

# Glaucoma Prevalence

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## **ABSTRACT:**

*Glaucoma is a group of eye diseases that gradually steals sight without warning and often without symptoms. Vision loss is caused by damage to the optic nerve. This nerve acts like an electric cable with over a million wires and is responsible for carrying the images we see to the brain.*

*It was once thought that high intraocular pressure (IOP) was the main cause of this optic nerve damage. Although IOP is clearly a risk factor, we now know that other factors must also be involved because even people with "normal" IOP can experience vision loss from glaucoma.*

*The diagnosis of glaucoma is a gray area that practitioners struggle with. When do we consider the patient to have glaucoma? And who is most at risk to develop glaucoma? These are questions that I would like to have answered. There are many studies out there that provide bits and pieces of glaucoma prevalence, incidence, and risk factors. This research paper will bring many studies together to clarify the prevalence, incidence, and risk factor..*

## **INTRODUCTION:**

**Glaucoma is a common eye condition in which vision is lost because of damage to the optic nerve.(14)**

**The optic nerve carries information about vision from the eye to the brain.(14) In most people with glaucoma, optic nerve damage is related to increased pressure of the fluid circulating inside the front portion of the eye.(14) However, glaucoma-related eye damage can occur even when the fluid pressure is normal. (14)**

**Glaucoma is the second leading cause of blindness in the United States, and the leading cause of blindness in African-Americans.(14) It currently affects as many as 2.5 million Americans, but up to half of people with glaucoma don't know that they have the condition. (14) Glaucoma tends to run in families and is five times more common in African-Americans than in Caucasians.(14) The risk of glaucoma also increases with age in people of all ethnic backgrounds.(14)**

**Glaucoma, once thought of as a single disease, is actually a broad term for a certain pattern of damage to the optic nerve (the bundle of nerve fibers that carries information from the eye to the brain).(13) This pattern usually occurs in the presence of high intraocular pressure, but contrary to popular belief, glaucoma can occur with normal or even below-normal eye pressure.(13) Worldwide, it is estimated that about 50 million people suffer from vision impairment, if not complete blindness from glaucoma.(13) In the United States, about 300,000 new cases are diagnosed each year, adding to the more than three million cases.(13)**

**Open-angle glaucoma, the most common form of glaucoma, affects about 3 million Americans--half of whom don't know they have it.(12) It has no symptoms at first.(12) But over the years it can steal your sight.(12) With early treatment, you can often protect your eyes against serious vision loss and blindness.(12)**

## **THEORIES OF GLAUCOMA:**

**It seems that different mechanisms of damage occur in glaucoma. Schulzer et al. (1990) identified two subgroups of glaucoma patients: one group in which the degree of VF**

**damage was correlated with IOP level, and one group in which it was not. In glaucoma, ganglion-cell death can be mediated via apoptosis. Stimuli that may lead to apoptotic cell death include neurotrophin deprivation and glutamate toxicity (Nickells 1996). Neurotrophin withdrawal can be caused by blockage of retrograde axonal transport during periods of increased IOP or by defective neurotrophin transport by energy depletion due to ischemia. Glutamate toxicity is believed to be caused by ischemia of the optic nerve and retinal ganglion-cells.**

**According to the mechanical theory of glaucoma, the main cause of glaucomatous ONH damage is elevated IOP or increased susceptibility to IOP Evidence exist that IOP contributes to the pathogenesis of glaucoma**

**Blood flow in a tissue is determined by perfusion pressure , arterial pressure minus venous pressure, and resistance to flow between arteries and veins. Like other parts of the central nervous system, the optic nerve and ONH exhibit autoregulation of blood flow constant despite changes in the perfusion pressure, for example in cases of change in arterial pressure or when venous pressure is altered by change in IOP, Ischemia due to increased IOP may result if autoregulation is impaired, for example because of innate deficiency or vasospasm.**

## **RISK FACTOR:**

<b>RACE/AGE</b>	<b>RISK FACTOR</b>
<b>Barbados Eye Study:</b> <b>With Cristina Leske PH.D</b>	<b>*7% of blacks have Glaucoma</b> <b>*1% of white minority have Glaucoma</b> <b>*3% mixed population have Glaucoma</b>  <b>*1% of blacks in 40-50 year of age</b> <b>*10% of blacks in 80's year of age</b>
<b>Beaver Dam Eye study:</b> <b>With Barbara Klein MD</b> <b>Study consisted of 99% white population</b>	<b>*1% 43-54 years of age had Glaucoma</b> <b>*4.5% over 75 years of age have Glaucoma</b>  <b>*1.74% increased odds for every 10 year age increment.</b>  <b>*1.23% of blacks between 40-49 years of age had Glaucoma</b> <b>*11.26% of blacks over 80 years of age had Glaucoma</b>  <b>*.92% of whites between 40-49 years of age had Glaucoma</b> <b>*2.16% of whites over 80 years of age had Glaucoma</b>

<b>Baltimore Eye Study:</b>	<ul style="list-style-type: none"> <li>*1% of blacks between the ages of 40-50 had Glaucoma</li> <li>*10% over the age of 80 had Glaucoma</li> </ul>
<b>Framingham Eye Study:</b>	*4x-5x the risk of blacks to have Glaucoma over the age of 40

<b>AGE</b>	<b>RISK FACTORS</b>
<b>Beaver Dam Study</b>	<ul style="list-style-type: none"> <li>*2.1% prevalence in Caucasian population</li> <li>*8.8% Prevalence in St. Lucia population (African-Caribbean)</li> </ul>
<b>African-Caribbean Eye Study</b>	*African Caribbean have a 3.7 fold odd on developing Glaucoma over the Roscommon Caucasians

<b>GENDER</b>	<b>RISK FACTORS</b>
<b>Baltimore Eye Study</b>	* No difference between sexes
<b>Beaver Dam Study</b>	* No difference between sexes
<b>Roscommon Study</b>	* No difference between sexes
<b>Barbados Eye Study</b>	*Males are 1.4 times more susceptible to get Glaucoma
<b>Rotterdam Study</b>	*Males are 3 times more susceptible to get Glaucoma
<b>Dalby Study</b>	*Females are more susceptible to get Glaucoma

<b>INTRAOCULAR PRESSURE</b>	<b>RISK FACTOR</b>
<b>Baltimore Eye Study</b>	<ul style="list-style-type: none"> <li>*Prevalence of POAG increases, with increased IOP</li> <li>*With decreased IOP, decrease visual field loss</li> <li>*Normal IOP is between 10-22 mmHg</li> <li>*IOP readings fluctuate with different corneal thickness.</li> </ul>

<b>OPTIC NERVE HEAD</b>	<b>RISK FACTORS</b>
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<p><b>Study – Optic disc, cup and neuroretinal rim size, configuration and correlations in normal eyes.</b></p>	<p><b>*7% of the normal population had C/D of 0.5 or greater.</b>  <b>*The average horizontal C/D ratio was found to be 0.74 in Caucasians and .057 in African-Americans.</b>  <b>*C/D 's less than 0.74 horizontal and 0.64 vertical should be considered normal.</b></p>
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<p><b>HYPERTENTION</b></p>	<p><b>RSK FACTORS</b></p>
<p><b>*A number of studies have noted a direct relationship between rise in blood pressure and a rise in intraocular pressure.</b>  <b>*younger subjects (&lt; 60 years of age) with raised blood pressure have a lower risk of POAG than the age-matched normal population.</b>  <b>*Older subjects (&gt;70 years of age) higher risk than their aged-matched population.</b></p>	
<p><b>Baltimore Eye Study</b></p>	<p><b>*Patients who are nocturnal dippers, increase the risk of POAG</b></p>

<p><b>GENETICS</b></p>	<p><b>RISK FACTORS</b></p>
<p><b>*Increased risk with family history, 13-47%</b></p>	
<p><b>Baltimore Eye Study</b></p>	<p><b>*Family history increases risk for POAG</b>  <b>*Odds are:</b>  <b>1. Siblings 3.69</b>  <b>2. Parents 2.17</b>  <b>3. Children 1.12</b></p>

<p><b>OTHER FACTORS</b></p>	<p><b>RISK FACTORS</b></p>
<p><b>Myopia</b></p>	<p><b>*Increase risk of POAG with increase myopia</b></p>
<p><b>Diabetes mellitus</b></p>	<p><b>*Increase risk of Glaucoma with diabetes mellitus</b></p>
<p><b>Smoking</b></p>	<p><b>*No associations</b></p>
<p><b>Alcohol</b></p>	<p><b>*No associations</b></p>

## **Conclusion:**

**Glaucoma of some type is found in about 2% of the population over the age of 40.(11) It can also affect children and young adults, though much less frequently.(11)**

**It is estimated that over 3 million Americans have glaucoma but only half of those know they have it. (3) Approximately 120,000 are blind from glaucoma, accounting for 9% to 12% of all cases of blindness in the U.S. (3) About 2% of the population ages 40-50 and 8% over 70 have elevated IOP.\*(3) Glaucoma is the second leading cause of blindness in the U.S. and the first leading cause of preventable blindness.(3) Glaucoma is the leading cause of blindness among African-Americans. (3) 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.(3) The most common form, Open Angle Glaucoma, accounts for 19% of all blindness among African-Americans compared to 6% in Caucasians. (3) Other high-risk groups include: people over 60, family members of those already diagnosed, diabetics, and people who are severely nearsighted. (3) Estimates put the total number of suspected cases of glaucoma at around 65 million worldwide. (3)**

**Its very important to take into consideration the corneal thickness, which can determine and explain certain situation where a case does not make sense.**

**Another factor is central corneal thickness. Normal central corneal thickness varies from one study to another. The studies referenced here find the CCT to average from 524 to 563 *um*, with standard deviations of from 29 to 38 *um*.(16) Our experience is that measurements of CCT below 490 *um* or well above 630 *um* are frequent in our practices. (16) On average every 20 *um* account for 1 mmHg of pressure. Prevalence of POAG increases, with increased IOP. With decreased IOP, decrease visual field loss.**

**In a study 7% of the normal population had C/D of 0.5 or greater, therefore any C/D's over 0.5 should be considered a glaucoma suspect until proven otherwise. African Americans normally have C/D's larger than Caucasians. Consider 0.5 C/D or larger on a Caucasian to have a larger risk than an African American.**

**Genetics have a role in glaucoma diagnosing. Increased risk with family history of 13-47%, Odds from the Baltimore eye study states that the odds are as follows. Siblings 3.69, parents 2.17, children 1.12. Therefore as a practitioner its crucial to include genetic desposition as part of the decision making.**

**Systemic hypertension has an effect on glaucoma, a number of studies have noted a direct relationship between rise in blood pressure and a rise in intraocular pressure.**

**Other factors that could effect glaucoma are myopia and diabetes mellitus. Increased risk of POAG with increase myopia. Increase risk of glaucoma with diabetes mellitus. No association was found with smoking and alcohol.**

**The best way to protect yourself from loss of vision due to glaucoma is with regular, thorough eye exams. You can't treat a disease you don't know you have. Loss of vision from glaucoma is irreversible. Glaucoma usually has no signs or symptoms until serious loss of vision occurs. Most cases of glaucoma are controlled with medication or surgery. Therefore early detection is crucial.**



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