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Perception – A comparison of professional assessments- A pilot study

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Abstract

Introduction: Beauty and aesthetics are subjective phenomenon. In orthodontics, beauty is collaborated with function and a compromised function is known to lead towards detrimental effects in the long term. The measurement of aesthetics in orthodontics is through the Index of Orthodontic Treatment Need (IOTN). This is a universal scale which is easy to use for all professionals dealing with child care.

Material and Methods: A cross-sectional validation study was conducted in the dental clinics of Karachi at Aga Khan University Hospital, Jinnah Medical and Dental College and Fatima Jinnah Dental College on a sample size of 17 professionals from July to August 2012. Each subject was shown a set of 32 pictures which they scored against the aesthetic component of the IOTN. The principal investigator assessed the normative score from the study casts using the IOTN-DHC. Data collected was analyzed using Kruskal- Wallis, Bland- Altmann, Paired sample t- test and Kappa Cohen's. Intra examiner reliability was assessed using Spearman's correlation.

Results: The sample size consisted of 24% males (mean age 28.25±2.06 years), and 76% females ((mean age 31.92±9.19 years). A statistically significant difference was obtained between orthodontists', pedodontists' and restorative dentists perception for a single image (p- value 0.005). Similarly a difference in perception of the three groups with normative need (p- value- 0.002 [orthodontists], 0.03 [pedodontists], 0.05 [restorative dentists]); was also obtained.

Conclusions:

- There is no significant difference in perception between orthodontists, pedodontists and restorative dentists.
- Orthodontists, pedodontists and restorative dentists overestimate the patients' pretreatment condition as compared to normative treatment need.

Keywords: Treatment need; aesthetics; beauty

Introduction

Team work towards optimum patient care is an integral part of health care profession. Team work also requires that all concerned in patient care should have a mutual and agreed-upon diagnosis of presenting conditions. This allows timely referrals which leads towards timely intervention and hence proper care and management of presenting condition.

Esthetics has always been recognized as the mainstay of orthodontic treatment. Nevertheless, the timing for prompt treatment has been a cause of concern. Treatment of growing patients is always a race against time. Literature review shows that although early initiation of treatment through preventive and interceptive procedures simplifies corrective orthodontics but it may also increase treatment duration.[1,2] This is a cause of concern as it may lead towards patient burnout. However, conditions such as posterior crossbite in deciduous dentition requires early intervention as they increase the risk of facial

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asymmetries.[3] Similarly, Leighton [4,5] in his study found that crowding in deciduous dentition always results in crowding in permanent dentition, hence requiring early treatment.[6]

Hence the question arises, can visual examination of the dentitions by non orthodontists be a reliable method to identify developing malocclusions and make referrals to the orthodontists?

Orthodontics in Pakistan is still in its infancy and the ratio of number of orthodontic specialists and general dental practitioners (GDP) to dental patients and referrals made to them by GDPs is unknown. This is a limiting factor as studies conducted have shown that the number of potential orthodontic patients ranges from 40-60 %. [7,8]

A child's first dental visit can commence at any age between 7-11 years.[9] Children are primarily seen either first hand by GDP or may be referred to GDPs by medical practitioners.[10] The most common presenting complaint is toothache.[10] If a developing malocclusion is detected at this age, a prompt referral should be made. An early intervention, though associated with prolonged treatment duration, is also associated with high level of patient cooperation as children at this age try to please adults and gain acceptance from peers.[9]

Although several indices have been developed over the years, the visual and subjective assessment is done by the Aesthetic Component of the Index of Orthodontic Treatment Need (IOTN-AC). This component was developed from the Standardized Continuum of Aesthetic Need.[11] The IOTN was developed by Brook and Shaw [12] with the objective to measure treatment need priority. The second component of the IOTN, the Dental Health Component (IOTN-DHC) is used to provide a more objective assessment of the presenting malocclusion.

The focus of the present study is to assess the level of perception of malocclusion at an early age by pedodontists and restorative dentists along with the orthodontists using the IOTN-AC. The hypothesis is that there is no difference in perception of detection of malocclusion between the three groups. An early detection of malocclusion will allow prompt referrals and better treatment outcomes.

