A comparative investigation of the protective effects of natural oils vs. silicones on African and Caucasian hair types

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Introduction

Hair is constantly exposed to physical stress due to washing and combing, as well as heat styling, to achieve desired appearance set by trends and personal preferences. As a consequence of these activities, hair develops undesirable sensory attributes. On the cellular level, the cuticle becomes damaged and gradually completely degrades, leaving cortex cells exposed and weakened mechanically [1]. As a result, protecting the hair with cosmetic treatments is quite important for maintaining a healthy appearance.

The aim of this study was to determine the protective effects of two natural oils compared to two silicones on virgin Caucasian and African hair. For this, consumer behaviours in regarding to grooming habits had to be explored and materials with protective effects had to be determined. Protocols for testing were developed and performed and results were statistically analysed.

Materials and Methods

Table 1: Active treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Supplier</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON</td>
<td>Clarion, Switzerland</td>
<td>ASO</td>
</tr>
<tr>
<td>ASO</td>
<td>Berao, Brazil</td>
<td>BSO</td>
</tr>
<tr>
<td>BAD</td>
<td>Eroni, Germany</td>
<td>SQ22</td>
</tr>
</tbody>
</table>

Tensile properties

Tensile properties of the fibre reflect the integrity of the protein structures in the cortical cell. Within 10% extension such properties are determined by the disulphide bonds. The results infer that repetitive heat and wash, combined with UV radiation cause breakage of disulfide bonds to hair that has not been subjected to prior oxidative treatments.

Caucasian hair (Figure 1)

BAD was most effective at preserving the tensile properties of Caucasian hair. Caucasian hair close to that of untreated hair. According to Kamath and Teixeira [2], silicone has a substantive effect and is able withstand up to six washes without losing its ability to exerting a protective effect. All other treatments showed a tensile stress reduction after grooming on part with that of the control. African hair (Figure 2)

The natural oils preserved the tensile properties of African hair in line with previously published data [3], whilst the silicones did not.

Combability

There was an expected increase in combability of control as hair was not protected. The results (Figure 3) show that Caucasian hair treated with natural oil ASO had a 6% reduction in combing force before and after. The oil was thought to form a film on the hair, allowing fibres to be held together through surface tension forces, reducing inter-fibre and comb-fibre friction [4].

However, oil BSO did not seem to have this effect and increased combability by 210%. This was assumed to be due to excessive shampooing which removes 20-90% free-lipids from the hair surface. Silicone BADD increased combing force by 228% compared to control which was surprising as previous studies have shown that the material has protective properties [5].

Table 2: AE values for Caucasian and African hair after treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Caucasian hair</th>
<th>African hair</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON</td>
<td>0.98</td>
<td>5.65</td>
</tr>
<tr>
<td>ASO</td>
<td>0.40</td>
<td>4.40</td>
</tr>
<tr>
<td>BSO</td>
<td>0.39</td>
<td>5.05</td>
</tr>
<tr>
<td>BAD</td>
<td>2.68</td>
<td>5.14</td>
</tr>
<tr>
<td>SQ22</td>
<td>1.45</td>
<td>4.10</td>
</tr>
</tbody>
</table>

Conclusion

A difference in hair morphology between ethnicities means that grooming effects hair in different ways. Based on the results, it can be concluded that Caucasian and African hair responded differently to various treatments but in general, there was an indication that silicones perform better on Caucasian hair, while natural oils had a stronger effect on African hair. It was also noticed that certain materials were more effective at protecting particular attributes of the hair.

A combination of treatments may be required for optimised protection against all types of grooming damage, which could be beneficial for chemists and new product development teams. However, it cannot be the case that studies concluded that specific treatments should be targeted towards damaged hair of different ethnicities.

The results were found to be quite varied, indicating that a more reproducible and repeatable process of treating and inflicting grooming damage is required. Similar studies in the field exist for the same reasons, so perhaps a higher amount of grooming cycles is required, as one month worth of grooming damage may not have been significant enough for noticeable benefits that the actives could offer. In addition, actives are usually added to vehicle formulations, thus the direct application may not have been an ideal way of assessing protective benefits, so perhaps, a more sophisticated method representing consumer behaviour is required.

References: