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A clinical comparison of three hydrophilic contact lenses on dry eye patients

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Thesis

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A CLINICAL COMPARISON OF THREE
HYDROPHILIC CONTACT LENSES
ON DRY EYE PATIENTS

By
JENNIFER HARNISH
SHELBY WICKHORST

A thesis submitted to the faculty of the
College of Optometry
Forest Grove, Oregon
for the degree of
Doctor of Optometry
May, 1999

Advisor:
Patrick Caroline
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Signatures

Patrick Caroline (Adviser)
Jennifer Harnish
Shelby Wickhorst
Biography Page

Jennifer Harnish


Attended Pacific University College of Optometry. Received WICHE from Washington. Awarded the King County Optometric Society Scholarship. After graduation I plan to provide primary care optometry with an emphasis in pediatrics and vision therapy.

Shelby Wickhorst

Awarded John Knight Memorial Citizenship, Theatre endowed Scholarship and Alumni Grant to attend Pacific University. Graduated Pacific University May 1991 with a Bachelor of Art degree and majors in Business Administration, Psychology, Theatre, Visual Science, minor in Spanish, and emphasis in Management.

Attended Pacific University College of Optometry and Master of Education programs. Recipient of WICHE grant. I plan to provide primary eye care with an emphasis in contact lens and pediatrics.
Abstract

This study was designed to evaluate three hydrophilic contact lens materials for comfort, dryness and overall satisfaction on subjects with and without subjective dry eye. The lenses evaluated were Acuvue, Proclear and SaturEyes. Thirty-seven subjects wore each pair of contact lenses for one week. Lens evaluations were reported via questionnaire. The subjects without dry eye rated all three lenses about the same for comfort, dryness and overall satisfaction. Participants with dry eye symptoms rated the lenses the same for comfort and overall satisfaction but preferred SaturEyes when assessing dryness.
Key Words

Acuvue, Biocompatibles, contact lenses, disposable lenses, dry eye, etafilcon A, Hioxifilcon A, hydrophilic contact lenses, keratoconjunctivitis sicca, Metro Optics, Omafilcon A, Proclear, SaturEyes, soft contact lenses, Vistakon.
Acknowledgments

We thank Biocompatibles, Metro Optics, and Vistakon for their generous donation of contact lenses for this study. We would also like to thank Allergan for donating Ultracare for the study. We also thank Patrick Caroline for all of his guidance and help during this research project.
Introduction

One of the leading concerns of contact lens patients is dry eye. Patients with dry eye experience a wide range of symptoms from foreign body sensation to burning and itching. Contact lens wearers experience dry eye symptoms more often than people who do not wear contact lenses. Caffery, Richter, Simpson, Fonn, Doughty, and Gordon (1996) evaluated 13,513 surveys and found that fifty percent of contact lens wearers reported dry eye as compared to twenty-two percent of non-contact lens wearers. Researching contact lens options for dry eye patients benefits both clinicians and patients. The ultimate goal is to find contact lenses that are more comfortable, safer and can be worn longer.

Detection of dry eye involves a number of tests that are often done during routine vision examinations. The skilled practitioner will observe the tear film and tear meniscus as well as check for fluorescein and/or rose bengal staining. It is also appropriate to measure tear break up time (TBUT). The Schirmer test or phenol red thread test may be helpful, especially when educating the patient about dry eye syndrome. Case history is very important in the detection of dry eye. McMonnies (1986) used standardized questionnaires to diagnose dry eye prior to contact lens fitting. The McMonnies questionnaire showed a 98% sensitivity and 97% specificity for the identification of dry eye patients (McMonnies, 1987).

Lens selection is vital in successful fitting of dry eye patients. There are several contact lens options specific for dry eye patients. To increase contact lens success, contact lens parameters such as thickness, water content, materials, diameter, and edge design can be manipulated. Disposability and lens care solution can also be modified.

The physiology of the dry eye patient exposes contact lenses to mucus, protein, lipids, mucopolysaccharide, and calcium build up (Caffery, Cotter, White, 1997). To prevent build up, frequent replacement lenses are an appropriate option. It is also appropriate to put dry eye patients on hydrogen peroxide-based systems to prevent reactions to chemical based solutions.

Another option that a practitioner has is increasing lens thickness to decrease the rate of dehydration. Unfortunately dry eye patients do not always prefer thicker contact lenses. Jurkus and Gurkaynak (1994) did a pilot study using ten subjects to compare two
contact lenses that differed only in the lens thickness. The two lenses used were Acuvue and Surevue. Both lens types are made of Etafilcon and have 58% water content. Acuvue has a center thickness of 0.07mm and Surevue has a center thickness of 0.105mm. The dry eye patients in this study preferred Acuvue, the thinner lens. Acuvue objectively showed the least corneal responses as well.

Concerning water content, there are two schools of thought. One group of clinicians advocates using low water content lenses so there is not as much water to evaporate from the lens. When water evaporates from the lens, it tends to absorb tears to replace the evaporated water, creating dry eye symptoms. Other practitioners use high water content lenses because even though the lenses dehydrate quickly, they rehydrate quickly as well. Finnmore (1990) suggested a medium water content lens (55%) with increased center thickness of 0.10mm to 0.12 mm.

Another option is to change contact lens materials. Hester (1997) compared the Proclear and Focus lenses. Comfort and dryness were rated the same for both lens types among dry eye subjects but not among non-dry eye patients. The non-dry eye patients preferred the Focus lens when evaluating comfort and dryness. The Focus lens is made from Vifilcon A and has a 55% water content and a 0.10 mm center thickness. Proclear is made of Omafilcon A and has a 59% water content and a center thickness of 0.07 mm.

This study evaluates Acuvue, Proclear, and SaturEyes, which have been identified by clinicians as common contact lens choices for the symptomatic dry eye patient. Acuvue is made of Etafilcon A material with a 58% water content and a center thickness of 0.07 mm. Proclear’s material is Omafilcon A with 62% water content and a center thickness of 0.065 mm. SaturEyes is Hioxifilcon A material with 55% water content and a center thickness of 0.14 mm.

Methods

All potential subjects had a complete optometric examination within one year prior to consideration for the study. Eligible subjects were free of ocular and systemic diseases that would contraindicate contact lens wear. Subjects with anisometropia greater than one diopter sphere and/or one diopter of refractive astigmatism were excluded from the study. A total of thirty-seven subjects were accepted for the study. All subjects were
empirically fit with the three types of contact lenses based on their current lens power, base curve and diameter. The contact lenses evaluated were Acuvue, Proclear and SaturEyes. Lens parameters can be found in Table 1.

Prior to wearing the contact lenses, all subjects filled out a dry eye questionnaire (Appendix A). For the first week of the study, all participants wore Acuvue lenses and used a preservative free lens care system provided by the examiners to control for preservative sensitivity. The preservative free solution used was Ultracare from Allergan. Compliance was monitored by questionnaire.

After wearing Acuvue for one week, subjects were given the first pair of unknown lenses. To decrease subject and examiner bias, the type of lens for each subject was randomly assigned and distributed. Lenses were dispensed with patient instructions and Ultracare solution. At the dispensing visits, subjective lens comfort was assessed via questionnaire (Appendix B). This was repeated on each of the one-week follow up appointments.

**Results**

Thirty-seven subjects participated in the study. Twenty-seven people reported they had dry eye (73%). The most common symptom reported was dryness, followed by burning, grittiness and scratchiness. Two of the dry eye subjects had previously been told they could not wear contact lenses because they had dry eye. Out of the thirty-three people currently wearing contact lenses, eleven reported good comfort (33.3%), thirteen reported moderate comfort (39.4%) and nine were not comfortable (27.3%).

At the end of each week, each subject rated comfort, dryness and overall satisfaction. A score of one (worst) to five (best) was used. Thirty-four questionnaires were turned in each week (91.9%). A complex chi-square was performed to evaluate significance.

The non-dry eye participants reported no significant difference between Acuvue, Proclear, and SaturEyes in comfort (p<0.75), dryness (p<0.75), or overall satisfaction (p<0.75). The dry eye subjects reported no significant difference between lenses when evaluating comfort (p<0.50) and overall satisfaction (p<0.25) but they did report a statistically significant difference when evaluating dryness (p<0.05). When evaluating
Among dry eye participants, SaturEyes had the highest mean (3.42 ± 1.04) followed by Proclear (3.19 ± 0.79) and finally Acuvue (2.72 ± 1.15). See figure 1.

**Discussion**

Patients with dry eye symptoms can often be a challenge to successfully fit with contact lenses. Practitioners can use various options to make dry eye patients more comfortable. This study attempted to find a lens that dry eye patients subjectively preferred. When assessing dryness, the dry eye group preferred SaturEyes contact lenses followed by Proclear. When assessing comfort and overall satisfaction, dry eye subjects did not report a significant difference between Acuvue, Proclear, and SaturEyes. There was no significant difference in the non-dry eye group when evaluating comfort, dryness, or overall satisfaction of the different lenses.

There are very few studies available in the literature to help determine the best contact lenses for dry eye patients. The studies that have been done do not show consistent results. Further, studies rarely compare more than two lenses and the results usually favor the company sponsoring the study. It is necessary to conduct more studies where only one lens parameter is manipulated at a time.

