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Dental Aesthetics and its psychosocial impact among adolescents: A cross-sectional survey

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Abstract
Background: Patients' perceptions of psychosocial impact related to dental esthetics are multifactorial and one of the factors is malocclusion.
Aim: To assess dental aesthetics and its association with psychosocial impact among 13-15year old adolescents in Davanagere city.
Methodology: 400 adolescents were assessed for severity of malocclusion and psychosocial impact of dental aesthetics using Dental Aesthetic Index (DAI) and Psychosocial Impact of Dental Aesthetic Questionnaire (PIDAQ) respectively. Spearman correlation, Kruskal Wallis and Man Whitney U tests were used for statistical analysis.
Results: The mean PIDAQ scores increased with the increasing DAI scores and the association was statistically significant (P =0.01). The mean PIDAQ score was significantly higher in severe forms of malocclusion compared to minor malocclusion. There was a positive correlation between DAI and PIDAQ scores (r= 0.240, P=0.01)
Conclusion: Psychosocial impact of malocclusion increases with severity of malocclusion among adolescents.

Keywords: Psychosocial impact, PIDAQ, Adolescents, Malocclusion

Introduction

Dental appearance is an important feature in determining the attractiveness of a face, and thus plays a key role in human social interactions. There are multiple factors which affect the appearance or aesthetics of the face and one among them is the dentofacial status. As an instrument of speech and eating, as well as a mirror of emotions the dentofacial complex has unique social and psychological implications. The self-perceived level of the attractiveness or ''positive'' feelings toward the dentofacial region is an important factor contributing to self-concept in preadolescents and adolescents. Malocclusion is a widespread oral condition that occurs worldwide. It differs from the majority of medical and dental conditions in that it is 'a set of dental deviations' rather than a disease [1]. Orthodontic treatment conventionally is majorly confined to improvement in the function and oral health as judged by the clinician, with a very minimal consideration of the self-perception and psychosocial requirements of the individual. Malocclusion as a whole, or through its components, had no influence upon the individual's perception of oral functions [1]. Patients' perceptions of psychosocial impact related to dental esthetics are multifactorial and are influenced by measures of normative orthodontic treatment need as well as subjective aspects. Hence a multifactorial approach may also be useful in planning orthodontic services and in guiding public health practices.
Psychological Impact of Dental Aesthetic Questionnaire (PIDAQ) [2] is a multi-item validated psychometric instrument used for assessment of psychosocial impact of dental aesthetic appearance. It has four subscales which measure the emotional state of the individual [Dental Self Confidence (DSC) subscale], potential problems in social situation due to subjective perception of an unfavorable own dental appearance [Social Impact (SI) subscale], inferiority and unhappiness when the affected individual compares him/herself with persons with superior dental aesthetics [Psychological Impact (PI) subscale] and disapproval of one's own dental appearance when confronted with mirror, photographic and/ or video images [Aesthetic Concern (AI) subscale]. There is a paucity of epidemiological data on the psychosocial impact of dental aesthetics among adolescent population in India.

Therefore, a study was done to find the association between dental aesthetics and its psychosocial impact among 13-15 year old adolescents in Davanagere city.

2. Material and methods

A cross-sectional survey was conducted among school going children aged 13-15 years. Permission to conduct the study was obtained from concerned authorities. Sample size was calculated using formula for descriptive studies, wherein Type I (α) error was fixed at 0.04, $Z_{1-\alpha}$, that is standard normal variate (at 4% type I error ($p< 0.05$) was 1.96 and p, the prevalence of malocclusion from previous study [3] was 0.20. The sample size was estimated to be 384, which was approximated to 400. Multistage stratified random sampling technique was followed to select a sample of 400 adolescent children. Davangere city was arbitrarily divided into North zone (35 schools) and South zones (83 schools) having government and private schools. The children were proportionately selected from both the zones. One government and three private schools from north zone and two government and ten private schools from south zone were randomly selected. One class was chosen from the school selected by lottery method. A random sample of 25 children were then selected from chosen class by systematic random sampling. Subjects aged 13-15 years who consented to participate and present on the day of examination were included in the study. Subjects who had undergone or were undergoing orthodontic treatment, with a history of psychiatric problems and with visible lesions on their anterior teeth due to caries, traumatic injury, or Hypoplasia /fluorosis were all excluded. Examiner was calibrated by an Orthodontist to assess malocclusion using DAI index. Inter examiner reliability was assessed using kappa statistics which was found to be 0.83 reflecting a high degree of conformity. Informed consent from guardians and verbal assent from their children were obtained before the conduct of study.

2.1 Recording of Dental Aesthetic Index (DAI)

The severity of malocclusion was assessed using the Dental Aesthetic Index [4]. Interpretation of scores was as follows; DAI - 25 or < 25 = Normal or minor malocclusion, DAI - 26 to 30 =Definite malocclusion, DAI - 30 to 35 = Severe malocclusion, DAI - 36 and above = Handicapping malocclusion

2.2 Assessment of Psychosocial Impact of Dental Aesthetics

Data regarding psychosocial impact of dental aesthetics was collected using a Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ).[2] The questionnaire was converted into Kannada language and validated for comprehensibility by translation and back translation method. Every question had responses on a five-point Likert scale. The response options were as follows: 0 = Not at all; 1 = A little; 2 = Somewhat; 3 = Strongly; and 4 = Very strongly, each subscale score could be calculated separately and was obtained by summing the item scores. The questionnaire was administered by the investigator in the selected schools in the respective classroom.

2.3 Oral examination

Oral examination was done by the investigator making the subjects sit comfortably on a chair with back rest and a total number of 25-30 children were examined per day. Type III examination was done using the Community Periodontal Index probe and plane mouth mirror under available light in school premises.

2.4: Statistical analyses

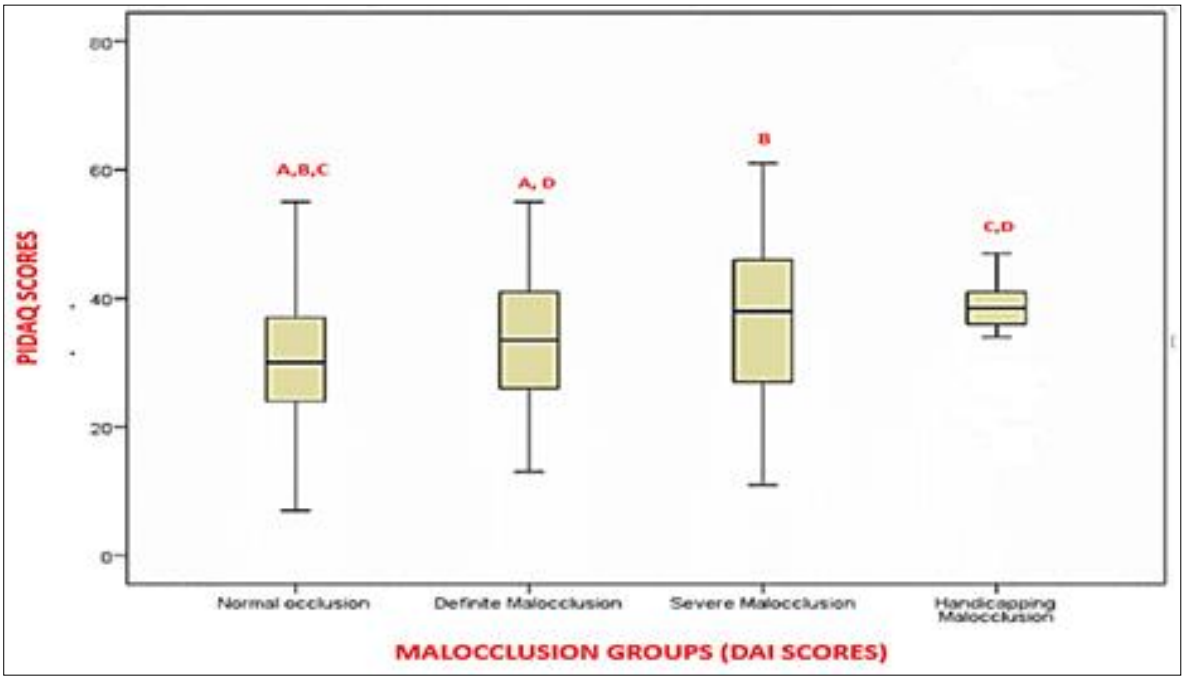
Statistical analyses were performed using SPSS software version 20. The data was not normally distributed hence non parametric tests were applied for data analysis. Significance level was set at $p\leq 0.05$. Kruskal Wallis test was used for comparison of mean PIDAQ scores between malocclusion groups followed by Man Whitney U test. The association between Malocclusion and PIDAQ score was tested using Spearman correlation test.

