

# Magnitude and causes of unilateral absolute blindness in a region of Oman: A hospital-based study

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**PURPOSE.** To report the magnitude and causes of unilateral absolute blindness (no light perception) and barriers faced by persons with unilateral blindness in the South Batinah region of Oman.

**METHODS.** Between January and June 2002, 12,000 patients were evaluated for visual acuity, ocular pressure, anterior ocular biomicroscopic examination, and posterior segment indirect ophthalmoscopy examination by ophthalmologists at Al Rustaq hospital in Oman. Patients having no perception of light in at least one eye were included in the cohort. A closed-ended questionnaire was used to collect data on the personal profile, history of blindness, barriers perceived as the cause of blindness, and participants' attitude towards eye care and quality of life following visual disability.

**RESULTS.** In the 12,000 patients studied, absolute unilateral blindness (no perception of light) was present in 122 persons, a rate of 1.0% in our series. The onset of blindness was gradual in 78 (63.9%) persons and 64 (54.9%) persons had unilateral blindness for more than 10 years. The main causes of blindness were phthisis/absent/disorganized blind eye, which was present in 64 (52.5%) persons; glaucoma, seen in 49 (40.2%) participants; and corneal opacity, seen in 8 (6.5%) persons. Eighty (14.8%) persons had <3/60 vision in the fellow eye. Thirty (24.6%) persons had cataract and 19 (15.6%) persons had glaucoma in the fellow eye. Forty-eight (39.3%) persons had undergone cataract surgeries while 2 (1.6%) persons were operated for glaucoma in the fellow eye. Lack of access to ophthalmic services and use of traditional medicines during the onset of blindness were reported by nearly half of the cohort. The attitude towards blindness was negative in two thirds of subjects.

**CONCLUSIONS.** Cataract and glaucoma were important determinants of visual impairment in the fellow eyes of this cohort. These patients are at higher risk of developing bilateral impairment and need special care to prevent/treat visual disabilities in the fellow eyes. Using appropriate services, one can attempt attitudinal changes, rehabilitate them, and create a positive attitude towards life. (*Eur J Ophthalmol* 2007; 17: 418-23)

**KEY WORDS.** Unilateral blindness, Oman, Barriers of visual disability

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## INTRODUCTION

In the VISION 2020 global initiative, the main emphasis is on reducing bilateral blindness, as it causes a sub-

stantial health burden on society (1). In contrast, people with unilateral blindness continue their routine activities like normal sighted persons. Hence, they often ignore their eye care. Many diseases like glauco-

ma, complications of diabetes, hereditary retinal dystrophies, and age-related macular degeneration (AMD) often begin as a problem of one eye but the fellow eye is always at risk and bilateral visual disabilities take place in later years. Hence, to reduce the burden of all types of visual disabilities, national programs should address unilateral blindness in addition to bilateral blindness. Estimating the magnitude and finding the causes of unilateral blindness enables decision makers to adopt a program approach. If the barriers faced by unilaterally blind patients and their current attitude towards life and eye care are known, one can motivate them to attend timely and regular follow-up. Such studies in developing countries are important as access to eye care services is difficult.

Oman has experienced rapid socioeconomic development in the last two decades (2). The quality of life of residents has improved considerably. However, the elderly population, as a result of their visual disabilities, faces hardships. In a population-based survey in Oman in 1996–1997, the prevalence of bilateral blindness was 1.1% and the prevalence of unilateral blindness was 1.67% (3). Cataract and corneal opacities were the major causes of blindness. The World Health Organization recommended definitions of blindness were used in this survey. This study and many more have proven to be useful tools in the planning of eye care programs. The public's concept of blindness is no light perception. Concerns about barriers, social reasons, and outlook towards life, which are important aspects to a good quality of life for the visually impaired, have not been investigated by health researchers. Hence, we carried out a study at Rustaq Hospital in the South Batinah region of Oman to examine a more holistic approach to care for the visually impaired.

In 1994, a new hospital with modern eye care facilities was commissioned at Rustaq (4). Earlier, in the 1980s and early 1990s, people living in the mountainous terrain has no access to standard eye care. Also, people from the coastal part of the region had to travel more than 150 Km to reach Muscat, the capital. The roads and transport were sparse in the 1970s. Thus the risk of severe visual impairment in this trachoma endemic area of South Batinah during this period was very high. The study area thus could be representative of a developing country that has evolved

in the recent past and continues to show eye problems in large proportions among the elderly population.

We conducted this study to estimate the rate of unilateral absolute blindness. We assessed the causes and barriers responsible for such disability. Comorbidities in the fellow eye were evaluated. We also determined the participants' attitude towards life and their disability.

## METHODS AND MATERIALS

This was a hospital-based historical cohort study. Eye patients visiting Rustaq Hospital between January and June 2002 were the study population. Patients who had lost vision in one eye in the past and had no light perception in either eye were included in the cohort. Two qualified ophthalmologists, two Arabic-speaking nurses, and one optometrist were the field investigators. We interviewed patients and accompanying relatives to collect personal details like age, sex, and area of residence. The ophthalmologist and the nurse noted a detailed history regarding the onset and duration of blindness, access to health facilities in the past, availability of transport, and use of traditional medicines for their eye care.

The ophthalmologists used the biomicroscope to examine the anterior segment of eyes. They measured intraocular pressure by applanation tonometer and examined the posterior segment by panretinal indirect ophthalmoscope and Volk Lens. Presenting and best possible vision was recorded using Snellen's distant vision chart.

The data were recorded on a pretested standardized form and information was computed using a Microsoft XL® spreadsheet. Univariate parametric analysis was conducted using Statistical Package for the Social Studies (SPSS-9). Frequencies, percentage proportions, and 95% confidence intervals (CI) were calculated.

The health authorities gave consent for this study. Verbal consent of the patients was obtained for participation. The names were delinked from other outcomes to maintain confidentiality. All subjects with ocular and systemic health problems were provided free eye care and counseling.

For most people in Rustaq Wilayat, the interior areas

are inaccessible due to the mountainous terrain. Lack of transport was defined as residing in remote villages not connected by asphalted roads to the region's capital Rustaq and not having a vehicle.

If a primary health care center (PHC) did not exist within 10 Km of the house, we considered such people as without access to primary care. Prior to 15 years ago, no organized eye care services were available in the region. Old Rustaq Hospital was without specialized equipment. Primary eye care was not integrated in PHCs before 1995. Hence it could be said that eye patients were without access to modern eye care prior to 1996.

## RESULTS

We examined 12,000 patients. Absolute unilateral blindness (no perception of light) was present in 122 (1.0%). Characteristics of our cohort are given in Table I. The cohort had more women and elderly subjects. No light perception (NLP) was noted in the left eye of 62 persons and in the right eye of 60 persons.

The principal causes of blindness in eyes with NLP were evaluated. Causes and variations by sex, duration, type of onset, and age at onset are given in Table II. Phthisis bulbi and absolute glaucoma were the main causes of blindness. In the eyes with phthisis bulbi,

loss of vision was attributed to infection in the eye. Only two eyes had history of ocular trauma before developing infection in the eye that resulted in phthisis bulbi.

**TABLE I - CHARACTERISTICS OF PATIENTS WITH UNILATERAL ABSOLUTE BLINDNESS**

Variant	No.	%	
Sex	Male	49	40.2
	Female	73	59.8
Age group, yr	Less than 20	2	1.6
	20 to 39	6	4.9
	40 to 59	48	39.3
	60+	66	54.1
Eye involved	Right	60	49.2
	Left	62	50.8
Area of residence	South Batinah region	93	76.2
	Rustaq Wilayat	71	58.2
	Barka Wilayat	2	1.6
	Mussana Wilayat	14	11.5
	Nakhal Wilayat	5	4.1
	Al Awabi Wilayat	7	5.7
	North Batinah region	23	26.8
	Suwaiq Wilayat	22	18
	Saham Wilayat	1	0.8
Total	122		

