

# Comparative Evaluation of Men's Depilatory Composition Versus Razor in Black Men

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*Shaving with razors often is problematic for men with sensitive skin, especially black individuals who are generally prone to developing pseudo-folliculitis barbae (PFB). For patients with PFB, physicians often recommend shaving with depilatory creams that chemically remove hair from the skin surface by dissolving keratin. This 1-week, controlled, single-center, split-faced, randomized trial compared shaving with 3 different depilatory compositions to shaving with a manual razor in black men. One depilatory composition was withdrawn during the study because of the high incidence of adverse events. The depilatory compositions produced fewer papules and more irritation immediately after use and to a greater extent than the manual razor; the irritation was transient and more often subjective than objective. In this preliminary study, the result of using depilatory compositions was that the skin looked and felt smoother compared to shaving with a razor. Depilatory products are recommended for patients who develop PFB or are unsatisfied with the results of shaving with a manual razor.*

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Shaving with razors often is problematic for sensitive skin, especially skin of black individuals. This method of shaving often leads to erythema and irritation. Moreover, black men are prone to pseudo-folliculitis barbae (PFB), a common and distressing disorder in which the growing hair shaft curves back into the skin, producing a foreign body inflammatory reaction.<sup>1</sup> Physicians often recommend growing a beard, which is not an option for some patients,<sup>2,3</sup> or using a depilatory cream. Depilatory creams chemically remove hair from the skin surface. The active ingredients of depilatory creams dissolve the keratin of hair by lysing the disulfide bonds in the hair, which results in a softer hair tip and decreases extrafollicular and transfollicular penetration of the hair.

A PubMed search of English-language articles indexed for MEDLINE using the Medical Subject Heading (MeSH) search terms *shaving* or *barbering* with *depilatory cream*, *depilatory creams*, and *depilatory* yielded no published trials with human participants about depilatory cream and shaving the beard area. The common problems associated with shaving with a razor coupled with the lack of published data underscores the need for a randomized controlled clinical trial that compares depilatory creams to shaving with a razor. The purpose of this study was to compare shaving with 3 depilatory compositions to shaving with a manual razor.

## Methods

**Study Design**—A total of 101 black men aged 18 to 66 years were recruited for this single-center study. Three compositions were used in the study. The following active ingredients comprised each composition: composition 1 (powder), calcium hydroxide

and barium sulfide; composition 2 (powder), calcium hydroxide, guanidine carbonate, and calcium thioglycolate; composition 3 (cream), calcium hydroxide, lithium hydroxide, and thioglycolic acid. Compositions 1 and 2 were powders that the participants mixed with water to form a paste; composition 3 was a cream. Participants were required to have a history of depilatory use and pass a sensitivity test. The sensitivity test entailed applying the paste or cream to a quarter-sized area of the beard area. After waiting 7 to 9 minutes, the participants rinsed the product off without scraping. Clinicians assessed the area for signs of irritation immediately after the test and 24 hours later. Individuals without signs of irritation were allowed to enroll in the study. Women, children, and those unable to provide consent were excluded from the study.

After passing a sensitivity test, the participants shaved with their preferred routine at home on a Saturday, and then made a total of 3 visits to the clinic on Monday, Wednesday, and Friday. At each visit, the participants shaved one side with the randomly assigned depilatory composition and the other side with the manual razor. All participants used triple-blade manual razors with new blades provided for each shave as well as a shaving gel for the razor side. For the depilatory side, all participants used a spatula (wooden tongue blade) to remove hair and cream, and then rinsed with water to remove any residual cream. Before the participants shaved, the physician photographed both sides of the face and used a 4-point scale to assess objective and subjective signs of irritation, tactile roughness, visual roughness, and unevenness of skin tone. After the participants shaved, the physician repeated the photography and assessment. The participants did not shave on Sunday, Tuesday, or Thursday. After shaving at home on Saturday, the participants were not allowed to shave at home until after the completion of the study.

**Statistics**—For all attributes, a Wilcoxon signed rank test was used for comparisons between 2 products at each time point. For each product, a Wilcoxon signed rank test also was used for over-time comparisons (ie, visit 1 vs baseline and visit 2 vs baseline). The statistical significance level was set at  $P \leq .05$ .

