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Evaluation of Optic Atrophy and patients suffering from the disease: A Systematic Review of Studies and Literatures

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ABSTRACT: Millions of people in this world are suffering from the optic diseases or normally called eye disorders such as glaucoma, cataract, strabismus and so on but this diseases also takes place due to tumour in brain and may cause optic atrophy. Presently 9.3 million people are suffering from eye diseases in India. It influences majority cases due to corneal blindness and optic atrophy in which vision loss takes place beginning from partially in one eye then go to its higher stage of fully vision loss and cause the blindness sometimes which is unable to reverse heal. It shows the symptoms like dizziness, watery eyes, vision loss, faded hues, and sometimes pain in eyes and headache too. Yet not any proper treatment is discovered for its reverse healing. Its diagnosis can be done by MRI of brain, optical coherence tomography(OCT), B scan ultrasonography. On the basis of survey the many more causes of optic atrophy can be founded. It often affects people between the ages of 10 and 50. Patients commonly exhibit rapid, frequently severe sight loss accompanied by discomfort while moving their eyes. According to estimates, 1 in 35,000 persons worldwide suffer with optic atrophy type 1. Around 1 in 10,000 persons in Denmark are affected by this illness, which is more prevalent there and in India it is 1 in 50,000 persons.

1.INTRODUCTION

Optic atrophy is a disorder that causes the retinal ganglion cells that make up the optic nerve to die. Images of the optic nerve obtained by fundoscopy during optic atrophy seem pale. The last stage of optic nerve degeneration, known as optic atrophy, can occur anywhere along the optic nerve's path from the retina to the lateral geniculate. Because the optic nerve transmits data from the retina to the brain, loss of vision is associated with optic atrophy. The phrase "optic atrophy," which suggests inactivity, is rather misleading and is thus best used to denote damage to the optic nerve.

When light from a light source hits the fundus and enters the axonal fibres, total internal reflection happens. A healthy optic disc reflects light from the capillaries on its surface, giving it a characteristic yellow-pink colour. In cataract-affected eyes, the disc seems hyperemic because the red colour is more intense. On the other side, in individuals with pseudophakic circumstances, the disc could appear a little paler.

It is unclear exactly what causes the optic disc pallor seen in cases of optic atrophy. The reorganisation of astrocytes and the loss of axonal fibres are assumed to be the causes of the disc pallor. The degenerated axons lose the optical quality of complete internal reflection, which is why the optic disc is pale in this state.

2.CAUSES

Examples of extrinsic compression include the pituitary adenoma, cerebral meningioma, aneurysms, craniopharyngiomas, mucoceles, papillomas, and metastases.

Examples of intrinsic optic nerve tumours include gliomas, meningiomas, and lymphomas of the optic nerve sheath.

Vascular conditions include cranial arteritis, anterior ischemic optic neuropathy (AION, NAION), central retinal artery occlusion, and carotid artery occlusion.

Inflammatory disorders include meningitis, Devic's disease, sarcoidosis, systemic lupus erythematosus, polyarthritis nodosa, Churg-Strauss syndrome, and orbital cellulitis, to name a few.

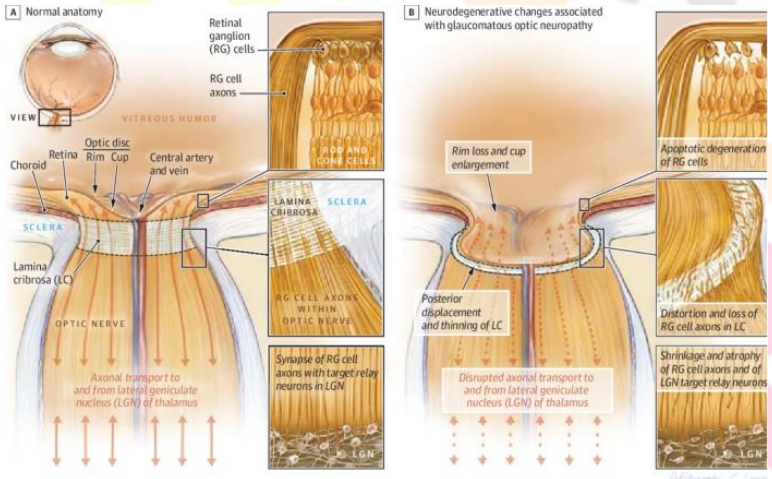
Examples of infections include syphilis, TB, Lyme disease, Aspergillosis, Cryptococcus, chickenpox, measles, and mumps.

Toxic and nutritional optic neuropathies include, among others, thyroid ophthalmopathy, juvenile diabetes, smoking, methyl alcohol consumption, and drug addiction.

Trauma: Injury caused by a foreign body or an orbital fracture. injury to the optic nerve.

Brain and central nervous system disorders may potentially be a factor in the sickness. These might include multiple sclerosis, stroke, brain cancer, and inflammation of the brain (also known as temporal arteritis).

Rare types of hereditary optic nerve atrophy can affect kids and teenagers. Sometimes head or face traumas can result in optic nerve atrophy.



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3. DIAGNOSIS, EXAMS AND TEST

- Colour perception
- Light reflex in the eyes
- Tonometry
- Seeing clearly
- Test of the visual field (side vision)
- Your ophthalmologist may notice that the optic nerve appears pale at the back of your eye using a device called an ophthalmoscope, which denotes a loss of nerve fibres.
- It may be essential to do further tests, such as an orbital MRI, blood tests, and brain scans.
- Take your blood pressure and get your heart evaluated to look for vascular reasons.
- Testing in a laboratory may be required on occasion.

- Homocysteine levels, antiphospholipid antibodies, and ELISAs for herpes simplex, CMV, rubella, and toxoplasmosis (TORCH panel).
- Fractures, fibrous dysplasia, sinusitis, hyperpneumatized sinuses, and space-occupying lesions can all be seen by imaging techniques.

4.PROGNOSIS

Depending on the underlying cause of the condition, optic atrophy patients' prognoses might vary. If optic neuritis is to blame, the patient may often anticipate ultimately getting their eyesight restored as the inflammation subsides. The patient's eyesight could not get better if the culprit is another optic neuropathy.

The goal of treatment, where available, is to slow the course of optic atrophy. The administration of steroids may in certain situations be able to prevent the optic atrophy associated with optic neuritis.

5.RISK FACTOR

5.1 TOXIC OPTIC NEUROPATHY OR OPTIC ATROPHY

1.Alcohol Consumption

Optic neuropathy, also known as tobacco-alcohol optic neuropathy, is still one of the most often reported alcohol-related neuropathies, but the precise interaction or synergism between alcohol and tobacco as trigger variables has never been demonstrated. Patients may have discrete bilateral visual disturbances, significantly reduced visual acuity, symmetric central or cecocentral scotomas, and acquired color vision disorders. Significantly, alcohol is no longer acknowledged as a toxin that causes toxic optic neuropathy on its own. Alcohol abusers are more likely to consume fewer servings of vital minerals and vitamins due to their vulnerability to undernutrition and impaired gastrointestinal absorption, and this appears to be a risk factor for developing nutritional optic atrophy.

5.2 Toxic Substances

Carbon monoxide (CO), industrial solvents (toluene, styrene, tetrachloroethylene, carbon disulfide, n-hexane, and solvent combinations), or organophosphate insecticides can also result in toxic ocular neuropathy. Reduced visual acuity, morphological alterations, and delays in both the flash and pattern VEPs (visual evoked potentials), an aberrant pattern ERG (electroretinogram), and a pale optic disc in fundoscopy can all be signs of CO poisoning. The mechanism behind cigarette amblyopia and CO-induced toxic optic neuropathy may be identical. Similar to cases of cigarette amblyopia, CO-induced optic nerve degeneration may be at least partially treatable with early hydroxocobalamin administration.