**TABLE II - PROFILE OF BLIND EYES**

	No.	%	95% Confidence interval
<b>Type of onset</b>			
Gradual	78	63.9	53.3 to 74.6
Sudden	42	38.4	20.1 to 48.8
Undetermined	2	1.6	
<b>Duration of blindness, yr</b>			
<5	34	27.9	
5 to 9	21	17.2	
10 to 15	13	10.6	
15+	54	44.3	
<b>Age at onset of blindness (1 missing), yr</b>			
<20	26	21.5	
20 to 39	13	10.7	
40 to 59	11	9.1	
60+	71	58.7	
<b>Principal cause of blindness</b>			
Phthisical/absent/disorganized eyeball	64	52.5	40.2 to 64.7
Corneal opacity/dystrophy	8	6.6	
Glaucoma	48	39.3	25.5 to 53.2
<b>Posterior segment pathology</b>	2	1.6	

**TABLE III - OCULAR PROFILE OF THE FELLOW EYE**

		No.	%
<b>Vision</b>	Less than 3/60	18	14.75
	3/60 to 6/60	26	21.3
	6/60 to 6/18	26	21.3
	>6/18	10	8.2
	Undetermined	42	34.4
<b>Ocular ailments</b>	Absolute glaucoma	4	3.3
	Aphakia with comorbidity	22	18.0
	Corneal opacity/dystrophy	11	9.0
	Glaucoma	15	12.3
	Cataract with comorbidity	30	24.6
	Intraocular lens implanted	26	21.3
	Disorganized globe	2	1.6
	Refractive error	2	1.6
	Operated for glaucoma	2	1.6
	Complications of diabetes	1	0.8
	Macular/retinal degeneration	3	2.5
	Other	1	0.8
	Normal eye	3	2.5

**TABLE IV - PERCEPTION OF BARRIERS AT THE TIME OF BLINDNESS ONSET IN PATIENTS WITH UNILATERAL ABSOLUTE BLINDNESS**

Barriers	No.	%
Lack of transport	67	54.9
Lack of primary health care in village	54	44.3
Lack of ophthalmic services near to residence	61	50.0
Use of traditional medicine for treating eye condition	62	50.8

The majority of patients attended the eye clinic to treat the functional eye that had residual vision. In these eyes, the presenting visual acuity was grouped into blindness, legal blindness, and low vision. The profile of the fellow eyes is given in Table III. The majority of the participants in our cohort had compromised vision in the fellow eye. Glaucoma was the leading eye disease in the fellow eye. Many patients had undergone either cataract surgery or glaucoma surgery in the fellow eye.

The perception of barriers at onset of blindness is

given in Table IV. Sixty-seven (54.9 %) patients could not access the medical services at the onset of blindness. This was either due to lack of transport or non-availability of eye care near their villages. Barriers that are common in a developing country were reported by more than half of our cohort.

Forty (32.8%) persons with one eye with absolute blindness had a positive attitude towards blindness and life following visual disability. The responses of 82 (67.2%) persons in our cohort suggested that they underwent a difficult time and had complaints towards eye care provided and circumstances leading to the visual impairment. They faced difficulties as they could not perform daily activities after total vision in one eye was lost.

## DISCUSSION

In this hospital-based study of 12,000 patients, the rate of unilateral absolute blindness was 1.0%. Various population-based and hospital-based studies suggest that the prevalence of unilateral blindness varies from 3.8% to 9.1% (5, 6). This prevalence has been based on visual acuity of <3/60 or 6/60 in the better eye. The subjects in our study had NLP in the blind eye. Hence, comparison of our results with other studies using different definitions of blindness should be done with caution.

