

# Prevalence of Asymptomatic Eye Disease

## Prévalence des maladies oculaires asymptomatiques



### Abstract:

*Purpose:* To determine the proportion of people presenting for an eye examination who are unaware that they have an eye disease.

*Methods:* A cross-sectional clinical study with a consecutive sampling of patients from the practices of 133 optometrists across Canada.

*Results:* Data was collected for 24,570 patients (57.2% female, 42.8% male) from mid-October 2000 to the end of January 2001. The prevalence of asymptomatic eye disease in this optometric patient population was 14.4% (95% CI, 13.9% to 14.8%). Almost half of patients (48.3%) with eye disease were asymptomatic. Two-thirds of people with eye disease had a best-corrected visual acuity of 6/7.5 or better. *Conclusions:* In this study almost one out of every 7 people presenting for an eye examination had asymptomatic eye disease. A good visual acuity does not rule out the presence of eye disease. This study supports the importance of a full ocular health assessment with each eye examination.

### Résumé:

*Objet:* Déterminer le pourcentage de personnes subissant un examen de la vue qui ignorent qu'elles sont affectées d'une maladie oculaire.

*Méthodes:* Étude clinique transversale constituée d'un échantillon consécutif de patients provenant des cabinets de 133 optométristes au Canada.

*Résultats:* Les données ont été recueillies auprès de 24 570 patients (57,2 % de femmes et 42,8 % d'hommes) entre la mi-octobre 2000 et la fin de janvier 2001. La prévalence d'une maladie oculaire asymptomatique dans cette population de patients optométriques s'établit à 14,4 % (IC de 95 %, de 13,9 % à 14,8 %). Presque la moitié des patients (48,3 %) affectés d'une maladie oculaire ne présentaient aucun symptôme. Les deux tiers des personnes ayant une maladie oculaire affichaient une acuité visuelle avec correction maximale de 6/7,5 ou mieux.

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*Conclusions: Dans cette étude, presque une personne sur sept se présentant à un examen de la vue était affectée d'une maladie oculaire asymptomatique. Une bonne acuité visuelle ne signifie pas l'absence d'une maladie oculaire. Cette étude appuie l'importance d'une évaluation complète de la santé oculaire lors de chaque examen de la vue.*

## INTRODUCTION

The most common functional problems reported by Canadians are vision problems. Fifty percent of Canadians report that they have reduced visual function due to being near-sighted, far-sighted or blind.<sup>1</sup> The 1999 Statistical Report on the Health of Canadians considered aging and diabetes to be two major risk factors for eye problems that may lead to blindness.<sup>2</sup> The report then states that, "A regular eye examination to assess vision, prescribe corrective lenses, and check for eye diseases such as glaucoma is thus a recommended practice."

The importance of regular eye examinations in the early detection of glaucoma was highlighted in a study that looked at the socio-economic risk factors for first presentation advanced glaucomatous visual field loss.<sup>3</sup> The authors concluded that there was strong evidence that the longer since the last visit to an optometrist the greater the likelihood that someone will have advanced glaucomatous visual field loss when first diagnosed with the disease.<sup>3</sup> A population-based prevalence survey found that approximately half of those with glaucoma were unaware of their illness.<sup>4</sup>

The two principal reasons that Canadians give for seeking a regular eye check-up are usually listed as the wish to "make sure everything is OK" or to update a prescription.<sup>2</sup> How frequently are eye diseases found during one of these routine eye examinations? The purpose of this study was to assess the prevalence of eye disease in an apparently asymptomatic population.

## METHODS

This is a cross-sectional clinical study with a consecutive sampling of patients from the practices of optometrists across Canada. Optometrists were selected by stratified random sampling. The strata were composed of 6 regions across Canada based on provincial boundaries; the Atlantic region includes Newfoundland, Prince

Edward Island, Nova Scotia and New Brunswick. Inclusion criteria for optometrists consisted of those registered or licensed to practice and those who provide 30 or more patient care hours per week.

