ISSN 2236-8035
Archives of Oral Research, v. 8, n. 2, p. 111-19, May/Aug. 2012

Evaluation of self-perceived dental aesthetics and orthodontic treatment need among young adults

Avaliação da autopercepção da estética dental e da necessidade de tratamento ortodôntico entre pacientes adultos jovens

Kikelomo Adebanke Kolawole[a], Olusegun Oluseun Ayeni[b], Vivien Ijeoma Osiatuma[c]

[a] B.Ch.D, FWACS, Department of Child Dental Health, Faculty of Dentistry, Obafemi Awolowo University, Ile-Ife - Nigeria. e-mails: kkole@oauife.edu.ng, topkol2001@yahoo.com
[b] BDS, Department of Preventive Dentistry, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife - Nigeria
[c] BDS, Department of Child Dental Health, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife - Nigeria

Abstract

Objectives: The aim of the study was to assess the self-perception of dental aesthetics and orthodontic treatment need in a group of young adults. **Materials and methods**: Perception of dental aesthetics and orthodontic treatment need was assessed among 189 first year university undergraduates using the Oral Aesthetic Subjective Impact Scale (OASIS), a visual analogue scale (VAS), and the Aesthetic component (AC) scale of the Index of Orthodontic treatment Need (IOTN). Data analysis was done using SPSS version 11.0. Descriptive statistics and Chi-square tests were used. One way analysis of variance (ANOVA) was used to identify differences in the mean VAS and OASIS scores according to perceived orthodontic treatment need on the AC scale of IOTN. The relationship between the various scales was examined using correlation tests. Statistical significance was set as $p < 0.05$. **Results**: The mean OASIS and VAS scores were 13.61 ± 5.98 and 75.64 ± 18.40 respectively. According to the AC scale of IOTN, 86.8% of participants rated themselves as having no need for treatment, 7.4% borderline need and 5.8% great need for orthodontic treatment. Comparison of mean OASIS and VAS scores according to the AC category showed a trend towards higher mean OASIS scores and lower VAS scores with greater treatment need. ANOVA showed there were significant differences between the AC groups in mean OASIS and VAS scores. Spearman's correlation tests between the 3 scales gave low results. **Conclusion**: There was a low correlation between the OASIS, VAS and AC

scale of IOTN in evaluating self-perception of dental aesthetics and orthodontic treatment need. The OASIS and VAS were able to discriminate between participants with different degrees of treatment need.

Keywords: Dental aesthetics. Self-perception. Orthodontic treatment need. OASIS. VAS.

Resumo

***Objetivos**: O objetivo do estudo foi avaliar a autopercepção da estética dentária e necessidade de tratamento ortodôntico em um grupo de adultos jovens. **Materiais e métodos**: A percepção da estética e a necessidade de tratamento ortodôntico foram avaliadas entre 189 estudantes universitários do primeiro ano, usando a Escala Ortodôntica de Impacto Subjetivo (OASIS), uma escala visual analógica (VAS), e a Escala de Componente Estético (AC) do Índice de Necessidade de Tratamento Ortodôntico (IOTN). A análise dos dados foi feita usando SPSS versão 11.0. Estatística descritiva e Qui-quadrado foram utilizados. Análise de variância (ANOVA) foi utilizada para identificar diferenças entre as médias e pontuações de VAS e OASIS de acordo com a necessidade percebida de tratamento ortodôntico na escala AC de IOTN. A relação entre as várias escalas foi examinada utilizando ensaios de correlação. A significância estatística foi definida como $p < 0,05$. **Resultados**: As medias e desvios padrão de OASIS e VAS foram 13,61 ± 5,98 e 75,64 ± 18,40, respectivamente. De acordo com a escala AC de IOTN, 86,8% dos participantes se classificaram como não tendo necessidade de tratamento, 7,4% ficaram na situação limítrofe de necessidade, e 5,8% relataram grande necessidade de tratamento ortodôntico. A comparação entre as medias de OASIS e VAS de acordo com a categoria AC mostrou uma tendência de maior escore para OASIS e mais baixo escore para VAS, com maior necessidade de tratamento. ANOVA mostrou que houve diferenças significativas entre os grupos OASIS e VAS. Testes de correlação de Spearman entre as três escalas apresentaram resultados baixos. **Conclusões**: Houve uma baixa correlação entre o OASIS, VAS e escala de AC de IOTN na avaliação de autopercepção da estética dentária e necessidade de tratamento ortodôntico. OASIS e VAS foram capazes de discriminar entre os participantes com diferentes graus de necessidade de tratamento.*

