AN EVALUATION OF THE YOUNG PEOPLE'S KNOWLEDGE REGARDING THE OPHTHALMIC EFFECTS OF SMOKING

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ABSTRACT

Purpose: To assess the young people's knowledge regarding the ophthalmic effects of smoking.
Methods: 198 students (111 males and 87 females) with a mean age of 27 years old (±6 years) participated in the study. A simple questionnaire was used and the participants were requested to fill out the questionnaire themselves.

Results: 77% (152) of the participants were smokers. 67% (130) have never heard about the adverse effect of smoking to the eyes. 87% (172) have not heard about the relationship between smoking and thyroid eye disease. 84% (166) were not aware that smoking could ccontribute to the formation of cataract. 50% (99) have no knowledge about the association between smoking and age-related macular degeneration. 80% (158) were unaware that smoking is a risk factor for visual loss.

Conclusions: The level of knowledge of young people regarding the ophthalmic effects of smoking is not satisfactory. There is an urgent need to promote the awareness of the population regarding the adverse effect of smoking on visual function.

KEY WORDS

eye disease; smoking; young people.

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Submitted: 15-05-2010
Accepted: 10-09-2010

INTRODUCTION

Tobacco is the most studied environmental carcinogen, particularly in developed countries (1-4). Existing epidemiological data highlight the involvement of smoking as a causative factor in heart and lung disease (1-4). It is also found that smoking is a major risk factor for many eye diseases, often severe, such as Graves eye disease, age related macular degeneration, glaucoma and cataract (5-13).

As with most autoimmune diseases, the causes of Graves' disease are multifactorial. The exact cause, however, is unknown. Genetic and environmental factors are implicated (14). A significant proportion of patients with Graves' disease have subclinical ocular disease (15-18). Epidemiological studies provide evidence for a correlation between smoking and Graves' eye disease. Hagg and Asplund (19) were among the first who reported this correlation, which was confirmed by other studies (20, 21). The incidence of in Graves' eye disease is greater in smokers than non-smokers (22). While smoking is an independent risk factor for Graves' disease, the correlation with the eye disease is stronger and more statistically significant compared to the other contributing factors (23, 24). A survey containing 400 hyperthyroid patients showed an increased risk of developing eye disease in patients who smoked (25). The amount of smoking is also linked proportionally to the severity of ocular disease. Moreover, patients with moderate or severe eye disease showed less response to treatment than non-smokers (26, 27).

Age-related macular degeneration (AMD) is a major cause of blindness in Europe and the U.S. and leading cause of significant loss of visual acuity in elderly patients. The incidence of AMD increases with age (28). Risk factors associated with AMD include age, smoking, diet, exposure to sunlight and hypercholesterolemia (29). The effect of smoking on the development of AMD has been investigated in many epidemiological studies, which showed that patients with wet AMD are more often smokers (30-33). In a study involving 421 patients over 55 years with wet AMD and 615 healthy controls was found that smokers and former smokers had statistically significant increased risk of developing AMD compared to non-smokers (29). Smoking habits also appear to play a role in the development of AMD. The deep inhalation of smoke and smoking cigarettes without filter, starting smoking before the age of 20 years and smoking for more than 40 years have major effects in causing AMD (33). The effect of smoking on AMD is dose dependent. In a prospective study, it was found that smokers who smoke more than 2 cigarettes a day are in two to three times greater risk of developing AMD. The risk for former smokers was kept high for some years after stopping smoking, while in former smokers the risk of AMD was statistically higher in those who smoked more than 20 cigarettes per day (34). Another study has shown that the duration of smoking also influences the risk of AMD (35).

