

KHOL: What Impact on the Ocular Surface?

J. Ait Elhaj^{1*}, S. Bousseta¹, K. Elhamraoui¹, A. Mchachi¹, L. Benhmiddoune¹, R. Rachid¹, M. Elbelhadji¹

¹Adult Ophthalmology Department, Hospital August 20, CHU IBN ROCHD of Casablanca, Faculty of Medicine and Pharmacy of Casablanca, HASSAN II University, N°51, HAY Ifriquia Rue Echahid Eloualid Essaghir, Casablanca 20000, Morocco

DOI: [10.36347/sasjm.2023.v09i01.003](https://doi.org/10.36347/sasjm.2023.v09i01.003)

| Received: 16.11.2022 | Accepted: 28.12.2022 | Published: 10.01.2023

*Corresponding author: J. Ait Elhaj

Adult Ophthalmology Department, Hospital August 20, CHU IBN ROCHD of Casablanca, Faculty of Medicine and Pharmacy of Casablanca, HASSAN II University, N°51, HAY Ifriquia Rue Echahid Eloualid Essaghir, Casablanca 20000, Morocco

Abstract

Original Research Article

KHOL is usually applied along the edges of the eyelid, causing cosmetic particles to spread over the openings of the Meibomian glands. Two hundred women whose age varies between 18 and 25 years old were included in this cross-sectional descriptive study. Half use KHOL regularly and the other half rarely or never use it. The severity of ocular surface symptoms was investigated by the OSDI score and ocular surface evaluation by Schirmer's test, fluorescein eye stain test and with a non-invasive break-up time (NIBUT). A moderate to severe dry syndrome was found in patients who used KHOL. The use of Khol causes disturbances in tear homeostasis and causes dry eye symptoms.

Keywords: Khol, eye cosmetics, dry eye, OSDI, ocular surface.

Copyright © 2023 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

According to the Ocular Surface and Tear Film Society TFOS DEWS II, dry eye is a multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiological roles. The KHOL; considered to be an ancestral remedy for eye diseases as well as a cosmetic product used for centuries for the eyes is one of the factors aggravating or inducing an alteration in the homeostasis of the tear film. The aim of this work is to assess the incidence and severity of sicca syndrome in women who use KHOL regularly and in those who never use it.

MATERIALS AND METHODS

This is a cross-sectional descriptive study conducted in our department from June 2022 to November 2022. We included young women whose age varies between 18 and 25 years. Our study took the form of interviews. The information was collected after questioning the patients. All patients underwent an ophthalmologic examination with measurement of best corrected visual acuity, ocular tonus, biomicroscopic examination, eye fundus and ocular surface evaluation by Schirmer's test, fluorescein eye stain test and with a non-invasive break-up time (NIBUT). The severity of

ocular surface symptoms was investigated by the OSDI score. Patients with an history of connectivitis, diabetes, glaucoma and patients with severe ocular symptoms (OSDIW score > 32) or severe sicca syndrome (or Meibomian gland dysfunction > stage III) were excluded.

RESULTS

Two hundred women were included in the study. Half use KHOL regularly and the other half rarely or never use it. According to the OSDI score, we found in the first category, a severe sicca syndrome in 73% of women and a mild to moderate sicca syndrome in 27%, and in the second category, a moderate sicca syndrome in 11%, mild in 21% and absence of sicca syndrome in 68% of women. Regarding the Schirmer test, we did not note a significant difference between women in the first category and the second category. On the other hand, we noted an instability of the tear film in 46% of women regularly using kohl with a NIBUT < 5s.

DISCUSSION

KHOL is an Arabic word for a fine powder with a texture and appearance similar to mascara. It is used in the Middle East and the Far East and in the populations of East Africa) as a symbol of beauty and femininity (eye cosmetics). It is also given medicinal properties. Its main component is lead sulfide, and in some preparations it contains herbs and crystals. KHOL

is usually applied along the edges of the eyelid, causing cosmetic particles to spread over the openings of the Meibomian glands. In this study, the NIBUT measurements carried out on subjects applying the KHOL showed a significantly lower value compared to the group who did not use the cosmetic. The contamination of the tear film and blockage of the Meibomian gland openings due to the diffusion of cosmetic materials on the edge of the eyelid would have affected the stability of the tear film. Previous studies show that eye cosmetics cause symptoms of dry eye.

In contrast, the amount of tear measured using the Schirmer's test showed no difference between the groups. Heavy metals like lead and cadmium are potentially toxic at different cellular levels. The main component of KHOL is Galena (lead sulfide) but it can also contain herbs and crystals, some the black core of batteries. One hundred KHOL samples, collected from different regions of Morocco, regarding lead and cadmium contents, their analysis showed that they do not comply with the international standards in force. The toxic effects of cadmium on the cornea have been studied on rats, it may be responsible for corneal edema and stromal opacities this effect is due to mitochondrial degeneration causing dysfunction of corneal endothelial cells following the action of cadmium on zinc which can inhibit the function of the enzyme carbonic anhydrase. Similarly, KHOL application brushes can damage the cornea in the event of accidental contact: corneal cavities have been described which are responsible for sometimes significant drops in vision which have justified keratoplasties.

CONCLUSION

A stable tear film is very important to maintain a stable surface for the comfort of the eye. The use of cosmetic products for the eyes in general and in particular KHOL causes disturbances of the tear film homeostasis and causes symptoms of dry eye.

REFERENCES

- Brison, S., & Kssowski, A. (2006). Le khôl, un cosmétique responsable d'intoxications au plomb, Institut national de santé publique du Québec.
- Parry, C., & Eaton, J. (1991). Khôl: A lead hazardous makeup from the Third World to the first World. *Environmental Health Perspectives*, 94, 121-123.
- Food and Drugs Administration (FDA). (2003). *Kohl, Kajal, al Kahl, or Surma : By any name, a source of Lead poisoning*. Tiré de FDA www.cfsan.fda.gov/~dms/cos-kohl.html(le lien est externe).
- Mojdehi, G., & Gurtner, J. (1996). Childhood Lead poisoning through Khôl. *American Journal of Public Health*, 86, 587-588.
- Canfield, R. L., Henderson Jr, C. R., Cory-Slechta, D. A., Cox, C., Jusko, T. A., & Lanphear, B. P. (2003). Intellectual impairment in children with blood lead concentrations below 10 µg per deciliter. *New England journal of medicine*, 348(16), 1517-1526.
- US Department of Health and Human services. *Healthy People 2010*. 2nd ed. Washington DC: US Dept of Health and Human Services, 2000. www.healthypeople.gov/Document/HTML/Volume1/08Environmental.htm#_Toc490564710(le lien est externe)
- Sanborn, D., Abelsohn, A., Campbell, M., & Weir, E. (2002). Identifying adverse environmental effects: 3 Lead exposure. *CMAJ*, 166(10), 1287-1292.
- Iowa Department of Public Health. (2005). *Sources of Lead other than lead based paint*. www.idph.state.ia.us/eh/common/pdf/lead/lead_source.pdf(le lien est externe).
- Sprinkle, R. V. (1995). Leaded eye cosmetics: a cultural cause of elevated lead level in children. *J Fam Pract*, 40(4), 358-362.
- Hardy, A. D., Sutherland, H. H., & Vaishnav, R., (2002). A study of the composition of some eye cosmetics (khols) used in the United Arab Emirates. *Journal of Ethnopharmacology*, 80, 137-145.
- ATSDR. (2000). Case studies in environmental medicine. *Lead toxicity. Environmental Alert*. www.atsdr.cdc.gov/HEC/CSEM/lead/(le lien est externe)