ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

The Common Cause of Visual Impairment and Blindness Among an Elderly Population in the Province of Kars

Kars Şehrindeki Yaşlı Nüfusta Görme Bozukluğu ve Körlüğün Yaygın Nedenleri

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ABSTRACT

Aim: *To describe the common causes of visual impairment and blindness in an elderly population in the province of Kars.*

Material and Method: *The study design was cross-sectional and observational. A total of 1820 women and men were successfully enumerated and recruited for the study. All selected subjects were interviewed and underwent detailed ophthalmic examinations. Visual impairment was defined as best corrected visual acuity (BCVA) worse than 20/40 and better than 20/200. Blindness was defined as a BCVA of 20/200 or worse in the better eye.*

Results: *The most frequent ophthalmologic disabilities were cataract (40.44%) and age-related macular degeneration (AMD) (17.75%). We identified 291 subjects (173 women, 118 men) who were visually impaired in at least one eye with mean age of 77.22±6.17 and 381 subjects (174 women, 207 men) who were blind in at least one eye. In descending order, the causes of bilateral and unilateral blindness in geriatric patients were AMD and cataract.*

Conclusion: *This study may help to determine possible precautions by identifying the common causes of visual impairment and blindness in the elderly population in the northeast Anatolia region, specifically Kars.*

Key words: *cataract; prevalence; age-related macular degeneration*

ÖZET

Amaç: *Kars şehrindeki yaşlı nüfusta görme bozukluğu ve körlüğün yaygın nedenlerini tanımlamak.*

Materyal ve Metot: *Bu kesitsel ve gözlemsel çalışmaya toplam 1820 kadın ve erkek dahil edildi. Seçilen tüm gönüllüler ile görüşüldü ve detaylı oftalmik muayeneleri yapıldı. Görme bozukluğu, en iyi düzeltilmiş görme keskinliği (EİDGK) 20/40'tan daha kötü ve 20/200'den daha iyi olarak tanımlandı. Körlük, EİDGK 20/200 veya daha kötü olarak tanımlandı.*

Bulgular: *En sık görülen oftalmolojik özürlülük katarakt (%40,44) ve yaşa bağlı makula dejenerasyonu (YBMD) (%17,75) idi. Yaş ortalaması 77,22±6,17 olan, en az bir gözünde görme bozukluğu bulunan 291 olgu (173 kadın, 118 erkek) ile yaş ortalaması 78,45±5,98 olan, en az bir gözünde körlük bulunan 381 olgu (174 kadın, 207 erkek) tespit edildi. Azalan sıra ile geriatrik hastalarda bilateral ve tek taraflı körlük nedenleri YBMD ve katarakt idi.*

Sonuç: *Bu çalışma, Kuzeydoğu Anadolu Bölgesi'nde, özellikle Kars'da, yaşlı nüfusta görme bozukluğu ve körlüğün yaygın nedenlerini belirleyerek olası önlemlerin belirlenmesine yardımcı olabilir.*

Anahtar kelimeler: *katarakt; prevalans; yaşa bağlı makula dejenerasyonu*

Introduction

Currently the life expectancy in many countries is increasing. According to population projection studies, in 2050 the proportion of the population above the age of 65 will be 16.1%, with the population above the age of 80 expected to reach 4.2%[1]. Similarly, in Turkey the proportion of the geriatric population is rapidly increasing. According to 2008 data from the Turkish Demographic Health Survey, the proportion of the population above 65 years is 7.2% with mean life expectancy of 74.3 years[2]. Together with increasing age, the rates of visual impairment and blindness are increasing[3]. The most important cause of visual impairment in the elderly population is cataract, with the most important cause of blindness age-related macular degeneration (AMD)[4,5]. Thus, knowing the epidemiologic properties of these two diseases is important in terms of increasing the quality of life of the geriatric population, avoiding preventable blindness and for appropriate planning of treatment and rehabilitation services.

The aim of this study is to assess the epidemiologic properties of cataracts and AMD in the population above 65 years of age in the northeast Anatolia region in Turkey.

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Material and Method

This cross-sectional study was carried out between January 2014 and August 2015 among individuals aged 65 years and older who were living in Kars province. Kars is a province located in north east Turkey (43.05° E and 40.36° N), at altitude of 1768 meters, and has a cold climate. The total number of people aged 65 years and older in the rural area of Kars was 3115 according to the 2013 census[2,3]. Using the Epi-info Statcalc package 2000, the required sample size was calculated to be 168 for a 95% cluster interval, 50% observation frequency, and 10% deviation (sample error) with 20% backup.

The participant's addresses were obtained from their family physicians. We invited 2000 individuals to participate and enrolled 1820 participants over a 19-month period. The 1820 subjects comprised of 950 (52.2%) females and 870 (47.8%) males. The study adhered to the Helsinki Declaration. Ethics approval was obtained from the Ethics Committee of Kafkas University Faculty of Medicine.

