SYSTEMATIC REVIEW OF POPULATION-BASED STUDIES OF THE PREVALENCE OF CATARACTS

REVISIÓN SISTEMÁTICA DE ESTUDIOS POBLACIONALES DE PREVALENCIA DE CATARATA

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ABSTRACT

Objective: The prevalence of cataracts has increased due to the progressive ageing of the population and the fact that cataracts affect a wide and increasing proportion of the population. The goal of the present study was to describe the prevalence of cataracts through a systematic and exhaustive review of population-based studies.
Methods: A systematic review of population-based studies of the prevalence and incidence of cataracts was performed. Inclusion criteria were: a healthy non- institutionalised population, older than 40 years of age, of white race, with a sample size of greater than 1,000 and published between 1980 and 2002.
Results: Ten studies met the inclusion criteria (3 European, 5 from the United States and 2 from Australia), and were performed between 1984 and 2001. The cataract prevalence, according to lens opacity criteria, ranged between 15% and 19%. When the cataract was defined as a lens opacity combined with a decreased visual acuity, the preva-

RESUMEN

Objetivo: El envejecimiento de la población ha provocado un aumento de la prevalencia de cataratas afectando a una amplia y creciente proporción de la población. El objetivo del presente estudio es describir la prevalencia de catarata a partir de estudios poblacionales mediante una revisión bibliográfica sistemática y exhaustiva.
Métodos: Se realizó una búsqueda sistemática de estudios poblacionales de prevalencia e incidencia de cataratas, realizados en población sana no institucionalizada, mayor de 40 años, de raza blanca, con una muestra superior a 1.000 individuos y cuyo año de publicación estuviera entre 1980 y 2002.
Resultados: Diez estudios cumplieron con los criterios de inclusión (3 europeos, 5 de Estados Unidos y 2 australianos), realizados entre 1984 y 2001. La prevalencia de catarata según opacificación del cristalino en los estudios que la describen estaba entre el 15 y 19%. Cuando se define catarata como opacificación y nivel de agudeza visual conjunta-

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lence ranged from 15% to 30%. The overall prevalence increased with age, reaching 40% and more than 60% in populations older than 70 and 75 years respectively. The prevalence among women was higher than that among men, with a more marked increase being evident at older ages than for men.
Conclusions: There were variations among the criteria used to measure the prevalence of cataract, which made it difficult to compare all the studies. Overall the prevalence was higher in the older population, especially among women. The increasing prevalence associated with age predicts an increasing burden of cataract to health services, this being particularly related to the ageing of the population *(Arch Soc Esp Oftalmol 2006; 81: 509-516).*

Key words: Systematic review, prevalence, incidence, cataract, visual acuity, lens opacities.

mente los estudios describen prevalencias entre el 15 y 30%. La prevalencia aumenta con la edad, alcanzando entre un 40% y más del 60% de la población a partir de los 70/75 años. Las mujeres tienen una prevalencia mayor que los hombres, con un aumento más pronunciado en edades más avanzadas.
Conclusiones: No existe una forma estandarizada de medir la prevalencia de catarata, lo que dificulta la comparación entre los estudios. La prevalencia de catarata fue mayor en los grupos de mayor edad y entre las mujeres, en especial en edades mayores. La creciente prevalencia asociada a la edad muestra el aumento de la carga poblacional de las cataratas asociada al envejecimiento de la población.

Palabras clave: Revisión sistemática, prevalencia, incidencia, cataratas, agudeza visual, opacidad del cristalino.

