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Research Article

**EVALUATION OF ORTHODONTIC STATUS AND TREATMENT NEED
IN PATIENTS REPORTING TO ORTHODONTIC DEPARTMENT OF
KRL GENERAL HOSPITAL, ISLAMABAD: AN EPIDEMIOLOGICAL
STUDY USING DENTAL AESTHETIC INDEX (DAI)**

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Abstract:

Objective: The study was done to evaluate the malocclusion status and its impact on aesthetics, using the DAI to assess the treatment need in patients reporting to Dental Department of KRL Hospital Islamabad.

Study Design: Retrospective, Descriptive, and cross sectional.

Place and Duration: The study was carried out in the Dental Department of KRL Hospital, Islamabad.

Material and Methods: Using the Dental Aesthetics Index (DAI) to observe and quantify the occlusal characteristics and to designate the extent of malocclusion. The data was analyzed using Statistical Package for Social Sciences Software for Windows version 22.0 (SPSS Inc, Chicago, III).

Results: There were a total of 120 individuals included in the study for which the descriptive stats showed that 51 need minor treatment, 22 lie in the moderate treatment need category, 21 in severe treatment need and 26 in very severe treatment need categories. One-way ANOVA was conducted between the groups divided on the basis of DAI Scores i.e. Minor Treatment Need, Moderate Treatment Need, Severe Treatment Need and Very Severe Treatment Need. The one-way ANOVA results were then assigned group wise to determine whether the treatment need is significant or not. It was determined that all categories fell under the result of insignificant need for treatment.

Conclusion: In conclusion, we can determine that the DAI is an important index in the prevention, intervention, and treatment planning of the orthodontic problems on a very nascent level. This makes it an important tool for diagnostic purposes in the Pakistani population. It is efficient and descriptive in its scoring methodology and ease of use.

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INTRODUCTION:

Primarily most patients who seek orthodontic treatment do it for aesthetic purposes. The purpose of orthodontic treatment is to focus on occlusion and function as well, besides just aesthetics.¹ The reason aesthetics are an important deciding factor in initiation of orthodontic treatment is because of the social and psychological factors associated ³ with aesthetic distortion due to malocclusion. Malocclusion is defined as the disorientation of teeth from the normal. Various indices exist to find out the deviation of occlusion from standard in order to help orthodontists in reaching a substantial treatment goal. These indices help with the assessment of malocclusion, and categorizing it on the basis of treatment needed. Of all the indices that have come to be accepted, the Dental Aesthetic Index (DAI) ⁵ is the most commonly used index, and is adopted by the World Health Organization (WHO) due to its simplicity and

ease of use. It was established by Cons et al in 1986 that encompasses various aspects of treating malocclusion on a holistic level 6-9. Its universality is determined by how commonly it is used now.

The DAI is a score based analytical index which takes aesthetics, occlusion and clinical observations and quantifies them according to different scores. For these, the aesthetics are determined according to the social norms, and the occlusion according to Angle's classification of malocclusion⁷⁻⁸. Upon completion of the evaluation of the patient according to the DAI, the total scores are calculated according to the degree of severity. A score of 25 or less designates a need for either no treatment, or minor treatment ³. A score between 26 to 30 implies an elective treatment might be requires ⁴. For scores between 31-35, treatment becomes highly desirable. For scores of 36 and above, treatment becomes essential.

Table**1****Table 1.** Standard DAI Regression Equation

	DAI Components	Rounded Weight
1	Number of missing visible teeth (incisors, Canines and premolars teeth in the maxillary and mandibular arches)	6
2	Crowding in the incisal segments: (0 = no segment crowded, 1 = one segments crowded, 2 = two segment crowded)	1
3	Spacing in the incisal segments: (0 = no spacing, 1 = one segment spaced, 2 = two segment spaced)	1
4	Midline diastema, in millimeters	3
5	Largest anterior maxillary irregularity, in millimeters	1
6	Largest anterior mandibular irregularity, in millimeters	1
7	Anterior maxillary overjet, in millimeters	2
8	Anterior mandibular overjet, in millimeters	4
9	Vertical anterior open bite, in millimeters	4
10	Anteroposterior molar relationship, largest deviation from normal either left or right: (0 = normal, 1 = 1/2 cusp either mesial or distal, 2 = one full cusp or more either mesial or distal)	3
11	Constant	13
	Total	DAI Score

Due to the convenience of the DAI in the diagnosis of malocclusion and its indexing, the DAI can be used in primary and secondary care hospitals in third world countries like Pakistan, following the referral of the patient to either a tertiary care hospital with Orthodontic facilities, or an independently practicing orthodontist ⁹. Thus, the purpose of the study was to evaluate the malocclusion status and its impact on aesthetics, assed using the DAI. The research was done on the orthodontic status and treatment need in patients reporting to Dental Department of KRL Hospital Islamabad.

