

〈一般論文〉

市販まつ毛美容液におけるプロスタグランジン F_{2α}類縁物質の 含有実態調査

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Survey of Prostaglandin F₂-alpha Analogues in Eyelash Serum

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Abstract

Cosmetic products promoting eyelash growth have been marketed in European countries and the United States. These products contain prostaglandin F₂-alpha (PGF_{2α}) analogues, which enhance eyelash growth. Previous studies have identified the presence of not only the PGF_{2α} analogues listed on the product labels but also other related compounds not mentioned. In this study, we developed an analytical method using high performance liquid chromatography (HPLC) to investigate the presence of PGF_{2α} analogues in commercially available eyelash serums in Japan. The target substances measured were bimatoprost, isopropyl cloprostenate, and ethyl tafluprostamide. Several HPLC methods were evaluated based on column separation and mobile phase conditions. The limit of quantification for the target substances ranged from 0.0001–0.0003% under the analytical conditions, corresponding to 1/100–1/300 of the concentration found in ophthalmic and cutaneous solutions containing bimatoprost. This level of sensitivity was sufficient for the measurements. Method validation through additive recovery tests yielded satisfactory results, with recovery/precision ranges of 101–103%, repeatability (RSD_r%) ranging from 0.21–1.8%, and intermediate precision (RSD_R%) ranging from 1.1–1.4%. The HPLC analysis showed that bimatoprost was not detectable in any of the eyelash serum samples. Ethyl tafluprostamide was detected in two samples labeled with this compound. Isopropyl cloprostenate was observed in two products, although it was below the limit of quantitation in one and detected above the lower limit of quantitation in the other. These concentrations were similar to or slightly lower than those previously reported. In contrast, isopropyl cloprostenate was only detected in one unlabeled sample. High performance liquid chromatography-tandem mass spectrometry (LC/MS/MS) analysis using the same and another lot of this product also detected isopropyl cloprostenate, indicating a labeling omission of this compound in these products.

Key words: bimatoprost, isopropyl cloprostenate, ethyl tafluprostamide, eyelash serum, HPLC, LC/MS/MS.