

Original Article

Body dysmorphic disorder in adult orthodontic treatment candidates according to the index of treatment need

Maryam Shiazhi¹, Maryam Tofangchiha², Ayda Taheri³, Aydin Pirzeh⁴

Departments of ¹Orthodontics and ²Radiology, Qazvin Dental Faculty, ³Dental Office, Qazvin, ⁴National Research Institute of Tuberculosis and Lung Disease (NRITLD) Masih Daneshvari Hospital, Tehran, Iran.



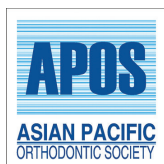
***Corresponding author:**

Aydin Pirzeh,
National Research Institute of
Tuberculosis and Lung Disease
(NRITLD), Masih Daneshvari
Hospital, Tehran, Iran.
ap4177@gmail.com

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ABSTRACT

Objectives: Body image perception plays an important role in seeking orthodontic treatment. Body dysmorphic disorder (BDD) is a psychological condition where an individual constantly focuses on flaws in their appearance. This study aimed to assess BDD in adult orthodontic treatment candidates according to the index of treatment need (IOTN) in Qazvin city in 2020.

Material and Methods: This descriptive study was conducted on 404 eligible patients over 18 years of age presenting to dental clinics in Qazvin seeking orthodontic treatment. The patients were categorized according to their IOTN (grades 1–5) and filled out the Body Deformation Metacognition Questionnaire (BDMCQ). Data were analyzed by *t*-test and Analysis of Variance using the Statistical Package for the Social Sciences.

Results: Of all the patients, 50.2% were grade 1 (no need for treatment), and 1.5% were grade 5 (very great need for treatment). Furthermore, 54.5% of patients had severe BDD. BDD had no significant correlation with gender or marital status ($P > 0.05$). BDD was significantly correlated with age, educational level, and IOTN grade ($P < 0.05$).

Conclusion: The present results revealed that over 50% of patients seeking orthodontic treatment did not need treatment, according to the IOTN. Dental clinicians are advised to be more careful in accepting patients with a history of psychological problems and numerous surgical procedures who seek cosmetic treatments.

Keywords: Orthodontics, Index of orthodontic treatment need, Body dysmorphic disorder

INTRODUCTION

Crowded and protruded teeth have long been a problem for many individuals, and attempts to correct them date back to at least 1000 years before Christ.^[1] The prevalence of dentofacial anomalies is approximately 82% in the United States, 78% in some parts of Europe, such as Finland, Switzerland, Denmark, and Sweden, 84% in parts of Iran, and 86% in Ahwaz, Iran, as reported in the literature.^[2] With the advances in civilization, the prevalence of dentofacial anomalies, known as malocclusion, has increased similar to the prevalence of many other conditions such as hypertension, cardiovascular diseases, and diabetes mellitus. However, this increase in frequency does not mean that malocclusion is a normal phenomenon.^[3]

Index of treatment need (IOTN)

The Index of Treatment Need (IOTN), developed by Brook and Shaw in the United Kingdom, was designed to evaluate need for treatment. It places patients in five grades from “no need for

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treatment” to “treatment required” that correlate reasonably well with clinician’s judgments of need for treatment. The index has a dental health component derived from occlusion and an esthetic component derived from comparison of the dental appearance versus standard photographs.^[4] IOTN is a patient-driven index, which is a combination of one’s judgment about their attractiveness and assessment of esthetics using clinical indices.^[5] IOTN is close to clinical judgment and is increasingly used since it addresses the severity of malocclusion while taking into account the esthetic parameters.^[6] IOTN is commonly used worldwide for assessment of the need for orthodontic treatment.^[7-10]

Body dysmorphic disorder (BDD)

Concerns about appearance are a well-accepted aspect of human behavior in most cultures. Nonetheless, obsession with such concerns with adverse effects on the quality of life may indicate body dysmorphic disorder (BDD). Although BDD was first described by Enrico Morselli, an Italian psychologist over 100 years ago and coined “dysmorphophobia” from the Greek term “dysmorphia” that means ugliness, evidence shows that it has not yet been well elucidated.^[11] Not detecting BDD can bring about adverse physical and psychological consequences for patients and can lead to chronicity of this condition.^[12]

The Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders by the American Psychological Association describes BDD as “a preoccupation with one or more perceived defects in appearance that are not observable to others.”^[13] The 11th Revision of the International Classification of Diseases 11 by the World Health Organization, which was recently published, states that BDD are such those patients who do not often have a correct attitude toward the main problem and, therefore, seek non-psychological treatments such as skin treatments, cosmetic procedures such as liposuction and rhinoplasty, and dental treatments such as tooth bleaching, orthodontic treatment, and maxillofacial surgery.^[14] Since such patients do not have a correct attitude toward their psychological problem that is BDD, they are often dissatisfied with the results and undergo multiple procedures.

The number of individuals who seek orthodontic treatment to overcome psychosocial problems related to their facial appearance has increased in the recent years. Furthermore, more attention is paid to dental esthetics and facial appearance as novel goals in orthodontic treatment.^[6] Recent evidence suggests that severe malocclusion can be considered as a social disability. Leveled and aligned teeth and a beautiful smile highly contribute to one’s self-esteem in social encounters, while crowded and protruded teeth often create a negative impression.^[15]

BDD is a psychological condition where an individual constantly focuses on flaws in their appearance. Individuals with BDD are highly ashamed of flaws that are insignificant or even unnoticeable to others and experience a lot of stress and tension. Thus, they often avoid social encounters. It appears that the head and face are the most concerning body parts in patients with BDD. BDD is a rare condition; however, it can have a negative impact on orthodontic treatment. Patients with BDD are likely to seek orthodontic treatment, which is often associated with orthognathic surgery. However, such treatments rarely improve the perception of such patients about their flaws. Therefore, it is highly important for orthodontists to use screening tools for detection of BDD.^[16] Thus, this study aimed to assess BDD in adult orthodontic treatment candidates according to the IOTN in Qazvin city in 2020.

MATERIAL AND METHODS

This study was approved by the Ethical Committee of Qazvin University of Medical Sciences with ethical number of IR.QUMS.REC.1400.088. There is no conflict with ethical considerations. This study was conducted on adult patients seeking orthodontic treatment in Qazvin city, Iran. Patients who could not fill out the questionnaire due to syndromes or cognitive impairments (such as Down syndrome and autism) were excluded from the study. Patients over 18 years of age presenting to dental clinics and offices in Qazvin city seeking orthodontic treatment who were willing to participate in the study were enrolled after obtaining their informed consent. They filled out the BDD questionnaire and were then examined by the same specialist. A tongue blade, a ruler (to measure the overbite and overjet), and disposable gloves were used for this purpose. The patients were assigned to IOTN grades 1–5 based on the dental health component (DHC) of IOTN [Figure 1]. Information of each patient was recorded in a checklist. The checklist included demographic information, IOTN grade, and the questionnaire score.

For assessment of DHC, overbite, occlusal interferences, overjet, cross-bite, semi-erupted teeth, missing teeth, cleft lip and palate, problems in deglutition, and tissue trauma are evaluated.^[6] The order of assessment of the abovementioned factors is not important. The important topic is that the most severe malocclusion pattern is considered to make a decision about the need for treatment. Each group has subgroups that are marked with alphabets for epidemiological purposes.^[17]

The AC includes 10 grades, characterized by 10 images. The images have been selected and classified by a group of dentists based on their attractiveness. This classification is based on dental attractiveness and not morphological similarities. The final score determines the need for orthodontic treatment based on esthetics and the psychosocial need for treatment. IOTN can be easily used by children and their parents, and

<p>Grade 5 (Extreme/Need Treatment)</p> <p>5.i Impeded eruption of teeth (except third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth, and any pathologic cause.</p> <p>5.h Extensive hypodontia with restorative implications (more than one tooth per quadrant) requiring preprosthetic orthodontics.</p> <p>5.a Increased overjet greater than 9 mm.</p> <p>5.m Reverse overjet greater than 3.5 mm with reported masticatory and speech difficulties.</p> <p>5.p Defects of cleft lip and palate and other craniofacial anomalies.</p> <p>5.s Submerged deciduous teeth.</p> <p>Grade 4 (Severe/Need Treatment)</p> <p>4.h Less extensive hypodontia requiring prerestorative orthodontics or orthodontic space closure (one tooth per quadrant).</p> <p>4.a Increased overjet greater than 6 mm but less than or equal to 9 mm.</p> <p>4.b Reverse overjet greater than 3.5 mm with no masticatory or speech difficulties.</p> <p>4.m Reverse overjet greater than 1 mm but less than 3.5 mm with recorded masticatory or speech difficulties.</p> <p>4.c Anterior or posterior crossbites with greater than 2 mm discrepancy between retruded contact position and intercuspal position.</p> <p>4.i Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments.</p> <p>4.d Severe contact point displacements greater than 4 mm.</p> <p>4.e Extreme lateral or anterior open bites greater than 4 mm.</p> <p>4.f Increased and complete overbite with gingival or palatal trauma.</p> <p>4.t Partially erupted teeth, tipped, and impacted against adjacent teeth.</p> <p>4.x Presence of supernumerary teeth.</p> <p>Grade 3 (Moderate/Borderline Need)</p> <p>3.a Increased overjet greater than 3.5 mm but less than or equal to 6 mm with incompetent lips.</p> <p>3.b Reverse overjet greater than 1 mm but less than or equal to 3.5 mm.</p> <p>3.c Anterior or posterior crossbites with greater than 1 mm but less than or equal to 2 mm discrepancy between retruded contact position and intercuspal position.</p> <p>3.d Contact point displacements greater than 2 mm but less than or equal to 4 mm.</p> <p>3.e Lateral or anterior open bite greater than 2 mm but less than or equal to 4 mm.</p> <p>3.f Deep overbite complete on gingival or palatal tissues but no trauma.</p> <p>Grade 2 (Mild/Little Need)</p> <p>2.a Increased overjet greater than 3.5 mm but less than or equal to 6 mm with competent lips.</p> <p>2.b Reverse overjet greater than 0 mm but less than or equal to 1 mm.</p> <p>2.c Anterior or posterior crossbite with less than or equal to 1 mm discrepancy between retruded contact position and intercuspal position.</p> <p>2.d Contact point displacements greater than 1 mm but less than or equal to 2 mm.</p> <p>2.e Anterior or posterior open bite greater than 1 mm but less than or equal to 2 mm.</p> <p>2.f Increased overbite greater than or equal to 3.5 mm without gingival contact.</p> <p>2.g Prenormal or postnormal occlusions with no other anomalies.</p> <p>Grade 1 (No Need)</p> <p>1. Extremely minor malocclusions, including contact point displacements less than 1 mm.</p>

Figure 1: Index of treatment need chart.

there is a high agreement between the scores of dentists and parents.^[3]

These two components are closely correlated. Thus, only the DHC was evaluated in this study. DHC evaluates 10 discrepancies, including overjet, reverse overjet, overbite, open bite, cross bite, crowding, tooth impaction, cleft lip/palate, buccal occlusion (class II and III), and hypodontia.

This index has five grades, and each patient is assigned to one of them depending on the type of dental anomaly.^[18]

The patients filled out the Body Dysmorphic Meta-Cognition Questionnaire (BDMCQ), and the results were recorded, coded, and used anonymously. To prevent bias, the researcher who analyzed the results was not aware of the contents of the questionnaire.

