TOPICAL NIACINAMIDE FORMULATIONS REDUCE THE APPEARANCE OF FACIAL SKIN REDNESS WHILE FORMULATIONS OF OTHER NICOTINATES INDUCE SKIN FLUSHING

D L Bissett, L R Robinson, M H Flarida, and E Jewell-Motz
P&G Beauty, Cincinnati, Ohio, USA

INTRODUCTION

Niacinamide (vitamin B3) is a member of the nicotinate family of compounds. There are reports of an acute skin flushing (reddening) response induced by several nicotinate compounds when applied topically (1-5). This prostaglandin-mediated flush response can be accompanied by a sensation of warmth but also other side effects (e.g., sting, burn, itch). Thus, for aesthetically preferred skin care products, flushing and the associated effects are typically not desirable.

OBJECTIVE

To determine if topical application of formulations containing niacinamide vs. other nicotinates induce skin flushing.

METHODS

In acute testing, 2 µl/cm^2 simple vehicle solutions of 1% nicotinate compounds vs. vehicle control were applied to the inner forearm (n = 4 male and female subjects). Skin was then graded for flushing (redness) on a 0-3 scale for up to the subsequent 12 hours.

In chronic testing, an oil-in-water emulsion formulation of 5% niacinamide vs. emulsion control was applied to the face (n = 50 female subjects) twice daily for 12 weeks using blind-coded products in a split-face design (left-right randominzed). Color images were captured after 0, 4, 8, and 12 weeks of treatment, and image analysis (blind-coded images) for red blotchiness was done by expert graders (n = 3) using a 4-point scale.

RESULTS

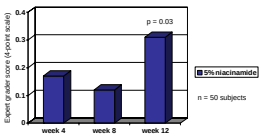
Acute testing: In forearm testing, topical niacinamide did not induce a skin flushing response. In contrast, a wide range of other nicotinates did induce an often intense flushing response, with onset times as early as 2 minutes post application and duration as long as 12 hours (see table below).

Flushing response by nicotinate compounds

Test compound (1% in simple vehicle)	Approximate flush onset (minutes)	Peak redness score (0-3 scale)	Approximate flush duration (hours)
Niacinamide	-	0	-
Nicotinic acid	30	2	10
Nicotinyl alcohol	30	2	7
Methyl nicotinate	2	2	7
Ethyl nicotinate	2	2.5	4
Propyl nicotinate	2	2.5	2
Isopropyl nicotinate	5	3	2
Butyl nicotinate	2	2.5	6
Hexyl nicotinate	2	3	12
Benzyl nicotinate	5	3	12
Phenyl nicotinate	5	2	12

Chronic testing: In facial skin testing, topical niacinamide did not induce a flushing response, as was observed in forearm testing. In fact, niacinamide reduced existing facial skin red blotchiness in 12-week clinical studies (6,7). Results from such testing are shown in the figures below.

Niacinamide reduces appearance of facial red blotchiness



Niacinamide reduces red blotchiness

CONCLUSIONS

- In contrast to many nicotinate compounds (including nicotinic acid), topical niacinamide does not induce a skin flushing response.
- Niacinamide-containing formulations decrease facial skin red blotchiness, likely due to barrier-enhancing effects (6).
- For niacinamide formulations it is important to use only high purity material (no contaminating nicotinic acid) and to maintain pH at approximately 5-7 to avoid hydrolysis of niacinamide to nicotinic acid.

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