



Research Article

Computer Vision Syndrome (CVS): An Integrative Overview from Ophthalmological and Ayurvedic Perspectives

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Abstract

Nowadays, devices such as computers, smartphones, tablets, and laptops in daily life. Prolonged exposure to digital screens has resulted in a growing incidence of Computer Vision Syndrome (CVS), also referred to as Digital Eye Strain (DES). CVS represents a group of ocular and visual symptoms resulting from extended use of digital display devices. Common manifestations include asthenopia (eye strain), ocular dryness, irritation, blurred vision, headache, and musculoskeletal discomfort.

From an ophthalmological perspective, CVS is primarily associated with a sustained accommodative effect

The rapid expansion of digital technology has significantly increased the use of electronic rt, reduced blink rate, tear film instability, and poor visual ergonomics. In Ayurvedic literature, similar disorders may be interpreted through the concept of Asatmya Indriyarth Samyoga, which describes diseases caused by improper interaction between sensory organs and their respective stimuli. Excessive exposure of the eyes (Chakshu Indriya) to digital screens may therefore be considered a form of Ati-yoga (overuse).

This article reviews the etiopathogenesis, clinical manifestations, risk factors, preventive strategies, and integrative management approaches for Computer Vision Syndrome from both modern ophthalmological and Ayurvedic perspectives.

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KEYWORDS: Computer Vision Syndrome, Digital Eye Strain, Asthenopia, Accommodation, Tear Film Instability, Asatmya Indriyarth Samyoga, Ayurveda, Netra Tarpana, Shalaky Tantra.

INTRODUCTION

In the modern digital era, the use of electronic devices has become an integral component of daily life. Computers, smartphones, and tablets are widely used for professional work, academic activities, and recreational purposes. However, prolonged and continuous exposure to digital screens has led to a noticeable increase in visual and ocular complaints.

Computer Vision Syndrome (CVS) is defined as a collection of ocular and visual symptoms associated with prolonged use of digital display terminals. Unlike printed text, digital screens

present unique visual challenges such as pixelated characters, reduced contrast, screen glare, and increased accommodative demand, which place significant stress on the visual system.

According to Ayurvedic principles, diseases may arise due to improper interaction between sensory organs and external stimuli, known as Asatmya Indriyarthā Samyoga. Classical texts such as the Charaka Samhita identify Asatmya Indriyarthā Samyoga, Prajnāparādha, and Parinama as three primary causes of disease.

As mentioned in Charak Samhita:

इत्यसात्म्येन्द्रियार्थसंयोगः, प्रज्ञापराधः, परिणामश्चेति त्रयस्त्रिविधविकल्पा हेतवो विकाराणां;
समयोगयुक्तास्तु प्रकृतिहेतवो भवन्ति॥४३॥

Among the sensory organs, the eyes (Chakshu) are considered highly significant. Prolonged exposure to digital screens may therefore be interpreted as Ati-yoga (excessive use) of the visual sense organ, leading to ocular discomfort and functional disturbances.

Etiopathogenesis

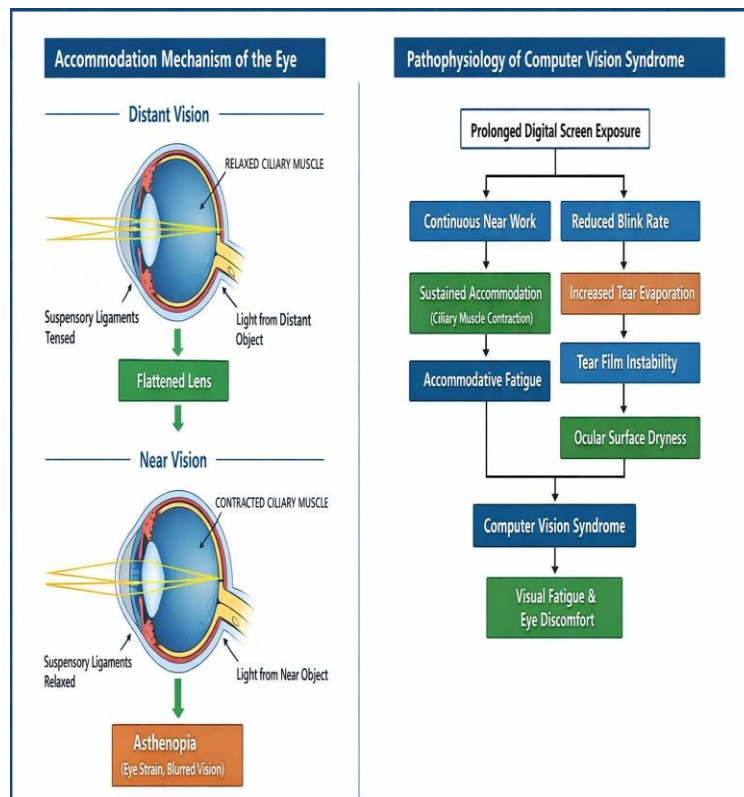
Accommodation and Visual Fatigue

Accommodation is the physiological process by which the eye alters its refractive power to focus on objects at varying distances. This mechanism involves coordinated activity of the ciliary muscles, zonular fibers, and crystalline lens.

When viewing distant objects, the ciliary muscles remain relaxed, allowing the lens to maintain a flattened configuration. In contrast, near vision tasks—such as viewing digital screens—require contraction of the ciliary muscles, resulting in increased lens curvature and enhanced refractive power.

During prolonged digital screen use, the eyes remain in a state of continuous accommodation, leading to sustained contraction of the ciliary muscles. Over time, this persistent effort may result in accommodative fatigue, manifesting clinically as asthenopia or eye strain.

Additional factors contributing to the development of Computer Vision Syndrome include environmental, behavioural, and ergonomic influences.



Contributing Factors

Blue Light Exposure

Digital screens emit high-energy visible blue light (400–490 nm), which may contribute to glare sensitivity and visual fatigue during prolonged exposure.

Reduced Blink Rate

The normal blink rate in humans ranges between 15–20 blinks per minute. However, studies have demonstrated that during digital screen use the blink rate decreases significantly, resulting in tear film instability and increased tear evaporation, leading to ocular surface dryness and irritation.

Poor Ergonomics

Improper posture and incorrect screen positioning can lead to musculoskeletal strain, particularly affecting the neck, shoulders, and upper back.

Clinical Features

Computer Vision Syndrome is characterized by a combination of ocular and extra-ocular symptoms.

Ocular Symptoms

Asthenopia (eye strain)
Ocular dryness and irritation
Burning sensation in the eyes
Blurred or fluctuating vision
Foreign body sensation
Excessive tearing
Extra-Ocular Symptoms
Frontal headache
Neck pain
Shoulder discomfort
Reduced visual efficiency during prolonged near tasks

Risk Groups

Individuals at increased risk of developing Computer Vision Syndrome include:

Information technology professionals and office workers
Students engaged in prolonged online learning
Individuals using digital screens for more than 4–5 hours daily
Individuals involved in prolonged gaming or social media usage

Preventive Strategies

Effective management of Computer Vision Syndrome primarily involves preventive measures and ergonomic adjustments.

1. The 20-20-20 Rule

After every 20 minutes of screen exposure, individuals should focus on an object 20 feet away for at least 20 seconds to relax the accommodative system.

2. Proper Viewing Distance

The computer screen should be placed approximately 50–65 cm (20–25 inches) away from the eyes and positioned slightly below eye level.

3. Conscious Blinking

Frequent blinking helps maintain tear film stability and reduces ocular dryness.

4. Screen Adjustment

Adjusting screen brightness according to ambient lighting and using blue-light filters or night mode may help reduce visual discomfort.

Ayurvedic Management

Ayurveda describes several therapeutic procedures under Shalaky Tantra aimed at maintaining ocular health.

Anjana (Medicated Collyrium)

Traditional formulations containing Saindhava Lavana, Daruharidra, and Shunthi, processed with ghee, are used to support ocular hygiene and health.

Nasya Karma

Nasya involves the administration of medicated oils through the nasal route. Preparations such as Anu Taila or Jivaniya Ghrita are traditionally believed to strengthen sensory organs, including the eyes.

Bidalaka

Bidalaka refers to the application of herbal paste over the eyelids, which may help alleviate ocular fatigue and inflammation.

"उत्पन्नमात्रे तरुणे नेत्ररोगे बिडालकः।"

Netra Tarpana

Netra Tarpana, commonly performed using Triphala Ghrita, is a nourishing therapy described to lubricate ocular tissues and relieve symptoms of visual strain.

"निर्वाते तर्पणं योज्यं शुद्धयोः मूर्धकाययोः।"

DISCUSSION

Computer Vision Syndrome has become a significant global concern due to the widespread use of digital devices. Epidemiological studies indicate that approximately 50–90% of individuals who regularly use computers experience at least one symptom of CVS.

Research conducted among university students and IT professionals has reported prevalence rates ranging from 60% to 80%, with symptoms including eye strain, dryness, headaches, and blurred vision. Individuals who use digital devices for more than six hours per day demonstrate a significantly higher risk of developing CVS.

The pathophysiology of CVS is multifactorial. Sustained near work leads to continuous accommodative effort and ciliary muscle fatigue, while reduced blink rate contributes to tear film instability and ocular surface dryness.

Environmental factors such as screen glare, improper lighting, and poor workstation ergonomics further exacerbate visual strain and may lead to extra-ocular symptoms including neck and shoulder pain.

From an Ayurvedic perspective, excessive visual strain may be interpreted as Ati-yoga of Chakshu Indriya, a subtype of Asatmya Indriyatha Samyoga. Traditional therapies described in Shalakyta Tantra aim to restore ocular balance and improve nourishment of ocular tissues.

Although these Ayurvedic interventions are widely practiced, further controlled clinical trials and scientific studies are necessary to establish their efficacy in the management of Computer Vision Syndrome.

CONCLUSION

Computer Vision Syndrome has emerged as an increasingly prevalent ocular condition in the digital age. Prolonged exposure to digital screens leads to accommodative fatigue, reduced blink rate, and tear film instability, resulting in symptoms of ocular discomfort and visual strain.

Adoption of preventive strategies such as proper visual ergonomics, regular screen breaks, and conscious blinking plays a crucial role in minimizing the impact of CVS. Ayurvedic therapeutic procedures described under Shalakyta Tantra, including Anjana, Nasya, Bidalaka, and Netra Tarpana, may provide supportive benefits in maintaining ocular health.

An integrative approach combining modern ophthalmological preventive strategies with traditional Ayurvedic therapies may offer a comprehensive method for managing Computer Vision Syndrome in the digital era.

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