The epidemiological association of cataract with smoking vs non-smoking as well as the dosage, duration and smoking habits has been highlighted in many investigations (36-40). Dose-dependent relationship between smoking and the risk of developing nuclear cataract was found (41, 42). With regard to other types of cataract, research results are conflicting, as there are studies that show positive correlation, while in others there are no similar findings (41-45). A prospective study of 30 years showed that people who smoke 20 or more cigarettes per day were more likely to suffer from nuclear cataract than non-smokers during the first eye examination (46). Those who smoked more than 20 cigarettes per day had a statistically greater chance of developing nuclear cataract than those who smoked fewer than 20. Longer smoking period also corresponds to increased risk of cataract. This risk is reduced in people who stop smoking for 10 years or more (38). In a study of 3654 people, it was found that smokers had a statistically higher incidence of both nuclear and posterior subcapsular cataract. Nuclear cataract occurred more frequently in pipe smokers. This is probably due to different smoking habits, and not the difference in tobacco (47). The pipe smokers are less likely to inhale smoke than cigarette smokers, while releasing more smoke in the air. It is possible that more smoke causes more damage to crystal lens, either by the entry of tobacco ingredients in the eye, or due to the continuous increased temperature of the crystal lens (48).

Primary open angle glaucoma (POAG) has also been found to be highly associated with tobacco smoking (5-7). The risk for POAG has been reported to increase with the amount and the duration of smoking (5,6). This is probably related to the toxic influence of tobacco on the eye through ischemic or oxidative mechanisms (7). Additionally, smoking might have an adverse effect on the successful surgical managemant of POAG (5). Ocular disease associated with smoking often causes irreversible loss of visual function. The purpose of this study is to assess the level of knowledge of young people regarding the ophthalmic effects of smoking.

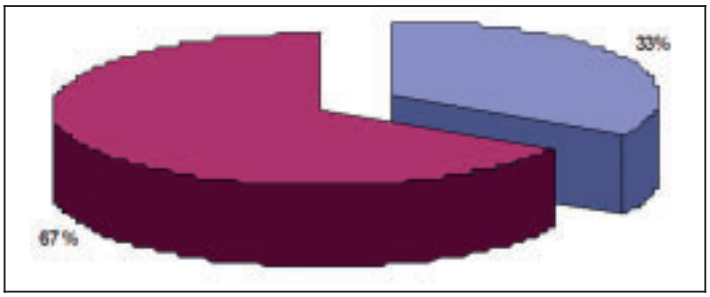

Fig. 1: Percentage of participants who had not heard about the adverse effect of smoking on the eyes (67%).

MATERIALS AND METHODS

198 young people with a mean age of 27 years old (± 6 years) participated in the study. 111 were male and 87 female. The study was undertaken among students attending the Organization of Professional Training, Vocational Training Institute (IEK) Thermis, Thessaloniki, Greece. The evaluation of the level of awareness and understanding of the influence of smoking on the visual function was made by the use of simple questions in a questionnaire that was distributed and completed by the participants themselves. The study was in accordance with the Declaration of Helsinki and was approved by the local ethics committee. Written informed consent was obtained from all subjects prior to their participation.

RESULTS

The questionnaires were evaluated by the authors and the statistical analysis of the responses was made using SPSS for windows (version 14.0).

77% (152) of the participants were smokers. 67% (130) have never heard about the adverse effect of smoking on the eyes (Figure 1). 82% (172) have not heard about the relationship between smoking and thyroid eye disease. 84% (166) were not aware that smoking could contribute to the formation of cataracts. 50% (99) have no knowledge about the association between smoking and age-related macular degeneration (Figure 2). 80% (158) were unaware that smoking is a risk factor for visual loss.

