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Contact lens compliance and comfort

MASTER THESIS

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ANOTÂCIJA

Darbs uzrakstīts angļu valodā uz 52 lapām, satur 44 zīmējumus un 1 tabulu, kā arī 20 atsauces uz literatūras avotiem.

Mērķis. Noteikt kontaktlēcu lietotāju līdzestību, komfortu un objektīvās acs priekšējo daļu izmaiņas.

Metode: Anketas un CCLRU skala objektīvai izvērtēšanai.

Subjekti: 200 kontaktlēcu lietotāji.

Rezultāti. 15% augšējā plaksta konjunktīvas 4. pak. izmaiņas, mehāniski netīrot lēcas, 38.5% izlieto 1/3 pudeles šķīduma mēnesī un atbilstoši sliktāks konjunktīvas stāvoklis, 34.5% nekad nav sūdzību par sarkanām, sāpīgām acīm, bet objektīvi ir pat 4. pakāpes konjunktīvas izmaiņas.

Secinājumi. Atrasta tendence pasliktināties konjunktīvas stāvoklim mehāniski netīrot lēcas un ekonomējot šķīdumu. Regulārās pārbaudes vizītes ir būtiskas, jo subjektīvās sajūtas var neatbilst objektīvai atradnei. Atrasta korelācijas starp KL lietošanas intensitāti un objektīvām izmaiņām.

Atslēgas vārdi: Kontaktlēcu lietotāju līdzestība, komforts, CCLRU skala.

ABSTRACT

The work is written in English and is composed of 52 pages, containing 44 figures, 1 table and 20 bibliographic references.

The purpose: to evaluate CL compliance, comfort and objective changes of anterior eye.

Methods: Questionnaires and eye condition evaluation using CCLRU grading scale.

Subjects: 200 contact lens wearers.

Results: 15% of subjects condition of upper eyelid had the 4th grade changes, if they don't rub CL 38,5% of subjects used only 1/3 of bottle of solution in month. 34,5% of subjects never experienced red, painful eyes with their CL but objective findings show even of 4th grade changes of bulbar conjunctiva.

Conclusions: Was found tendency to have more serious upper lid and bulbar conjuctival changes for CL wearers who do not rub lenses and economize on solution. Regular aftercare visits are essential. Correlation between intensity of contact lenses use and objective findings of anterior parts of eye.

Key words: CL compliance, comfort, CCLRU grading scale.

RESÜMEE

Magistritöö on kirjutatud inglise keeles ja on 52 leheküljel, sisaldades 44 joonist ja 2 lisa 9 leheküljel.

Eesmärk: hinnata KL hooldust, mugavust ja objektiivseid muutusi silma eesmises osas.

Meetodid: Küsimustikud ja silma tervisliku seisundi hindamine CCLRU hindamisskaala järgi.

Uuritavad: 200 kontaktläätsede kandjat.

Tulemused: 15% nendest uuritavatest, kes puhastamisel ei hõõrunud KL, oli ülemise silmalau konjuktiivil 4.-nda astme muutused. 38,5% uuritavatest kasutasid ära ainult 1/3 KL puhastusvedelikust 1 kuus. 34,5% uuritavatest ei kogenud KL kandes kunagi silmade punetust ja valu, kuid objektiivsed leiud näitavad isegi 4.-nda astme muutuseid bulbaarsel konjuktiivil.

Kokkuvõte: Nendel KL kandjatel, kes ei hõõru puhastamisel KL ja kasutavad KL puhastusvedelikku vähem kui ette nähtud, on tendents tõsistele ülemise silmalau konjuktiivi ja bulbaarse konjuktiivi muutustele. Regulaarsed järelvisiidid on hädavajalikud. Korrelatsioon KL kandmise intensiivsuse ja silma eesmiste osade objektiivsete muutuste vahel.

Võtmesõnad: KL hooldus, mugavus, CCLRU hindamisskaala.

TABLE OF CONTENTS

INTRODUCTION

Some sources of literature show, that patients non - compliance in contact lens practice could be even from 50 - 90%.

Numerous studies over the years have looked at compliance among contact lens patients, and statistics abound. Following are just a few examples of statistics that have been published in recent years regarding compliance:

- Most healthcare providers say that one-third of patients will follow instructions exactly, one-third will follow some instructions and one-third will not follow instructions at all;
- 74% of contact lens patients exhibit at least one aspect of noncompliant behaviour;
- 40% to 91% of contact lens patients are noncompliant in their recommended care and maintenance regimen;
- Though 75% of soft contact lenses are prescribed for one-day to two-week replacement, only 25% of patients adhere to that schedule. One-fourth of patients stretch the replacement schedule to one month and 23% to as long as six months;
- Another study showed that 53% of patients keep lenses longer than recommended;
- 25% to 50% of patients are noncompliant in some aspect of hygiene. One-fourth of patients don't always wash their hands prior to handling contact lenses and 12% never do;
- 20% of patients replace their contact lens case yearly while 23% of patients never replace their case;
- Up to 80% of contact lens complications trace back to poor patient compliance with recommended lens care guidelines;
- 29% consult their eye care practitioner every two years;
- One study asked patients six questions to assess patient knowledge of contact lens care and safety. Of a possible six out of six correct answers, the mean number of correct responses was 3,74 (62%). [1]

The aim of the study is to find out, how good is patient compliance in contact lens practice in Estonia. Especially to investigate wearers established compliance after 1-2 years wearing experience. It is not easy to achieve better compliance, but we must try all possible methods to rise and keep the patient compliance as high as possible. By this study we can give good base of equipments to CL practitioners and CL wearers for better compliance and comfort.

1. LITERATURE OVERVIEW

1.1. Contact lens care

Recent events have forced manufacturers and practitioners to take more notice of compliance issues. Lens care compliance is an ongoing issue in the contact lens industry, so it must take appropriate steps to educate our patients about proper lens care. [2]

1.1.1. Contact lens surfaces

It is important to keep contact lens surface clean Meibomian gland secretions, make up, hand and facial creams, potentially attracted to the lipophilic nature of silicone hydrogel lens surface. Digital rubbing of the lens surfaces products helps to remove these deposits, resulting in better vision and greater comfort. [3]

'No-rub' multipurpose solutions (MPS) have been a dominant and effective part of lens care for several years. However, it is known that for many customers, manual cleaning is necessary to appropriately care for their lenses. A rub and-rinse step can help remove debris, deposits and, most importantly, microorganisms from the lens. Emphasizing the importance of rubbing lenses even when it is prescribed a no-rub solution can encourage further compliance.[4] Advanced Medical Optics (AMO) has recently released an MPS in the United States, Europe and Canada marketed as a "rub and rinse" solution. Complete MPS Easy Rub Formula contains Poloxamer 237 and has been sold globally for a number of years. It must be cognizant, however, that patients may try to use it as a no-rub MPS. Therefore, it is important to make sure to properly educate customers before prescribing this solution. [4]

Major risk factors for microbial keratitis (MK) include overnight lens wear, wearing lenses during water activities (while showering, hot tubs, swimming) and improper lens storage case care. Overnight lens wear remains the major risk factor for contracting lens-associated MK. Recent articles (2008) shows that the incidence of MK has not been reduced by newer silicone hydro polymers – in fact, the opposite appears to be the case. [3]

1.1.2. Contact lens cases

The most common patient error in lens care is topping off the lens case with multipurpose solution (MPS) product in place of proper emptying, air-drying and filling the

lens case well with fresh MPS. [1] Contamination may occur in up to 80% of contact lens cases (Fig. 1.1.) and may result in the formation of a biofilm. A biofilm is an aggregation of microorganisms to a surface or to one another, marked by a glycocalyx extracellular matrix. When microorganisms attach to a surface, they may become more tolerant to disinfecting agents. Lens cases are usually moist and act as ideal environments to facilitate biofilm formation. If cells from the biofilm are released and attach to a contact lens, the lens itself may act as the medium for pathogenic transmission to the eye. [4]

Fig. 1.1. **Dirty contact lens case of a noncompliant patient [4]**

If cells from the biofilm are released and attach to a contact lens, the lens itself may act as the medium for pathogenic transmission to the eye. To help avoid contact lens contamination, patients should clean cases daily with contact lens solution and leave to air dry. No solution should remain in the case. Clients should use fresh solution every time they disinfect their lenses and change their case every one to three months. [4]

1.1.3. Case care

It's also important that patients digitally clean, rinse and air dry their lens storage cases. The solution left behind without proper and regular case cleaning may leave a slimy or sticky residue. During the recent *Fusarium* concern, it was found that residue from a multipurpose contact lens solution may have contributed to an increased incidence of fungal infections. Strongly recommend that patients clean their cases daily and replace cases regularly. Most solution manufacturers continue to reiterate the importance of caring for contact lens cases. A great deal of time and effort has been put into educating patients and practitioners over the past year and a half. This will help enforce compliance among our patients. [4]

1.1.4. Hand washing compliance

A 2005 nationwide poll by Harris Interactive reported that women (95%) are more likely to wash their hands than are men (75%) after using the restroom. In this poll, hand washing compliance ranged from a low of 74% for baseball fans at Turner Field in Atlanta to 89 percent at Chicago's Shedd Aquarium. [2]

Hand washing is an integral component of good contact lens hygiene. Hopefully, hand washing compliance improves when patients receive proper instructions and the instructions are reinforced during follow-up care. [2]

In the recent past it could assume that most customers used soap and tap water to clean their hands. Today, antimicrobial hand sanitizers, which may contain alcohol, are more prevalent. Alcohol is irritating if it comes in contact with the eye. Soft lenses may absorb the alcohol during lens application or during the removal and disinfection process. This may lead to a sustained exposure time with the cornea resulting in symptoms of burning and/or signs of corneal staining. [2]

Hand drying may be accomplished by using cloth or paper towels, warm forced air through a hand dryer or good-old evaporation. Several studies analyzed the efficacy of different methods of hand drying. Though counterintuitive, hot air drying tends to increase the amount of bacterial load on the hands, whereas paper towel drying causes a slight decrease in the bacterial load. [2]

Regardless of method, its recommend those customers thoroughly dry their hands to avoid tap water contamination of their lenses and case. Also, lint free towels will reduce the introduction of foreign bodies to the lens surface. It's important to have clients wash their hands before lens application and removal, but it's equally important to remind patients to wash their hands prior to even touching their eyes. [2]

1.2. Contact lens complications

The development of eye redness with contact lens use is always a warning sign. At the least, it may mean that the lenses have been in too long, and should be removed. Often, a red eye with contact lens use is treated like a case of conjunctivitis (pink eye), when actually the redness may be due to a contact lens related allergy or infection (Fig. 1.2.). Some common causes of a red eye with contact lens use include:

- Contact lens allergy, lens solution allergy, or allergy to protein build-up on lenses;

- Lens over wear with corneal edema, with corneal drying or a tight CL syndrome;
- Interaction of bacterial toxins (from the eyelids) trapped beneath the CL leading to corneal irritation (phlyctenulosis);
- Corneal ulcer;
- Giant papillary conjunctivitis;
- Poorly fitting or defective contact lenses. [5]

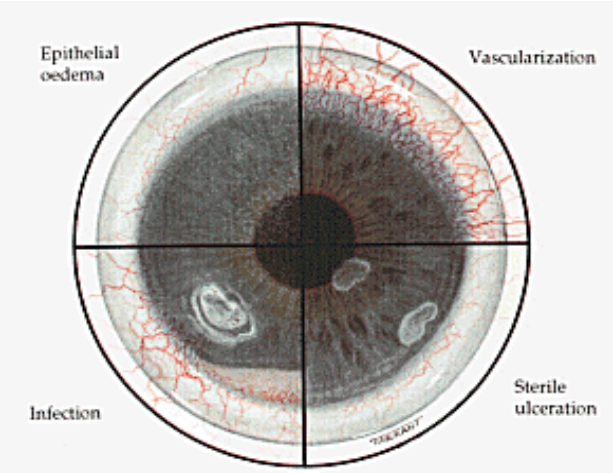


Fig. 1.2. **Contact lense related complications [5]**

Contact lens acute red eye syndrome (CLARE) can be graded using the special grading scales. Although illustrative grading scales are not as accurate as objective computer-based image analysis systems, grading scales do offer sufficient sensitivity for general clinical use if clinicians are willing to estimate the grade redness to the nearest 0.1 grade unit. [6]

The fact that a contact lens is constantly touching the eye leads to:

- The possibility of an allergy developing to the lens material;
- Deposits on the lens;
- Solutions used with the lens. [5]

1.2.1. Conjuctival redness

The conjunctiva is a thin membrane which lines the white surface of the eye and the inside of the eyelids. Soft lenses usually extend somewhat onto the conjunctiva outside of the cornea. The inside of the eyelids are also in contact with lenses especially during blinking.

The conjunctiva contains cells which can rapidly respond to allergens, leading to redness, itching, tearing or discharge, and a general inability to wear a contact lens. [5]

1.2.2. Contact lens solutions

When it comes to contact lens irritation, dryness or corneal staining, the solution is usually the cause (Fig. 1.3.). For most patients, the right solution is the key to contact lens comfort and ultimately, to successful wear.[7]

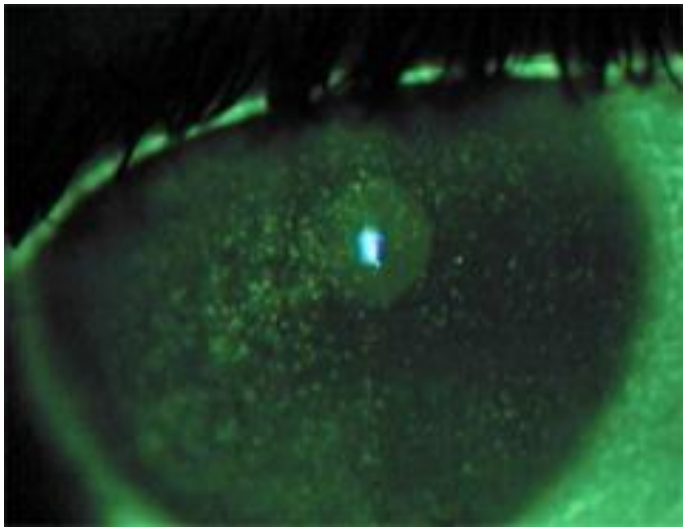


Fig. 1.3. **Solution-induced staining viewed with Wratten filter[7]**

A common source of allergy is a preservative found in the contact lens solutions. Thimerasol was used frequently as a preservative in the past, but severe allergic problems developed. EDTA is common preservative found in contact lens solutions.