## Results

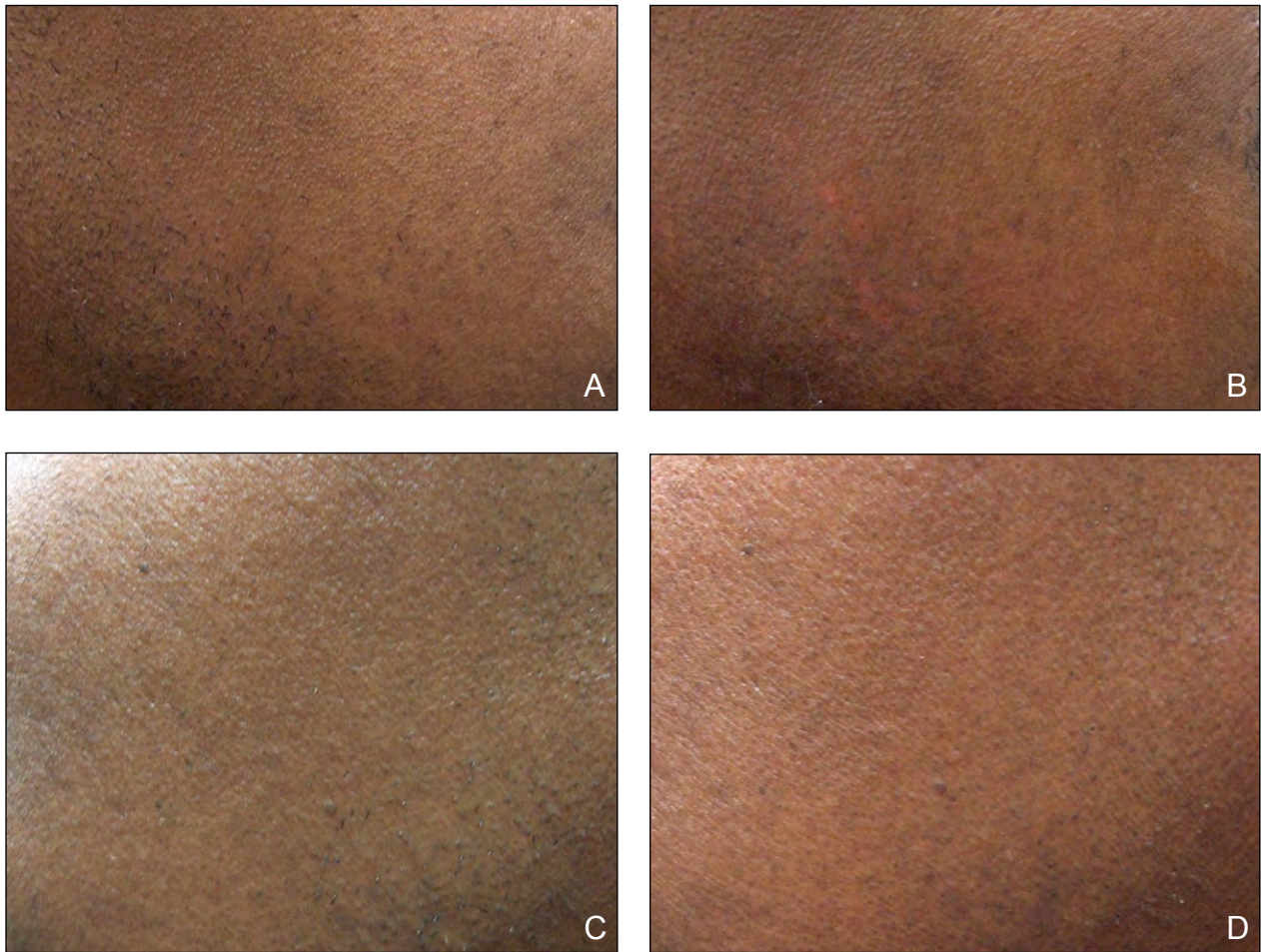
**Study Participants**—Of the 101 participants recruited, 73 enrolled in the study. A total of 45 participants completed this preliminary study. Of the 10 participants who used composition 1, 2 completed the study, 5 had an adverse effect, and 3 were lost to follow-up or dropped out of the study. These 10 participants and the use of composition 1 were withdrawn from the study

because of the frequency of adverse events. Of the 35 participants who used composition 2, 21 completed the study, 11 had an adverse effect, and 3 were lost to follow-up or dropped out. Of the 28 participants who used composition 3, 24 completed the study, 2 had an adverse effect, and 2 were lost to follow-up or dropped out.

**Assessments**—For each composition, 3 comparisons were made: razor compared to depilatory composition, razor before compared to razor after, and depilatory composition before compared to depilatory composition after. As previously stated, composition 1 was withdrawn from the study.