Material and Methods

This study primarily focused on the perception of malocclusion of pedodontists and restorative dentists in comparison with the orthodontists. The Helsinki Declaration[13] to protect patients' identity was adhered to. Verbal informed consent was taken from all test subjects and the confidentiality of the test subjects was maintained.

This study primarily focused on the perception of malocclusion of pedodontists and restorative dentists. As this was a pilot study, no proper sample size calculation was done. Also the pedodontist group consisted of only 2 pedodontists (Aga Khan University Hospital [AKUH] and Jinnah Medical and Dental College [JMDC]) working in the city of Karachi. This further limited the sample size of one group in our study. The other two groups consisted of orthodontic and operative dentistry residents and consultants at AKUH and one operative dentistry consultant at Fatima Jinnah Dental College [FJDC]. Hence a convenience sampling technique was used. The duration of this study was from July to August 2012 and a validation study design was used.

Perception was measured using IOTN-AC and correlating it with IOTN-DHC for each group. Orthodontic photographic records from year 2002-2012 were scanned to select intra-oral frontal pictures of patients in late mixed dentition. This was determined visually by the presence of either primary canines or first and second molars in one or both of the arches. Hence, records of patients in the primary to mixed dentition stage between the ages of 6-11 years (as determined

from orthodontic record files) were included into the study. Patients presenting with craniofacial anomalies or syndromes or compromised medical histories were not taken into consideration. From a total of 1407 records, 31 pictures were selected (Figure 1) which were arranged into a presentation using Microsoft Office Windows Power Point Version 2007®. Each slide consisted of one colored intra oral frontal picture on left along with the IOTN-AC scale on the right against a black background. A black background was chosen in order to enhance the color of the pictures. Each slide was shown for 30 seconds to all subjects. The IOTN-DHC was recorded by the principal investigator.

Data collected was analyzed using Statistical Package for Social Sciences Version 19.0 (SPSS Version 19.0 Chicago, Inc.). Groups were formed based on treatment need with IOTN-AC divided into three groups for Mild (Grades1-4), Moderate (Grades 5-7) and Severe (Grades 8-10). The normative categorization of IOTN-DHC included Grades 1-2 as Mild, Grade 3 as Moderate, and Grade 4-5 as Severe. Descriptive statistics were calculated for age, gender, IOTN-AC and DHC. Means and standard deviations for the age of patients were also determined. For the purpose of investigating the perception, Kruskall- Wallis test; Bland-Altmann test and Kappa Cohen's test; and, Paired t-test were applied. Kruskall- Wallis was used to assess the level of difference in perception among the three groups. Bland-Altmann test and Kappa Cohen's test were used to assess the level of agreement of perception of each of the three groups with IOTN-DHC. Paired t- test was used to assess the difference in perception of each group with normative treatment need. Intra-examiner reliability of the principal investigator was done using Spearman's Correlation. A *p* value of less than or equal to 0.05 was taken as statistically significant.

Results

Overall the sample size consisted of 17 subjects of which there were 8 orthodontists, 2 pedodontists and 7 restorative dentists. There were 4 males (mean age- 28.25±2.06 years) and 13 females (mean age- 31.92± 9.19 years).

The key results of this empirical study show a statistically significant difference in perception between the three groups for picture labeled "002-11" (p value- 0.005). Other than that, no significant difference in perception among the three groups was obtained, as shown in Figure 2.

Bland- Altmann was used to assess the agreement between the three groups with IOTN-DHC. As the magnitude of the IOTN-DHC increased, the difference with perception of each group became larger as well. Hence, no agreement was found between the perception of the orthodontists, restorative dentists and pedodontists with normative treatment need (Figure 3-5). This was further investigated using Kappa Cohen's test. While a poor agreement was obtained for restorative dentists (k-0.073; p-0.05); a slight level of agreement was obtained for orthodontists (k-0.111, p- 0.002) and, pedodontists (k-0.151, p-0.03), as shown in Table I.[14]

Data were further analyzed using Paired t-test to assess the difference in perception of orthodontists, pedodontists and restorative dentists with IOTN-DHC. A statistically significant difference in perception of the three groups was obtained, as shown in Table II.

