by using frequency and percentage and (frequency) tables. Chi-square test has been used as a hypothesis testing method. Chi-square tests involve checking if observed frequencies in one or more categories match expected frequencies. Chi-square tests involve variables that divide your data into categories.

### Results

51.3% of 1325 visually disabled individuals included in the study group were male and 48.7% were female. 48.4% of the visually disabled were aged 65 and over.

It has been determined that 46.6% of the visually disabled were illiterate, only 1.0% was university graduates and 90.5% were not working in any job.

It was determined that the majority of the visually disabled (76.2%) were married, 8.5% were single, 81.1% lived with their spouse and children, 9.0% lived with their parents and 79.2% lived in nuclear families.

10.8% of the visually disabled stated that they could not go out of their house alone.

**Table 2.** Vision Level of the Visually Disabled Identified During the Study

Vision Level	Number	%
Not seeing with both eyes	172	13.0
Low vision with one eye and not seeing anything with the other eye	95	7.2
Low vision in both eyes	982	74.1
Not seeing anything with one eye and seeing normal with the other eye	76	5.7
<b>Blindness</b>	<b>188</b>	<b>14.2</b>
<b>Low vision</b>	<b>1137</b>	<b>85.8</b>

It was determined that 74.1% of 1325 visually disabled individuals included in the study group had low vision with their both eyes, and 13% were not seeing with both eyes. According to the degree of vision, it was determined that 14.2% were blind and 85.8% had low vision.

In our study, both low vision and blindness were found to increase significantly with age ( $p < 0.05$ ). While 55.9% of 188 people who were blind and 47.1% of 1137 people who had low vision were at the age of 65 and over; very few were under 25 years old. Although most of the visually disabled people were living in urban areas and were male, no significant relationship has been found between the gender and the residential place due to the degree of vision.

Causes of visual disability among the visually disabled identified during the study is shown at Table 4. Causes of visual disability was identified by the data obtained from the questionnaire and from the disability reports of the visually disabled taken from any health care institution. The first five causes of visual disability were cataract (31.7%), age-related macular degeneration (15.4%), genetic-hereditary causes (7.5%), refractive error (5.2%) and accidents (5.0%) respectively.

It was determined that cataract is the most important cause of blindness (37.2%) and low vision (30.8%). Senile macular degeneration was found to be the second most common cause of blindness (13.8%) and low vision (15.7%).

In our study, it was found that cataract, which is the most important cause of visual disability increased significantly with age ( $p < 0.001$ ). While 39.5% of 420 people with cataracts were at the age of 65 and over; 20.8% were under the age of 25. Cataracts was found to be significantly higher in those whose age was 65 and over than those who were in smaller age groups;

cataracts were found to be significantly higher among women than men; cataracts were found to be significantly higher among the residents of urban areas than rural areas ( $p < 0.01$ ).

It was found that cataracts were higher in those with diabetes and cardiovascular diseases than those without, but the difference was not significant.

**Table 3.** The Socio-demographic Characteristics of Seeing Disabled in the Research Group

Characteristic	Low Vision		Blindness		Total		
	Number	%	Number	%	Number	%	
Age groups	<25	70	6.2	7	3.7	77	5.8
	25-44	215	18.9	32	17.0	247	18.6
	45-64	316	27.8	44	23.4	360	27.2
	65+	536	47.1	105	55.9	641	48.4
	<b>Total</b>	<b>1137</b>	<b>100.0</b>	<b>188</b>	<b>100.0</b>	<b>1325</b>	<b>100.0</b>
$\chi^2 = 5.625$ $p = 0.131$							
Gender	Male	585	51.5	95	50.5	680	51.3
	Female	552	48.5	93	49.5	645	48.7
	<b>Total</b>	<b>1137</b>	<b>100.0</b>	<b>188</b>	<b>100.0</b>	<b>1325</b>	<b>100.0</b>
$\chi^2 = 0.055$ $p = 0.815$							
Residential Place	Rural	269	23.7	38	20.2	307	23.2
	Urban	868	76.3	150	79.8	1018	76.8
	<b>Total</b>	<b>1137</b>	<b>100.0</b>	<b>188</b>	<b>100.0</b>	<b>1325</b>	<b>100.0</b>
$\chi^2 = 1.076$ $p = 0.300$							