Palavras-chave: Estética dental. Autopercepção. Necessidade de tratamento ortodôntico. OASIS. VAS.

Introduction

The importance of patients' perceptions of occlusal features and orthodontic treatment cannot be underestimated, as it is the patients who receive treatment and need to gain satisfaction from improved aesthetics and function (1). Understanding a patient's perception is essential because it may influence expectations about treatment and treatment outcomes. It could also be an indication of a patient's degree of motivation for treatment, which may affect their level of cooperation and compliance with instructions during treatment. If motivation and decision to seek treatment are initiated by others, the incentive to cooperate fully during the treatment period may be reduced or absent (2). Self-perceived treatment need has been judged as the key to establishing treatment priority especially in publicly funded oral health care systems (3).

Perception of dental appearance is rather complex. Several studies have shown that there are differences in the recognition and evaluation of dental features (4). A variety of social, psychological and personal factors influence the self-perception of dental appearance and the decision to undergo orthodontic treatment (5). These include gender, age, peer group norms, level of education, social class, personality, attitude, culture, standards of reference and value systems. Perception can be subjective and is therefore liable to errors. These perceptual errors have been demonstrated in two directions, individuals tend to either overestimate or underestimate the degree of severity of their malocclusion. The demand for correction of malocclusion is therefore not equal even among those with the same severity of occlusal deviation (6).

Opinions have varied on the effect of culture on perception of dental features and degree of

perceived need. Pratelli et al. (7) suggested variation due to cultural differences, but Birkeland et al. (8) found that cultural differences are smaller than might be anticipated. Cons and Jenny (9) opined that there may be cultural variations in the perception of the physical features of beauty such as eyes or noses, but it is less apparent when rating the social acceptability of teeth. They therefore concluded that perceptions of dental aesthetics among all ethnic and racial groups are not affected by culture. Langlois et al. (10) and Edler (11) have reinforced the notion that there is close agreement in the ratings of facial attractiveness recorded by people from similar as well as from different cultures. Other factors which may affect self-perception have also been investigated such as gender and age. Although accuracy in the perception of occlusion is expected to improve with increasing age, studies have not necessarily found this to be true (12).

Previous studies in Nigeria (13, 14) have assessed the perception of dental aesthetics in school children and referred populations and their parents using the Aesthetic Component (AC) scale of the Index of Orthodontic Treatment Need (IOTN) (15), this has however not been without its limitations. Participants find the concept of aesthetic component difficult to grasp, the AC may also be criticized for providing only a two dimensional guide and insufficient wide range of dental appearance. With the increase in the number of adults seeking and receiving orthodontic treatment and increased acceptance of orthodontic appliances in our environment it is important that adults are also investigated. The aim of this study was therefore to assess the perception of dental aesthetics among adults using the Oral Aesthetic Subjective Impact Scale (OASIS) (16) and a Visual Analogue Scale (VAS) and to determine their relationship with the Aesthetic Component (AC) scale of the Index of Orthodontic Treatment Need (IOTN).