DISCUSSION

The study shows that the level of knowledge of young people regarding the relationship between smoking and eye disease is far from satisfactory. This is in agreement with similar investigations undertaken among teenagers,

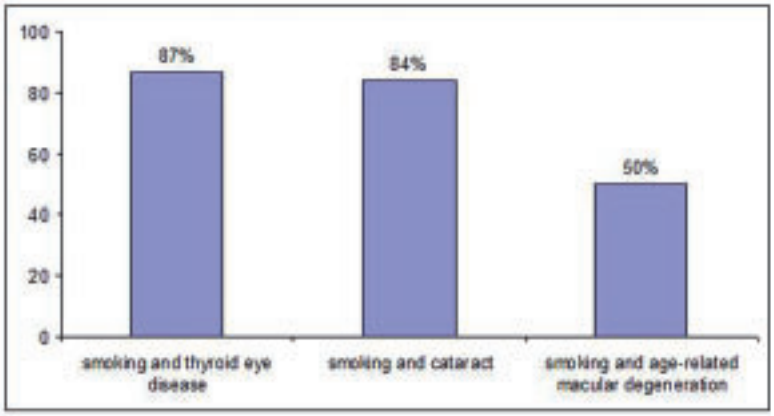

Fig. 2: Percentage of respondents who were unaware of the relationship between smoking and eye disease.

medical students and adult patients in the past (49-51).

In particular, Morandi et al. (49) conducted a cross – sectional study, using a structured interview of teenagers attending four organized social events. The questionnaire investigated awareness and fear of blindness, and of three smoking – related diseases (lung cancer, heart disease and stroke) and a distractor condition (deafness). 260/283 teenagers (92%) agreed to participate in the survey. The proportion of teenagers who believed smoking caused stroke, heart disease and lung cancer was 39 (15%), 70 (27%) and 210 (81%), respectively. However, only 14 (5.4%) believed smoking caused blindness compared with 39 (15%) for deafness. The percentage of the teenagers who believed that smoking caused blindness was lower than that found in our survey, where 80% (158/198) of the young people who participated in the survey were unaware that smoking is a risk factor for visual loss and 67% (130/198) have never heard about the adverse effect of smoking on the eyes.

Moreover, Kusma et al. undertook a cross-sectional, self-administered, anonymous survey of fifth-year medical students in Berlin, Germany (50). Their current knowledge regarding tobacco dependence and the effectiveness of smoking cessation methods was assessed. About 25% of the participating medical students were smokers. In our survey 77% of the young people aged 27 ± 6 years were smokers. Although the questionnaire of the two surveys included different diseases and conditions related to smoking, the results of both papers showed that young people underestimated the influence of smoking on health issues. Medical students underestimated smoking-related mortality and the negative effect of smoking on longevity whereas in our survey, the majority of young people (67%) never heard about the adverse effect of smoking on the eyes.

Similarly, Bidwell et al. conducted a cross-sectional study using a structured interview of adult patients attending general hospital ophthalmology, general surgery, and orthopaedic clinics (51). The interview investigated the awareness and fear of blindness for three established smoking-related diseases (lung cancer, heart disease, and stroke) and a distractor condition (deafness), as well as blindness, and the likelihood that smokers would quit on developing early signs of each condition. The proportion of clinic attenders who believed smoking 'definitely' or 'probably' caused stroke, heart disease, and lung cancer was high - over 70% for stroke, over 85% for heart disease, and over 90% for lung cancer. However, few patients, both smokers and non-smokers, were aware that smoking could cause blindness. Only 12% of eye clinic patients and 7% of other clinic attenders believed smoking caused blindness. The results of the survey are similar to ours, where 80% of the young people who participated were unaware that smoking is a risk factor for visual loss.

There have been many hypotheses proposed to explain the correlation of smoking with Graves' disease. One of these is that smoking can disturb the immune system. It was found that smokers have lower activity of T-leukocytes and lower capacity of immunosuppression than non-smokers (52-54). The effect of smoking on eye disease is that it causes increased secretion of a thyroid antigen, which affects the ocular muscles, by causing inflammatory changes. These subsequently lead to muscles' enlargement and muscles' fibres degeneration resulting in a reduction of the elasticity of muscle fibres (55). Smoking also increases the production of peroxide radicals and reduces the production of antioxidants. Dose-dependent increase of cell proliferation by peroxide was caused in cultures of fibroblasts from connective tissue of eyes from patients with Graves' eye disease (56). The proliferation of ocular fibroblasts and the extracellular secretion of glucozamin glycans cause retention of fluid resulting in swelling of the orbital content. This volume growth is a hallmark of Graves' eye disease (57, 58). Interleukin 1 (IL-1) also contributes to the volume increase, because of the inflammatory properties, promoting the formation of muscle fibres. It was also observed that high levels of serum thyroxin were not consistent in smokers with Graves' disease. In chronic smokers, however, lower levels of TSH and elevated levels of thyroglobulin levels were found (23, 24).

