Relationship Between Long-Term use of Soft Contact Lenses and Dry Eye Symptoms in Students

Okkis Razuansyah Siregar1, T. Indra Azrial2
1,2 Main Outpatient Clinic Medan Eye Center, Indonesia
*Correspondence author: okkis.razuansyah@gmail.com

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ABSTRACT
Contact lenses are usually attached to the cornea of the eye contact lenses usually have a corrective purpose like glasses but the difference is that contact lenses are lighter and almost invisible. Dry eye caused by contact lenses is one of the health problems is developing in the community, one of the reasons and ultimately has an impact on vision problems where eventually vision becomes blurry. The purpose of this study was to ascertain how contact lenses affected dry eyes. This study used a quantity method for its survey investigation. DTA collecting methods use a nominal scale questionnaire. Using a straightforward linear regression test, the study sample consisted of 49 respondents who are students at the University Pembangunan Panca Budi Medan Faculties Agama Islam Dan Humaniora. It was determined from the results that there is no significant correlation between the dependent variable, namely dry eye symptoms, and the independent variable, the length of time using soft contact lenses. The R square values indicate that there is only a 19.8% correlation between the symptoms of dry eyes and long-term contact lens usage.

Keywords: Contact Lens, Dry Eye, Health Problems

INTRODUCTION

Contact lenses are also known as a popular innovation and are widely used as corrective, cosmetic or therapeutic lenses and are usually installed on the cornea of the eye. Contact lenses usually have the same corrective purpose as glasses, but the difference is that contact lenses are lighter and almost invisible (Renzi et al., 2020). The number of contact lens wearers worldwide has reached 125 million people. (Musgrave & Fang, 2019). In the United States, it is estimated that there are 40.9 million contact lens users (Cope et al., 2015). Indonesia itself does not yet have an official count of contact lens wearers, however data from Riskesdas 2013 (Basic Research Health in Indonesia) shows that the prevalence of glasses/contact lens wearers reached 2.9% for the 15-24 year age group and 2.8% for the 25-34 year age group.

Contact lenses have a lengthy and complicated history, Leonardo Da Vinci was the first to explain the many types of contact lenses and to describe a contact lens in 1508. Subsequently, Rene Descartes proposed corneal lenses in 1636, further advancing the development of contact lenses (Shaker et al., 2023). Then, in 1801 Thomas Young employed the Deocrates principles to improve his vision by employing a quarter-inch-long glass tube that was filled with water and had a tiny lens at the outside (Shaker et al., 2023). Then, in 1827, English astronomer Sir John Herschel proposed printing the eye to guarantee proper fitting and a technique for rubbing contact lenses in accordance with the cornea’s form and the discovery of anesthesia in 1884 made this feasible at last (Buttman, 2022). Sir John Herschel was the first to articulate the idea of cosmetic contact lenses (Brashear & Patterson, 2021). Based on new technologies that can make contact lenses safer, more comfortable, and less expensive, contact lens development is still happening (Fleiszig et al., 2020).

A frequent multifactorial illness of the tears and the surface of the eye, dry eye disease, also known as keratoconjunctivitis sicca, can severely impair visual function and quality (Aragona et al., 2021). Reduced tear production, increased tear evaporation, or unstable tears can all contribute to dry eye syndrome (Kojima et al., 2020), one of the primary reasons patients see an ophthalmologist is for this reason. According to estimates, this illness primarily affects women in the United States and affects 5–35% of the population. Currently contact lenses are a lifestyle and
cosmetic product, despite the popularity of contact lenses, contact lens wearers still experience problems, especially eye health problems, one of which is dry eyes (Rykowska et al., 2021). Dry eyes caused by contact lenses are a growing health problem in society (Tsubota et al., 2020), before the investigation was carried out, it was estimated that the frequency of dry eyes due to contact lens wear was around 50% and one of the reasons is discomfort and ultimately results in visual disturbances where the vision becomes blurry (Kaur et al., 2022). This symptom of discomfort is the main reason for contact lens intolerance where ultimately there is a reduction in wearing time and ends in cessation of use (Arroyo-del-arroyo et al., 2021). Numerous prior research has linked extended daily contact lens wear to dry eyes caused by the lenses (Koh, 2020). In Croatia, there’s a study that revealed a somewhat unfavorable connection and a modest link with the length of daily usage. Additionally, some researchers discovered a negative association between daily usage duration, on the other hand, there’s research revealed no connection between the symptoms of dry eyes and prolonged contact lens usage (Almutairi et al., 2021; Chalmers et al., 2012).

