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Review

Occupational Eye Diseases

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Abstract

Depending on the person's working, various disorders related to the eye can occur. Depending on the work, cataracts, macular degeneration, retinal detachment, allergic conjunctivitis can be seen. Welders, computer and other users with visual displays, jewelery makers, fluoroscopy and cardiac catheterizers, radiology technicians are at risk for cataracts. Allergic conjunctivitis due to allergens such as organic dusts, chemicals, etc., which are exposed in the working environment, may ocur. Employees should perform necessary medical examinations and tests according to the nature of the work and the working environment. If the work done and the environment are risky for eye disease, necessary precautions should be taken. The worker should also be examined before starting work, and periodic eye examinations should be done after starting work.

Keywords: Cataract, ocular allergy, radiation, welding

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Depending on the person's working, various disorders related to the eye can occur. Depending on the work, cataracts, macular degeneration, retinal detachment, allergic conjunctivitis can be seen. Welders, computer and other users with visual displays, jewelery makers, fluoroscopy and cardiac catheterizers, radiology technicians are at risk for cataracts. Allergic conjunctivitis due to allergens such as organic dusts, chemicals, etc., which are exposed in the working environment, may occur.[1-2]

In this article, we aimed to review pass on the published information about the etiological causes of ocular diseases which are thought to be related to the work.

Welding

Welding is a commonly used process for bonding metals together by melting them under high heat or applying high pressure.[3] Dangers of welding jobs; ergonomic constraints, noise, working in indoor environment, high work done by electric power, electromagnetic field, rays, fire-pumping, welding gas-smoke, hot surface, welded gas hazards, hazards arising from grinding work, hammering and impact work.[4]

It can be heat, radiation, gas and metal exposure during welding.[5] During welding, they are subjected to 60% infrared rays, 30% bright (visible rays), 10% ultraviolet rays. [4] Infra-red rays cause sand in the eyes, damage to the lens and cornea. Ultraviolet rays cause blurring of vision, cataracts, damage to the cornea and iris.[4,6]

In a survey conducted on persons exposed to nonionized radiation, the frequency of cataract was 38.37% in electrical welders.[7] Cataract When 87 workers engaged in electrical welding were evaluated, there was an increase in the risk of cataracts by 24.13% over the last 10 years.[8] When 86 male welders were evaluated, the total incidence of phototactic maculopathy was found to be 32.0% when evaluated from August 2010 until December 2013.[9] Cataracts and eye injuries are more common, especially when the eyeglasses-mask is not used regularly by welder worker.[6,10]

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To prevent visual disturbances in welders, they must use appropriate welder masks. Eyewear and mask should be selected according to welding type and current intensity. Mineral-oxidized glasses should be used. Mineral-oxidized glasses can adjust to all kinds of current intensity.[4]

Computer Using

Computers are used by millions of people around the world for work, education, and entertainment on a daily basis. Muscular-skeletal system disorders, visual disturbances and headache are common in computer users, depending on the duration and inappropriate working position.[7]

Employees should perform necessary medical examinations and tests according to the nature of the work and the working environment. If the work done and the environment are risky for eye disease, necessary precautions should be taken. The worker should also be examined before starting work, and periodic eye examinations should be done after starting work.

When 27 women and 22 men were evaluated, it was observed that women were working with more computer screens. 49% of the 24 working workers complained of itching and burning in the eyes.[8] In another study, dry eye was detected in one of three or four computer users.[9] In another study, visual screen users initially had hypofunction in the lacrimal gland and were associated with dryness in the eyes.[10]