If one develops an allergy or sensitivity to these preservatives, symptoms of allergy (redness, itching, discharge) frequently develop especially when the lens is first inserted, or when rewetting drops containing these preservatives are used. Solutions marked as being for "sensitive eyes" usually contain no less preservative than other solutions. If a lens solution allergy is suspected, switching to a preservative free lens disinfection system may help. [5]

A commonly overlooked area in the quest for comfort is the upper eyelid. Consider that the average patient has an 11mm palpebral fissure and blinks about 15 times per minute. With this information, everything the eyelid is a critical component in a thorough evaluation of an uncomfortable lens wearer. [7]

1.2.3. Contact lens deposits

Several factors are involved in the formation of deposits on the front or back surface of CL. These factors include: adequacy of lens maintenance procedures (wearer compliance); hand contamination; lens wear modality; lens replacement frequency and water content; chemical composition of lens maintance solutions and lens material; and intrinsic properties of the tears. The most common tear-derived components of lens deposits are proteins, lipids and calcium. [6]

Prior to the release of frequent replacement and daily disposable lenses, patients would often present with GPC from deposit build-up on their lenses (Fig. 1.4.). Fortunately, disposable lenses reduced the number of patients who developed this mechanical and allergic condition lenses. [7]

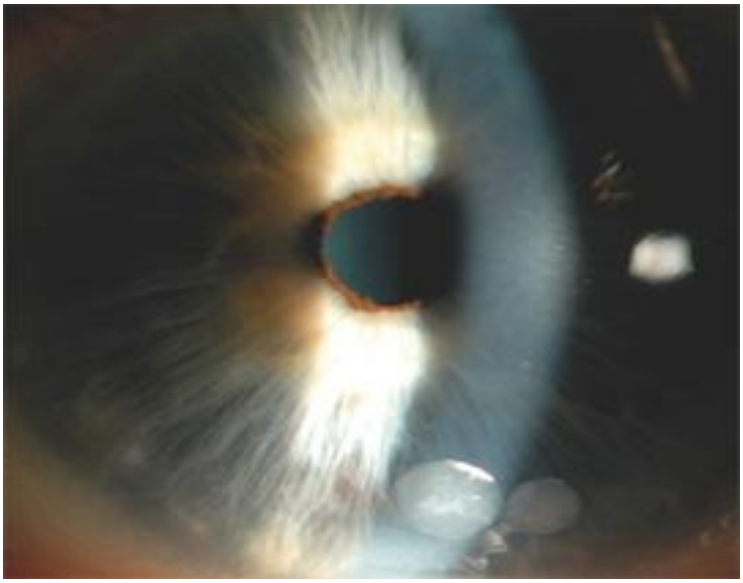


Fig. 1.4. **CL deposits buildup on contact lens surface [7]**

Talking about silicone hydrogel lenses, silicone is very hydrophobic and lipophilic, making it a likely surface for deposits. Because patients often replace their soiled lenses prior to coming in for their visit, it's necessary to evert all patients' eyelids to evaluate the appearance of their tarsal plate (Fig. 1.5.). [7]

Fig. 1.5. **Upper eyelid eversion revealing an abnormal tarsal surface [5]**

Developing an allergy to protein deposits on lenses is common, and this may lead to a condition called GPC - giant papillary conjunctivitis. [5] If a patient is asymptomatic and has grade 2 or higher GPC, or if the patient is symptomatic and has even the mildest of GPC, must to consider changing his solution, revisiting the cleaning instructions that include a rub and rinse step or switching the patient to a different lens modality such as daily disposables. [7]

1.2.4. Giant Papillary Conjunctivitis (GPC)

Giant Papillary Conjunctivitis (GPC) is a type of allergic reaction, usually to protein deposits on contact lenses. Since these deposits are more common with soft contact lens use, GPC is more common with soft lenses also. Sometimes GPC can occur as a reaction to the presence of a lens itself, or in reaction to lens solutions used. GPC is visible as large lumps beneath the upper eyelid (usually). [5]

These lumps can interfere with lens use, as they may "grab" the lens when the upper eyelid blinks over the lens. Other symptoms include itching, discharge, and redness. Excessive lens movement or decentration and blurred vision may also occur. Lens material, design or fitting characteristics may need to be modified to prevent recurrence of this condition. [8]

During this investigation, both the position and distribution of papillae were examined to obtain a detailed evaluation of the presentations of CLPC with high DK silicone hydrogel wearers. Several aspects of lens wear were compared, including: patient and lens characteristics, and distribution of clinical presentations of enlarged papillae between local

and general types at two clinical sites (Vision CRC in Sydney, Australia from 1998 to 2004 and LV Prasad Eye Institute in Hyderabad, India from 1993 to 2003). [8]

Differences in the location and number of areas involved between local and general CLPC presentations were confirmed. The enlarged papillae and hyper anemia was most often in zones 2 and 3 of the UPC in local cases of CLPC (Fig. 1.6.),

Fig. 1.6. **An example of a case of local CLPC at 16x mag.**
Note enlarged papillae in zone 2 of the upper palpebral conjunctiva[8]

Whereas, in general CLPC, the majority were observed in zones 1,2 and 3 and sometimes in zones 4 and 5 (Fig. 1.7.).

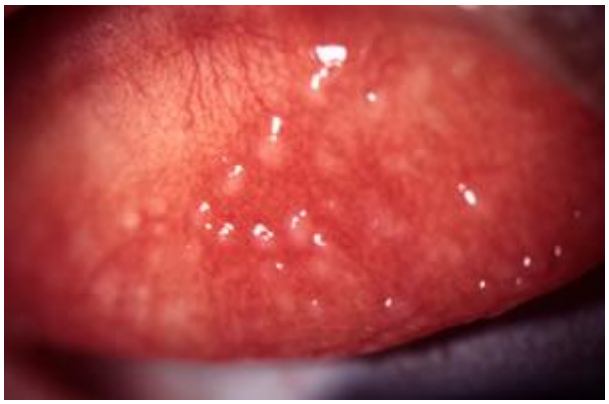


Fig. 1.7. **An example of a case of general CLPC at 16x mag.**
Note enlarged papillae in zones 1, 2 & 3 of the upper palpebral conjunctiva[8]

The incidence of local CLPC was found to be 3.4% compared to 1.2% for general cases of CLPC. These results are significantly different and strongly suggest that the aetiology of the two presentations may differ. The data also indicates that the majority of CLPC cases in high DK silicone hydrogel lens wearers are associated with the local response. [8]

The symptoms reported between the two groups were similar, with blurred vision, lens awareness, eye secretion and itching most frequently described. Mean lens centration, movement and tightness were optimal for local and general presentations. No clinically significant differences were found for lens wettability between local and general cases and asymptomatic controls, however, front surface deposits were clinically greater in both cases compared to asymptomatic controls. No differences in patient characteristics such as mean age and gender were observed between the two types of presentations. [8]

The two presentations make to believe that there may be difference in aetiology. High DK SiH lenses have a higher modulus of elasticity making the lens stiffer than hydrogel lens. The stiffness of the lens material may contribute to mechanical irritation of the lens rubbing against the UPC producing a local response. The lens and edge design may also promote mechanical irritation to the upper lid. The influence of lens design on the development of local CLPC is demonstrated by the difference in incidence between spherical and aspheric lens designs. Aspheric lens wearers show less local CLPC than those wearing spherical lenses (4.4% vs 1.8%, respectively). This maybe as an aspheric lens approximates the shape of the cornea more closely so that there is less lift - off over the periphery of the cornea and limbal areas. [8]

The distribution of papillae in *general* CLPC may indicate an immunological response initiated by the deposits or allergens that accumulate on the contact lens surface. The resulting mechanical interaction between deposits rubbing against the UPC encourages the development of general CLPC.

CLPC has been reported to occur more frequently with silicone hydrogel CW than with conventional lens wear. [9] The changes that occur in overnight wear may include some or all of the following: tear stagnation, localized pressure, closed eye environment producing a sub clinical inflammatory condition and frictional rubbing of the lens on the UPC. We can speculate that some or all of the changes in the UPC contribute to the subsequent development of CLPC. [8]

Recent studies indicate a lower incidence of CLPC with the lower modulus/second generation silicone hydrogel lenses formulations and the option of a second steeper base curve

Further follow-up is needed to investigate whether it is the incidence of local CLPC that has changed, which is perhaps more likely than a different rate of general CLPC. The popularity of high DK silicone hydrogel lenses will continue to grow as improvements to the lens designs, materials and surface properties continue. These changes and use of DW modality in those susceptible patients should bring about a significant reduction in the incidence of CLPC. [8]

1.2.5. Infective complications

A more unusual but common allergy problem is the development of an allergy to bacteria present on the edge of the eyelid. These bacteria produce toxins which become trapped in the tears, especially beneath a contact lens. [8]

Historically, overnight wear and length of overnight wear are strongly correlated with increased risks of inflammatory and infective complications. However, other risk factors (modifiable and non-modifiable) have also been identified by various authors: modifiable and non-modifiable risk factors for microbial keratitis for contemporary contact lens. [10]

Modifiable factors:

- Overnight wear, more than 6 nights overnight wear, use while on holidays, swimming without goggles/disinfection, hand-washing, low hygiene, poor case hygiene, internet purchase., poor health, smoking.

Non-modifiable factors:

- Less than 6 months in extended wear, male gender, wearing lenses during winter months, high socioeconomic status, young age. [10]

The generally accepted figure for the annualised incidence of microbial keratitis (MK) in conventional hydrogel DW patients is 4 per 10,000 wearers, and EW has been reported to increase this risk by approximately five times. Although it was initially hoped that the risk for MK would be lower with SiH materials, 98 study results now indicate that the risk is similar to that found with conventional hydrogel materials for both DW and CW. Despite the similar incidence of MK for both conventional and silicone hydrogel lenses, studies do suggest that the severity of the condition and disease duration are reduced with CW or EW silicone hydrogel materials. [10]

1.2.6. Corneal staining - client compliance or not

It is inevitable to see in cl wearer eye corneal staining, especially on the inferior third of the cornea (Fig. 1.8.). But often the etiology of this staining is not clearly understood. Patient compliance may be the culprit, but there are also a few other possibilities. [11]

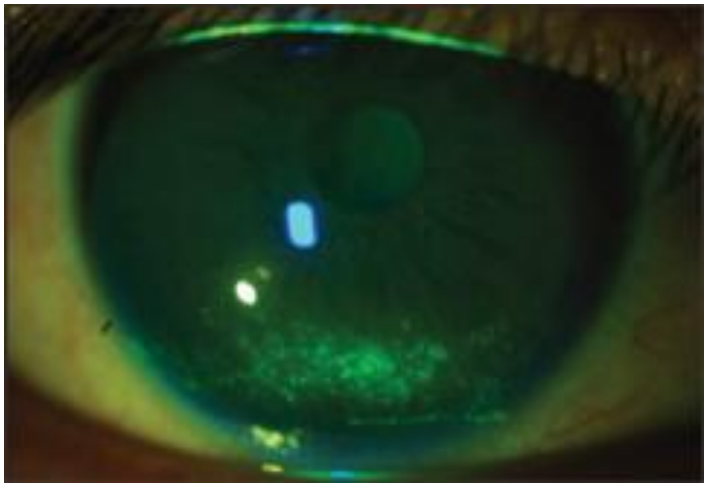


Fig. 1.8. **Inferior corneal staining [11]**

Compliance issues: patient education indicated:

1. Prolonged lens wear. Regardless of the material, a lens that stays on the eye for too long may induce corneal desiccation and staining

2. Improper lens removal technique. Ideally, a soft lens should be gently decentered onto the bulbar conjunctiva before removal to avoid irritation from pinching the lens off the cornea.

3. Eye rubbing. Forceful pressure from fingers or knuckles may chafe the cornea. [11]

While it's important to properly educate patients regarding lens compliance issues, it's equally important to ensure that patients understand why it's necessary to follow specific guidelines. If patients realize that their actions may result in compromised corneal health, vision and comfort, they may be more willing to comply with specific recommendations. [11]

Not compliance issues: practitioner action required:

1. Inadequate lens fit. A lens that is too steep or flat may not drape the cornea properly, which may disrupt the tear film and contribute to staining. [11]

2. Solution toxicity. Certain combinations of soft lenses and multipurpose solutions may contribute to increase corneal staining.

3. Lagophthalmos and partial blinking. Incomplete closure of the eyelids hinders adequate tear flow over the ocular surface.

4. Blepharitis and meibomitis. Inflammation of the eyelids and meibomian glands results in a decreased quality of mucus and lipids and an increase of proteins in the tear film. This debris may exacerbate corneal staining by disrupting tear flow and lens hydration, as the accumulated material generally settles along the lower lid margin. [11]

Patients with significant solution-related corneal staining are three times more likely to experience inflammatory events. Staining is an important component of lens wear from a safety standpoint, and according to the staining grid Web site, it plays a role in comfort as well. [7]

1.3. Research about CL compliance and comfort

There is many researches done to find out, how good is CL wearers CL compliance and comfort.

Bausch & Lomb did research about contact lens compliance in 2007. The purpose of this research was to provide statistically reliable evidence as to whether or not contact lens wearers comply with recommended lens usage, storing and cleaning regimens and protocols, and if not, to identify areas where failures are occurring. [12]

Method of data collection was online survey all together 1402 wearers from 7 countries: UK, Germany, France, Italy, Spain, Russia and Poland each 200 persons and Poland 202. Research period was in UK, France, Germany, Italy and Spain 24.11. – 5.12.2006 and in Russia and Poland 18. - 22.12. 2006. Respondents were contact lens users who wear either two-weekly or monthly disposable lenses aged 16-64, regionally representative. [12]

Results of this study showed that in compliance with lens usage there was funded some over -wear related non-compliance. The average wearing period is typically four days more than the recommended period. 17% always wear their CL for more days than they should and only one in four (23%) would never wear their lenses beyond the recommended period. Also 35% of CL wearers with lenses not intended for overnight wear sometimes sleep with their lenses in and 68% of CL wearers take a nap during the day wearing lenses not suitable for this purpose.

About non-compliance with inserting/removing lenses, 28% of cl wearers did not wash their hands before inserting their lenses and 43% of CL wearers did not wash their hands prior to removing them. Of those who washed their hands, 77% used soap prior to insertion of lenses

and 76% prior to removal of lenses. 90% of CL wearers did not rub-cleaned and rinsed their lenses in the time of inserting/removing. 14%admit having used either water or mouth saliva to clean lenses at some point. When it comes to filling the case with CL solution, almost a third (30%) exhibit non-compliant behaviour by topping-up existing solution at least sometimes.

25% of all CL users did not always change the solution in the lens case if there is an extended interval between wear. 2% of people admit to storing their lenses in a glass or mug. Total storing related non-compliance (using a case, using sufficient fresh solution, soaking time and re-soaking as required) was exhibited by 49% of respondents. [12]

Results of non-compliance with lens case, 20% of wearers indicated that they did not clean their lens case. 66% of wearers exhibited non-compliant behaviour by either using water (30%), water and soap (22%), antiseptic liquid (9%) or other (5%) to clean their lens cases. Of those that did clean their lens case, only 58% did this on at least a weekly basis. Only a third of wearers (34%) cleaned their cases with CL solution. About 20% of wearers replaced their lens case annually or less frequently when the recommendation is a month. Only 10% of wearers adopted ideal practice and used a new case every month or more frequently. [12]

Non-compliance with solution bottle, 29% of lens wearers admit to using their solution for a period of more than four months or more before throwing the bottle away. 35% claim to regularly check the expiry date on their solution bottle. 11% of respondents do not always close their CL solution bottle tightly after opening it. [12]

The other research was done in Australia by Institute for Eye Research and its purpose was beside evaluating the level of CL compliance to lens care to identify and analyse contact lens user profile and attitudes. It was done on 210 contact lens wearers who attended an optometry clinic at an education and research institute, were surveyed using a self-administered questionnaire. 62% of participants responded, with a mean age of 33,8+/-12 years. 55% of the respondents were female. The questionnaire was constructed to analyses by multivariate testing between lens wearers' demographic, hygiene, behaviours and attitude to aftercare visit. [13]

The results of this research as in B&L study prior, showed, that poor hand hygiene (11%), inadequate lens care (13%) and lens storage cases (61%) are the common non-compliant behaviours in lens wearers. Also one major non-compliance aspect identified was CL wearers not remembering how often they were advised to return for an aftercare (50%). These lens wearers who purchased contact lenses from the internet, were 3,8 times more likely to forget their aftercare schedule than those who purchased contact lenses from the optometrists. [13]

One important part to insure the good vision and comfort for CL wearer is the right contact lens wearing schedule. This kind of research about effect of compliance was done recently in Canada. The purpose of this analysis was to investigate the effect of compliance with the manufacturers' recommended replacement frequency (MRRF) on comfort and vision in Silicone hydrogel (SH) wearers. [13]

SH lenses are usually replaced after 2 weeks (2W) or 1 month (1M); however, many patients do not comply with the MRRF. Patients were asked to rate their subjective comfort and vision from 0 (very poor) to 10 (excellent) in the morning, at the end of the day (EVE), when lenses were new, and needed replacing (NR). One thousand three hundred forty-four patients wore 2W replacement modality (2WR) (n = 717) or 1M replacement modality (1MR) (n = 617) SH lenses. [14]

Results showed that comfort and vision in the morning and when lenses are new were significantly higher than for at the end of the day and needed replacing. 29% of 1MR and 59% of 2WR wearers were non-compliant with the MRRF. Compliance had a significant effect on EVE and NR comfort and vision. After accounting for compliance, EVE and NR comfort and EVE vision were higher for 1MR than 2WR. [14]

This research confirms the importance of compliance and Optimal subjective performance with SH lenses seems to be facilitated by replacing lenses as recommended.

Also one important item, what has been studied is patient anxiety level during CL fitting.

For example one research which improves that, was done to evaluate patient anxiety during a commonly conducted type of optometric examination, namely a contact lens fit. 40 participants (15 male, 25 female; mean age 28.3 ± 9,5) underwent a full contact lens fitting consultation. Skin conductance was recorded continuously to measure participant arousal; the physiological correlate of anxiety. . Results showed that the skin conductance analysis identified arousal levels peak during history and symptoms, contact lens insertion and removal and practitioner advice. Peak arousal levels occur during periods of 'communicative interaction' between the patient and the optometrist. Since anxiety is associated with poor attention, this suggests that optometrists should not assume that patients remember what they are told during the consultation. [15] This study showed clearly, how important continuous educating of CL compliance for CL wearers is.

As many researches has been shown, there is one important issue in CL compliance - CL cleaning by rubbing. One of the recent studies (2009) compared effectiveness of cleaning

with and without rubbing of soft contact lenses. 300 new biweekly disposable hydrogel lenses (Ocufilcon D, FDA Group IV; 55% water content) were artificially deposited with serum albumin, hand cream (semi-transparent deposits) and mascara (black deposits). The treated lenses were randomly divided into three groups, each group cleaned by one of three methods of cleaning--Rubbing (R), No-Rub following the manufacturer's instruction on duration of rinsing (NR1) and No-Rub with a shorter duration of rinsing (NR2). There were used 4 commercially-available multipurpose solutions (MPS) and a saline. Lenses cleaned by the R method were significantly cleaner than those cleaned by methods NR1 and NR2. No significant difference was found between lenses cleaned by NR1 and NR2 methods. [16]

Not rubbing the soft lens when cleaning is ineffective in removing loosely-bound deposits. A longer rinse, as recommended by the manufacturers, does not remove significantly more deposits than a shorter rinse with the MPS. [16]

1.4. How to rise CL compliance and comfort

As these researches prior show, patient education is very important part to improve CL compliance. It is not easy to achieve better compliance, but it is important to try all possible methods to raise the patient compliance as high as possible**.**

One research was done to find out, which education is better when it consist oral and written instructions both or only oral instruction. Patients received oral or oral plus written information depending on their score from a previously validated oral and written comprehension test. A survey containing theoretical and practical questions was given to the patient at the end of the study in order to establish compliance with the given instructions. Results of this research were that there was not statistically significant difference between the two groups of patients. A correlation was discovered between non-compliance and ocular complications and between ocular complications and the physical appearance of contact lenses and cases. [17]

The oral and written comprehension test served to establish the comprehension skills typology of the patients, thus allowing for the appropriate type of instructions (oral or written) to be given to each patient in accordance with their particular abilities. This methodology could lead to a relevant increase in compliance. [17]

Another research was done to determine the scale of non-compliant behaviour of CL wearers and develop strategies of engaging and educating patients to increase compliance with safe contact lens practices. [17]

The literature regarding noncompliance with medical regimens, contact lens wear, and cleaning was reviewed. 111 contact lens wearers from a college campus, a dental clinic, and ophthalmology clinics were surveyed in a pilot study regarding their contact lens knowledge, attitudes, and practices. Statistical analysis of the results was performed with SPSS software. [18]

Results showed, that a review of the literature found overall rates of noncompliance with medical regimens varies from 24.8% to 44%, and the rates reported for contact lens wearers varies from 50% to 99%. Noncompliant behaviour affecting the safety of contact lenses is more common than behaviour affecting lens comfort. This study found that many lens wearers thought they were compliant, but actually reported a wide variety of noncompliant behaviours. [18]

In conclusion, noncompliance with lens-wearing schedules, replacement schedules, and lens care regimens remains a significant problem of contact lens complications and lens failure , although there have been remarkable advances in contact lens science. Data regarding strategies for increasing compliance are scant. Noncompliance must be considered in the development of future lens care products and must be addressed by eye care professionals when patients are fitted with contact lenses and at each follow-up appointment. [18]

Contact lens technology has improved dramatically over the past 10 years. Silicone hydrogel lenses may offer benefits such as improved comfort and physiology to many patients, including those who formerly had difficulty with hydrogel lenses. Daily disposable lenses are an outstanding option for patients who are sensitive to solutions, have allergies, are heavy depositors or are part-time or full-time wearers. [19]

By embracing new technology and educating patients about these new offerings, patients are more aware that each lens demonstrates different qualities and therefore should be treated individually. This knowledge can reduce problems associated with contact lens noncompliance. [19]

Communication is necessary for proper education and to avoid the potential consequences of poor contact lens care. Providing written material for new and existing lens wearers is essential to encourage compliance. People tend to absorb more information when verbal communication is supplemented with written communication. Topics may include: what's new with contact lenses, the importance of annual eye exams, solution and lens compliance. Additionally, asking patients whether they wish to receive e-mails or mailings

about lens advances. By providing literature about new lens technologies, its giving patients the perception that optical offices remain current and provide outstanding patient care. [19]

Many patients use the Internet to order lenses because of convenience and cost issues, yet only a small percentage of optometrists and ophtalmologists use the Internet to encourage contact lens sales within their own practices. By making themselves accessible via the Internet, they become just as convenient as the Internet companies, and are able to better control the length of time that a patient may order lenses. In addition, it should always offer to mail lenses to patients. Convenience is an integral part of today's society, and should incorporate it into patient care. [19]

Also must to recommend annual lens exams. If we educate patients to purchase a year's supply of lenses, they will be less likely to "stretch" their lens replacement schedule. To supplement this practice, provide yearly reminders to emphasize the importance of maintaining ocular health. [19]

1.5. Instruction for established contact lens users to increase compliance

Studies show that many patients are more or less negligent in regard to lens handling and maintenance. It is possible that the great comfort and ease of use initially enjoyed with new contact lenses encourages a noncompliant attitude. However, some patients eventually present with clinical signs and symptoms such as lens awareness at the end of the day, vision disturbances, and chronic redness. These are frequently a result of poor compliance with recommended lens management. [20]

One of the most difficult tasks can be trying to improve compliance for patients who have enjoyed initial success despite negligent maintenance. As a consequence of their initial success, these patients have concluded that compliance is not essential to successful wear. [17]

Other factors may contribute to noncompliance. For example, motivation to wear lenses may be low, and lapsing into poor compliance may occur more easily for such patients. In these patients, findings such as chronic redness and/or lens awareness at the end of the day are more likely to develop and can become the basis for giving up lens wear. At first they may just reduce their hours and/or days of lens wear. [20]

However, voluntary cessation of lens wear may occur even when the complications are at a low level. Too many people who are initially satisfied—or very satisfied—with their

ability to wear contact lenses full-time resort to occasional lens wear or end up abandoning lenses permanently. [20]

Studies show that poor hygiene causes infections, not the lenses. Improving compliance, however, is not easy. Re-issuing the same information about lens management in the same format that we originally used can be unproductive.

There is made written instruction especially for established patients to improve compliance. It is titled "Too Many Contact Lens Patients Are Heading for Trouble…".It consist an explanation about CL care behaviour on a lottery analogy to show how this view is incorrect. [20]

There are also showed 13 aspects, which show, how easy to increase the chances of contact lens complications is.

1. Not washing hands with soap, and rinsing thoroughly, prior to lens handling.
2. Re-using or topping-up storage solution.
3. Not using enough storage solution to completely cover lenses.
4. Not keeping the storage case clean and not replacing it regularly.
5. Contaminating the solution bottle nozzle with fingers, or by leaving the cap off.
6. Using tap water to rinse your lenses or case.
7. Not cleaning and rinsing lenses after removal.
8. Using products that have not been recommended for your type of contact lenses.
9. Not replacing lenses according to the recommended schedule.
10. Failing to have regular reassessment of your ocular health.
11. Wearing lenses while swimming, or in a hot tub, or spa.
12. Sleeping in lenses, especially if unwell or if lenses are uncomfortable.
13. Continuing to wear contact lenses when your eyes are abnormally red, or abnormally irritated, or when vision has deteriorated suddenly. [20]

2. EXPERIMENTAL PART

2.1. Purpose

The purpose of this research was to collect statistically reliable evidence as to whether or not contact lens wearers comply with recommended lens usage, storing and cleaning regimens and protocols, and if not, to identify areas where failures are occurring. Besides evaluating the level of CL compliance to lens care was to identify and analyse contact lens user comfort and quality of life.

2.2. Methods

The experimental part of master thesis was done in two parts: with the questionnaire method and practical method.

2.2.1. Questionnaire

The questionnaire consists from two parts all together 24 questions with multichoise answers. The CL compliance questions were done on the base of B&L CL compliance research 2007. And in the CL comfort part of questionnaire were used questions from The Contact Lens Impact on Quality of Life (CLIQ) questionnaire by K. Pesudovs, E. Garamendi and D. B. Elliott. All the questions were translated to Estonian language.

About CL compliance there was 9 questions:

1. How often do you wash your hands?
2. What can happen to the eyes, if you wear contact lens over the time?
3. What kind of contact lens can wear 24h?
4. How often do you check your eyes?
5 How often do you change your contact lens case?
6. How often do you change your contact lenses?
7 How many days in week do you wear contact lens?
8. Do you clean your contact lenses by rubbing?
9. How many bottles (360 ml) of solution do you spend in 1 month?

About CL comfort there was 15 questions:

1. During the past month, how often have you experienced your eyes feeling tired or strained with your contact lenses?
2. During the past month, how often have you experienced red/painful/itchy/sore/ uncomfortable/gritty or dry eyes with your contact lenses?
3. How much trouble is the routine care of your contact lenses (cleaning, using eye drops?
4. How much trouble has to insert things into your eyes: contact lens, eye drops?
5. How concerned are you about the cost of your next contact lenses?
6. How concerned are you about the cost of unscheduled maintenance of your contact lenses; breakage, loss, running out of supplies?
7. How concerned are you about having to increasingly rely on your CL since you started to wear them?
8. How concerned are you about your vision being not as good as it could be with your contact lenses?
9. How concerned are you about medical complications from your contact lenses?
10. How concerned are you about eye allergies/eye infections from your contact lenses?
11. How concerned are you about falling asleep in your contact lenses?
12. How concerned are you about eye protection from ultraviolet radiation?
13. During the past month, how much of the time have you felt that you have looked your best when wearing contact lenses?
14. During the past month, how much of the time have you felt confident when wearing contact lenses?
15. During the past month, how much of the time have you felt able to do the things you want to do when wearing contact lenses?

The introducing form in English is shown in Table 2.1 and questionnaire and eye condition evaluating form in Estonian language is shown in appendices' 1. and appendices' 2..

Table 2.1.

CLCP introducing form in English

Contact Lens Compliance in Practice (CLCP)

Welcome to CLCP, a questionnaire desined to measure the contact lens compliance of people who wear contact lenses.

If you have any questions on any part of the questionnaire, please contact:
Merle Väljari optometrist; e-mail: merle.valjari@ttk.ee

Please,write here your CL information :
Wearing time:
Type of CL:
Age:
Sex:

Instructions

This is a simple questionnaire with 25 questions formatted as in example 1 below.Please complete pages 1-4 using a cross(x) as shown:

Example : How much trouble is being unable to have good, comfortable vision all day with your contact lenses?

None ***X***	*A little bit*	*Amoderate amount*	*Quite a lot*	*Extremely*

Thank you for agreeing to participate.

Questions I

1.During the past month,how often have you experienced your eyes feeling tired or strained with your contact lenses?

Never	*Occasionally*	*Fairly often*	*Very often*	*Always*

2.During the past month,how often have you experienced red/Painful/itchy/burning/sore/uncomfortable/gritty or dry eyes with your contact lenses?

Never	*Occasionally*	*Fairly often*	*Very often*	*Always*

3.How much trouble is the routine care of your contact lense(cleaning,using eye drops)?