INTRODUCTION

Cataracts is a chronic disease associated to the ageing process. The gradual increase of life expectancy has led to a substantial increase in the prevalence of cataracts which affects a growing proportion of the population. The clinical definition of cataracts is a reduction of visual acuity caused by a gradual increase in the opacity of the lens. It frequently arises bilaterally. Until now, the only curing treatment was surgery, which has proved to be highly cost-effective (1,2). The surgical procedure consists in the replacement of the opaque lens by an intraocular lens. This intervention is more frequent in the retired population in developed countries and has experienced a large increase in recent years (1). In addition, a number of criteria have been added as indications for surgery due to the introduction of less invasive techniques which have reduced the surgical risks. These facts indicate the relevance of the disease, both due to its impact in the older population and to its influence on the utilization of health services and the waiting lists for cataracts surgery in many developed countries (3). However, regardless of the importance of this disease for health policies and services (4), there aren't many studies assessing the prevalence of cataracts in the general population due to the logistical difficulties inherent in taking clinical measurements of large numbers of patients, in addition to the considerable financial and time resources required.

Accordingly, it is relevant to establish with precision the proportion of patients suffering said disease and who are potential users of selective and cataracts surgery. The objective of this paper is to describe, by means of a systematic and comprehensive bibliographic review, the prevalence of cataracts based on population studies of population groups similar to that of Spain.

SUBJECTS, MATERIAL AND METHODS

Cataracts prevalence population studies were selected. The strategy for identifying articles consisted in a web search of the Medline database (Pub-MED) using the following key words: prevalence, incidence, cataract, population based study, epidemiology, survey. The Medline search result yielded 238 articles of which 23 were relevant. The abstracts of the articles identified in the search were assessed and copies were obtained of those considered to be most relevant to determine whether they fulfilled the inclusion criteria. In addition, a search was made of the articles referenced in the selected articles and a search for related articles. Furthermore, we accessed other literature reviews published in

the websites of the National Eye Institute, Alberta University (Western Canada Waiting List Project) and the NHS Center for Reviews and Dissemination, British Columbia University, Department of Health (United Kingdom).

The inclusion criteria were as follows: a) population studies of healthy non-institutionalized adults over 40 and white race (similar to the population of Spain), b) a minimum sample of 1,000 individuals, c) published between 1980 and 2002, d) including a detailed description of the sample selection process, and e) articles written in English, Spanish, French or Italian.

As cataracts is associated to ageing, detailed attention was given to the studies comprising cataracts prevalence data by age groups and gender. It was verified that the text should specify that the population selected for the study was representative of the age and gender groups of the general population. An aggregate representation was made of all the studies comprising age group prevalence data to assess the tendency of prevalence according to age. Subsequently, the age group values for men and women were represented separately. In addition, as the cataracts prevalence is an indicator of the pace of appearance of the disease in the population and is closely linked to prevalence, the search also considered the studies providing information about the prevalence of cataracts.

RESULTS

Ten studies are described: 3 from Europe, 5 from the USA and 2 from Australia. Three were carried out in the eighties and the rest in the nineties. The percentage of selected individuals who responded the survey ranged between 67 and 84% (table I).

For measuring the presence of cataracts, the studies utilized three types of measurements: the ensuing visual acuity (VA) deficit, the opacification of the lens and its combination, i.e. Presence of opacification with a given VA level.

The studies made in Rotterdam (5), Baltimore (6,7), SEE (8), Casteldaccia (9,10) and VER (11) measured the presence of visual deficit only the VA level and reported the proportion of which is attributed to cataracts. North London (12), Framingham (13), Casteldaccia (9,10) and Beaver Dam (14) assessed the VA and opacification criteria jointly, while the latter also assessed the opacification criterion separately. As for the Australian studies, Blue Mountains (15,16) and VIP (17-19) assessed VA and opacification separately.

To assess the prevalence of cataracts according to the presence of opacification (i.e., the morphological criterion) we utilized classification systems which group the types of cataracts (opacification) per size and location in the lens (the nucleus, cortex or posterior capsule). The most frequently used systems are the Lens Opacification Classification System (LOCS), Wilmer, and the Wisconsin classification system.

To assess the prevalence of cataracts jointly by opacification and VA level (i.e., the functional criterion), cataracts is defined as the presence of any lens opacification accompanied by a certain visual acuity level. The most widely used level is below or equal to 0.7.