In our study, disorganized eyeball (53%) and glaucoma (40%) were the main causes of absolute unilateral blindness. Corneal opacities were responsible for only 6% of eyes with absolute unilateral blindness. This study was conducted in a trachoma endemic area; hence such a low proportion of trachoma-related corneal blindness is unusual. This cause was responsible for 9% of unilateral blindness in an urban hospital in Texas and 20% of unilaterally blind subjects in a survey in Ethiopia (7, 8). The residual vision in eyes with sequel of trachomatous corneal opacities could have resulted in more visual impairment but not to the extent of absolute blindness among our cohort.

Dandona et al reported corneal disease (23.2%), cataract (22.5%), retinal disease (18%), and optic atrophy (12.9%) as the main causes of unilateral blindness in South India (9), whereas amblyopia, AMD, and diabetic retinopathy were the most common causes of unilateral blindness, accounting for 28.6%, 16.7%, and 9.5% of all

unilateral blindness, respectively, in a study in Denmark (10). Thus, the causes of unilateral blindness differ in developing countries and industrialized countries and Oman's absolute unilaterally blind subjects had a mixture of causes found in both developing and developed countries.

Absolute glaucoma was the most common cause of absolute blindness in our study. The fellow eye with vision had glaucoma in more than 50% of cases. Glaucoma was responsible for 8.8% of unilaterally blind cases in a population-based survey in Oman (11). Compliance with the medical treatment of glaucoma was very poor in Oman (12). A preliminary report of the national glaucoma survey that was conducted in 2005 suggested that the prevalence of glaucoma was 4.75% (Khandekar R, Mohammed AJ, Al Raisi A. Prevalence and determinants of glaucoma in Oman. Poster presented at the World Ophthalmology Congress; Sao Paulo, Brazil; 2006). Thus, the risk of glaucoma in a person with unilateral absolute blindness is high and should be ruled out.

Posterior segment pathology (optic atrophy) was responsible for absolute unilateral blindness in only two patients. In contrast, AMD was the major cause of blindness in developed countries (13). However, eyes with AMD have peripheral vision. Hence they are less likely to have absolute unilateral blindness. Due to many eyes with anterior segment pathologies, the causes of posterior segment resulting in blindness were less in our study compared to that reported in industrialized countries.

Lack of modern eye services in the past was a major constraint in our study area. Fifty-five percent of patients became blind more than 10 years ago, when primary care and secondary care hospital services were evolving in Oman.

Use of traditional treatments like Basam and plant sap, which was popular 10 years ago in Oman, is still practiced in many African countries (14). This might be the reason for advanced visual disabilities and perhaps delay in proper eye treatment. Poor socioeconomic status and lack of transport were also responsible for delayed or no treatment in many cases. Expansion of PHC services in remote areas, training of medical doctors and nurses in primary eye care, and provision of transport to such patients, with urgent attention and counseling of the patients and their relatives for proper and timely eye care, are strategies that should be adopted to reduce visual disability.

We evaluated the impact of visual disability on quality of life as per the perception of the elderly patients. These people also had other morbidities in the fellow eye. Hence, the contribution of absolute blindness in deterioration of the quality of life is difficult to assess. Literature suggests that moderate to severe noncorrectable unilateral impairment was associated with poorer SF-36 profiles (15).

The event precipitating loss of vision and its details were collected through personal interviews. Recall bias could have influenced the outcomes especially in patients with very long duration of blindness. The study covered only patients with blindness visiting an ophthalmic unit. These patients are likely to have severe problems. In addition, one blind eye without a problem in the fellow eye and patients visiting other institutions were not included in our study. Hence the results of our study should be extrapolated to the study area with caution.