None	*A little bit*	*A moderate amount*	*Quite a lot*	*Extreme*

2.2.2. Practical part

Eye condition evaluating. At the same time, after the questionnaire was filled by patient, the optometrist checked also the condition of the eyes at the same moment in the optical shop. To evaluate the condition in the same way, there was exact instructions used CCLRU table grading scale (Fig. 2.1.). The evaluating parts of the eye were conjuctiva, cornea, limbus and upper eye lid conjunctiva. Every part has its own grading scale with pictures from grading 1 to 4:

1 = very slight

2 = slight

3 = moderate

4 = severe

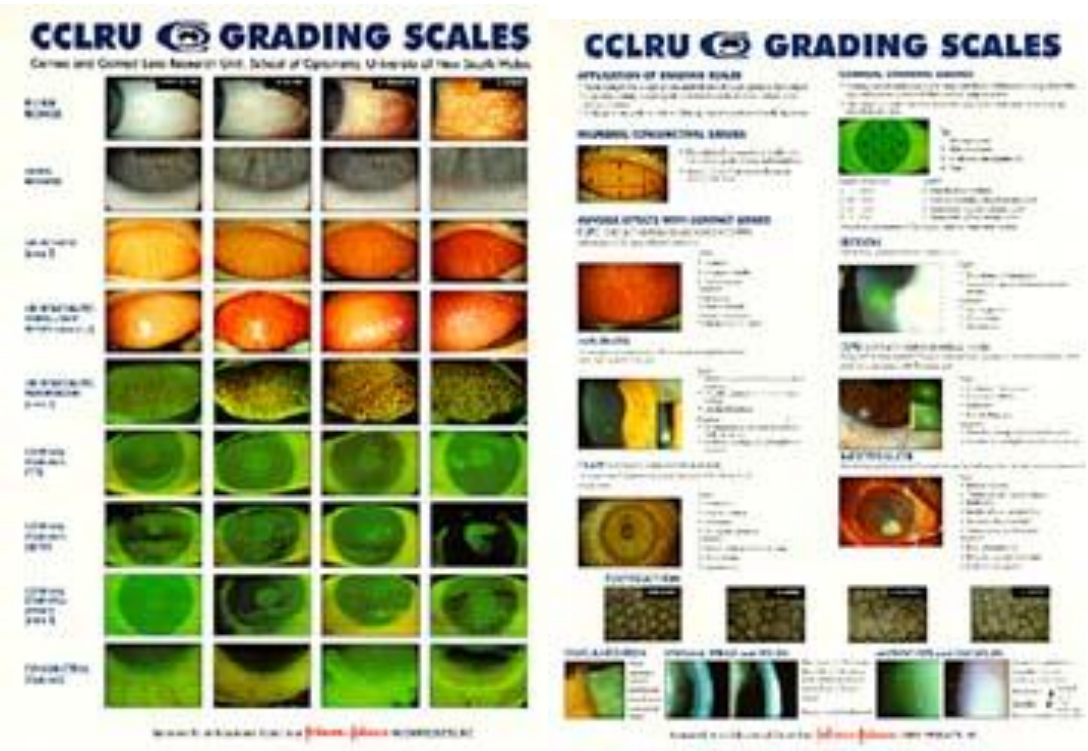


Fig. 2.1. **CCLRU grading scale**

2.3. Subjects

There was sent questionnaires with eye evaluation forms to optometrists in Estonia for apply these during the eyecheck or if customers were being new lens in optical shops. The target group was subjects, who had contact lens wearing experience beginning from 1-2 years or more (Figure 2.2.). 49,5% of subjects had 3 – 6 year wearing experience. From 200 subjects there were 165 (82,5%) female and 35 (17,5%) male.

There was returned 200 filled questionnaires with eye condition evaluation all together during the three months. 120 questionnaires were returned from 12 optometrist and 2 opthalmologist and 80 questionnaires from me. The CL wearer's eyes condition has been evaluated in the same time when questionnaire was filled.

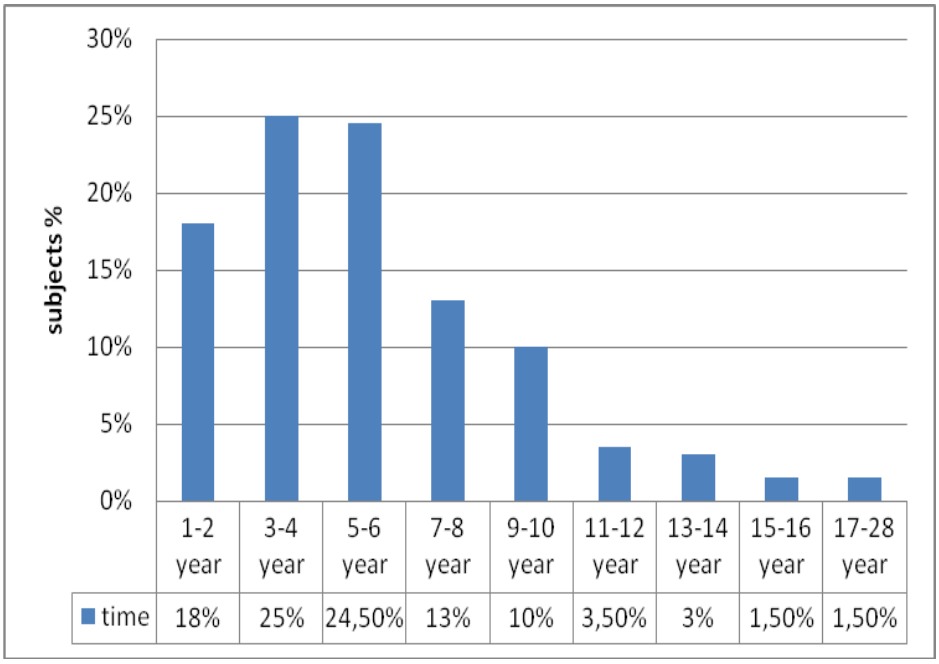


Fig. 2.2. **Wearing experience**

2.4. Results

Data analysis was done with Microsoft Excel program. The results are shown in percentage and diagrams.

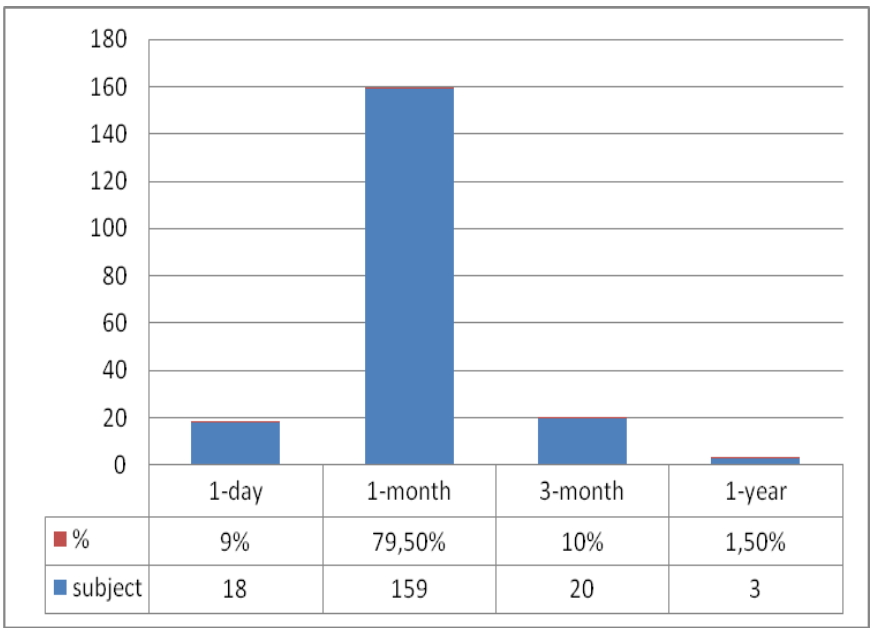


Fig. 2.3. **Contact lens types**

Answers show, that most common contact lens type is soft one month replacement lenses 79,5%.

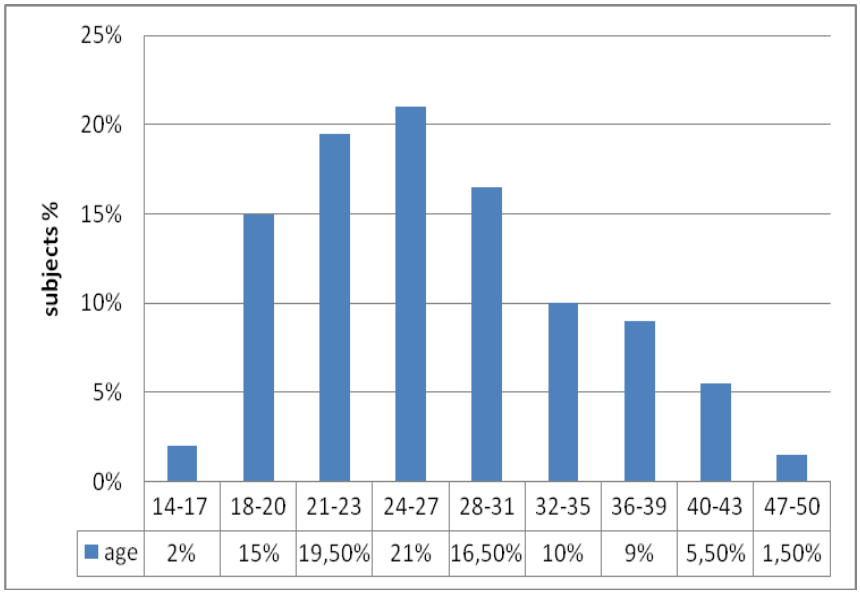
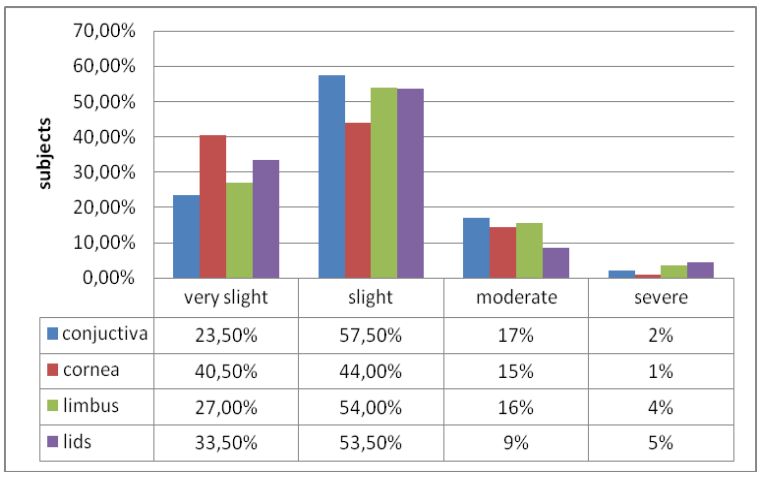


Fig. 2.4. **Subject's age**

The age of subjects was between 14 - 50 years. 72 % of them were in the age between 18 - 31 and the average of the age was 27 years.



	very slight	slight	moderate	severe
conjuctiva	23,50%	57,50%	17%	2%
cornea	40,50%	44,00%	15%	1%
limbus	27,00%	54,00%	16%	4%
lids	33,50%	53,50%	9%	5%

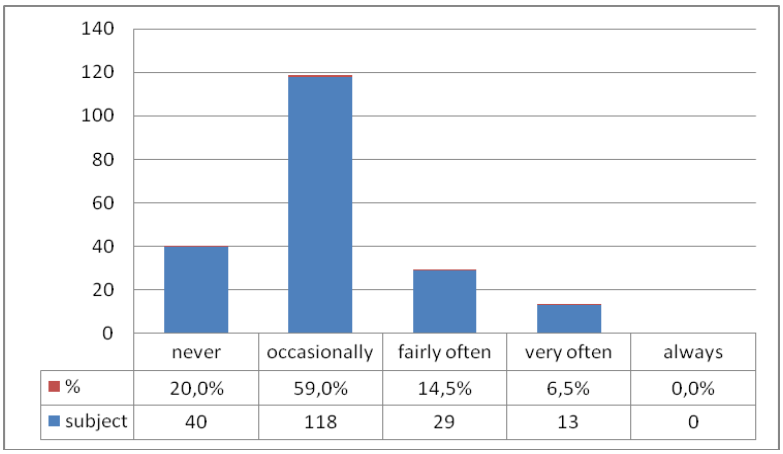
Fig. 2.5. **Eye condition**

Objective findings show that about 80% of contact lens users have good eye condition, because first two grades "very slight" and "slight" are both variants of normal situation. About 20 % have problematic changes in the anterior parts of eye and these who have severe – are troubleshooting situation.

2.4.1. Contact lens comfort

The purpose of this part of study was to find out the CL impact on quality of life. Data analysis was done with Microsoft Excel program. The results are analysed by every question separately.

1. During the past month, how often have you experienced your eyes feeling tired or strained with your contact lenses?



	never	occasionally	fairly often	very often	always
%	20,0%	59,0%	14,5%	6,5%	0,0%
subject	40	118	29	13	0

Fig. 2.6. **During the past month, how often have subjects experienced their eyes feeling tired or strained with CL**

118 (59%) of the 200 subjects experienced their eyes feeling tired or strained with their contact lens occasionally and 40 (20%) of subjects never did (figure 2.6.). This is a very good result and shows a good impact on quality of life. Only 29 (14,5%) of subjects experienced these symptoms fairly often and very often 13 (6,5%) of them.

2. During the past month, how often have you experienced red/painful/itchy/ sore/uncomfortable/gritty or dry eyes with your contact lenses?

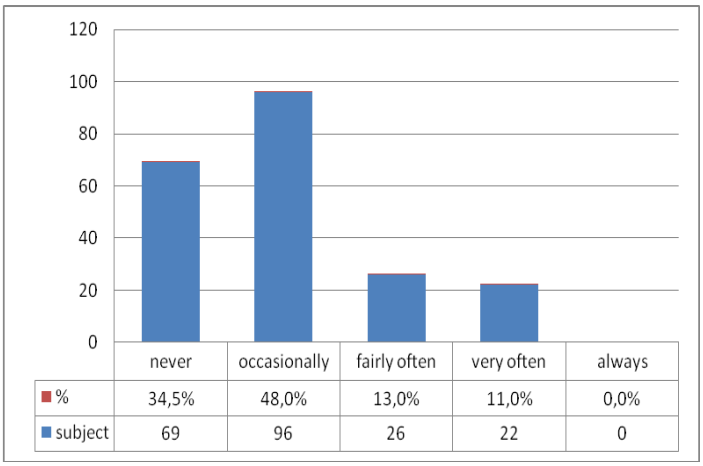


Fig. 2.7. **How often subjects experienced red/painful/itchy/sore/ uncomfortable/gritty or dry eyes with your contact lenses**

Results of that question showed that 69 (34,5%) of subjects never experienced red/painful/itchy/sore/uncomfortable/gritty or dry eyes with their contact lenses during the past month and 96 (48%). 26 (13%) of subjects experienced these symptoms fairly often and 22 (11%) very often. These results looked quite good, besides nobody experienced these symptoms always.