The definition of cataracts prevalence characterized by the VA deficit is commonly determined by the visual deficit definition established by the World Health organization (WHO) and utilized in the United States for issuing driving licenses (20). The basis was the corrected vision in the best eye. The WHO definition of severe visual deterioration consists in a decimal visual acuity between 0,05 and 0,3, whereas Vas under 0,05 are considered as blindness. In the US, a severe visual deterioration is considered to be a VA between 0,1 and 0,5 and blindness when below 0,1.

Total prevalence figures vary considerable from 5% to 30%. The studies which assess VA only do not provide raw prevalence data (the prevalence figures in table I were calculated on the basis of the frequencies contained in the respective article). The lowest prevalence is that described in the Beaver Dam study (14), of 5%, corresponding to the Wisconsin criterion: any opacity and corrected VA of ≤ 0,7 in the best eye; this value increases to 14,2% when utilizing the same criterion but assessed on the worst eye. The Casteldaccia study (9,10), with VA and opacification, found a prevalence of 19,4% in a population over 40, while the North London Eye Study (12) found a prevalence of 30% utilizing the same criterion. However, these differences could be explained because this study comprised a population group over 65.

On the other hand, when using only the opacification criterion, the prevalence is of 15,4% in Beaver Dam (14), 18% in VIP (17-19) and 19,6% in the Blue Mountains study (15,16). The latter comprises a population a few years older than the other two studies (over 49).

Table I. Characteristics of the selected studied, cataracts prevalence and criteria utilized for calculation

Study	Year	Sample size	% R*	Age	Measurement	Criterion	Prevalence (%)
Europe							
Rotterdam	1990-1993	6.775	84,8	55+	VA	WHO (VA≤ 0,3)	0,52
Casteldaccia	1994	1.068	67,3	40+	VA	WHO (VA≤ 0,3)	0,65
					Op + VA	LOCS II: any opacity with a corrected VA ≤ 0,7 in the worst eye	19,4
North London	1995-1996	1.547	84	65	+ Op + VA	LOCS II: any opacity With VA and ≤ 0,5 in one or both eyes	30,0
United States							
Framingham	1984	2.477		52+	Op + VA	Any opacity with a corrected VA of ≤ 0,7 in the worst eye	15,5
Baltimore	1985-1988	5.300	79	40+	VA	USA (VA≤ 0,5)	0,91
Beaver Dam	1988-1990	3.684	83	43+	Op	Wisconsin: nuclear opacity>4, or	15,3/15,5
					Op + VA	cortical>25%, or subcapsular posterior>5% in the right/left eye	
						Wisconsin: Any opacity with a corrected VA ≤ 0,7 in the best/worst eye	5,0/14,2
SEE	1993	2.519	66	65-84	VA	USA (VA≤ 0,5)	1,08
VER	2001	4.774	72,0	40+	VA	USA (VA≤ 0,5)	0,94
Australia							
Blue Mountains	1992-1994	3.654	82,4	49+	Op	Wisconsin: nuclear opacity>4, or	19,6
					VA	cortical opacity >25%, or subcapsular posterior>5% in the right eye	
VIP	1992-1996	3.271	83	40+	VA	WHO (VA≤ 0,3)	0,47
					Op	Wilmer: nuclear opacity ≥ 2, or cortical opacity >4/16, or any subcapsular posterior opacity in one or both eyes	18,0

*: Response percentage; VA: Visual Acuity; Op: Lens Opacity; Op + VA: Combined criterion (opacity + visual acuity); LOCS II: Lens Opacities Classification System; Wilmer: Wilmer Cataract Grading System; Wisconsin: Wisconsin Cataract Grading System.

Table II shows for the respective study the cataract prevalence results per age group. Although there are large variations between the age groups utilized in each study, it can be seen that the prevalence of cataracts increases with age and reaches around 50% for the age group over 70.

In turn, table III illustrates the prevalence of cataracts per age and gender. There is a greater prevalence of cataracts in women, which increases with age. There are differences of up to 9% in the age group 65-75 and of up to 27% for those over 85 in the Blue Mountains study (15,16).

