Perceptions of Dental Dyschromia by Patients and Dentist

Delia Cristina Greta, DMD, PhD(c)
Department of Prosthetic Dentistry and Dental Materials, Division of Dental Prophylactic and Esthetic Dentistry, Iuliu Hațieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania.

Horatiu Alexandru Colosi, DMD, MSc, PhD
Department of Medical Education, Division of Medical Informatics and Biostatistics, Faculty of Medicine, Iuliu Hațieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania.

Cristina Gasparik, DMD, PhD
Diana Dudea, DMD, PhD
Department of Prosthetic Dentistry and Dental Materials, Division of Dental Prophylactic and Esthetic Dentistry, Iuliu Hațieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania.

Purpose: To assess patient self-perception of overall dental appearance and of potentially localized dyschromic teeth and to compare them to the perception of the treating dentist. Materials and Methods: A sample of 160 patients from Cluj-Napoca, Romania, answered a questionnaire regarding the self-perception of their dental appearance and of potential localized dental discolorations. The same questions were answered by their dentist, without knowing their answers, after clinical examination of each patient. Each patient and the dentist were asked to indicate a tooth with a pleasant color to be considered as reference. Color measurements of teeth indicated as dyschromic and of the reference teeth were performed using a spectrophotometer. Color differences were calculated using the ΔE00 formula. Results: Tooth color was considered the most disturbing factor of their dental appearance by 41.25% of patients. Most patients (58.12%) acknowledged localized dyschromic teeth in their dental arches. Agreement between patients and dentist regarding the identification of dyschromic teeth was found in 61.87% of cases. The ΔE00 between the reference teeth and the teeth considered dyschromic by both patients and dentist ranged between 0.8 and 23.1. Disagreement between patients and dentist was found in 38.12% of situations. For teeth considered dyschromic only by patients, the ΔE00 ranged between 0.8 and 23.1. For teeth considered dyschromic only by the dentist, the ΔE00 ranged between 0.8 and 25. Conclusion: Most patients expressed concerns regarding their overall dental color and perceived themselves as having teeth with localized dyschromia. More than a third of the investigated patients had different perceptions regarding dyschromic teeth compared to their dentist. The majority of ΔE00 values calculated between dyschromic and reference teeth exceeded the perceptibility and acceptability thresholds. Int J Prosthodont 2021;34:154–162. doi: 10.11607/ijp.6312

The term “esthetics” is defined as “a set of principles governing beauty at a given time and place” or “a particular individual’s set of ideas about style and taste, along with its expression.” Therefore, by definition, esthetics are associated with subjectivity and are a matter of perception. In dentistry, it was concluded that esthetic perception differs between patients and dentists among dentists with different specialities and among patients of different ages, genders, and ethnicities. For dentists, in addition to dental appearance, functional and biologic demands govern the treatment plan. Disagreement between patients’ self-evaluations and dentists’ assessments regarding perception and need for esthetic treatment has been reported in the literature.2,4

It is becoming increasingly mandatory for dentists to understand the patient’s needs in terms of esthetics by using different methods of communication, including esthetic questionnaires, discussions of images and videos of the current situation of the patient, and previsualization of the treatment outcome by using dedicated software or building a mock-up before starting dental preparation. Questionnaires have been used...
in research to compare the perceptions of patients and dentists regarding facial and dental appearance\textsuperscript{3,5,9,11} or the final outcome of dental treatment.\textsuperscript{2,4,12}

Tooth color plays a major role in dental esthetics. Studies based on questionnaires evaluating the perception of dental color demonstrate a major concern of patients with their dental color. Samorodnitzky-Naveh et al\textsuperscript{8} conducted a study on 407 patients in 2007 and determined that 89.3% considered tooth color the most disturbing factor with regard to their dental appearance and that 37.3% were dissatisfied with their dental color. Both Al-Zarea\textsuperscript{13} and Azodo and Ogbomo\textsuperscript{14} distributed questionnaires to evaluate dental appearance among patients and reported that 65.9%\textsuperscript{13} and 71.4%\textsuperscript{14} had high levels of dissatisfaction with their tooth color. Schulman et al\textsuperscript{15} found that 31.6% of patients were dissatisfied with dental color.

