

THE REASONS FOR DEVELOPMENT OF COMPLICATIONS IN SOFT CONTACT LENSES WEARERS: A QUALITATIVE STUDY

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RAZLOZI ZA RAZVOJ KOMPLIKACIJA KOD KORISNIKA MEKIH KONTAKTNIH SOČIVA: KVALITATIVNA STUDIJA

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ABSTRACT

Objective. To determine reasons and their actual role in occurrence of complications in users of soft contact lenses.

Methods. This was a qualitative study in which a constructivist grounded theory approach was used to analyze obtained data. The study population consisted of two groups of subjects: 10 students who were identified as users of soft contact lenses and 4 ophthalmologists. Each of the respondents participated in a single interview. Based on audio recordings of these interviews appropriate transcripts of conversations were made and analyzed. After elimination of waste words 11 key categories were crystallized.

Results. Recommendations of the ophthalmologists perhaps have the decisive role in the formation of attitude that users will have regarding the adequate hygiene of soft contact lenses: hand hygiene, proper cleanliness of storage for soft contact lenses and using the solution in the allotted time are imperative for users of soft contact lenses. Sleeping with soft contact lenses for a long period and more frequently than it was specified in the recommendation of an ophthalmologist is one of the greatest reasons for development of dry eye symptoms, while swimming with soft contact lenses increases the risk for occurrence of eye infections.

Conclusion. The main reasons for the occurrence of complications in soft contact lenses users are inadequate hygiene and weakening of compliance of soft contact lenses users over time.

Key words: contact lenses, hydrophilic; dry eye syndrome; eye infections; corneal ulcer; qualitative research

SAŽETAK

Cilj. Cilj rada bio je određivanje faktora rizika i njihove prave uloge u razvoju komplikacija kod korisnika mekih kontaktnih sočiva.

Metode. Studija je bazirana na principima jednog oblika kvalitativne analize podataka – konstruktivističke utemeljene teorije. Studijsku populaciju čine dve grupe ispitanika: 10 studenata korisnika mekih kontaktnih sočiva i četiri specijalizovana medicinska radnika iz oblasti oftalmologije. Urađen je intervju sa svakim ispitanikom ponaosob. Na osnovu audio-snimaka ovih intervjua napravljeni su odgovarajući transkripti razgovora, koji su nakon toga analizirani. Posle izbacivanja suvišnih reči iskristalisalo se 11 kategorija.

Rezultati. Preporuke oftalmologa možda imaju presudnu ulogu u formiranju stavova, koje korisnici mekih kontaktnih sočiva zauzimaju prema njihovoj adekvatnoj higijeni: higijena ruku, odgovarajuća čistoća posudica za čuvanje mekih kontaktnih sočiva i upotreba rastvora u predviđenom vremenskom roku imperativ su za korisnike mekih kontaktnih sočiva. Spavanje sa mekim kontaktnim sočivima duže i češće od preporuka oftalmologa jedan je od najvećih faktora rizika za razvoj simptoma suvog oka, dok plivanje sa mekim kontaktnim sočivima povećava rizik od pojave infekcije oka.

Zaključak. Glavni razlozi za pojavu komplikacija kod korisnika mekih kontaktnih sočiva jesu neadekvatna higijena i slabljenje komplijanse korisnika mekih kontaktnih sočiva tokom vremena.

Ključne reči: kontaktna sočiva, hidrofилна; sindromi suvog oka; infekcije oka; ulceracija rožnjače; kvalitativno istraživanje