According to the Australian VIP study (17-19), 38% of men and 54% of women between 70 and 79 years exhibited cataracts based on the opacification criterion. The studies which assessed older age groups reveal that this disease would be present in about two thirds of the population. In the North London Eye Study (12), with a joint assessment of opacification and VA, 58,8% of men and 75,6% of women exhibited cataracts, whereas the Blue Mountains study (15,16) points out that 56,5% of men in the same age group and 83,8% of women have cataracts according to the lens opacity criterion. Figure 1 shows the variations between studies and the age-related curve.

In what concerns the magnitude of the prevalence of bilateral cataracts, three studies (12,17,21) point to a greater proportion of individuals who exhibit cataracts in both eyes at the assessment, in comparison with the unilateral cataracts prevalence. On the other hand, the prevalence of bilateral cataracts is greater among women than men (table IV).

Of all the studies under analysis, only two (Beaver Dam (21) and Blue Mountains (22)) (table V) carried out a follow-up of the cohort to

Table II. Prevalence (in %) of cataracts per age groups

Study	Age groups									
	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
VIP (Op)	40-49		50-59		60-69		70-79		80-89	
Total	2.6		6.7		23.2		46.1		61.1	
Beaver Dam (Op)		43-54		55-64		65-74			75+	
Total right eye		0.5		5.5		24.0			52.2	
Total left eye		0.6		5.7		24.8			51.8	
Blue Mountains (Op)		43-54		55-64		65-74		75-84		85+
Total		2.7		5.0		21.6		53.6		71.7
North London (Op+VA)						65-69	70-74	75-79	80-84	>85
Total						16.3	24.4	41.5	58.5	70.6
Casteldaccia (Op+VA)	40-49		50-59		60-69		70+			
Total	4.0		8.7		21.5		54.4			
Framingham (Op+VA)				52-64		65-74				75+
Total				3.4		13.2				40.8
Beaver Dam (Op+VA)		43-54		55-64		65-74		75-84		
Total worst eye		1.6		7.2		20.0		43.4		
Total best eye		0.2		0.7		6.3		21.0		

identify the prevalence of cataracts. The former defined cataracts as the presence of opacification in one or both eyes, while the second defines bilateral and unilateral cataracts on the basis of the visual deficit, with a VA threshold below 0,5. It must be taken into account that the latter study includes surgery-related complications as cataracts. As evidenced with the prevalence, the rates are higher when defining cataracts in terms of opacification than with the combined criterion of VA + opacification. It can also be seen that the prevalence is markedly lower in the Blue Mountains study (22) against the Beaver Dam study (21) (table V).

Table III. Prevalence (%) of cataracts per age group and gender

Study	Age groups									
	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
VIP (Op)	40-49		50-59		60-69		70-79		80-89	
Men	2,6		7,5		19,9		38		53,6	
Women	2,6		6,1		26,6		54		67,4	
Beaver Dam (Op)		43-54		55-64		65-74		75-84		
Men		0,1		3,4		20,1		42,9		
Women		0,9		7,3		26,8		57,5		
Blue Mountains (Op)			49-54	55-64		65-74		75-84		85+
Men			1,5	5,4		19,1		48,4		56,5
Women			3,7	4,7		23,6		57,6		83,8
North London (Op+VA) (worst eye)						65-69	70-74	75-79	80-84	85+
Men						15,6	21,1	38,7	48,1	58,8
Women						16,9	26.9	43,6	63,5	75,6
Casteldaccia (Op+VA)	40-49		50-59		60-69			70+		
Men	3,5		9,2		20,2			45,7		
Women	4,3		8,4		22,664,4					
Framingham (Op+VA)				52-64		65-74			75+	
Men				3,3		11,9			33,6	
Women				3,5		14,1			45,3	
Beaver Dam (Op+VA)		43-54		55-64		65-74		75-84		
Men (worst eye)		0,4		3,9		14,3		38,8		
Women (worst eye)		2,6		10,0		23,5		45,9		
Men (best eye)		0		0,3		3,4		12,6		
Women (best eye)		0,4		1,0		8,3		25,4		