1. How do you feel about the appearance of your teeth?						
1	2	3	4	5	6	7
Not concerned at all						Very concerned
2. Have you found that other people have commented about the appearance of your teeth?						
1	2	3	4	5	6	7
Not at all						All the time
3. Have you found that other people have teased you about the appearance of your teeth?						
1	2	3	4	5	6	7
Not at all						All the time
4. Do you try to avoid smiling because of the appearance of your teeth?						
1	2	3	4	5	6	7
Not at all						All the time
5. Do you ever cover your mouth because of the appearance of your teeth?						
1	2	3	4	5	6	7
Not at all						All the time

Figure 1 - Oral aesthetic subjective impact scale (OASIS)

Source: Research data.

Materials and methods

Participants who were first year university undergraduates were invited to participate in the study while undergoing medical examination as part of their initial registration in the university health centre. Self-evaluation of dental aesthetics and perceived orthodontic treatment need was assessed through three different methods using the Oral Aesthetic Subjective Impact Scale (OASIS), a Visual Analogue Scale (VAS) and the Aesthetic Component (AC) scale of the Index of Orthodontic Treatment Need (IOTN).

The Oral Aesthetic Subjective Impact Scale (OASIS), a questionnaire developed by Mandall et al. (16) to assess the degree of concern or disadvantage an individual perceives because of the arrangement of their teeth, was completed by the participants. They were asked to evaluate their occlusion answering five questions using a seven point Likert scale with numerical values (Figure 1) ranging from 1 (not concerned at all) to 7 (very concerned). Oral aesthetic impact score were computed by the addition of scores for all questions, a higher score indicates greater degree of concern.

A simple Visual Analogue Scale (VAS) was also used to assess each respondent's perception of his or her occlusion. It is an economic and simple means of obtaining data about an individual self-perception, which can be adapted for use with individuals from any age group or sociocultural background. The VAS is a horizontal line 100 mm in

