

# The Role of Opticians in Providing Counseling Based on Optical Physics in Turkey Society

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## Abstract

Eye diseases that are directly related to human health and eye diseases solutions make the profession of opticianry available and compulsory. Opticians are very important professionals in relation to protect the vision health by helping to choose optical products prescribed by eye doctor. They prepare the proper materials and optical products for vision and ensure the best usage of eye products for patient satisfaction and follow the next process with patient. On the whole, opticians have a consultancy role in society. This consultation should be meeting with the needs of the society. In this study, the questions of what kind of the updated knowledge is used by the profession of opticianry at the present time, whether does the mentioned information meet the needs of the society or not and what is the educational fields that should be completed by opticians are researched. By looking at the results of the surveys, it can be seen that the trainings were received 10 or more years ago this results shows that opticianry training needs to be renewed in certain periods. People will be able to feel safe by starting to use the equipment related to sight which is one of the most important variable in their lives with the help of the updated knowledge and guidance of the optician.

**Keywords:** Turkey, optician, opticianry, consultancy, survey, eye health, optical physics

## 1. Introduction

The current population of Turkey continues to increase. Innovations in health system are being made in the health care system of Turkey with the policy of raising healthy individuals in this constantly increasing population either health costs or thinking of raising healthy individuals makes this situation compulsory therefore, Opticians, who are an important part of the health sector, must inform and provide counseling to society in their field. To achieve this, they should renew their training and increase their level of knowledge. If we look at the historical development of opticianry education in Turkey; at the times of the Ottoman Empire before the foundation of the Turkish Republic, opticianry was not managed by state while education of the profession was developing rapidly in the world. Opticianry had started to develop after foundation of the republic in Turkey. Between the years 1923-1940, law has been prepared about opticianry with named Law on Opticianry dated December 30. At the date 1940 and with the Law no: 3953, it is considered as the first governmental regulation of opticianry in Turkey. In the next law, Law no: 3958, it was describing the profession of Opticianry and the rules of performing it and also specified the prohibitions related to it but not

determining details of practice. The profession may be carried out only by licensed opticians and has put the requirements to get a license from the Ministry of Health stating in the Law. In 1989, the Institute for Higher Education has decided to start Opticianry Program as a pre-bachelor degree course in their faculties. The first one of such courses was given at the University of Sivas, in 1992. Because of the Law these graduates had no right to practice as opticians for 12 years. The government had set the new Law on Opticianry, in 2004. After that, the profession was based on university education and won a new and modern approach in Turkey. The graduates from between the years 1992-2004 obtained their right to practice and start optic shops after of the new Law. The new law let persons studied at the university but worked at least 4 years at optic shops to have the right to obtain license but not being Optician and to participate at courses at the university. As such special courses ended for two years in the university, people had received their license without thinking of having optic store because everyone can enroll the Opticianry Program if get the required exam. This program aims to enable students to gain theoretical knowledge and practical skills required to safely and competently dispense subnormal optical products for vision, contact lenses, and eyeglasses. Students acquire knowledge in the principles of physics, the basic science of sight and optics, anatomy of eyes, mathematics and administration as well as marketing. This program also prepares technical staff to work as opticians with the ability to use the English language and gives participants the opportunity to get technical knowledge and modern education. Graduates from the program who get the title of Optician are able to open their own optician stores, as well as take a position of manager in optical retail companies. Besides that opticians can work in enterprises which produce and sell glasses. This study aims to contribute to the development of the profession of Opticianry Programs in Turkey. In this study will answer the questions of how the status of Opticianry Program in Turkey is, how to be different and how to meet if Opticians need to improve itself when graduate from the program. This is necessary for meeting society's expectations and guiding especially in the districts of our country which have less the distribution of healthy personnel. Innovations and changes made for this field may increase the response of this need. While scientific activities constantly developing and renewing itself, it is not thinkable that the opticians whose profession is the sensitive eye organ, could not stay away from the developments and same level of the knowledge.

## 2. The importance of the Physics-Based Education in the Opticianry Program

The profession of opticianry is related to the behavior of light while passing from one medium into another (air, glasses, cornea, and lens). In opticianry course contents in Turkey there are some courses named with optical physics, geometrical optics or opticianry physics which have the syllabus with the laws of optics. The mentioned courses aim to give students, who may use knowledge all of life, about identification of the light, physical properties of light, definition of the law of reflection, the law of refraction and total internal reflection, the nature of prism to disperse, the light of understanding the reflection on prisms, the idea of image formation by light on human eyes, the behavior of light by optical components, optical equipment such as lenses or glasses, Abbe number, the principles of Shell's Law, application of the Law different mediums, the concepts of electromagnetic spectrum, UV radiation, polarization ... As mentioned above, especially Optical Physics generally referred to Geometrical Optical Physics in vocational schools is the study of the interaction between light and matter. The topics of Geometrical Optical Physics include the behavior of light while passing from one medium into another. Refraction is one of the main topics of the opticianry education which is the bending of light where its speed is different. The amount of bending depends on the refraction index of the two media and is described quantitatively by Snell's Law in Optical Physics

$$\frac{n_1}{n_2} = \frac{\sin \theta_2}{\sin \theta_1} \quad (1)$$

where  $\theta_1$  and  $\theta_2$  represent the angles of incidence and  $n_1, n_2$  are index of mediums by Snell's Law. Different materials have different refractive index describing by a well-characterized refractive index also have different behavior while facing with light. Some refractive index of selected materials are  $n_{vacuum} = 1$ ,  $n_{air} = 1.000293$ ,  $n_{water} = 1.3330$ ,  $n_{cornea (human)} \approx 1.373$ ,  $n_{lens (human)} \approx 1.386$  etc. A corrective lens, contact lenses and glasses or spectacles are worn on the face a short distance in front of the eye mainly used to treat myopia, hyperopia, astigmatism, and presbyopia which are optical defects in which

