

The Assessment of Orthodontically Treated Cases Using the Dental Parameters by Index of Complexity, Outcome and Need.

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Abstract: **Aim:** The study aimed to assess the pre-treatment and post-treatment dental components of orthodontically treated patients by using Index of Complexity, Outcome and Need (ICON). **Material and Method:** 100 dental study casts of both pre-treatment and post-treatment ranging the age from 13-25 years were selected from the record room of Department of Orthodontics, Saraswati Dental College and Hospital, Lucknow. These 100 sets were further divided into 47 males and 53 females. All the datas were collected according to the ICON scoring system. **Statistical Analysis:** The datas were analyzed statistically using Wilcoxon signed rank test and paired t- test. **Result:** Results showed some of the malocclusion trait appeared more frequently in males than in females. **Conclusion:** It was concluded that the need of treatment was found more in males than in females.

Key Words: Index of Complexity Outcome and Need; Index of Orthodontic Treatment Need, Peer Assessment Rating

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I. Introduction

Since years orthodontic treatment has played an important role in improving the oral health, function, facial aesthetics. The correct patient identification in need of orthodontic treatment allows interceptive treatments to prevent the increase in the severity of the disorders and the need for more complex and expensive corrective orthodontic treatment.¹ The changes achieved by orthodontic treatment can be assessed by orthodontist by analyzing the treatment.²

Due to the multiplicity of measurement methods and the difficulty in standardising criteria the concerns were expressed about the lack of suitable methods of recording malocclusion. Since then a constant effort has been made to develop the indices help in assessing the need for treatment.³ Occlusal indices have been widely used as a method of achieving a more uniform evaluation of orthodontic treatment need for many years. Some examples of these indices are Grainger's Treatment Priority Index (1967), Salzmann's Handicapping Malocclusion Assessment Record (1968) and Summer's Occlusal Index (1971). Additionally some authors have described the recently developed orthodontic indices that are being used in orthodontic treatment need, priority, and evaluation of treatment success, Index of Orthodontic Treatment Need (IOTN), Peer Assessment Rating (PAR) and Index of Complexity, Outcome and Need (ICON) are some of them.⁴

The IOTN, originally named the Index of Orthodontic Treatment Priority, was suggested by Evans and Shaw^{5,6} in 1987. IOTN is used for epidemiological purpose and to determine individual need for orthodontic treatment. The PAR belonged to the group of indices of orthodontic treatment outcome. British Standards Working Party was responsible for development of PAR in 1992⁷. Because of the limitations of these indices the Index of Complexity, Outcome and Need was introduced.

The ICON had been developed to assess the need for treatment, treatment complexity and outcome and was based on the general consensus of 97 orthodontists across the globe. It had been developed by **Daniels C and Richmond S** in 2000⁸. Because it is both an index of treatment need and an occlusal index of malocclusion severity, the ICON offers significant advantages over other indices of treatment need.

As the ICON index is easy to use, it is undertaken in this study for assessing the pre-treatment and post-treatment study models for the treatment need and outcome by assessing the dental parameters.

II. Material And Methods

The study was conducted in the Department of Orthodontics and Dentofacial Orthopaedics, Saraswati Dental College, Lucknow. 100 sets of pre-treatment and post-treatment study models were selected which fulfilled the inclusion criteria. These casts were further divided into 47 males and 53 females.

The inclusion criteria for the study was:-

- Age group between 13 years to 25 years
- Fully erupted permanent dentition (with the exception of third molars)
- No history of previous orthodontic treatment
- Complete set of records

Exclusion criteria for case file set:-

- Missing and impacted tooth
- History of previous orthodontic/Orthognathic treatment
- Patients with TMJ problems and craniofacial syndromes
- Patients with facial trauma and asymmetries
- Patients with systemic disease

For the evaluation of dental component, each set of dental models were occluded in the maximum intercuspation and value of each component upper arch crowding/spacing, the presence of crossbite, anterior vertical relationship (over bite / openbite), and buccal segment interdigitation were calibrated according to the ICON scoring system as stated by the author of ICON⁸ and the tabulation of the data were done on the score sheet for both pre-treatment and post-treatment.

III. Reliability Analysis

To control the errors in calculating the score, Dahlberg's formula was applied. For reliability analysis 50 sets of randomly selected study models were taken. For all the parameters, the Dahlberg's error was < 0.5 mm which is well below the acceptability criteria of 0.5 mm, hence the observation was considered normal.

Statistical Analytic Method

The results were analyzed using descriptive statistics and making comparisons among pre treatment and post-treatment scores. The Wilcoxon signed rank test and paired t- Test was used for statistical analysis.