INTRODUCTION

Contact lenses are medical devices made from plastic materials, which are used for correction of refraction anomalies like myopia, hyperopia, astigmatism (1) and

presbyopia (2). The number of contact lenses users is increasing worldwide. The reason for such an expansion undoubtedly comes from their significant advantages over glasses in terms of larger field of view and better visual activity, as well as the fact that these optical aids enable

unobstructed peripheral vision. Besides, there are a number of other, primarily esthetic reasons, which contribute to enormous popularity of contact lenses, especially with adolescents (3). In recent years, soft contact lenses, made from 2-hydroxyethyl methacrylate, are especially popular. Soft contact lenses in their structure contain some percentage of water (30-90%), which affects their ability to allow oxygen permeability. Considering that cornea presents non-vascularized part of the eye, the ability of oxygen permeability is one of the most important parameters, directly determining the comfort of soft contact lenses wearers (4). Biopolymers used to make soft contact lenses allow oxygen passage to a satisfactory extent, so today there are types of soft contact lenses which can be worn continuously for several weeks, while not compromising physiological function of cornea (5).

In parallel with the increasing number of soft contact lenses wearers, the frequency of complications associated with their use is growing. These complications are numerous and various (6). It is well-known that users of soft contact lenses are at increased risk of onset of symptoms and signs of the dry eye syndrome and the infections of various segments of eye, but precise data on the incidence of these complications do not exist. Although numerous cases of such complications were described, their difficulty, seriousness, and possibility of their prevention and treatment have not yet been completely clarified. Also, there is the uncertainty about knowledge of all factors which may provoke their occurrence (7).

The aim of this study primarily refers to precise definition of the reasons and their actual role in occurrence of complications in users of soft contact lenses. Additionally, our aim was to assess the "realistic representation" of such complications in routine practice, as well as the attitudes that users of these devices have towards the possible development of the complications.

SUBJECTS AND METHODS

This was a qualitative study in which a constructivist grounded theory approach was used to analyse obtained data. The study has been approved by Ethic committee of the Clinical Centre of Kragujevac, No 01/9815.

Grounded theory

The grounded theory is an inductive research method which makes it possible to understand behavior of people in an area of interest. In this study, the researchers had conducted an interview with each respondent, and after that they performed an analysis of each interview. First of all, the analysis involved removing unnecessary words and text parts that are not related to the topic of research,

after which the useful data were further broken down to the appropriate semantic unit. Semantic units were mutually compared, combined and connected until they formed abstract continent called concepts or later categories (8).

Respondents

There were two groups of respondents included in the study. The first group of respondents consisted of ten undergraduate students from the Faculty of Medical Sciences in Kragujevac, who were identified as users of the soft contact lenses. The idea was to find users of soft contact lenses, each in their own way, who differed with some specificity to others. The second group of respondents comprised of ophthalmologists and nurses who received training with users of soft contact lenses. Including experts in research was of invaluable importance for several reasons. Firstly, in such way scientific explanations were obtained for proper hygiene and maintenance of soft contact lenses. Secondly, ophthalmologists provided data about the degree of compliance of users of soft contact lenses. And finally, through interviews with medical staff who came in direct contact with users of soft contact lenses, the quality of their service and advice they gave to the patients were examined. For the purpose of this research, the interviews were conducted with three ophthalmologists specialized in the area of application of soft contact lenses, and with one nurse who was trained to advise patients on proper wearing of soft contact lenses.

Conduction of interviews

The interviews with students were conducted at the facilities of the Faculty of Medical Sciences in Kragujevac, while the interviews with medical staff were conducted at their workplaces. For each interview an adequate room was provided, with excellent conditions for pleasant and honest conversation with respondents due to its comfort and noise insulation. Before each interview, a short conversation was made with the respondents and they were presented with basic aims of this research, and the fact that the results of this research will be presented anonymously and used only for the purposes of this research. Each conversation was recorded, and audio tracks of these interviews were later used for the production of transcripts.

There were two groups of questions, and each of them was prepared for the certain group of respondents. There were no essential differences in context of questions for these two groups, but the difference was in ways of asking the questions. The questions to the first group of respondents were asked directly in order to enhance their

honesty and directness in the evocation of their individual experiences related to the implementation of soft contact lenses. On the other hand, the questions for medical staff were conceived in that way to obtain professional and unambiguous answers related to all situations and challenges awaiting users of soft contact lenses in practice. It is important to emphasize that there were no set of fixed questions while conducting the interviews, but both questions and conversation were adjusted to the answers of respondents.

With the aim to as closely as possible interpret the interviews, this part of the work was interspersed with quotes by the most characteristic subjects. In order to protect anonymity of respondents, before each quote there was a code of appropriate respondent. The students who were soft contact lenses wearers and who took part in research had codes ranging from U1 to U10, ophthalmologists from O1 to O3, and an only nurse that took part in research had the code N1. The codes were granted according to the order of performing interviews.

Transcription and analysis of interviews

Preliminary sampling, as the first step in grounded theory approach, covered one student and one ophthalmologist. With usage of both audio tracks of these interviews, faithful transcripts of the conducted conversations were made. Then, the parts of conversations which were not related to research subject were carefully eliminated. From the remaining part of the transcript, appropriate semantic units were formed, and with their comparison ten preliminary categories were separated. With detailed analysis further directions of research were crystallized, so with the evolution of research large number of questions emerged, which firstly contributed to better analysis of the categories created. The study included a time period of about 50 days, so careful analysis all uncertainties in all categories were made clear.

RESULTS

Recommendations of ophthalmologists

An indispensable part of the interview were questions that guided students to describe their first contact with contact lenses as well as the content of the ophthalmologist's check up and basic advice and recommendations received from their ophthalmologists on that occasion. When it comes to the content of the ophthalmologist's check up, the descriptions given by the students questioned were very scarce. None of the soft lens users mentioned that during the first encounter with lenses the fitting process was done. Controls are an important part of any doctor's checkups and prescribing appropriate therapy. In this case, the students' answers

were not in accordance with the recommendations given by the ophthalmologists examined. In fact, the students who participated in this study highlighted that after they had finished their training there were no scheduled controls by their ophthalmologists.

Hand hygiene

According to the ophthalmologists, the most important recommendation that users of soft contact lenses obtained from them was the permanent need for adequate hand hygiene.

O1: "It is imperative, it's just what you always say to them: before each placement and removal of contact lenses you must clean your hands!"

Most of the students honestly responded that because they made decision to correct nearsightedness by using soft lenses, they took over the obligation to cleanliness of their hands was always at a high level, and that their hand hygiene was generally much better from the moment they had begun to wear lenses.

Considering that among the students there were 7 females, a question regarding the influence of women's long nails on the correct placement and removal of soft contact lenses, and therefore the possible damage to the lens or eye, was processed in a successful manner. The ophthalmologists and the nurse who participated in this research believed that long nails that women wear could pose a real danger to soft contact lenses, because they could lead to a variety of mechanical damages, as well as damages to the eye itself, because it could lead to very serious injuries.

Soft contact lenses solutions

Soft contact lens users use multi-purpose solutions to maintain their lenses. Ophthalmologists in this study advise users to rinse soft contact lenses after each removal. In addition to rinsing lenses, these solutions are used for their storage, and vials in which lenses must be kept are filled with a solution. Ophthalmologists and students agree that a solution should not be used longer than the time period intended by the manufacturer. The student with the code U7 had an especially interesting experience of potential complications that derived directly from the solution for maintaining the soft contact lenses. She had decided to substitute a solution which she was using for a long time for a solution from another manufacturer, but soon the problems started to occur.

U7: "I had big problems, I felt inconvenience with my soft contact lenses. When I was setting my soft contact lenses I felt real pain, but I finally realized that all these problems were due to the solution used".

Storage of soft contact lenses

Storage boxes with soft contact lenses should be kept at room temperature and for practical reasons these storages should not be kept in the bathroom. According to ophthalmologists' opinion, bathrooms are places with the highest risk for possible transfer of microorganisms. Despite these recommendations by the ophthalmologists, it could be said that the majority of the students in this research were keeping their storage boxes with soft contact lenses only in the bathroom, and they even did not see any need to change this routine behaviour. The ophthalmologists who participated in this study suggested cleaning these storages every week, but they gave very different recommendations relating to the cleaning methods as well as the type of chemical means used for cleaning these storages. Storages for soft contact lenses should be changed every three months, and this is a practice implemented by all students who participated in this research.