In other studies, most participants have assessed their teeth darker than their dentist did\textsuperscript{3,16} and preferred “white” and “shiny” teeth rather than a natural appearance.\textsuperscript{3}

Evaluation of dental color is based on subjective methods of shade matching using shade guides or instrumental measurements, which generate objective data that aim to eliminate differences due to subjective evaluation. A particular situation of dental discoloration often encountered in the dental practice is localized dyschromia as a result of pulp pathology, dental decay, or in the presence of a defective restoration. The major interest of previous studies was directed toward the perception of facial and dental esthetics, including overall dental color; however, to the present authors’ knowledge, the perception and self-perception of localized dental discoloration and treatment needs have not been addressed. The aims of this study were therefore (1) to evaluate the role of dental color in the self-perception of dental arches and (2) to compare the patients’ and dentist’s perceptions regarding the presence of localized dental discoloration, validated by instrumental measurements. The null hypotheses were: (1) esthetics and dental color motivate patients to address the dental office to the same extent as other reasons; and (2) there is no difference between patients and dentists in terms of perception of localized dental discolorations.

**MATERIALS AND METHODS**

**Participants**

A total of 160 consecutive subjects with complete dental arches or fixed restorations who attended a private dental office in Cluj-Napoca, Romania, between July and August 2016 were asked to complete an anonymous questionnaire regarding the self-perception of their dental appearance. The same questionnaire was then answered by their treating dentist (D.C.G., general practitioner and endodontist, 10 years of experience) based solely on clinical examination without previous knowledge regarding the questionnaire answers offered by each patient. To account for potential age-related differences between younger and older patients, two age groups have been defined, as presented in Table 1.

The subjects were informed about the aims and methods of the study and signed voluntary written participation consent forms. Only patients with complete dental arches or fixed dentures were included in the study. Edentulous patients with complete or partial removable dentures were excluded.

**Questionnaire**

The questionnaire was approved by the Ethics Committee of the Iuliu Hățieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania, and contained two parts. The first consisted of 12 multiple-choice questions addressed to the patient regarding the main reason for attending the dental office; self-perception of teeth with dyschromia (generalized or localized); and the preferred method of treatment for localized discolorations. In addition, patients were asked to indicate teeth considered dyschromic, as well as a tooth with pleasant color (further used as reference). The second part of the questionnaire (4 items) was addressed to the dentist. After clinical examination, the dentist evaluated each patients’ dyschromic condition and noted in the questionnaire the teeth considered dyschromic, as well as a reference tooth with a pleasant/normal shade.

**Instrumental Measurements**

Teeth considered dyschromic by patients and/or the dentist, as well as the reference teeth, were instrumentally measured with a dental spectrophotometer (VitaEasyshade Advance IV, Vita Zahnfabrick). The middle third of the buccal surface of the teeth was evaluated. In order to avoid variations of probe angulation and to measure similar tooth areas, a custom-made acrylic jig was used. The spectrophotometer was used in “single-tooth” mode or “verify restore” mode, depending on the measured substrate (tooth or ceramic restoration). The dental office where the clinical examinations of patients and instrumental recordings were performed had specific artificial illuminants (ceiling fluorescent tube lighting, Osram LumiluxDeluxe 36W/965 5500K).

**Calculation of Color Difference**

CIEDE2000 color difference ($\Delta E_{00}$)\textsuperscript{17,18} as well as CIE L*\textsuperscript{a}b* ($\Delta E_{ab}$), between dyschromic and reference teeth were calculated using the following formulae:

\[
\Delta E_{00} = \sqrt{\left(\frac{\Delta L'}{K_S S_L}\right)^2 + \left(\frac{\Delta C'}{K_C S_C}\right)^2 + \left(\frac{\Delta H'}{K_H S_H}\right)^2 + R_f \left(\frac{\Delta C'}{K_C S_C}\right) + \left(\frac{\Delta H'}{K_H S_H}\right)}
\]

\[
\Delta E_{ab} = \sqrt{\left(\frac{\Delta L}{K_S S_L}\right)^2 + \left(\frac{\Delta a}{K_a S_a}\right)^2 + \left(\frac{\Delta b}{K_b S_b}\right)^2 + R_f \left(\frac{\Delta a}{K_a S_a}\right) + \left(\frac{\Delta b}{K_b S_b}\right)}
\]