Aims and Objectives:

The study was conducted in Orthodontics Department of KRL Hospital . The study design was retrospective and we were to evaluate the malocclusion severity levels, their distribution, and their treatment needs.

Our specific objectives were

1. To determine the extent of malocclusion.
2. To determine what patients come under the umbrella of treatment need.
3. To evaluate need-based orthodontic treatment on the basis of DAI.

Purpose of the study:

Pakistan's annual budget allocation for healthcare is not enough to cover the basic healthcare needs of patients who are dependent on government facilitated healthcare. Factoring dental treatment into this, on a primary healthcare level, most of the patients requiring dental treatment are deprived of facilities to even diagnose malocclusion. Thus, we conducted this study to see the prevalence of malocclusion and how DAI is a universally accepted diagnostic index which can be used even in rural areas because of its simplicity and ease of use.

MATERIAL AND METHOD:**Study Design:**

Our study design was descriptive, retrospective, and cross-sectional.

Sample:

The sample size was calculated using the WHO calculator. According to our reference articles the population proportion of the patients seeking treatment was calculated as 0.72 with a precision of 10% and level of significance was set at 5%. According to this, minimum sample size required to test our hypothesis should be more than 80. So we took a sample size of 120 patients – randomly selected from the outpatient department of KRL Hospital's Orthodontic Unit of Dental Department. The age range in the sample size of the patients was between 12 to 70 years.

Method:

We used the Dental Aesthetics Index to analyze the occlusal characteristics and to weigh the extent of malocclusion by using study casts. DAI consists of ten occlusal traits for assessing and quantification of malocclusion. The first step is to observe the number of missing teeth in the casts. This was given a score of 6. The second component of DAI was to evaluate crowding in the anterior/incisal segment which was assigned a score of 1. After that, spacing was inspected in the incisal segment which was scored as 0 having no spacing, 1 designating a lone space in just one segment, and two was assigned to spacing in

Table 2

DAI Score	Severity Level	Treatment Need
≤25	Normal or minor malocclusion	No treatment need or slight need
26 – 30	Definite malocclusion	Treatment elective
31 – 35	Severe malocclusion	Treatment highly desirable
≥36	Very severe (handicapping) malocclusion	Treatment mandatory

According to our study, the individuals needing

two or more than two segments. A score for 4 was assigned to midline diastema, having a weightage of 3. The fifth and sixth components of DIA correspond to misalignment in the anterior segment of maxillary and mandibular dentition respectively. This component is assigned a score of 1. The seventh and eighth portion of the DAI respectively deal with overjet in the maxillary segment having a score of two and mandibular segment having a score of 4. The ninth component consists of anterior open bite with a measuring score of 4. The tenth component uses Angle's classification of molar relationship to determine the scores. If the molar relationship is normal then we assign a score of 0. A score of 1 designates half cusp Class II or Class III, whereas 2 signifies full cusp Class II or Class III.

The scores of all these components were tabulated and multiplied by previously assigned weightage as per the DAI and a constant was added to get to the final DAI score of each study model.

Statistical Analysis:

We used Statistical Package for Social Sciences Software for Windows version 22.0 (SPSS Inc, Chicago, III) for our studies by inputting the data we had collected and comparing it to the DAI.

The data that we gained was evaluated for descriptive statistics like percentage frequencies of qualitative and quantitative variables. Mean, standard deviation, and frequencies were calculated for all the DAI scores. Each DAI component was compared using the one-way ANOVA test. A value of P less than 0.05 was considered as the significant level.

