COMPARISON OF THE FRONTAL ESTHETIC PREFERENCES IN THE LOWER FACIAL PORTION OF KOREANS AND CAUCASIANS

Aim: To compare the differences in frontal esthetics in the lower face among Caucasian models, Korean models, and Korean nonmodels.

Methods: The sample consisted of three groups comprising 36 Caucasian models, 30 Korean models, and 26 Korean nonmodels. Their frontal photos were scanned, and 12 distances, five angles, lip perimeter, and lip area were measured. Differences among groups were compared using one-way analysis of variance (ANOVA) and Tukey’s test.

Results: There was no significant difference in the upper lip height among the three groups. The Korean models had shorter lower lip to chin height than the two other groups. Full lip width was wider in the Korean and Caucasian models than in the Korean nonmodels. The Caucasian models had greater total vermilion area compared to both Korean groups. Finally, the Korean models had fuller lower and thinner upper vermilion areas than the nonmodels.

Conclusions: Attractive lower facial portions in Caucasians are different from those of Koreans. Therefore, clinicians in Korea should use these data as guidelines for evaluating and enhancing patients’ frontal facial esthetics.


The dimensions of the lower face can be significantly improved by surgical and orthodontic treatment.1–3 The lips are a key esthetic feature of the lower face. Scott et al showed that attractive lip proportions positively influence the perceptions of negative occlusal traits.4 Although patients are more concerned with their frontal view, it has not been investigated as much as profile views.2,5–7 Fuller lips were considered more beautiful than thinner ones, as Bisson and Grobbelaar2 found in Caucasian fashion models who had also greater lip heights and angles compared with nonmodel controls.2 Norms and preferences of facial characteristics differ among populations, and as such, individuals from different populations may require different diagnoses and treatments3,8–11.

An earlier study in Korean females provided lip and frontal lower facial measurements but made no suggestions about esthetic standards.7 Hwang et al reported that the soft tissue profiles of Koreans with well-balanced faces had more prominent lips but less prominent chins than Caucasians.10 Little research exists to demonstrate whether preferences in frontal view esthetics are similar among Koreans and Caucasians.

Therefore, the purpose of this study was to compare the differences in frontal esthetics in the lower face between Caucasian and Korean fashion models for ethnic preferences. Also, differences between Korean fashion models and nonmodels should be evaluated.
MATERIALS AND METHODS

The sample consisted of 36 Caucasian models, 30 Korean models, and 26 Korean nonmodels. This study followed the method of Bisson and Grobbelaar\(^2\) in terms of sampling the model photo images and recording the measurements.

Photographs of randomly selected Korean and Caucasian models were obtained with the permission from current popular fashion and lifestyle magazines. The photographs were carefully selected to include only ones with strict anteroposterior orientation and negligible head tilt or rotation. The photographs of the Korean nonmodels came from nursing students at the Catholic University of Korea, Seoul (mean age, 21 years ± 6 months). Their images were taken with relaxed, nonsmil- ling lips, thus minimizing possible changes in size and shape. Any interlabial gap had to be less than 1 mm. Further inclusion criteria were no obvious facial asymmetry, no cleft lip, no trauma history, and no orthodontic treatment. The university internal review board approved the participation of all individuals.

The models’ images were digitally captured by scanning them into a desktop computer with an Astra 4000U scanner (UMAX, Dallas, Texas, USA). The nonmodel students were digitally photographed with a Finepix S2Pro (Fujifilm, Tokyo, Japan).

Adobe Photoshop 6.0 (Adobe Systems, San Jose, California, USA) was used to measure 12 distances and five angles in each of the images. Lip area and perimeter were measured using AutoCAD 2005 (Autodesk, San Rafael, California, USA). All measurements taken are depicted in Fig 1 (distances), Fig 2 (angles), and Fig 3 (area and perimeter). To correct for inevitable variations of image size, all distance and perimeter measurements were expressed as ratios of the intercanthal distance of each individual. This distance was given arbitrarily a nominal value of 10 (units). Subsequently, distance measurements were divided by the respective intercanthal distance and multiplied by 10.

The following linear measurements were taken (see Fig 1):

1. Full face width: width of the total face measured along a horizontal line through the right and left corners of the mouth
2. Full lip width: distance between the right and left corners of the mouth
3. Lower facial height: distance from subnasale to soft tissue menton
4. Upper lip height: distance from subnasale to the most inferior portion of the vermilion of the upper lip
5. Upper vermilion height: distance between the most inferior portion of cupid’s bow to the most inferior portion of the vermilion of the upper lip
6. Lower vermilion height: distance between the lower border of the lip to the most superior portion of the vermilion of the lower lip
7. Lower lip to chin height: distance between middle of lip commissure to soft tissue menton
8. Upper vermilion left height: distance between left cupid’s bow tip and upper lip commissure line
9. Upper vermilion right height: distance between right cupid’s bow tip and upper lip commissure line
10. Bow tip to tip: distance between left and right cupid’s bow tips of the upper lip
11. Right angle to bow tip: distance between right corner of the mouth and right cupid’s bow tip of the upper lip
12. Left angle to bow tip: distance between left corner of the mouth and left cupid’s bow tip of the upper lip

The following angular measurements were taken (see Fig 2):

1. Upper vermilion angle: angle between lip commissure line and a line connecting cupid’s bow tip and mouth corner
2. Lower vermilion angle: angle between lip commissure line and lower vermilion borderline
3. Right bow angle: angle between the vermilion border line connecting right cupid’s bow tip to right mouth corner and right cupid’s bow inner slope
4. Left bow angle: the angle between the vermilion border line connecting left cupid’s bow tip to left mouth corner and left cupid’s bow inner slope
5. Central bow angle: angle between right and left cupid’s bow slope

Total vermilion perimeter and vermilion areas were measured as depicted in Fig 3.

Measurements for all three groups were statistically analyzed using the SAS System for Windows 8.01 (SAS Institute, Cary, North Carolina, USA). One-way analysis of variance (ANOVA) was applied to compare the mean values, and the Tukey’s test for multiple comparisons among the groups.

The measurement error was assessed by analyzing the difference between the duplicate means of 10 models and 10 nonmodels using Dahlberg’s formula: \[ \sqrt{\frac{\sum d^2}{2n}} \] (d, difference; n, sample number). Errors were less than 0.12 units for linear, less than 1.5 degrees for angular, 1.36 units for perimeter, and 13.64 units² for area measurements. Thus, all measurements were found to be highly reliable.
RESULTS

The comparison between Caucasian and Korean models revealed that full face width, full lip widths, and upper as well as lower vermilion heights were greater in Caucasians as were the vermilion perimeter and the two area measurements (Table 1 and Fig 4). The ratio between the upper and lower vermilion area was approximately 73% in Caucasians compared to 66% in the Korean models. The upper lip height was greater in the Korean groups, although not significantly. However, lower lip to chin height was shorter in the Korean models. All bow angles were greater in the Korean models than in the Caucasian models (Fig 5).

Table 1 Means and standard deviations (SD) of all measurements

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Caucasian models (1) (n = 36)</th>
<th>Korean models (2) (n = 30)</th>
<th>Korean nonmodels (3) (n = 26)</th>
<th>One-way ANOVA P value</th>
<th>Post-hoc ANOVA (Tukey’s test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total vermilion perimeter</td>
<td>34.97 ± 3.10</td>
<td>32.32 ± 2.37</td>
<td>29.92 ± 2.41</td>
<td>***</td>
<td>1 vs 2, 1 vs 3, 2 vs 3</td>
</tr>
<tr>
<td>Upper vermilion area</td>
<td>287.74 ± 70.83</td>
<td>230.02 ± 54.04</td>
<td>236.91 ± 56.66</td>
<td>**</td>
<td>1 vs 2, 1 vs 3</td>
</tr>
<tr>
<td>Lower vermilion area</td>
<td>394.29 ± 89.26</td>
<td>350.84 ± 53.50</td>
<td>292.68 ± 57.39</td>
<td>***</td>
<td>1 vs 2, 1 vs 3, 2 vs 3</td>
</tr>
<tr>
<td>Total vermilion area</td>
<td>682.03 ± 141.49</td>
<td>580.86 ± 95.25</td>
<td>521.90 ± 113.32</td>
<td>***</td>
<td>1 vs 2, 1 vs 3</td>
</tr>
<tr>
<td>Full face width</td>
<td>32.95 ± 3.64</td>
<td>30.62 ± 2.37</td>
<td>32.75 ± 3.04</td>
<td>*</td>
<td>1 vs 2, 2 vs 3</td>
</tr>
<tr>
<td>Full lip width</td>
<td>15.18 ± 1.46</td>
<td>13.23 ± 1.05</td>
<td>12.44 ± 1.06</td>
<td>***</td>
<td>1 vs 2, 1 vs 3, 2 vs 3</td>
</tr>
<tr>
<td>Lower facial height</td>
<td>18.19 ± 2.31</td>
<td>16.85 ± 1.26</td>
<td>18.45 ± 1.59</td>
<td>*</td>
<td>1 vs 2, 2 vs 3</td>
</tr>
<tr>
<td>Upper lip height</td>
<td>3.93 ± 0.62</td>
<td>4.15 ± 0.52</td>
<td>4.02 ± 0.53</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Upper vermilion height</td>
<td>2.08 ± 0.53</td>
<td>1.79 ± 0.30</td>
<td>2.22 ± 0.53</td>
<td>*</td>
<td>1 vs 2, 2 vs 3</td>
</tr>
<tr>
<td>Lower vermilion height</td>
<td>3.70 ± 0.68</td>
<td>3.36 ± 0.33</td>
<td>3.09 ± 0.42</td>
<td>***</td>
<td>1 vs 2, 1 vs 3</td>
</tr>
<tr>
<td>Lower lip to chin height</td>
<td>8.69 ± 1.23</td>
<td>7.62 ± 0.96</td>
<td>9.29 ± 1.35</td>
<td>***</td>
<td>1 vs 2, 2 vs 3</td>
</tr>
<tr>
<td>Upper vermilion left height</td>
<td>2.70 ± 0.53</td>
<td>2.24 ± 0.31</td>
<td>2.56 ± 0.48</td>
<td>**</td>
<td>1 vs 2, 2 vs 3</td>
</tr>
<tr>
<td>Upper vermilion right height</td>
<td>2.72 ± 0.49</td>
<td>2.24 ± 0.32</td>
<td>2.58 ± 0.44</td>
<td>***</td>
<td>1 vs 2, 2 vs 3</td>
</tr>
<tr>
<td>Bow tip to tip</td>
<td>3.44 ± 0.54</td>
<td>3.32 ± 0.37</td>
<td>2.98 ± 0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right angle to bow tip</td>
<td>6.71 ± 0.83</td>
<td>5.45 ± 0.53</td>
<td>5.54 ± 0.58</td>
<td>***</td>
<td>1 vs 2, 1 vs 3</td>
</tr>
<tr>
<td>Left angle to bow tip</td>
<td>6.29 ± 0.73</td>
<td>5.42 ± 0.52</td>
<td>5.51 ± 0.52</td>
<td>**</td>
<td>1 vs 2, 1 vs 3</td>
</tr>
<tr>
<td>Upper vermilion angle</td>
<td>35.22 ± 8.82</td>
<td>33.61 ± 2.87</td>
<td>38.65 ± 9.17</td>
<td>*</td>
<td>2 vs 3</td>
</tr>
<tr>
<td>Lower vermilion angle</td>
<td>44.44 ± 7.61</td>
<td>54.32 ± 3.81</td>
<td>48.73 ± 8.20</td>
<td>***</td>
<td>1 vs 2, 1 vs 3, 2 vs 3</td>
</tr>
<tr>
<td>Right bow angle</td>
<td>121.89 ± 10.08</td>
<td>141.33 ± 6.97</td>
<td>138.35 ± 4.44</td>
<td>***</td>
<td>1 vs 2, 1 vs 3</td>
</tr>
<tr>
<td>Left bow angle</td>
<td>121.69 ± 11.80</td>
<td>143.19 ± 7.53</td>
<td>139.04 ± 3.79</td>
<td>***</td>
<td>1 vs 2, 1 vs 3</td>
</tr>
<tr>
<td>Central bow angle</td>
<td>123.25 ± 11.19</td>
<td>138.87 ± 11.60</td>
<td>145.70 ± 6.10</td>
<td>***</td>
<td>1 vs 2, 1 vs 3, 2 vs 3</td>
</tr>
</tbody>
</table>

n, number of individuals; NS, not significant; * P < .05; ** P < .01; *** P < .00.
When comparing Caucasian models and Korean nonmodels, both groups had the same full face width, but full lip width was greater in the Caucasian models. Upper vermilion height was greater, although not significantly, in Korean nonmodels. In contrast, lower vermilion height was greater in Caucasians models, thus the ratio of the upper to lower vermilion area amounted to 81% in Korean nonmodels. No significant differences were found for upper lip height and lower facial height. However, the lower lip to chin height was greater in the Korean models.

When comparing the Korean models with the Korean nonmodels, it became apparent that the models had a smaller full face width and a shorter lower facial height but a wider full lip width than the nonmodels. Models showed greater total vermilion perimeter and areas. They also had bigger lower but thinner upper vermilion area than the nonmodels. Even though upper lip height was not significantly different in the two groups, lower lip to chin height was larger in the nonmodels.

The ratio between full face width and full lip width was 43% in Korean models compared to 38% in the nonmodels.

DISCUSSION

Evaluations of frontal views regarding differences in esthetics of the lower face between Caucasians and Koreans have not been reported in the literature. This study was designed to clarify and distinguish between the preferences for these two ethnic groups. For example, protrusive lips are a common complaint in East Asians and patients therefore request thinner, less protruding lips.12,13

It is well-documented that lips become thinner and less well-defined as a result of aging; therefore, lips that appear full and rounded are considered youthful and beautiful.14,15 In general, a gradual increase in lip prominence among models can be observed, and lip augmentation procedures have become ever more common in esthetic plastic surgery to create full, large lips.16–18

In our study, the ages of the models were undetermined but they all seemed to be in their twenties. Therefore, nonmodels with a mean age of 21 years 6 months were chosen for comparison.

The intercanthal width was used to compare measurements among all individuals. Even if this width varies among subjects, this seemed meaningful because the enlargement of the models’ photos could not be determined. This method was also used in the study of Bisson and Grobbelaar.2 Besides this, it is important to consider not only absolute facial measurements in ethnic groups but also proportions.19–21

Some bias in the measurements of photographs occurred because the models wore lipstick, but this was true for Caucasians and Koreans and also a reflection of esthetic preference.2 In contrast, all nonmodels were asked not to wear lipstick, which should be taken into account in the respective comparisons.

The ratios of upper lip height to lower lip to chin height were significantly different: 45.2% in Caucasian models, 54.5% in Korean models, and 43.3% in Korean nonmodels. This indicates that Korean models have the shortest lower lip to chin height, which is no surprise because Korean culture looks down on pronounced chins because disliked skeletal Class IIIs are more prevalent in East Asia.

Similarly, Hwang et al compared soft tissue profiles of European-Americans and Korean subjects to find out that Koreans with well-balanced profiles had more prominent lips but less prominent chins than their Caucasian counterparts.10

In a study that compared Caucasian models and nonmodels, in frontal view, upper and lower lip height and total lip area were found to be greater in the models. However, the lower facial height was the same for both groups.2

Frontal esthetic criteria in the lower face for Koreans are not similar to those of Caucasians. The esthetic preferences shown in this paper can contribute to surgical, as well as orthodontic, treatment planning and should be considered.
CONCLUSIONS

There were significant differences among Caucasian models, Korean models, and Korean nonmodels. Caucasian esthetic criteria in frontal view of the lower face are different from that of Koreans. Therefore, it is recommended that clinicians use population-adjusted data as a guideline for evaluating and enhancing patients’ frontal facial esthetics.

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