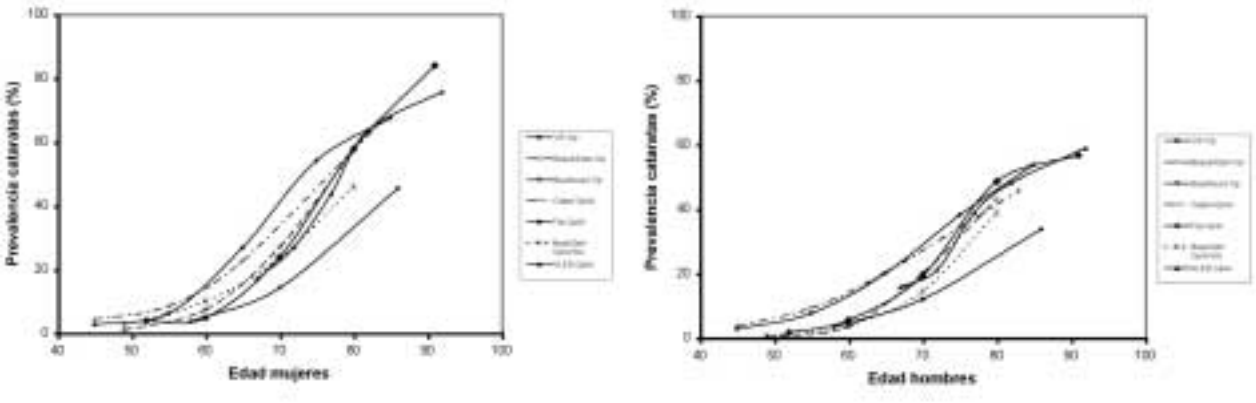

Fig. 1: prevalence of cataracts per age and gender.

The only study showing disaggregated prevalence data is the Beaver Dam study (21), which shows a growing tendency (table VI) as occurred with prevalence. However, in the two first age groups the prevalence is greater among women than men, in contrast with the two last studies where the prevalence is higher amongst men.

Table IV. Prevalence (%) of unilateral and bilateral cases

	Unilateral	Bilateral
Framingham		
Men	5,3	5,1
Women	6,0	8,2
Total	5,6	6,9
VIP		
Men	6,5	9,7
Women	7,2	12,6
Total	6,8	11,2
Blue Mountains		
Total	2,7	6,0

DISCUSSION

To date there are no cataracts prevalence studies for the Spanish population. However, the studies included in this review have been made in countries with populations sharing similar characteristics with that of Spain, mainly as regards race and development levels. Accordingly, the estimates reported and described in this review provide valid information for assessing the burden of this disease in our country.

The review reveals the absence of a standardized criterion for defining the presence of cataracts, which hinders comparisons between each. All the studies include parameters involved in cataracts such as visual acuity (in isolation or in combination) and opacification of the lens, as criteria for assessing the presence of cataracts. We did not find studies including estimated prevalence rates based on the degree of disability cataracts produce in patients. This is relevant since in clinical practice one of the predominant criteria for determining the need of surgical treatment is the functional limita-

Table V. Cataracts prevalence studies

Study	Period of first and second assessment	Time between assessments	Age	Pop. at risk	Total	Men	Women	Definition of cataracts
Beaver Dam	1988-90 1993-95	4,8 years	43-86	2,346 eyes	24,4%	22,6%	26,0%	Opacification as per Wisconsin
Blue Mountains	1992-94 - 1997-99	5 years	49+	2,142 patients	3,4% 0,88%			VA <0,5 and unilateral cat. VA <0,5 and bilateral cataract

* unilateral cataract; ** bilateral cataract.

Table VI. Cataract prevalence (%) in one or both eyes, stratified by age group and gender. Beaver Dam study

Beaver Dam	Age groups			
	43-54	55-64	65-74	75-86
Men	6,8	21,6	59,7	73,5
Women	9,6	31,1	54,4	66,7
Total	8,3	26,5	56,7	70,5

tions caused by cataracts, frequently independently of the level of VA or lens opacification (1). For this reason, the prevalence rates convey the impact of this disease on the population, but additional studies are required to quantify the need for cataracts surgery.