Effect of water on hygiene of soft contact lenses

Ophthalmologists highlighted that every possible contact of lenses with water could be very risky, because there was a real danger of infection due to microorganisms living in water, particularly in the standing water of swimming pools. The ophthalmologists also pointed out that swimming and wearing lenses were mutually exclusive, unless users were wearing goggles specifically designed for such situations. However, among the participating students there was a group that did not adhere to these recommendations from ophthalmologists. Because of that, some of them had had serious problems in the form of conjunctivitis. Due to warning examples such as this, soft contact lenses wearers should not ignore the recommendations of their ophthalmologists.

Effects of sleep on hygiene of soft contact lenses

Ophthalmologists advised on removal of the lens frequently, even for users with soft contact lenses intended for extended use. In this regard, the attitudes of the students showed a great diversity of their routine behaviours related to sleep and the use of soft contact lenses. First of all, the majority of the students were not even sure whether the lenses that they wore were intended for standard or extended use. Three students tried to remove lenses every night before sleeping and by their own admission, they managed to do so. There were the students that removed their lenses once a week, because they had got such recommendations from their ophthalmologist. However, the most extreme attitude towards wearing soft contact lenses during sleep was shown by the respondent U8, who initially adhered to the

recommendations of his ophthalmologist, but eventually began to experiment, so the lenses that were intended for the compulsory removal before bedtime, he continuously wore for up to 2 months without removal.

Life habits of soft contact lens users

There were a few problematic life habits that could make application of soft contact lenses very difficult. When it comes to the female population, the inevitable theme of conversation had to be related to the make-up and other preparations that members of gentler sex use for beautification. In order to prevent the occurrence of the possible complications, ophthalmologists advised their patients to apply makeup after they had set the lenses; when they remove their soft contact lenses, the order remained the same. Female students were especially well informed with these rules relating to the harmonization of wearing soft contact lenses and applying makeup. A few smokers were among the students who participated in the interviews, but they denied feeling any unpleasant symptoms in their eyes when they were smoking. However, all students agreed that they felt certain symptoms of discomfort when they stayed in a smoky room. The ophthalmologists pointed out that smoking could represent a potential risk factor, but only for individuals with bad quality of the tear film.

Symptoms of dry eye

The ophthalmologists claimed that symptoms of eye dryness were inevitable occurrence for users of contact lenses. They believed that the symptoms of eye dryness often occurred in susceptible individuals who already had disrupted the tear film. In such individuals, the application of contact lenses could provoke the appearance of dry eye symptoms. However, ophthalmologists emphasized certain situations associated with the particular risk of the symptoms of dry eye, as outlined in the following statement.

O2: "The most important factors that provoke symptoms of dry eye in soft contact lenses wearers are extended work on computers and staying in smoky rooms".

The ophthalmologists advised their patients to use artificial tears that did not contain preservatives for the treatment of dry eye symptoms. When it comes to the attitude of students towards the use of artificial tears, as well as in most other situations, there were several models of behavior. There were a few users who complied with the recommendations made by their ophthalmologists, and they regularly bought and used artificial tears, while some users stopped the purchase of artificial tears for financial reasons.

Eye infections

Three ophthalmologists involved in this research pointed out that soft contact lenses wearers were a very predisposed population when it came to developing infections that could affect different parts of the eye. However, according to their experiences, the infections of the eye were not so common fortunately, at least not with their patients. They were mainly talking about young users of contact lenses, who were not yet sufficiently aware of the potential danger posed by eye infections, and for this reason they did not pay enough attention to hand hygiene and handling of contact lenses. They also stated that the most common form of infections were different forms of conjunctivitis, typically manifested by mild and readily observable symptoms. Slightly higher number of students, six of them, had not experienced any eye infection when using soft contact lenses. The other four students pointed out that they had experienced the symptoms of eye infections only once and after a treatment they had no longer noticed the occurrence of similar symptoms. The common characteristic of these infections was redness of the eyes, which made them quite frightened.

