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Impact of Environmental Hazards on Sense of Vision - A Conceptual Study

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ABSTRACT

"Eyes are god's greatest gift and are said to be the best among all sense organs." We perceive upto 80% of all impressions by means of our sight. The eye is a specialized sense organ that helps us to understand our environment, which is sensitive to light and atmospheric pressure, therefore its functions, to a large extent depend on the quality of the environment. Eyes being the window to the world, but for many the view become blur, dim and even entirely dark due to visual impairment that can be due to environmental contacts. Although the full impact of the environment on sight is unknown, many reports have shown that low vision and blindness can be directly or indirectly related to environmental exposure. In this article ayurvedic view on the topic is enlightened along with *Kriyakalpa* procedures.

Key words: Visual Impairment, Environmental Exposure, Kriyakalpa.

INTRODUCTION

Eye being the most vulnerable organ to atmospheric and environmental insults, even though, naturally eyes are structured to protect itself from foreign objects such as, bright light, dust, and wind, for the purpose of vision they need to remain open. Frequent exposure to toxic pollutants via air, water noise and radiation can damage the eye from minor irritation of eye to complicated cases of retinal bleeding. Getting exposed to air pollutants, taking a shower in water contaminated with chemicals can degrade eye health and vision slowly over the time. Exposure to increased noise, dim light sources, global warming, radiations

too damages our vision.^[1] This article reviews the role of impact of environmental factors on sense of vision.

Environmental Air Pollution

Commonly found air pollutants in cities include - carbon monoxide, nitrogen dioxide, sulphur dioxide, arsenic, benzene, lead etc. The severity of discomfort produced by air pollution is determined by the levels of Hydrocarbons and nitric oxide in ambient air. Air pollution mainly occurs due to irradiation of automobile exhaust, exposure to smoking. The most common symptoms seen due to exposure to these are Burning sensation and redness eye irritation which occurs when exposed to air pollution, watering of eyes, discharge, allergy with severe itching, swelling of the eyes and difficulty in opening the eyes, increased risk of infection and visual difficulty including Refractive errors and impaired color vision. Most common eye disorders in 10-15% of people is suffering from chronic irritation and dry eye syndrome due to constant exposure to a high level of air pollutants, Conjunctivitis which occurs with increased nitrogen dioxide levels in the environment and weak synthetic estrogens bind to the steroid receptors of our eyes and can cause diseases such as Dry eye

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syndrome, Uveitis and Cataract. One of the most important cause is Smoking.

Smoking leading to eye disorders

Risk of **Allergic conjunctivitis** is noticed to be increased by about 20% in children who are exposed to environmental tobacco smoke. Smoking cigarettes in adults is associated with **Cataract** more so for nuclear cataract i.e., 3 times than sub capsular posterior cataract. Endotoxins formed in tobacco smoke induce inflammatory response and **Acute Uveitis**. Smoking also causes **Age Related Macular Degeneration**. Smokers with Thyroid Eye Disease have poor prognosis as compared to non smokers. Passive smoking can also increase the risk of ocular surface disorders like Atopic Kerato Conjunctivitis and Allergic Conjunctivitis. Cigarette smoking also causes Primary Open Angle Glaucoma according to various studies.

Noise Pollution

According to studies, noise pollution can also affect the eyes and the environment of loud noises for a long time causes Eye strain, Eye pain, Blurred vision, Tearing, Abnormality in color vision. Noise decreases the sensitivity of human visual receptor cells above 90db and results in lengthening of the reaction time for faint light, where as noise above 95db can lead to mydriasis and blurred vision which has been proven among 40 % of the exposed population. In different studies it's been observed that most people have difficulty in responding to light when exposed to noises of 115db.

Radiation Pollution

Exposure to harmful radiation such as electromagnetic radiation at workplaces can influence human vision and ocular physiopathology. Global warming and ultraviolet radiation are the two commonest causes for human blindness, where global warming is the prominent factor for the early onset and rapid progression of cataract. While, increased Ultra violet radiation due to the depletion of ozone is the causative agent for Acute photokeratitis, pterygium, trachoma and cataract. Ultraviolet

radiation either from the Sun or artificial source of light can also lead to Eyelid cancer.

Light Hazards

Continuous use of mobile phones, laptops and TV screens before bedtime in the dark can cause extensive strain to eyes which result in a condition called Computer Vision Syndrome or Digital Eye Strain. Mobile devices emit high energy visible [HEV] light and is responsible to cause changes in certain cells of eyes. It initially causes Dry eye syndrome, and strain to eyes and continuous glare over half an hour can cause irreversible eye macular degeneration resulting in rapid deterioration of vision. Usage of smart phones may also lead to dry eye disorder especially among the young children. These radiations cause irritation and stress on eyes and can lead to early **cataract**.

Thermal Pollution

An average rise of Ambient temperature of 3°C can able to increase in the incidence of Fungal Keratitis.

Heat Hazards

Welding process produces high levels of infrared and ultraviolet radiations along with intense visible light, where mixture of flammable gases burns to produce intense heat and high intensity of light. This may cause thermal damage to the eyes which may be permanent and sight threatening. Bursting firecracker and Exposure to heat in bakeries can also cause many ocular injuries including irreparable vision threatening problems and damage to the eye lens. It is also possible that chronic heat exposure during household cooking and welding process and heating fires could induce cataract. Food either fried or grilled at high temperature, can emit smoke and volatile organic compounds which can cause harm to the eyes.

Water Pollution

Eyes are vulnerable to hundreds of diseases, some of which may be water born, the responsible bacteria and /or virus might be present in the water and enter the eye during bathing or swimming at public places.