A study in California conducted with 395 people consisting of 180 Asians and 215 non-Asian people, and they were asked to stop wearing their contact lenses for 24 hours and were asked to report to the Berkeley Clinical Research Center (Efron et al., 2021). They carry out a Fluoroscein Corneal Staining examination and are asked to fill out a Dry Eye Flow Chart which is useful for determining the level of eye dryness (Tsubota et al., 2020). The results show that the annual use of contact lenses in Asians does not cause dry eyes and even reduces the incidence of dry eyes in non-Asian people. They suggest that the duration of comfortable daily contact lens wear may increase over time in successful silicone hydrogel lens wearers. They also suggest that this may occur due to decentering of the cornea which causes a lack of perception of dryness (Pucker & Tichenor, 2020). Based on the description above, the author is interested in taking the research title "Relationship between long-term use of soft contact lenses and dry eye symptoms in students at the Panca Budi Development University, Medan, Faculty of Islamic Religion and Humanities."

METHODS

This study employed a quantitative research design, where is quantitative research is a methodology that use numerical data processing to analyze and carry out research investigations, particularly about the subject matter of the study. According to Sugiyono (2018), quantitative research methods are "research methods based on the philosophy of positivism, used to research certain populations or samples, data collection using research instruments, quantitative/statistical data analysis with the aim of testing predetermined hypotheses". The research was conducted at the Panca Budi Development University, Medan, specifically within the Faculty of Islamic Religion and Humanities. Researchers utilized approximately one month from the issuance of the research permit for data collection, processing, presentation in scientific papers, and the guidance process.

As a data source with specific features for a study, a population is the full topic of the investigation, which includes people, things, animals, plants, symptoms, values, and events. The population in the study were students at the Panca Budi Development University, Faculty of Islamic Religion and Humanities, Medan, Indonesia. The sample taken in this research was 49 people based on the inclusion categories contained in the purposive sampling technique. Primary data is data that has been prepared by researchers using tools in the form of questionnaires. Secondary data is data obtained from other parties, bodies or agencies that routinely collect data. Secondary data in this research is data that comes from references, information or from literature that has conducted the same research.

Sampling technique involves the process of ascertaining a sample size that aligns with the actual data source, considering the population's characteristics and distribution to produce a representative sample. Purposive sampling, which is a sample strategy based on specific considerations made by the study itself, based on previously known traits or features of the population, is what Notoatmodjo (2012) claims to have occurred. Deviant sample characteristics can disrupt the process of data collection. Before data collection is carried out, it is necessary to
determine the inclusion and exclusion criteria first so that the sample characteristics do not deviate. Every person of the population who may be used as a sample must meet the inclusion criteria, which are requirements or qualities (Notoadtmojo, 2012).

The following are the study’s inclusion criteria: Student at the Panca Budi Development University, Medan, Faculty of Islamic Religion and Humanities. Wear Soft Contact Lenses for at least one year and 5 days a week. Willing to be respondent exclusion criteria are criteria or characteristics of population members who cannot be taken as samples (Notoadtmojo, 2012). The exclusion criteria in this study are: The sample is experiencing infection of the eyelids and cornea.

Validity is showing a measure of a levels of validity or validity of instrument. The method used is to compare the correlation or calculated r values of the research variables with the table r values. Validity and reliability testing in this research used SPSS software. Before data collection is carried out, the questions in the questionnaire are tested first to determine their validity and reliability. As a minimal criterion for validity testing, thirty respondents underwent validation testing. The measuring approach makes use of SPSS to determine the validity of each question item under specific conditions, specifically: 1) An instrument is deemed acceptable if the R count ≥ r table with 95% significance. 2) The instrument is deemed faulty if R count ≤ r table with a significance level of 95% (Sugiyono, 2017). 3) The calculated r value for this test can be known through the results of data processing via SPSS version 16. Meanwhile, the value of r table for n=30 and an error level (α) of 5% is 0.361 (db=n-2) (Shofa, 2017).

Regression using a single independent variable (X) and a single dependent variable (Y) is known as simple linear regression. Testing the impact of variable X on variable Y is the goal of this straightforward regression study. The independent variable is the one that influences, while the dependent variable is the one that is influenced. The model for simple linear regression equation looks like this: The dependent variable is Y=a+bX. Y is a Dependent variable; X is an independent variable.