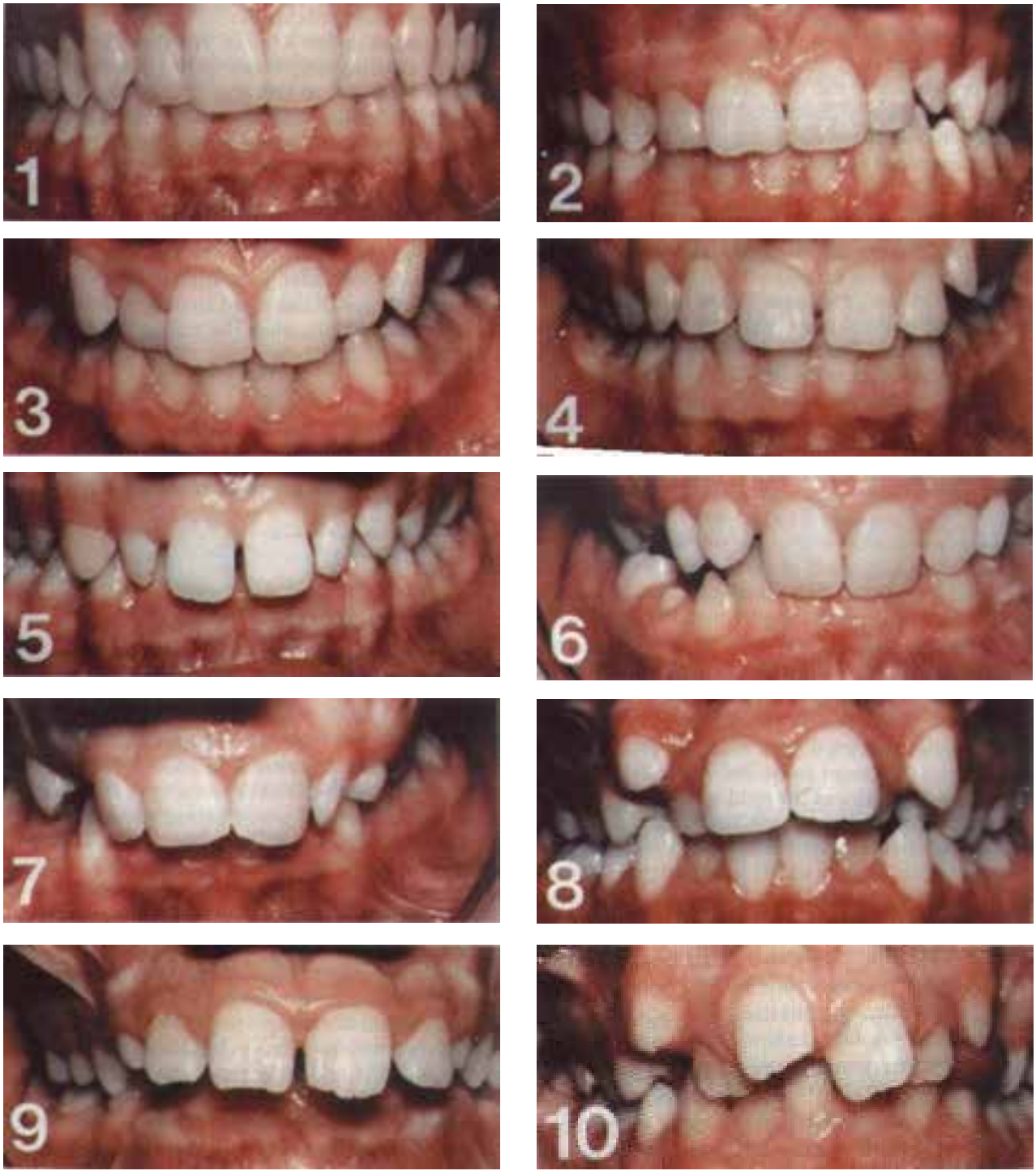

Figure 1 - BAesthetic component scale of IOTN
Notes: Photographs 1-4 represent "No need for treatment"; photographs 5-7 represent "Borderline need for treatment"; Photographs 8-10 represent "Great need for treatment".
Source: Researtch data

length anchored by word descriptors at both ends. Each participant was asked to indicate his or her assessment on the 100 mm line with 0 being the worst possible aesthetics and 100 being the most ideal aesthetics possible. The VAS has previously been used to evaluate esthetic perception and perceived treatment need (17, 18).

Finally, the participants were asked to rate their occlusion on the Aesthetic Component (AC) scale of the Index of Orthodontic Treatment Need (IOTN). The AC assesses the perception of an individual on the attractiveness of his/her dentition through a 10-point photographic scale (Figure 2) showing different levels of dental attractiveness, with photo1 representing the most attractive and photo 10 the least attractive.

Data analysis was done using SPSS version 11.0. Descriptive statistics and Chi-square tests were used. The Kolmogorov-Smirnov test showed that the sample was from a normally distributed population for both the OASIS and VAS ($p > 0.05$) therefore parametric tests were used. One way analysis of variance was used to identify differences in the mean VAS and OASIS scores according to their perceived orthodontic treatment need on the Aesthetic Component (AC) scale of the Index of Orthodontic Treatment Need (IOTN). The relationship between the various scales was examined using correlation tests. The criterion for statistical significance was set at the 5% level.

Table 1 - Gender distribution of Aesthetic Component (AC) scale of IOTN scores

Treatment Category	Female n (%)	Male n (%)	Total n (%)
No need for treatment	66 (34.9)	98 (51.9)	164 (86.8)
Borderline need for treatment	6 (3.2)	8 (4.2)	14 (7.4)
Great need for treatment	5 (2.6)	6 (3.2)	11 (5.8)
Total	**77 (40.7)**	**112 (59.3)**	**189 (100)**

Source: Research data.
Note: $x^2 = 0.144$; df = 2; $p = 0.931$.