vision is blurred due to the inability of the optics of the eye to focus a point object into a sharp focused image on the retina. The correction of an optical defect is corrected by using of symptomatic, glasses, contact lenses and refractive surgery. Glasses and lenses are typically used by an optician because an optician, is a health personnel who just can design, fit and dispense corrective lenses which are prescribed by eye doctor. Opticians should know the concept of refraction and index of mediums if they want to have a guidance role in healthy way because the amount of refraction and the concept of refraction index are written on the lenses bag. When a patient comes to the store licensed Opticians read prescription given by eye doctor and use the information written on lenses bag, after all, they manufacture lenses to their own specifications and design and manufacture spectacle frames and other devices, as appropriate, for each patient. Opticians advise generally anti-reflected coated eyeglasses for patient and solution of cleaning. Anti-reflected coated eyeglasses can eliminate reflections of light from the front and back surface of eyeglass lenses. With fewer reflections, more light passes through the lens to the eye for good vision and the lenses look more transparent and attractive. For example, the regular plastic lenses reflect roughly 8 percent of light hitting the lenses, so only 92 percent of available light enters the eye for vision. High index plastic lenses can reflect up to 50 percent more light than regular plastic lenses so even less light is available to the eye for vision. This can be particularly troublesome in low-light conditions, such as when driving at night. When necessary, the optician should recommend glasses suited to the needs of the individual and inform them about the optical materials that will affect their eyes' health. However, opticians should have knowledge of these issues to be able to inform patients. In our day, most people do not know the importance of using sunglasses and can buy these glasses from any store without the necessary information. Sunglasses which include polarized filters or mirror coatings reflects light which is ultraviolet radiation coming from sun attributed to the development of many eye problems including cataracts and age-related macular. Good quality sunglasses can protect human's eyes from 100% of sun's harmful UV rays and extremely bright reflections that can distracting and interfere with vision. This is especially dangerous when driving, riding a motorbike, skiing or boating.

### **3. Subjects and methods**

The educations taken in the Opticianry Program have importance of how to use these educations for benefit of society; it is also same for the other profession. When the mentioned issue is healthcare sector the responsibility of profession should be at the top level. Because it is easier for society to visit optical centers than it is to access eye doctors, opticians are an important group who direct the patients to doctors for front-line treatment. They prepare the proper materials and optical products for vision and ensure the best usage of eye products for personal satisfaction. The importance of this group that directs patients who come to them to the right doctor, provides information about the field when necessary and offers consultation is particularly clear given the socio-cultural situation of Turkey and its rural areas. In this study, we have used survey method for social output for analyzing of what are the expectations of patients from opticians when come to the optical stores to buy eyeglasses or lenses and how much the impact of education on profession of opticianry. Different areas in Turkey were selected mostly in Istanbul, about 100 Optician and 100 people in society have been visited and attended to survey. Two different surveys are applied to opticians and society. The first survey applied to opticians contains questions about the information of whether opticians are using optical physics while guiding patients or they are using their given information as a ranker. The survey seeks the facts to decide by asking some questions as following, whether patient request information from optician or not, what topics on counselling generally is, do given information by optician meet the patient's request, whether information provided by the optician is sourced university education or past experiences, does optical physics education give opticians different point of view, how much is known about all aspects of optical physics while practicing their profession. The second survey is taken to society by thinking as patient to find out what society exceptions from opticians by asking some questions as follow; what is the last request information from optician, whether given information by optician meet their request or not.

### **4. Conclusion**

The result of two surveys conducted among 200 people (each survey addressed to 100 people) reveals the following: In the first survey, the majority (90 percent) of opticians surveyed has 10 or more years of experience. The majority of patients (98 percent) report that they request information from opticians. The

findings of this research reveal that most (80 percent) of this information is acquired from the sector. The questions most frequently asked by patients regard medical information about materials that are to be used (90 percent) and eye health (88 percent). The answers given to questions about refractive errors and optical physics, which make up the primary education of the optician, indicate that optical physics is not used frequently in the profession (70 percent). As this survey shows, the use of basic education and optical physics education has declined due to the fact that opticians are taught before acquiring long-term experience and vocational retraining is not provided in regular intervals, nor are refresher courses offered at specific times. If this training is updated incorporating real-world developments, professional awareness will increase and professional satisfaction will rise. In the second survey, all (100 percent) of the respondents said that either they or somebody close to them had had experience related to eye care products. When asked whether the place where they bought optical products was important or not, nearly all (95 percent) said yes. Most (90 percent) preferred optical shops and optical pharmacies. According to the survey, the information requested was generally (88 percent) about the product and its physical appearance. Around half of the respondents (55 percent) stated that they were not satisfied with the information they received. The information they requested primarily concerned refractive error and the quality of glass and frames. Around half of the respondents (55 percent) indicated that they questioned the knowledge of the optician and found it insufficient. The majority (70 percent) said they would not choose the same shop again for this reason. As these findings reveal, it is inevitable that opticians direct patients to doctors when needed, prepare products in line with doctors' prescriptions and provide information and consultation for the effective use of these materials. The goal of the optician's profession is to prepare the eye doctors' treatment materials according to contemporary standards and to serve as a source of information in the field for the patients. In this regard, our recommendation is that opticians in Turkey should follow the latest developments through training based on optical physics, attend vocational retraining and refresher courses given at regular intervals and provide information and counseling when needed, just as their colleagues in Europe and the wider world do. Furthermore, the main goal should be to play a role in raising healthy individuals by contributing to the treatment provided by doctors, and thereby increase society's trust in these reliable institutions.

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