5.3 Nutritional Deficiencies

Deficiencies in diet, pollutants, and medications all have the potential to cause optic nerve dysfunction. Methanol, amiodarone, cigarettes, and ethanol are some common triggers in this group. Similar to hereditary optic neuropathies, nutritionally-induced optic neuropathies arise in central or cecocentral scotomas and are characterised by selective maculo-papilar bundle involvement. Ethambutol may cause optic neuropathy in at least 1% of people. Patients who are zinc (Zn) deficient are particularly susceptible to ocular neuropathy. Typically, 2 to 8 months after the last dose, symptoms appear. There may be extremely little pupillary abnormalities in the patient. A visual evoked potential could be required in some circumstances in order to confirm the diagnosis.

5.4 Drugs

The medications that cause optic neuropathy include antibiotics (linezolid, ciprofloxacin, cimetidine, and chloramphenicol), antitubercular medications (isoniazid and ethambutol), halogenated hydro quinolones, benzofuran derivatives (amiodarone), antiepileptic medications (vigabatrin), cGMP-specific phosphodiesterase type 5 inhibitors (sildenafil (etanercept, infliximab, and adalimumab). Another well-known and frequent side effect that might emerge from ethambutol use is optic atrophy. Ethambutol-induced optic neuropathy (EON), which is expected to occur in 1-2% of TB patients, is likewise dose-dependent. Ethambutol's neurotoxicity on

the visual neurons has not yet been proven, however it is thought that its metal chelating properties may be to blame. Ethambutol use over a long period of time is also linked to vitamin E and B12 deficiency, which worsens optic atrophy symptoms. The painless loss of central vision and the appearance of cecocentral scotomas in the field of vision are the most typical signs of EON.

5.5 Some common risk factors are-

- Diabetes Mellitus
- Genetical Predisposition
- Hypertension
- Vitamin B12
- Folic Acid
- Vitamin B1

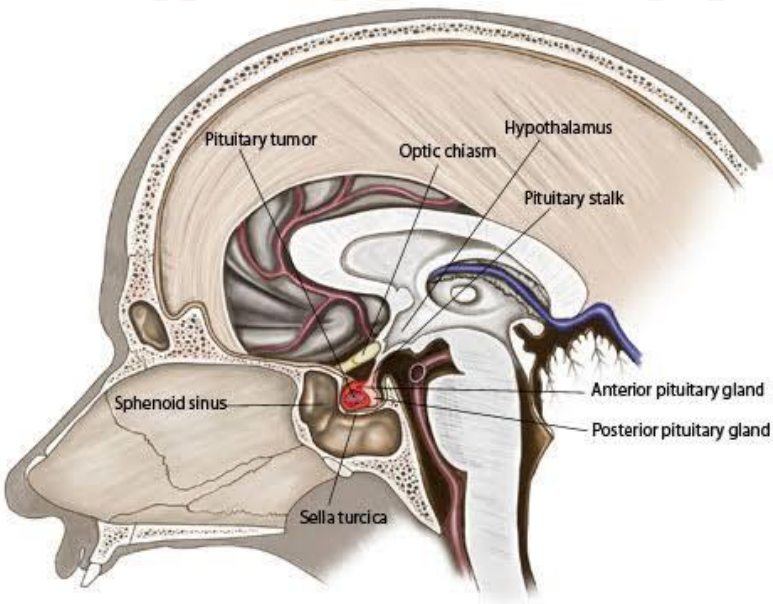
6. FINDINGS OF OPTIC ATROPHY IN PATIENTS WITH PITUITARY TUMOR

Secretory tumor patients may experience systemic symptoms linked to the underlying hormonal imbalance. The majority of ophthalmologic problems are a result of widespread effects brought on by optic nerve atrophy.

Headaches -With a reported prevalence of 45%, headaches are one of the symptoms associated with pituitary adenomas that are most frequently reported. These headaches frequently only affect the brow or the periorbital area.

Decreased vision - The chiasm can get compressed by pituitary adenomas, which frequently results in a gradual loss of visual function. This may manifest as a loss in the outer visual fields or as a drop in center sharpness.

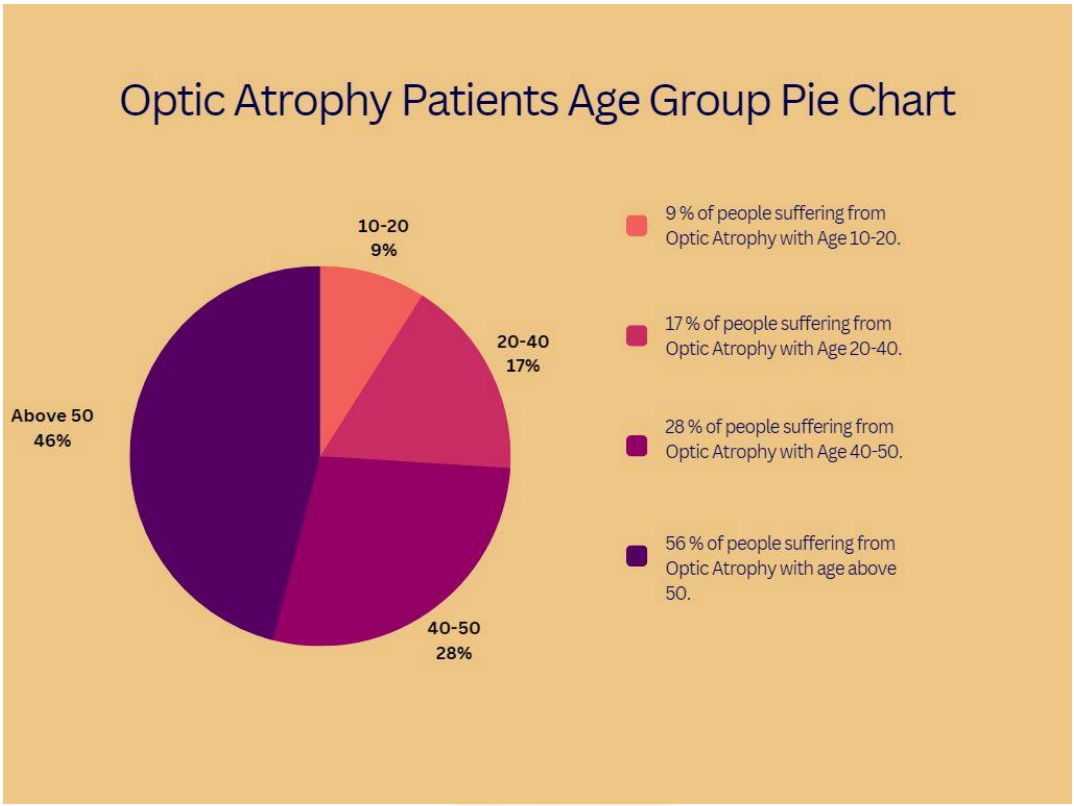
Loss of Peripheral Vision - Patients frequently are unaware of peripheral field loss; however, queries focusing on functional changes, such as the increased risk of auto accidents as a result of failing to notice automobiles approaching in the peripheral vision, etc., can help the doctor identify a visual field deficit. Optic neuropathy, bitemporal hemianopsia from chiasmal compression, or, less frequently, homonymous hemianopsia from involvement of the optic tract, can all cause visual loss. Depending on whether one or both optic nerves are extended, the visual acuity may or may not be affected.

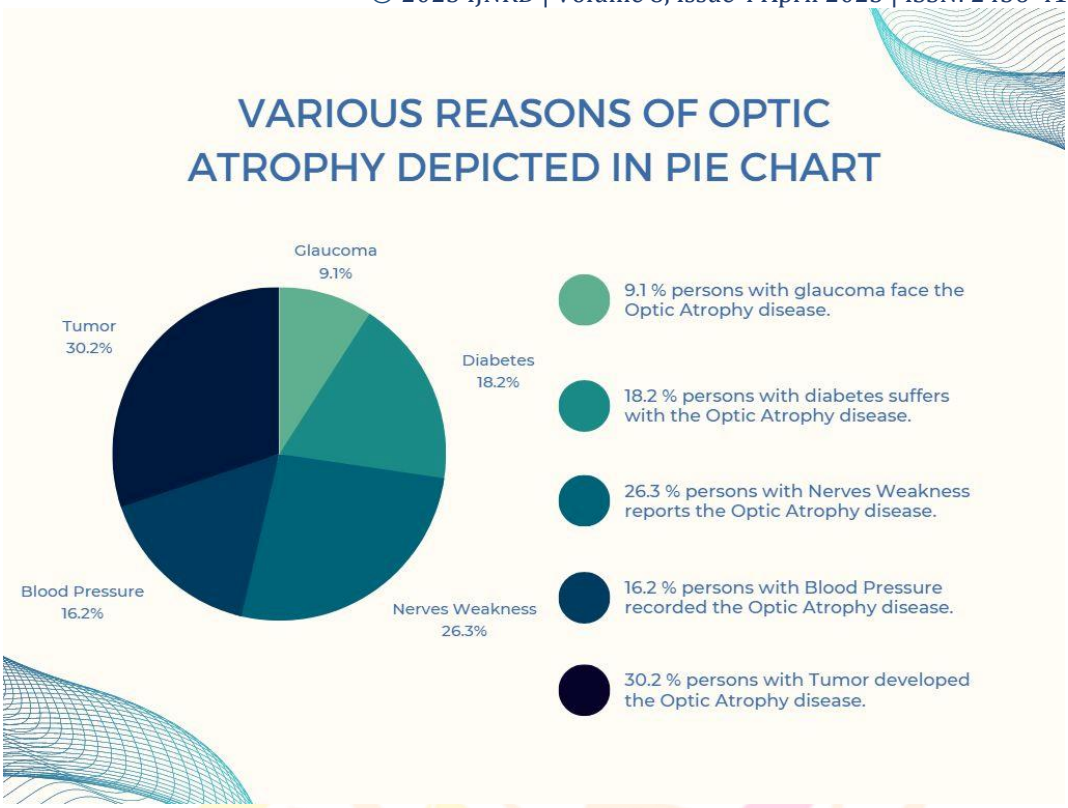


Optic Atrophy - Optic atrophy can result from persistent tumor compression. According to reports, 50% of pituitary tumors with visual field abnormalities have some atrophy. Only the nasal and temporal optic disc may become atrophic if only the fibers nasal to the macula are damaged; this condition is frequently described as having a "bow-tie" or "band-shaped" pattern in both eyes in bitemporal hemianopsia and only in the eye

with the temporal visual field loss (nasal fiber loss) in a condition known as homonymous hemianopsia from an optic tract lesion.

Pituitary Apoplexy -Pituitary apoplexy, which is most frequently caused by a hemorrhagic infarction of a pituitary adenoma, is the abrupt swelling of the pituitary gland. Acute headache, loss of visual field or vision, ophthalmoplegia, face pain, or facial numbness are common symptoms of pituitary apoplexy. Cranial nerves III, IV, V, and VI may become dysfunctional as a result of a sudden tumor extension into the surrounding cavernous sinuses, with cranial nerve III being the most frequently impacted. Loss of the visual field and/or central vision, as well as a loss of the ability to perceive light, are all effects of superior extension





CONCLUSION

According to a study of the available evidence, optic atrophy is a disease that cannot be fully cured and can only be slowed with treatment. In some circumstances, the injection of steroids may be able to stop the visual atrophy brought on by optic neuritis. Both its reverse healing and prior injury cannot be reversed or addressed. The condition starts with a loss of vision in one side eye and gradually worsens this effect by harming both eyes. We interviewed a significant number of people with optic atrophy and found that various additional disorders, such as glaucoma, diabetes, nerve deterioration, and high blood pressure, are very frequently associated with this condition. Moreover, research has shown that, although optic atrophy can affect people of all ages, people over 50 are the most impacted.

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