Information: a= constant number, b= linear regression direction coefficient (Hertanto, 2016:6).

Hypothesis testing is to determine if a proposed theory is accepted or rejected. An assertion or statement about a population that may or may not be true is called a hypothesis. A hypothesis can determine the truth or falsity of a study by looking at the complete population. There is an assumption or null hypothesis statement in hypothesis testing. The hypothesis that has to be tested is known as the null hypothesis, or H0. If H0 is rejected, it is assumed that the other hypothesis, represented by H1, is true. A substantial test of the suggested hypothesis is conducted if the Coefficient of Determination (r2) has been established. The Chi Square exam, F-Test, Z-Test, or T-Test can all be used for this exam. It is possible to determine if the independent/predictor/independent variable (X) significantly affects the dependent/response/dependent variable (Y) using this significance test. According to Yuliara

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(2016), a variable is considered important if its impact on the population as a whole is applicable. Definition of operations

**Table 1. Operational Definition**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Measuring Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Use Contact Lens</td>
<td>Contact lenses are an assistive device vision placed on the surface of the cornea. The duration of contact lens wear is related to frequency use of LK</td>
<td>Questioner</td>
</tr>
<tr>
<td>Dry Eye</td>
<td>Reduced tear production, increased tear evaporation, or unstable tears are the three main causes of dry eye syndrome. (Chandrasekhara Reddy, Sagili, 2016)</td>
<td>Questioner</td>
</tr>
</tbody>
</table>

**RESULTS & DISCUSSION**

Analyzing Respondent Features Descriptively

The following figure, which displays the analysis of respondent answer data, provides a description of the questionnaire that respondents completed in order to identify their characteristics:

**Figure 1. Respondent age distribution**

![Respondent age distribution](image)

In the figure above, with a total number of respondents of 49 people, it was found that the largest number of respondents were 23 people aged 20 years (46.9%), the other numbers were 1 person aged 21 years (36.7%), and 22 years old. as many as 8 people (16.3%).

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Based on the preceding figure, which shows a total of 49 respondents, it was determined that, at 42 (85.7%), female respondents made up the majority of the respondents; male respondents made up the remaining 7 (14.3%).

**Figure 3. Respondent distribution of faculty**

Based on figure above, with a total number of respondents of 49 people, it was found that the largest number of respondents were Islamic religious faculty students with a total of 49 people (100%).

**Figure 4. Distribution of Majority**

Based on the figure above, which shows a total of 49 respondents, it was determined that the
The department of Early Childhood Islamic Education received the most responses (18 people, or 36.7%), followed by the department of Religious Studies (17 people, or 34.7%), and philosophy majors (14 people, or 28.6%).

**Figure 5. Types of contact lenses**

![Types of Contact Lenses](image1.png)

Based on the table above, with a total number of respondents of 49 people, it was found that the largest number of respondents used monthly contact lenses, amounting to 40 people (81.6%), the other number was 9 people using weekly contact lenses (18.4%).

**Figure 6. Contact Lens Colors Types**

![Contact Lens Colors Types](image2.png)

The department of Early Childhood Islamic Education received the most responses (18 people, or 36.7%), followed by the department of Religious Studies (17 people, or 34.7%), and philosophy majors (14 people, or 28.6%), according to the figure above, which displays a total of 49 respondents.
Based on the figure above, with a total number of respondents of 49 people, it was found that the largest number of respondents used X2 brand contact lenses, totaling 23 people (46.9%), the other number was 13 people (26.5%) using ICE brand contact lenses (%), freshkon brand as many as 7 people (14.3%), brand Olens as many as 6 people (12.2%).

**Figure 7. Contact lens brand**

According to the aforementioned data, out of the 49 respondents, the greatest percentage (27, or 55.1%) utilized eye drops, while the remaining 22 respondents (or 44.9%) did not.

**Figure 8. Eye drops**
Based on the table above, with a total number of respondents of 49 people, it was found that the largest number of respondents used O2 brand eye drops, totaling 11 people (22.4%), the other number used X2Comfort brand eye drops, 9 people (18.4 %), 4 people from the Freshkon brand (8.2%), 3 people from the ICE brand (6.1%) and 22 people from the ICE brand (44.9%).

**DISCUSSION**

**Validity Test**

To establish if a questionnaire is legitimate or not, apply the validity test. Validity is the degree of accuracy with which the data reported by the researcher and the data that really occurs on the research object coincide, ensuring that the data supplied is consistent with the data reported by the researcher and the data that occurs on the research object. If an instrument can reliably provide data from the variables under study, it is considered legitimate. The instrument is considered legitimate if and only if $r_{count} > r_{table}$.

The following table displays the data validity test results:

**Table 2. Variable X Validity**

<table>
<thead>
<tr>
<th>No</th>
<th>RCount</th>
<th>Rtable</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.424</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>0.316</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>0.362</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>4</td>
<td>0.416</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>5</td>
<td>0.513</td>
<td>0.281</td>
<td>Valid</td>
</tr>
</tbody>
</table>

**Table 3 Variable Y Validity Test**

<table>
<thead>
<tr>
<th>No</th>
<th>RCount</th>
<th>Rtable</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.375</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>0.312</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>0.368</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>4</td>
<td>0.430</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>5</td>
<td>0.711</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>6</td>
<td>0.350</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>7</td>
<td>0.479</td>
<td>0.281</td>
<td>Valid</td>
</tr>
<tr>
<td>8</td>
<td>0.515</td>
<td>0.281</td>
<td>Valid</td>
</tr>
</tbody>
</table>

The data in the table above, with a total number of respondents of 49 people, found that of the 13 questionnaires distributed to respondents, they passed the validity test where $r_{count} \geq r_{table}$ with a calculation for 49 respondents of 0.2816 with a significance of 5% or 0.5.
Reliability Test

Reliability testing was carried out to see whether the measuring instrument used (questionnaire) showed consistency in measuring the same symptoms (Sugiyono, 2007: 110). A questionnaire is said to be reliable if the respondent's answers to questions are consistent or stable over time. SPSS provides facilities for measuring reliability with the Cronbach's Salpha statistical test. The guideline for a measuring instrument that is said to be reliable is if Cronbach's alpha is > 0.6. The results of the reliability test can be seen in the following table:

**Table 4. Reliability Test Results (Variable X), Reliability Statistics**

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.682</td>
<td>9</td>
</tr>
</tbody>
</table>

(Source: primary data processed by SPSS)

**Table 5. Reliability Test Results (Variable Y), Reliability Statistics**

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.664</td>
<td>9</td>
</tr>
</tbody>
</table>

(Source: primary data processed by SPSS)

Based on the results of the table above, it shows that each independent and dependent variable is declared reliable >0.6 with a relationship between length of use of soft contact lenses (X) of 0.682, and dry eye symptoms (Y) of 0.664. So, it can be concluded that all instruments in this research are reliable.

Normality Test

The purpose of the normality test is to determine whether or not the regression model's distribution is normal. When evaluating the significance of regression coefficients, the assumption of normalcy is a crucial prerequisite. Regression models with a normal or nearly normal distribution are considered to be of high quality.

**Table 6. Normality test One-Sample Kolmogorov-Smirnov Test**

<table>
<thead>
<tr>
<th>N</th>
<th>Unstandardized Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Parameters</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>.0000000</td>
</tr>
<tr>
<td>Std.</td>
<td>1.74048211</td>
</tr>
<tr>
<td>Deviation</td>
<td></td>
</tr>
<tr>
<td>Most Extreme</td>
<td>Absolute</td>
</tr>
<tr>
<td>Differences</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
</tr>
<tr>
<td>Test Statistic</td>
<td></td>
</tr>
<tr>
<td>Asymp. Sig.(2-tailed)</td>
<td></td>
</tr>
</tbody>
</table>

- a. Test distribution is Normal.
- b. Calculated from data.
- c. Lilliefors Significance Correction.
- d. This is a lower bound of the true significance.

(Source: primary data processed by SPSS)

Judging from the data above, it shows a normal distribution pattern, with a total of 49 respondents, it was found that the data passed the normality test with a value (significance)> 0.05, namely 0.200

Simple Linear Regression Analysis

It is necessary to examine the collected data in order to meet the study objectives. This study employed a basic linear regression analysis model. We did a basic linear regression analysis to find the magnitude of the connection between the dependent variable (dry eye symptoms) and the
independent variable (length of contact lens usage, X).