RESULTS:

Out of total 120 individuals that were included in the study, the descriptive stats showed that 51 individuals fall into the category of minor treatment need, 22 in the moderate treatment need, 21 in severe treatment need and 26 in very severe treatment need; according to the DAI scoring criteria, as shown in in Table 1 below.

minor treatment ranged from a minimum age of 8 to

a maximum of 25, having a mean of 17.4. Those patients who needed moderate treatment fell under the range of minimum being 26 to a maximum of 30, with a mean of 28. The category needing severe treatment had a minimum age of 31 and a maximum

of 35, with the mean being 32.5. The patients with very severe treatment need ranged from the minimum age of 37 to 46, with a mean of 40.8 of all the subjects included in our study, the age ranged between twelve to seventy, with a mean of 40.35.

Table 3

	N	Minimum	Maximum	Mean
Minor treatment need	51	8.00	25.00	17.4118
Moderate treatment need	22	26.00	30.00	28.0909
Severe treatment need	21	31.00	35.00	32.5238
Very Severe treatment need	26	37.00	46.00	40.8846
age	120	12.00	70.00	40.3500
gender	120	1.00	2.00	1.4417

Gender wise distribution of our study showed that in men, the number of males who needed no or minor treatment were 30 with a mean of 17 and a Standard Deviation (SD) of ± 4.5 . Those 16 men who needed moderate treatment had a mean age of 27.8 with a SD

of ± 1.5 . Men who fell under the severe treatment need category were 15 in number, having a mean age of 32.3 and a SD of ± 1.44 . The 18 males who were categorized as having severe treatment need had a mean age of 40.9, with a SD of ± 3.1 .

Table 4
Comparison Of Means

gender		Minor Treatment Need	Moderate Treatment Need	Severe Treatment Need	Very Severe Treatment Need
male	Mean	17.1000	27.8750	32.3333	40.9444
	N	30	16	15	18
	Std. Deviation	4.57391	1.50000	1.44749	3.17105
female	Mean	17.8571	28.6667	33.0000	40.7500
	N	21	6	6	8
	Std. Deviation	4.06553	1.03280	1.54919	2.60494
Total	Mean	17.4118	28.0909	32.5238	40.8846
	N	51	22	21	26
	Std. Deviation	4.34592	1.41115	1.47034	2.95739

One-way ANOVA was conducted between the groups divided on the basis of DAI Scores i.e. Minor Treatment Need, Moderate Treatment Need, Severe Treatment Need and Very Severe Treatment Need.

The one-way ANOVA results were then assigned group wise to determine whether the treatment need is significant or not.

Table 5

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Minor Treatment Need	Between Groups	7.082	1	7.082	.370	.546
	Within Groups	937.271	49	19.128		
	Total	944.353	50			
Moderate Treatment Need	Between Groups	2.735	1	2.735	1.399	.251
	Within Groups	39.083	20	1.954		
	Total	41.818	21			
Severe Treatment Need	Between Groups	1.905	1	1.905	.876	.361
	Within Groups	41.333	19	2.175		
	Total	43.238	20			
Very Severe Treatment Need	Between Groups	.209	1	.209	.023	.881
	Within Groups	218.444	24	9.102		
	Total	218.654	25			

In the Minor Treatment Need Group, there was an insignificance for treatment reported [$F(1, 49) = 0.370$, $p = 0.546$]. Similarly, in the group that required Moderate Treatment, the one-way ANOVA showed that there was also an insignificance in the requirement for treatment [$F(1, 20) = 1.399$, $p = 0.251$]. The results for the group with Severe Treatment Need also showed an insignificance in treatment requisite [$F(1, 19) = 0.876$, $p = 0.361$]. Conclusively, the results for Very Severe Treatment Need group also showed particular insignificance in the results to determine treatment need [$F(1, 24) = 0.023$, $p = 0.881$].

DISCUSSION:

The appearance of patient is a prominent factor in deciding the need for orthodontic treatment. Therefore, various indices have been proposed to evaluate and quantify the aesthetic needs to help the orthodontist to classify the extent of malocclusion 10. Index of Orthodontic Treatment Need (IOTN) is one of the indices that is predominantly used, but it does not take into consideration the aesthetic need of the patient. On the other hand, DAI does incorporate that, and assesses it to produce a score to determine the treatment need. This enables the DAI to create boundaries at which the treatment level is determined 12.* A score of 36 is considered to be the cut-off point at which the malocclusion is deemed debilitating or not.