Study population and sample size

The samples were enrolled by convenience sampling. Since the prevalence of BDD was estimated to be 6.3% in the previous studies, the sample size was calculated to be 404, assuming 5% error and 95% confidence interval.^[19]

Data collection and statistical analysis

The questionnaires were collected and the data were analyzed using the Statistical Package for the Social Sciences version 24. Descriptive results were reported as frequency, mean, and standard deviation depending on the type of variable and statistically analyzed by the correlation tests, *t*-test, and Analysis of Variance (ANOVA).

RESULTS

Based on the ANOVA statistical test, a significant relationship was observed between BDD severity and IOTN grade in the participants ($P < 0.05$). 56.4% of women and 44.9% of men have BDD disorder. 54.5% of adults seeking for orthodontic treatment have BDD disorder. Furthermore, based on the *T* test, there was no significant relationship between the prevalence of BDD and the gender and marital status of the patients ($P < 0.05$). About 93.3% of participants that were over the age of 41 have severer BDD disorder, while this ratio is 14.5% for people under the age of 20. Based on the statistical correlation test, a significant relationship was observed between the prevalence of BDD and the age of the patients ($P < 0.05$). Furthermore, based on the ANOVA statistical test, a significant relationship was observed between the level of education and the prevalence of BDD in the patients ($P < 0.05$) [Tables 1-9].

Table 1: Demographic information of participants seeking orthodontic treatment.

Category	Frequency	Percentage
Age groups		
<20 years	62	15.3
21–30 years	175	43.3
31–40 years	137	33.9
>41 years	30	7.4
Gender		
Female	335	82.9
Male	69	17.1
Marital status		
Single	294	72.8
Married	110	27.2
Level of education		
Under high-school diploma	47	11.6
High-school diploma	172	42.6
Bachelor's degree	108	26.7
Master's degree and higher	77	19.1

DISCUSSION

According to the present results, grade 1 IOTN had the highest prevalence (50.2%), followed by grade 4 (29.7%). This finding indicates that over half of the participants did not need orthodontic treatment, and this issue should be taken into account in their dental visit. Furthermore, over half of the participants had severe BDD. The present results revealed

Table 2: BDD in adults seeking orthodontic treatment according to IOTN grade.

IOTN	BDD			P-value
	Mild	Moderate	Severe	
1				0.000
Frequency	2	9	192	
Percentage	1.0	4.4	94.6	
2				
Frequency	17	14	3	
Percentage	50.0	41.2	8.8	
3				
Frequency	23	16	2	
Percentage	56.1	39.0	4.9	
4				
Frequency	54	45	21	
Percentage	45.0	37.5	17.5	
5				
Frequency	3	1	2	
Percentage	50.0	16.7	33.3	
Total				
Frequency	99	85	220	
Percentage	24.5	21.0	54.5	

IOTN: Index of treatment need, BDD: Body dysmorphic disorder

Table 3: Frequency percentage of different IOTN grades in adults seeking orthodontic treatment.

IOTN	Frequency	Percentage
Grade		
1	203	50.2
2	34	8.4
3	41	10.1
4	120	29.7
5	6	1.5

IOTN: Index of treatment need

Table 4: Severity of BDD in adults seeking orthodontic treatment.

BDD	Frequency	Percentage
Severity		
Mild	99	24.5
Moderate	85	21
Severe	220	54.5

BDD: Body dysmorphic disorder

Table 5: Frequency of males and females with BDD.

Gender	BDD			P-value
	Mild	Moderate	Severe	
Female				0.778
Frequency	84	62	189	
Percentage	25.1	18.5	56.4	
Male				
Frequency	15	23	31	
Percentage	21.7	33.3	44.9	
Total				
Frequency	99	85	220	
Percentage	24.5	21.0	54.5	

BDD: Body dysmorphic disorder

Table 6: Effect of marital status on prevalence of BDD in adults seeking orthodontic treatment.