Treatment of eye infections

According to the ophthalmologists, the most important step in the treatment of eye infections in soft contact lenses wearers, is early recognition of symptoms by patients. After that, they need to take off their lenses and turn to their ophthalmologist. Ophthalmologists agreed that these infections were commonly quite easy to treat. If an untimely or insufficiently effective treatment of infections results in the occurrence of cornea ulcers, ophthalmologists usually decide that such patients are prohibited of continuing application of the soft contact lenses. If the user in such situations does not accept the advice of the cease-application of the, lenses consequences can be disastrous.

N1:” We have the case of a girl who had developed such a complex of wearing glasses and forcibly placed lenses, so she has now gone to corneal transplantation”.

Compliance of the soft contact lenses wearers over time

The ophthalmologists agreed in their assessment that over time the majority of users of soft contact lenses started with different improvisations related to all aspects of proper maintenance and correct use of the lenses, but this improvisation could be assessed as highly individual. The majority of the students pointed out that they paid much less attention to certain actions which were an integral part of the proper behavior when using lenses, primarily because of inadequate organization and

permanent lack of time. In addition to the lack of time, the second most important reason why users did not abide by all recommendations from ophthalmologists came from a group of financial reasons. This was either related to the extended use of lenses, solutions, or to replacement of the recommended solution for a cheaper one in the same group. The experiences of ophthalmologists were such that users did not bear the ban on wearing the lenses and it was quite difficult for them to abide these decisions.

Theory

The central place in this study is dedicated to complications that may occur in the users of soft contact lenses, and this study shows the existence of two groups of these complications. The first group consists of symptoms related to dryness of the eye, which occur more or less frequently to all users of soft contact lenses without exceptions. The importance of these complications is certainly not small because they significantly reduce the comfort of the user, but when it comes to the severity of the symptoms by themselves, these complications are harmless in comparison to the second group of complications - infections of different parts of the eye as well as of the eye itself. Namely, eye infections represent the only negative association that users can relate to wearing of soft lenses. Between these two central categories of the theory, one can observe real connections in one direction, as well as the existence of pseudo-connections in the other direction. The symptoms of dry eye are very unpleasant for the patient and provide a very intense feeling of unease and discomfort. Patients often try to solve these problems by rubbing or massaging the eye, whereby they often do this with not enough clean or even dirty hands. Because of this, the existence of dry eye symptoms can be a prelude to the occurrence of eye infection. On the other hand, the symptoms of eye infections could be identical to the symptoms of dry eye. In both cases burning sensation may occur, itching eyes and feeling of the presence of a foreign body in the eyes. The intense redness of the eye is certainly a symptom of which patients are the most afraid of and that usually indicates that there is an infection, but redness of the eye can also occur in severe forms of eye dryness. The majority of the results are based on an analysis of the impact of certain risk factors for development of both groups of complications. The recommendations given by ophthalmologists perhaps have the decisive role in the formation of attitude that users will have with respect to the adequate hygiene of soft contact lenses: regardless of how the formation of this relationship is influenced by the characteristics and attitudes of the user's own life, their future treatment regarding this behaviour will largely depend on the ability of ophthalmologists to animate their attention at the first meeting. Adherence to the

recommendations certainly cannot be an absolute guarantee that the complications will be avoided, but they are the basis of responsibility and correct wearing of soft lenses in terms of hygiene.

