Aesthetic facial perception and need for intervention in laterognathism in women of different ethnicities

Priscilla Bispo de Carvalho Barbosa, Pâmela Letícia Santos, João Paulo De Carli, Paulo Henrique Luiz de Freitas, Matheus Melo Pithon, Luiz Renato Paranhos*

Universidade Federal de Sergipe, Postgraduate Program in Dentistry, Rua Cláudio Batista, s/n. Bairro Sanatório, Aracaju, Sergipe, CEP: 49060-100, Brazil

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ABSTRACT

This study compared the perception of facial pleasantness and the need for intervention, as assessed by orthodontists, oral and maxillofacial (OMF) surgeons, and laypersons, in people of different ethnicities showing varying degrees of simulated laterognathism. Facial photographs were modified to simulate deviations in the lower face of women of African, Asian and Caucasian descent, ascending in two-degree steps from zero to eight degrees of deviation. Three groups of 20 individuals each (OMF surgeons, orthodontists, and laypersons) assessed the images and rated facial pleasantness on a numerical scale ranging from 0 to 10. The results showed that orthodontists and laypersons rated faces differently only after six and eight degrees of facial change. OMF surgeons rated faces statistically differently from laypersons in all degrees of deviation, and differently from orthodontists in faces with zero, two, and four degrees of deviation. Scores for Caucasian and Asian faces differed only at two degrees of deviation. On the other hand, Caucasian and African faces differed at two and four degrees of deviation, while African and Asian faces differed only at eight degrees. The results suggest that, as a group, OMF surgeons were able to detect all degrees of lower face deviation. Moreover, orthodontists and OMF surgeons seemed to agree in terms of need for facial intervention, and saw that need more often than laypersons. In addition, ethnicity also affected the perception of milder facial changes.

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1. Introduction

The search for an ideal standard of beauty has always been a matter of heated discussion in the cinema, fashion, and art industries. Scientific evidence (Kiekens et al., 2008; Jon et al., 2009; Almeida et al., 2010; Feu et al., 2012) has proved over time that perception of beauty depends on individual preference, and that it is influenced by a range of factors such as the social and cultural environment in which the individual is placed (Türkkahraman and Gökalp, 2004; Reis et al., 2006; Naini et al., 2006; Mcleod et al., 2011; Barroso et al., 2012; Hayn-Leichsenring et al., 2013; Chong et al., 2014; Ioi et al., 2014; Salmória et al., 2014). Mass media are also heavy influencers of beauty standards, changing and influencing personal choices regarding facial aesthetics and defining what a beautiful face must look like (Almeida et al., 2010; Reis et al., 2006).

While deciding whether a face is beautiful is rather subjective, beauty seems to be directly related to facial symmetry (Meyer-Marcotty et al., 2011; Silva et al., 2011; Jackson et al., 2013). Interestingly, a perfectly symmetrical face is not always considered beautiful; on the other hand, gross asymmetries affect facial attractiveness directly and negatively (Baudouin and Tiberghien, 2004; Debruine et al., 2007; Silva and Fukusima, 2010).

Dentofacial deformities affect a significant number of individuals and may produce different degrees of aesthetic and functional impairment (Dias et al., 2004; Allgayer et al., 2011; Soares et al., 2012). These may vary from mild functional deviations, which are easily corrected with orthodontic treatment, to more serious problems that require orthognathic surgery to address secondary issues such as poor mastication, temporomandibular joint dysfunction, and higher susceptibility to caries and periodontal disease (Dias et al., 2004).

Among the several catalogued dentofacial deformities, skeletal laterognathism occurs when there is permanent mandibular

* Corresponding author. Federal University of Sergipe, Department of Dentistry, Av. Governador Marcelo Déda 13, Centro, Largarto, 49400-000, Sergipe, Brazil.
E-mail address: paranhos.lrp@gmail.com (L.R. Paranhos).

deviation to one side of the facial midline. This change is directly related to the mandibular condyle, which is the main growth center of the mandible and, therefore, the anatomic location where growth abnormalities could occur and lead to mandibular asymmetries. Laterognathism is diagnosed by thorough extraoral clinical examinations that assess facial proportions and homologous structures of the face, and usually indicate where the asymmetry is located (Yamashiro et al., 1998).

Given the need that orthodontists and OMF surgeons have for gathering data to aid the assessment of facial harmony, which in turn guide the development of a treatment plan that addresses all needs and complaints of their patients, this study was intended to test the following hypotheses: (1) orthodontists and OMF surgeons are more sensitive in detecting asymmetries than laypersons; (2) orthodontists and OMF surgeons indicate the need for professional interventions more often than laypersons; (3) ethnicity affects aesthetic perception of facial asymmetries; and (4) the gender of the evaluators influences facial aesthetic perception.

2. Materials and methods

2.1. Ethical aspects

The Ethics Committee on Human Research approved this study without limitations (Certificate of Presentation for Ethical Consideration: 37580614.0.0000.5546).

2.2. Study type and characterization

This was an observational, analytical study that assessed digitally modified images of three female individuals of African, Asian, and Caucasian descent selected according to criteria adapted from Krieger et al. (1965). These criteria considered external phenotypic traits such as skin color (melanoderma, xanthoderma, and leukoderma), nose shape, and hair texture to best represent African, Asian, and Caucasian faces.

The models photographed were chosen from portfolios of modeling agencies located in Aracaju, Brazil. Besides ethnical traits, other inclusion criteria were used for the selection of the female faces — namely, age 18—29 years and presence of proper facial muscle balance expressed by passive lip sealing. Faces with any condition that could compromise facial aesthetics (expression marks, birthmarks, tattoos, piercings etc.) were excluded (Reis et al., 2006).

Standardized facial photographs in frontal norm were taken with a professional camera (Canon™ EOS 7D, Melville, NY, USA) with 300 dpi of resolution, and placed 1 m from the models. Three Brazilian women of African, Asian, and Caucasian descent were instructed to find and stay in their natural head position, look at the horizon, and keep a neutral facial expression with lips slightly sealed (Silva and Fukusima, 2010) (Fig. 1A).

The photographs were scanned (resolution of 1366 × 768 pixels) and imported to a personal computer for digital correction of minor imperfections, mirroring, and simulation of mandibular deviations using Adobe Photoshop™ CS5 software (Adobe Systems Inc., San Jose, California, USA). After minor color and contrast adjustments, and skin imperfection removal, the image mirroring technique was performed to establish facial symmetry (Fig. 1A). Thus, for each of the three faces (African, Asian, and Caucasian), the right hemiface was duplicated by reflection (Silva and Fukusima, 2010) before the mandibular deviations were simulated.

To simulate the mandibular deviations, a vertical reference line was created at the midline of the symmetrized faces so that angulation could be controlled in relation to a horizontal reference line passing through the oral commissures. Then, the lower third of the face was angulated in two-degree steps from zero to eight degrees of deviation (Fig. 1B). After that, minor corrections were made with the Smudge and Stamp tools to conceal the digital manipulation. Five images were obtained for each of the three symmetrized faces (Fig. 2).

The sample included three groups of 20 evaluators each, namely laypersons, orthodontists, and OMF surgeons. Sample size
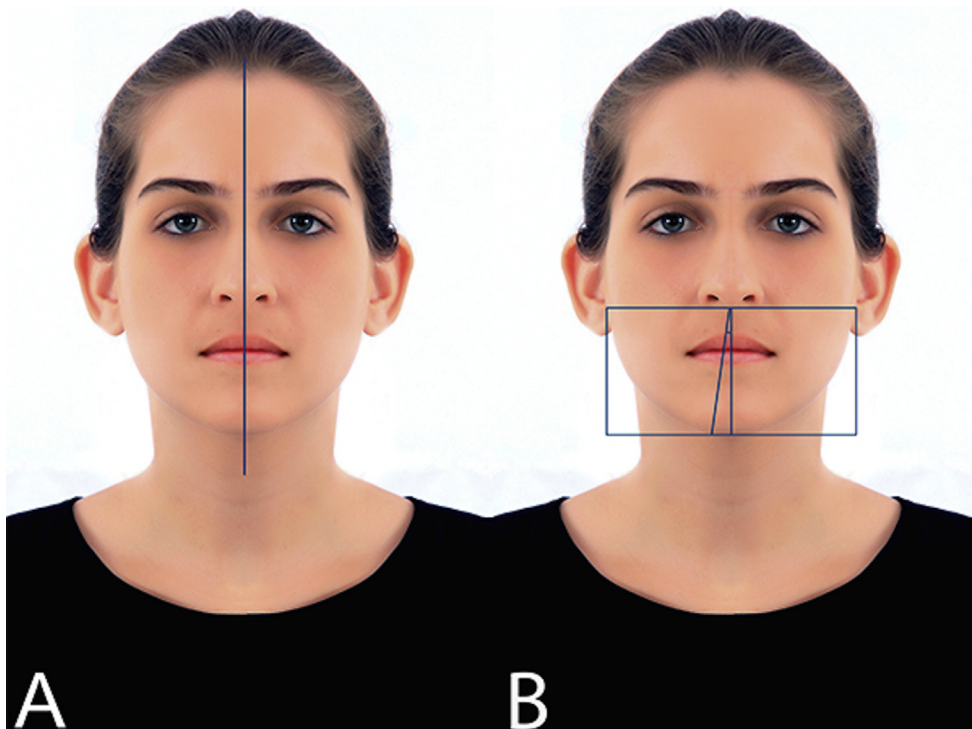

Fig. 1. (A) Image of the model after facial mirroring or symmetrization; (B) Digital simulation of laterognathism.