3. Results

A total of 387 study subjects were present on the day of examination out of which 219 (56.5%) were males and 168 (43.4%) females, 23.8% were 13years old, 47% were 14 years old and 29.2% were 15 years old. Majority of the subjects (56.6%) had normal occlusion followed by definite malocclusion (24.8%), severe malocclusion (10.9%) and handicapping malocclusion (7.8%). A highly statistically significant difference was observed between mean PIDAQ (P=0.00) scores of different malocclusion groups. The mean PIDAQ scores of Severe and Handicapping malocclusion groups was significantly higher than definite malocclusion and normal occlusion groups. [Table 1] The mean PIDAQ scores for males was 31.69 and for females was 33.60 and the difference was statistically non-significant. Man whitney U test showed statistically significant difference between mean PIDAQ scores of normal and definite malocclusion (P=0.017), normal and severe malocclusion (P= 0.002), normal and handicapping malocclusion (p= 0.000), and between definite and handicapping (P= 0.036) malocclusion. [Fig 1] The scores of dental self-confidence (DSC), Social Impact (SI), Psychological Impact of Aesthetic Component (PI) increased with increasing DAI scores. [Table 2] A statistically significant difference was observed between mean DSC (P=0.003), SI (P= 0.002) and PI (P=0.039) subscale scores of PIDAQ of different malocclusion groups. However, there was no significant difference found between the Aesthetic Component subscale scores of different malocclusion groups (P= 0.278). [Fig 2] There was a weak correlation between DAI and PIDAQ scores (Spearmans correlation r= 0.240, p = 0.01)

Table 1: Distribution of sample based on malocclusion and PIDAQ scores

Dental Aesthetic Index	Frequency	PIDAQ (mean and SD)	Range	Median
< 25 Normal/Minor malocclusion	219 (56.6%)	30.45 (9.94)	29.13 - 31.78	30.00
26-30 Definite malocclusion	96 (24.8%)	33.43 (9.29)	31.55 - 35.32	33.39
31-35 Severe malocclusion	42 (10.9%)	36.52 (12.37)	32.66 - 40.37	38.00
35+ Handicapping malocclusion	30 (7. 8%)	39.06 (12.30)	34.47 - 43.66	38.50
Total	100% (n= 387)	p = 0.00 - Kruskal Wallis test		