Table 2 - Distribution of OASIS and VAS scores according to AC scale of IOTN categories

AC Categories	Scale	Mean	SD
No need for treatment	OASIS	12.93	5.45
	VAS	78.29	17.25
Borderline need for treatment	OASIS	15.36	7.25
	VAS	66.75	15.37
Great need for treatment	OASIS	21.55	6.12
	VAS	48.14	11.84

Source: Research data.

Results

One hundred and eighty nine undergraduates participated in this study. There was no history of previous or ongoing orthodontic treatment. There were 112 male and 77 female participants with a mean age of 20.61 ± 2.84.

Scores for the OASIS ranged from 5 to 35 demonstrating both floor and ceiling effects with a mean score of 13.61 ± 5.98, the VAS scores ranged from 11.1 to 100 with a mean score of 75.64 ± 18.40. Ten of the participants rated themselves 100, i.e., the best dental aesthetics possible or imaginable.

According to the participants evaluation of treatment need using the AC scale of IOTN, 86.8% rated themselves pictures 1-4 which indicated they had no need for orthodontic treatment, 7.4% rated themselves 5-7, i.e., borderline need and 5.8 % selected pictures 8-10 indicating great need for orthodontic treatment (Table 1). There were no significant gender differences in mean OASIS, VAS and the AC scale of IOTN scores.

There were distinct gradients in mean OASIS and VAS scores across the various categories of malocclusion according to the AC scale of IOTN, although in opposite directions. The mean OASIS scores was found to increase as the need for treatment was greater on the AC scale of the IOTN, while the mean VAS score decreased as treatment need increased (Table 2).

One way analysis of variance ANOVA comparing the mean VAS and OASIS scores of participants showed significant differences between the VAS and OASIS scores in the various treatment categories. The VAS demonstrated the strongest difference with F value of 18.54 and OASIS F value of 12.79 ($p = 0.000$). Post hoc tests (Scheffe) showed that differences were significant between the no treatment need and definite treatment need and the borderline treatment need and definite treatment need groups for both OASIS and VAS ($p < 0.005$).

The relationship between OASIS, VAS and IOTN AC were examined. Spearman's correlation tests between the scales gave low but statistically significant

results between OASIS and IOTN AC (r = 0.269; p = 0.000). Tests between VAS and OASIS and VAS and IOTN AC also gave low negative correlation (-0.306 and -0.374 respectively) which were also statistically significant (p = 0.000). The negative correlation indicates that as the aesthetic perception of an individual increased (worsened) on the AC scale of the IOTN, and OASIS score increased indicating greater concern about dental aesthetics, the VAS score decreased, moving towards the unattractive end of the scale, representing the worst possible dental aesthetics.

Discussion

If the decision to embark on treatment depends on the perception of dental aesthetics, it is important to understand precisely, how individuals perceive their occlusion. Previous studies have found oral aesthetic impact of malocclusion to be important in motivating individuals to desire orthodontic treatment (16).

In this study, perception of dental appearance was evaluated simultaneously using the Oral Aesthetic Subjective Impact Scale (OASIS), Visual Analogue Scale (VAS) and Aesthetic Component scale of IOTN. The simultaneous use of various scales has been judged to be useful to evaluate various aspects of dental aesthetic self-perception, which can increase our knowledge on patients' perceptions (17).

None of the participants in this study was found to have received previous orthodontic treatment. This sharply contrasts reports from Finland, Sweden and Norway where up to 61.5% of young adults had received previous orthodontic treatment (17). This is a reflection of the scanty availability and uptake of orthodontic services in Nigeria.

The Oral Aesthetic Subjective Impact Scale (OASIS) is based on a likert scale which is thought to place few cognitive demands on the respondent (19). Although initially developed for use in children has been used in a number of adult studies (17, 20).

The mean OASIS score which was slightly higher than that obtained by Flores-Mir et al. (20), and Bernabé et al. (17) may suggest a slightly higher aesthetic impact of malocclusion among these Nigerian undergraduates.