**Table 7. Linear Regression Test Model Summary**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.174a</td>
<td>.198</td>
<td>-.0.56</td>
<td>1.759</td>
</tr>
</tbody>
</table>

Predictors: (Constant), discount

It describes the magnitude of the correlation/relationship value (R), which is 0.174, based on the table above. An analysis of this data revealed a coefficient of determination (R Square) of 0.198, indicating a 19.8% correlation between the dependent variable (dry eye symptoms) and the independent variable (length of soft contact lens use).

**Table 8. Linear Regression Test Coefficients**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Constant)</td>
<td>10.153</td>
<td>.228</td>
</tr>
<tr>
<td>TOTALX</td>
<td>.228</td>
<td></td>
</tr>
</tbody>
</table>

(Source: primary data processed by SPSS)

Dependent Variable: symptoms of dry eyes

As the constant value (a) in the preceding table is known to be 10.153 and the relationship value (b/regression coefficient) for the length of contact lens usage is known to be 0.228, the regression equation may be structured as follows:

\[ Y = a + bX \]

Where:
- \( Y \) = Duration of contact lens wear
- \( X \) = Symptoms of dry eyes
- \( a \) = Constant number
- \( b \) = Linear regression direction coefficient

Table 4.16 provides the regression equation model. \( Y \) is equal to 10.153 + 0.228X.

Translation of the equation regresster calls:
1. Since the constant is 10.153, variable \( Y \) has a consistent value of 10.153.
2. There is a positive regression coefficient.
3. Hypothesis Testing

**Table 9. Hypothesis testing Coefficients**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Constant)</td>
<td>10.153</td>
<td>.228</td>
</tr>
<tr>
<td>TOTALX</td>
<td>.228</td>
<td></td>
</tr>
</tbody>
</table>

(Sources: primary data processed by SPSS)

Based on the t value: it is known that the calculated t value is 4.856> ttable 2.012, so it can be concluded that the relationship variable for the duration of contact lens wear (X) is related to the variable dry eye symptoms (Y).

How to search ttable:
\[ ttable = \left( \frac{t}{\sqrt{2}} ; n-k-1 \right) \]
\[ = (0.05/2; 49-2-1) \]
\[ = (0.025; 46) \] [Look at the distribution of ttable values]
\[ =2.012 \]
CONCLUSION

Based on the results of the research and discussion in the previous chapter regarding the relationship between long use of soft contact lenses and dry eye symptoms in students at the Panca Budi Development University, Medan, Faculty of Islamic Religion and Humanities, the following conclusions can be drawn: More women wear contact lenses than men. In this study, 20- and 21-year-olds were the respondents who wore contact lenses the most. The respondents of this research were students from the Islamic Religion and Humanities faculties with the largest number of respondents being 18 students majoring in Sufism. The types and colors of lenses most commonly used were monthly contact lenses by 40 people and color contact lenses by 44 people. The most widely used contact lens brand is the X2 brand by 23 people. Most of the respondents used eye drops when wearing contact lenses. The brand of eye drops that most respondents used when wearing contact lenses was the O2 brand with 11 users.

A total of 34 respondents wore contact lenses for a year or more, 37 people wore contact lenses 5 days a week, the largest number of respondents, namely 18 people, wore contact lenses for 5 to 7 hours a day, and 16 people wore contact lenses for 2 to 4 hours and 8 to 12 hours. as many as 15 people. The results of the questionnaire on variable Y, namely dry eye symptoms, found that as many as 27 people experienced dry eyes. In the research, the hypothesis taken was H1 where it was found that there was a relationship between the length of use of soft contact lenses and dry eye symptoms of 19.8%. This was based on answers from student respondents from the Faculty of Islamic Religion and Humanities, Panca Budi Development University, Medan, which could be seen from the aspect namely the length of use and respondents who experience dry eyes.

From the results of this study, regarding the relationship between long use of soft contact lenses and symptoms of dry eyes, it is hoped that respondents, especially contact lens users, will be able to recognize the symptoms of dry eyes when wearing contact lenses. For contact lens providers (optics), or Optician Refractionist health workers from the results of this research, contact lens providers (optics) and optical refractionists also gain insight into the relationship between long-term use of soft contact lenses and dry eye symptoms. So, we can educate contact lens users about the relationship between long-term use of soft contact lenses and dry eye symptoms. It is recommended to future researchers that if the data collection process uses a questionnaire, it is advisable to ask the question "how long have you been using contact lenses" to the respondent. Then, with this research, it is hoped that it can become a reference for conducting further, more complex research.

REFERENCES


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