A secondary set of results was also generated in this study. Frequency of treatment need was noted by forming three groups (as mentioned in Materials and Methods). While the orthodontists identified 36.2% patients in moderate treatment treatment need, the pedodontist and the operative dentists identified 43.8% and 42.9% patients as mild treatment need, respectively.

This is in contrast to the IOTN-DHC which identified 65.4% as severe treatment need (Figure 6). Overjet was identified as the occlusal trait of highest frequency, as shown in Table III.

Intra-examiner reliability of the principal investigator was determined for IOTN-DHC. 15 cases were randomly selected and were evaluated and re-evaluated after an interval of 15 days. Spearman's Correlation test was used and a strong correlation was obtained (r-0.931).

Table I: Agreement of Perception with normative treatment need

	IOTN-DHC Score		
IOTN-AC Score	Group	Measure of agreement (k)	*p*-value
	Orthodontists	0.111	0.002**
	Pediatric Dentists	0.151	0.03*
	Restorative Dentists	0.073	0.05*

N=17
Kappa- Cohen's Test
**p value ≤ 0.05*
***p value ≤ 0.001*

Table II: Comparison of perception with normative treatment need

	IOTN-AC	IOTN-DHC	*p*-value
Orthodontists	6.00±2.47	3.79±0.99	0.001**
Pediatric Dentists	5.25±2.62	3.75±1.04	0.001**
Restorative Dentists	5.50±2.67	3.77±1.00	0.012*

N= 17
Paired sample *t*-test
*p-value ≤ 0.05**
*p-value ≤ 0.001***

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Table III: Frequency of occlusal traits leading to increased severity of malocclusion

IOTN-DHC	Frequency	Percentage	Occlusal Trait	Frequency	Percentage
1	1	3.1	x	1	3.1
2	1	3.1	a	21	65.6
3	8	25	c	2	6.3
4	14	43.8	d	2	6.3
5	8	25	e	2	6.3
			i	4	12.5
n	**32**	**100**		**32**	**100**

x- no identifiable occlusal trait as IOTN-DHC recognized them in Grade 1

Discussion

Of the 31 pictures shown, a difference in perception was obtained for one picture only. A possible reason is that while the orthodontists scored higher on basis of increased overjet, the other two groups gave a lower score due to regular alignment of teeth. However, the results of the present study retain the hypothesis as stated earlier. This is important as it shows that the ability of non-orthodontists to detect malocclusions is almost at par with the orthodontists. Hence, this lays ground work on whether a referral would be considered or not.

The level of agreement of perception of the three groups with IOTN-DHC showed weak results. This states that perception alone is not the only deciding factor, an objective assessment is thus mandatory as well. Study conducted by Bentele et al[15] on final year dental students showed that students trained in IOTN index are better at identifying treatment needs than the control/untrained group (k-0.623±0.038 ,$p < 0.05$). Thus, the IOTN should be taught in final year dental