Chlorine widely used for the treatment of public water supplies, can pose greater long term dangers to the eyes. Increased rates of eye symptoms have been seen among swimmers and swimming compromises the eye's immune defenses. Symptoms seen on exposure includes itching sensation, burning sensation, excessive eye watering and discharge, gritty sensation, irritation, redness and blurred vision leading to diseases like Chemical conjunctivitis, onchocerciasis, dry eye.

Ayurvedic View

Indriyas are the medium through which we sense the whole creation. According to Ayurveda *Satmya Indriyartha Sannikarsha* is required for the correct perception of knowledge. For this to happen the coordination between *Indriyartha*, *Indriya*, *Manas*, *Budhi* and *Atma* should be healthy and intact. One of the big reasons for *Tridosha* imbalance leading to diseases is improper use of sense organs or *Asatmyendriyartha Samyoga*. This includes *Ayoga* of *Chakshurindriya* and *Mithyayoga* of *Chakshurindriya* with *Artha (Rupa)*.^[2] **Ayoga** referring to - Not in a habit of observing greenery / Indulging in distant vision or near vision uniformly / Not in a habit of blinking / Habit of staring continuously / Not indulging in distant vision or near visual acts / Remaining in house for longer duration / Not exposed to external environment. **Atiyoga** refers to excessive gazing at highly luminous substance/ Excessive utilization of visual objects / Watching television for prolonged hours / Staring at smart phones all the time / Job of IT professionals / Continuous reading of books etc. are some examples Playing computer games sitting too close / watching tv sitting too close / Looking directly at sun or solar eclipse without any safety means / Reading in dim light / Staring at very bright screen of smart phones in dim light / Light emitted from crackers, job of welders, automotive technicians, job of goldsmith, manufacturing mechanist etc. also lead to **Mithyayoga** of eye. In Ayurveda these 3 factors are considered to be the foremost cause for any disease. All *Netraroga Nidana* mentioned in *Samhitas* can be included in these 3 categories.^{[3],[4]}

Commonest eye diseases occurring due to pollution

1. Conjunctivitis,
 2. Dry eye syndrome,
 3. Computer vision syndrome,
 4. Pterygium
- **Conjunctivitis** - An inflammation of Conjunctiva characterized by redness and discharge. Signs and Symptoms-Gritty sensation, purulent discharge, crusts on lids upon awakening, inflamed and injected conjunctiva usually with limbal pallor, follicles and foreign body sensation. Ayurvedic correlation can be taken as **Abhishyanda** which is one among *Sarvagata Netra Roga*, which means it affects all parts of the eye. The symptoms are *Raga* (redness), *Lohitnetrata* (ecchymosis), *Sangharsh* (foreign body sensation), *Nistoda* (pricking sensation), *Daha* (burning sensation) and *Upadeha* (sticky discharge). The management of this condition is based on various measures like *Seka*, *Ashchyotana*, *Bidalaka* and *Anjana* (collyrium) etc.
 - **Dry eye syndrome** - Occurring as a sequelae to deficiency or abnormality of the tear secretion. Dry eye is a chronic lack of sufficient lubrication and moisture on the surface of the eye. There is generalised decrease in production of tears qualitatively and quantitatively. Tears are composed of three layers oily lipid layer, watery layer and mucous layer, problem in any of these layers results in dryness of eyes. Ayurvedic correlation can be taken as **Shushkakshipaka** - which can be managed by - *Snehapana* with *Kulira Mamsarasa*, *Achyotana* with *Darvi*, *Manjistadi Kwatha*, *Nasya* with *Anutaila* or *Sarivadi Taila*, *Snaihika Tarpana* and *Putapaka* with *Triphala Gritha* and *Anjana*.
 - **Computer vision syndrome** - Group of Ocular Symptoms produced due to working with computer monitors. Symptoms include - Decreased vision, burning sensation, redness of eyes, stinging sensation, photophobia and

headache. Ayurvedic approach of Computer Vision Syndrome is similar to Dry Eye Syndrome.

- **Pterygium** - A triangular fold of conjunctiva encroaching over cornea usually from nasal side, which is a degenerative condition. Common in hot climates where there is dry heat, high wind and abundance of dust. It is the response of eye to ultra violet rays of the sun. Ayurvedic correlation is **Arma** which is characterized by a fleshy tissue in *Shuklamandala* and managed through by *Seka* with *Triphala Kashaya*, *Nasya* with *Anutaila*, *Tarpana* with *Maha Triphaladi Gritha* and *Putapaka*, *Anjana* with *Darvi Anjana*.^[5]

DISCUSSION

A study performed by the scientists from AIIMS, New Delhi, India during 2015 has proved that 10-15% of people in Delhi suffer from chronic irritation and dry eye syndrome due to constant exposure to a high level of air pollutants. Long term exposure to air pollutants can damage the outer layer of the eye. It can also alter lipid profile and water contents of tears leading to chronic irritation. Environmental pollution contributes many problems to the human eyes; in addition to this natural inherited disease and ill health may also cause severe damage to our eyes.

CONCLUSION

The 21st century is fraught with dangers like climate change and pollution, which impact the human health. And most important eye health. Classes, seminars, counseling and awareness programs should be conducted in schools and colleges with support of concerned organization to explain the hazards of pollution. Chemical substances that are thrown out as

industrial waste are found in the air, waters and the soil. So it is beneficial to identify vulnerable people whose quality of life will be significantly impaired by environmental changes and provide counter measures in form of protection or treatment. The environmental factors such as toxic gases, smoke, chemicals and biomaterials exposure should be avoided.

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