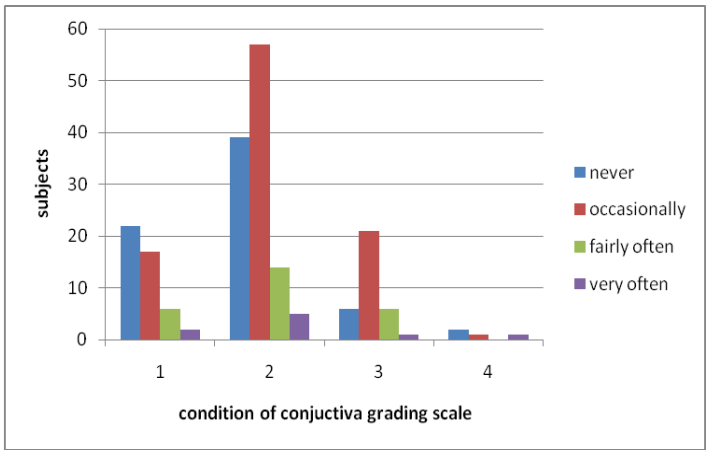


Fig. 2.8. **Correlation between subjective answers and the condition of conjunctiva**

But results of comparing subject's answers with the condition of conjunctiva (fig.2.8.) showed that subjective answers may be different from objective findings. For example those 14 subjects, whose condition of eye conjunctiva was slight (grade 2), experienced subjectively red/painful/itchy/sore/uncomfortable/gritty or dry eyes with their contact lenses fairly often, when at the same time 21 subjects with moderate condition of conjunctiva (grade 3) experienced these symptoms only occasionally. But most important are results of subjects who never feel problems but objective findings show even of 4th grade changes of bulbar conjunctiva in this group.

3. How much trouble is the routine care of your contact lens (cleaning, using eye drops)?

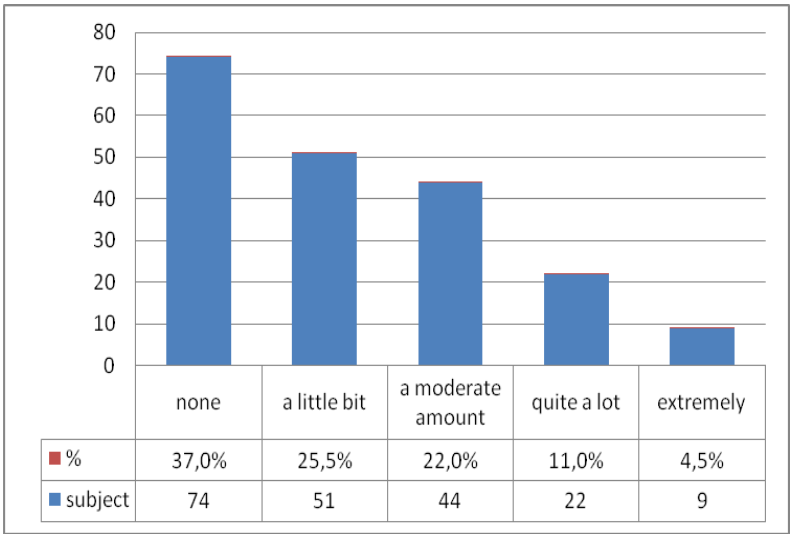


Fig. 2.9. **How much trouble is the routine care of contact lenses**

74 (37%) of subjects answered that the routine care of their contact lens is not trouble at all and 51 (25,5%) of subjects experienced a little bit trouble. 44 (22%) of subjects experienced these procedures a moderate amount trouble, 22 (11%) quite a lot trouble and 9 (4,5%) experienced extreme trouble. These results shows that 125 (62,5%) understand the importance of the routine care of contact lens but the data (78 (37,5%)) of subjects, who experienced more or less trouble shows that practitioners in the optical shops should explain once more, how much this procedure affects on contact lens comfortable wearing.

4. How much trouble is having to insert things into your eyes: contact lens, eye drops?

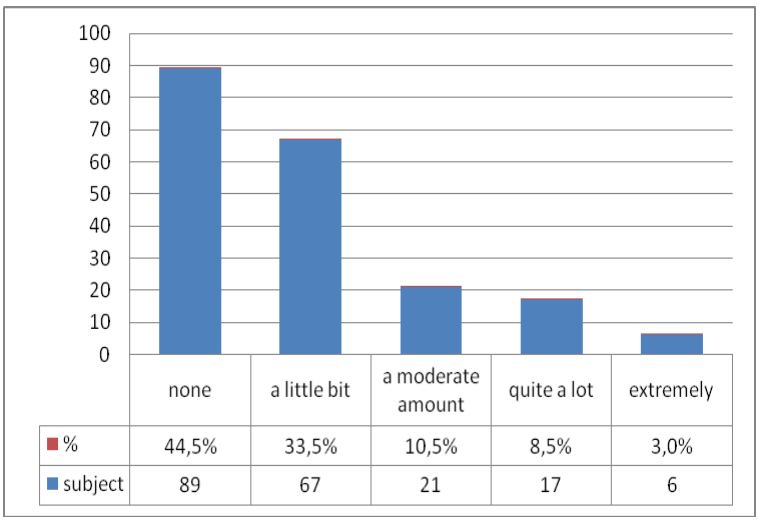


Fig. 2.10. **How much trouble has to insert things into their eyes: contact lens, eye drops**

89 (44,5%) of subjects were not trouble at all having to insert things into their eyes (figure 2.10.).

67 (33,5%) of subjects were a little bit trouble and 21 (33,5%) of subjects were trouble a moderate amount in this matter.

17 (8,5%) of subjects were quite a lot trouble and 6 (3%) of subjects were extreme trouble having to insert things into their eyes.

Results of these question shows that educational part of CL compliance is quite good, but not perfect and some patients may be not a good candidates for contact lens wear.

5. How concerned are you about the cost of your next contact lenses?

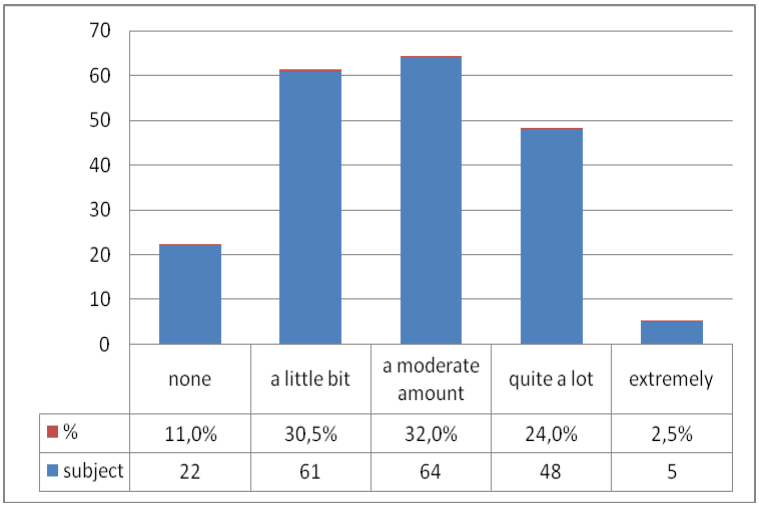


Fig. 2.11. **Subjects answers about concerning the cost of their next contact lenses**

Only 22 (11 %) of all subjects were not concerned about the cost of their next contact lenses at all (figure 2.11.).

61 (30,5%) of subjects were a little bit concerned, 64 (32%) of subjects were concerned a moderate amount and 48 (24%) of them concerned quite a lot. 5 (2,5%) of subjects were extremely concerned about this matter. These results show that the economical part affects on the quality of CL comfort and life quite a lot – 178 (89%) of 200 subjects were more or less concerned about the cost of their contact lenses.

6. How concerned are you about the cost of unscheduled maintenance of your contact lenses; breakage, loss, running out of supplies?

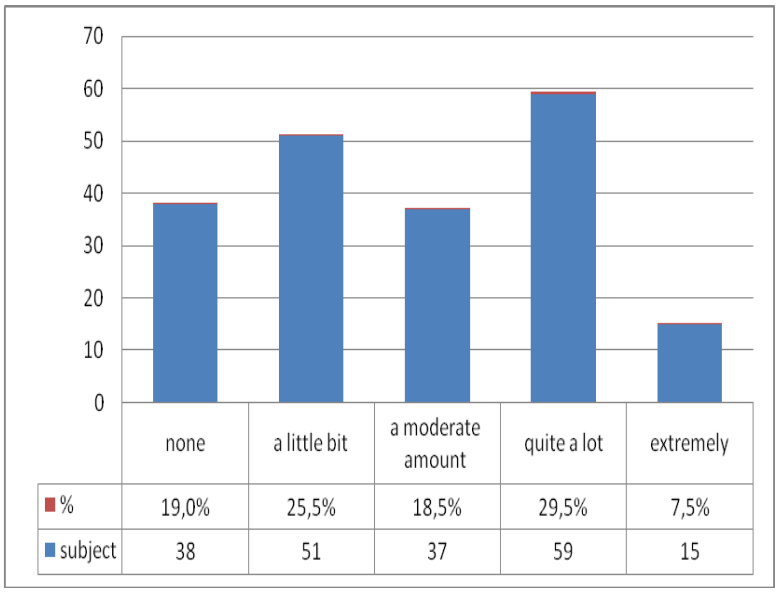


Fig. 2.12. **Subjects answers about concerning the cost of unscheduled maintenance of CL**

The results of this question indicate even more clearly to the importance of economical part wearing contact lens than the previous question. From the results of fifth and sixth questions can conclude, that some subjects experience the cost of their contact lens too expensive and can affect on CL comfort and quality of life, if contact lens wearers does not changes their lens in recommended schedule of time or more suitable CL type.

7. How concerned are you about having to increasingly rely on your CL since you started to wear them?

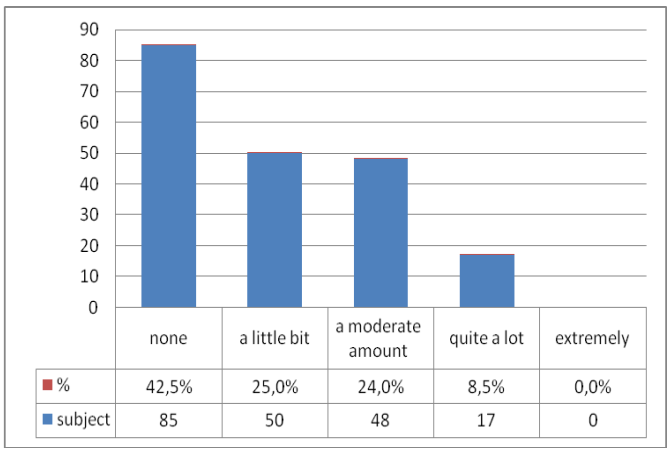


Fig. 2.13. **Subjects answers about concerning about having to increasingly rely on their CL since they started to wear them**

85 (42,5%) of 200 subjects were not concerned about having to increasingly rely on their CL since they started to wear them (figure 2.13.).

50 (25%) of subjects were a little bit concerned and 48 (24%) of subjects were concerned a moderate amount about having to increasingly rely on their CL since they started to wear them.

Only 17 (8,5%) of subjects were quite a lot concerned in this matter.

Results of this question shows that CL wearers does not concerned about longer CL using time since they started to wear them and it indicates to the good quality of CL wearers life.

8. How concerned are you about your vision being not as good as it could be with your contact lenses?

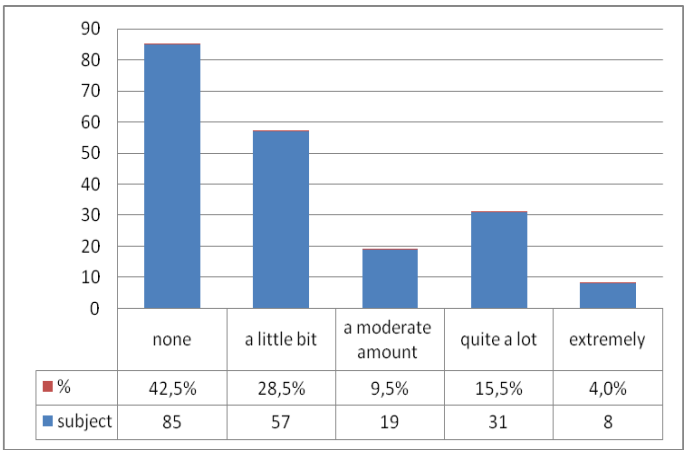


Fig. 2.14. **Subjects answers concerning about their vision being not as good as it could be with CL**

The answers of this question (fig.2.14) shows that 71% of contact lens wearers are quite comfortable with their vision quality, but 29% would like to see better. It could be the indicator that toric lenses or other more suitable contact lenses may be fit to these patients.

9. How concerned are you about medical complications from your contact lenses?

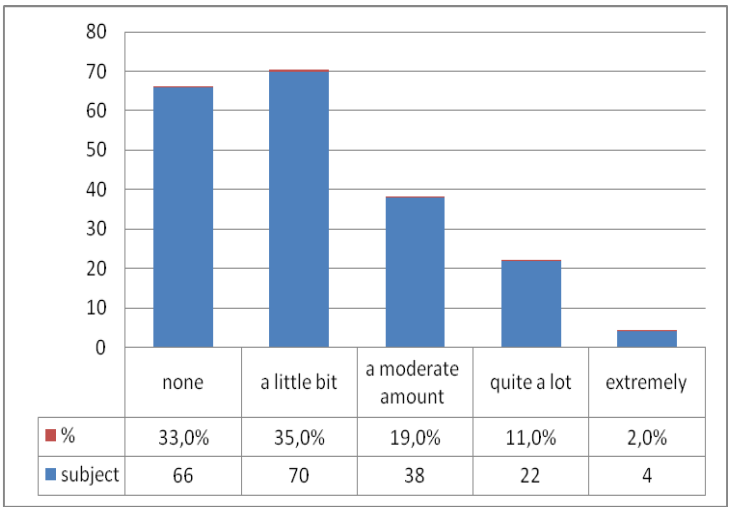


Fig. 2.15. **Subjects answers concerning about medical complications from their contact lenses**

From these results (Fig. 2.15.) can be conclude that thinking about medical complications from contact lenses is not the main issue and does not affect very much on the quality of life and comfort. But it can be enough risky case, when patient do not aware of potential risks.

10. How concerned are you about eye allergies/eye infections from your contact lenses?

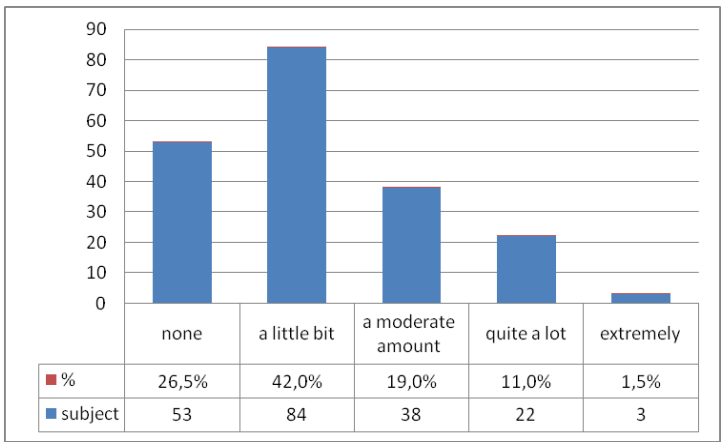


Fig. 2.16. **Subjects answers about concerning about eye allergies/eye infections from contact lenses.**

25 (12,5%) of subjects are seriously concerned about eye allergies/eye infections from contact lenses.