The studies assessing the prevalence of cataracts according to the morphological definition (lens opacification) set forth percentages ranging from 15 to 20%, whereas when including VA associated to lens opacification the range broadens, reaching a prevalence of up to 30% in a population aged 65 or more in the North London survey (12). In what concerns the bilaterality of the cataracts, the majority of measurements consider the most affected eye. However, some report the presence of cataracts in both eyes, therefore allowing us to deduce the bilateral development of the disease.

Even with said differences in defining the disease and in the populations surveyed, we observe an increase in the prevalence of cataracts associated to age. At lower ages (50-55) the prevalence rates are low, in the range of 0,2% to 7%, while in intermediate age groups (55-65 approx.) cataracts affect about 20% of the population and, after 70-75 years of age, cataracts affect between 40 and over 60% of the population. In turn, the results show that in almost all studies women exhibit more cataracts than men, and this difference increases with age. Some explanations offered for this include the longer survival rate of women, their exposure to cataract risk factors linked to reproduction and differences in the access to and utilization of health services (23).

Very few studies have reported estimates on the prevalence of cataracts, possibly because the progression of this disease is slow, therefore requiring long follow-up periods in addition to the complexity of determining the starting point.

To conclude, cataract is particularly associated to the ageing process, with growing prevalence amongst the aged and women. This profile allows us to foresee a growing importance of this disease due to the marked population ageing tendency occurring in developed countries. In this regard, estimates indicate that the world population will increase one third in the next 15 years while the group over 65 years of age will more than double in the same period (20). Spain also follows this tendency: projections show that by 2020 nearly a fifth of the population in our country will be over 65, amounting to 9 million people (24) liable to suffering senile cataract. On the other hand, the cataracts surgery rates have increased significantly in developed countries, which has reduced the impact of cataracts on the amount of people with high visual disability and blindness. However, considering the ageing population and the broadening of criteria for indicating surgery, the increased amount of operations has not been able to reduce the gap between the number of people needing surgery and actual access to the surgery room (25,26).

REFERENCES

1. *O'Day DM. Management of cataract in adults. Quick reference guide for clinicians. The Cataract Management Guideline Panel of the Agency for Health Care Policy and Research. Arch Ophthalmol 1993; 111: 453-459.*
2. *Desai P, Reidy A, Minassian DC, Vafidis G, Bolger J. Gains from cataract surgery: visual function and quality of life. Br J Ophthalmol 1996; 80: 868-873.*
3. *Bellan L, Mathen M. The Manitoba Cataract Waiting List Program. CMAJ 2001; 164: 1177-1180.*
4. *Taylor HR. Cataract: how much surgery do we have to do? Br J Ophthalmol 2000; 84: 1-2.*
5. *Klaver CC, Wolfs RC, Vingerling JR, Hofman A, de Jong PT. Age-specific prevalence and causes of blindness and visual impairment in an older population: the Rotterdam Study. Arch Ophthalmol 1998; 116: 653-658.*
6. *Rahmani B, Tielsch JM, Katz J, Gottsch J, Quigley H, Javitt J, et al. The cause-specific prevalence of visual impairment in an urban population. The Baltimore Eye Survey. Ophthalmology 1996; 103: 1721-1726.*
7. *Tielsch JM, Sommer A, Witt K, Katz J, Royall RM. Blindness and visual impairment in an American urban population. The Baltimore Eye Survey. Arch Ophthalmol 1990; 108: 286-290.*
8. *Munoz B, West SK, Rubin GS, Schein OD, Quigley HA, Bressler SB, et al. Causes of blindness and visual impairment in a population of older Americans: The Salisbury Eye Evaluation Study. Arch Ophthalmol 2000; 118: 819-825.*
9. *Giuffre G, Giammanco R, Di Pace F, Ponte F. Casteldaccia eye study: prevalence of cataract in the adult and elderly population of a Mediterranean town. Int Ophthalmol 1994; 18: 363-371.*

