

Evaluation of microsplatatter produced during mechanical in-office lid hygiene treatments

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Introduction

In office treatments to improve eyelid hygiene and overall eye health have continued to grow over recent years. It was reported that blepharitis was found in 37% of patients in the ophthalmologist’s clinical practice in the United States.¹ One class of in-office therapies involves mechanical cleaning of the eyelid margins. BlephEx uses a rotational absorbent sponge soaked in a liquid foam solution to perform “microblepharon exfoliation” to the lid margins.² NuLids Pro uses an oscillating non-absorbent silicone Soft Tip with a gel to perform “mechanical eyelid stimulation and hygiene”.³ These devices are used to aid in removal of eyelid biofilm, bacteria and other debris from the eyelid margins and lashes.

Definitions

Microblephroexfoliation: in-office lid hygiene technique that exfoliates the eyelid margins
Biofilm: aggregate of bacteria held together by a mucus matrix that adheres to a surface
Collarettes: Demodex matter that accumulates at the base of eyelashes.

Purpose

The purpose of this study is to evaluate the extent of microsplatatter induced by the two commercially available devices (NuLids Pro and BlephEx) used for mechanical, in office lid hygiene.

Method

Each device is used as described by the manufacturer. An artificial lid margin (foam rubber) is placed in the center of a field of white paper (Figure 1). The respective cleaning solution for each device is dyed blue with a small amount of food coloring. Each device is used as would normally be done on the lid margin for 30 seconds. Any splatter is easily displayed on the white paper (Figure 2). Each process is repeated 3 times for each device. A measurement is made of the extent of the splatter both in total length as well as number of droplets dispersed. These numbers are averaged for the 3 treatments. (Table 1 & Table 2).



Figure 1 Equipment used for this demonstration.

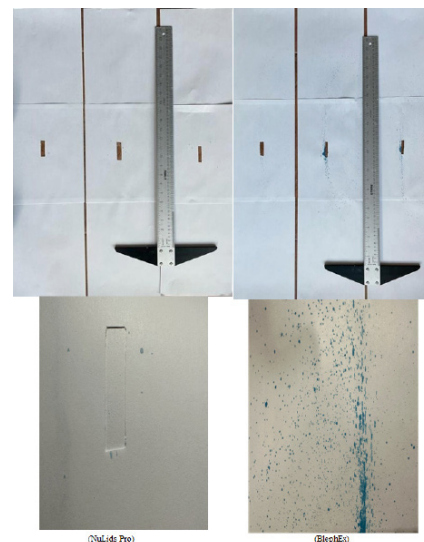


Figure 2 Example of microsplatatter produced by each device.

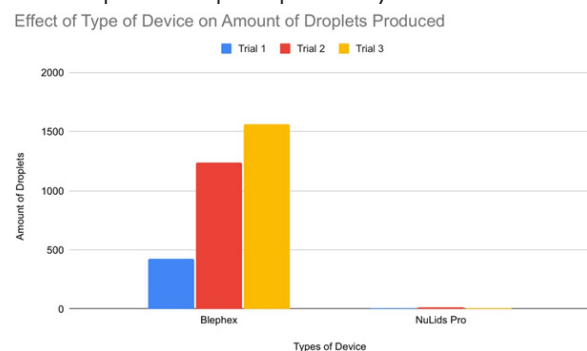


Table 1 Effect of type of device on number of droplets produced

	Trial 1	Trial 2	Trial 3	Average
Blephex	422	1241	1566	1076
NuLids Pro	3	13	10	9

p < 0.05

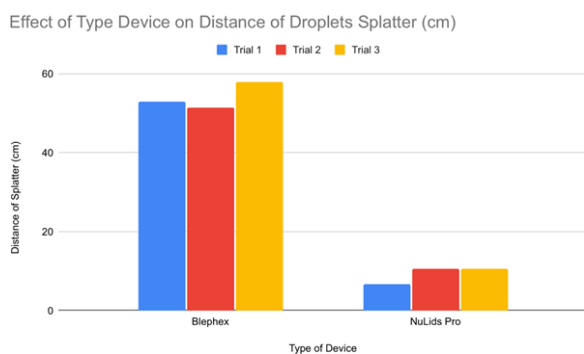


Table 2 Effect of type of device on distance of splatter (cm)

	Trial 1	Trial 2	Trial 3	Average
Blephex	53	51.5	58	52.4
NuLids Pro	6.7	10.6	10.5	9.3

$p < 0.05$

Results

The NuLids Pro device showed an average length of splatter of 9.27 cm (6.7-10.6), approximately 3.6 inches. Whereas the BlephEx device had an average splatter length of 52.4 cm (53-58), approximately 20.6 inches. In looking at the number of droplets dispersed, the NuLids Pro device spread an average of 9 droplets (3-10) in the 30 second treatment. Whereas the BlephEx device splattered an average of 1076 droplets (422-1566) during the 30 second treatment.

Discussion

Both devices displayed some degree of microsplatler in this simulation. The results revealed a statistically significant wider spread for the BlephEx device than the NuLids Pro (52.4 cm vs 9.27cm or 20.6 inches vs 3.6 inches). In addition, there was a statistically significant higher number of droplets spread with the BlephEx device versus NuLids Pro (1076 vs 9), an approximately 100-fold difference. The rotational spin of the BlephEx device causes the drops to be flung in a centrifugal manner which carries them up and outward into the surrounding area to land at a great distance from the device. In addition, the saturated BlephEx sponge material allows for the excess fluids to be dispersed widely. Lastly, the liquid nature of the BlephEx cleaning solution allows for easier spread. The NuLids Pro device uses an oscillating head which does not produce the same centrifugal forces that would spray liquids up and outward. Also, the NuLids head design is a flatten non-spongelike disc with small massaging micro fingers that act to trap the cleaning product and lid debris and thus keep these from being thrown up and outward. Lastly the gel used during the NuLids Pro treatment is more viscous thus decreasing splatter.

It is uncertain whether the degree of microsplatler impacts their level of eyelid hygiene as both of these devices have been shown to be effective in treating Meibomian Gland Disease (MGD) and blepharitis.^{2,3} The most common bacteria in chronic blepharitis include *Staphylococci*, *Corynebacterium*, and *Propionibacterium* species.⁴ Between 54% and 65% of patients have collarettes, the pathognomonic sign of Demodex blepharitis.⁵ As these devices are used to loosen lid margin debris including biofilms, bacteria and Demodex matter, the splatter of this debris can be of concern particularly to the fellow eye as well as the practitioner performing the treatment. Producing less splatter contributes to a more hygienic environment around the patient's face and the surrounding area during the treatment.

Conclusion

Meibomian Gland Disease (MGD) and blepharitis are the leading causes of Dry Eye Disease.⁶ In office lid hygiene therapies have become a popular and effective treatment for MGD and blepharitis. Consideration is warranted of the spread of contaminated droplets during the procedure which could seed the fellow eye or be spread about the face of the patient or the person performing the treatment. The NuLids Pro device, based on its design, displayed statistically significant less microsplatler during the procedure and, thus, induces less risk of contamination.

Acknowledgments

None.

Conflicts of interest

The author is a founder and board member of NuLids LLC but receives no financial support.

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