11. How concerned are you about falling asleep in your contact lenses?

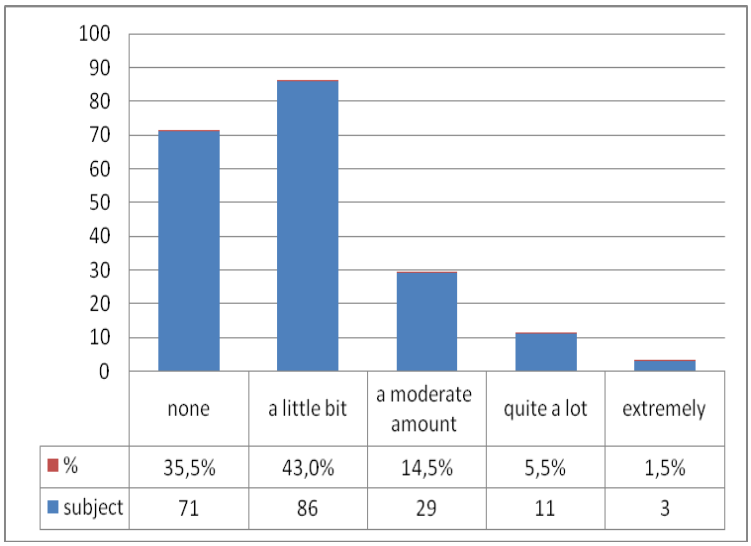


Fig. 2.17. **Subject answers about concerning about falling asleep in contact lenses**

Only 14 (7%) of subjects (Fig. 2.17.) are seriously concerned about falling asleep and this is the serious matters of risky behaviour which may lead to serious complications.

12. How concerned are you about eye protection from ultraviolet radiation?

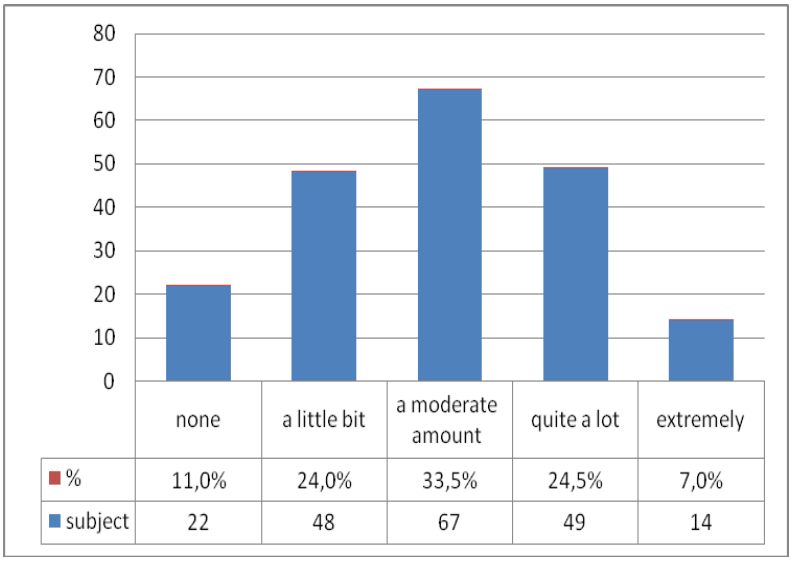


Fig. 2.18. **Protection from ultraviolet radiation**

Only 22 (11%) of subjects are not concerned about this issue at all (2.18). Here we can see influence of massive information in media about hazards of UV radiation.

13. During the past month, how much of the time have you felt that you have looked your best when wearing contact lenses?

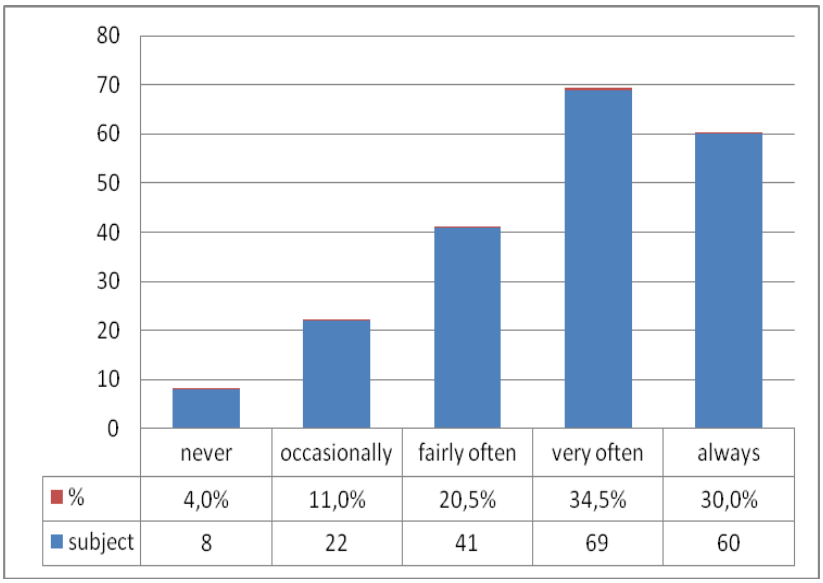


Fig. 2.19. **Good outfit with wearing contact lens**

14. During the past month, how much of the time have you felt confident when wearing contact lenses?

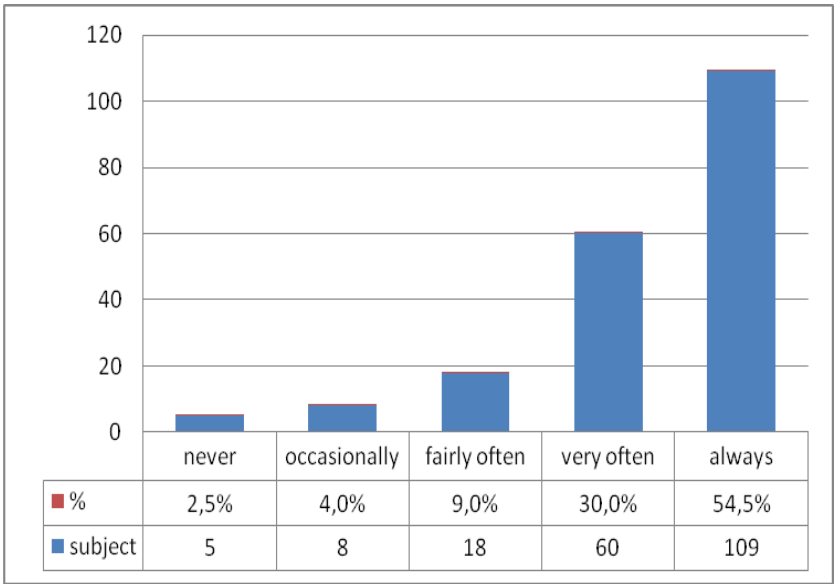


Fig. 2.20. **Feeling confident with CL**

15. During the past month, how much of the time have you felt able to do the things you want to do when wearing contact lenses?

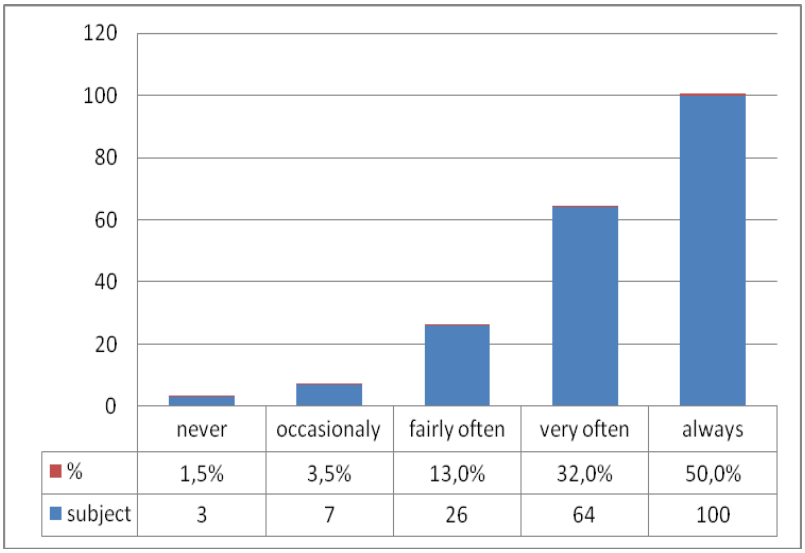


Fig. 2.21. **Freedom of action**

These results of the questions 13, 14 and 15 show clearly that wearing CL has very positive influence to their quality of life.

2.4.2. Contact lens compliance

1. How often do you wash your hands?

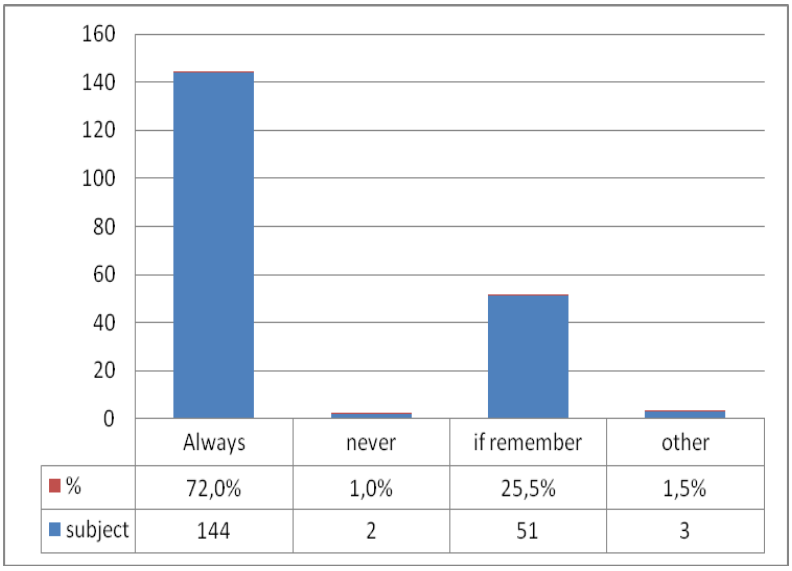


Fig. 2.22. **Hand washing**

In this study 54 (28%) of patients don't always wash their hands before putting and removing their contact lenses and 2 (1%) never do (fig.2.22).

Results of B&L research 2007 showed that 25% to 50% of patients are not good with hand hygiene, 28% before inserting their lenses and 43% of cl prior to removing them. [11]

Other results in the research of Wu Y., Carnt N., Stapleton F., Contact lens user profile, attitudes and level of compliance to lens care (2010) showed that poor hand hygiene is 11%. [12]

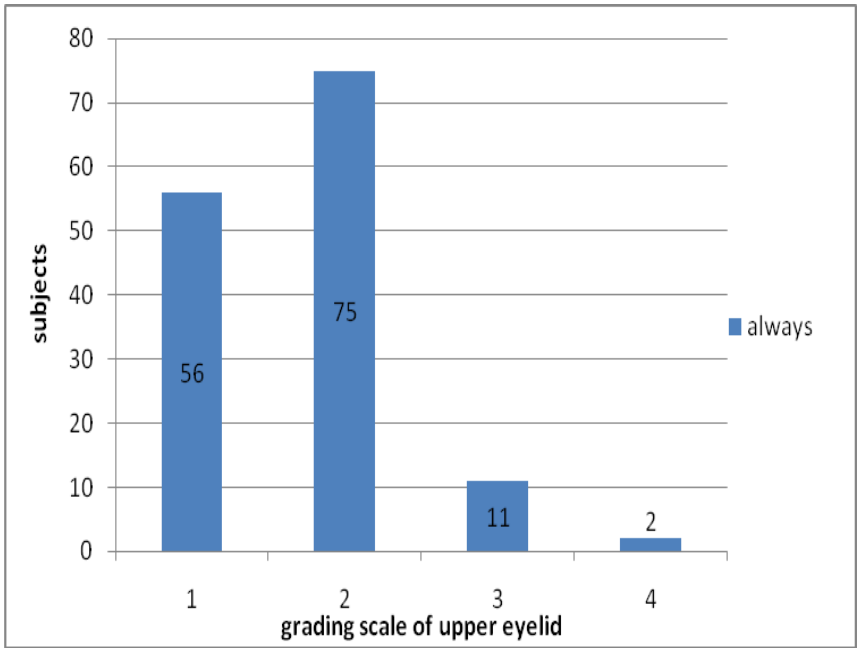


Fig. 2.23. **Correlation between hand washing and condition of the upper eyelid conjunctiva**

The results of this research (Fig. 2.23.) showed in compare these subjects, who answered that they wash their hands always versus eye condition of the upper eyelid, that 13 (9%) of the subjects, who washed their hands always, had upper eyelid condition moderate (grade 3) to severe (grade 4).

One possible reason for that may be, that these persons wanted to show him from better light and answered that washes hands always but in practice it was not true or it shows no direct impact of eye condition.

2. What can happen to the eyes, if you wear contact lenses over the time?

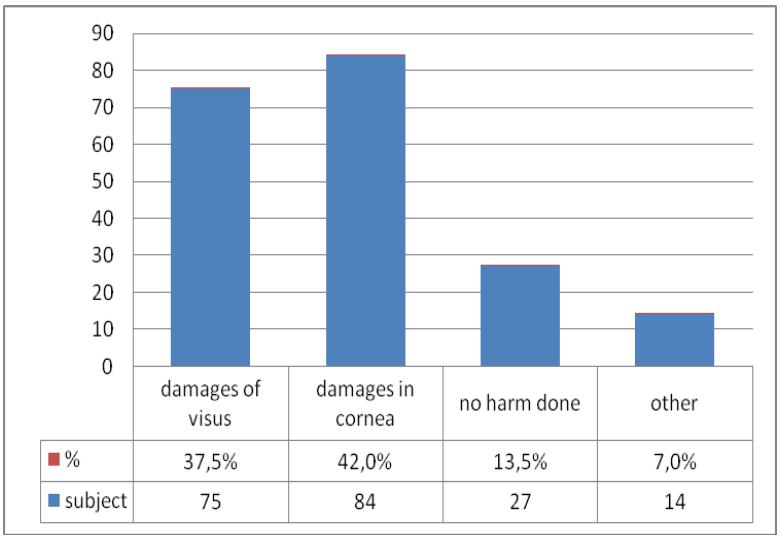


Fig. 2.24. **Possible problems of contact lens over wearing**

Results of this question showed that there is enough good educational background. Only 27 (13,5%) of subjects had no knowledge about wearing contact lens over the time.

3. What kind of contact lenses can wear 24h?

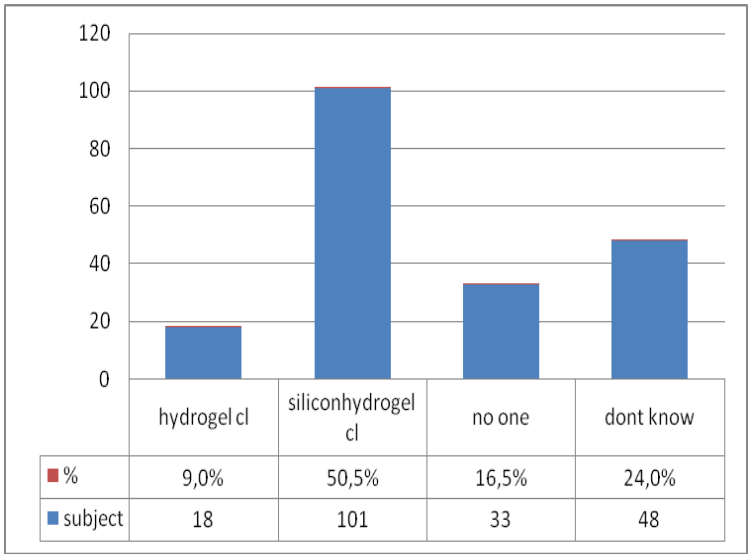


Fig. 2.25. **Type of CL material wearing CL 24 h**

Results of this question (Fig. 2.25.) showed, that even 99 (49,5 %) of subjects had no knowledge in the matter of CL materials on the wearing time 24 h and needs more of educating about this matter.

4. How often do you check your eyes?

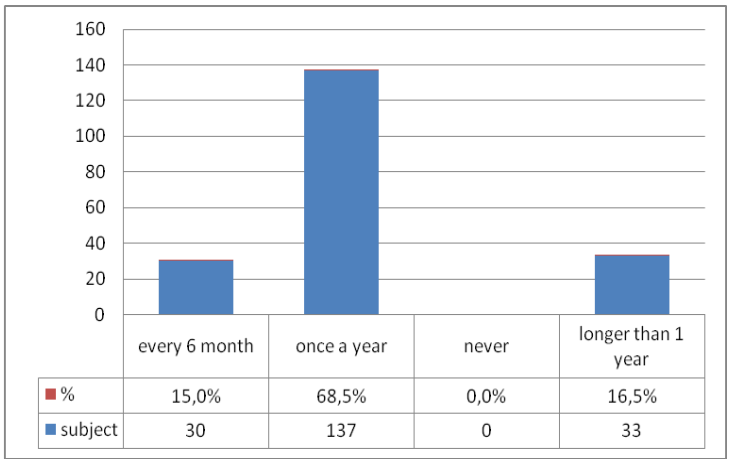


Fig. 2.26. **Eye check interval**

Results of B&L CL compliance research 2007 showed that 29% consult their eye care practitioner every two years

Other results in the research of Wu Y., Carnt N., Stapleton F., Contact lens user profile, attitudes and level of compliance to lens care (2010) showed that one major non-compliance aspect identified was CL wearers not remembering how often they were advised to return for an aftercare (50%). [12]

Results of this study 33 (16,5%) of subjects visit their optometrist/ophthalmologist longer than 1 year interval and if it is actually true, it is a better, than in other researches, at least far from recommended routine visit aftercare every 6 months – only 30 (15%) of subjects.

5 How often do you change your contact lens case?

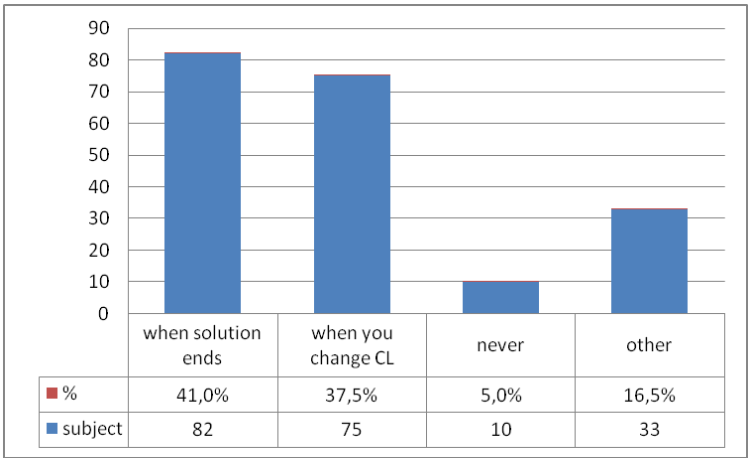


Fig. 2.27. **Contact lens case change schedule**

82 (41%) of subjects (fig.2.27.) changes their CL case when solution ends and 75 (37,5%) of wearers when they change CL pair. But results of B&L CL compliance research (2007), only 10% of wearers adopted ideal practice and used a new case every month or more frequently and and about 20 % of wearers replaced their lens case annually or less frequently when the recommendation is a month.[12]

These good results of this study showed that the system of giving with every new bottle of solution also new case is working. Those 10 (5%) of subjects are 1 day CL wearers who answered that they don't change their CL case never.

6. How often do you change your contact lenses?

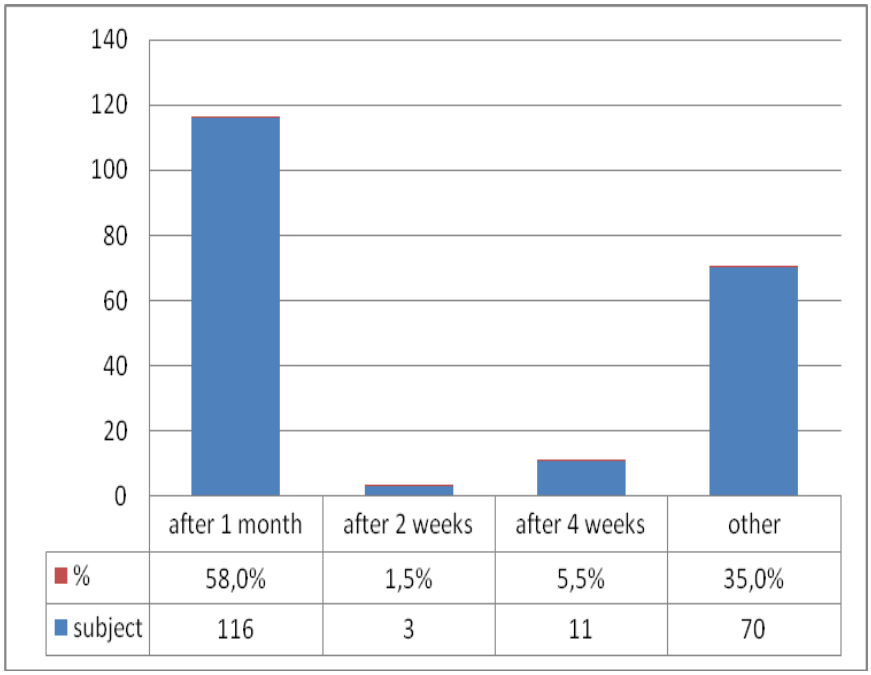


Fig. 2.28. **Contact lens change schedule**

116 (58%) of CL wearers change their lenses after 1 month and 3 (1,5%) of subjects after 2 weeks. These results shows comply recommended 30-day interval on soft 1-month CL. Other 70 (35%) distributes 41 of responders were 1-day, 3-month, 1-year CL users and 29 subjects wore longer than 4 weeks.

7 How many days in week do you wear contact lens?

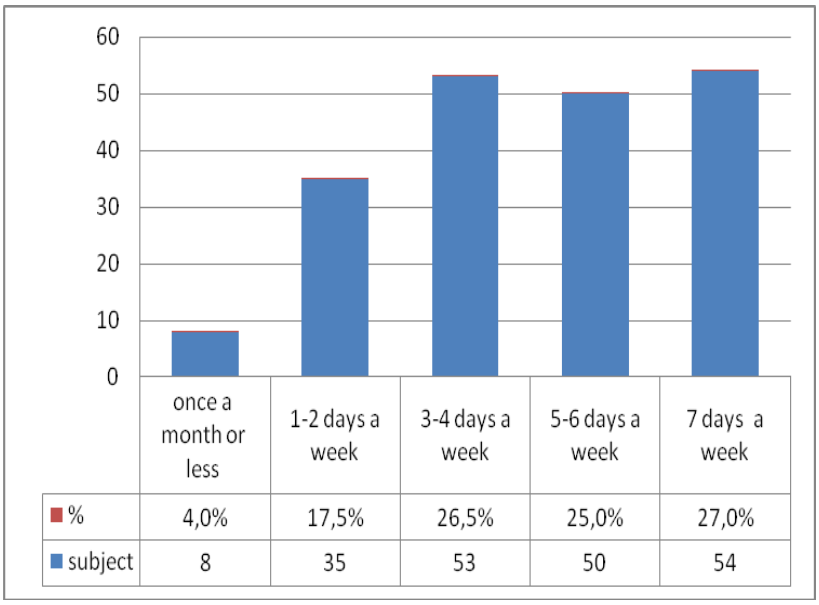


Fig. 2.29. **Contact lens wearing intensity**

54 (27%) of subjects wear CL seven days a week, 50 (25%) of subjects wear CL 5 – 6 days during the week and 53 (26,5%) of subjects wear their lens 3 – 4 days in the week(.*Fig. 2.4.2.8).* 35 (17,5%) of subjects wear CL 1 -2 days and 8 (4%) of CL wearers once a month or less.

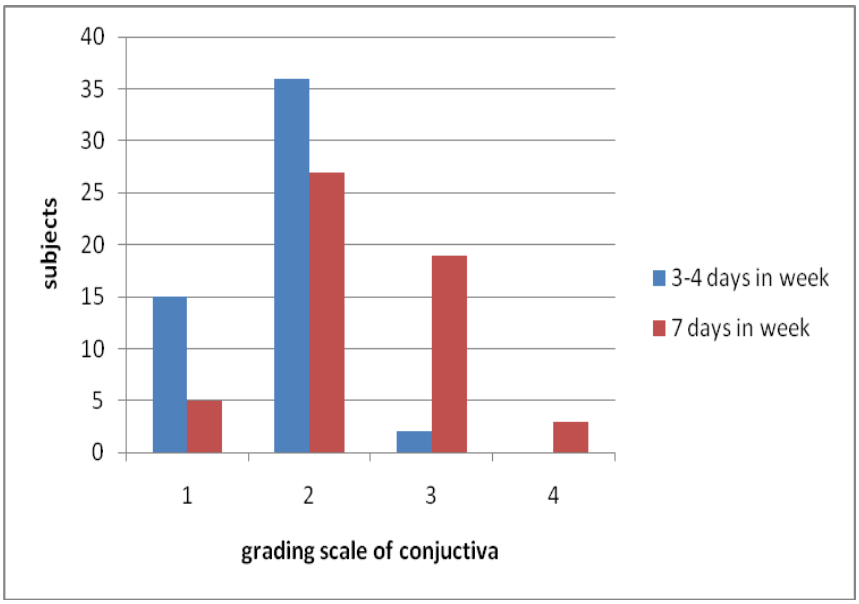


Fig. 2.30. **Comparison the condition of bulbar conjunctiva between subjects with CL wearing schedule 3-4 and 7 days in week**

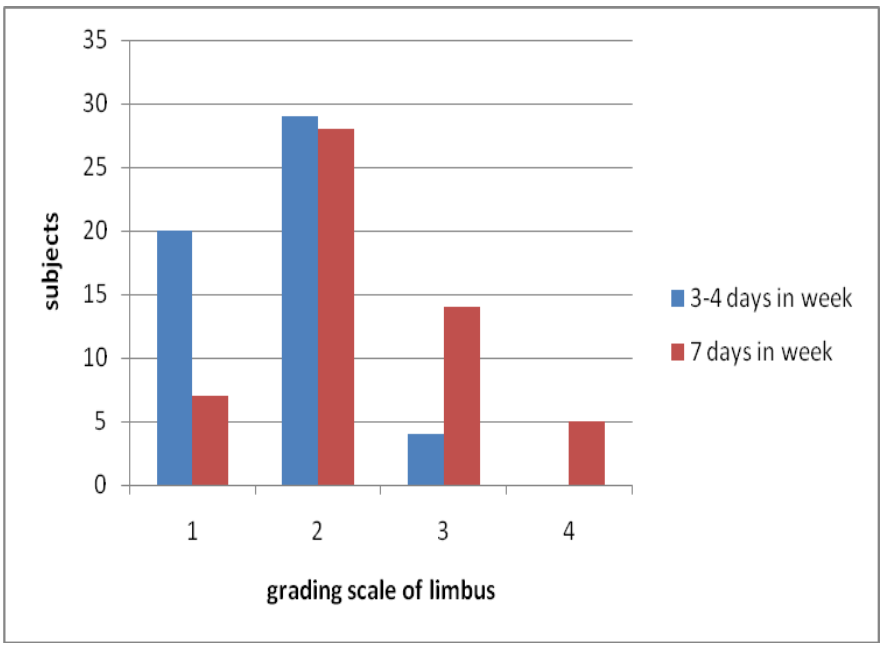


Fig. 2.31. **Comparison the condition of limbus between subjects with CL wearing schedule 3-4 and 7 days in week**

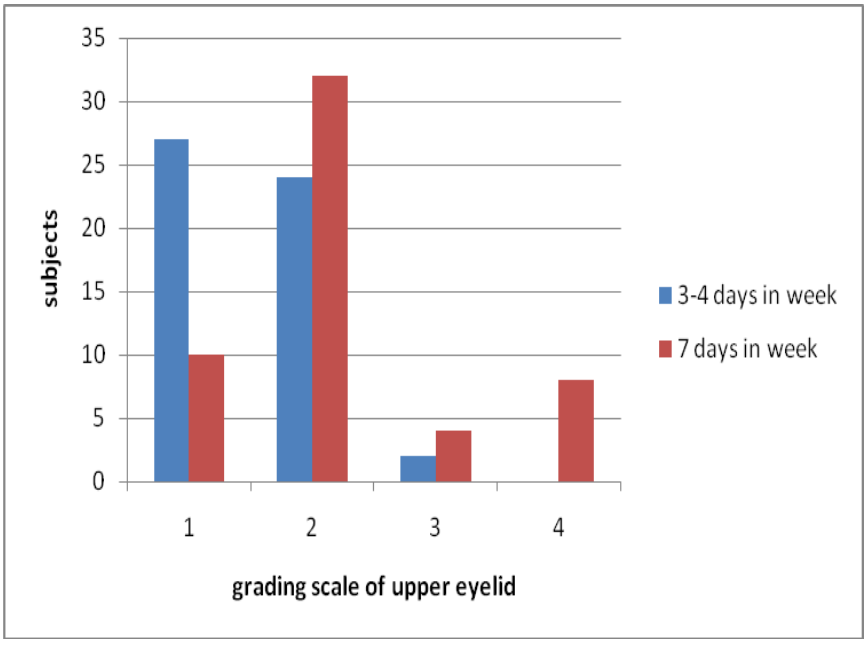


Fig. 2.32. **Comparison the condition of upper lid conjunctiva between subjects with CL wearing schedule 3-4 and 7 days in week**

Results from figures 2.30.-2.32. show direct relationship with intensity of contact lens use and objective changes of anterior parts of eye. Only these patients, who use contact lenses 7 days a week, have 4th grade changes of limbus, bulbar conjuctiva and upper lid conjunctiva.