Hand hygiene is imperative for users of soft contact lenses. There is strong connection between hand hygiene and occurrence of eye infections: good hand hygiene decreases the risk of eye infections and vice versa. Hand hygiene is of less importance for dryness of the eye, because the only relationship was observed in the case of women's long nails that can mechanically damage the lens and thus provoke the development of dry eye symptoms.

The solution for the maintenance of soft contact lenses also has a huge impact on the potential development of infections. Using the solution in the appointed time and its regular replacement in soft contact lenses storage can significantly reduce the risk of developing complications. Similarly, maintaining proper cleanliness of these storages

and their regular replacement also reduce the risk of infections. A major risk for the occurrence of infections appears with every potential contact of soft contact lenses with water from running or standing water surfaces because microorganisms normally live in these waters. Sleeping with soft contact lenses longer and more frequently than the ophthalmologist recommended is one of the greatest risk factors for the development of dry eye symptoms, and therefore may indirectly increase the risk of developing eye infections. Active smoking (tobacco smoke) and makeup are among the most potent causes of the symptoms of dry eye in soft contact lens users, thus indirectly multiplies the possibility of infection.

If an infection is promptly detected and the patient undergoes a relevant therapy, the prognosis is really good. Any other situation may result in severe complications, such as corneal ulcers, which can represent a contraindication to continuation of wearing soft contact