The VAS is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured (21). The mean VAS score in this study was much higher than that obtained by Flores-Mir et al. and Bernabé et al. (17) in similar untreated populations. This indicates that participants in this study generally perceived their occlusion as being quite good and not requiring treatment. Less than 10% of all participants rated themselves below the 50% mark on the VAS.

Although Studies have found the VAS and Likert scales to encounter "end -aversion bias" when used in adults (22), ten of the participants in this study rated themselves 100, i.e., the best dental aesthetics possible or imaginable. This could be due to the fact that participants were a cross section of university undergraduates not a clinic population who may not have had serious aesthetic impairments, it could also be an indication of overrating of their occlusion by participants. This is possible because the VAS does not force the respondent into fixed categories (23).

With the AC of IOTN, there was skewing to the more attractive end of the scale. Respondents generally seemed to have an aversion for the pictures towards the unattractive end of the scale. This is similar to previous reports with the use of the scale among both school and referred populations in Nigeria (13, 24). One of the participants who had a maximum score of 35 on the OASIS and 16mm on the VAS still rated himself a score of 1 on the AC. Many explanations may be advanced for the skewing observed. The insufficient wide range of dental appearance is frequently given as an excuse for selecting close to the attractive end of the scale, failure to recognize individual deviant occlusal traits may also influence selections. The very obvious deviant occlusal traits like crowding, protrusion may be easier to recognize by respondents than more subtle deviations. Marques et al. (5) reported upper anterior crowding ≥ 2 mm as the only occlusal characteristic that influenced the desire for orthodontic treatment among Brazilian adolescents. The adolescents were quick to identify upper anterior crowding as an indication for treatment while they were tolerant of features like lower anterior crowding and median diastema.

The distinct gradients in mean OASIS and VAS scores across the various categories of malocclusion according to the AC scale of the IOTN observed in this study is similar to previous reports by Mandall et al. (16) and Flores-Mir et al. (20). These observed gradients as the aesthetic appearance worsened on the AC scale of IOTN, shows that the impact of malocclusion experienced by participants is related to

the severity of their malocclusion, and also confirms the OASIS and VAS as valid tools in evaluating the level of treatment need in prospective orthodontic patients. Although the aesthetic impact of malocclusion may not be significantly different in individuals' with subtle differences in their degree of malocclusion. This may have been responsible for the failure to observe differences between the "no need for treatment" and "borderline need for treatment" groups on both the OASIS and VAS.

There appeared to be a similarity in the pattern of response on both the VAS and the AC of IOTN, i.e., an aversion for the unattractive end of the scales by participants. The fact that both scales are simple and easy to interpret even to the lay man could explain this pattern. Respondents seemed to be able to predict what would be regarded as good/acceptable and bad/unacceptable and probably tried to avoid being labeled unacceptable. This may also be because many are unaware of the possibilities of correction.

It may however be possible to get more objective self-assessments from participants with AC of IOTN by modifying the scale and presenting the photographs in a random order rather than the progressive order in which they appear on the scale. This will limit the practice of selectively avoiding the unattractive end of the scale. Methods of minimizing overrating or underrating of aesthetic appearance should be considered during development of any self-rating scale.

Behaviour Scientists have helped to provide explanations of the factors underpinning peoples health and illness behaviours, i.e., identification of the factors that predict behaviour such as beliefs, attitudes e.g. why they may or may not carry out health preventive behaviours, perception of own views and others views etc. (25). One of the factors that may have influenced perception of dental aesthetics in the study is the value placed on dentofacial aesthetics. Much value may not be placed on dental aesthetics in our environment probably because dentofacial anomalies are seldom, if ever, of life or death concern. Another is the fact that the assessment of beauty is subjective (26).

