ORIGINAL RESEARCH

Evaluation of Orthodontic Treatment Need and Its Correlation with the Perception, Awareness and Satisfaction of Personal Dental Appearance among Dental Students

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ABSTRACT

Introduction: Facial esthetics as well as dental health improvements is the main concern of orthodontic treatment. Dentofacial appearance that deviates from normal may have a negative impact on social, physiological and psychological functions. But individual's attitude to its malocclusion is an important factor in determining treatment need.

Objectives: The study was conducted to assess the perception of malocclusion and need of orthodontic treatment among dental students using index of orthodontic treatment need (IOTN). Also self-awareness and level of satisfaction of personal dental appearance were analyzed.

Materials and methods: Sample of 300 dental students was selected, their alginate impressions were poured, and study casts were prepared. IOTN was used to find out the impact of malocclusion on individual's dental health and psychological well being. A questionnaire was prepared consisting of part 1, self-awareness and part 2, satisfaction and attitudes. Each part consisted of series of questions with alternative answers. Each selected subject was given this questionnaire for self-evaluation and self-perception of occlusion and facial appearance.

Results: Majority of dental students were observed in grades I and II of IOTN indicating no or minimal treatment need. The students were aware that malocclusion, orthodontic treatment and facial esthetics are the important factors for self-image and self-esteem.

Keywords: Malocclusion, Facial esthetics, Treatment need, Self-image.

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INTRODUCTION

Facial esthetics as well as dental health improvement is the main concern of orthodontic treatment. Since, oral health is an integral part of general health, any deviation in dentofacial appearance may have a negative impact on social, physiological and psychological functions.

Orthodontic treatment is carried out to improve patient's dental appearance. Hence, individual's attitude to his own malocclusion is an important factor in determining treatment need. Malocclusion if left untreated, may lead to problems like difficulty in speech, eating, swallowing, poor facial

esthetics and psychological disturbances. Self-perception is guided by social, cultural and personal level of satisfaction. Therefore, knowledge of adult's perception of personal dental appearance is important to seek orthodontic treatment.

Perception of dental appearance by oneself and by other person is of major importance in orthodontic treatment. Psychological problems could arise either in response to society or his own perception to deformity, which might be partially related to real impairment presented by problem.

Several indices have been developed in an attempt to categorize malocclusion into groups according to level of treatment need such as 'occlusal index' by 'Summers'[1] and 'handicapping malocclusion assessment record' by 'Salzmann'.[2] As stated by Shaw,[3] individuals with little need for treatment can be safeguarded from potential risks of treatment with the help of proper index. The main benefits of orthodontic treatment are an improved esthetics, proper occlusion and sociopsychological well-being. Additionally, orthodontic treatment develops a positive attitude in patient toward dental health.[4] Bos et al[5] conducted a study to evaluate expectations of treatment and satisfaction with dentofacial appearance in orthodontic patients and concluded that dental appearance is a significant predictor of orthodontic patient's expectations about treatment.[5] Brook and Shaw[6] described index of orthodontic treatment need (IOTN) as most reliable and valid occlusal index to assess both dental esthetics as well as dental health need of an individual.

Previous studies[7] on patient's experiences during orthodontic treatment observed that pain and discomfort are reported mainly in the first week after inserting an orthodontic appliance. The degree of pain and discomfort can be explained not only by force application but also by emotional, cognitive and environmental factors.[8,9] Hence, need for questionnaire was felt and its reliability and validity was evaluated by clinical and subjective measurements. Feldmann et al[10] assessed the reliability and validity of questionnaire in a young population receiving orthodontic treatment and recommended its use in assessment of expectations and experiences of orthodontic treatment.

The purpose of this study was to assess the correlation of orthodontic treatment need with perception, awareness and satisfaction of personal dental appearance among dental students using IOTN and questionnaire provided to them.

MATERIALS AND METHODS

A sample size of 300 students was selected from students of MM College of Dental Sciences and Research, Mullana. Following criteria were taken into consideration for the study sample:

1. All the subjects selected were between 18 and 23 years of age.
2. None of the subjects had any past history of orthodontic treatment.
3. All subjects were selected at random.

Alginate impressions of upper and lower dental arches were taken and study casts were prepared in dental stone for the study. The IOTN was used to find out impact of malocclusion on individual's dental health and psychological well-being. IOTN consists of two components:

(i) Dental health component (DHC)
(ii) Esthetic component (EC).

Dental Health Component

It has been developed from an index used by dental board in Sweden (Linder-Aronson, 1974[11]). It has five grades:

Grade I: No need
Grade II: Little need
Grade III: Moderate need
Grade IV: Great need
Grade V: Very great need.
A ruler was used to assess DHC (Annexure 1).

Esthetic Component

It comprises a set of 10 standard photographs (Fig. 1) grading from score 1 (most esthetically pleasing) to score 10 (least esthetically pleasing). The scores are categorized according to need of orthodontic treatment as follows:
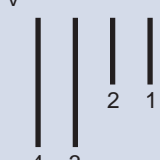
Score 1 or 2—none
Score 3 or 4—slight
Score 5, 6, 7—moderate/borderline
Score 8, 9, 10—definite

A questionnaire was prepared consisting of a series of questions with alternative answers. Each selected subject was given this questionnaire for self-evaluation and self-perception of occlusion and facial appearance (Annexure II).

RESULTS

The results of study were analyzed, compared and tabulated using statistical package as per SPSS version 12 and test of significance were carried out as per Spearman correlation.

In DHC, 83 students (27.7%) were categorized as grade I (no need), 154 students (51.3%) as grade II (little need), 36 students (12%) as grade III (moderate need), 27 students (9%) as grade IV (great need) and nil number of students were categorized as grade V (very great need) (Table 1).

Annexure 1: A ruler was used to assess dental health component						
0	3	4	5	5 Defect of CLP	3 OB with NO G + P trauma	Displacement open bite V
0	1 2 0			5 Noneruption of teeth	3 Cross-bite 1-2 mm discrepancy	
				5 Extensive hypodontia	2 OB >—	
				4 Less extensive hypodontia	2 Dev. from full interdig	
				4 Cross-bite >2 mm discrepancy	2 Cross-bite < 1 mm discrepancy	
3	4			4 Scissor bite		
4	ms-5			4 OB with G + P trauma	IOTN Victoria University of Manchester	4 3 2 1

Annexure 2: A questionnaire was prepared consisting of a series of questions with alternative answers. Each selected subject was given this questionnaire for self-evaluation and self-perception of occlusion and facial appearance

Questionnaire
Part 1 (awareness)
1. There are gaps between the upper front teeth   Yes/no
2. The upper front teeth are crowded   Yes/no
3. The lower front teeth are crowded   Yes/no
4. The upper front teeth are irregular   Yes/no
5. The lower front teeth are irregular   Yes/no
6. The upper front teeth are positioned too far anterior to the lower front teeth (the overjet is too large) yes/no

Part 2 (satisfaction and attitudes)
7. How satisfied are you with the arrangement of your anterior teeth?
   Very satisfied/satisfied/dissatisfied/very dissatisfied
8. How would you consider the appearance of your own teeth compared to the teeth of your peers?
   Among the best/better than average/below average/among the poorest
9. How would you consider the appearance of your teeth compared to other features of your face?
   Among the best/better than average/below average/among the poorest
10. Do you consider well-aligned teeth important for overall facial appearance?
   Very important/rather important/not important/not important at all

Fig. 1: The esthetic component of orthodontic treatment need

Table 1: Frequency table showing number of percentile with grade in dental heath component		
DHC (grade)		
Grade	*Frequency*	*Percentage*
Valid 1	83	27.7
2	154	51.3
3	36	12.0
4	27	9.0
5	0	0
Total	300	100.0

In EC, 149 students (49.7%) were categorized as score 1 and 2 (none or no need), 97 students (32.3%) as score 3 and 4 (slight need), 23 students as score 5, 6, and 7 (moderate or borderline need), and 31 students (10.3%) as score 8, 9 and 10 (definite need) (Table 2).

Questionnaire for self-evaluation, perception and awareness showed responses of subjects regarding question numbers from 1 to 6 of the questionnaire. For question no. 1, 94 students answered 'yes' and 206 students answered

Table 2: Frequency of treatment need in esthetic component

	Esthetic component		
	Treatment need	Frequency	Percentage
Valid	None	149	49.7
	Slight	97	32.3
	Moderate or borderline	23	7.7
	Definite	31	10.3
	Total	300	100.0

Table 5: Response of the subjects (n = 300) regarding question no. 7 (level of satisfaction)

Level of satisfaction Q/7		
Valid	Frequency	Percentage
Very dissatisfied	0	0
Dissatisfied	49	16.3
Satisfied	169	56.3
Very satisfied	82	27.3
Total	300	100.0

'no' indicating less problem of gaps in upper front teeth. In question no. 2 and 3, majority of students revealed no crowding in upper and lower front teeth. In question no. 4 and 5, maximum students answered no for any irregularity in upper and lower front teeth. For question no. 6, 18 students answered 'yes' and 282 students answered 'no' showing high level of awareness regarding positioning of upper front teeth anterior to lower anterior teeth (Table 3).

Table 4 shows significant correlation (p = 0.001) in six traits of questionnaire between reported data of subjects and recording by examiner with their respective casts of each subject. When IOTN (DHC and EC) was correlated with six traits of questionnaire, statistical significance showed highly aware attitude of students toward their personal looks.

Question no. 7 of questionnaire indicated 27.3% as 'very dissatisfied', 56.3% as 'satisfied', 16.3% as 'dissatisfied'. None of the subjects showed 'very dissatisfied' (Table 5).

Table 6 shows Spearman statistical analysis revealing highly significant correlation between the IOTN (DHC and EC) and level of satisfaction of the arrangement of their teeth, again revealing their high level of consciousness.

Table 6: Correlation between IOTN (DHC, EC) and level of satisfaction question no. 7 (part 2) using Spearman's correlation

	Spearman's ratio		
	DHC (grade)	EC (score)	Q/7
Correlation coefficient	1.000	0.602 (**)	−0.157 (**)
Sig. (2-tailed)	–	0.000	0.006
N	300	300	300
Correlation coefficient	0.602 (**)	1.000	−0.189 (**)
Sig. (2-tailed)	0.001**	–	0.001
N	300	300	300
Correlation coefficient	−0.157 (**)	−0.189 (**)	1.000
Sig. (2-tailed)	0.001**	0.001	–
N	300	300	300

p-value is 0.001 (highly significant using Spearman's coefficient of correlation)

Table 3: Response of the subjects (n = 300) regarding question no. 1 to 6 (awareness component/part 1 of the questionnaire)

Questionnaire (Part 1)		
Q. no.	Responses	
	Yes	No
1	94	206
2	62	238
3	37	263
4	48	252
5	38	262
6	18	282

Table 7: Response of the subjects (n = 300) regarding question no. 8 (self-perception)

	Dental appearance Q/8		
		Frequency	Percentage
Valid	Among the poorest	1	0.3
	Below average	50	16.7
	Better than average	198	66.0
	Among the best	51	17.0
	Total	300	100.0

Table 4: Correlation between IOTN (DHC, EC) and awareness (questionnaire part 1) using Spearman's correlation

		Spearman's ratio		
DHC (grade)	Correlation coefficient	1.000	0.602(**)	0.336(**)
	Sig. (2-tailed)	–	0.000	0.000
	N	300	300	300
EC (score)	Correlation coefficient	0.602(**)	1.000	0.393(**)
	Sig. (2-tailed)	0.001**	–	0.000
	N	300	300	300
Awareness	Correlation coefficient	0.336(**)	0.393(**)	1.000
	Sig. (2-tailed)	0.001**	0.000	–
	N	300	300	300

p-value is 0.001 (highly significant using Spearman's coefficient of correlation)

Table 8: Correlation between IOTN (DHC, EC) and self-perception question no. 8 (part 2) using Spearman's correlation

		Spearman's ratio		
DHC (grade)	Correlation coefficient Sig. (2-tailed) N	1.000 – 300	0.602(**) 0.000 300	−0.256(**) 0.000 300
EC (score)	Correlation coefficient Sig. (2-tailed) N	0.602(**) 0.001** 300	1.000 – 300	−0.244(**) 0.000 300
Q/8	Correlation coefficient Sig. (2-tailed) N	−0.256(**) 0.001** 300	−0.244(**) 0.000 300	1.000 – 300

p-value is 0.001 (highly significant using Spearman's coefficient of correlation)

Question no. 8 of questionnaire indicated that 17% were grouped as 'among the best', 66% as 'better than average', 16.6% were grouped as 'below average', and 0.3% were grouped as 'among the poorest'. This reveals their moderate attitude toward their appearance compared to their peers (Table 7).

Table 8 also indicates highly significant correlation (p = 0.001) between IOTN components (DHC and EC) and self-perception of subjects regarding their looks and acceptance in society.

For question no. 9 of questionnaire, the results showed 19% as 'among the best', 63.3% as 'better than average', and 17.3% grouped as 'below average'. This again shows their average nature to accept appearance of teeth compared to other features of face (Table 9).

Table 10 shows highly significant correlation (p = 0.001) between the IOTN components (DHC and EC) and students self-perception of facial appearance.

In question no. 10 of questionnaire, subjects were asked whether well-aligned teeth were important for overall facial appearance, 83.7% answered as 'very important', 15.7% as 'rather important', and 0.7% were grouped as 'not important'. This reveals students consider teeth as very important parameter for their overall facial appearance (Table 11).

DISCUSSION

The major benefits of orthodontic treatment are improvements of oral functions, prevention of oral tissue destruction and correction of facial esthetics. However, contemporary orthodontic opinion doubts the importance of orthodontic treatment care in prevention of caries, periodontal disease and temporomandibular joint (TMJ) disorders. For the majority of patients, the eventual decision to seek an orthodontic treatment depends on the combination of beliefs and aspiration of the consumers (parent and patients) and the providers (orthodontists or dentist).

Table 9: Response of the subjects (n = 300) regarding question no. 9 (self-perception)

		Dental appearance Q/9	
		Frequency	Percentage
Valid	Among the poorest Below average Better than average Among the best	0 53 190 57	0 17.7 63.3 19.0
	Total	300	100.0

Table 11: Response of the subjects (n = 300) regarding question no. 10 (self-perception)

		Self-perception Q/10	
		Frequency	Percentage
Valid	Not important at all Not important Rather important Very important	0 2 47 251	0 0.6 15.7 83.7
	Total	300	100.0

Table 10: Correlation between IOTN (DHC, EC) and self-perception question no. 9 (part 2) using Spearman's correlation

		Spearman's ratio		
DHC (grade)	Correlation coefficient Sig. (2-tailed) N	1.000 – 300	0.602(**) 0.000 300	−0.225(**) 0.000 300
EC (score)	Correlation coefficient Sig. (2-tailed) N	0.602(**) 0.001** 300	1.000 – 300	−0.216(**) 0.000 300
Q/9	Correlation coefficient Sig. (2-tailed) N	−0.225(**) 0.000** 300	−0.216(**) 0.000 300	1.000 – 300

p-value is 0.001 (highly significant using Spearman's coefficient of correlation)

In an attempt to improve the quality of orthodontic treatment, malocclusion is categorized into different groups and various occlusal traits which caused malocclusion. This was observed to be one of the simplest methods to use, where orthodontic treatment resources are limited and large number of patient's needs treatment. The use of occlusal indices in the assessment of orthodontic treatment need (IOTN) provides the opportunity to reduce subjective bias and also to standardize the profession.

The findings of present study revealed that according to DHC grades, 27.7% subjects were categorized as grade I (no need), 51.3% was grade II (little need), 12% as grade III (moderate need) and 9% as grade IV (great need). No subjects were categorized as grade V (very great need). In study conducted by NA Mandall,[12] 48% of subjects categorized as grades I and II which is much less than present study where 79% were categorized as grades I and II when 27.7% of grade I and 51.3% of grade II are combined. Ali H Hassan[13] in his study revealed that 60.6% of subjects were categorized as grade I, 23.3% as grades II to III and only 16.6% as grade IV which is in correlation with present study findings.

Trivedi et al[14] assessed the reliability of EC of IOTN in the assessment of subjective orthodontic treatment need and concluded that using professional rating, the EC does not seem to be more precise or reliable than self-evaluation which is in contrast to the present study. Miguel et al[15] investigated the relationship between factors involved in orthodontic treatment in children aged 12 to 15 years and concluded self-perceived orthodontic treatment need is the key to establishing treatment priority which is parallel to the present study findings.

The subjects selected for the present study were different from the study conducted by Neslihan U et al[16] for Turkish school population. The variation in results was seen due to difference in age factor, educational standard, social and cultural values. The subjects in present study were dental college students; hence their level of education was comparatively better than subjects of their study. Prabu et al[17] assessed the relationship between socioeconomic status and self-perceived need for orthodontic treatment. They concluded that socioeconomic status affects normatively measured orthodontic treatment need and also affects the person's perception of need for orthodontic treatment. Padisar et al[18] used IOTN index in different countries for assessment of orthodontic treatment needs in recent years and found significant correlation between DHC and type of malocclusion. They also concluded that subjective data of IOTN index alone cannot be considered an appropriate indicator of orthodontic treatment needs determination.

In EC of present study, 49.7% of subjects were categorized as score 1 and 2, 32.3% as score 3 and 4, 7.7% as score 5, 6 and 7, 10.3% as score 8, 9 and 10. Mandall[12] revealed same results in his study where he categorized 72% of subjects in score 1 to 4. Papa Ibrahim et al[19] in his study on school children, categorized 8.7% subjects in score 8, 9 and 10. The present study revealed approximately the similar results (10.3%).

Brien et al[20] in his study concluded that 63.6% of subjects were categorized in score 8, 9 and 10. These findings do not correlate with findings of present study probably due to fact that dental cast used in his study were of subjects seeking orthodontic treatment in England whereas present study sample had no past history of orthodontic treatment.

Self-perception, DHC and EC revealed statistical significant correlation ($p < 0.001$) as dentofacial attractiveness was significantly related to self-concept domains explaining academic competence and physical self-concept.

Eser Tufekci[21] surveyed 150 dental students and completed a questionnaire regarding subjects assessment of own profile and teeth in correlation with analysis of various profile photographs of the subjects by two orthodontists to match the individuals perception and awareness. Anna-Liisa et al[22] assessed the correlation between dental appearance and self-perception of orthodontic treatment need with the help of EC of IOTN 74% subjects were satisfied with their own dental appearance and highly significant correlation was observed between orthodontic rating and subjects satisfaction with his or her own dental appearance ($p < 0.001$). This reiterates the fact that dental students have better perception of dental occlusion and realize its importance in facial appearance.

Arcis et al[23] determined the orthodontic treatment need of a young adult population in Spain by means of Dental Esthetic Index (DEI), the IOTN and the need perceived by the patients. They found significant differences in patient perception as women perceived greater demand (23.9%) than men (14.4%). Also significant differences were found between middle high (15%) and low (9%) social class and between secondary/tertiary (14%) and primary (3.3%) education. Alkins et al[24] investigated the self-perception of malocclusion among Nigerian school children aged 12 to 18 years in order to compare their perception with that of an orthodontist. A significant difference was found between the orthodontist's rating and the student's rating of attractiveness of their occlusion. Therefore, for effective orthodontic care, self-perception along with professional assessment must be taken into consideration.

The last question of questionnaire pertaining to general view of subjects regarding importance of dentition to overall facial appearance showed a very positive response (83.7%) reaffirming the fact that level of awareness among the subjects of present study have been highly significant being the undergraduate student of a dental college.

CONCLUSION

1. Both IOTN and questionnaire were observed to be easy and simple to use.
2. Majority of dental students were observed in grades I and II of IOTN indicating no need or minimum need.
3. The components of IOTN observed by subjects and recorded by examiner were approximately similar.
4. Majority of subjects were aware that malocclusion, orthodontic treatment and facial esthetics are important factors for self-image and self-esteem.
5. Highly significant correlation existed between IOTN and perception, awareness and satisfaction of personal dental appearance among dental students.

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