An initial letter from the Canadian Association of Optometrists was sent to all optometrists across Canada. This letter outlined the purpose of the study and advised them that those selected to participate would be contacted by phone by the company contracted to distribute the study questionnaires, H.I.T. Research Group. The letter also stipulated they were free to decline to participate. The Canadian Association of Optometrists granted optometrists a credit of 5 hours of continuing education for participating in the study.

Data collection took place from October 2000 to January 2001. Recruited optometrists were asked to fill in reports concerning the next 200 patients that they saw for a diagnostic visit. The optometrists were provided with recording sheets for each patient that included basic demographic information as well as the reason for the visit, history of previous eye disease or eye surgery, risk factors for eye disease, and best corrected visual acuity. They were provided with diagnostic codes and asked to indicate any diagnosis of eye disease. They were also asked to indicate if the patient was aware of eye diseases that were diagnosed. Information collected did not include individual identifiers such as patient names and addresses.

<b>Table 1.</b> <b>Distribution of</b> <b>optometrists</b>	<b>STUDY</b>	<b>CANADA</b>
Region	n (%)	n (%)
Atlantic	14 (10.53)	201 (6.47)
Quebec	43 (32.33)	1133 (36.47)
Ontario	42 (31.58)	939 (30.22)
Manitoba / Saskatchewan	10 (7.52)	200 (6.44)
Alberta	10 (7.52)	294 (9.46)
British Columbia	14 (10.53)	340 (10.94)
Total	133	3107

Age range (yr)	STUDY POPULATION n (%)	POPULATION OF CANADA (2000) n (%)
≤ 9	2086 (8.58)	3821748 (12.43)
10 to 24	4980 (20.47)	6201940 (20.17)
25 to 34	2104 (8.65)	4392936 (14.29)
35 to 44	3312 (13.62)	5306804 (17.26)
45 to 54	4058 (16.68)	4364941 (14.19)
55 to 64	2665 (10.96)	2811821 (9.14)
65 to 74	2812 (11.56)	2135166 (6.94)
75 to 84	1888 (7.76)	1298770 (4.22)
≥ 85	419 (1.72)	415961 (1.35)
Total	24,324	30,750,087

## RESULTS

Eighty-five percent of optometrists completed the study (133 out of 157). The distribution of study optometrists by region closely resembles the national distribution (Table 1). There was no statistically significant difference in the two distributions when measured by chi-square ( $\chi^2 = 4.606$ ,  $P = 0.466$ ). The doctors collected data for 24,570 patients (57.2% female, 42.8% male). On average each doctor completed reports for 185 patients with the average length of data collection being 26.47 days.

Age was reported for 99% of the patients (24,324 out of 24,570). When compared to the population of Canada in the year 2000<sup>5</sup> the optometric patient population has a higher proportion of people in the 45 and over age categories (Table 2). This difference is especially notable in the population 65 years and over. In the study sample, 21.05% of patients (5,119 out of 24,324) were 65 years of age or older compared to 12.52% (3,849,897) of the population of Canada ( $Z = 39.88$ ,  $P < 0.001$ ).

The most common reason given for visiting the optometrist at 32.6% (7896) was for a regular eye exam with no apparent problems. Concern about the health of their eyes or a follow-up visit for a previously diagnosed problem were the reasons for 20.23% of patient visits. This corresponds to the 17.9% of people who were found to have a previously diagnosed eye disease.

The probability of a previous diagnosis of eye disease increased dramatically with age. The percentage of those with a previous diagnosis changed from 4% in the under 25 years of age category to 76.9% in those who are 85 years of age or older. The proportion doubles with each decade from the age of 54 years to 74 years. There is a small but statistically significant difference between the proportion of females with previously diagnosed eye disease and the proportion of males (18.97% versus 16.60%,  $Z = 4.70$ ,  $P < 0.001$ ).

