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Associations between malocclusion and self-esteem among Persian adolescent population

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Abstract:

OBJECTIVES: To assess the effect of malocclusion on the self-esteem of adolescents.

MATERIALS AND METHODS: This cross-sectional study evaluated 496 student aged between 12 and 14 years old living in Shiraz city. The level of self-esteem was determined using the Rosenberg self-esteem scale (RSES). To assess the degree of malocclusion, Index of Orthodontic Treatment Need- Dental Health Component (IOTN-DHC) was used. The Spearman's correlation coefficient was calculated to assess the correlation of malocclusion and self-esteem. The mean of IOTN-DHC and total score of RSES in different age groups were analyzed using the Kruskal–Wallis test. The mean IOTN-DHC and total score of RSES were compared between the two municipal districts and males and females using the Wilcoxon test and independent t-test, respectively.

RESULTS: A significant but weak correlation was noted between IOTN-DHC and self-esteem ($r = 115/0$, $P = 04/0$), while IOTN-DHC subscale: space shortage, dental missing, overjet, overbite, and crossbite had nonsignificant correlation with self-esteem. The socioeconomic status of adolescents significantly affected their self-esteem ($P < 0.001$).

CONCLUSIONS: Weakly significant correlation between mild malocclusion and dental self-esteem.

Keywords:

Malocclusion, orthodontic treatment need, quality of life, self-esteem

Introduction

At present, demand for orthodontic treatment has greatly increased to level and align teeth and subsequently improve dental and facial esthetics.^[1] Hassebrauck showed that a beautiful smile is the second most important facial component after the eyes that catches the eyes when assessing facial attractiveness.^[2] Although dental clinicians and orthodontists pay attention to all aspects of malocclusion in orthodontic treatment such as esthetics, occlusion, mastication, and speech, patients

often seek orthodontic treatment aiming to improve their facial appearance.^[3] Evidence shows that physical appearance can affect the psychosocial status, especially in adolescents and young adults.^[4] Moreover, they may be subjected to bullying and mocking and in severe cases, isolation.^[5]

Teachers' perception of the attractiveness of students can affect their expectations and assessments of children.^[6] Those who are considered by their teachers, peers, and employers to be attractive are more likely to achieve a better position.^[7] Thus, attractive individuals often have positive social experiences. Although such relationships are well accepted,

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evidence regarding direct correlation of self-esteem and malocclusion or orthodontic treatment in different communities is scarce.^[8] Furthermore, it has been shown that self-esteem of adolescents does not change after orthodontic treatment compared to before treatment.^[9]

According to psychologists, the term self-esteem may have three different definitions: (I) the golden concept of self-esteem, which refers to one's feelings about himself, (II) individual assessment of one's capabilities, and (III) momentary feelings of an individual about himself.^[10] The present study focused on the golden concept of self-esteem.

The Rosenberg self-esteem scale (RSES) is extensively used for the assessment of self-esteem. It has been translated to at least 28 languages and used in several countries worldwide.^[11] This study aimed to assess the effect of malocclusion on the self-esteem of 12- to 14-year-old adolescents using RSES.

Materials and Methods

In this cross-sectional study, 496 students were selected among all 12- to 14-year-old male and female students in Shiraz city in 2017 by cluster sampling. First, the middle schools of Shiraz city were identified and then 4 schools from the 2nd (low to moderate socioeconomic status) and 3rd (high socioeconomic status) municipal districts were randomly chosen. Next, the list of 12- to 14-year olds in each school was obtained. Students who met the inclusion criteria were chosen by convenience sampling. Students with mental disability, those with maxillofacial syndromes, facial or palatal clefts, history of orthodontic treatment, and subjects under orthodontic treatment were excluded. Before participation, a written informed consent form from the participants' parents and an informed assent form from the adolescents were obtained.

The RSES was used to assess the self-esteem of student. This questionnaire has 10 four-point Likert scale questions. Five questions were positive and the remaining five were negative. Positive questions were scored 4 (strongly agree) to 1 (strongly disagree). Negative questions were scored 1 (strongly agree) to 4 (strongly disagree) [Table 1]. Thus, the total score ranged from 10 to 40. In most studies, the self-esteem index (SI) is used to assess the overall self-esteem. SI was calculated by dividing the total score (10 to 40) by 10 (number of questions). One week before the clinical examinations, RSES Questionnaires were sent to the schools and collected before the clinical examinations, so that the examiner would not know any information regarding students' self-esteem.

Table 1: Rosenberg self-esteem scale

1. On the whole, I am satisfied with myself.	Strongly agree	Agree	Disagree	Strongly disagree
2. At times, I think I am no good at all.	Strongly agree	Agree	Disagree	Strongly disagree
3. I feel that I have a number of good qualities.	Strongly agree	Agree	Disagree	Strongly disagree
4. I am able to do things as well as most other people.	Strongly agree	Agree	Disagree	Strongly disagree
5. I feel I do not have much to be proud of.	Strongly agree	Agree	Disagree	Strongly disagree
6. I certainly feel useless at times.	Strongly agree	Agree	Disagree	Strongly disagree
7. I feel that I'm a person of worth, at least on an equal plane with others.	Strongly agree	Agree	Disagree	Strongly disagree
8. I wish I could have more respect for myself.	Strongly agree	Agree	Disagree	Strongly disagree
9. All in all, I am inclined to feel that I am a failure.	Strongly agree	Agree	Disagree	Strongly disagree
10. I take a positive attitude toward myself.	Strongly agree	Agree	Disagree	Strongly disagree

Q 1,3,4,7,10: SA=4 A=3 D=2 SD=1. Q 2,5,6,8,9: SA=1 A=2 D=3 SD=4

The Index of Orthodontic Treatment Need-Dental Health Component (IOTN-DHC) was used to determine the level of malocclusion and the need for orthodontic treatment. This index evaluates the missing teeth, overjet, overbite, crossbite, and crowding by taking into account their severity. The clinical examination of students was carried out by same orthodontist in a classroom with adequate lighting using a spotlight, a dental mirror, and a ruler. Intraexaminer reliabilities were assessed in 30 subjects (test-retest at a 1-week interval). Weighted Cohen kappa's values for IOTN-DHC indicated complete agreement (0.82).

Statistical analysis

Data were analyzed using SPSS version 19. The Kolmogorov-Smirnov test revealed that data were not normally distributed. Thus, the mean of IOTN-DHC and total score of RSES in different age groups were analyzed using the Kruskal-Wallis test. The mean IOTN-DHC and total score of RSES were compared between the two municipal districts and males and females using the Wilcoxon test and independent t-test, respectively. Considering the nonnormal distribution of data, the Spearman's correlation coefficient was used to assess the correlation between RSES questions and IOTN-DHC.

Results

Of 496 students participating in this study, 242 (48.8%) were males and 254 (51.2%) were females. Comparison of the mean IOTN-DHC subscales and SI among the 6th ($12 \pm 1/23$ years old), 7th ($13 \pm 0/25$ years old), and 8th ($14 \pm 0/86$ years old) graders showed a

significant difference in crossbite among different age groups ($P = 0.01$) [Table 2]. Comparison of the mean and standard deviation of IOTN-DHC subscales and SI of the two municipal districts revealed significant differences in dental missing ($P < 0.001$), crossbite ($P < 0.001$), crowding ($P < 0.001$) and SI score ($P < 0.001$) [Table 3]. A significant difference in dental missing ($P = 0.01$) and crossbite ($P = 0.02$) in the mean and standard deviation of IOTN-DHC subscales and SI score between male and female students were found [Table 4].

The Spearman’s correlation coefficient can be interpreted as followed: 00–0.19 = very weak; 0.20–0.39 = weak; 0.40–0.59 = moderate; 0.60–0.79 = strong; 0.80–1.0 = very strong. The result of this study showed a significant but very weak correlation between questions 3 and 7 and SI score with a total score of IOTN-DHC [Table 5].

Discussion

A beautiful smile is the second most important facial characteristic in physical attractiveness.^[1] Evidence shows that malocclusion can negatively affect the psychosocial status and quality of life.^[12,13] Nonetheless, several other factors can also affect the psychological state of individuals including hair, skin, eyes, body shape, height, and financial status;^[5] thus, single-dimensional evaluation of psychological status can be limiting.^[5] The present study aimed to assess the effect of space shortage, dental missing, overjet, overbite, crossbite, and the need for orthodontic treatment on self-esteem of adolescents.

