

Preventive use of eye drops to stabilize the tear film in video display terminal workers: preliminary notes

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Abstract

In this work, he presents the results of preliminary work concerning the protective use of eye drops stabilizing all three layers that make up the tear film.

Infact, video display terminals (VDT) are today an essential element in almost all work environments, from offices where they represent the fundamental work tool to production environments where they are indispensable for carrying out control functions (control stations, management of quantities and flows, etc.) or design.

The risk due to VDTs is one of the factors considered by Legislative Decree 81/08, therefore its assessment falls within the employer's obligations and at the same time requires health surveillance by the occupational doctor. *Clin Ter 2023; 174 (6):483-485 doi: 10.7417/CT.2023.2501*

Key words: Legislative Decree 81/08, Video display terminal, Professionally exposed workers

Introduction

The activity at the VDT involves particular risks for the health of workers, attributable to the components of the VDT (screen, keyboard, mouse, other peripherals), the software installed, the workstation (essentially desk and seat) and the environment in which is inserted (ambient light, microclimate, work and movement spaces, sound environment, etc.)

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Materials and methods

One of the most important elements in this case is represented by the morpho-functional integrity of the tear film, which classically consists of three layers which, going from

the outside to the inside, are: lipid layer, aqueous layer and mucous layer.

Until now, ophthalmologists prescribed artificial tears based on hyaluronic acid, more or less added with other substances, using an EX POST criterion, i.e. symptomatic workers were treated AFTER exposure to VDTs (2).

A specialty called EVOTEARS OMEGA eye drops from the Ursapharm company has appeared on the market, a medical device consisting of a liquid eye drop without water, without antimicrobial preservatives and phosphates. Contains perfluorohexyloctane (EyeSol) with 0.2% omega-3 fatty acids. It stabilizes the lipid state of the tear film and reduces the evaporation of the aqueous phase underlying the tear film.

Chemical agents irritating the ocular surface

Numerous indoor air quality studies have found a high prevalence of ocular disorders (eye irritation) in office workers. These disorders appear to be caused by numerous substances in the air that have an irritating effect on all mucosal surfaces of the human body, including the ocular surface.

Among these the most active:

- aldehydes (in particular formaldehyde and acetaldehyde, acrolein);
- volatile organic compounds (VOCs);
- tobacco smoking (ETS);
- zinc oxide (NOX);
- ozone (O3);
- dust and fibres.

Professional asthenopia

One of the most historically remote definitions of asthenopia is probably that of Duke-Elder (1949), according to whom asthenopia means "that sensation felt when one realizes the work of the ocular apparatus to make vision clear through accommodative adjustments sometimes ineffective" (3).

This definition is restrictive as it refers only to the accommodative aspect of the problem, but it underlines a

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fundamental character of the phenomenon, namely its essentially subjective nature, linked above all to the overload of the ciliary muscle (4).

A more modern definition refers to “a set of functional disorders that arise when the visual system tries to obtain functional results that exceed its physiological possibilities by using stressful devices”. Studies conducted on VDT workers tend to report specific definitions such as the one cited by Bergqvist (1994): “the presence of any symptom or subjective visual disturbance resulting from the use of the visual apparatus”. The Guidelines of the main Scientific Societies consider professional asthenopia a syndrome “caused by environmental factors and work tasks which, in association with the subject’s ophthalmic characteristics, favor the onset and recurrence of a set of ocular and/or visual symptoms which, in the most serious cases, can also be accompanied by general disorders” (5).

These substances, commonly present in indoor work with internal concentrations higher than external ones, coming into contact with the ocular surface can cause, with different frequency and severity depending on the pathophysiological conditions of the operator and the possible concomitant presence of other factors (environmental and work), alterations such as:

- conjunctival hyperemia;
- decrease in the formation of physiological foam under forced blinking;
- reduction in the stability of the tear film (alterations of Tear Break-up Time, TBUT);
- alterations of the corneal-conjunctival epithelium (altered fluorescence staining capacity).

It is also important to underline that the TLV “threshold limit values” for the airborne concentrations of these substances, despite having a recognized validity for the effects induced on the upper respiratory tract, have not been developed considering the anatomical-physiological specificity of the eyeball.

Professional asthenopia has the following characteristics:

- clinical manifestations which do not correspond to an internationally agreed definition (“disability/glare” for lighting technicians, “visual fatigue” for psycho-perceptors, “ocular irritation” for occupational hygienists) (6);
- the causes are difficult to identify;
- non-specific symptoms associated with rapid reversibility;
- high diffusion among VDU workers and in the general population, in the latter case in the absence of exposure to professional factors;
- significant psycho-emotional component;
- its objective quantification is not currently possible;
- there is no evidence that it can become chronic.

From another point of view, there are those who believe that health surveillance, especially if well conducted, must go beyond disease prevention (as indicated by the code of ethics), to achieve a condition of working well-being for the VDT operator (7).

The decrease in cases of asthenopia would be one of the tangible results, in fact even the national literature of the 90s

indicated a prevalence of 40-50%, which today in some studies drops to 20% and even to much lower percentages (8).

At the same time, a concrete benefit for VDT could come from research and implementation of preventive measures to reduce asthenopia, which in most cases recognizes psychosomatic reasons. Furthermore, to verify the possible worsening of refractive disorders in workers exposed to VDTs, a study found that the perception of anxiety is of fundamental importance with respect to environmental factors, the use of lenses, the time of use of VDTs and the psychosocial factors (9).

Therefore, according to the authors, the use of VDTs is not harmful to vision, but it is necessary to promote worker well-being by focusing on interventions to reduce anxiety, increase good relationships with workers and promote psychosocial well-being (10).

Results

We therefore studied 60 patients (40 women and 20 men, aged between 24 and 63), none of them wearing corneal contact lenses, users of VDT even in a non-professional manner but in any case for a considerable time and every day (PC, smartphones, tablets), who reached the our observation complaining of the following ocular symptoms: burning, tiredness, fogginess, sensation of sand and sensitivity to light (11).

They were then evaluated by the ophthalmologist at time zero and after three months, filling out a specific questionnaire (attachment no. 1) in which the above symptoms were quantified in ascending order from 1 to 4 and obviously in these three months they instilled in the morning before the beginning the use of VDTs, one drop of the above eye drops for eye (12).

After three months of testing the results were encouraging, namely (13):

BURNING: 30 patients (50%) REDUCTION
 TIREDNESS: 20 patients (33%) REDUCTION
 FOGGING: 20 patients (33%) REDUCTION
 SAND FEELING: 30 patients (50%) REDUCTION
 SENSITIVITY TO LIGHT: 12 patients (20%) REDUCTION

All this considered, further experimentation over longer periods of time and aimed at individuals falling within the category of video terminal operators based on Legislative Decree no. 81/2008 and subsequent amendments and additions is therefore desirable (14).

Discussion and conclusions

From the examination of these 60 video terminal workers (such according to the current Italian Legislative Decree no. 81/2008) studied, who before and after an initial period of three months during which on working days (obviously before starting the work at the video terminal) they preventively instilled a drop per eye of the eye drops in question capable of reconstituting the physiological three layers of the tear film (which we remember is the first element reached by the

light in the process of vision of the ocular diopter) and thus carried out a quantitative evaluation ex post of the subjective symptoms highlighted, we can certainly state that the results in terms of subjective symptoms (which are the most annoying in these patients) were encouraging and therefore worthy of further studies on the subject with the necessary morphological and pathophysiological insights (15).

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