Marques et al. (27) reported that the value attributed to dentofacial aesthetics varies depending on cultural, social traditions, socio-economic position and ethnic characteristics of each population. Hamdan (18) had earlier concluded that perceptions of need for orthodontic treatment are multifactorial and influenced by elements other than measures of normative orthodontic treatment need and perceptions of aesthetics.

We observed a low correlation between the three scales used in this study unlike Flores-Mir et al. (20) but similar to their report, VAS had better correlation with other scales. While the VAS and AC of IOTN do not force the respondent into fixed categories, the OASIS is based on a Likert scale which consists of verbal categorical response options, apart from the fact that, a lot of questions on the OASIS are actually centered on other people's opinions, despite being a measure of self-perception. Although it can be argued that the opinions of others affects our opinions or perceptions of ourselves (26, 28). Van Laerhoven et al. (19) found the VAS and Likert scale had strong correlation when compared as response options in children's questionnaires, although the questionnaires used included seven similar questions.

The negative correlation observed between the VAS and the other scales further demonstrates its ability to discriminate between individuals with different degrees of aesthetic impairment and perceived orthodontic treatment need. It could therefore be expected that with a VAS score closer to the unattractive end of the scale, an individual's self-perceived AC score becomes higher, and he or she experiences a greater oral aesthetic impact of malocclusion.

Despite the low correlation observed between them, all the scales are convenient and valid quantification instruments for measuring perceived dental aesthetics and orthodontic treatment need. Since normative and subjective needs are important in making treatment prescriptions, the VAS and OASIS can be used routinely along with the AC of IOTN to determine an individual's opinion during diagnosis and treatment planning. An investigation into some of the personal or individual factors which affect the perception of dental aesthetics in our environment may be necessary.

Conclusions

- There was a low correlation between the OASIS, VAS and AC scale of IOTN in evaluating self-perception of dental aesthetics and orthodontic treatment need.

- There is a similarity in the pattern of response of participants on both the VAS and the AC of IOTN, i.e., an aversion for the unattractive end of the scales.
- The VAS had better correlation with both the OASIS and AC scale of IOTN.
- The OASIS and VAS were able to discriminate between participants with different degrees of treatment need; they are therefore valid tools for evaluating self-perception of dental aesthetics and orthodontic treatment need.

