

Università degli Studi di Catania

Clinica Oculistica

Direttore: Prof. A. Reibaldi



**Processi fisio-patologici di invecchiamento
delle strutture oculari correlate all' idrodinamica: il glaucoma
Epidemiologia**

A. Longo

*XXXVI congresso S.O.Si.
Acireale, 14-16 aprile 2011*

Epidemiologia:

- ***descrivere la frequenza nella popolazione***
- ***identificare fattori di rischio***

Problemi metodologici

Campione esaminato

Grandezza

Selezione (*in teoria random*)

Parametri valutati

PIO

misurata come, che valore cut-off

nervo ottico

studiato come, cosa è significativo?

campo visivo

studiato come, cosa è significativo?

Esecuzione (*tempo / costi*)

Personale (*formazione personale per uniformità dati*)

Strutture / apparecchiature

studi eseguiti su popolazione di alcune località

variabile rapporto partecipanti/popolazione totale

utilizzati criteri diagnostici differenti



Limite nei risultati

L'EPIDEMIOLOGIA
OTTALMICA
IN ITALIALuciano Cerulli
Mario Miglior
Francesco PonteEditore  L.N.C. Innovazione

NAZIONE	USA	USA	IRLANDA	OLANDA	SUDAFRICA	AUSTRALIA
Località	Baltimore	Beaver Dam	Contea di Roscommon	Rotterdam	Mamre	Blue Mountains
Anno	1985/88	1987/88	1988	1991/93	1992-93	1994-95
Età	40 ed oltre	43-85	50 ed oltre	55 ed oltre	40 ed oltre	49-97
Tipo del campione	random sample	popolazione totale	random sample	random sample	popolazione totale	popolazione totale
Partecipanti	2.913 bianchi	4.926	2.186	4.318	987	3.654
Partecipazione	75,7%	83,1%	99,5%	71,0%	82,7%	82,4%
Perimetro adottato	Humphrey e Goldmann	Henson	Henson	Humphrey e Goldmann	Humphrey	Humphrey
Campi visivi effettuati	88,6% dell'intero campione con l'Humphrey e 5,5% con il Goldmann	94,9% dell'intero campione. 92,3% dei sospetti sono stati ritestati.	Solo i sospetti (55,8% del campione)	Screening dell'intero campione con l'Humphrey. 85,8% dei sospetti con il Goldmann	Solo i sospetti (% non riportata)	88,9% dell'intero campione. 95,5% dei sospetti ritestati
Strategia di indagine perimetrica	Screening con il Full Field 120 o Goldmann. 66 sospetti ritestati con il Goldmann	Screening con 26-stimuli 851 sospetti ritestati con 132-points	132-points	Screening con 76-points ripetuto in 563 soggetti. 205 sospetti ritestati con il Goldmann	88-points three-zone soprasoglia	Screening con 76-points. 336 sospetti ritestati con 30-2
% GPAA	1,29%	2,11%	1,88%	1,10%	1,5%	2,4%
95% C.I.	0,80-1,78	non riportato	1,35-2,53	1,09-1,11	non riportato	2,5-3,6 (con sospetti)

Changing Views on Open-Angle Glaucoma: Definitions and Prevalences— The Rotterdam Study



This Article

Invest. Ophthalmol. Vis. Sci.
October 2000 vol. 41 no.
11 3309-3321

Abstract *Free*

Full Text

Full Text (PDF)

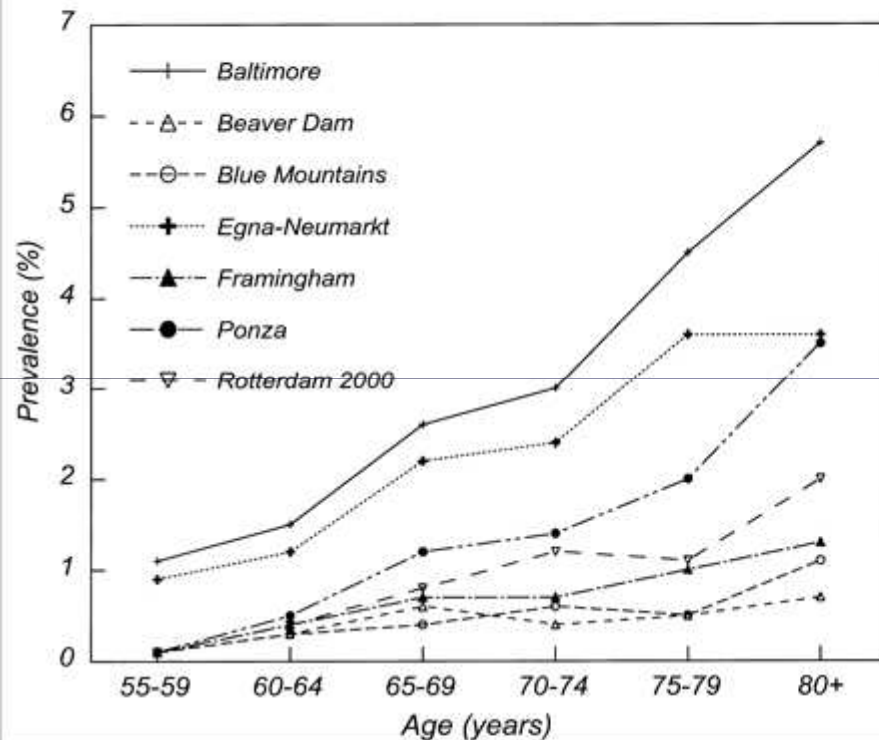


FIGURE 2.

Variation in prevalence figures of OAG in the Rotterdam Study when different criteria for the definition of OAG, as used by other population-based studies, were applied to the Rotterdam data.

Prevalenza nella popolazione esaminata

Studio	Egna	BDES	BES	Roscommon	RS	BMES	BAES	Dalby
Età	> 40	43-84	> 40	> 50	> 55	> 49	40-84	55-69
POAG	1.4	2.1	1.3	1.9	1.1	2.4	0.8	0.9
OH	2.1	-	-	3.6	-	3.7	-	-

Tab 2

Prevalenza di POAG e OH nei principali studi epidemiologici di popolazione

Legenda: Stime di prevalenza di POAG ed ipertensione oculare nei principali studi epidemiologici di popolazione relativamente a soggetti di razza caucasica. BDES: Beaver Dam Eye Study. BES: Baltimore Eye Survey. RS: Rotterdam Study. BMES: Blue Mountains Eye Study. BAES: Barbados Eye Study.

Studio	St. Lucia	BES	BAES	London	KEP
Età	> 30	> 40	40-84	> 35	> 40
POAG	8.8	4.2	7.1	3.9	3.1

Tab 3

Prevalenza di POAG nei principali studi epidemiologici di popolazione

Legenda: Stime di prevalenza di POAG in soggetti di razza nera. BES: Baltimore Eye Survey. BAES: Barbados Eye Study. KEP: Kongwa Eye Project, Tanzania

Studio	Roscommon	BDES	Dalby	BMES	BES Bianchi	BES Neri	Egna
ACG	0.09	0.04		0.3	0.9	0.4	0.6
PEX	1.33		0.07				
Secondari	0.09		0.27	0.2			

Tab 6

Prevalenza di ACG ed altre forme di glaucoma

BDES: Beaver Dam Eye Study. BMES: Blue Mountains Eye Study. BES: Baltimore Eye Survey.