Age-related macular degeneration (AMD) in its early stages can be defined as the presence of soft drusen or any type of drusen combined with changes in the pigment epithelium or increased pigmentation in the macular region (28, 59).

AMD causes localized macular degeneration, with destruction of rods and cones, either with presence of vascular damage and serum extravasations (wet AMD) or without (dry AMD). Although only 10% of patients have wet AMD, more than 85% of blindness is attributed to this form of AMD (28, 59).

Blindness in AMD is caused by the degeneration of pigment epithelium, which is characterized by the following features: hyperpigmentation of the RPE, geographic atrophy of the RPE associated with visible underlying choroidal blood vessels, RPE detachment with or without overlying detachment of neurosensory retina and subretinal or sub-PRE choroidal neovascularization (59-62). The degeneration of pigment epithelium in AMD is believed to be a consequence of cellular metabolism, which is not normal because of an incomplete intracellular degradation and abortion of biomolecules, resulting in the accumulation of biochemical coproducts in the epithelium (33). Many theories have been developed for the effect of smoking on cell metabolism. Smoking can also cause atherosclerotic and hypoxic damage to the choroidal vessels thus promoting the creation and development of subretinal neovascularization. As smoking decreases the levels of HDL-cholesterol while increases the levels of total cholesterol and LDL-cholesterol concentrations as well as the adhesion of platelets, it promotes hypoxia and ischemia in macula (63-65). The increased concentration of carboxyhaemoglobin reduces blood flow to the choroid and accelerates degenerative processes in the macula, by promoting neovascularization (66-68). The choroidal neovascularization affects pigment epithelium, causing macular degeneration (69-71).

The cause of blindness may also be the impairment of the photoreceptors. The oxidizing agents contained in tobacco smoke increase oxidative stress in the retina (26, 72). This results in increasing the peroxidation of polyunsaturated fatty acids in the photoreceptors layer, which promotes AMD (73). In addition, smoking decreases the concentration of antioxidants in plasma and therefore the retina (43, 74-76). At the same time, it decreases the concentration of carotenoids in the blood and the retina (77). As a consequence oxidative stress is increased and protection of normal structures of the retina from sunlight is reduced. The causes of cataract are multifactorial and the pathogenesis is complex. Smoking is one of the risk factors, which include among others age, injury, the existence of persistent intraocular inflammation, exposure to ultraviolet radiation, diabetes mellitus and hyperparathyroidism (78). Smoking may increase oxidative stress in the lens, reducing the levels of nutrients with antioxidant properties (38, 39, 79, 80). In addition, components of smoke can cause a change in the architecture of the lens (81, 82). In organic cultures of mice crystal lens, hyperplasia and hypertrophy of the lens was caused after exposure of the lens to smoke from wood burning (83). Similar histopathological findings were found in cultured mice lenses, which were exposed to cigarette smoke for 60 days for two hours daily (84). These studies provide evidence of the damage to the lens in vivo. However, further research is needed on a large scale, excluding other risk factors, to identify objective evidence of the influence of tobacco in the pathogenesis of cataract.

The epidemiological association of eye disease with smoking vs non-smoking as well as the dosage, duration and smoking habits has been highlighted in many investigations. Therefore, there is need to promote the level of awareness of the population regarding the adverse effects of smoking on visual function. A more structured educational and informative programme with the valuable contribution of teachers and health professionals might be of utmost importance in achieving this aim.

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