Marital status	BDD			P-value
	Mild	Moderate	Severe	
Single				0.235
Frequency	56	49	189	
Percentage	19.0	16.7	64.3	
Married				
Frequency	43	36	31	
Percentage	39.1	32.7	28.2	
Total				
Frequency	99	85	220	
Percentage	24.5	21.0	54.5	

BDD: Body dysmorphic disorder

that a higher percentage of females (56.4%) compared with males (44.9%) had severe BDD. Greater attention of females to esthetics and their possible mental obsessions in this regard, as well as the public perceptions are probably responsible for this finding. Furthermore, single individuals had a higher frequency of severe BDD (64.3%) compared with married individuals (28.2%). This difference can be due to concerns and challenges encountered by singles. Moreover, a significant correlation existed between the prevalence of BDD, and the age of participants such that by an increase in age, the severity of BDD increased. A similar study^[20] showed that younger individuals had a higher frequency of BDD, while in the present study, BDD was more common in older participants.

The present results revealed a significant correlation between the level of education and prevalence of BDD, such that the BDD score of participants with a Master's degree or higher level of education was significantly higher than that of other educational groups. This finding can be due to the higher level of social interactions of such individuals and their need for higher self-esteem. A significant correlation was noted between the severity of BDD and degree of IOTN in the present study, such that the BDD score of the participants

Table 7: Effect of age on prevalence of BDD in adults seeking orthodontic treatment.

Age groups	BDD			P-value
	Mild	Moderate	Severe	
<20 years				0.000
Frequency	29	24	9	
Percentage	46.8	38.7	14.5	
21–30 years				
Frequency	48	40	87	
Percentage	27.4	22.9	49.7	
31–40 years				
Frequency	21	20	96	
Percentage	15.3	14.6	70.1	
>41 years				
Frequency	1	1	28	
Percentage	3.3	3.3	93.3	
Total				
Frequency	99	85	220	
Percentage	24.5	21.0	54.5	

BDD: Body dysmorphic disorder

Table 8: Effect of level of education on prevalence of BDD in adults seeking orthodontic treatment.

Level of education	BDD			P-value
	Mild	Moderate	Severe	
Under high-school diploma				0.001
Frequency	11	13	23	
Percentage	23.4	27.7	48.9	
High-school diploma				
Frequency	38	34	100	
Percentage	22.1	19.8	58.1	
Bachelor's degree				
Frequency	39	27	42	
Percentage	36.1	25.0	38.9	
Master's degree and higher				
Frequency	11	11	55	
Percentage	14.3	14.3	71.4	
Total				
Frequency	99	85	220	
Percentage	24.5	21.0	54.5	

BDD: Body dysmorphic disorder

with grade 1 IOTN (not requiring treatment) was significantly higher than that of other individuals. In other words, individuals who did not require any treatment had a higher prevalence of BDD than others. Having religious beliefs had no significant correlation with the prevalence of BDD in the present study.

Devanna analyzed 1745 participants across five studies and reported that female patients with BDD were more interested

Table 9: Effect of spirituality and being religious on prevalence of BDD in adults seeking orthodontic treatment.

Being religious	BDD			P-value
	Mild	Moderate	Severe	
Not religious				0.071
Frequency	24	30	77	
Percentage	18.3	22.9	58.8	
Religious				
Frequency	36	25	84	
Percentage	24.8	17.2	57.9	
Very religious				
Frequency	39	30	59	
Percentage	30.5	23.4	46.1	
Total				
Frequency	99	85	220	
Percentage	24.5	21.0	54.5	

BDD: Body dysmorphic disorder

in orthodontic treatment than male patients.^[21] The same result was obtained in the present study, which can be due to the higher attention of females to esthetics and their obsessions with their attractiveness as well as the public opinion in this regard. Tusi *et al.* evaluated IOTN among medical students and reported that 8.3% of them had a moderate need for orthodontic treatment, according to the AC. Moreover, according to the DHC, 8.6% of students had a moderate need, and 0.8% had a severe need for orthodontic treatment. In total, the need for orthodontic treatment was relatively low in medical students of Alborz University of Medical Sciences.^[17] In the present study, 8.4% of the participants had a mild, and 10.1% had a moderate need for orthodontic treatment, which was different from their results. This difference can be due to the fact that the present study was conducted on candidates for orthodontic treatment. Furthermore, the two studies were conducted in different cities. Sathyanarayana *et al.* evaluated the prevalence of BDD in 1184 individuals over 18 years who sought orthodontic treatment. Of all, 62 individuals (5.2%) were positive for BDD; the majority of them were single and young and had many previous orthodontic consultations.^[22] In the present study, 54.5% of the participants had severe BDD and 21% had moderate BDD, which was different from the results of Sathyanarayana *et al.*^[22] Furthermore, unlike their study that reported a higher frequency of BDD in younger individuals, the present study showed an increase in the severity of BDD with age. This difference in the results may be due to cultural differences and different prevalence rates of the disease in the study populations, as well as differences in the treatment costs. Due to the low costs of orthodontic treatment in Iran, the number of patients seeking orthodontic treatment due to mild problems is often higher than that in other countries. Furthermore, the economic status and the referral system of

other countries are such that only patients who truly need orthodontic treatment are referred to orthodontists, which can be another reason for different results obtained. However, the present findings regarding the marital status of patients were in agreement with their results. Etezadi *et al.* evaluated the orthodontic treatment need of 12-14-year-old students in Sari, Iran, and reported that of all, 24% had grade 1, 29.2% had grade 2 (small need for treatment), 21.5% had grade 3, 17.2% had grade 4, and 8.2% had grade 5 (very great need for orthodontic treatment).^[23] These values were 50.2%, 8.4%, 10.1%, 29.7%, and 1.5%, respectively, in the present study, which are different from their results. This difference may be attributed to the evaluation of different age groups and study populations from two different cities. Gyawali *et al.* evaluated IOTN of 207 patients under orthodontic treatment and reported that 0.5% were grade 1, 9.7% were grade 2, 24.2% were grade 3, 46.9% were grade 4, and 18.8% were grade 5. The majority of such patients had a great and very great need for treatment while a small number of them (0.5%) did not need treatment.^[24] Unlike their study, over half of the participants in the present study did not require any treatment, and only 1.5% had a great need for orthodontic treatment. This difference can be attributed to different study populations (patients seeking treatment and those already under treatment). Yassaei *et al.* evaluated the prevalence of BDD in 270 patients; out of which, 17 (5.5%) were positive for BDD; 80% of them had a history of multiple orthodontic treatments in the past, and the majority of them were single women and younger than BDD-negative individuals.^[14] In the present study, over half of the participants (54.5%) had severe BDD, which was different from the results of Yassaei *et al.*^[14] Furthermore, unlike their study, the severity of BDD increased with age in the present study, which can be due to differences in study populations since they evaluated patients referred by dentists for orthodontic treatment, which indicates their actual need for treatment while the present study was conducted on patients seeking orthodontic treatment by themselves. However, their results regarding marital status and gender were in agreement with the present findings.

Hepburn and Cunningham evaluated BDD in 70 adults presenting to the Orthodontics Department of Eastman Dental Hospital in London. BDD was diagnosed in 2 of the general population (2.86%) and three orthodontic patients (7.5%).^[5] Their results were different from the present findings since over 50% of the participants had severe BDD in the present study. This difference may be due to the fact that their study was conducted on patients already under orthodontic treatment and the general population, and considering the referral system of patients in the UK, patients under treatment are those who actually need treatment.

CONCLUSION

Many cosmetic demands of individuals depend on their self-image. Some patients who seek orthodontic treatment for esthetic purposes may have a misleading image of themselves. The results showed that over half of the participants had no need for treatment according to their IOTN grade, and over half of them had severe BDD. Thus, orthodontists should be careful in admitting patients with a history of psychological and personality problems and a positive history of multiple cosmetic procedures and encourage such patients to seek psychological counseling or refer them to a psychologist to prevent adverse consequences.

Ethical approval

The research/study approved by the Institutional Review Board at Qazvin University of Medical Sciences, number IR.QUMS.REC.1400.088, dated May 26, 2021.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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