For composition 2, the following assessments were made. Compared to the razor, the depilatory composition generated more subjective irritation on visit 1 ( $P = .025$ ), visit 2 ( $P = .008$ ), and visit 3 ( $P = .002$ ), and more objective irritation on visit 3 ( $P = .001$ ). To a greater extent than shaving with the razor, use of the depilatory composition improved tactile roughness ( $P = .001$ ), visual roughness ( $P = .004$ ), and unevenness ( $P = .008$ ) on visit 3. Compared to baseline, the depilatory composition worsened subjective irritation on visit 1 ( $P = .046$ ), visit 2 ( $P = .014$ ), and visit 3 ( $P = .008$ ), and objective irritation on visit 3 ( $P = .002$ ). On the depilatory side, shaving improved tactile roughness on visit 1 ( $P < .0001$ ), visit 2 ( $P < .0001$ ), and visit 3 ( $P < .0001$ ), and visual roughness on visit 1 ( $P = .011$ ) and visit 3 ( $P = .008$ ) compared to baseline. On the razor side, shaving with the razor improved tactile roughness on visit 1 ( $P < .0001$ ) and visit 2 ( $P = .001$ ).

For composition 3, the following assessments were made. Compared to the razor, the depilatory composition generated more subjective irritation on visit 1 ( $P = .025$ ) and visit 2 ( $P = .025$ ), and more objective irritation on visit 3 ( $P = .001$ ). To a greater extent than shaving with the razor, use of the depilatory composition improved tactile roughness ( $P = .002$ ), visual roughness ( $P = .004$ ), and unevenness ( $P = .011$ ) on visit 1; tactile roughness ( $P = .033$ ) and visual roughness ( $P < .0001$ ) on visit 2; and tactile roughness ( $P < .0001$ ), visual roughness ( $P < .0001$ ), and unevenness ( $P = .001$ ) on visit 3. On the depilatory side of the face, objective and subjective irritation worsened after using the depilatory composition on visit 1 ( $P = .020$  and  $P = .046$ , respectively), visit 2 ( $P = .020$  and  $P = .025$ , respectively), and visit 3 ( $P = .001$  and  $P = .009$ , respectively) compared to baseline. On the depilatory side, shaving improved tactile roughness ( $P < .0001$ ) and visual roughness ( $P < .0001$ ) on visit 1, tactile roughness ( $P < .0001$ ) and visual roughness ( $P = .002$ ) on visit 2, and tactile roughness ( $P < .0001$ ) on visit 3. On the razor side, tactile roughness improved on visit 1 ( $P < .0001$ ) and



**Figure 1.** A study participant before shaving with composition 3 (A), after shaving with composition 3 (B), before shaving with razor (C), and after shaving with razor (D).

visit 2 ( $P < .0001$ ) while visual roughness worsened ( $P = .034$ ) on visit 3. Figure 1 is representative of the results for participants who used composition 3.

**Adverse Effects**—Of the 10 participants who used composition 1, 2 completed the study, 5 developed moderate irritant contact dermatitis (ICD), and 3 did not return for subsequent visits. As a result, this composition was withdrawn from the study. One of 3 participants followed up and reported a history consistent with ICD, but all signs resolved at that time without treatment. Of the 5 participants with ICD from the composition 1 group, 3 developed ICD on visit 1 and 2 on visit 2. Of the 35 participants who used composition 2, 8 developed ICD: 4 on visit 1, 3 on visit 2, and 1 on visit 3. Two additional participants withdrew from the study because of concerns of developing ICD after witnessing it in fellow participants. Two participants using composition 2 aggressively removed the product with the spatula (tongue blade), creating

erosions that led to their withdrawal from the study. Both stated that because the depilatory composition did not produce a sufficiently close shave on the first visit, they attempted to generate better results with a more aggressive technique with the spatula on the second visit. For composition 3, 1 of 28 participants developed an ICD on visit 1. For the razor, 3 participants developed moderate PFB at the completion of the study (Figure 2).

### Comment

The importance of alternative methods to shaving with a razor is based on the intrinsic properties of curly hair. Most black individuals have curly to tightly curled hair determined by intrinsic follicular properties. The asymmetric accumulation of the acidic keratin hHa8 on the concave side of the hair follicle determines the degree of curliness, regardless of ethnic origin.<sup>4</sup>





**Figure 2.** Pseudofolliculitis barbae in a study participant before shaving with razor on visit 1 (A), after shaving with razor on visit 1 (B), and after shaving with razor on visit 3 (C).