10. *Ponte F, Giuffre G, Giammanco R. Prevalence and causes of blindness and low vision in the Casteldaccia Eye Study. Graefes Arch Clin Exp Ophthalmol 1994; 232: 469-472.*
11. *Rodriguez J, Sanchez R, Munoz B, West SK, Broman A, Snyder RW, et al. Causes of blindness and visual impairment in a population-based sample of U.S. Hispanics. Ophthalmology 2002; 109: 737-743.*
12. *Reidy A, Minassian DC, Vafidis G, Joseph J, Farrow S, Wu J, et al. Prevalence of serious eye disease and visual impairment in a north London population: population based, cross sectional study. BMJ 1998; 316: 1643-1646.*
13. *Kahn HA, Leibowitz HM, Ganley JP, Kini MM, Colton T, Nickerson RS, et al. The Framingham Eye Study. I. Outline and major prevalence findings. Am J Epidemiol 1977; 106: 17-32.*
14. *Klein BE, Klein R, Linton KL. Prevalence of age-related lens opacities in a population. The Beaver Dam Eye Study. Ophthalmology 1992; 99: 546-552.*
15. *Attebo K, Mitchell P, Smith W. Visual acuity and the causes of visual loss in Australia. The Blue Mountains Eye Study. Ophthalmology 1996; 103: 357-364.*
16. *Mitchell P, Cumming RG, Attebo K, Panchapakesan J. Prevalence of cataract in Australia: the Blue Mountains eye study. Ophthalmology 1997; 104: 581-588.*
17. *VanNewkirk MR, Weih L, McCarty CA, Taylor HR. Cause-specific prevalence of bilateral visual impairment in Victoria, Australia: the Visual Impairment Project. Ophthalmology 2001; 108: 960-967.*
18. *Weih LM, VanNewkirk MR, McCarty CA, Taylor HR. Age-specific causes of bilateral visual impairment. Arch Ophthalmol 2000; 118: 264-269.*
19. *McCarty CA, Keeffe JE, Taylor HR. The need for cataract surgery: projections based on lens opacity, visual acuity, and personal concern. Br J Ophthalmol 1999; 83: 62-65.*
20. *Resnikoff S, Pascolini D, Etya'ale D, Kocur I, Pararajasegaram R, Pokharel GP, et al. Global data on visual impairment in the year 2002. Bull World Health Organ 2004; 82: 844-851.*
21. *Klein BE, Klein R, Lee KE. Incidence of age-related cataract: the Beaver Dam Eye Study. Arch Ophthalmol 1998; 116: 219-225.*
22. *Foran S, Wang JJ, Mitchell P. Causes of incident visual impairment: the Blue Mountains Eye Study. Arch Ophthalmol 2002; 120: 613-619.*
23. *Reidy A, Minassian DC, Desai P, Vafidis G, Joseph J, Farrow S, et al. Increased mortality in women with cataract: a population based follow up of the North London Eye Study. Br J Ophthalmol 2002; 86: 424-428.*
24. *Instituto Nacional de Estadística. Proyecciones de población a partir del Censo 2001 [citado 20 diciembre 2005]. Disponible en: www.ine.es/inebase/cgi/um?M=%2Ft20%2Fp251&O=inebase&N=&L=0*
25. *Minassian DC, Reidy A, Desai P, Farrow S, Vafidis G, Minassian A. The deficit in cataract surgery in England and Wales and the escalating problem of visual impairment: epidemiological modelling of the population dynamics of cataract. Br J Ophthalmol 2000; 84: 4-8.*
26. *Lundstrom M, Stenevi U, Thorburn W. Age-related utilisation of cataract surgery in Sweden during 1992-1999. A retrospective study of cataract surgery rate in one-year age groups based on the Swedish National Cataract Register. Acta Ophthalmol Scand 2001; 79: 342-349.*