	POAG	ACG	Popolazione
Cina	22.5	22.4	1300
India	5.6	5.6	1450
Asia Meridionale	4.2	4.2	770
Europa	6.9	0.6	1150
Africa	7.0	0.05	724
America Latina	1.3	0.5	510
Medio Oriente	0.6	0.3	330
Totale	48.1	33.65	6224

Tab 1

Prevalenza del glaucoma nel mondo

Legenda: I numeri nelle caselle sono espressi in milioni. Le regioni raggruppano Paesi che dovrebbero avere prevalenze simili di glaucoma. Cina: Cina, Taiwan, Singapore. India: India, Pakistan, Bangladesh, Nepal, Afghanistan, Iran. Asia Meridionale: restante parte dell'Asia e Oceania. Europa: Europa, USA, Canada, Australia, Nuova Zelanda. Africa: Africa sub-sahariana, Carabi, Afro-Americani. America Latina: America centro-meridionale. Medio Oriente: Paesi arabi e nord Africa

Stime della prevalenza nella popolazione generale

Some Statistics About Glaucoma

Sources are listed at the bottom of this page.

- It is estimated that over 4 million Americans have glaucoma but only half of those know they have it. (1)
- Approximately 120,000 are blind from glaucoma, accounting for 9% to 12% of all cases of blindness in the U.S. (2)
- About 2% of the population ages 40-50 and 8% over 70 have high eye pressure.
- Glaucoma is the second leading cause of blindness in the world, according to the World Health Organization.
- Glaucoma is the leading cause of blindness among African Americans. (2)
- Glaucoma is 6 to 8 times more common in African Americans than Caucasians. (3)
- African Americans ages 45-65 are 14 to 17 times more likely to go blind from glaucoma than Caucasians with glaucoma in the same age group.
- The most common form, open-angle glaucoma, accounts for 19% of all blindness among African Americans compared to 6% in Caucasians. (4)
- Other high-risk groups include: people over 60, family members of those already diagnosed, diabetics, and people who are severely nearsighted.
- Estimates put the total number of suspected cases of glaucoma at around 70 million worldwide. (5)

Sources: (1) Prevent Blindness America; (2) National Eye Health Program/National Institutes of Health; (3) American Academy of Ophthalmology; (4) Racial differences in the cause-specific prevalence of blindness in east Baltimore. N Engl J Med. 1991 Nov 14;325(20):1412-7; (5) Quigley, "Number of people with glaucoma worldwide," 1996; (6) NEI, Report of the Glaucoma Panel, Fall 1998



World Glaucoma Week

March 6 - 12, 2011

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ended**[Home](#) >> [What is Glaucoma?](#)

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What is Glaucoma?

Glaucoma is a group of eye diseases that cause progressive damage of the optic nerve at the point where it leaves the eye to carry visual information to the brain.

If left untreated, most types of glaucoma progress (without warning nor obvious symptoms to the patient) towards gradually worsening visual damage and may lead to blindness. Once incurred, visual damage is mostly irreversible, and this has led to glaucoma being described as the "silent blinding disease" or the "sneak thief of sight".

Glaucoma is the second most common cause of blindness worldwide. It is estimated that 4.5 million persons globally are blind due to glaucoma¹ and that this number will rise to 11.2 million by 2020². It is noteworthy that due to the silent progression of the disease - at least in its early stages - up to 50% of affected persons in the developed countries are not even aware of having glaucoma³. This number may rise to 90% in underdeveloped parts of the world.

See activities world-wide



Glaucoma come causa di cecità

Policy and Practice
Visual impairment in 2002

Serge Resnikoff et al.

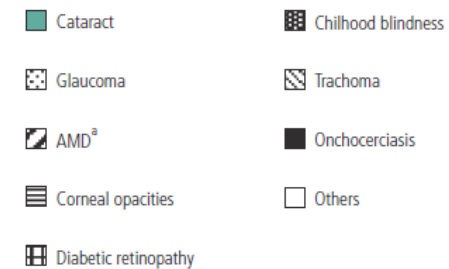
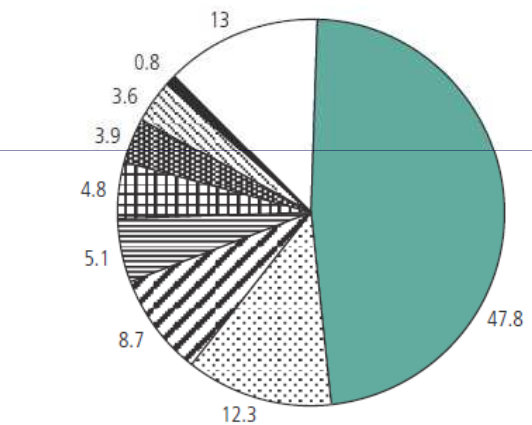
Table 4. Causes of blindness as a percentage of total blindness – by WHO subregion, 2002

Region	Cataract	Glaucoma	AMD ^a	Corneal opacities	Diabetic retinopathy	Childhood blindness	Trachoma	Oncho-cerciasis	Others
Afr-D	50	15		8		5.2	6.2	6	9.6
Afr-E	55	15		12		5.5	7.4	2	3.2
Amr-A	5	18	50	3	17	3.1			3.9
Amr-B	40	15	5	5	7	6.4	0.8		20.8
Amr-D	58.5	8	4	3	7	5.3	0.5		13.7
Emr-B	49	10	3	5.5	3	4.1	3.2		22.2
Emr-D	49	11	2	5	3	3.2	5.5		21.3
Eur-A	5	18	50	3	17	2.4			4.6
Eur-B1	28.5	15	15	8	15	3.5			15.0
Eur-B2	35.5	16	15	5	15	6.9			6.6
Eur-C	24	20	15	5	15	2.4			18.6
Sear-B	58	14	3	5	3	2.6			14.4
Sear-D	51	9	5	3	3	4.8	1.7		22.5
Wpr-A	5	18	50	3	17	1.9	0.025		5.0
Wpr-B1	48.5	11	15	3	7	2.3	6.4		6.8
Wpr-B2	65	6	5	7	3	3.6	3.5		6.9
Wpr-B3	65	6	3	3	5	9.5	4.3		4.2
World	47.8	12.3	8.7	5.1	4.8	3.9	3.6	0.8	13.0

Afr, WHO African Region; Amr, WHO Region of the Americas; Emr, WHO Eastern Mediterranean Region; Eur, WHO European Region; Sear, WHO South-East Asia Region; Wpr, WHO Western Pacific Region.

^a AMD, age-related macular degeneration.

Fig. 1. Global causes of blindness as a percentage of total blindness in 2002



^aAMD = Age-related macular degeneration.

WHO 04.138

Bulletin of the World Health Organization 2004;82:844-851.