Diagnosis	Number	Percent (95% CI)
Cataract or IOL opacification	3157	12.85 (12.43 to 13.27)
Conjunctivitis	458	1.86 (1.7 to 2.04)
Keratoconjunctivitis sicca	628	2.56 (2.36 to 2.76)
Keratitis	164	0.67 (0.57 to 0.78)
Corneal degeneration, dystrophy, keratoconus	261	1.06 (0.94 to 1.20)
Keratopathy	172	0.70 (0.60 to 0.81)
Contact lens complication	201	0.82 (0.71 to 0.94)
Episcleritis/ Scleritis	30	0.12 (0.08 to 0.17)
Foreign body	80	0.33 (0.26 to 0.41)
Glaucoma - Acute angle-closure	40	0.16 (0.12 to 0.22)
Glaucoma - Chronic open-angle	276	1.12 (1.00 to 1.26)
Iritis	50	0.20 (0.15 to 0.27)
Lid diseases/ defects	472	1.92 (1.75 to 2.10)
Optic nerve – papilledema, atrophy, neuritis	100	0.41 (0.33 to 0.49)
Retinal detachments	52	0.21 (0.16 to 0.28)
Retinal tear or hole without detachment	80	0.33 (0.26 to 0.41)
Diabetic retinopathy	182	0.74 (0.64 to 0.86)
Macular degeneration	804	3.27 (3.05 to 3.50)
Peripheral retinal degeneration	199	0.81 (0.70 to 0.93)
Vitreous degeneration	287	1.17 (1.04 to 1.31)
Vitreous hemorrhage	11	0.04 (0.02 to 0.08)

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**Table 4.**  
**Awareness of eye disease by age**

Age range (yr.)	Aware of Eye disease n (%)		
	Yes	No	Total
≤ 24	262 (40.87)	379 (59.13)	641
25 to 44	500 (44.25)	630 (55.75)	1130
45 to 64	959 (47.62)	1055 (52.38)	2014
65 to 84	1802 (57.59)	1327 (42.41)	3129
≥ 85	219 (67.38)	106 (32.62)	325

The timing of their last full eye exam was a significant factor in who had a previous diagnosis of eye disease. People who were previously examined within the last 2 years were 4.27 times more likely to have such a diagnosis than those whose last examination was 7 years or more.

The response rate for "previous eye surgery" was 96.2%. Of those responding, 9.96% had a previous eye surgery. The most frequently reported surgery was for cataracts with 1402 or 5.93% of optometrists' patients reporting a procedure involving cataracts.

Many risk factors for eye disease, other than age, were reported. The four most frequently reported were hypertension at 8.94%, then a family history of eye disease at 7.46%, followed by diabetes at 4.74% and finally heart disease at 4.46%. The prevalence of self-reported diabetes in Canada is currently estimated to be 3.2%.<sup>6</sup> The prevalence of self-reported diabetes in this study should be higher due to an older population and self-selection.

Prevalence of specific eye disease ranged from a high of 12.85% for cataracts to a low of 0.04% for vitreous hemorrhage (Table 3). Prevalence values for anterior segment disorders were similar to those found in a study of Ontario optometrists conducted in 1997.<sup>7</sup>

The prevalence of eye disease that people are not aware of in the optometric patient population was 14.4% (95% CI, 13.9% to 14.8%) or 3497 out of 24324 (Table 4). Optometrists reported that their patients were unaware of the presence of 48.3% of eye diseases that were diagnosed. In other words 48.3% of disease was

**Table 5.**  
**Best corrected distance visual acuity n (%)**

Best corrected visual acuity (right eyes)	Best corrected distance visual acuity n (%)			
	6/6 or better	6/7.5	6/9	6/12 or worse
With disease	2422 (42.34)	1397 (24.42)	770 (13.46)	1132 (19.79)
Total reported	17781(74.71)	2972 (12.49)	1326 (5.57)	1722 (7.23)

asymptomatic. The proportion of disease that was asymptomatic was higher in some categories of "reason for visit". The majority of people (79.77%) who see an optometrist do not indicate an ocular complaint as their reason for the visit. They most commonly report that they require a regular eye exam, their spectacles need updating or their vision is reduced. Twenty percent of these people (3857 out of 19317) have an eye disease and 57.84% were unaware of the eye disease.

Awareness of eye disease was also related to patient's age and time since last full eye examination. Older patients were more likely to be aware of the presence of an eye disease than younger patients were (Table 4). People whose last full examination prior to the current visit was 1 year or less had the highest probability of knowing about the eye disease.