Computer Vision Syndrome (CVS) is described by the American Optometry Association as a complex of eye vision problems associated with the near vision of activities that occur during the use of computers. Approximately 60 million people are globally affected by CVS, which leads to reduced productivity in the workplace and has a decline in the quality of life of computer workers. Persons with CVS may experience dryness, irritation, fatigue, flushing, pain, sensitivity to light, slowing to change focus, double vision and color perception in the eyes. In order to be considered as a CVS symptom, the symptoms should be last at least 1 week in the last year. In the survey conducted, 2210 people who worked with computer screen for at least 2 hours in a year and at least last 12 months were evaluated. The incidence of 1-year of CVS was estimated to be 67.4%, which was higher in women than in men. The most important risk factor for CVS development was pre-existing eye disease and using of contact lens-glasses. Increasing daily working time, long working time, female gender, presence of previous eye disease, not using of VDT (visual display terminal filter), using contact lens and high ergonomic risks were identified as factors increasing CVS.[11]

Precautions should be taken to prevent visual disturbances in computer users. When the computer screen light isn't suitable, visual disturbances will be increased. Therefore the screen light should be become available. The lighting of the working environment should be arranged to reduce the brightness of the table lamps and windows. The computer user should not look at the window; the light from the window can cause the flash. A medium, non-reflecting paint can be used on the walls to limit the reflection from the walls around the computer screen. Using an anti-reflection screen or filter on the computer screen absorbs the reflected light and increases the contrast of the screen. Computer users should take regular breaks. It is suggested that the computer user should take a break every 2-3 minutes for every 30 minutes and a 10-15 minute break after every hour when they use computer. The computer users should look for at least 20 seconds at something six meters away after they use copmuter 20 minutes. These suggestions reduce ocular symptoms, increase work efficiency and productivity.[7]

Jewelry

The causes of asthenoscopy (visual weakness) are defined as a combination of individual visual problems, poor workplace conditions, inappropriate working habits (long working exposure, non-optimal stance), increased visual acuity, constantly looking at a fixed object and less blinking of the eyelids. Jewelery manufacturing activities include metals, as well as stones, polishing and precision designs. It is very important to control the quality and precision of the product at every stage of production. While any reprocessing increases the cost of labor and materials, workers need to pay more attention to the quality of the product. In such a case, workers may want to have a higher visual attention to perform their jewelery manufacturing activities. For this reason, it is expected that workers who are engaged in jewelery manufacturing will experience visual disturbances in their workplaces. The effects of exposure to work, It was recorded that the eye discomfort survey (noted in the first step) was used on 26 jewelery manufacturers and 26 graduate students (controlled group study). 71.3% of the jewelery makers show that they show signs of subjective visual impairment. In 34.78% of VDT operators, visual disturbances were reported. Visual indicators such as Individual Visual component, Ocular-ESF and Ocular-ISF components were observed to be higher for jewelery workers.[12]

Nuclear Station and Radialogical Imaging

Radiation energy absorbed in living tissues initiates physical and chemical reactions that can result in biological changes. The decisive effects that may occur in certain tissues are cataracts; non-malignant lesions on the skin, infertility, decreased bone marrow cells, and impaired severity of organ function. Nuclear power plant workers, radiology

technicians working at the hospital, cardiac catheterisation and fluoroscopy workers are exposed to known radiation.[13]

Nuclear Station

A study was conducted to evaluate the risk of cataract in nuclear plant employees. 15,883 employees were monitored. People who started from 1948 to 1982 were followed in the study. During the study, there were a total of 22,377 workers, 25.4% women. Since 43 people were exposed to acute high-dose radiation were excluded. 1274 workers were excluded due to missing medical records. Cohort's follow-up started from the date of the first work in one of the main Mayak PA facilities. The main characteristics of the work cohort are presented. Since annual health examinations of employees of Mayak PA were conducted at a special medical center, each employee was examined by one and the same eye specialist for many years (10-15 years). At the end of the follow-up (December 31, 2008), 4159 cases of cataracts were recorded among 482.217 person-years among Mayak PA workers.