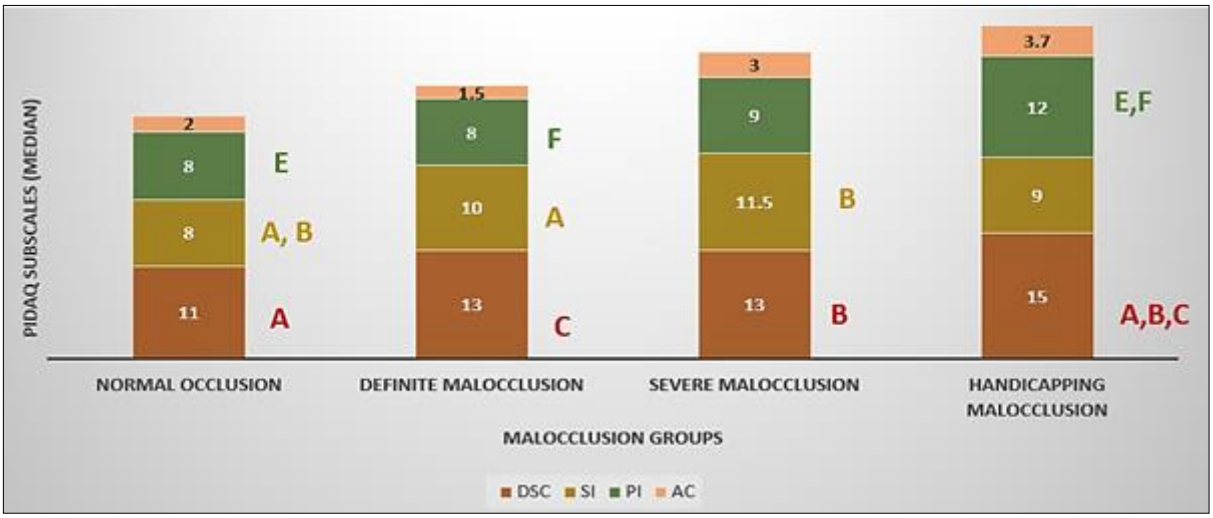


Same alphabets indicate significant differences between groups.: AA (P=0.017*), BB (P= 0.002*), CC (P= 0.000*), DD (P= 0.036*), Statistically significant (Man Whitney U test)

Fig 1: Box plot depicting PIDAQ scores among malocclusion groups

Table 2: Subscale scores of PIDAQ in relation to DAI groups among study Population

Psychosocial Impact of Dental Aesthetic Questionnaire (PIDAQ) Scales	DAI (Dental Aesthetic Index) scores – Median (Range)				
	Normal occlusion	Definite malocclusion	Severe malocclusion	Handicapping Malocclusion	Kruskal Wallis test
Dental Self Confidence subscale	11 (11-12)	13 (11- 13)	13 (11-14)	15 (13 – 16)	P=0.003*
Social Impact subscale	8 (7-9)	10 (8 – 11)	11.5 (10 -14)	9 (8- 12)	P= 0.002*
Psychological Impact subscale	8 (7-9)	8 (7-9)	9 (7-10)	12 (8-12)	P=0.039*
Aesthetic Concern subscale *Statistically significant	2 (2- 3)	1.5 (2-4)	3 (2-4)	3.7 (2.5-5)	P = 0.278



Same alphabets with similar color indicate significant differences between the subgroups (Man Whitney U Test)
Dental Self Confidence (DSC): AA (P -0.000), BB (P-0.028), CC (P- 0.025)
Social Impact (SI): AA (p -0.013), BB (p- 0.001), Psychological Impact (PI): EE (p-0.009), FF (p- 0.018)

Fig 2: Subscales of PIDAQ in relation to malocclusion groups

4. Discussion

The present cross-sectional survey was conducted among a random sample of 13-15-year-old adolescents to assess the association between dental aesthetics and its psychosocial impact and the study results indicated that there was a significant association between dental aesthetics and psychosocial impact. The results are in line with the studies conducted by De Paula *et al.* [5], Bellot C *et al.* [6] and Abualella M *et al.* [7]. However, the correlation was weak. This study was one of the very few studies conducted in India to determine the association between dental aesthetics and its psychosocial impact. A study conducted by Jha K *et al.* [8] to assess the prevalence of malocclusion and its psycho-social impact among 12 to 15yrs old school children in Lucknow city, considered only two components of the PIDAQ scale wherein majority of study subjects had normal occlusion

followed by definitive malocclusion. Similar results were observed in studies done by Shivkumar *et al*. [3] where majority of the study subjects had normal occlusion. The mean DAI score of subjects in present study was more or less similar to results of study done by Shivkumar *et al*. [3] among adolescents of Davangere urban area.

There was significant difference in PIDAQ scores across various malocclusion groups. These results are in line with results of studies done by de Paula *et al*. [5] and Nazir *et al*. [9] where they had assessed the difference between mean PIDAQ total scores among the various malocclusion groups as determined by the DAI index. A study conducted by Bellot C *et al*. [10] also had found significant difference between mean PIDAQ scores and malocclusion groups as determined by Index of Orthodontic Treatment Need (IOTN).The increasing scores of DSC, SI, PI and AC with increasing DAI scores indicated that the social impact, psychological impact and aesthetic concern increased with the severity of malocclusion and the dental self-confidence decreased with the severity of malocclusion. These results are similar to studies conducted by de Paula *et al*. [5], Bellot-Arcís *et al*. [10], Nazir R *et al*. [9]. However, AC subscale of PIDAQ was not significantly related to DAI score. The reason for this perhaps may be that individuals with marked self-attention and intense management of their image in public might be aware of having minor dental irregularities and be more apprehensive about potential rejection by others. Such individuals might never be satisfied with their own dental aesthetics. On the contrary subjects with less acute social awareness might be less able to register difference in dental aesthetics and anticipated social reactions. Public and private self-consciousness has a moderating effect on the relationship between dental aesthetics and social appearance concern as stated by Klages *et al*. [2] The DAI, an orthodontic index that provides a single score linking the public's perceptions for dental aesthetics with objective measurements associated with malocclusion, has been made a more practical tool for epidemiologists. The DAI is particularly sensitive to occlusal conditions that have the potential for causing psychological or social dysfunction [11]. The index has also been adopted by the World Health organization (WHO) as a cross-cultural index and as a model for the WHO's pathfinder survey protocol.[12] Therefore this index was used in the present study. Most of the studies conducted to assess the psychological impact of dental aesthetics have used the IOTC-AC index to grade the severity of malocclusion. The present study has used the DAI index, which is more convenient for use in community settings by epidemiologists.

The 13-15 year old age group was selected because the type and extent of malocclusion can be best made out in the 13 to 15 year old age group. It is also a stage of life wherein the individual starts interacting with the ever-widening social world, a complex intersection of the psychology with society under peer pressure [13].

The study has certain limitations because of acquiescence bias that would have crept in due to the pattern of answers in PIDAQ. Malocclusion has psychosocial implications as well as affects oral health related quality of life not only in adolescence, but also in adulthood [14, 15]. The present study was done on 13-15 year adolescents, hence the generalizability of the study results across other age groups, in whom the changes of life are subsided, having a sense of stability, cannot be ignored. Hence further studies involving subjects with various age groups, socioeconomic status, and cultural background are recommended to understand the psychosocial impact of malocclusion Orthodontic services are an interesting aspect of dental public health. Though malocclusion is not a disease, yet the demand for services in most countries generally exceeds supply and presents difficult choices in the distribution of dental public health. [16] Therefore wherever the public dental health system requires that allocation of resources, it should be based on need rather than demand. Screening for malocclusion and assessing the orthodontic treatment needs along with its social and psychological implications among adolescents may improve their oral health related quality of life. Psychometric tools may be useful to prioritize orthodontic treatment needs. Behavior modification and counselling may be done to treat the psychosocial impact of dental aesthetics in resource limited settings.

5. Conclusion

Psychosocial impact of malocclusion increases with severity of malocclusion among adolescents. Malocclusion among adolescents should be treated not only at clinical level but also at psychosocial level in order to improve their quality of life.

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