Prevention of Blindness and Visual Impairment

- [Blindness](#)
- [Data and maps](#)
- [Publications](#)
- [Causes](#)
- [Partnerships](#)
- [Socioeconomic aspects](#)
- [History of WHO Prevention of Blindness](#)

WHO releases the new global estimates on visual impairment

In 2010, WHO released new global estimates of visual impairment

Using the most up to date studies, WHO estimates that the number of people with visual impairment (presenting vision) is 285 million (65% of whom are aged over 50 years). Of these, 246 million have low vision (63% over 50) and 39 million are estimated to be blind (82% over 50).



These estimates were based on 50 national and sub-national studies from 38 countries, published and unpublished, conducted since 2004 and on previous studies that were still representative; the majority of the 50 surveys were rapid assessments for the population 50 years and older.

Regional estimates were calculated with a model taking into account, among other factors, the country's economic development status, after having verified the fit between data on visual impairment and development indicators.

The distribution of blind and visually impaired of all ages in the six WHO Regions

ICD Update and Revision Platform: Change the Definition of Blindness

Full text pdf, 100kb

NEWS

PBD Newsletter No.1 - March 2011 pdf, 348kb

A GUIDE: TRACHOMA PREVENTION THROUGH SCHOOL HEALTH CURRICULUM DEVELOPMENT



Full text pdf, 586kb

Contact us

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Blindness and Deafness
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The top three causes of visual impairment are uncorrected refractive errors, cataract and glaucoma. The top three causes of blindness in the 2010 estimate are cataract, glaucoma and age-related macular degeneration.

Given that the methodology to estimate the prevalence of visual impairment and blindness is different from the one used in previous studies, it is not possible to make a direct comparison of the magnitude and causes of visual impairment and blindness with earlier estimates.

There is a global and regional reduction in visual impairment and blindness, which is demonstrated in those countries where repeat surveys over time were conducted.

The distribution of blind and visually impaired of all ages in the six WHO Regions is as follows (in millions)

WHO Regions	Visual impairment (millions)	Blind (millions)
AFR	26.3	5.9
AMR	26.6	3.2
EMR	23.5	4.9
EUR	28.2	2
SEAR	90.5	12
WPR	90.2	10.6

The distribution of V.I. by age group is the following: 0-14 years 7%, 15-49 years 28%, 50 years and older 65%.

WORLD VIEW

The number of people with glaucoma worldwide in 2010 and 2020

H A Quigley, A T Broman

Br J Ophthalmol 2006; 90: 262–267. doi: 10.1136/bjo.2005.081224

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Accepted for publication
2 October 2005

Aim: To estimate the number of people with open angle (OAG) and angle closure glaucoma (ACG) in 2010 and 2020.

Methods: A review of published data with use of prevalence models. Data from population based studies of age specific prevalence of OAG and ACG that satisfied standard definitions were used to construct prevalence models for OAG and ACG by age, sex, and ethnicity, weighting data proportional to sample size of each study. Models were combined with UN world population projections for 2010 and 2020 to derive the estimated number with glaucoma.

Results: There will be 60.5 million people with OAG and ACG in 2010, increasing to 79.6 million by 2020, and of these, 74% will have OAG. Women will comprise 55% of OAG, 70% of ACG, and 59% of all glaucoma in 2010. Asians will represent 47% of those with glaucoma and 87% of those with ACG. Bilateral blindness will be present in 4.5 million people with OAG and 3.9 million people with ACG in 2010, rising to 5.9 and 5.3 million people in 2020, respectively.

Conclusions: Glaucoma is the second leading cause of blindness worldwide, disproportionately affecting women and Asians.

Table 1 Number of people with OAG and ACG combined, 2010

World region	Total glaucoma	Lower CL	Upper CL	Total population >40	Ratio glaucoma to population >40	Lower CL	Upper CL
China	15,782,196	11,114,702	23,640,340	593,278,000	2.66%	1.87%	3.98%
Europe	12,064,740	8,910,048	16,475,405	541,993,000	2.23%	1.64%	3.04%
India	11,944,896	9,443,597	15,447,556	468,426,000	2.55%	2.02%	3.30%
Africa	6,458,023	5,227,245	7,979,655	149,408,000	4.32%	3.50%	5.34%
Latin America	5,677,158	3,252,201	10,035,372	169,215,000	3.35%	1.92%	5.93%
SE Asia	4,257,620	2,990,848	6,432,503	178,899,000	2.38%	1.67%	3.60%
Japan	2,662,446	2,278,345	3,154,376	72,007,000	3.70%	3.16%	4.38%
Middle East	1,618,718	1,171,439	2,268,907	110,094,000	1.47%	1.06%	2.06%
World	60,465,796	44,388,425	85,434,114	2,283,320,000	2.65%	1.94%	3.74%

Table 2 Number of people with OAG, 2010

	Total OAG	Lower CL	Upper CL	% World OAG
Europe	10,693,335	7,599,188	15,040,703	23.9
China	8,309,001	6,695,433	10,423,439	18.6
India	8,211,276	6,812,711	9,937,413	18.4
Africa	6,212,179	4,992,103	7,722,626	13.9
Latin America	5,354,354	2,943,534	9,697,792	12.0
Japan	2,383,802	2,106,534	2,697,623	5.3
SE Asia	2,116,036	1,744,523	2,580,354	4.7
Middle East	1,748,877	1,001,315	2,082,944	3.2
World	44,720,832	33,895,340	60,182,894	

Table 3 Number of people with ACG, 2010

	Total ACG	Lower CL	Upper CL	% World ACG
China	7,473,195	4,419,269	13,216,902	47.5
India	3,733,620	2,630,886	5,510,142	23.7
SE Asia	2,141,584	1,246,325	3,852,149	13.6
Europe	1,371,405	1,310,861	1,434,702	8.7
Latin America	322,804	308,667	337,581	2.1
Japan	278,643	171,811	456,753	1.8
Africa	245,844	235,143	257,029	1.6
Middle East	177,869	170,124	185,964	1.1
World	15,744,965	10,493,085	25,251,221	

Glaucoma angolo aperto

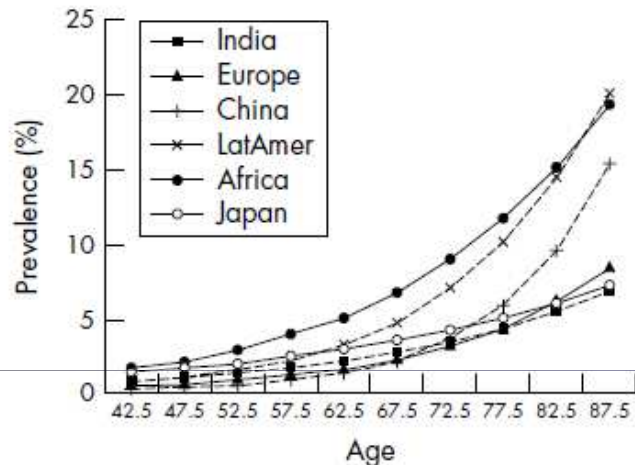


Figure 1 The prevalence model data showing age specific prevalence of open angle glaucoma (OAG) for the six major ethnic groups (as defined in Methods) among whom qualifying studies have been performed. Prevalence is highest among the African and Latin American groups.

