

The assessment of dentofacial esthetics in restorative dentistry

A review of the literature

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In classical music, there are only a few compositions that have reached the highest rank along with Symphony No. 9, “Ode to Joy,” by Ludwig van Beethoven, which he completed in 1824. With this composition, Beethoven led music to previously unknown heights, and since then only imitation, not improvement, has been possible. In math and arts, the ideal proportion is the golden proportion, which has the proportion of 1.6103 to 1, in which the shorter part is 62 percent of the longer part of a line.¹ This ratio creates an esthetically pleasing rectangle. Kant described esthetic judgment as being based on feelings of pleasure or displeasure.² Even today, Beethoven’s symphony and the principle of the golden proportion are models of perfection for thinkers and artists all over the world.

In dentistry, the golden proportion was first described in detail by Levin.³ He proposed that the golden proportion existed in dentistry—for example, in the proportion of the width between the central and the lateral incisor and that between the lateral incisor and the canine, as well as within the dimensions of a smiling face. Well-formed anterior teeth and an attractive smile have positive effects on a patient’s self-esteem and psychosocial well-being.⁴⁻⁶ In restorative dentistry, esthetic knowledge is based mainly on an

ABSTRACT

Background. The authors conducted a literature review to determine how dentofacial esthetics can be evaluated in restorative dentistry and which quantifiable clinical parameters can be used for this assessment of dentofacial esthetics.

Types of Studies Reviewed. The authors selected 35 studies that focused on assessment strategies for dental professionals. The primary inclusion criteria were intraoral and extraoral esthetic assessment methods and indexes or rating scales evaluating esthetics in restorative dentistry.

Results. The studies’ protocols and assessment methods were heterogeneous. The authors grouped the studies into six categories according to topic: golden proportion, soft-tissue measurement, smile and smile line assessment, orofacial indexes and scales, incisor proportion and angulation, and facial esthetics. These categories included various esthetic parameters, including the smile line, lip line, incisal offset, location of dental and facial midline, incisor angulations and width to height ratios of the maxillary anterior teeth, gingival contour, and root coverage and papilla height. These parameters should be considered when providing dental treatment in the anterior area, as they allow for quantification and objective judgment.

Clinical Implications. The findings of this review might increase interest in a comprehensive dental esthetic index that allows for objective quantification and intrastudy and interstudy comparison of dental treatment outcomes.

Key Words. Dentofacial esthetics; assessment; restorative dentistry; literature review.

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accumulation of experts' references in textbooks and literature that describe parameters commonly accepted in the Western world.⁷⁻¹⁹ Little, however, has been reported regarding what professionals' esthetic perceptions and discriminations are based on and whether their subjective perceptions can be assigned to objective esthetic items that allow for quantification.²⁰

In general, esthetic ratings can be subjective or objective. An example of a subjective method of rating esthetics is a questionnaire that solicits patients' opinions. Objective measurements include ratings or indexes used by dental professionals to quantify a status.²¹ The most commonly accepted clinical rating criteria in restorative dentistry are Ryge and Snyder's criteria,²² today known as the modified U.S. Public Health Service (USPHS) criteria or FDI World Dental Federation clinical criteria.²³⁻²⁵ Although the criteria quantify the esthetic parameters "surface luster," "surface staining," "color match and translucency" and "esthetic anatomical form," they provide insufficient detail for the purposes of treatment planning or outcome assessment of restorations of anterior teeth. One crucial aspect that is not represented in the modified USPHS criteria is the smile assessment, which is influenced by the teeth, the lip framework and the gingival scaffold.²⁶ The shape and size of the lips outline the esthetic zone, forming a frame that displays the teeth and various amounts of gingiva.²⁷

We surveyed the literature to identify methods of esthetic assessment of anterior maxillary teeth and facial esthetics used in restorative dentistry. Our goal in conducting this review was to classify the different methods and extract quantifiable clinical parameters that might aid the development of a standardized and comprehensive esthetic evaluation index to be used for diagnosis, treatment planning and outcome assessment.

METHODS

Search strategy. We searched the Cochrane Library and MEDLINE (PubMed, National Library of Medicine) from Jan. 1, 1975, to Dec. 31, 2010, by using Medical Subject Headings (MeSH) and free text terms. The search strategy included the combination of the following MeSH terms: "dental" and "aesthetic," "dental" and "aesthetic" and "index," "dental" and "aesthetic" and "measurement," "dental" and "aesthetic" and "assessment," "dental" and "aesthetics" and "needs assessment" and "adolescent," "dental" and "aesthetics" and "needs assessment" and "child." We included and manually searched ref-

erence articles found in full-text manuscripts.

Selection criteria. We selected studies according to the inclusion and exclusion criteria listed in the box. Our focus was on including studies that had extraoral and intraoral esthetic assessment methods and indexes and rating scales evaluating esthetics in restorative dentistry.

Review methods and categories. As much as possible, we adapted the review method from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement's item checklist and flowchart (Figure).²⁸ We evaluated the abstracts of all reports identified by means of our database search according to the inclusion and exclusion criteria. For articles that met the inclusion criteria, we obtained the full-text versions. After reading the articles, we sorted and grouped them into six categories according to their esthetic assessment topic: golden proportion, soft-tissue measurement, smile and smile line assessment, orofacial indexes and scales, incisor proportion and angulation, and facial esthetics. Owing to the heterogeneity of the study protocols and methods we used, statistical data collection and analysis were not applicable.

RESULTS

The golden proportion. Levin³ described the naturalness of the golden proportion and recommended that this principle be applied to the arrangement of the anterior esthetic region. Because tooth dimensions vary greatly by sex and race, Mahshid and colleagues,²⁹ Preston³⁰ and Gillen and colleagues³¹ could not agree that the golden proportion applied to the relationship of maxillary anterior teeth. Nikgoo and colleagues³² found the golden proportion between the maxillary central incisor and the lateral incisor in 50.3 percent of people with an attractive smile. In a Web-based study, Rosenstiel and colleagues³³ interviewed dentists regarding computer-manipulated images of width to height ratios of the anterior maxillary teeth and found that the golden proportion was inferior when normal or short teeth were evaluated. Only when assessing long teeth did dentists prefer them for fulfilling the golden proportion.

Soft-tissue measurement. Kerner and colleagues^{34,35} found that an image analysis system was reliable for assessing root coverage. In combination with a five-point ordinal scale, they recommended the use of this image analysis

ABBREVIATION KEY. MeSH: Medical Subject Headings. USPHS: U.S. Public Health Service. VAS: Visual analog scale.

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