Clinicians should pay close attention to early detection of eye ailments in the fellow eye of a patient with unilateral absolute blindness. Proper counseling, taking preventive steps, and protecting the working eye is crucial. Patients and their relatives should also be encouraged to be more responsible for their eyes and undergo periodic checkup of both eyes. The risk of malignant changes in the absolute blind eye has been reported to be high and therefore should be evaluated periodically (16). A feasibility study may need to be undertaken to register such cases in Oman, which has a limited and manageable population with such disabilities. The national program should also establish a defaulter retrieval system for persons with unilateral absolute blindness.

## CONCLUSIONS

The prevalence of unilateral absolute blindness was 1.0% in our series. Corneal infections in the past resulted in phthisis bulbi in many patients. Disorganized eyeball and glaucoma were the major causes of absolute unilateral blindness. Most of the hospital visits by these patients were to take care of the fellow eye. Eyes with absolute blindness are often neglected. According to the patients, lack of access to health services in the past was the main reason for absolute blindness in one eye.

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## REFERENCES

1. Pararajasegaram R. VISION 2020: the right to sight: from strategies to action. *Am J Ophthalmol* 1999; 128: 359-60.
2. World Health Report 2000. Health Systems: Improving Performance. Geneva: WHO; 2000: 200.
3. Khandekar R, Mohammed AJ, Negrel AD, Riyami AA. The prevalence and causes of blindness in the Sultanate of Oman: the Oman Eye Study (OES). *Br J Ophthalmol* 2002; 86: 957-62.
4. Ministry of Health, Sultanate of Oman. 6th Five-Year Health Plan. Al Zahra Printers; 2001.
5. Newland HS, Hiller JE, Casson RJ, Obermeder S. Prevalence and causes of blindness in the South Australian population aged 50 and over. *Ophthalmic Epidemiol* 1996; 3: 97-107.
6. Al-Bdour MD, Al-Till MI, Abu-Khader IB. Causes of blindness among adult Jordanians: a hospital-based study. *Eur J Ophthalmol* 2002; 12: 5-10.
7. Apte RS, Scheufele TA, Blomquist PH. Etiology of blindness in an urban community hospital setting. *Ophthalmology* 2001; 108: 693-6.
8. Melese M, Alemayehu W, Bayu S, et al. Low vision and blindness in adults in Gurage Zone, central Ethiopia. *Br J Ophthalmol* 2003; 87: 677-80.
9. Dandona L, Dandona R, Srinivas M, et al. Unilateral visual impairment in an urban population in southern India. *Ind J Ophthalmol* 2000; 48: 59-64.
10. Buch H, Vinding T, La Cour M, Nielsen NV. The prevalence and causes of bilateral and unilateral blindness in an elderly urban Danish population. The Copenhagen City Eye Study. *Acta Ophthalmol Scand* 2001; 79: 441-9.
11. Ministry of Health. Causes of blindness. In: Report on the Prevalence of Blindness and Common Eye Diseases in Oman 1996-97. Muscat, Oman: Mazoon Printers.
12. Khandekar R, Shama Mel-S, Mohammed AJ. Noncompliance with medical treatment among glaucoma patients in Oman-a cross-sectional descriptive study. *Ophthalmic Epidemiol* 2005; 12: 303-9.
13. Wang JJ, Foran S, Mitchell P. Age-specific prevalence and causes of bilateral and unilateral visual impairment in older Australians: the Blue Mountains Eye Study. *Clin Exp Ophthalmol* 2000; 28: 268-73.
14. Prajna NV, Pillai MR, Manimegalai TK, Srinivasan M. Use of traditional eye medicines by corneal ulcer patients presenting to a hospital in South India. *Ind J Ophthalmol* 1999; 47: 15-8.
15. Chia EM, Mitchell P, Rochtchina E, Foran S, Wang JJ. Unilateral visual impairment and health related quality of life: the Blue Mountains Eye Study. *Br J Ophthalmol* 2003; 87: 392-5.
16. Vemuganti GK, Jalali S, Honavar SG, Shekar GC. Enucleation in a tertiary eye care centre in India: prevalence, current indications and clinicopathological correlation. *Eye* 2001; 15: 760-5.