Best-corrected visual acuity was recorded for 96.87% of the optometric patients. A best corrected visual acuity of 6/6 or better is not indicative of the absence of disease (Table 5). Many of the optometric patients with eye disease, 42.34%, had a best-corrected visual acuity of 6/6 or better. This proportion increases to 66.8% when one line worse than 6/6 is included, 6/7.5 or better. However, there is a statistically significant difference in the distribution of visual acuity in the right eyes of the total population versus the right eyes of the people with eye disease,  $\chi^2 = 2305$ ,  $P < 0.001$ . A reduced best-corrected visual acuity may indicate the presence of eye disease.

Table 6 shows the distribution by age group of the four major causes of blindness in the Canadian population. Each age group has some risk of these diseases with the prevalence increasing sharply in those 65 years of age and older. The proportion of people who were unaware of having each specific eye disease ranges from 41 to 50 percent.

## DISCUSSION

This is the first study to look at the prevalence of asymptomatic or undetected eye disease in an optometric patient population. Studies have looked at the prevalence of undetected eye disease in general medicine populations.<sup>8,9</sup> Wang et al's study in Baltimore found that 50.6% of patients (n=405) in a primary care clinic population had clinically important ocular pathology.<sup>8</sup> They found that one-third of those affected (n=68) were unaware of their eye disease, and 26% (n=18) of these 68 patients required immediate medical or surgical intervention.

The prevalence of undetected eye disease and the specific rates of disease awareness were similar between the current study and that of Wang et al.<sup>8</sup> In Baltimore the overall prevalence of undetected eye disease was 16.67% with 49% of the cataract cases, 60% of those with diabetic retinopathy, and 42% of the glaucoma cases and suspects unaware of their diseases. The corresponding rates for this optometry study: 14.4% prevalence of undetected disease, 45% of cataract cases unaware of their disease, 41% with diabetic retinopathy, and 50% of the glaucoma cases and suspects.

Many studies have demonstrated the importance of early detection and treatment of eye disease in the prevention of blindness. The majority of studies focus on diabetic eye disease. One study reviewed the evidence on screening for diabetic retinopathy and estimated 260 new cases of blindness in England and Wales would be prevented each year.<sup>10</sup> This estimate was based on a program where patients with diabetes mellitus are systematically referred to optometrists for a retinal examination

(88% detection of serious retinopathy, 87% of cases treatable). A study which compared the performance of an optometrist and an ophthalmologist found 77% total agreement about the presence or absence of diabetic retinopathy.<sup>11</sup> The optometrist's sensitivity of referral for moderate or severe background diabetic retinopathy was 92%. In another study in England where optometrists were given a defined protocol for referable eye disease, optometric screening for diabetic eye disease produced a sensitivity of 100% and a specificity of 94%.<sup>12</sup>

The impact of a national diabetic eye-screening program is illustrated in Iceland where they have seen a reduction in the prevalence of blindness due to diabetic eye disease. The prevalence of blindness in patients with Type I diabetes decreased from 2.4% in 1980 to 0.5% in 1994, 14 years after the institution of the diabetic eye screening program.<sup>13</sup> The authors of the study conclude that, "visual impairment in diabetics can be prevented with active regular screening and standard laser therapy."

In this study almost one out of every seven people presenting for an eye examination had asymptomatic eye disease. A good visual acuity did not rule out the presence of eye disease. This study and other similar studies support the importance of regular eye examinations and a full ocular health assessment with each eye examination.

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**Table 6. Prevalence of specific eye diseases by age group and proportion unaware**

Eye Disease	Age group (yr)				Unaware
	≤ 24	25 to 44	45 to 65	≥ 65	
Cataract / IOL opacification	24 (0.34)	67 (1.24)	576 (8.57)	2465 (48.15)	45%
Glaucoma cases & suspects	42 (0.59)	192 (3.55)	462 (6.87)	473 (9.24)	50%
Diabetic retinopathy	0 (0)	15 (0.28)	88(1.31)	78(1.52)	41%
Macular degeneration	6 (0.08)	19 (0.35)	136 (2.02)	623 (12.17)	48%

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