The patients' demographic data, detailed ocular and systemic histories were recorded. The eye examinations were conducted according to a standardized protocol that included visual acuity measurement with Early Treatment Diabetic Retinopathy Study (ETDRS) charts and recorded in each eye separately with best corrected visual acuity (BCVA), noncontact tonometry (iCare, Tiolat Oy, Helsinki, Finland), slit-lamp biomicroscopy, and fourier-domain RTVue optical coherence tomography (Optovue, Inc. Fremont, CA, USA). Fundus photography was undertaken with a fundus camera (Topcon, TRC 50IX, Japan) in a darkened room. Digital images of fundus photographs were uploaded and analyzed with an IMAGEnet digital imaging system. Lens opacities were graded by slit lamp biomicroscopy according to the Lens Opacities Classification System III (LOCS III)[6]. Patients with pseudophakia and aphakia were excluded when evaluating cataract rates. Grading of AMD was based on a modified version of Wisconsin Age-Related Maculopathy Grading System (WARMGS)[7]. Features of AMD were classified into five mutually exclusive grades: grade 0, no pathological changes; grade 1, only soft distinct drusen (≥63 μm) or pigmentary irregularities only; grade 2, soft indistinct (≥125 μm) or only reticular drusen or soft distinct drusen (≥63 μm) with pigmentary irregularities; grade 3, soft indistinct (≥125 μm) or reticular drusen with pigmentary irregularities; and grade 4, either choroidal neovascularization (CNV; presence of any of the following: serous or hemorrhagic retinal or RPE detachment, subretinal neovascular membrane, and periretinal fibrous scar) or geographic atrophy (GA; well-demarcated area of retinal pigment atrophy with visible choroidal vessels). Early AMD was defined as grades 1 to 3 and late AMD as grade 4[(7)]. When both eyes of participant had lesions with different severity, AMD was defined according to the worse eye.

Visual impairment was defined as BCVA worse than 20/40 and better than 20/200. Blindness was defined as a BCVA of 20/200 or worse in the better eye[4].

The data were evaluated using the SPSS (version 10.0) computer program. Pearson chi-square tests were performed to test for an association between demographic variables (age and gender). For prevalence estimates, the 95% confidence intervals are provided. A P value of 0.05 was considered to be statistically significant.

Results

There were 1820 subjects randomly recruited and comprising 870 (47.80%) males and 950 (52.20%) females with a male to female ratio of 1/1.1. The age interval for males was 66–86 years with mean age of 74.54±6.64, while the age interval for females 65–87 years with mean age of 75.71±5.54 (Table 1). The most frequent ophthalmologic disabilities were cataracts (40.44%) and AMD (17.75%). The other age-related ophthalmologic diseases causing visual impairment in the geriatric population are shown in Table 2. We identified 291 subjects (173 women, 118 men) who were visually impaired in at least one eye and their mean age was 77.22±6.17. We identified 381 subjects who were blind (174 women, 207 men) in at least one eye and their mean age was 78.45±5.98. In descending order, the causes of bilateral low vision were cataracts and AMD; the causes of low vision in a single eye were cataracts and AMD; the causes of bilateral blindness in geriatric patients were AMD and cataract; and the causes of unilateral blindness were AMD and cataract.

How many patients are visually impaired or blind due to cataract?

When pseudoaphakia and aphakia patients were removed, 736 (40.44%, 95% CI 37.18–43.71) of the remaining 827 subjects had cataract in at least one eye. Of patients with cataracts, 390 were female (53.80%) and 340 were male (46.20%). The sexual predilection

of cataract towards females was seen only in the group aged 75 years and above. The distribution of cataract types is shown in Table 3.

Disease was due to cataract for 30.95% of patients with unilateral visual impairment, for 27.11% of patients with bilateral visual impairment, for 22% of patients with bilateral blindness and 8.51% of patients with bilateral blindness (Table 4).

How many patients are visually impaired or blind due to AMD?

AMD was identified in 323 patients (17.75%). These patients included 180 females (55.73%) and 143 males (44.27%) with no significant difference in AMD identified according to gender (p=0.14). Of female patients with AMD, 164 (91.11%) had early AMD, while 16 (8.89%) had late-type AMD. Significantly early-type AMD was higher (p=0.001). For male patients with AMD, 110 (76.92%) had early AMD and 33 (23.08%) had late-type AMD. Significantly early-type AMD was higher (p=0.003). In males late-type AMD was significantly higher as a proportion of all AMD compared to females (p=0.002).

Disease was caused by AMD for 35.71% of unilateral visual impairment patients, 20.34% of bilateral visual impairment patients, 28% of unilateral blindness patients and 17.02% of bilateral blindness patients (Table 4).