**Maggiore prevalenza
razze di origine africana
e latino-americani**

Glaucoma angolo chiuso

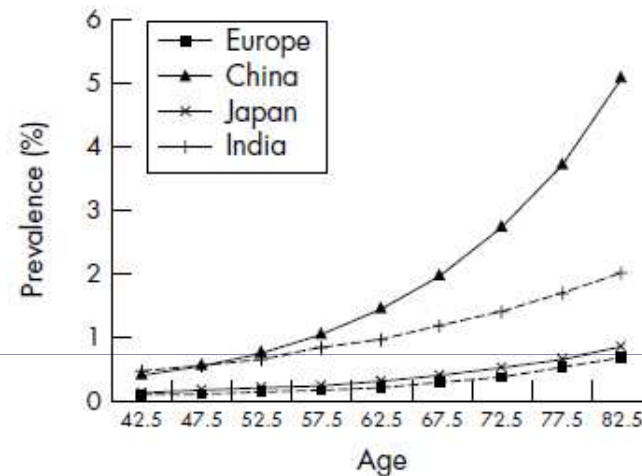


Figure 2 Prevalence model data for the age specific prevalence of angle closure glaucoma (ACG), highest in the China group, second highest among Japanese, and lowest in European and Indian groups (as defined in Methods).

**Maggiore prevalenza
cinesi e giapponesi**

Table 4 Percentage >40 years of age by region with OAG and ACG, 2010

	OAG		ACG
Africa	4.16%	China	1.26%
Japan	3.31%	SE Asia	1.20%
Latin America	3.16%	India	0.80%
Europe	1.97%	Japan	0.39%
India	1.75%	Europe	0.25%
China	1.40%	Latin America	0.19%
Middle East	1.31%	Africa	0.16%
SE Asia	1.18%	Middle East	0.16%
World	1.96%	World	0.69%

Table 5 Number of people with OAG and ACG combined, 2020

World region	Total glaucoma	Lower CL	Upper CL	Total population >40	Ratio glaucoma to population >40	Lower CL	Upper CL
China	21,824,015	15,564,052	32,008,501	714,911,000	3.05%	1.64%	1.41%
India	16,088,243	12,661,836	20,921,034	610,439,000	2.64%	1.81%	0.82%
Europe	13,971,113	10,338,552	19,017,776	583,088,000	2.40%	2.13%	0.27%
Africa	8,359,451	6,744,779	10,360,282	190,366,000	4.39%	4.22%	0.17%
Latin America	8,011,575	4,625,900	14,035,093	222,238,000	3.60%	3.40%	0.20%
SE Asia	6,005,711	4,242,094	8,976,978	234,717,000	2.56%	1.29%	1.26%
Japan	3,084,669	2,620,687	3,686,374	77,968,000	3.96%	3.53%	0.43%
Middle East	2,273,407	1,663,614	3,210,499	151,907,000	1.51%	1.35%	0.17%
World	79,640,184	58,461,515	112,216,536	2,785,634,000	2.86%	2.11%	0.75%

Table 6 Number with OAG in 2020

	Total OAG	Lower CL	Upper CL	% World OAG
Europe	12,397,352	8,834,379	17,371,262	21.1
China	11,733,463	9,478,881	14,637,523	20.0
India	11,076,123	9,169,246	13,437,368	18.9
Africa	8,040,780	6,439,995	10,027,097	13.7
Latin America	7,559,113	4,193,288	13,561,883	12.9
SE Asia	3,039,376	2,497,186	3,715,897	5.2
Japan	2,749,598	2,417,389	3,127,327	4.7
Middle East	1,422,895	1,027,720	2,947,352	3.5
World	58,639,527	44,453,258	78,825,708	

Table 7 Number with ACG in 2020

	Total ACG	Lower CL	Upper CL	% World ACG
China	10,090,552	6,085,171	17,370,978	48.0
India	5,012,120	3,492,590	7,483,666	23.9
SE Asia	2,966,334	1,744,908	5,261,080	14.1
Europe	1,573,761	1,504,174	1,646,514	7.5
Latin America	452,462	432,612	473,211	2.2
Japan	335,071	203,299	559,047	1.6
Africa	318,671	304,784	333,185	1.5
Middle East	257,600	211,720	263,147	1.2
World	21,000,657	14,008,258	33,390,828	

SOCIETÀ OTTALMOLOGICA ITALIANA

L'EPIDEMIOLOGIA OTTALMICA IN ITALIA

Luciano Cerulli
Mario Miglior
Francesco Ponte

Editore  L.N.C. Innovation-News-Communication

PREVALENZA DI GPAA NEGLI STUDI ITALIANI

LOCALITÀ	PONZA	VENTOTENE	BOLLATE	PRIVERNO	CASTELDACCIA	EGNA- NEUMARKT
Età del campione	40 anni ed oltre	40 anni ed oltre	40 anni ed oltre	45-69	40 anni ed oltre	40 anni ed oltre
Numero di partecipanti	1.034	220	1.691	860	1.068	4.078
% GPAA	2,5	7,3	1,1	1,5	1,2	2,1

PERCENTUALE DI DIAGNOSI DI GLAUCOMA CONFERMATE DALLA VISITA NEGLI STUDI EPIDEMIOLOGICI ITALIANI

Priverno	33,3%
Ponza	29,6%
Ventotene	44,4%

**Stimati attualmente in Italia > 500.000 pazienti con glaucoma diagnosticato.
(stimati altri 500.000 con glaucoma non diagnosticato).
previsto incremento del 33% prevalenza per invecchiamento popolazione.**



Ministero della Salute

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Prevenzione ipovisione e cecità

SECONDO SIMPOSIO INTERNAZIONALE SULLA RIABILITAZIONE DELL'IPOVEDENTE E SULL'ABILITÀ VISIVA

Dare risposte terapeutiche e riabilitative al milione e mezzo d'ipovedenti che risiedono in Italia e ai 245 milioni che, secondo l'Oms, vivono nel mondo. È stato questo il fine principale del secondo Simposio internazionale sulla riabilitazione dell'ipovedente e sull'abilità visiva che, inaugurato il 15 dicembre al Centro Congressi Parco dei Principi di Roma alla presenza del Ministro della Salute Ferruccio Fazio (a cui è stato conferito il Premio Internazionale G. B. Bietti), si è concluso il 17 dicembre. Tra i temi trattati: la riabilitazione e le malattie oculari che causano con maggiore frequenza ipovisione, l'impiego delle cellule staminali e la retina elettronica (occhio bionico).

Le malattie dell'occhio che causano più spesso disabilità visiva sono, a livello globale, la cataratta (operabile, ma responsabile del 53% dei casi di disabilità visiva), il glaucoma (9%) e la degenerazione maculare legata all'età (6%). Quest'ultima è, invece, la prima malattia causa di cecità e ipovisione nei Paesi di maggior benessere, a cui seguono il glaucoma e la cataratta. In Italia l'incidenza delle patologie oculari associate all'età, ha osservato il Ministro Fazio, "è destinato a crescere, visto il progressivo invecchiamento della popolazione del nostro Paese. Basti pensare che in Europa le persone disabili incapaci di leggere e scrivere, non autonome per queste patologie, dopo gli 80 anni sono tra il 10% e il 20%". Per questa ragione, ha proseguito Fazio, "è importante proseguire con l'attività di prevenzione [della cecità, ndr] e diffondere a livello regionale i servizi di riabilitazione visiva, attualmente non distribuiti in modo omogeneo".