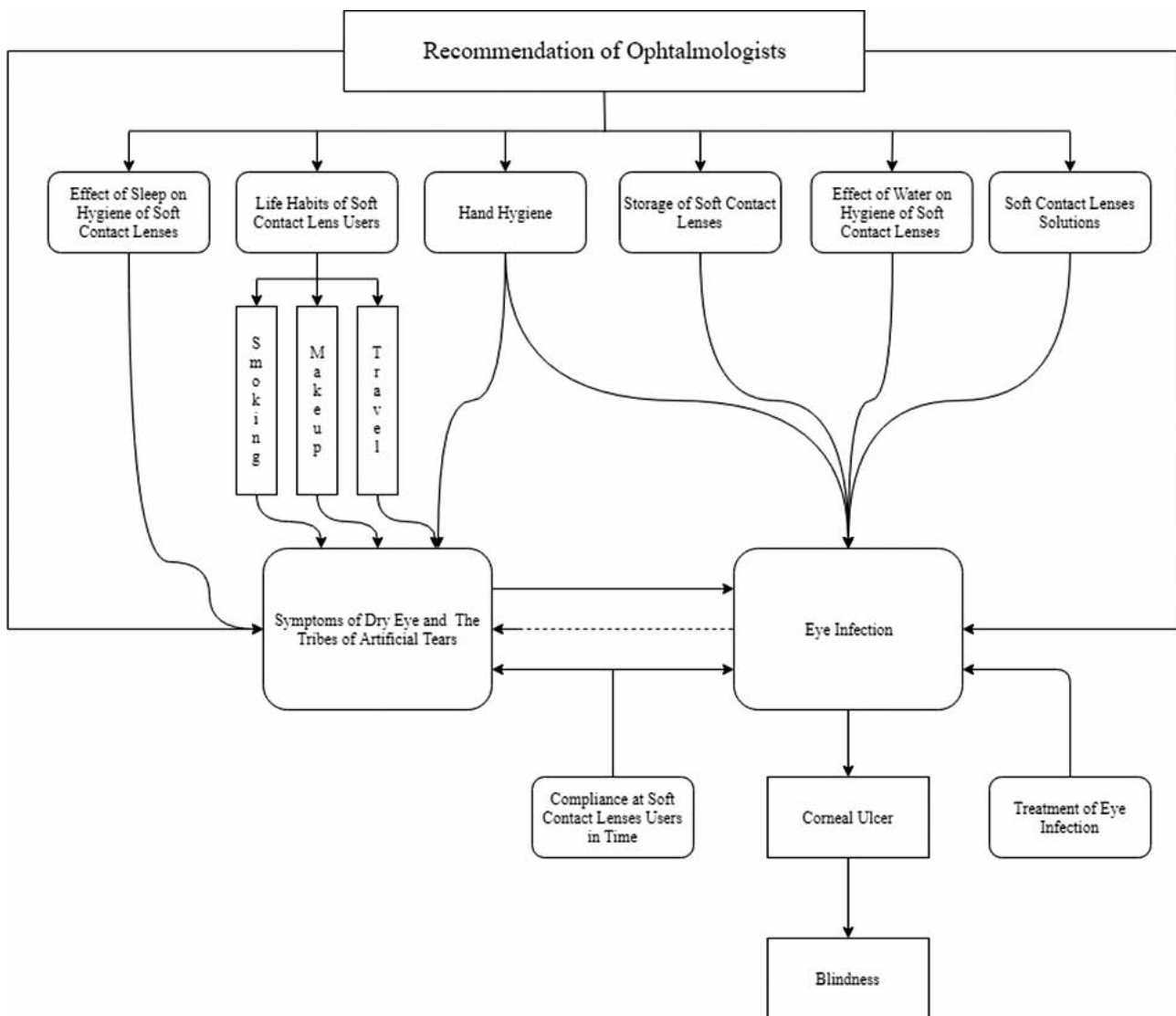


Figure 1. The complexity of the relationship between the analyzed categories.

lenses. If such cases, the patients who refuse the advice from their ophthalmologists could experience the development of the most difficult complication – blindness. Extended wearing of soft contact lenses without complications may decrease patient's compliance to ophthalmologist's recommendations. On the other hand, it is assumed that users who experience an infection of the eye become much more aware of the risk, so they pay more attention to proper care of soft contact lenses, thus increasing compliance.

The complexity of the relationship between the analyzed categories can best be seen in the Figure 1.

DISCUSSION

Soft contact lenses have an important place in the field of ophthalmology both for the correction of refractive errors and for the treatment of many eye diseases. Expansion of soft contact lenses started from the moment when adequately biocompatible materials were found (early 60s of the 20th century). Soft lenses have been conquering the world with incredible speed, especially young people (9). In parallel with the improvement of the material from which the lenses are made, the pharmaceutical industry also improved numerous preparations which makes wearing soft contact lenses almost perfectly comfortable to the patients (10). Nevertheless, the number of complications that can occur to the wearers is also increasing (11).

According to the Food and Drug Administration (FDA) recommendations (12), the optimal hand hygiene is an absolute prerequisite for the safe use of soft contact lenses. The results of a study (13) that used a very similar methodological approach are fully consistent with the results of this study, as the ratio of soft contact lens users to the proper hand hygiene in this study also does not fully comply with the recommendations made by the FDA. It is necessary to rinse soft contact lenses after each removal (14) which users in our study generally did.

FDA strongly recommends that soft contact lenses wearers use solutions made by manufacturer which also made their soft contact lenses, because solutions may contain certain ingredients that do not comply with all types of soft contact lenses (15). It is important to note that solutions for maintenance of soft contact lenses may cause serious complications to soft contact lenses wearers. In April 2006, a pharmaceutical company Bausch and Lomb in cooperation with the FDA withdrew from the market its solution for the maintenance of soft contact lenses- ReNu with MoistureLoc, because of complications occurring to a large number of patients (16). Fungus from the genus *Fusarium* was found in the solution. This fungus brought to occurrence of fungal keratitis to patients who were using this solution. The respondent U7 in this study used

this type of solution. We described her adverse experiences with the solution ReNu with MoistureLoc in Results. The possibility of infection associated with irregularities regarding the quality of the solutions is very high (17).

FDA advises regular cleaning of boxes for storage of lenses and their obligatory replacement every 3 months (18). Also, users of soft contact lenses should avoid sleeping with contact lenses whenever that is possible. Interviewed students generally complied with the recommendations of their ophthalmologists and they rarely carried contact lenses for more than the manufacturer specified, but there were also students, such as the respondent U8, who wore his lenses, without removing, continuously for 2 months.