Figure 1: Intra oral Frontal Pictures

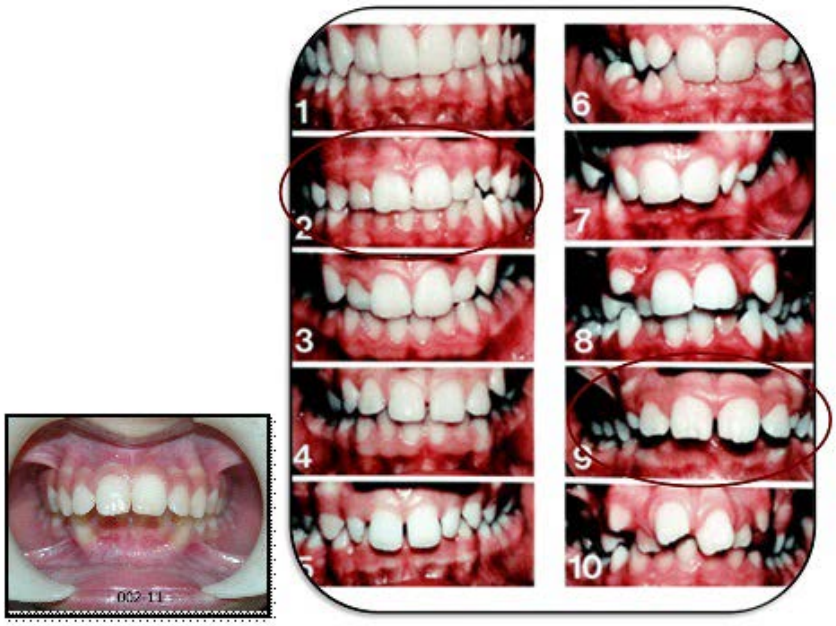

Figure 2: Comparison of perception between orthodontists, pediatric dentists and restorative dentists

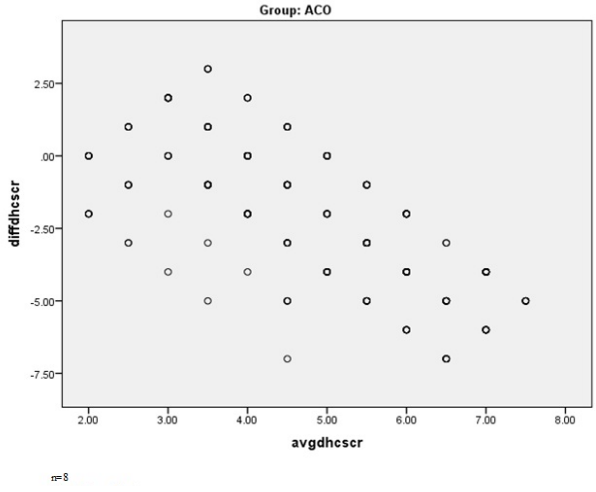

Figure 3: Comparison of Perception of Orthodontists with IOTN-DHC

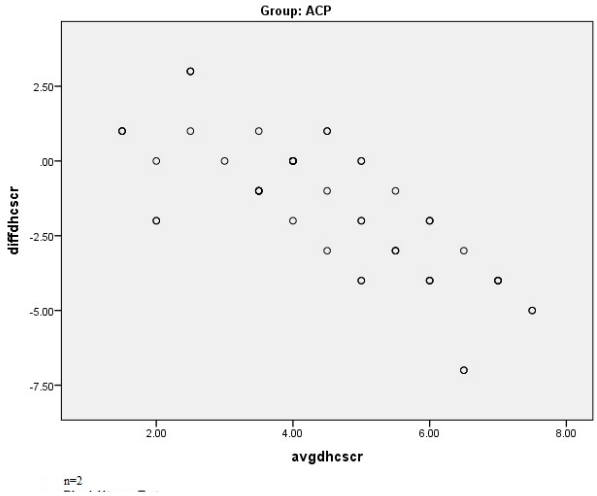

Figure 4: Comparison of perception of pedodontists with IOTN-DHC

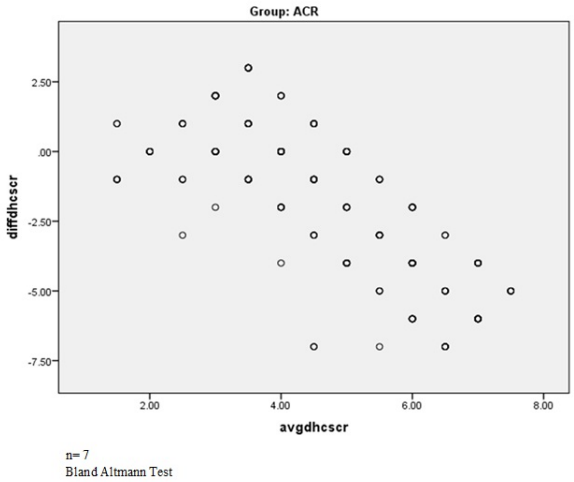

Figure 5: Comparison of perception of restorative dentists with IOTN-DHC

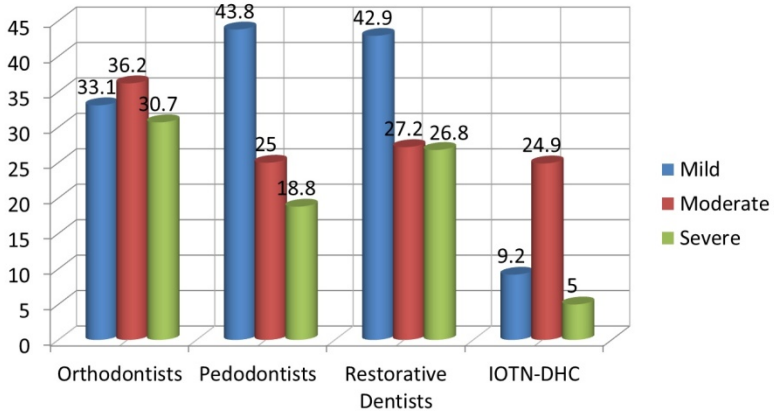

Figure 6: Comparison between orthodontist, pedodontists and restorative dentists perception with IOTN-DHC

curriculum and its use in general dental practice as a diagnostic tool should be encouraged. This will allow better identification of malocclusion and treatment needs by non-orthodontic professionals. Patients in greater need will be identified timely and hence prompt treatment can be done with better treatment outcomes. A cause of concern arises if an orthodontist overestimates a presenting condition. Thus the present study recommends that an orthodontist's decision should be based on objective assessments more rather than visual inspection.

While the orthodontists identified patients' treatment needs almost equally for mild, moderate and severe groups, the pediatric and operative dentists had a predilection for mild treatment need. Christopherson et al[16] in their study conducted on pediatric residents showed that subjectively 16.7% and objectively, 17.1% patients examined between the ages of 8-11 years had definite treatment need. The pediatric consultants in the present study identified 18.8% children between the ages of 6-11 years as severe treatment need. While the pediatric residents had been validated in the use of the IOTN, the pediatric consultants had not received training in the use of the index in the present study. However, while the pediatric residents had also used the IOTN-DHC, the pediatric consultants in the present study did not.

Study conducted by Tausche et al[17] using the IOTN on children between the ages of 6-8 years found deep overjet (46.2%) and overbite (37.5%) (greater than 3.5 mm) to the cause for increase in severity of presenting malocclusion. Similarly, a greater treatment need was also shown with IOTN-DHC grade greater than equal to Grade 4 (26.2%). This is in concurrence with the present study which found that overjet to be the common occlusal trait (65.6%) and along with IOTN-DHC grade 4 and above (43.8%) in the mixed dentition.

The present study being a pilot study had several limitations. The test subjects were not assessed on their experience of working with children. Prior to availability of pedodontists, all children were treated either by restorative dentists or GDPs. Another limitation of the present study was that GDPs were not taken into consideration. This is significant as the highest numbers of children are more likely to be seen by them. The referrals to orthodontists after identification of treatment needs and severity of malocclusions were not taken into consideration either.

Hence the following recommendations are made:

1. Use of results of present study to calculate sample size
2. Inclusion of general dentists into study
3. Query on number of children presenting to practice daily and experience of working with children
4. Number of referrals made to orthodontists
5. Inclusion of IOTN training in final year dental curriculum
6. Incorporation of IOTN into daily practice to identify orthodontic treatment needs of patients to allow timely interventions
7. Query on traits that lead towards orthodontic treatment needs should always be taken into consideration

Conclusions

- There is no significant difference in perception between orthodontists, pedodontists and restorative dentists
- Orthodontists, pedodontists, restorative dentists overestimate the patients' pretreatment condition as compared to normative treatment need

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