© 2021 BY QUINTESSENCE PUBLISHING CO, INC. PRINTING OF THIS DOCUMENT IS RESTRICTED TO PERSONAL USE ONLY. NO PART MAY BE REPRODUCED OR TRANSMITTED IN ANY FORM WITHOUT WRITTEN PERMISSION FROM THE PUBLISHER.
$\Delta E_{ab}* = \sqrt{(\Delta L*)^2 + (\Delta a*)^2 + (\Delta b*)^2}$

The $\Delta E_{00}$ formula includes lightness ($L$), chroma ($C$), and hue ($H$) weighting functions, as well as a scaling factor for $a^*$ and a rotation function ($R_H$) between chroma and hue differences in order to improve the formula performance for gray and blue colors.\(^{18}\) The parametric correction factors $K_L$, $K_C$, and $K_H$ were set at a value of 1.

A perceptibility threshold (PT) of 0.8 and an acceptability threshold (AT) of 1.8\(^{17,18}\) were used to interpret the magnitude of $\Delta E_{00}$. For situations using $\Delta E_{ab}$, PT and AT were 1.2 and 2.7, respectively.\(^{17,18}\)

Color difference between dyschromic ceramic restorations and reference teeth was automatically indicated by the spectrophotometer (“verify restore” mode) as CIE $L^*a^*b^*$ color difference ($\Delta E_{ab}$).

When dyschromic teeth were evaluated, the calculation of color difference using the CIE $L^*a^*b^*$ formula was performed in order to provide uniformity in the formulation of results.

Statistical Analyses
Answer frequencies to several questionnaire items have been graphically represented, and associations between nominal responses have been tested using chi-square tests. Cramer’s $V$ was computed as a measure of nominal association. Quantitative variables were evaluated for normality using histograms and Q-Q plots and were then compared using parametric tests (Student $t$ test for independent samples). Statistical significance was set at $\alpha = .05$. Data analyses were performed using Microsoft Excel, SPSS 16.0 (IBM), and VassarStats: Website for Statistical Computation (http://www.vassarstats.net).

RESULTS
Of the 160 investigated patients, 67 (41.88%; 95% confidence interval [CI: 34.51% to 49.63]) attended the dental office for dental emergencies and 24 (15%; 95% CI 10.29% to 21.35) declared visiting for esthetic reasons. The distribution of the main reasons to visit the dentist among the age and gender groups is illustrated in Table 2.

More women (18.96%) than men (9.25%) were motivated by esthetic reasons; however, this difference did not reach statistical significance compared to other individual reasons ($\chi^2 [4, n = 160] = 4.23, P = .38$) or to other reasons overall ($\chi^2 [1, n = 160] = 2.15, P = .14$). Younger adults (18 to 39 years) declared a slightly (15.90%) but not significantly higher preference compared to older (40 to 71 years) patients (13.20%) for improving dental appearance as a primary reason for attending the dental office ($\chi^2 [1, n = 160] = 0.04, P = .84$).

Tooth color was considered the most disturbing factor of dental appearance by 41.25% of the investigated patients. Results regarding the self-perception of overall dental color, as well as the desire to improve it, are presented in Fig 1. The presence of localized dyschromic teeth, their visibility during smiling, and their impact on self-perception among patients are highlighted in Fig 2.

**Table 1** Demographic Characteristics of the Investigated Subjects

<table>
<thead>
<tr>
<th>Total no.</th>
<th>Gender, n (%)</th>
<th>Age, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Women</td>
<td>Men</td>
</tr>
<tr>
<td>160</td>
<td>95 (59.37)</td>
<td>65 (40.62)</td>
</tr>
</tbody>
</table>

**Table 2** Main Reasons to Address the Dental Office Based on Gender and Age Groups

<table>
<thead>
<tr>
<th>Total (n = 160)</th>
<th>Routine check-up</th>
<th>Dental emergency</th>
<th>Masticatory problems</th>
<th>Phonetic problems</th>
<th>Esthetic reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>51 (31.87)</td>
<td>67 (41.88)</td>
<td>18 (11.25)</td>
<td>0</td>
<td>24 (15)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total (n = 95)</th>
<th>Routine check-up</th>
<th>Dental emergency</th>
<th>Masticatory problems</th>
<th>Phonetic problems</th>
<th>Esthetic reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women (n = 95)</td>
<td>29 (30.52)</td>
<td>40 (42.10)</td>
<td>8 (8.42)</td>
<td>0</td>
<td>18 (18.96)</td>
<td></td>
</tr>
<tr>
<td>Men (n = 65)</td>
<td>22 (33.84)</td>
<td>27 (41.53)</td>
<td>10 (15.38)</td>
<td>0</td>
<td>6 (9.25)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Total (n = 53)</th>
<th>Routine check-up</th>
<th>Dental emergency</th>
<th>Masticatory problems</th>
<th>Phonetic problems</th>
<th>Esthetic reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>18–39 y (n = 107)</td>
<td>41 (38.31)</td>
<td>38 (35.51)</td>
<td>11 (10.28)</td>
<td>0</td>
<td>17 (15.90)</td>
<td></td>
</tr>
<tr>
<td>40–71 y (n = 53)</td>
<td>10 (18.86)</td>
<td>29 (54.74)</td>
<td>7 (13.20)</td>
<td>0</td>
<td>7 (13.20)</td>
<td></td>
</tr>
</tbody>
</table>

Data are reported as no. (%).
Most of the subjects who reported teeth with localized dyschromia also declared their desire to improve the color of dyschromic teeth (n = 63). Among them, most would opt for conservative treatment (bleaching) (n = 52) rather than ceramic veneers (n = 6) or ceramic crowns (n = 5). These results are illustrated in Fig 3.

No significant association was found between addressing the dental office for esthetic reasons and self-perceived abnormal dental color ($\chi^2 [1, n = 160] = 0.85$, $P = .358$). Nevertheless, a significant but relatively weak association was found between addressing the dental office for mainly esthetic reasons and the patients’ desire for tooth color improvement ($\chi^2 [1, n = 160] = 5.04$, $P = .025$, Cramer’s $V = 0.177$). Self-perceived dyschromia of individual teeth was also associated with a significant desire for color-correcting procedures addressing all teeth ($\chi^2 [1, n = 160] = 5.53$, $P = .019$, Cramer’s $V = 0.186$) or only color-modified teeth ($\chi^2 [1, n = 160] = 43.79$, $P < .001$, Cramer’s $V = 0.523$).
When the answers of the patients were compared to the dentist’s responses, the following situations were found:

- **Agreement between patient and dentist (APD) regarding teeth with localized dyschromia:** localized dyschromia absent (LDA) defined situations where both patients and the dentist agreed that no teeth presented localized dyschromia; localized dyschromia present (LDP) defined situations where both patients and the dentist perceived the presence of localized discolorations (extrinsic discolorations, nonvital teeth, faulty restorations).

- **Disagreement between patient and dentist (DPD) regarding teeth with localized dyschromia:** total disagreement on localized dyschromia (TDLD) defined situations where patients considered no teeth with localized dyschromia, but the dentist acknowledged discolorations (nonvital teeth, faulty restorations with localized dyschromia); while partial disagreement on localized dyschromia (PDLD) defined situations where both patients and the dentist acknowledged the same teeth with localized dyschromia, but either the patients or the dentist considered other discolored teeth in addition.

The distribution of these encountered situations is presented in Table 3. APD regarding teeth with localized dyschromia was found in 99 of 160 patients, representing 61.87% of cases (95% CI: 54.16% to 69.04%). DPD was found in 61 of 160 patients, representing 38.12% of cases (95% CI 30.97% to 45.85%). Nonvital teeth identified as dyschromic by both patient and dentist belonged to both the anterior dental arch (69.23%) and the posterior area (30.76%). All teeth with faulty composite or ceramic crowns identified as dyschromic belonged to the anterior area.
No significant difference was found between female and male patients with respect to the frequency with which they agreed or disagreed with the dentist ($\chi^2 [1, n = 160] = 0.0053, P = .94$). The calculated color difference between teeth considered dyschromic by patients and reference teeth ranged between $\Delta E_{00} = 0.8$ and 14.8 (mean $\Delta E_{00} = 7.1$) and $\Delta E_{ab} = 1.6$ to 35.9 (mean $\Delta E_{ab} = 14.7$), respectively. Five $\Delta E_{00}$ color difference values were between the PT (0.8) and AT (1.8), none were below the PT, and most values were above the AT. Two $\Delta E_{ab}$ values were between the PT (1.2) and AT (2.7), none were below the PT, and most values were above the AT. Values of both $\Delta E_{00}$ and $\Delta E_{ab}$ situated between PT and AT were found in dyschromia situations of extrinsic etiology.

Color difference between dyschromic ceramic restorations and reference teeth, as indicated by the spectrophotometer, ranged between $\Delta E_{ab} = 2.8$ and 8.4; all ($n = 16$) indicated that dyschromic ceramic crowns exceeded AT (1.8).

In 29.37% of situations, a total lack of consensus among patients and dentist was encountered (TDLD): either the patients in this group responded that they did not have dental discolorations while the dentist noted the presence of localized dyschromia, or patients identified dyschromic vital maxillary canines and/or certain malpositioned vital incisors while the dentist considered other teeth (nonvital teeth and/or teeth with faulty ceramic crowns) as being dyschromic. In these cases, the $\Delta E_{00}$ (between teeth considered dyschromic and reference teeth) ranged between 1.3 and 9.4 for patients (mean $\Delta E_{00} = 5.7$) and 3.9 and 25.0 for the dentist (mean $\Delta E_{00} = 13.8$); respectively, $\Delta E_{ab} = 2.1$ to 14.4 (mean $\Delta E_{ab} = 9.9$) and $\Delta E_{ab} = 6.2$ to 43.9 (mean $\Delta E_{ab} = 21.2$). One $\Delta E_{00}$ value was situated between PT (0.8) and AT (1.8) in this group, none were below the PT, and most exceeded the AT. The same situation was encountered for the $\Delta E_{ab}$ values calculated.

Color difference for ceramic restorations ($n = 21$) considered inappropriate only by the dentist but not by the patients ranged between $\Delta E_{ab} = 1.3$ and 13.4. Four $\Delta E_{ab}$ values ranged between PT = 1.2 and AT = 2.7, none were below the PT, and the rest exceeded the AT.

Color differences situated between the PT and AT corresponded to situations of malpositioned vital lateral incisors reported by patients as discolorations or to inappropriate metal-ceramic anterior crowns identified by the dentist.

In other situations, PDLD was encountered. Patients in this group fundamentally agreed with the dentist regarding the presence of dyschromia in localized teeth, but identified either additional dyschromic teeth (vital maxillary canines) or fewer dyschromic teeth (by not including nonvital posterior teeth). In the PDLD group, the values of $\Delta E_{00}$ ranged between 2.3 and 23.1 for dyschromic teeth (mean value $\Delta E_{00} = 10.6$ for patients and mean $\Delta E_{00} = 12.1$ for the dentist), and $\Delta E_{ab}$ ranged between 3.4 and 43.6 (mean $\Delta E_{ab} = 17.8$ for patients and 19.3 for the dentist). None of the $\Delta E_{00}$ or $\Delta E_{ab}$ color difference values fell below the PT = 0.8 or PT = 1.2 thresholds, nor were they situated between the PT and AT values. All color difference values ($\Delta E_{00}$ and $\Delta E_{ab}$) exceeded the corresponding AT.

Color difference for inappropriate ceramic restorations ($n = 6$) ranged between 1 and 12.8. Only one $\Delta E_{ab}$ value was below the AT (1.2) and PT (2.7), while the rest
The mean value of $\Delta E_{ab}$ between normal and dyschromic teeth acknowledged by patients (mean $\Delta E_{ab} = 7.65$, SD = 4.06, n = 109) was statistically different ($t = -2.44$, df = 212, $P = .02$) from the mean value of $\Delta E_{ab}$ between normal and dyschromic teeth identified by the dentist (mean $\Delta E_{ab} = 9.24$, SD = 5.69, n = 118). The mean $\Delta E_{ab}$ values between normal and dyschromic teeth acknowledged by patients (mean $\Delta E_{ab} = 14.59$, SD = 7.54, n = 109) were not significantly different ($t = -1.62$, df = 221, $P = .11$) from the mean $\Delta E_{ab}$ values between normal and dyschromic teeth identified by the dentist ($t = -0.72$, df = 55, $P = .47$). These color differences are represented in Fig 4.

No significant difference was found between esthetically motivated patients (ME; n = 24) and patients motivated by other reasons (MOR; n = 136) in terms of agreement with the dentist regarding the presence of dyschromic teeth. Cases in which patients in the two groups agreed or disagreed with the dentist followed the same trend: the majority of ME patients (50%) and MOR patients (33.83%) who agreed with the dentist belonged to LDP, followed by the TDLD group of agreement (ME 29.16%, MOR 29.41%). These results are presented in Table 3.

**DISCUSSION**

The main reason for attending a dental office may be different for each patient. In contemporary times and in socioeconomically advanced countries, esthetics tend to become one of the most important reasons for attending a dental office. However, the present study revealed that patients were not actively seeking esthetic treatments very often. Only 15% (95% CI 10.29% to 21.35%) of patients who participated in this study addressed the dental office in order to improve dental appearance. Based on the nonoverlapping 95% CI of frequencies for different reasons to address the dental office, the first null hypothesis of this study has been rejected. Therefore, in the present study, esthetics and dental color did not seem to motivate patients to address the dental office to the same extent as other reasons. However, a possible limitation when interpreting this finding could be the specialty of the attending dentist, who was an endodontist, in this study. Despite the fact that more women (18.96%) appeared to be motivated by esthetic reasons compared to men (9.25%), this difference did not reach statistical significance. Among age groups, young adults declared a slightly (15.90%) but not significantly higher preference compared to older patients (13.20%) for improving dental appearance as a primary reason for attending the dental office. Similar results have been reported by previous authors.

The aim of this study was to understand patients’ awareness of their esthetic dental condition regardless of what main reason motivated patients to address the dental office. It could be argued that patients who were not attending the dental office for esthetic reasons may have given less pertinent answers regarding esthetic parameters, such as the presence of dyschromic teeth, compared to esthetically motivated patients. However, allowing this sample of consecutive patients to exhibit an expected variability regarding the main motivation to attend the dental office and its possible influence on answers regarding the investigated esthetic parameters was intended to render an accurate reflection of dyschromia perception in the general population.

Tooth color is one of the most important aspects associated with dental appearance. The most disturbing factor in assessing self-perception of dental appearance was tooth color, reported by 41.25% of the participants, followed by inappropriate restorations (25%). These results are in agreement with other studies and highlight the importance attributed to dental color by patients in judging their own dental appearance. An interesting finding was the fact that a large number of subjects indicated inappropriate restorations as a result of color modifications as being the most evident defect of their dental arches. The perception of a color deficiency in a restoration was viewed as a flaw and motivated patients to ask for its replacement.

The number of patients who prefer professional treatments in order to improve dental shade has increased in contemporary times. In the present study, 65.62% of the participants declared that they wanted to improve their general dental appearance. In Samorodnitzky-Naveh et al., 88.2% of the subjects responded that they would like to have their teeth whitened. One of the most frequent considerations to improve dental appearance and/or faulty restorations is to correct color; therefore, dentists need to take into account what the patient regards as esthetic in order to provide a satisfactory treatment.

Perception of esthetics varies among laypeople (patients in particular) and professionals (dentists) and is influenced by sex, race, education, personal experiences and environment, and social media. Numerous studies have tried to establish a consensus regarding perception of esthetics of professionals vs laypeople. Most of the studies concluded that, when judging general appearance, there was variability in the agreement between laypeople and professionals. Perception
of teeth with localized dyschromia and the need for treatment oriented toward those teeth differ among patients and dentists. In the present study, the results indicated that 61.87% of patients agreed with the dentist regarding the perception of teeth with localized dyschromia. However, in 38.12% of situations, patients and dentist disagreed on the perception of teeth with localized dyschromia. Based on the nonoverlapping 95% CI of agreement vs disagreement frequency, the second null hypothesis of this study has also been rejected. Therefore, this study found a significant difference between patients and dentists in terms of their perception of localized dental discolorations.

These results were comparable to those reported by Reddy et al.,² Mehl et al.,³ and Tortopidis et al.⁴ These authors concluded that there was a relative disagreement between subjects’ perceptions and professional assessment; however, those studies were oriented toward the need for esthetic dental treatment or the perception of general appearance, not toward specific and localized dyschromic conditions. Samorodnitzky-Naveh et al.⁵ conducted a study in 2010 on 193 participants and reported disagreement between patients and clinician regarding self-perception of general tooth shade. Patients rated their tooth shade darker than did the clinician and declared a preference toward “white” and “shiny” rather than a natural appearance.³,¹¹

In the present study, among the total of 160 participants, 38.12% disagreed with the dentist regarding the presence of teeth with localized dyschromia and indicated vital maxillary canines as teeth with localized dyschromia, either as a single tooth or in addition to other chosen teeth, and requested dental treatment for these self-perceived discolorations. Calculated color differences supported this result, as the mean values for ΔE₀₀ were 5.7 and 8.9 and for ΔE_ab were 9.9 and 16.1, respectively, depending on the TDLD or PDLD groups presented in Table 3. Furthermore, some patients in the TDLD and PDLD groups did not perceive nonvital posterior teeth as dyschromic (mean ΔE₀₀ = 14.8 and mean ΔE_ab = 22.9), in contrast to the dentist. This finding may indicate that nonprofessionals lack the ability to acknowledge tooth discolorations in less visible areas. Areas that are less visible during smiling were evaluated differently by professionals, both visually and by instrumental color measurement. In addition, the dentist, who understood the chromatic particularities of teeth, did not consider vital canines as being dyschromic even if they were darker than the adjacent teeth.

The correction of dental dyschromia, either of the entire dentition or only of certain teeth, was a procedure often requested by patients based on their self-perceived dental color. Therefore, even when patients do not report a primary motivation in esthetics when addressing the dental office, dental dyschromia, generalized or localized, seems to be an important issue, and the desire to correct it a clinical reality.

The present study underlines the importance of assessing the esthetic desires of patients in order to harmonize them with professional requirements and guide treatment planning. The general dentist must be careful not to impose on the patient their own perceptions of esthetics.

Factors such as gender, age, and education level may affect dental perception and the esthetic agreement between patient and dentist. Therefore, it may be highly useful to introduce objective validation methods for evaluating tooth color in current dental practice. Instrumental color measurement protocols could be introduced in addition to questionnaires in order to corroborate results. Validating color parameters by means of instrumental methods may foster objectivity when harmonizing the perception of esthetics among patients and dentists.

CONCLUSIONS

- Dental emergencies, followed by routine check-ups, were the most frequent reasons for dental visits. Only 15% of patients who participated in this study addressed the dental office in order to improve their dental appearance.
- The majority of patients declared they were “moderately satisfied” with their smile; however, a large number responded that the most disturbing factors perceived as influencing dental appearance were dental color and inappropriate dental restorations.
- Most participants perceived the presence of teeth with localized dyschromia, and a majority reported “medium visibility” during smiling.
- Correction of dental color in general was requested by a majority of patients, and most patients would choose whitening treatments.
- Agreement between patients and dentist regarding the perception of dyschromic teeth was predominant. However, in over one-third of cases, patients had different perceptions compared to the dentist when identifying dyschromic teeth.
- Almost all ΔE₀₀ and ΔE_ab values calculated between dyschromic and reference teeth exceeded the PT and AT.
ACKNOWLEDGMENTS

This study was supported by the Research Project: PCD 7690/52. The authors report no conflicts of interest.

REFERENCES