L'evento è stato organizzato dall'Agenzia internazionale per la prevenzione della cecità-IAPB Italia onlus attraverso il Polo Nazionale di Servizi e Ricerca per la Prevenzione della Cecità e la Riabilitazione Visiva.

Gli ipovedenti nel mondo, secondo i dati preliminari dell'Oms 2010, sono 245 milioni e i ciechi sono 40 milioni. In Italia, stando all'Istat, i non vedenti sono 362mila; gli ipovedenti, invece, si stima che siano circa un milione e mezzo (soprattutto anziani). L'allungamento della vita media a livello mondiale rende oggi, più che mai, urgente affrontare il problema delle malattie degenerative e, in particolare, quelle che colpiscono gli occhi.

A cura di:
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 **Contatti**

Redazione salute.gov.it / 17 febbraio 2011

Prevenzione, assistenza e riabilitazione delle patologie oculari

Relazione annuale al Parlamento sull'applicazione della Legge 284

Commissione nazionale

Linee di indirizzo

Cooperazione internazionale

Glaucoma in China: how big is the problem?

Paul J Foster, Gordon J Johnson

Abstract

Aims—To derive preliminary estimates for the number of adults in China suffering from glaucoma, and project the burden of visual morbidity attributable to primary and secondary glaucoma.

Methods—Age and sex specific data from two population surveys were applied to US Census Bureau population estimates for urban and rural China. It was assumed that data from Singapore were representative of urban China, and those from Mongolia were representative of rural China.

Results—It was estimated that 9.4 million people aged 40 years and older in China have glaucomatous optic neuropathy. Of this number, 5.2 million (55%) are blind in at least one eye and 1.7 million (18.1%) are blind in both eyes. Primary angle closure glaucoma (PACG) is responsible for the vast majority (91%) of bilateral glaucoma blindness in China. The number of people with the anatomical trait predisposing to PACG (an "occludable" drainage angle) is in the region of 28.2 million, and of these 9.1 million have significant angle closure, indicated by peripheral anterior synechiae or raised intraocular pressure.

Conclusions—This extrapolation of data from two east Asian countries gives an approximate number of people in China suffering from glaucoma. It is unlikely that this crude statistical model is entirely accurate. However, the authors believe the visual morbidity from glaucoma in China is considerable. PACG is probably the leading cause of glaucoma blindness in both eyes, and warrants detailed investigation of strategies for prevention.

(*Br J Ophthalmol* 2001;85:1277-1282)

Glaucoma has long been recognised as a leading cause of blindness, but only recently has it been appreciated how numerically important it is worldwide, and that the scale of the problem will only increase with future population growth and increasing life expectancy.

The epidemiological information available in 1993 in the World Health Organization's (WHO) global data bank on blindness was reviewed by Thyéfors and Négrel.¹ They developed a simple model estimating the number of glaucoma blind people in each World Bank region. Primary open angle

glaucoma (POAG) was judged to be responsible for three million blind, primary angle closure glaucoma (PACG) for two million, and for congenital glaucoma the figure was 200 000, giving a total of 5.2 million blind. This represents 15% of global blindness. The number of people affected by glaucoma was estimated to be about 20 million.

In 1996, Quigley used 111 published reports of glaucoma prevalence to construct a statistical model of the number of people affected by glaucoma worldwide. Data were included only if the study design, methods, and reported results met certain specific criteria. The countries of the world were arranged in seven groups according to similarities in ethnicity and presumed characteristics of glaucoma. For each region, the available age specific prevalence of OAG and ACG were applied to population projections for the year 2000. It was estimated that 66.8 million people were affected by OAG and ACG, with nearly equal numbers of people affected by each disease. Few prevalence studies described secondary glaucoma separately, but an estimate of six million for secondary glaucoma was reached, making a total, without childhood glaucoma, of around 73 million affected. Of these, 6.7 million were thought to be blind.

At that time there were only three studies from east Asia meeting the stipulated criteria. These limited data indicated a linear relation of OAG to age in Asians. It was also assumed that ACG increased with age in a linear fashion, but with a rate three times greater than OAG in Chinese people. The WHO has subsequently amended its projections of glaucoma prevalence in line with Quigley's analysis, suggesting that 6.7 million are blind from glaucoma. This places glaucoma second only to cataract as a cause of world blindness.² Current WHO population estimates suggest that the Asia region is home to 3583 million people (61% of the total population of the world). This number is projected to rise to 5268 million by 2050 (becoming 51% of the world's population). Clearly, causes of blindness and visual impairment in Asia will exert considerable leverage on the projected totals, and have increasing impact on the socioeconomics of the world's most populous region.

It has been estimated that glaucoma causes blindness in approximately 10% of those affected.² The importance of glaucoma blindness is compounded by the fact that damage is irreversible, and may progress from

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Accepted for publication 18 July 2001

Table 4 Estimated number of individuals with occludable drainage angles, primary angle closure, and glaucomatous optic neuropathy

	Occludable angles ($\times 10^3$)		Primary angle closure ($\times 10^3$)		Primary angle closure + GON ($\times 10^3$)		Incidence of symptomatic primary angle closure (people/year)	
	Men	Women	Men	Women	Men	Women	Men	Women
40-49	355.0	3312.6	123.9	1050.4	45.1	414.9	2 349	4 098
50-59	2184.6	6098.2	716.1	1955.4	274.9	765.0	7 613	18 490
60-69	2748.3	5346.0	896.1	1714.0	345.6	670.6	10 044	25 818
70-79	3035.2	3331.5	968.0	1077.9	380.5	418.4	7 994	18 835
80+	684.6	1112.2	218.3	359.8	85.8	139.7	1 803	6 288
Subtotal	9007.8	19 200.4	2922.583	6157.5	1131.8	2408.6	29 804	73 530
Total	28 208.2		9080.0		3540.4		103 334	

Number of people with occludable angles calculated for urban and rural areas by age and sex standardised rates from Singapore and Mongolia respectively, and includes people with PAC and PACG.

Number of people with PAC includes those with PACG.

All figures in thousands *except* incidence of symptomatic episodes.

Incidence of symptomatic, "acute" angle closure is expressed as cases per year.

Some columns may not add up exactly because of rounding of figures.

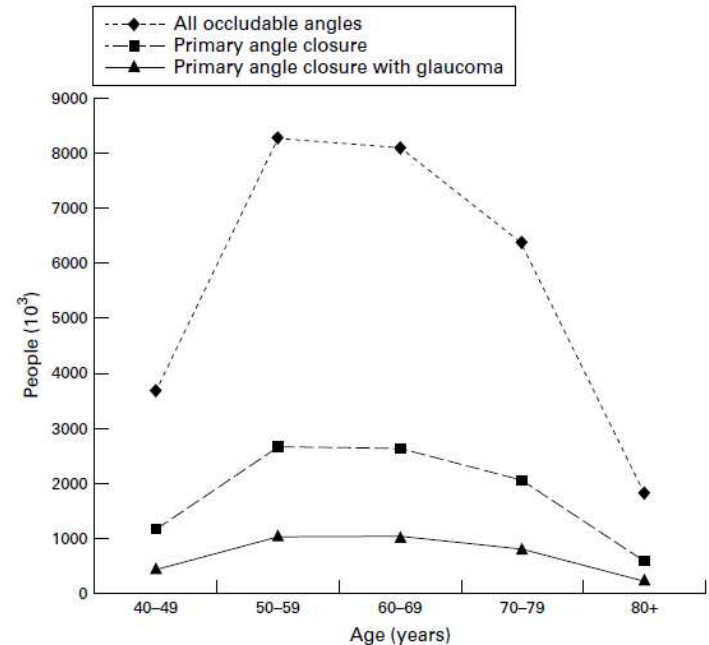


Figure 1 Angle closure glaucoma in China.

La prevalenza del glaucoma aumenta con l'età

Età	Bianchi	Neri	Ispanici
Donne			
40-49	0.83 (0.65-1.06)	1.51 (0.94-2.41)	0.34 (0.15-0.72)
50-54	0.89 (0.78-1.02)	2.24 (1.59-3.14)	0.65 (0.37-1.15)
55-59	1.02 (0.89-1.16)	2.86 (2.16-3.78)	0.98 (0.61-1.58)
60-64	1.23 (1.07-1.41)	3.65 (2.83-4.69)	1.49 (0.97-2.28)
65-69	1.58 (1.37-1.82)	4.64 (3.54-6.05)	2.24 (1.43-3.49)
70-74	2.16 (1.87-2.49)	5.89 (4.28-8.05)	3.36 (2.00-5.60)
75-79	3.12 (2.68-3.63)	7.45 (5.06-10.84)	5.01 (2.68-9.15)
≥ 80	6.94 (5.40-8.88)	9.82 (6.08-15.48)	10.05 (4.35-21.52)
Uomini			
40-49	0.36 (0.27-0.47)	0.55 (0.31-0.95)	0.39 (0.18-0.85)
50-54	0.61 (0.50-0.74)	1.71 (1.25-2.32)	0.69 (0.39-1.25)
55-59	0.85 (0.72-1.00)	3.06 (2.30-4.04)	1.00 (0.61-1.64)
60-64	1.18 (1.02-1.37)	4.94 (3.69-6.59)	1.44 (0.92-2.24)
65-69	1.64 (1.40-1.91)	7.24 (5.40-9.63)	2.07 (1.32-3.23)
70-74	2.27 (1.90-2.72)	9.62 (7.29-12.59)	2.97 (1.79-4.89)
75-79	3.14 (2.53-3.90)	11.65 (8.81-15.25)	4.23 (2.32-7.60)
≥ 80	5.58 (4.15-7.47)	13.21 (7.85-21.38)	7.91 (3.53-16.77)

Tab 5

Prevalenza di POAG per età, sesso e razza

Legenda: Prevalenze in percentuali con limiti di confidenza al 95%. Queste stime sono tratte da uno studio (16) che ha intergrato i dati di prevalenza dei seguenti studi epidemiologici: Baltimore Eye Survey, Barbados Eye Study, Beaver Dam Eye Study, Blue Mountains Eye Study, Proyecto VER, Rotterdam Study, Kongwa Eye Project, Melbourne Vision Impairment Project

PREVALENZA PERCENTUALE DI GLAUCOMA IN ALCUNI PAESI NORD-EUROPEI RICALCOLATA IN BASE AI DATI FORNITI DAI SERVIZI SANITARI NAZIONALI

GRUPPI DI ETÀ	SVEZIA		NORVEGIA	FINLANDIA
	HALSINGLAND (1981)	GOTHENBURG* (1976)	NORV. CENTRALE (1972-82)	KOKTA (1986)
0-39	0,00	0,02	–	
40-44	0,00	0,11	–	0,01
45-49	0,00	0,11	–	
50-54	0,11	0,23	0,17	0,18
55-59	0,16	0,45	0,51	
60-64	0,72	0,74	0,74	0,76
65-69	1,18	1,29	1,38	
70-74	2,29	2,58	2,24	2,91
75-79	3,56	4,04	3,00	
80 ed oltre	4,35	7,30	2,28	4,28
*TOTALE	0,53	0,63	–	0,60
GLAUC. CAPSULARE	67,2%	48,3%	57,8%	47,0%

*Riferita ai casi di glaucoma totale.

Tabella IX

PREVALENZA ED INDICE DI CONFIDENZA AL 95% DEL GPAA
RICAIVATA DAGLI STUDI DI PONZA, BOLLATE, PRIVERNO,
CASTELDACCIA ED EGNA-NEUMARKT

GRUPPI DI ETÀ	PONZA	BOLLATE	PRIVERNO	CASTELDACCIA	EGNA- NEUMARKT	TOTALE VISITATI	% (95% C.I.)
40-49	1,4	0,0	0,7	0,4	0,4	1.970	0,5 (0,2-0,9)
50-59	1,3	1,1	1,4	0,3	1,4	2.823	1,2 (0,9-1,7)
60-69	2,5	1,7	1,9	1,3	2,4	2.606	2,1 (1,6-2,7)
70 ed oltre	4,4	2,3	-	3,6	4,7	1.332	4,3 (3,3-5,5)

Tabella X

IPOTESI SUL NUMERO DI PAZIENTI CON GPAA IN ITALIA AL 1996

ETÀ	N. ABITANTI	N. PAZIENTI CON GPAA			%
		N. GREZZO	N. MINIMO	N. MASSIMO	
40-49 anni	7.746.416	36.068	15.493	69.717	7%
50-59 anni	7.009.657	86.920	63.087	119.164	16%
60-69 anni	6.426.522	135.600	102.824	173.516	25%
70 anni +	6.594.829	282.259	217.629	362.716	52%
TOTALE	27.776.314	541.382	399.033	725.113	100%

Età fattore di rischio

AUMENTO SIGNIFICATIVO DELLA PREVALENZA DI GLAUCOMA CON IL PROGREDIRE DELL'ETÀ

NAZIONE - LOCALITÀ	ETÀ DEL CAMPIONE	AUMENTO SIGNIFICATIVO DI GPAA
Inghilterra - Ferndale	40-75 anni	Dopo i 60 anni
Inghilterra - Bedford	40 anni ed oltre	Dopo i 60 anni
Danimarca - Dalby	55-69 anni	Dopo i 60 anni
Stati Uniti - Framingham	52-85 anni	Dopo i 70 anni
Stati Uniti - Baltimora	40 anni ed oltre	Dopo i 70 anni
Stati Uniti - Beaver Dam	43-85 anni	Dopo i 65 anni
Irlanda - Roscommon	50 anni ed oltre	Dopo i 70 anni
Olanda - Rotterdam	55 anni ed oltre	Dopo i 65 anni
Australia - Blue Mountains	49 anni ed oltre	Dopo i 60 anni
Italia - Bollate	40 anni ed oltre	Differenze non significative
Italia - Priverno	45-69 anni	Differenze non significative
Italia - Casteldaccia	40 anni ed oltre	Dopo i 60 anni
Italia - Ponza	40 anni ed oltre	Dopo i 70 anni
Italia - Ventotene	40 anni ed oltre	Dopo i 70 anni
Italia - Egna-Neumarkt	40 anni ed oltre	Dopo i 50 anni

Fattori di rischio

Sesso

Glaucoma angolo aperto: non differenza

Glaucoma angolo chiuso: più frequente nelle femmine

Razza

Glaucoma angolo aperto: maggiore prevalenza razza nera

Glaucoma angolo chiuso: maggiore prevalenza asiatici

Rapporto gl. angolo aperto/ gl. angolo chiuso

caucasici: 4:1

asiatici: 1:1

Fattori di rischio

Fattori genetici

Familiarità, specie se primo grado

Multifattoriale

Geni coinvolti (mutazioni geni TIGR, MYOC)

Mutazione optineurin (glaucoma a pressione normale)

Locus	Localizzazione Cromosomica	Gene	Bibliografia	Fenotipo
GLC1A	1q21-25	Miocillina	Stone et al. (1997)	Glaucoma primario ad angolo aperto giovanile ed adulto
GLC1B	2cen-q13	-	Stoilova et al. (1996)	Glaucoma primario ad angolo aperto dell'adulto
GLC1C	3q21-q24	-	Wirtz et al. (1997)	Glaucoma primario ad angolo aperto dell'adulto
GLC1D	8q23	-	Trifan et al. (1998)	Glaucoma primario ad angolo aperto dell'adulto
GLC1E	10p15-p14	Optineurina	Rezaie et al. (2002)	Glaucoma primario ad angolo aperto dell'adulto
GLC1F	7q35-q36	-	Wirtz et al. (1999)	Glaucoma primario ad angolo aperto dell'adulto
GLC1G	5q22.1	WDR36	Monemi et al. (2005)	Glaucoma primario ad angolo aperto dell'adulto
GLC3A	2p21	CYP1B1	Sarfarazi et al. (1995)	Glaucoma primario congenito
GLC3B	1p36.2-36.1		Akarsu et al. (1996)	Glaucoma primario congenito

Tab 1

Localizzazioni cromosomiche dei loci e/o geni in associazione con il glaucoma primario ad angolo aperto

Fattori socio-economici

Influenzano il danno e la cecità da glaucoma

Fattori di rischio

Diabete

Diabetici hanno PIO più elevata

Meno evidente rapporto con danno conclamato

Molti studi associazione non significativa

Fattori di rischio

Fattori vascolari

Ipertensione: non definito

Ipotensione

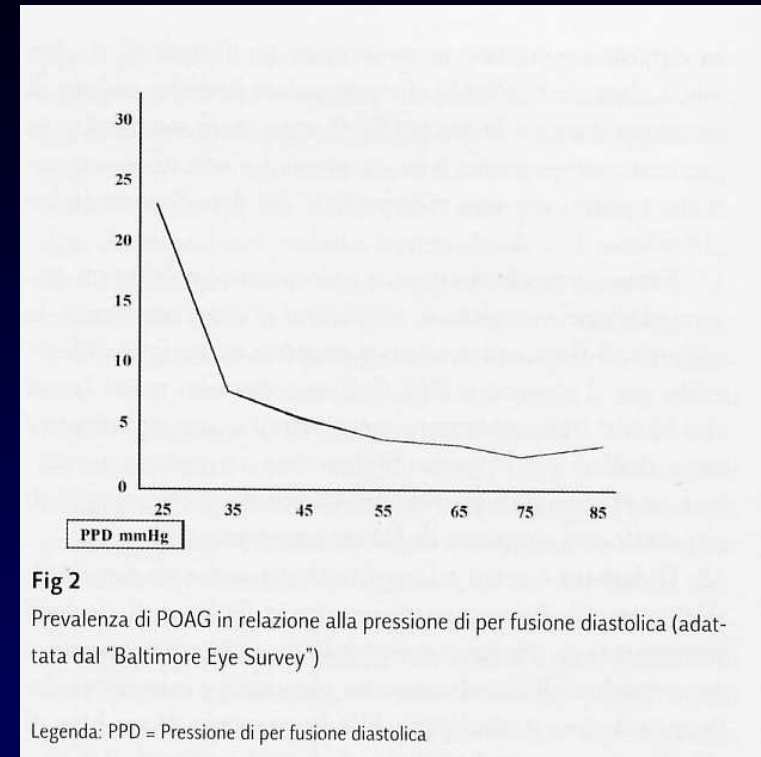
Bassa pressione perfusione diastolica

Disregolazione (vasospasmo)

Emicrania, ronzii auricolari, sindrome mani fredde,

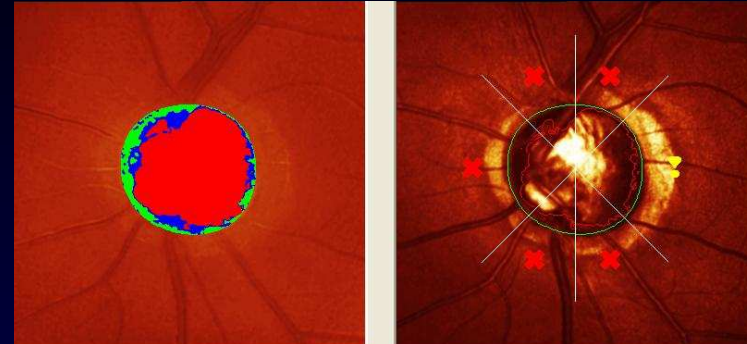
Raynaud

Glaucoma a pressione normale



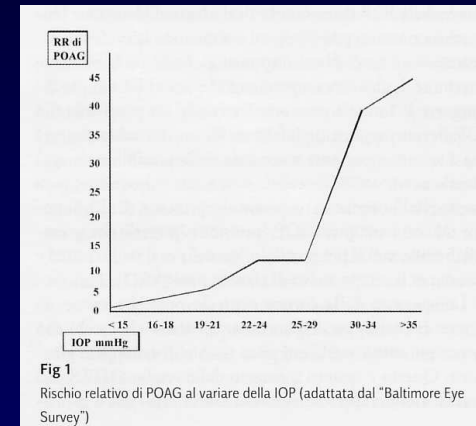
Fattori di rischio

Miopia



Ipertensione oculare

CCT



Glaucoma primario ad angolo aperto

Fattori di rischio prevalenza

PIO > 26

rischio 13 volte maggiore

Età > 40 anni

prevalenza 2.1%

(0,3 a 40 anni,

3,3% a 70 anni)

Razza afro-caraibica RR vs caucasici 3.80

Familiarità

RR 3.14 consanguinei

Diabete

RR 1.92

Miopia

RR 1,88

Glaucoma primario ad angolo aperto

Fattori rischio peggioramento cv

PIO elevata (AGIS)

Emorragie papillari

Gravità del danno

Età

Pressione perfusione

Patol. cardiovascolari

CCT

Glaucoma primario ad angolo aperto

Fattori rischio conversione OH-POAG (OHTS, EGPS)

Età avanzata

C/D elevato

PIO elevata

PSD elevata

CCT ridotto

Ipotensione arteriosa in normal tension (EMGT)

Glaucoma a pressione normale

Dati molto variabili: 6-60% POAG (30-40%)

Sesso (femminile)

Età : 0,2% 43-54 anni

1,6 > 75 anni

Glaucoma pseudoesfoliativo

Età > 60 anni

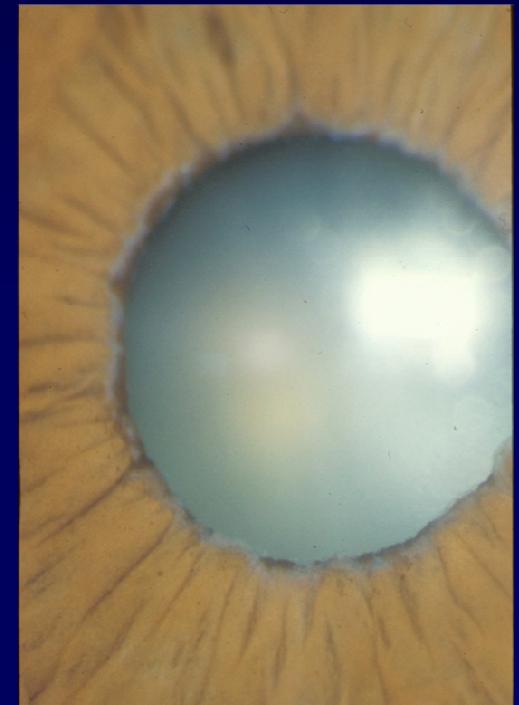
Fattore razziale (scandinavi)

Sindrome pseudoesfoliatio

(30-40% glaucoma a 10 anni)

Mutazioni gene LOXL1

25% dei glaucomi angolo aperto



Glaucoma pigmentario

Età > 30-50 anni

Caucasici (1-1.5% glaucomi totali)

Maschi

Miopia



Sindrome dispersione pigmento

2,5% popolazione razza bianca negli USA

Glaucoma a 10 anni 10%

a 15 anni 15%

Glaucoma da chiusura d'angolo

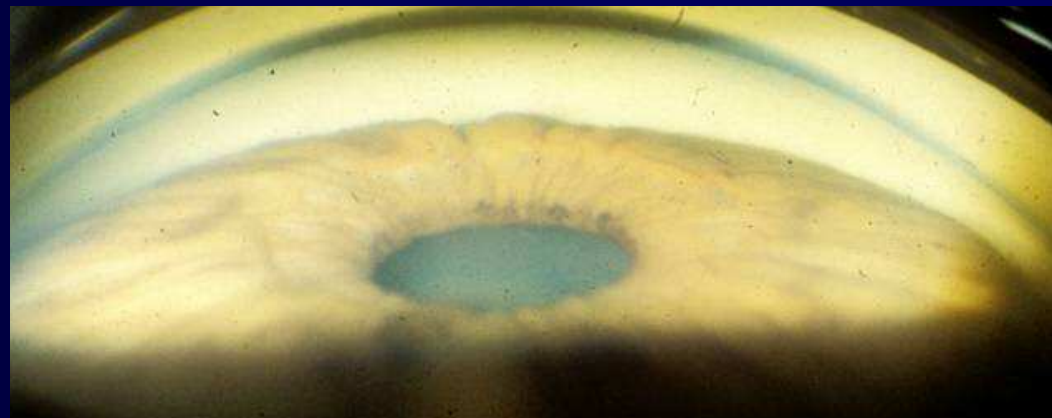
Età > 60 anni
Sesso femminile
Razza asiatica
Familiarità

Autore	Luogo/popolazione	Prevalenza
Hollows e Graham (1966)	Galles	0.09%
Bankes et al. (1968)	Bedford	0.16%
Hyams e Keroub (1977)	Israele	0.5%
Drance (1973)	Esquimesi	2.9%
Clemmesen e Alsbirk (1971)	Esquimesi	5.0%
Shiose et al. (1991)	Giappone	0.31%
Congdom e al. (1992)	Cina	1.3%
Salmon e al. (1993)	Sud Africa	1.0%

Tab 2
Prevalenza del GPCA in diverse popolazioni di età superiore a 40 anni (6)

Forma cronica più frequente (oltre 50%)

50 % delle cecità da glaucoma



Step 1

Age, y	Points
40-44	0
45-49	1
50-54	2
55-59	3
60-64	4
65-69	5
70-74	6
75-80	7

Step 2

IOP, mm Hg	Points
23	0
24	1
25	2
26	3
27	4
28	5
29	6
30	7
31	7
32	8

Step 3

CCT, μm	Points
450-469	30
470-489	27
490-509	24
510-529	21
530-549	19
550-569	16
570-589	13
590-609	11
610-629	8
630-649	5
650-669	3
670-689	0

Step 4

Vertical C/D Ratio	Points
0.1	0
0.2	2
0.3	5
0.4	7
0.5	10
0.6	12
0.7	15
0.8	17
0.9	20

Step 5

PSD	Points
1.00-1.19	0
1.20-1.39	2
1.40-1.59	4
1.60-1.79	6
1.80-1.99	8
2.00-2.19	10
2.20-2.39	12
2.40-2.59	14

Step 6

DM	Points
Yes	-9
No	0

Step 7

Add up Points From Steps 1 Through 6
Look up Below the Predicted 5-Year Risk of Glaucoma Development

Total Points	5-Year Risk, %
-9-12	<1
13-27	1-5
28-33	6-10
34-37	11-15
38-40	16-20
41-44	21-30
45-47	31-40
48-50	41-50
>50	>50

Calculation of Glaucoma Risk

- Scoring system for estimation of the 5-year risk of glaucoma development for untreated patients with ocular hypertension (from OHTS study) - adapted from Medeiros FA, Weinreb RN, et al. **Arch Ophthalmol**, 2005; 123:1351-1360, with permission from the publisher. CCT indicates Central Corneal Thickness; PSD, Pattern Standard Deviation; DM, Diabetes Mellitus.



Who is at risk for glaucoma?

Anyone can develop glaucoma. Some people are at higher risk than others. They include:

- African Americans over age 40.
- Everyone over age 60, especially Mexican Americans.
- People with a family history of glaucoma.

Among African Americans, studies show that glaucoma is:

- Five times more likely to occur in African Americans than in Caucasians.
- About four times more likely to cause blindness in African Americans than in Caucasians.
- Fifteen times more likely to cause blindness in African Americans between the ages of 45-64 than in Caucasians of the same age group.

A comprehensive dilated eye exam can reveal more risk factors, such as high eye pressure, thinness of the cornea, and abnormal optic nerve anatomy. In some people with certain combinations of these high-risk factors, medicines in the form of eyedrops reduce the risk of developing glaucoma by about half.

Allungamento vita media

***Aumento prevalenza glaucoma
(cataratta+glaucoma, PEX)***

Allungamento vita "attiva"

Strategie terapeutiche generali:

- ***Limitazione del danno (terapia aggressiva)***
 - ***Mantenimento integrità strutture***