8. Do you clean your contact lens by rubbing?

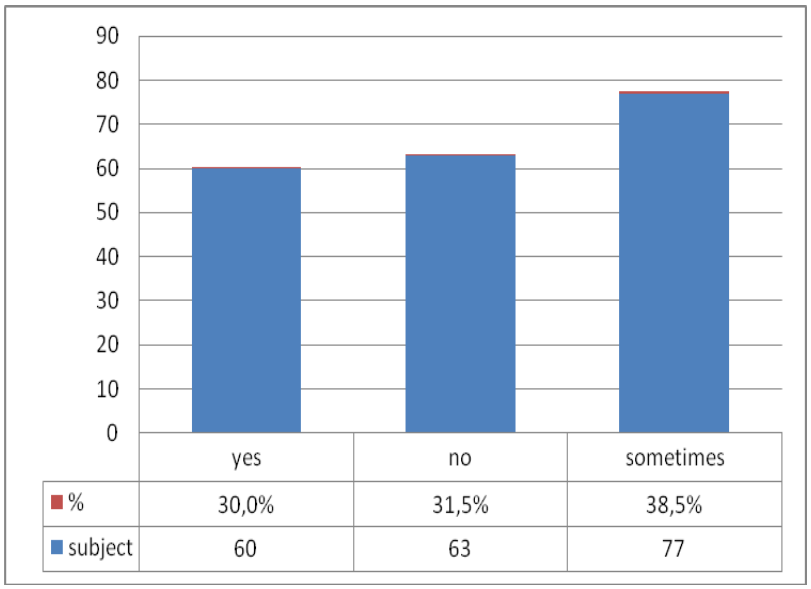


Fig. 2.33. **Cleaning contact lens by rubbing**

Results showed that only 30% of CL wearers clean their lenses by rubbing. It makes 70% of subjects non-compliant in this matter.

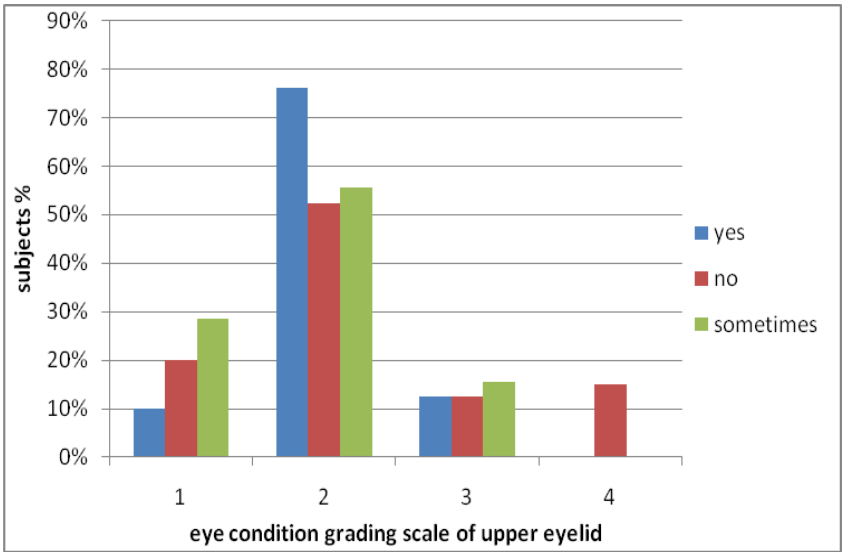


Fig. 2.34. **Affect of CL rubbing during the cleaning to the condition of upper eyelid**

And if there was compared results between subjects answers and evaluated eye condition of upper lid, it shows, that the 15% of subjects had the highest level points by CCLRU grading scale (4 –severe), if they don't rub CL during the cleaning.

9. How many bottles (360 ml) of solution do you spend in 1 month?

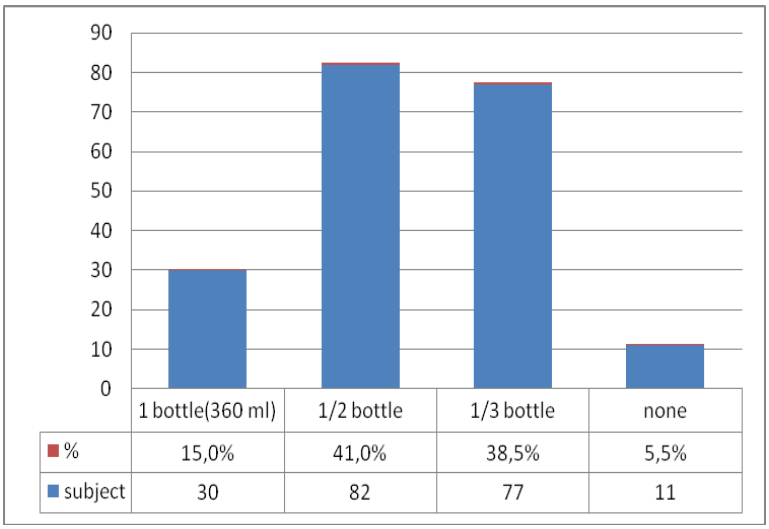


Fig. 2.35. **Spending of CL solution in one month**

Results of this question showed that 77 (38,5%) of subjects used only 1/3 of 360ml bottle of solution, which is less than normal using recommendation. Results of B&L CL compliance research (2007) showed that 29% of lens wearers admit to using their solution for a period of more than four months or more before throwing the bottle away.[12]

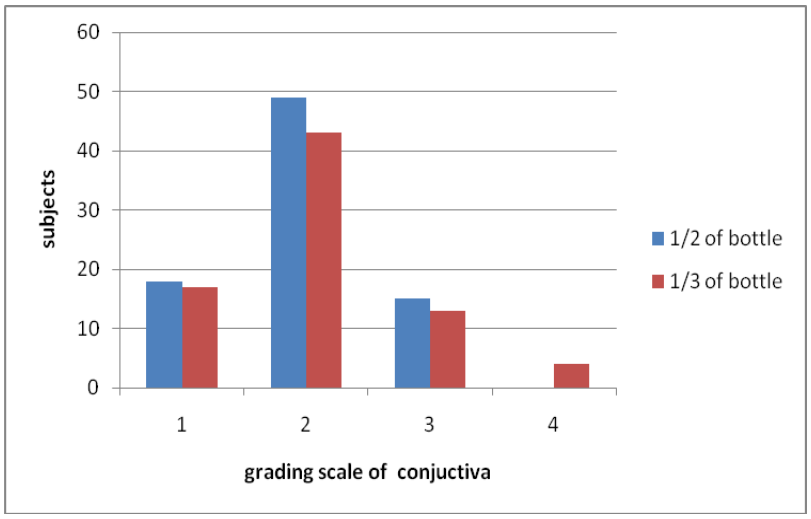


Fig. 2.36. **The condition of conjuctiva using ½ of solution bottle and 1/3 of solution bottle**

Also objective findings show a tendency, that using 1/3 bottle instead of ½ bottle of solution in one month, may lead to worse changes of bulbar conjunctiva.

CONCLUSIONS

1. There is found tendency to have more serious upper lid and bulbar conjuctival changes for CL wearers who do not rub lenses and economize on multipurpose solution.

2. The study shows that regular aftercare visits are essential, because subjective feelings of patients can be different from objective findings.

3. There is found direct correlation between intensity of contact lenses use and objective findings of anterior parts of eye, which does not found with compliance and comfort issues.

ACKNOWLEDGMENT

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Appendice 1. Questionnaire in Estonian language

Kontaktläätsede Praktiline Hooldus (KPH)
Contact Lens Compliance in Practice (CLCP)

See küsimustik on koostatud kontaktläätsede kandjatele, mõõtmaks kontaktläätsede hoolduse teooria vastavust praktikas.Tere tulemast.

Kui teil on küsimusi mingi küsimustiku osa kohta, palun kontakteeruge:
Merle Väljari optometrist; e-mail: merle.valjari@ttk.ee

Palun märkige siia informatsioon oma kontaktläätsede kohta:
Kui kaua olete KL-i kasutanud:
Kontaktläätsede tüüp(kandmise aeg, materjal):
Vanus:
Sugu:

Juhised

See lihtne küsimustik koosneb 24-st küsimusest, mis on vormistatud vastavalt näidisele alljärgnevalt. Palun täitke leheküljed 1-4, kasutades vastamisel ristikest (x) nagu allpool on näidatud:

Näidis: Kui palju Teid häirib asjaolu, et KL-ga ei ole võimalik näha hästi ja mugavalt kogu päeva jooksul?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*
X				

Tänan Teid, et nõustusite vastama.

Küsimused I

1.Kui tihti Te olete tundnud viimase kuu jooksul silmade väsimust või pingesolekut kontaktläätsede kandmise ajal?

Üldsegi mitte	*Vahetevahel*	*Sageli*	*Väga tihti*	*Alati*

2. Kui tihti on Teil esinenud viimase kuu jooksul silmade punetust, valu, sügelust,põletus-, või kuivustunnet silmades KL kandmise ajal?

Üldsegi mitte	*Vahetevahel*	*Sageli*	*Väga tihti*	*Alati*

3.Kui tülikas tundub Teile KL-de rutiinne hooldamine(puhastamine, silmatilkade kasutamine)?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*

4.Kui tülikas tundub Teile kontaktläätsede ja silmatilkade silma panemine?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*

5.Kui palju Te muretsete/mõtlete järgnevate KL-de ostmisel maksumuse/hinna üle?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*

6.Kui palju muret Teile tekitab mitte planeeritud KL-de ost;KL-de kadumisel, purunemisel,lisatarvikute vajadusel?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*

7.Kui palju Te muretsete/mõtlete järjest sagedamale Kl-de kandmisele alates nende kasutamise alustamisest?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*

8.Kui palju Teid häirib,et Teie nägemine ei ole KL-i kandes maksimaalselt selge?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*

9.Kui palju Te mõtlete KL-dest põhjustatud meditsiiniliste komplikatsioonide peale?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*

10.Kui palju Te mõtlete/muretsete , et KL-de kandmine võib põhjustada Teile silmapõletikke ja allergiaid?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*

11.Kas Te muretsete, et jääte/olete jäänud KL-dega magama?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*

12.Kui palju Te hoolite, et Teie silmad oleks kaitstud UV-kiirguse eest?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris palju*	*Eriti*

13.Kui sageli Te viimase kuu jooksul tundsite, et Te näete KL-si kandes väga hästi?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris tihti*	*Alati*

14.Kui tihti Te tundsite viimase kuu jooksul end enesekindlalt/hästi välimuse suhtes KL-i kasutades?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris tihti*	*Alati*

15.Kui tihti Te tundsite KL-i kandes viimase kuu jooksul, et saate teha kõike, mida soovite?

Üldsegi mitte	*Veidi*	*Keskmiselt*	*Päris tihti*	*Alati*

Küsimused II

1. Kui tihti Te käsi pesete?

alati enne KL-de silma panemist ja nende eemaldamist

mitte kunagi

kui meeles on

muu.....

2. Millised komplikatsioonid võivad tekkida, kui Te kannate KL-i üle ette nähtud aja?

nägemisteravuse langus

kahjustused silma eesmisel pinnal

ei juhtu midagi

muu.....

3. Mis tüüpi KL-i võib kanda 24h järjest?

hüdrogeel KL

silikoon hüdrogeel KL

mitte ühtegi

muu.....

4. Kui sageli Te kontrollite/olete kontrollinud oma silmi optometristi/silmaarsti juures?

iga 6 kuu tagant

kord aastas

mitte kunagi

muu.....

5. Kui tihti Te vahetate oma KL-de konteinerit?

iga kord kui hooldusvedelik otsa saab

siis kui võtate kasutusele uue KL-de paari

mitte kunagi

muu.....

6. Kui tihti Te oma KL-i vahetate/võtate uue paari kasutusele?

iga 1 kuu tagant

iga 2 nädala tagant

iga 4 nädala tagant

muu(nädalad või kuud).....

7. Mitu päeva nädalas Te KL-i kannate?

Kord kuus või veel vähem	*1-2 päeva nädalas*	*3-4 päeva nädalas*	*5-6 päeva nädalas*	*iga päev*

8. Kas Te puhastate oma KL-i mehhaaniliselt peopesal sõrmega hõõrudes?

jah	*ei*	*mõnikord*

9. Mitu pudelit(360ml) läätsehooldusvedelikku Te kulutate 1 kuu jooksul?

üks pudel	*pool pudelit*	*1/3 pudelist*

Appendice 2. Eye condition evaluating form in Estonian language

Kontaktläätsede Praktiline Hooldus (KPH)

Contact Lens Compliance in Practice (CLCP)

See ankeet on koostatud optometristidele/silmaarstidele, et hinnata KL-de kasutajate silmade tervislikku seisundit, mõõtmaks kontaktläätsede hoolduse teooria vastavust praktikas. Samaaegselt palutakse uuritaval täita eelnev küsimustik.Tere tulemast.

Kui teil on küsimusi mingi küsimustiku või antud ankeedi osa kohta, palun kontakteeruge:

Merle Väljari optometrist; e-mail: merle.valjari@ttk.ee

Palun märkige siia informatsioon uuritava kontaktläätsede kohta:

Kui kaua on KL-i kasutanud:

Kontaktläätsede tüüp(kandmise aeg, materjal):

Vanus:

Sugu:

Juhised

See ankeet koosneb 4-st vaatluse osast, kasutades CCLRU tabelit, millega saab hinnata kliendi silmade tervislikku seisundit ilma kontaktläätsedeta. See on vormistatud vastavalt näidisele alljärgnevalt. Palun täitke lehekülg 1, kasutades hindamisel ristikest (x) nagu allpool on näidatud:

Silma ülemise lau konjuktiiv

Very slight	*slight*	*moderate*	*severe*
X			

Tänan Teid, et nõustusite hindama.

Hinnatavad silma osad:

1. Conjunctiva

Very slight	slight	moderate	severe

2. Cornea

Very slight	slight	moderate	severe

3. Limbus

Very slight	slight	moderate	severe

3. Conjunctiva of the upper eyelid

Very slight	slight	moderate	severe

Master thesis „Contact lens compliance and comfort” is elaborated in faculty of Physics and Mathematics.

I confirm with my signature, that study is done independently, only in references mentioned sources are used and electronically submitted version of work conforms with printed version.

Author: Merle Väljari

I recommend Master thesis for presentation

Supervisor: lecturer M.Sc, Anda Balgalve

Reviewer: lecturer M.Sc, Sergejs Fomins

Master thesis is submitted in Department of Optometry and Vision Science 08.01.2011.

Secretary: Anete Paušus

Work has been evaluated in a Master’s final examination commission

15.01.2011. protocol No , grade

Secretary of commission: