

Prospective Evaluation of Psychosocial Impact after One Year of Orthodontic Treatment Using PIDAQ Adapted for Indian Population

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ABSTRACT

Introduction: The impact of dental appearance, malocclusion and treatment for the same on psychological and functional well-being has drawn increasing attention over the past decade. Various psychometric instruments alongside normative indices have been used to predict orthodontic concerns. Evaluating the patients' experience during the orthodontic treatment can help us understand the true benefits and advantages of orthodontic therapy.

Aim: The aim of the present study was to evaluate the change in the psychosocial impact of malocclusion using the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) adapted for the Indian population after one year of fixed orthodontic treatment.

Materials and Methods: This interventional study was conducted on 93 patients requiring fixed orthodontic treatment. Brazilian, Chinese, Spanish, Nepali and Moroccan versions of the PIDAQ have been published but the questionnaire is not available in Hindi. In the present study, the original PIDAQ was translated into Hindi language to adapt it for the Indian

population and was validated by back translation and pretest. All the subjects answered the Hindi version of the questionnaire at pretreatment (T1) and at one year of orthodontic treatment (T2). Additionally, the Index of Orthodontic Treatment Need (IOTN) was applied to measure the severity and self-perception of malocclusion. The data were analysed using paired t-test, Wilcoxon signed rank test and Kruskal-Wallis test.

Results: Significant reduction was found in the total PIDAQ score and each factor's score ($p < 0.001$) after one year of orthodontic treatment. There was a positive association of the psychosocial impact of malocclusion with the IOTN-AC (IOTN-Aesthetic Component). Adolescent females were found to be most concerned with their dentofacial appearance.

Conclusion: Results showed significant improvement in the psychosocial impact of malocclusion with a reduction in the self-perceived needs of patients with orthodontic treatment. The psychometric instrument used may be recommended as an Oral Health Related Quality of Life (OHRQoL) assessment tool for the population in India for further research.

Keywords: Malocclusion, Quality of life, Self-perception

INTRODUCTION

Malocclusion is one of the most common dental problems together with dental caries and gingival disease [1]. Not only is the oral form and function affected due to malocclusion but also has psychological, social and economic effects [2]. Today, persons requesting orthodontic treatment do so primarily for aesthetic reasons. However, functional disability may also be one of the reasons. Improvement of oral function, appearance and psychosocial well-being are perceived as the major benefits from orthodontic treatment [2]. Traditional methods to evaluate orthodontic treatment needs or outcome are mostly based on assessment of normative need and use; they do not estimate the effect of malocclusion on patients' self-perception and quality of life and thus, the measurements by clinicians may differ from patients' reasons to seek treatment [3-5]. Therefore, in order to improve the effectiveness and quality of orthodontic care, it is important to understand the impacts of malocclusion and its treatment from patients' perspective. There has been increasing interest in the incorporation of various psychometric instruments that measure the OHRQoL outcomes during the orthodontic treatment planning process [3,6]. PIDAQ is a psychometric instrument that was developed in 2006 which is selective and specific to orthodontic aspects of OHQRoL [7]. The present study was undertaken to address patient satisfaction and changes in their sense of well-being after orthodontic intervention using the PIDAQ. The aim of the present study was to prospectively evaluate the psychosocial impact of malocclusion after one year of fixed orthodontic treatment using

the PIDAQ adapted for the Indian population helping us to analyse the psychosocial burden of malocclusion.

MATERIALS AND METHODS

Sample

This interventional study was carried out in Department of Orthodontics, Maulana Azad Institute of Dental Sciences, Delhi, India. The sample size was determined to provide an 80% statistical power in identifying a significant difference in psychosocial impact before and after one year of treatment. A minimum of 60 patients were required for the purpose of statistical significance. The probability of type 1 error was 5%.

Only the participants who had received at least primary level of education were included in the study. Patients with a history of previous orthodontic treatment or any oral disorders such as congenital deformities/missing front teeth/discoLOURED teeth were excluded.

The present study was conducted on 93 patients who required orthodontic treatment and satisfied the inclusion criteria. The sample consisted of 67 adolescents (10-19 years) and 26 young adults (20-35 years); age groups as per the WHO Classification. Revised BG Prasad scale was employed to classify the socioeconomic classes of the participants [8], 46.2% belonged to the upper class, 23.7% upper middle class, 12.9% middle class and 17.2% belonged to the lower middle class.

Tools

Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ): Original version (English language): Assessment of psychosocial impact of malocclusion was done using the PIDAQ [7]. It is a Quality of Life (QoL) instrument developed and validated for orthodontics by Klages U et al., [7,9]. It is a psychometric measure composed of 23 items divided among four subscales: aesthetic concern (3 items), psychological impact (6 items), social impact (8 items), and dental self-confidence (6 items). Each item is scored on a five-point scale ranging from 0 (no impact) to 4 (maximum impact). Most items employed a negative approach, e.g., "I don't like to see my teeth" and "I hide my teeth." Other items had a positive approach, e.g., "I am proud of my teeth" and "I like to show my teeth when I smile." Thus, for positively worded items, the scoring was reversed: 4 =not at all, 3 =a little, 2 =somewhat, 1 =strongly, and 0 =very strongly.

Indian version of the PIDAQ (Hindi language): PIDAQ was developed in English but in order to be used in other countries it was required to be translated and adapted appropriately taking into account the cultural and social aspects of the new region while preserving their psychometric properties. Brazilian, Chinese, Spanish, Nepali, Moroccan and Arabic versions of the PIDAQ have been published [10-14] but the questionnaire is not available in Hindi. Prompted by the importance the questionnaire had acquired globally and the number of people in India that have Hindi as their first language, the original PIDAQ was translated into Hindi language to adapt the PIDAQ for the Indian population. It was validated by back translation and pretest.

Translation

The PIDAQ was first translated into the Hindi language by two orthodontic postgraduate students who were proficient in both English and Hindi languages independently. After a proper discussion, the first draft of translation was formed.

Back translation

The first draft was translated back into English by another orthodontic postgraduate student and an English teacher who had proficiency in both Hindi and English languages. The two members were un-informed of the original scale and blinded to the original PIDAQ. After back translation and comparison, modification was done in certain words. The Hindi version I was thus formed.

Assessment of the translation quality

Two orthodontic specialists and a clinical psychologist gave their comments on the accuracy and clarity of the translation and offered suggestions. Disagreement among the professionals was resolved by discussion until a consensus was reached. Some words were changed into more colloquial Hindi language to make the questionnaire easier to understand and locally more meaningful. The proposed amendments were made so that the back-translated items would come as close as possible to those in the original questionnaire. The Hindi version II was thus formed.

Pretest

Thirty individuals without any orthodontic treatment experience participated in the pretest of the Hindi version II. According to 30 completed questionnaires, appropriate amendments were made and eventually the final Hindi version of PIDAQ was formed.

IOTN [15]: Assessment of self-perception was done using the Aesthetic component (IOTN-AC) and the Dental health component (IOTN-DHC) was used to determine the severity of malocclusion.

Assessment of psychosocial impact of malocclusion

Evaluation of psychosocial impact: All the participants were asked to fill the Hindi version of the PIDAQ before the start of their fixed orthodontic treatment (T1). The questionnaire was self-administered by the patients with the Likert scale to rate the response on a range from 0 (total disagreement) to 4 (total agreement). Each factor score was calculated separately and was obtained by summing the item scores. Higher the score obtained, more is the psychosocial impact; reduction in the scores would mean an improvement/reduction in the psychosocial impact and vice versa. The Socio-demographic profile of the patients was recorded along with the psychosocial assessment.

Assessment of self-perception (IOTN-AC): The patient were presented with ten photographs of the front teeth displaying varying degrees of malocclusion and were asked to indicate which grade of photograph (1-10) they think most closely resembled their own dentition. The ten IOTN-AC grades were combined into three groups: Grades 1-4, Grades 5-7, and Grades 8-10 [15].

The IOTN-DHC was assessed by the examiner at pretreatment. The IOTN-DHC grades were combined into three groups: Grades 1-2 (no/minimal malocclusion), Grade 3 (moderate) and Grades 4-5 (severe malocclusion) [15].

Assessment of the psychosocial impact of malocclusion was again done after one year of orthodontic treatment using an identical Hindi version of PIDAQ (T2). Self-perception of treatment needs was also done by the patients at T2. All paired questionnaires at T1 and T2 for each of the patients were statistically analysed. Association of the socio-demographic factors with the psychosocial impact of malocclusion was also assessed.

STATISTICAL ANALYSIS

The data were organised and statistically analysed using the Statistical Package for the Social Sciences (SPSS for Windows, version 17.0). Descriptive statistics of the clinical features and factors' scores were obtained. A paired t-test was used to evaluate the differences in the mean scores at pre-treatment and at one year of treatment. A nonparametric Kruskal-Wallis test was employed to determine any association between the sociodemographic factors and psychosocial impact. The Wilcoxon sign rank test was used to determine the change in the psychosocial impact within each sociodemographic factor. The p-value equal to or less than 0.05 was taken as statistically significant.

RESULTS

Results have been presented in [Table/Fig-1-5]. An Interventional study was conducted on a sample of 93 patients with a mean age

Factors	T1	T2	Mean reduction (T2 - T1) + SD	95% Confidence interval of the difference		p-value*
	Mean + SD	Mean + SD		Lower	Upper	
Dental self confidence	19.19 ± 5.25	9.66 ± 5.60	9.53 ± 6.73	8.15	10.92	0.001
Social impact	17.01 ± 8.19	8.61 ± 6.31	8.39 ± 7.49	6.85	9.94	0.001
Psychosocial impact	15.29 ± 4.99	7.96 ± 5.47	7.33 ± 6.09	6.08	8.59	0.001
Aesthetic concern	8.10 ± 3.35	3.82 ± 3.34	4.28 ± 3.85	3.49	5.07	0.001
Total PIDAQ score	59.59 ± 16.56	30.04 ± 16.39	29.54 ± 20.08	25.41	33.68	0.001

[Table/Fig-1]: Shows the mean T1 and mean T2 scores and the mean reduction in the factors and the total PIDAQ scores at pretreatment and at one year of fixed orthodontic treatment and the level of significance (n=93).

*p-value<0.001 by paired t-test

Factors	AC : Grade 1-4	AC : Grade 5-7	AC : Grade 8-10	p-value*	AC : Grade 1-4	AC : Grade 5-7	AC : Grade 8-10	p-value*
	T1 (Mean±SD)				Mean reduction (T2 - T1) ± SD			
Dental self confidence	17.64±5.43	20.74±5.58	20.82±4.18	0.007*	7.72±6.11	10.05±7.99	11.86±6.15	0.021*
Social impact	14.68±8.20	17.68±8.72	20.00±6.96	0.019*	5.65±7.56	9.47±6.50	11.73±6.59	0.004*
Psychosocial impact	14.09±4.55	15.26±5.10	17.07±5.14	0.057	5.65±5.66	8.47±6.87	9.06±5.71	0.082
Aesthetic concern	7.09±3.50	9.26±2.44	8.83±3.28	0.040*	2.43±3.49	5.73±3.75	6.06±3.21	0.001*
Total PIDAQ score	53.50±18.15	62.95±14.47	66.40±16.33	0.004*	21.47±1.88	33.73±1.88	38.73±1.83	0.002*

[Table/Fig-2]: Shows the intergroup level of significance of the mean values at pretreatment as well as the mean reduction in the total and factor PIDAQ scores in relation to the IOTN-AC grades (n=93).

*p-value <0.05 by Kruskal Wallis Test

Factors	AC: Grade 1-4	p-value*	AC: Grade 5-7	p-value*	AC: Grade 8-10	p-value*
	Dental self confidence	5.564	0.001	3.424	0.001	4.706
Social impact	4.109	0.001	3.725	0.001	4.684	0.001
Psychosocial impact	4.751	0.001	3.446	0.001	4.724	0.001
Aesthetic concern	3.853	0.001	3.667	0.001	4.465	0.001
Total PIDAQ score	5.311	0.001	3.825	0.001	4.783	0.001

[Table/Fig-3]: Shows the intragroup level of significance of the mean reduction in the total PIDAQ and factor scores in relation to the IOTN-AC grades (n=93).

*p-value <0.01 by Wilcoxon Sign Rank test

Factors	Age Group		p-value	Age Group		p-value
	Adolescent (10 - 19 Years)	Young adults (20-35 Years)		Adolescent (10 - 19 Years)	Young adults (20-35 Years)	
	T1 Mean ±SD	T1 Mean ±SD		Mean reduction (T2 - T1) ± SD	Mean reduction (T2 - T1) ± SD	
Dental self confidence	19.07±5.30	19.50±5.21	0.72	10.53±6.64	6.96±6.37	0.02*
Social impact	16.96±7.98	17.15±8.89	0.91	8.77±7.82	7.42±6.59	0.43
Psychosocial impact	15.42±5.04	14.96±4.90	0.69	7.85±6.01	6.00±6.01	0.19
Aesthetic concern	8.16±3.40	7.92±3.26	0.75	4.74±4.08	3.07±2.92	0.03*
Total PIDAQ score	59.61±16.47	59.54±17.11	0.98	31.91±19.94	23.46±19.50	0.04*

[Table/Fig-4]: Shows the level of significance of the mean values at pretreatment as well as the mean reduction in the total and factor PIDAQ scores in relation to the age group (n=93).

*p-value <0.05 by Kruskal-Wallis Test

of 17.46 years (SD±4.2 years) who required orthodontic treatment. A total of 43 out of 93 were males and 50 females. The Hindi version of the PIDAQ gave the mean total PIDAQ score of 59.59±16.56 (out of 92) at pretreatment. The mean dental self confidence score was 19.19±5.25 (24), social impact score was 17.01±8.19 (32), psychosocial impact score was 15.29±4.99(24), and aesthetic concern score was 8.10±3.35 (12). The difference in the means of the total PIDAQ score was 29.54±20.08 (95% confidence interval=31.1-33.3). The difference in the means of the dental self confidence, social impact, psychosocial impact and aesthetic concern scores was 9.53±6.73 (95% confidence interval=8.15 to 10.92), 8.39±7.49 (6.85 to 9.94), 7.33±6.09 (6.08 to 8.59) and 4.28±3.85 (3.49 to 5.07) respectively. [Table/Fig-2] shows highly significant reductions in the total PIDAQ score and the factors.

At pretreatment, 'dental self-confidence' and 'social impact' factors were found to be highest for subjects with more severe malocclusion i.e., IOTN DHC-Grade 3 and 4 and lowest for IOTN-DHC Grades 1 and 2. According to the IOTN-DHC, 63.4% of the individuals had Grades 4 and 5, 30.1% had Grade 3, and 6.5% had Grades 1 and 2. Of the total sample, 20.4% respondents rated their dental

Factors	GENDER		p-value	GENDER		p-value
	MALE	FEMALE		MALE	FEMALE	
	T1 Mean ±SD	T1 Mean ±SD		Mean reduction (T2 - T1) ± SD	Mean reduction (T2 - T1) ± SD	
Dental self confidence	17.67±5.57	20.50±4.70	0.24	8.41±5.91	10.50±7.28	0.13
Social impact	15.42±8.22	18.38±8.00	0.01*	7.30±7.39	9.34±7.52	0.19
Psychosocial impact	15.02±4.70	15.52±5.25	0.08	7.87±4.96	6.90±6.93	0.46
Aesthetic concern	7.30±3.12	8.78±3.41	0.03*	3.72±3.36	3.36±4.20	0.19
Total PIDAQ score	55.42±15.45	63.18±16.79	0.02*	27.27±15.91	31.50±23.05	0.31

[Table/Fig-5]: Shows the level of significance of the mean values at pretreatment as well as the mean reduction in the total and factor PIDAQ scores in relation to the gender (n=93).

appearance as IOTN-AC Grades 1-4, 35% placed themselves as IOTN-AC Grades 5-7, and 32.3% rated themselves as IOTN-AC Grades 8-10. An 86% subjects had aesthetics as the reason for seeking treatment while the rest had a functional reason. In terms of self perception, at pretreatment the scores were found to be highest for subjects rating themselves as IOTN-AC Grades 8 to 10, and least for those evaluating their dental appearance as IOTN-AC Grades 1-4, being significantly different amongst the groups. [Table/Fig-3] shows the intergroup level of significance of the mean values at pretreatment as well as the mean reduction in the total and factor PIDAQ scores in relation to the IOTN-AC grades while [Table/Fig-4] shows the intragroup level of significance in relation to the IOTN-AC grades. Patients' age and gender were also statistically associated with the mean values at pretreatment and the mean reduction in the total and factor PIDAQ scores [Table/Fig-5].

DISCUSSION

The increased emphasis on inclusion of patient-centred outcome measures in clinical research studies by agencies such as the WHO is one of the many factors that led to an increase in QoL research over the last 40 years. Over the past decade when the more specific concept of OHRQoL appeared, the impact of oral health and disease, malocclusion and treatment for these conditions on psychological and functional well-being drew increased attention from clinicians and researchers. Although, clinical outcomes of orthodontic treatment are well documented, relatively little is known about the psychological aspects. It has been found that improvement in smile aesthetics and subsequent enhancement of psychosocial well-being is the most frequently cited reason for undergoing orthodontic treatment [16,17]. The same was seen in our study with 80% individuals having aesthetics as the reason of seeking orthodontic treatment. The present study was undertaken to prospectively evaluate the psychosocial impact after orthodontic treatment.

Various studies have been done in the past using the different OHRQoL instruments mentioned. Marques LS, et al., used the Oral Impact on Daily Performance (OIDP) instrument to assess the aesthetic impact and the Dental Aesthetic Index (DAI) for clinical assessment [18]. Zhang M, et al., used a Child Perception Questionnaire (CPQ) to determine changes in OHRQoL during fixed orthodontic appliance therapy [19]. Oral health impact profile has been used in various studies to assess OHRQoL and to measure the association between orthodontic treatment need (using the IOTN), sex, age and education level and OHRQoL [20-22]. Sardenberg F et al., also used the CPQ and DAI to test the hypothesis that malocclusion has its impact on Quality of Life [23]. The instruments used in these studies, however, were not directly applicable to orthodontic treatment which is usually confined to correction of asymptomatic deviations from an ideal aesthetic form. Therefore, the PIDAQ was used which is selective and specific to orthodontic aspects of OHRQoL. The original PIDAQ was translated and validated to Hindi language to adapt the PIDAQ for an Indian population.

Psychosocial impact of malocclusion was assessed using the Hindi version of the PIDAQ. At pretreatment, the mean PIDAQ score obtained was 59.59 ± 16.56 indicating that malocclusion has a very strong psychosocial impact in all the patients who participated in the study. All the patients showed a highly reduced dental self-confidence. The high mean scores of the 'social impact' factor highlighted that malocclusion greatly affected the psychological well-being of the patients in social interactions and instilled an inferiority complex in them. The patients showed a high aesthetic concern for their dental appearance.

Our study revealed that individuals with severe malocclusion reported significant 'psychological impact' with reduced 'dental self-confidence' compared to individuals with no or minimal malocclusion as determined by the IOTN-DHC. Hamamci N et al. revealed negative correlations between Turkish university students' awareness of malocclusion and satisfaction with personal dental appearance at the various severity levels of malocclusion [24]. The self-perceived treatment needs of the patients as determined by IOTN-AC were found to be statistically significant with all the four factors of the PIDAQ. Klages U et al., results are in consensus with the present study, with a growing trend of psychosocial well-being along the IOTN-AC spectrum [7,25]. Overall; the present study demonstrated the detrimental effects of altered dental aesthetics on the emotional state of an individual. Onyeaso CO have reported depression related to altered dental aesthetics in 27% of their subjects [26].

The psychosocial impact of malocclusion was assessed prospectively at one year when each patient filled an identical Hindi version of the PIDAQ and gave a self-perception rating. Prospective evaluation was important to understand the importance of orthodontic treatment in improving the patients' psychosocial well-being altered due to their malocclusion. The mean PIDAQ score obtained was 30.04 ± 16.39 . Higher the score obtained, more is the psychosocial impact; reduction in the scores implied a reduction in the psychosocial impact. Highly significant reduction in the PIDAQ score was found with fixed orthodontic therapy during the one year study period (p -value <0.001). In our study, since each patient served as his/her own control, the significant differences in the mean values of the four factor scores at pre- and at one year treatment were extremely reliable. The reduction in psychological impact as assessed by the Hindi version of the PIDAQ can be attributed to the correction of their malocclusion. The findings support the contention that orthodontic treatment not only results in improvement in dental aesthetics but also has a significant impact on the psychological aspects of the patient's life [27,28].

Along with the improvement in the psychosocial impact, a reduction in the self-perceived needs of the individuals was also found

(p -value <0.05). At pretreatment 32.3% individuals self-scored themselves as Grades 8-10 (IOTN AC) which drastically reduced to 3.2% after one year of fixed orthodontic treatment. IOTN-AC Grades 8 to 10 showed the highest reduction in the psychosocial impact followed by Grades 5 to 7. Thus, the IOTN-AC may be considered an effective tool in assessing the psychosocial impact of dental aesthetics.

The results of the present study revealed that the psychosocial impact in individuals was influenced by gender. Females were found to be concerned with their dentofacial appearance. This was in accordance with other studies that found women to be more critical of their perception of impacts of dental aesthetic since males may be less self-conscious about their appearance [4]. De Oliveira CM and Sheiham A study's results are in parallel to ours, with a significantly greater psychosocial impact of malocclusion in women than in men [3]. No association was found between the aesthetic impact of malocclusion and social class though few studies showed a positive relationship [23,29]. The difference may be due to the methods employed to obtain socioeconomic information differ among the relevant studies. In the present study, adolescents showed a significant improvement in the dental self-confidence and the aesthetic concern after one year of fixed orthodontic treatment. Majority of the adolescents in our study (40.2%) had rated themselves as Grades 8-10 on the IOTN-AC scale while only 11.5% of the young adults had such high self-perceived needs and out of these adolescents, 65.7% were females. Thus, female adolescents showed more improvement in the psychosocial impact after one year of orthodontic treatment. Further follow up of the study is desired to assess the psychosocial impact of malocclusion completely.

CONCLUSION

All the patients who participated in the study had a strong psychosocial impact of their malocclusion. They reported significantly more 'psychological impact' with reduced 'dental self-confidence' and hence a worse QoL compared to a group of individuals with no or minimal malocclusion. Results showed a trend of decreasing dental self-confidence with increasingly high social impact and aesthetic concern in individuals having greater self-perceived needs. Females were found to be more concerned with their dentofacial appearance than males.

Prospective evaluation showed significant reduction in the psychosocial impact of malocclusion in all the patients. The patients showed increased self-confidence with a reduced psychological and social impact after one year of fixed orthodontic treatment. There was a reduction in the self-perceived needs of the individuals as well. Female adolescents showed more improvement in the psychosocial impact.

The present study was the first adaptation of the PIDAQ for the Indian population (Hindi version). The results obtained in this study using the Hindi version showed that it is able to capture self-perception of orthodontic aesthetic and treatment need. Ergo, the Hindi version of the PIDAQ adapted for the Indian population can be considered as a useful measure for assessing the psychosocial impact of dental aesthetics related to malocclusion, suggesting that it may be recommended as an OHRQoL assessment tool for the population in India for further research.

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