When an appropriate lens has been identified, further management may be required to create a successful contact lens patient. Patient education regarding the chronic nature of dry eye syndrome is imperative. Lubrications and punctal occlusion may also be required to make patients more comfortable.
References


# Contact Lens Parameters

<table>
<thead>
<tr>
<th></th>
<th>Acuvue</th>
<th>Proclear Compatibles</th>
<th>SaturEyes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company</strong></td>
<td>Vistakon</td>
<td>Biocompatibles</td>
<td>Metro Optics</td>
</tr>
<tr>
<td><strong>Lens Material</strong></td>
<td>Etafilcon A</td>
<td>Omafilcon A</td>
<td>Hioxifilcon A</td>
</tr>
<tr>
<td><strong>DK Value</strong></td>
<td>28</td>
<td>34</td>
<td>20</td>
</tr>
<tr>
<td><strong>Water Content</strong></td>
<td>58 %</td>
<td>62 %</td>
<td>55 %</td>
</tr>
<tr>
<td><strong>Center Thickness (-3.00 D)</strong></td>
<td>.07 mm</td>
<td>.065 mm</td>
<td>.14 mm</td>
</tr>
<tr>
<td><strong>Lens Diameter</strong></td>
<td>14.0 or 14.4</td>
<td>14.2 mm</td>
<td>14.2 mm</td>
</tr>
<tr>
<td><strong>Lens Base Curve(s)</strong></td>
<td>8.4mm/8.8mm/9.1mm</td>
<td>8.6 mm</td>
<td>8.1mm/8.4mm/8.7mm</td>
</tr>
<tr>
<td><strong>Lens Powers Available</strong></td>
<td>-11.00 to +8.00</td>
<td>Plano to -10.00</td>
<td>-10.00 to +10.00</td>
</tr>
<tr>
<td><strong>Replacement Schedule</strong></td>
<td>2 Weeks Daily Wear</td>
<td>1 Month</td>
<td>4 Months</td>
</tr>
</tbody>
</table>

Table 1
Contact Lens Dryness

Figure 1

Non-Dry Eye Subjects  Dry Eye Subjects

Acuvue  Proclear  SaturEyes
Dry Eye Questionnaire

1. Do you think you have dry eye?
   A. Yes
   B. No

2. Do you ever experience any of the following symptoms? (You may choose more than one.)
   A. Dryness
   B. Scratchiness
   C. Grittiness
   D. Burning
   E. Soreness
   F. None

3. How often do you have these symptoms?
   A. Never
   B. Sometimes
   C. Often
   D. Always
   E. Only when I wear contact lenses

4. Have you been diagnosed as having dry eye?
   A. Yes
   B. No

5. Have you ever been treated for dry eye syndrome?
   A. Yes
   B. No
   C. Not applicable

6. Do you suffer from arthritis?
   A. Yes
   B. No
   C. Uncertain

7. Do you suffer from lupus?
   A. Yes
   B. No
   C. Uncertain

8. Do you suffer from thyroid abnormality?
   A. Yes
   1. Hyperthyroid
   2. Hypothyroid
   B. No
   C. Uncertain

9. Do you ever experience dryness of the nose, mouth, or vagina?
   A. Never
   B. Sometimes
   C. Often
   D. Always
10. Do you regard your eyes as being unusually sensitive to cigarette smoke, smog, air conditioning, and central heating?
   A. Yes
   B. No
   C. Uncertain

11. Do you take or use any of the following medications?
   A. Antihistamine (oral or eye drops)
   B. Diuretics ("water tablets")
   C. Sleeping tablets
   D. Tranquilizers
   E. Oral contraceptives
   F. Ulcer medications
   G. High blood pressure medications
   H. Other

12. Are your eyes dry and irritated the day after drinking alcohol?
   A. Not applicable
   B. Yes
   C. No
   D. Uncertain

13. Are you known to sleep with your eyes partially open?
   A. Yes
   B. No
   C. Uncertain

14. Are your eyes irritated when you wake up?
   A. Yes
   B. No
   C. Uncertain

15. Do you have allergies that affect your eyes?
   A. Yes
   B. No
   C. Uncertain

16. Do you regularly use eye drops or ointments of any kind?
   A. Yes
   B. No

17. Do you use a computer (VDT) regularly?
   A. Yes
   1. How many hours do you use a computer in an average day?
      C. No

18. If you have dry eye symptoms, do they occur only when using the computer?
   A. Yes
   B. No
   C. Does not apply
19. Were you told that you could not wear contact lenses because of a dry eye?
   A. Yes
   B. No

20. If you are currently wearing contact lenses, how comfortable are they?
   A. Good comfort
   B. Moderate comfort
   C. Not comfortable
Adaptation Questionnaire and Dry Eye

Assessment

Name __________________
Week ________________

Please rate the contact lenses you wore this week using a scale of 1 to 5 where 1 is the worst and 5 is the best. Circle the number corresponding to your choice.

1. Estimate the average number of hours you wore the lenses per day.
   ___________ Hours

2. How many days did you wear the lenses?
   ___________ Days

3. Did you only use the Ultracare System? (Honestly?)
   Yes   No

4. How was your vision with the lenses?
   1 2 3 4 5

5. What was the overall comfort of the lenses?
   1 2 3 4 5

6. What was the sensation of dryness associated with lens wear? (No dryness is 5.)
   1 2 3 4 5

7. What was the sensation of itching associated with lens wear? (No itching is 5.)
   1 2 3 4 5

8. Please rate your overall adaptation to the lenses.
   1 2 3 4 5

9. Please rate your overall satisfaction with the lenses.
   1 2 3 4 5

10. Did you treat your dry eye symptoms while wearing the lenses?
    Yes   No   Not Applicable

11. Please list any other symptoms you are experiencing.

Appendix 2