Referências

1. She-Te Yeh M, Koochek AR, Vlaskalic V, Boyd R, Richmond S. The relationship of 2 professional occlusal indexes with patients' perception of aesthetics, function, speech and orthodontic treatment need. Am J Orthod Dentofacial Orthop. 2000;118(4):421-28.
2. Gosney MBE. An Investigation into some of the factors influencing the desire for orthodontic treatment. Br J Orthod. 1986;13(2):87-94.
3. Miguel JA, Sales HX, Quintão CC, Oliveira BH, Feu D. Factors associated with orthodontic treatment seeking by 12-15 year old children at a state university funded clinic. J Orthod. 2010;37(2):100-06.
4. Brisman AS. Esthestics a comparison of dentist and patient concepts. JADA. 1980;100:345-52.
5. Marques LS , Pordeus IA , Ramos-Jorge ML, Filogonio CA, Filogonio CB, Pereira LJ, et al. Factors associated with the desire for orthodontic treatment among Brazilian adolescents and their parents. BMC Oral Health. 2009;9:34-40.
6. Shaw WC. Factors influencing the desire for orthodontic treatment. Eur J Orthod. 1981;3(3):151-62.
7. Pratelli P, Gelbier S, Gibbons DE. Parental perception and attitudes on orthodontic care. Br J Orthod. 1998;25(1):41-46.
8. Birkeland K, Boe OE, Wisth PJ. Orthodontic concern among 11-year-old children and their parents compared with orthodontic treatment need assessed by index of orthodontic treatment need. Am J Orthod Dentofacial Orthop. 1996;110(2):197-205.
9. Cons NC, Jenny J. Comparing perceptions of dental aesthetics in the USA with those in eleven ethnic groups. Int Dent J. 1994;44(5):489-94.
10. Langlois JH, Kalakanis LE, Rubenstein AJ, Larson AD, Hallam MJ, Smoot MT. Maxims and myths of beauty? A meta-analytic and theoretical review. Psychol Bull. 2000;126(3):390-423.
11. Edler RJ. Background considerations to facial aesthetics. J Orthod. 2001;28(2):159-68
12. Kolawole KA, Ayeni OO, Osiatuma VI. Psychosocial impact of dental aesthetics among university undergraduates. Int Orthod. 2012;10(1):96-109.
13. Otuyemi OD, Kolawole KA. Perception of orthodontic treatment need. Opinion comparisons of patients, parents and professionals. African Journal of Oral Health. 2005;2 (1- 2):45-51.
14. Kolawole KA, Otuyemi OD, Jeboda SO, Umweni AA. Awareness of malocclusion and desire for orthodontic treatment in 11 -14 year old Nigerian school children and their parents. Aust Orthod J. 2008;24(1):21-25.
15. Brook PH, Shaw WC. The development of an index of orthodontic treatment priority. Eur J Orthod. 1989;11(3):309-20.
16. Mandall NA, McCord JF, Blinkhorn AS, Worthington HV, O'Brien KD. Perceived aesthetic impact of malocclusion and oral self perceptions in 14-15 year old Asian and Caucasian children in greater Manchester. Eur J Orthod. 2000;22(2):175-83.
17. Bernabé E, Kresevic VD, Cabrejos SC, Flores-Mir F, Flores-Mir C. Dental Aesthetic self perception in young adults with and without previous orthodontic treatment. Angle Orthod. 2006;76(3):412-6.
18. Hamdan AM. The relationship between patient, parent and clinician perceived need and normative orthodontic treatment need. Eur J Orthod. 2004;26(3):265-71.
19. van Laerhoven H, van der Zaag-Loonen HJ, Derkx BHF. A comparison of Likert scale and visual analogue scales as response options in children's questionnaires. Acta Pædiatr. 2004;93(6):830-5.
20. Flores-Mir C, Major PW, Salazar FR. Self perceived orthodontic treatment need evaluated through 3 scales in a university population. J Orthod. 2004;31(4):329-34.

21. Gould D, Kelly D, Goldstone L, Gammon J. Examining the validity of pressure ulcer risk assessment scales: developing and using illustrated patient simulations to collect the data. J Clin Nurs. 2001;10(5):697-706.

22. Streiner DL, Norman GR. Health measurement scales: a practical guide to their development and use. 2nd ed. New York: Oxford University Press; 1995.

23. Ross DJ, Ross SA. Childhood pain: the school-aged child's viewpoint. Pain. 1984;20(2):179–91.

24. Kolawole KA, Otuyemi OD, Jeboda SO, Umweni AA. The need for orthodontic treatment in a school and referred population of Nigeria using the index of orthodontic treatment need (IOTN). Odontostomatol Trop. 2008;31(122):11-9.

25. Bekker HL, Luther F, Buchanan H. Developments in making patients orthodontic choices better. J Orthod. 2010;37(3):217-24.

26. Rustemeyer J, Eke Z, Bremerich A. Perception of improvement after orthognathic surgery: the important variables affecting patient satisfaction. Oral Maxillofac Surg. 2010;14(3):155-62.

27. Marques LS, Chaves KC, Ramos-Jorge ML, Pereira LJ. Extraction of four premolars in black patients with bi-protrusion: aesthetic perceptions of professionals and lay people. J Orthod. 2011;38(2):107-12.

28. Rosenberg M. Malocclusion and craniofacial malformation: self-concept implications. Paper presented at the workshop in psychosocial aspects of craniofacial malformation: Hilton Head, SC. 1974.

Received: 04/09/2012
Recebido: 09/04/2012

Approved: 06/19/2012
Aprovado: 19/06/2012