**Table 4.** Causes of Visual Disability among the Visually Disabled Identified During the Study

Cause	Low Vision		Blindness		Total	
	Number	%	Number	%	Number	%
Cataract	350	30.8	70	37.2	420	31.7
Senile Macular Degeneration	178	15.7	26	13.8	204	15.4
Genetic-Hereditary Causes	94	8.3	5	2.7	99	7.5
Refractive Error	66	5.8	3	1.6	69	5.2
Accident	63	5.5	3	1.6	66	5.0
Optic Atrophy	46	4.0	11	5.9	57	4.3
Glaucoma	40	3.5	13	6.9	53	4.0
Keratopathy	35	3.1	6	3.2	41	3.1
Autoimmune Disease	24	2.1	4	2.1	28	2.1
Adult Macular Degeneration (AMD)	21	1.8	3	1.6	24	1.8
Diabetic Retinopathy	12	1.1	10	5.3	22	1.7
Retinopathy	12	1.1	4	2.1	16	1.2
Other	12	1.1	2	1.1	14	1.1
Hypertensive Retinopathy	10	0.9	3	1.6	13	1.0
The Cause is Unknown	174	15.3	25	13.3	199	15.0
<b>Total</b>	<b>1137</b>	<b>100.0</b>	<b>188</b>	<b>100.0</b>	<b>1325</b>	<b>100.0</b>

**Table 5.** The Socio-demographic Characteristics of Cataract in the Research Group

Characteristic	Cataract (420)		Other Reasons (905)		Total		
	Number	%	Number	%	Number	%	
Age groups	<25	16	20.8	61	79.2	77	100.0
	25-44	20	8.1	227	91.9	247	100.0
	45-64	131	36.4	229	63.6	360	100.0
	65+	253	39.5	388	60.5	641	100.0
$\chi^2= 89.326$ $p= 0.000$							
Gender	Male	179	26.3	501	73.7	680	100.0
	Female	241	37.4	404	62.6	645	100.0
$\chi^2= 18.638$ $p= 0.000$							
Residential Place	Rural	76	24.8	231	75.2	307	100.0
	Urban	344	33.8	674	66.2	1018	100.0
$\chi^2= 8.895$ $p= 0.003$							
Diabetes Disease	Exist	24	35.8	43	64.2	67	100.0
	Does not Exist	396	31.5	862	68.5	1258	100.0
	$\chi^2= 0.175$ $p= 0.714$						
Cardiovascular Disease	Exist	83	35,0	154	65,0	237	100,0
	Does not Exist	337	31,0	751	69,0	1088	100,0
	$\chi^2= 1.813$ $p= 0.179$						

### Discussion

In our research, 1325 visually disabled individuals were identified, 51.3% of whom were male and 48.7% were female. When proportionate to the provincial population; it was also determined that the prevalence of visually disabled was 82.8 per ten thousand, the prevalence of low vision was 71.0 per ten thousand, and the prevalence of blindness was 11.8 per ten thousand, and these rates increased significantly with age.

Visual disability is very common worldwide and as the population ages, disability increases with age. 82% of cases worldwide are over 50 years of age (3).

According to Turkey Disability Survey data, the prevalence of visual disability is 48 per ten thousand across the country; and, it has been reported as 58 per ten thousand for men and 38 per ten thousand for women (2). The frequency of visual disability has been reported as 39.4 per ten thousand worldwide (1). In Canada, it has been stated that low vision rate is 35.6 per ten thousand and blindness is 3.8 per ten thousand and the incidence has increased sharply with age (10).

Although most of the visually disabled were men and were living in urban area; the difference between gender and residential places were not significant due to blindness and low vision.

It was determined that the majority of the visually disabled (74.1%) in the study group had low vision in both eyes, and 13% had blindness in both eyes. According to the degree of vision, it was determined that 14.2% were blind and 85.8% had low vision.

The first five causes of visual disability were respectively; cataracts (31.7%), age-related macular degeneration (15.4%), genetic-hereditary causes (7.5%), refractive error (5.2%) and accidents (5.0%), and cataracts has been found to be the most important reason of blindness (37.2%) and low vision (%30.8). Senile Macular Degeneration was found to be the second most common cause of blindness (13.8%) and low vision (15.7%).

