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Soft Contact Lens Parameter Changes After using the Lens2® Automated Lens Cleaner Machine

(Perubahan Parameter Kanta Sentuh Lembut Selepas Menggunakan
Mesin Pencuci Automatik Lens2®)

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ABSTRACT

Disinfection of contact lens is an important procedure strongly emphasized by eye care practitioners. There are several types of disinfecting methods. Some methods have been proven to induce parameter changes on soft lenses. These parameter changes are likely to affect the efficacy of contact lens fitting and patients comfort. A self-controlled trial was carried out on a series of disposable soft contact lenses of different material to evaluate parameter changes after cleaning with Lens2® (Automated Lens Cleaner Machine). This will be compared to the lens cleaned conventionally (digital rubbing). Fifty four pieces of soft contact lenses were divided into 2 groups; cleaned conventionally and with Lens2®. Three types of soft contact lenses of different materials were used; Soflens®38, Focus® Monthly and O₂ Optix. Each contact lens was cleaned for 30 times to mimic the period of 30 days wear. After the thorough cleaning process, the back optic zone radius (BOZR), back vertex power (BVP), central thickness(ct) and total diameter (TD) were measured. The parameters were statistically analysed to evaluate the changes. There were significant changes in the TD and BVP of Soflens®38 and O₂ Optix with both methods. The Focus® Monthly contact lens only showed significant BOZR changes with both methods. However, these parameter changes were not clinically significant because the changes were still in the tolerance range set by ISO (International Organization of Standardization). Both cleaning methods proved to maintain lens parameter within its acceptable range.

Keywords: Automated Lens Cleaner Machine; Lens2®; Soft Contact Lens

ABSTRAK

Disinfeksi kanta sentuh adalah satu prosedur yang sangat penting yang kerap kali ditekankan oleh pengamal penjagaan mata. Terdapat beberapa kaedah disinfeksi. Sesetengah kaedah telah dibuktikan boleh menyebabkan perubahan parameter kanta. Kesemua perubahan parameter akan memberi kesan terhadap pemasangan kanta sentuh dan keselesaan pemakai. Satu percubaan swakawal telah dijalankan ke atas siri kanta sentuh lembut pakaibuang pelbagai bahan untuk evaluasi perubahan parameter selepas pencucian dengan menggunakan Lens2® (Mesin Pembersih Kanta Otomatik). Ini akan dibandingkan dengan kanta yang dicuci secara konvensional (digosok secara digital). Sebanyak lima puluh empat keping kanta sentuh lembut telah dibahagikan kepada dua kumpulan; dicuci secara konvensional dan dengan Lens2®. Tiga jenis kanta sentuh berlainan bahan digunakan; Soflens®38, Focus® Monthly dan O₂ Optix. Setiap kanta sentuh dicuci selama 30 kali untuk meniru pemakaian selama 30 hari. Selepas proses pencucian yang rapi, zon optik radius belakang (BOZR), kuasa verteks belakang (BVP), ketebalan tengah(ct) dan diameter total (TD) diukur semula. Parameter yang diukur telah dianalisis secara statistik untuk menilai perubahannya. Perubahan pada diameter total dan kuasa vertek belakang bagi Soflens®38 and O₂ Optix didapati signifikan untuk kedua-dua prosedur. Kanta sentuh Focus® Monthly hanya menunjukkan perubahan signifikan pada BOZR bagi kedua-dua kaedah. Walau bagaimanapun, kesemua parameter ini tidak signifikan secara klinikalnya kerana perubahan parameter yang berlaku adalah dalam julat yang dibenarkan oleh ISO (International Organization of Standardization). Kesimpulan, kedua-dua kaedah pencucian telah membuktikan parameter kanta dapat dkekalkan dalam julat yang diterima.

Kata kunci: Kanta sentuh lembut; Lens2®; Mesin Pembersih Kanta Otomatik

INTRODUCTION

Lens2® is an automatic lens cleaner. It has been marketed since 7 years ago in Asia. Lens2® originated from the Republic of Korea (Green H.T Co., Ltd.). It operates at high speed (battery operated) to spin basket with contact lenses. Both contact lenses are stored separately in casing

filled with disinfecting solution. It has been proven to be able to remove protein on the lens (Musalib 2008). An antimicrobes formula (Biocleanact™) was added into the raw material make-up of the lens cleaner, to prevent contamination and colonization of microbes on contact lenses while storing them (Musalib 2008). It also helps to

prevent secondary contamination by hand by providing special vacuum lens holder for contact lens fitting

Lens2® has equal efficacy to the conventional cleaning method (Musalib 2008). Although there are various methods of cleaning and disinfecting, the most commonly used is mechanical rubbing using fingers known as digital rubbing or by using the automated lens cleaner machine. Rubbing the lens while cleaning could sometimes tear the lens while rough fingers could also damage the surface during the cleaning process. With the Lens2® no handling is involved during the process of cleaning, but the high speed rotation might cause some parameter changes when repeated on daily basis.

The lens cleaner machine acts differently when compared to the microwave disinfection system. Harris et al. (1989) was the first to use the microwave disinfection system. Boltz and Bhoola (1987) found that ionic contact lenses were affected and damaged by the microwave disinfection. However, the parameter of the non-ionic lenses remained the same. This was supported by Crabbe and Thompson (2001) who found that only certain types of contact lens showed small parameter changes with microwave disinfection. However, Harris et al. (1990) noted that small parameter changes were not clinically significant even after many disinfectant cycles.

The purpose of the present study was to evaluate the parameter changes of soft contact lens after cleaning it using Lens2® and digital rubbing.