The DAI is considered as a more feasible index to incorporate into treatment planning because of the fact that it is an easier index to use 11. It is numeric in its description of treatment need designation. It factors in the malocclusion traits such as morphology, aesthetics and function. It does not require the use of radiographic imaging to formulate a treatment plan, making it an index of choice for dental care primary care setups, especially in third world countries like Pakistan. Furthermore, the

scoring makes it easy to interpret the requirement of orthodontic treatment if the patient is referred to orthodontic specialist from a primary care or secondary care system 15.

The advantages of using DAI as the index of choice is because of its convenience, however it is unable to express the malocclusion traits such as crossbite, open bite, midline shift and deep over bite. Along with that DAI measurements are calculated using a millimeter scale which can account for minor errors of precision 17. DAI Scores are mainly used as excellent predictors of future orthodontic treatment receipt 19.

An important aspect for defining a gold standard index lies in its proper assessment capabilities. There are two general ways to define a panel for obtaining gold standard index - either Likert scale method or by consensus method 22. These methods determine a solid index. However, one of the drawbacks of the DAI is that it relies heavily on the perceived aesthetic standards among the patients. Thus the more the variance in the opinion of the demographic population of the subject, the more there is a variance in the scoring using DAI 21. However, it has been determined that the DAI scoring has generally captured the mainstream and universal perception of aesthetics, making it a reliable tool to quantify treatment need as perceived by the patients.

In Pakistan, we see that many children with severe malocclusion do not have proper access to orthodontic treatment. With the passing of time, the general population is becoming more aware of what constitutes orthodontic treatment and the number of persons seeking orthodontic treatment is increasing 20. This increase in the demand of orthodontic treatment is not corresponding with the ease of early orthodontic diagnosis and intervention available to the general and rural population 18. We know that

with orthodontic issues, prevention can only help so much and is not much affective in eliminating the problem. Interceptive orthodontics is an option that can help the patient control the malocclusion without the need for a later treatment 14. This can help in the competent treatment of skeletal and non-skeletal orthodontic concerns.

Various studies have shown that using the DAI 2, it is seen that younger children have a higher need of orthodontic treatment than older patients 13. This shows us that DAI can play an interceptive role in providing orthodontic treatment if we factor in the patient's chronological age.

In conclusion, we can determine that the DAI is an important index in the prevention, intervention, and treatment planning of the orthodontic problems on a very nascent level 16-20. This makes it an important tool for diagnostic purposes in the Pakistani population. It is efficient and descriptive in its scoring methodology and ease of use.

CONCLUSION:

The treatment needs of the patients reporting to the Orthodontics Department of KRL, General Hospital, Islamabad were almost equally distributed according to the four groups mentioned in the DAI. The extent of treatment need was basically characterized by extent of crowding, midline diastemas, increased overjet, open bite tendency and anterior crossbites. According to our study DAI has served as a gold standard for designating the malocclusion traits thus objectifying their specific treatment. The decision to find the exact cut-off points that will determine the treatment extent are can be obtained precisely through the DAI.

REFERENCES:

1. Goyal S, Goyal S, Muhigana A. Assessment of malocclusion severity levels and orthodontic treatment needs using the Dental Aesthetic Index (DAI): A retrospective study. *Rwa Med J*. 2013 Sep;70(3):20-7.
2. Shrestha RM, Lamichhane B, Sharma AK, Shrestha S. Dental Aesthetic Index among Nepalese Orthodontic Patients. *Orthodontic Journal of Nepal*. 2015;5(2):9-13.
3. Pratiwi AP, Lubis MM. The Relationship of Dental Perception and Orthodontic Treatment Need Based on Dental Aesthetic Index of SMA Negeri 15 Medan Student. In *International Dental Conference of Sumatera Utara 2017 (IDCSU 2017)* 2018 Feb 7. Atlantis Press.
4. Hamamci N, Başaran G, Uysal E. Dental Aesthetic Index scores and perception of

personal dental appearance among Turkish university students. *The European Journal of Orthodontics*. 2009 Jan 6;31(2):168-73.