How many patients have both cataract and AMD?

In 271 patients (17.75%) both cataract and AMD were identified. Of these patients 180 were female (55.73%) and 143 were male (44.27%) with no significant difference according to sex identified for AMD (p=0.14).

Discussion

It is thought that the proportion of the geriatric population (65 years and older) in the whole population will increase with time. This rate of increase will be more dramatic in developed societies[8]. As a result, the need for treatment of eye diseases and low-vision rehabilitation will increase. Societal-based studies including a large number of patients are very important to plan health services to meet these needs. The aim of our study was to identify the most common causes of visual impairment and blindness in the geriatric population in Kars in Turkey for appropriate health services planning. Previous studies in different countries have found that nearly 85% of patients with visual impairment are above the age of 65, so this age group was evaluated in our study[4,8]. There was a higher rate of females in our study group compared to males. This difference between the sexes increases with age. The reason for this is most likely the higher life expectancy for women (in Turkey male life expectancy is 71.8 years, female is 76.8 years)[2].

In many societies, the most common cause of reversible loss of vision in the elderly population is senile cataract, which may be successfully treated with modern surgical techniques[9]. In the same population the most common cause of irreversible blindness is AMD with blindness rates reduced by applications of anti-vascular endothelial growth factor[10,11]. Similar studies in our group found the most common cause of visual impairment was cataract (30.69%), with the most common cause of blindness AMD (20.83%). However, it is difficult to compare our results to previous studies for many reasons. Firstly the patient groups in the studies live in different geographical areas, with different living conditions and nutritional habits and have different rates of systemic diseases. Both cataract and AMD are closely related to these factors mentioned above. For example, these diseases are more common among those who are undernourished, live close to the equator and have systemic disease like diabetes mellitus[12–15]. Another difficulty of comparing studies is that clinicians who diagnose and those who classify the diseases are different within studies and between studies.

In the Danish population, an industrialized society, 39.7% of visual impairment in the elderly age group is related to cataract while 42.8% of blindness is related to AMD. However, this study was completed in the year 2000 when anti-VEGF applications were not common. This study did not include 17% of the patient group who had undergone cataract surgery and there was no difference identified for cataract patients in terms of sex[4]. In our study, patients who had undergone cataract surgery were excluded only when evaluating cataract rates. Again a study in the rural region of Denmark from 2010–2013 found 26.7% of visual impairment was related to cataract while 46.7% of blindness was related to AMD. Though anti-VEGF treatment was more common in this period, the rates of blindness linked to AMD did not reduce. However, these two studies in Denmark were completed on different populations[16]. A study in Iran found the major visual impairment cause was cataract (41.5%) while the major blindness cause was diabetic retinopathy. AMD was the 3rd cause of blindness (13.8%). This

Table 1. *Distribution of elderly by gender and selected characteristics*

Characteristic	Women, n (%)	Men, n (%)	Total, n (%)
Age			
65–74	410 (22.53)	430 (23.63)	840 (46.15)
75+	540 (29.67)	440 (24.18)	980 (53.85)
Diabetes			
Yes	146 (15.37)	234 (26.95)	380 (20.88)
No	804 (84.63)	616 (70.80)	1420 (78.02)
Hypertension			
Yes	310 (32.63)	460 (52.88)	770 (42.31)
No	640 (67.37)	410 (47.13)	1050 (57.69)
Total	950 (52.20)	870 (47.80)	1820 (100.00)

Tablo 2. *Age-related ophthalmologic diseases causing visual impairment in the geriatric population*

Age Group (y)	Women, n (%)	Men, n (%)	Total, n (%)
Cataract	396 (41.68)	340 (39.08)	736 (40.44)
AMD	180 (18.95)	143 (16.44)	323 (17.75)
Early	164 (17.3)	110 (12.6)	274 (15.05)
Late	16 (1.7)	33 (3.8)	49 (2.69)
Glaucoma	48 (5.52)	61 (6.42)	109 (6)
RVOD	40 (4.21)	64 (6.74)	104 (5.71)
BRVO	37 (3.9)	50 (5.8)	87 (4.78)
CRVO	2 (0.2)	11 (1.3)	13 (0.71)
BRAO	1 (0.1)	3 (0.34)	4 (0.22)
CRAO	0	0	0
DRP	35 (3.68)	61 (7.01)	96 (5.26)
NPDR	32 (3.37)	53 (6.09)	85 (4.67)
PDR	4 (0.42)	7 (0.8)	11 (0.6)

AMD: Age-realted macular disease; RVOD: Retinal vein occlusion disease; BRVO: Branch retinal vein occlusion; CRVO: Central retinal vein occlusion; BRAO: Branch retinal artery occlusion; CRAO: Central retinal artery occlusion; DRP: Diabetic retinopathy; NPDR: Non-proliferative diabetic retinopathy; PDR: Proliferative diabetic retinopathy

Table 3. *Prevalance of the different type cataract in older adults*

Age Group (y)	Women, n (%)	Men, n (%)	Total, n (%)
Nuclear Cataract	239 (60.35)	211 (62.06)	450 (61.14)
65–74	197 (49.75)	177 (52.06)	374 (50.82)
75+	42 (10.61)	34 (10.00)	76 (10.33)
Cortical Cataract	94 (23.73)	58 (17.06)	152 (20.65)
65–74	61 (15.40)	39 (11.47)	100 (13.59)
75+	33 (8.33)*	19 (5.58)	52 (7.07)
Posterior Subcapsular	63 (15.91)	71 (20.88)	136 (18.48)
Cataract			
65–74	44 (11.11)	46 (13.53)	90 (12.23)
75+	19 (4.80)	25 (7.35)	46 (6.25)
Total Cataract	396 (100.00)	340 (100.00)	736 (100.00)
65–74	302 (76.26)	262 (77.06)	564 (76.63)
75+	94 (23.74)*	78 (22.94)	172 (23.37)

Table 4. *Prevalence of visual impairment and blindness in patients with cataract and age-related macular degeneration*

n (%)	Low vision in at least one eye	Low vision in both eyes	Blindness in at least one eye	Blindness in both eyes
Cataract	15 (35.71%)	16 (27.11%)	11 (22%)	8 (8.51%)
AMD	13 (30.95%)	12 (20.34)	14 (28%)	16 (17.02%)

AMD: Age-related macular disease

study found that vision problems were more common in women and in rural areas[17]. An epidemiology study from Malawi identified cataract as the most common cause of both visual impairment and blindness[18]. The reason for this may be the limited access to health services preventing patients from having surgery in the early period. In our study the most common cause of visual impairment in the elderly population in northeast Anatolia was cataract, followed by AMD, glaucoma, retinal vascular obstructive diseases and diabetic retinopathy. The most common cause of blindness was AMD followed by retinal vascular obstructive diseases, diabetic retinopathy, glaucoma and cataract.

Prevalence and sex-distribution studies of cataract have found differences. The most significant risk factor is aging and as women have longer average life expectancy, women are observed more in the geriatric population[19]. Prevalence studies in developed western societies have reported lens opacity of 24–27% in women above 65 years and 14–20% in men above 65 years[20–22]. However, this rate may increase to 76% in less developed societies[23]. In our study, overall 59.56% (95% CI 57.44–61.64) of subjects had cataract surgery in both eyes. After excluding subjects with bilateral cataract surgery, the prevalence of cataract in at least one eye was 40.44% (95% CI 38.18–42.03) among all subjects. Among them, the prevalence of different types of cataract was 61.14% for nuclear cataract, 20.65% for cortical cataract, and 18.48% for posterior subcapsular cataract (Table 3). These results support previous studies[24,25]. Patients aged 65–74 years were defined as younger elderly and those aged ≥75 years as older elderly. The sexual predilection of cataract towards females was seen only in age group of 75 years and above.

The prevalence of AMD shows severe difference between studies, similar to cataract. As the most important risk factor is age, the prevalence increases with age[11]. Apart from this, as mentioned before prevalence varies with nutritional habits, systemic diseases, ethnicity and geographical location[26]. In the population above 50 years of age, the early AMD prevalence is 9.5% in China with late AMD rate of 1%; in India the early AMD prevalence in rural regions is 20.91% and late AMD is 2.26%, while in urban areas these rates are 16.4% and 2.32%, respectively[27,28]. Another study in Poland reported the early AMD rate was 3.25% while the late AMD rate was 1.08%[29]. Our results showed that the total prevalence of AMD among older adults in Northeast Anatolia was 17.75% (95% CI 15.17–19.54). This included 15.05% of subjects with early AMD and 2.69% subjects with late AMD. This high rate may be linked to the people of northeast Anatolia having a diet different to the Mediterranean diet, lower socioeconomic development levels and the high rate of cigarette use in the region.

The major limitation of this study is that patients with pseudophakia and aphakia were excluded when evaluating cataract rates. This may be affect the results and change the prevalence of different types of cataract.

The results of this study provide insight into the pattern of eye problems among elderly people in northeast Turkey. Due to diseases in the geriatric population being preventable and controllable, it is important to increase societal knowledge and awareness. This study provides a summary of the prevalence of clinically relevant age-related eye diseases among older adults in Turkey for the second time. Olcaysü et al. evaluated the causes of blindness and low vision according to ages of patients and, similar to our study, found the most common ophthalmologic disabilities were cataract (32.6%), AMD (24.1%) and glaucoma (10%)[30].

Further investigation is needed to identify the causes of variations in the prevalence rates and the relationships between incidence and risk factors.

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