FDA strictly denies the possibility of swimming in swimming pools to the patients who wear contact lenses; the only exception may be in case of application of appropriate protective eyewear worn over the lenses, but caution even in such situations must be significant (12). The pool water is especially dangerous for two reasons. The first is the chlorination of the water in the pool, so complications can arise as a result of possible contact of these chemicals with the lenses (19). However, the greatest danger lies in the fact that despite the process of chlorination of water, *Acanthamoeba* may live freely because it is resistant to the effects of chlorine. *Acanthamoeba* is the most common cause of infections in users of soft contact lenses who do not respect the recommendations of its ophthalmologist and decide to swim without the use of protective eyewear.

For safe use of soft contact lenses, it is necessary to make certain compromises in a way that many habits and satisfactions must however be at least a little in service of health. Smoking is a particularly high risk of developing dry eye symptoms. Tobacco smoke negatively affects the tear film to users of soft contact lenses, because it contains particles that bind to the surface of the lens and which cause very unpleasant symptoms (20). Therefore, FDA advises future users of soft contact lenses to quit smoking, although interviewed ophthalmologists point out such cases are rare in practice.

Soft contact lenses wearers show high compliance to ophthalmologists' recommendations at the beginning, but because of financial reasons they start with various improvisations sooner or later. This kind of behavior increases the risk of complications. Symptoms of eye dryness are common in soft contact lenses users, but the incidence of dry eye symptoms is not equal for all users of contact lenses, because there are patients who are simply more sensitive than the others, as it was confirmed by this study (21). Dryness of the eye is a very serious problem, because it can provoke the occurrence of the eye infections. The ophthalmologists who participated in this

study point out that they recommended use of artificial tears only when patients experience symptoms of eye dryness. However, according to some of the recommendations, appropriate application of artificial tears means their instillation before each insertion and after each removal of soft contact lenses, because better effect is achieved in this way (22).

However, the most important group of the complications that can be diagnosed to users of soft contact lenses are infections of different segments of the eye (11). The experience of respondents who participated in this study showed that the most common reasons for the occurrence of infections were insufficient conformity to recommendations received from the ophthalmologist or insufficient hygiene of the users themselves. According to interviewed ophthalmologists, these are usually conjunctivitis caused by staphylococcus or streptococcus, so the treatment is usually simple and short. However, previous studies suggest that there are not so rare cases of keratitis, with the most common causative agents such as *Acanthamoeba* and some types of fungi (23). Especially dangerous are the cases of keratitis caused by *Pseudomonas aeruginosa*, because these bacteria have a very quick destructive potential, especially to the eyes; furthermore, *Pseudomonas aeruginosa* shows a high degree of resistance to almost all known antibiotics. Due to these facts, we should not be surprised with the results of the studies (24,25), which state that nearly 15% of reported cases of keratitis caused by *Pseudomonas aeruginosa* resulted in blindness. Keratitis in most cases is associated with a certain degree of corneal ulceration (26,27).

The interviews with students who used soft contact lenses showed that compliance decreased over time. The users increasingly pay less attention to all aspects related to the proper application of contact lenses, primarily because of financial reasons, which is in accordance with the results of the study (18).

In conclusion, the number of users of soft contact lenses is increasing, and there is a possibility that this trend will continue. The predominant reasons why people with myopia make decisions for the use of soft lenses are aesthetic reasons and increased comfort in relation to the use of glasses. In parallel with the increased number of users of these optical aids, there is also growing frequency of the complications occurring to contact lens users. One of the main reasons for the occurrence of complications is poor compliance of soft contact lenses users over time. Complications and infections may be serious, and their appearance can be a contraindication to the continued application of soft contact lenses. Moreover, severe infection can be complicated by the emergence of blindness. Therefore, it can be said that there is huge space for improvement when it comes to ideas for preventing these complications, especially in terms of improving the education of users.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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