5. Jenny J, Cons NC. Comparing and contrasting two orthodontic indices, the Index of Orthodontic Treatment Need and the Dental Aesthetic Index. *American journal of orthodontics and dentofacial orthopedics*. 1996 Oct 1;110(4):410-6.
6. Brook PH, Shaw WC. The development of an index of orthodontic treatment priority. *The European Journal of Orthodontics*. 1989 Aug 1;11(3):309-20.
7. Bernabé E, Flores-Mir C. Orthodontic treatment need in Peruvian young adults evaluated through dental aesthetic index. *The Angle Orthodontist*. 2006 May;76(3):417-21.
8. Pérez MA, Neira Á, Alfaro J, Aguilera J, Alvear P, Fierro Monti C. Orthodontic treatment needs according to the dental aesthetic index in 12-year-old adolescents, Chile. *Revista Facultad de Odontología Universidad de Antioquia*. 2014 Dec;26(1):33-43.
9. Ashari A, Mohamed AM. Relationship of the Dental Aesthetic Index to the oral health-related quality of life. *The Angle Orthodontist*. 2015 May 27;86(2):337-42.
10. Cardoso CF, Drummond AF, Lages E, Pretti H, Ferreira EF, Abreu MH. The dental aesthetic index and dental health component of the index of orthodontic treatment need as tools in epidemiological studies. *International journal of environmental research and public health*. 2011 Aug;8(8):3277-86.
11. Twigge E, Roberts RM, Jamieson L, Dreyer CW, Sampson WJ. The psycho-social impact of malocclusions and treatment expectations of adolescent orthodontic patients. *European journal of orthodontics*. 2015 Dec 26;38(6):593-601.
12. Cosyn J, Thoma DS, Hämmerle CH, De Bruyn H. Esthetic assessments in implant dentistry: objective and subjective criteria for clinicians and patients. *Periodontology 2000*. 2017 Feb;73(1):193-202.
13. Øzhayat EB. Responsiveness of the prosthetic esthetic scale. *Clinical oral investigations*. 2017 Apr 1;21(3):907-13.
14. Gupta A. Orthodontic treatment needs of children living in orphanage according to Dental Aesthetic Index (DAI). *J Dent Health Oral Disord Ther*. 2015;2(1):00036.
15. Almeida AB, Leite IC, Melgaço CA, Marques LS. Dissatisfaction with dentofacial appearance and the normative need for orthodontic treatment: determinant factors. *Dental press*

- journal of orthodontics. 2014 Jun;19(3):120-6.
16. Feldens CA, Nakamura EK, Tessarollo FR, Closs LQ. Desire for orthodontic treatment and associated factors among adolescents in Southern Brazil. *The Angle Orthodontist*. 2014 Jul 21;85(2):224-32.
 17. AlQarni MA, Banihuwaiz AH, Alshehri FD, Alqarni AS, Alasmari DS. Evaluate the malocclusion in subjects reporting for orthodontic treatment among Saudi population in Asser Region. *Journal of international oral health: JIOH*. 2014 Jul;6(4):42.
 18. Kapoor P, Singh H. Evaluation of esthetic component of the index of orthodontic treatment need: The orthodontists' perspective. *Indian journal of dentistry*. 2015 Oct;6(4):181.
 19. KORUYUCU M, Elif TU, MÜNEVVEROĞLU AP, Gözde AC, SEYMEN F. ORTHODONTIC TREATMENT NEEDS OF CHILDREN: COMPARISON OF THREE INDEX- Çocuklarda Ortodontik Tedavi ihtiyacı: Üç indeksin Karşılaştırılması. *Journal of Istanbul University Faculty of Dentistry*. 2014;48(2):1-2.
 20. de Sousa ET, Da Silva BF, Maia FB, Forte FD, Sampaio FC. Perception of children and mothers regarding dental aesthetics and orthodontic treatment need: a cross-sectional study. *Progress in orthodontics*. 2016 Dec;17(1):37.
 21. Healey DL, Gauld RD, Thomson W. The socio-demographic and malocclusion characteristics of adolescents presenting for specialist orthodontic treatment in New Zealand practices. *Australian orthodontic journal*. 2015 May;31(1):20.
 22. Sanadhya S, Chadha M, Chaturvedi MK, Chaudhary M, Lerra S, Meena MK, Bakutra G, Acharya S, Pandey A, Tak M, Asawa K. Prevalence of malocclusion and orthodontic treatment needs among 12–15-year-old schoolchildren of fishermen of Kutch coast, Gujarat, India. *International maritime health*. 2014;65(3):106-13.