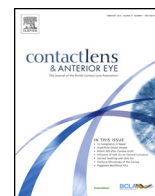




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Presbyopic and non-presbyopic contact lens opinions and vision correction preferences

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ABSTRACT

Purpose: To compare vision correction preferences, refractive error, and gender of non-presbyopes and presbyopes.

Methods: Adults who wear spectacles or contact lenses completed a survey about refractive correction opinions and refractive error was measured.

Results: Of the 304 subjects, 38.2% were presbyopic (≥ 40 years) and 59.2% were female. Spectacles were the primary vision correction for 78.0% of subjects. Compared to contact lens wearers, the proportion of presbyopes was higher ($p=0.006$) in spectacle wearers. There was no difference in the proportion of presbyopes and non-presbyopes who have tried contact lenses ($p=0.2$) or who would prefer to wear contact lenses ($p=0.2$). In contact lens wearers, there was no difference in the proportion of presbyopes and non-presbyopes with a history of temporary discontinuation ($p=0.9$). Within the contact lens wearing group, there was no refractive error difference between presbyopes and non-presbyopes (spherical equivalent $p=0.6$; power vector J0 $p=0.5$; power vector J45 $p=0.4$; anisometropia $p=0.2$). Overall, contact lens wearers were more likely to be female ($p=0.004$). There was no difference in gender in presbyopic and non-presbyopic contact lens wearers ($p=0.5$).

Conclusions: Presbyopes and non-presbyopes have similar opinions about spectacles and contact lenses. Presbyopes of all refractive errors prefer contact lens correction when good vision and comfort can be achieved. Eye care providers should not assume that presbyopia, refractive error, or gender are factors that preclude a patient from being interested in contact lens wear.

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While survey studies exist that query eye care practitioners about their prescribing habits and opinions of various lens designs [1–4], few studies ask patients what visual corrections they prefer. Presbyopes are known to be a difficult group to initiate and maintain satisfactory contact lens wear. As presbyopia progresses, visual correction at all distances becomes more complex. As well, symptoms of dryness and discomfort tend to increase with age [5]. This combination of factors likely contributes to the tendency of contact lens wearers to discontinue contact lens wear as they grow older [6,7], but preconceptions of eye care providers may influence the relatively low number of presbyopic contact lens prescriptions worldwide [3]. Morgan et al., suggested that the low utilization of presbyopic contact lens designs was likely due to a lack of fitting skills/clinical knowledge by contact lens fitters and a general preconception that visual compromises introduced by presbyopic designs are too great [3]. Despite these potential preconceptions, recent data suggests that presbyopic (multifocal or monovision)

contact lens wearers actually wear their lenses more frequently than more traditional lens modalities like spherical and toric lenses [8].

Advancements and innovations in contact lens technology have resulted in a market that boasts an impressive array of power profiles, correction types, and materials. Presbyopic contact lens options, in particular, have improved and increased in recent years [1]. Lenses that offer simultaneous optical designs allow presbyopic contact lens wearers to enjoy corrected vision at all distances, without compromising their stereovision with monovision or relying on reading glasses for near tasks [9,10]. These new designs and material innovations have likely contributed to the increase in presbyopic contact lens prescribing in recent years [1,2,11], but presbyopic contact lens modalities are still under-prescribed around the world [3,4].

How do presbyopic patients differ from their non-presbyopic counterparts in opinions of vision correction preference? When presbyopic or non-presbyopic patients do or do not succeed with contact lenses, are there differences in gender or refractive error? This survey study aimed to determine the vision correction

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preferences (spectacles versus contact lenses) of non-presbyopes and presbyopes and how refractive error and gender are related to these preferences

1. Methods

For this prospective cross-sectional study, subjects were recruited at the Center for Science and Industry (COSI) Life Labs in Columbus, OH. COSI, a science museum, is a unique setting to recruit subjects from the general population for research studies. All subjects provided written informed consent. This study followed the tenets of the Declaration of Helsinki and was approved by the Institutional Review Board of the Ohio State University.

COSI visitors that reported habitually wearing some form of refractive correction (contact lenses or spectacles) for distance, near, and/or full-time correction and met all inclusion criteria (Table 1) were asked to answer questions about their refractive error correction and demographic information on an iPad. Study data was collected and managed using Research Electronic Data Capture (REDCap) tools hosted at the Ohio State University [12]. Subjects who reported wearing spectacles as their primary vision correction were asked if they had previously tried contact lenses and, if so, why they discontinued contact lens wear. Subjects who reported contact lenses as their primary vision correction were asked if they had ever discontinued lens wear for a significant (≥ 1 month) amount of time and, if so, why they temporarily discontinued contact lens wear and why they resumed lens wear. All spectacle wearers who reported a history of contact lens wear and contact lens wearers were asked what their preferred form of vision correction would be (spectacles or contact lenses), assuming they could achieve good comfort and vision. Spectacle wearers with no history of contact lens wear were not asked this question because they had no contact lens experience on which to base their preference. After completing the survey, subjects were asked to remove their habitual vision correction and autorefractometry was performed on each eye using a Grand Seiko autorefractor while the subject viewed a distance target positioned at approximately 20 m. Autorefractometry data for both eyes were recorded in each subject's REDCap record.

Statistical analysis was performed using SPSS Version 24 (IBM). The level of significance used to make conclusions in this study was $p < 0.05$. Spherical equivalent (SE) values for each eye were calculated and averaged to produce a mean SE for each subject. A mean binocular magnitude of astigmatism was determined for each subject. Cylinder and axis components of refractive error were converted to power vectors (J0 and J45, as described by Thibos et al. [13] and Raasch et al. [14]) and a mean binocular value was produced for both vectors on all subjects. Anisometropia values were calculated using the absolute value of the difference in SE between the two eyes in each subject. Chi-square tests were

Table 1
Inclusion Criteria.

Inclusion Criteria
Age ≥ 18 years
Distance visual acuity 20/30 or better in both eyes (with habitual correction on a Bailey-Lovey logMAR chart)
Reports spectacle or contact lens wear
No history of ocular surgery
No history of the following ocular conditions:
Glaucoma
Macular degeneration
Retinal detachment
Keratoconus
Corneal disease

used to compare groups of categorical variables, and t -tests were performed when comparing means of continuous variables to categorical groups. Multivariate binary logistic regression was used to determine if gender, SE, J0, J45, or anisometropia varied between age groups (non-presbyopes and presbyopes) and vision correction groups (spectacle and contact lens wearers).

2. Results

Data from 304 subjects were collected. The mean age of the entire sample was 37.1 ± 14.4 years (range: 18–76 years), 59.2% of the sample was female ($n = 180$), and 38.2% ($n = 116$) of subjects were in the presbyopic age range (≥ 40 years). When asked to identify their primary vision correction (spectacles or contact lenses), 78.0% ($n = 237$) of the sample reported wearing spectacles for the majority of their vision correction needs. The proportion of presbyopes was higher ($p = 0.006$, $X^2 = 7.4$) in the spectacle group (42.2% presbyopic, 100/237) compared to the contact lens wearing group (23.9% presbyopic, 16/67). The proportion of presbyopes spectacle wearers (42.2%, 100/237) was higher than the proportion of presbyopic contact lens wearers (23.9%, 16/67, $X^2 = 7.4$, $p = 0.006$).

Table 2 shows a comparison of age, gender, and refractive error in non-presbyopes versus presbyopes and spectacle wearers versus contact lens wearers in the entire sample. Independent t -tests, Chi-square testing, and binary logistic regression were performed to determine if there were differences between the two age groups and vision correction groups. Table 3 compares age groups (non-presbyopes versus presbyopes) in each of the spectacle and contact lens wearing vision correction groups. Independent t -test, Chi-square testing, and binary logistic regression were performed to determine if differences occurred between the two age groups in each vision correction group. Subjects who reported wearing spectacles as their primary vision correction were asked if they had ever tried wearing contact lenses. Table 4 compares the age, gender, and refractive error of non-presbyopic and presbyopic spectacle wearers that reported trying contact lenses in the past.

Spectacle wearers were asked if they had ever tried contact lens wear and, if so, what form of vision correction they would prefer if they could achieve good vision and comfort. Contact lens wearers were asked if they had ever discontinued contact lens wear for a significant amount of time (> 1 month). The results of these three questions, compared between non-presbyopic and presbyopic subjects, are displayed in Fig. 1. The percentage of spectacle wearers that would prefer contact lens correction was significantly different than zero in the entire sample ($t = 36.5$, $p < 0.0001$), non-presbyopes ($t = 27.4$, $p < 0.0001$), and presbyopes ($t = 24.5$, $p < 0.0001$).

All spectacle wearers who reported wearing contact lenses in the past were asked to choose the primary reason for discontinuing contact lens wear. Fig. 2 shows the reasons reported by the entire sample, non-presbyopes, and presbyopes. Contact lens wearers who reported a period of lens discontinuation were asked to report the primary reason for this discontinuation (Fig. 3). This group of contact lens wearers was also asked to report the primary reason they chose to resume contact lens wear (Fig. 4).

3. Discussion

In this sample, non-presbyopic and presbyopic subjects reported similar experiences with and opinions of contact lenses. The proportion of spectacle wearing presbyopes that had tried contact lenses in the past and that would prefer to wear contact lenses, if their visual and comfort needs could be met, was not different when compared to non-presbyopes. As well, the

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