Although there is no recent study on this subject in our country; according to a study conducted on 8571 people 30 years ago; it is stated that cataract is the most important reason for both blindness (50%) and low vision (52%), and refractive error (26%) is the second most important reason for low vision (11).

Cataract is the most important preventable cause of blindness. Worldwide, 5-10 million new cataract cases occur every year (12). The leading causes of blindness worldwide are cataract (33%), uncorrected refractive errors (21%) and macular degeneration (7%) (13, 14). In Nigeria, 80% of blindness and 83% of low vision are caused by cataract and uncorrected refractive errors (15). In a study conducted in the USA it is stated that cataract is the most important cause of blindness (42.9%) and low vision (65%) (16). In another study conducted in the USA cataract is the most important reason (50%) of low vision; the most important cause of blindness in blacks is cataract and glaucoma (60%), and the most important cause of blindness in whites is age-related macular degeneration (54.4%) (17). Cataract and

macular degeneration are the leading causes of visual disability in Canada (10).

It has been reported that the main causes of blindness in Scotland are age-related macular degeneration (ARMD), glaucoma, diabetic retinopathy, myopic degeneration, and optical atrophy. It was emphasized that ARMD and diabetic retinopathy are the most common cause of blindness in people over 65 years old, and cataract is no longer a major cause of visual impairment (18). In a long-term cohort study in the USA; it is stated that as cataract is successfully treated with surgery its rate of causing visual disability decreases, and the frequency of cataract surgery is 4.2% annually (16).

Diabetes, cardiovascular diseases, drug use and occupation play an important role in the development of cataracts (8). However, in our study, it was found that the rate of cataracts was higher in those with cardiovascular disease (35%) than in those without cardiovascular disease (31%), but the difference was not significant. Again, the rate of cataracts (35.8%) was higher in those with diabetes than those without diabetes (31.5%), but the difference was not significant.

As cataract is still an important cause of visual impairment, it is suggested that preventive health services are not carried out properly and early diagnosis and treatment services are not performed adequately. In addition, the fact that the health literacy level of the society is not sufficiently developed, the patients' health negligence, transportation and economic difficulties aggravate the picture (19).

In a study conducted in India it has been found out that that 9 risk factors (low socioeconomic status, illiteracy, history of diarrhoea, history of diabetes, glaucoma, and myopia early in life, history of smoking, hypertension, and use of cheap cooking fuel) significantly contributed to cataract in this population after adjusting for the effect of other risk factors (20).

In a review conducted by Gupta et al. it has been found that senile cataract due to aging is more common than other types of cataracts and apart from aging, various risk factors of cataract like: Nutritional inadequacy, metabolic and inherited defects, ultraviolet radiation, and smoking have been implicated as significant risk factors in development of cataract (21).

### Conclusion

The results of this research; has made a full profile of the causes of visual disability in the region and drew attention to cataract, the most important preventable cause of visual disability. In addition, these results will be very useful in determining the areas where protective

eye health services need to be concentrated, proper planning of eye health services and determining the priorities of the related health institutions.

In our research, the prevalence of visual disability was 82.8 per ten thousand, the prevalence of low vision was 71.0 per ten thousand, and the prevalence of blindness was 11.8 per ten thousand, and it was found that these rates increased with age.

The first five causes of visual disability are respectively; cataract, age-related macular degeneration, genetic-hereditary causes, refractive error, and accidents and, cataract is the most important cause of blindness and low vision.

It has been revealed that most of the causes of visual disability are preventable and treatable causes. To prevent or reduce visual disability, field scans and early diagnosis and treatment services must be extended.

For cataract treatment (surgery), resources should be increased, and services should be provided specially to underdeveloped regions.

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**Ethics Committee Approval:** Ethics committee approval dated 10.04.2015 and numbered 2015/4 was obtained before starting the research. Medical data of the disabled were obtained from the disability report provided by the hospital, and socio-demographic data were obtained through a questionnaire developed by the researchers and was applied by face-to-face interview technique. Consent form was filled out by all participants.

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### Author Contributions:

*Concept:* T.Ş., N.H., S.Ş.; *Design:* T.Ş., N.H., S.Ş.; *Literature search:* T.Ş., N.H., S.Ş.; *Data Collection and Processing:* T.Ş., N.H., S.Ş.; *Analysis or Interpretation:* T.Ş., N.H., S.Ş.; *Writing:* T.Ş., N.H., S.Ş.

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