Parameter	OVERALL				MALE				FEMALE			
	Pre Treatment		Post Treatment		Pre Treatment		Post Treatment		Pre Treatment		Post Treatment	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Upper-ARCH CROWDING	5.85	6.20	0.10	0.70	5.96	6.81	0.00	0.00	5.75	5.67	0.19	0.96
Lower-ARCH CROWDING	6.90	5.11	0.25	1.10	6.81	5.26	0.11	0.73	6.98	5.03	0.38	1.33
Upper-SPACING	2.80	4.68	0.10	0.70	2.77	4.76	0.21	1.02	2.83	4.65	0.00	0.00
Lower-SPACING	0.95	2.53	0.00	0.00	1.28	3.21	0.00	0.00	0.66	1.71	0.00	0.00
CROSSBITE	0.42	1.05	0.00	0.00	0.57	1.19	0.00	0.00	0.28	0.89	0.00	0.00
OPEN BITE	0.88	2.88	0.00	0.00	0.51	1.98	0.00	0.00	1.21	3.47	0.00	0.00
OVER BITE	5.36	3.13	2.84	1.99	5.45	2.94	2.98	1.95	5.28	3.31	2.72	2.04
Righth-BUCCAL SEGMENT	3.09	2.64	1.11	2.07	3.26	2.57	1.15	2.13	2.94	2.73	1.08	2.05
left-BUCCAL SEGMENT	3.48	2.62	1.56	2.39	2.87	2.72	0.96	1.89	4.02	2.42	2.09	2.67

IV. Result & Discussion

The study was conducted in the Department of Orthodontics and Dentofacial Orthopaedics, Saraswati Dental College, Lucknow. A total 100 pairs of pre and post treatment records following the age of 13 years to 25 years with good periodontal status that fulfilled the inclusion criteria were selected for this study from the record room of the department. The records were further divided into 47 males and 53 females. The study aimed in assessing the pre and post treatment study models for the treatment need and outcome by using the index ICON.

Various indices have been used for the assessment of orthodontic treatment need and treatment outcome. In order to have a standardized system, it would be ideal to have an index that covered both the purposes. Such an index has been proposed in form of ICON. It is a pliable index and easy to use. It is the first index based on the average opinion of a large panel of international orthodontic opinions. ICON was developed to enable assessments of treatment need and outcome using a set of five occlusal traits and for this reason it offers clear advances on the currently used methods IOTN and PAR. **Fox N A**⁹ carried out a study to find correlation among PAR, IOTN and ICON in terms of orthodontic treatment need and outcome and also to establish whether or not ICON could replace these indices as a measure of orthodontic treatment complexity, outcome and need. The study concluded that a significant co-relations existed between ICON, IOTN and PAR and also that ICON may effectively replace PAR and IOTN as a means of determining need and outcome.⁹

The results showed the comparison of pre-treatment and post-treatment values of dental component. The difference between pre and post treatment values was found to be highly significant $P < 0.001$ among males and females.

The study showed that around 65% of the study population presented with crowding. This was in harmony with the studies carried out by **Bhardwaj VK, Veeresha KL and Sharma KR**¹⁰ were 62.41% of the subjects presented with crowding. Presence of dental crowding in the present study differs with that published in the international literature. It is greater than that found in Nigerians 33.6% by **Onyeano CO**¹¹ but lesser than those found in Peruvians 90.6% by **Bernabe and Flores –Mir**¹²

The results of both the upper and lower arch crowding if observed according to the study done signified that the incidence of lower arch crowding is slightly higher than that of upper arch crowding. The observation supported the study carried out by **Agarwal S S, Jayan B and Chopra SS**¹³ who observed a lower anterior crowding prevalence of 34.09% in their study. **Tak M et al.**¹⁴ observed in their study carried out among school children of Udaipur city, Rajasthan that the prevalence of malocclusion specially anterior crowding have significant difference with greater prevalence among the males than in females.

The study found that the spacing was present in 33% which was more than that compared to **Bhardwaj et al.**¹⁰ who found spacing present in 29.59% of their study subjects of Shimla city. **Shivakumar et al.**¹⁵ recorded spacing in 26.5% of the subjects of their study population group.

This study indicated a lesser incidence of crossbite when compared to crowding. **Kaur H**¹⁶ studied the prevalence of malocclusion among 2,400 adolescents in Karnataka state, India. The study observed that anterior crossbite was present in 8.48% of subjects while the posterior crossbite was present in 0.99% which were found to be very less when compared to the prevalence of crowding which was of 57.69%.

The study showed that around 3% of the study sample presented with anterior openbite. Lesser prevalence of anterior openbite was found in studies done on Indian population groups, **Kumar et al**¹⁷ found it in 1% of their study population of Davangere children, **Bhardwaj et al.**¹⁰ found it in 0.97% and **Tak M et al.**¹⁴ found it in 2.5% of their study population group.

Agarwal SS and Jayan B¹³ through their overview of studies on malocclusion trait in India reported that the prevalence of class I malocclusion was 43.6%, Class II 9.8% and class III 3.4%. No significant gender difference was observed. The studies presented clearly reported the prevalence of Class I malocclusion was more in North Indian population as compared to Class III malocclusion which is more prevalent in South India. The result of the study was no different from these studies. Most of the population in the given sample appeared with Class I malocclusion followed with Class II and a very less number were found exhibiting Class III malocclusion.

V. Conclusion

The present study concluded that ICON index is an easy way of assessing the treatment need and the treatment outcome. It is a simple and reliable index.

The study revealed that ICON index can be considered comprehensive enough for assessing the malocclusal traits. The frequency and severity of malocclusion observed was slightly more in males than females. As compared to females, males had higher mean scores for pre-treatment of the dental components such as in crowding, spacing and openbite.

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