This is the first study of the incidence of cataracts in a cohort of Mayak policlinic workers who worked in one of the major establishments between 1948 and 1982 and followed up to the end of 2008. In this study, there was no significant increase in the incidence of cataract in females compared to males. In the Mayak PA cohort study, cortical (48.26%) and nuclear (31.39%) cataracts were the most common senile cataract types. Posterior subcapsular cataracts were 19.3% of cases. The RR of cataract incidence was found to be highest in workers exposed to doses above 2.0 Gy. When exposed to radiation over 2 Gy for a long time, they found increased risk of cataracts. Ionized radiation causes lenste opacification.[14]

Radialogical Imaging

The lens is the most radio-sensitive structure in the eye.[15]

Cataracts are more common when compared to working and unexposed workers in industrial radiography. Hypertension, diabetes mellitus, age of exposure and body mass index (>27 kg/m^2) were significantly associated with increased risk of cortical, posterior subcapsular (PSC) and mixed cataract.[16]

Fluoroscopists are at risk for cataract because they are exposed to long-term radiation exposure. 780 cases were analyzed. Research conducted between October 2013 and December 2014. Of these, 182 were urological events. The mean duration of fluoroscopy was 34.86 seconds per case. For the highest exposed urologist, the estimated dose is 5.64 µGy per case. The defined threshold dose for cataract is 0.5 Gy.[17]

Interventional cardiology staff are exposed to some ofthe highest doses of occupational radiation in healthcare. When working in cardiac catheterization, ionizing radiation may cause lenste opacity. 117 (88% male) and 18 (61% male) controls were evaluated.[15]

Ocular Allergens

Allergic diseases have increased significantly in the last decade. Ocular allergy is one of the most common eye conditions encountered in clinical practice.[18] Allergic conjunctivitis is often associated with atopic diseases (allergic rhinitis, eczema, asthma). Allergic conjunctivitis is often associated with rhinitis. Often both eyes are itchy.[19] Allergic diseases have increased significantly in the last decade. Ocular allergy is one of the most common eye conditions encountered in clinical practice.[18]

The eye is one of the first organs to encounter environmental and occupational allergies. For this reason, ocular inflammation is a common problem in patients with allergic complaints. The most common form of ocular allergies is allergic conjunctivitis. Occupational allergic conjunctivitis (triggered by occupational allergens) is a specific type of allergic conjunctivitis that occurs in the workplace.[20]

Occupational allergic conjunctivitis is an IgE-mediated disease that is caused by a substance in the workplace's air. Risk factors include atopy, workplace airborne irritant, and a large number of irritating agents at high concentrations. Atopy is associated with the risk of sensitization specific to various high molecular weight agents. Objective research is needed for the diagnosis of occupational rhinitis and occupational allergic conjunctivitis, as well as clinical and occupational history as well as allergen-specific provocations. The management of these occupational diseases requires environmental interventions (increasing ventilation, reducing exposure time, replacing irritant with another). Medical treatment of occupational rhinitis is very similar to other allergic diseases: oral antihistamines, local (nasal) corticosteroids, combined (antihistamine and membrane stabilizer) eye drops. The most important step in the medical treatment of occupational allergic conjunctivitis is the daily administration of combined eye drops.[21]

Medical documentation and compensation procedures are important to associate allergic eye disorders with the profession. Analysis of cellular changes in the tear cell during the specific inhalation challenge test has been evaluated as a valuable diagnostic tool in occupational ocular allergies.[22]

A prospective study of a model of ocular disorders in workers in the Nigerian National Petroleum Corporation in Nigeria's Warri, Delta province, was conducted over a 1 year period. No cases of ocular trauma have been reported. The

indications of irritation in the eyes were much more common among technical workers. Allergic conjunctivitis, pterygium, corneal abrasion and foreign bodies on the cornea were significantly ($p<0.0001$) prevalent among technical workers. Irritant chemical exposure in the petroleum industry makes technical workers more susceptible to allergic conjunctivitis, pterygium, corneal abrasion and foreign bodies in the cornea. Safety goggles should be provided to all technical personnel.[23]

Conclusion

Employees should perform necessary medical examinations and tests according to the nature of the work and the working environment. If the work done and the environment are risky for eye disease, necessary precautions should be taken. The worker should also be examined before starting work, and periodic eye examinations should be done after starting work.

Disclosures

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