Many black individuals are prone to developing PFB in which the hair tip penetrates the skin either extrafollicularly or transfollicularly.<sup>1,5,6</sup> Shaving with a razor sharpens the tip and promotes reentry into the skin. Once in the skin, the hair tip produces a foreign body reaction.<sup>1,5,6</sup> A definitive treatment of PFB is to grow a beard,<sup>1</sup> which reduces the generation of ingrown hairs from shaving but also loosens ingrown hairs from the papules. For some, growing a beard is not a viable option, creating the need for alternatives to shaving with a razor.<sup>2,3</sup>

In this study, 3 depilatory compositions were compared to shaving with a razor. The results show that both tactile and visual roughness improved with the depilatory composition and to a greater extent than shaving with a razor. Composition 2 produced a closer and smoother shave and improved evenness of skin tone by the third shave to a greater extent than shaving with a razor. Composition 3 produced a closer and smoother shave and improved evenness of skin tone better than the razor after each shave. Compositions 2 and 3 produced more irritation but fewer

papules compared to shaving with a razor. Objective irritation (erythema and dryness) increased by visit 3. Composition 2 was more irritating than composition 3. Subjective irritation (burning, stinging, itching, tingling) decreased after 2 uses with composition 2.

Of note, composition 2 was a powder that the participants mixed with water and composition 3 was a cream that did not require the added step. Although the participants were given the exact same instructions in mixing the powder, it is highly likely that variations in the consistency of paste led to the participants essentially using different concentrations. That is, perhaps those participants who used a higher dose were more likely to develop ICD than those who used a lower dose. Furthermore, composition 1, which was removed from the study because of the frequency of ICD cases, also was a powder. The other reason may simply be the differences in active ingredients.

The adverse effects of the depilatory compositions were all ICD. Interestingly, many of the participants believed that a burning sensation indicating a contact dermatitis was necessary for a close shave, regardless of the recommended contact time of depilatory cream. In addition to close monitoring, timers were used to ensure the participants did not go beyond the recommended time.

Another adverse effect that was unexpected in such a short duration was the development of PFB. It generally is believed that the development of an ingrown hair requires enough time for the shaved hair tip to grow, exit the skin surface, curl, and then re-enter the skin. Figure 2 demonstrated 1 of 3 cases of PFB in this study. Initially, papules were barely perceptible before the participant shaved with a razor. Immediately after shaving, the preexisting papules became more prominent. By the third shave with a razor and 4 days after the first shave, new papules and ingrown hairs were clearly apparent, which was not expected to occur within a week. A similar study with a longer duration is warranted.

The final and surprising adverse effect was not a result of the depilatory composition or the razor but instead the technique. One of the limitations of using a depilatory composition was that the results were user dependent. Two participants were withdrawn from the study as a result of an over-aggressive technique. On the first visit, these participants were not satisfied with the results from the depilatory side, especially because the razor side produced a closer shave, leaving an asymmetrical shaving result. Moreover, while enrolled in the study, the participants were not allowed to shave at home. At the second visit, the participants removed the depilatory composition with a much more aggressive technique, excoriating the skin in the process. Immediately after

shaving, marked erythema was noted and the participants were withdrawn from the study. However, in darker pigmented skin, the erythema may be masked. On the follow-up visit 2 days later, the excoriations were more prominent. Both cases were treated with a mild topical corticosteroid and healed without permanent sequelae.

One limitation of this study is the 1-week duration. We expect more participants would develop cases of PFB on the razor-treated side with a longer duration of use. A study of a longer duration is necessary before determining if PFB would occur with use of the depilatory product. Secondly, the use of the depilatory product is user dependent and all of the participants were required to have a history of use of depilatory products. We expect the incidence of ICD to be higher in new users. Another limitation is that every participant had to adhere to the same schedule and shave every other day, even though their routine shaving schedule ranged from once a week to daily. A final limitation of the study is that composition 1 was withdrawn from the study.

Based on our observations during this study, we have suggestions for depilatory use and reducing the chance of developing ICD. First, the participants must be educated that contrary to popular belief, development of ICD is not necessary for a close shave. If the participants sense a mild stinging sensation, continue the application of the depilatory; however, if the participant senses burning, rinse the depilatory off immediately. The participant also must be warned that leaving the depilatory composition on the skin for an extra 2 minutes can produce moderate contact dermatitis. Because composition 2 was more irritating than composition 3, the following technique would help: decrease the length of time the depilatory composition is on the skin to 5 minutes; continue for an additional 1 or 2 minutes if no burning sensation is present, otherwise rinse and remove the hair. Finally, to remain within the recommended time frame, it is better to rinse the depilatory composition off the skin and then remove the dissolved hair with the spatula. These suggested techniques should reduce the chance of developing ICD.

## Conclusion

The exacerbation of PFB may occur with a single episode of shaving with a razor and the generation of new ingrown papules may occur within 2 to 3 episodes of shaving with a razor; these time periods are much shorter than expected. In conclusion, depilatory products are recommended as an alternative to shaving with a razor in individuals who are prone to developing PFB or are dissatisfied with using a razor. In addition, the use of depilatory products

for PFB are cost-effective alternatives to treatments with a Q-switched Nd:YAG laser in the physician's office. More research in this area is needed, especially a similar study in participants with a history of PFB.

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