MATERIAL & METHODS

CONTACT LENSES

Fifty four soft contact lenses of various power of -1.00D, -3.00D and -6.00D were used in this self-controlled trial. An equal number of lenses were divided into 3 groups: Soflens®38 (FDA Group 1), Focus® Monthly (FDA Group II) and O₂ Optix (FDA Group II). All contact lenses used the same brand of multipurpose solution (SOLOCARE Aqua®) for cleaning, rinsing and storing through out this study.

PROCEDURES

All contact lenses were labeled properly before being cleaned using the Lens2® for 3 minutes. This procedure was repeated for another 29 times (on the same day) to

mimic a full month cleaning cycle for monthly disposable lenses. The temperature of the solution was measured after the 15th time to make sure the solution temperature remained the same.

The other group of lenses was cleaned using the conventional digital rubbing method. The procedure was standardized whereby a few drops of Solocare Aqua® were dropped on the lens surface before the lens was rubbed radially 5 times on each surface.

INSTRUMENT

The parameter measurement was done using a Chiltern Optimec Digital and a manual focimeter (Nikon OL-5A). A calibrated Chiltern Optimec Digital was used in measuring the BOZR, ct and TD of lens. The same instrument was used through out the study to make sure that the measurement is consistent. A manual focimeter was used to measure the BVP of soft contact lenses. Three readings were taken for each parameter measured.

ANALYSIS

All the data collected for this study were analysed using the SPSS version 12. Wilcoxon Test was used in analyzing the parameter changes before and after the cleaning. The Mann-Whitney Test was used to compare the parameter difference of the two methods used.

RESULTS AND DISCUSSION

Table 1 shows the mean difference of parameters measured before and after cleaning with Lens2®. Focus® Monthly contact lenses showed no change in all parameters measured before and after cleaning. However, Soflens®38 & O₂ Optix contact lenses experienced significant changes in BOZR, TD, BVP and ct, TD & BVP, respectively.

Table 2 shows the mean difference of parameters measured before cleaning and after conventional rubbing. Conventional rubbing appears to change most parameters measured except ct for Soflens®38; and BOZR and ct for O₂ Optix. With Focus® Monthly, only BOZR changes significantly before and after conventional rubbing.

The comparisons of the two cleaning regimes are shown in Table 3. The two cleaning methods does not change significantly the parameters of the lenses used in this study.

TABLE 1. Mean difference of parameter values before and after cleaning with Lens2®

Parameter (N=18)	BOZR	ct	TD	BVP
Soflens®38	$P = 0.04$	$P > 0.05$	$P = 0.02$	$P = 0.034$
Value difference	0.52		0.05	0.13
Focus® Monthly	$P > 0.05$	$P > 0.05$	$P > 0.05$	$P > 0.05$
Value difference				
O ₂ Optix	> 0.05	$P = 0.028$	$P = 0.02$	$P = 0.011$
Value difference		0.009	0.06	0.26

TABLE 2. Mean difference of parameter values before and after conventional rubbing

Parameter (N=18)	BOZR	ct	TD	BVP
Soflens®38	$P < 0.05$	$P > 0.05$	$P < 0.05$	$P = 0.034$
Value difference	0.2		0.05	0.16
Focus® Monthly	$P > 0.05$	$P > 0.05$	$P > 0.05$	$P > 0.05$
Value difference	0.1			
O ₂ Optix	> 0.05	$P > 0.05$	$P < 0.05$	$P = 0.017$
Value difference			0.06	0.18

TABLE 3. Significant values of two cleaning methods

Parameter (N=18)	BOZR (P)	ct (P)	TD (P)	BVP (P)
Soflens®38 -1.00D	0.7	0.4	0.7	0.7
Soflens®38 -3.00D	1.0	0.2	0.7	1.0
Soflens®38 -6.00D	0.2	1.0	0.7	0.7
Focus® Monthly -1.00D	0.7	0.4	1.0	0.2
Focus® Monthly -3.00D	0.7	0.2	1.0	1.0
Focus® Monthly -6.00D	0.1	0.7	1.0	1.0
O ₂ Optix -1.00D	0.1	0.2	0.4	0.7
O ₂ Optix -3.00D	0.2	1.0	0.7	1.0
O ₂ Optix -6.00D	1.0	1.0	1.0	1.0

This study showed that when cleaning was done with Lens2®, some parameters changed significantly for the Focus® Monthly and O₂ Optix. Similarly when using cleaning with conventional rubbing, some parameters changes significantly for all 3 lenses. However, the change in the parameters although statistically significant, was clinically insignificant as the changes were within the tolerance range set by ISO. Table 4 shows the ISO tolerance range.

CONCLUSION

In conclusion, the Lens2® and the conventional cleaning had a similar effect on lens parameters. Lens2® might be a useful alternative for cleaning lenses. Although there were some significant changes of the parameters, it may be considered as not clinically significant as the values shown were in the range of tolerance following the international organization for standardization (ISO).

Therefore the Lens2® could be used to supplement non-compliant patients who simply refuse to rub lenses for disinfection purpose. Since the cleaning does not contribute to any parameter change, using the Lens2® or rubbing lens procedures does not attribute to discomfort due to altered

TABLE 4. Measured versus labeled parameters of daily disposable contact lenses (Long et al. 1997)

Parameter	ISO Tolerance
Centre Thickness	$\leq 0.1; \pm 0.01 + 10\%$ $> 0.1; \pm 0.015 + 5\%$
Diameter	± 0.20
BOZR	± 0.20
BVP from 0 to ± 10.00	± 0.25

parameters. In addition it can help reduce the risk of lens tear, scratch and chip during cleaning process. It can also be ideal for children and youngster who wears contact lenses and are unable to clean lens conventionally independently. For people on the fast pace, Lens2® can also be the best choice to effectively clean and care their contact lenses.

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