The RSES was used for the assessment of self-esteem in this study. RSES is among the most widely used tools for the assessment of self-esteem in social sciences.^[14]

The popularity of RSES is partly due to its favorable psychometric properties, simplicity, and brevity. More importantly, RSES has been translated into many languages including Farsi.^[14,15]

In this study, we used DHC of IOTN to determine the severity of malocclusion; the validity of this index has been reported in the literatures, and they showed IOTN-DHC is a valid tool for screening.^[16,17]

Although a significant correlation has been previously reported between the severity of malocclusion and self-esteem,^[18,19] the present study conducted on adolescents demonstrated a weakly significant correlation between IOTN-DHC and self-esteem. Several studies have evaluated the relationship between malocclusion and QoL through self-esteem in different societies, ethnics, and background.^[5,8,18-25] Gavric *et al.* found a weak but significant correlation between the self-reported severity of malocclusion and dental self-esteem; since the mean IOTN-DHC score in that study was 2.45 ± 1.23 , a weak correlation between dental self-esteem and IOTN-DHC can be due to low to moderate need for orthodontic treatment among the study population.^[8] Taylor *et al.* showed a poor correlation between malocclusion and OHRQoL.^[24]

Evidence shows that in only one-third of patients with severe malocclusion and scores 4 or 5 of IOTN, psychological status is significantly affected by malocclusion.^[26] Also, Kovalenko *et al.* showed that psychological problems are correlated directly with the severity of facial deformity.^[27] Nonetheless, patients who seek orthodontic treatment often have an IOTN-DHC score of <4 . Due to enhanced public knowledge about

Table 2: Mean and standard deviation of IOTN subscales and SI score in the 6th, 7th, and 8th graders

Variable	6 th graders (n=158)	7 th graders (n=160)	8 th graders (n=178)	Total (n=496)	P
Missing	0.42±0.11	0.46±0.12	0.33±0.06	0.40±0.10	0.64
Overjet	1.34 ± 2.54	1.26±2.44	1.29±2.41	1.29±2.46	0.90
Cross bite	0.82 ± 0.44	0.81±0.33	0.38±0.11	0.70±0.29	0.10
Crowding	1.28 ± 1.19	1.21±1.34	1.16±1.27	1.22±1.27	0.59
Overbite	1.31 ±2.80	1.20±2.67	1.28±2.58	1.27±2.68	0.79
IOTN	1.32 ±2.60	1.26±2.51	1.11±2.25	1.23±2.45	0.36
SI	0.45 ± 3.04	0.39±2.78	0.45±3.01	0.44±2.95	0.46

*P<0.05: Significant

Table 3: Mean and standard deviation of IOTN subscales and SI score in students of the two municipal districts

Variable	2 nd municipal district (n=242)	3 rd municipal district (n=254)	Total (n=496)	P
Missing	0.37±0.07	0.34±0.13	0.40 ± 0.10	<0.001†
Overjet	1.30±2.48	1.29±2.45	1.29 ± 2.46	0.31
Cross bite	0.72±0.30	0.68±0.28	0.70±0.29	<0.001†
Crowding	1.25±1.27	1.19±1.27	1.22±1.27	<0.001†
Overbite	1.14±2.54	1.37±2.80	1.27±2.68	0.05
IOTN	1.29±2.38	1.19±2.51	0.40±0.10	0.34
SI	0.40±3.01	0.48±2.88	1.29±2.46	<0.001†

*P<0.05: Significant, †P<0.01 highly significant

orthodontic treatment and dental esthetics, even patients with mild malocclusion seek orthodontic treatment.^[28]

In the present study, none of the dental components of IOTN including space shortage, dental missing, overjet, overbite, and crossbite alone had any significant correlation with Rosenberg questions or SI. Some studies concluded that spacing of the anterior teeth had the most negative impact on self-esteem,^[20,29,30] while others showed that crowding had the same influence on self-esteem.^[5,20,30,31] Also, negative impact of increased overjet on self-esteem have been reported.^[20,29-32] However, finding of the present study can be due to the fact that, in the present study, the severity of malocclusion for each of the IOTN subscales alone was low. Evidence shows that malocclusion detectable by the laypeople can decrease the quality of life.^[8] The National Center for Health Statistics of the United States has set a

basic level for each of the subscales of malocclusion. For instance, space shortage by 3 mm is the basic requirement for dental crowding.^[20] Thus, malocclusion alone can affect self-esteem only when it is severe enough and has reached a certain level of severity.

The self-esteem of students in the two municipal districts was significantly different, although comparison of the mean and standard deviation of IOTN-DHC revealed nonsignificant differences. Students who studied in 2nd municipal districts with low to moderate socioeconomic status showed significant more missing, crowding, and crossbite and they also showed less SI score compared to students studied in 3rd municipal districts with high socioeconomic status, which indicates the effect of other factors such as socioeconomic status on self-esteem. Sfredo *et al.* reported that adolescents from low socioeconomic background reported worse OHRQoL compared to those from high socioeconomic background.^[33] Eremie and Chikweru found that private school students demonstrated higher self-esteem than public school students.^[34]

A significant difference was noted between males and females in dental missing and crossbite. However, no significant difference was found between males and females in total IOTN-DHC and self-esteem in Iranian society. The result of the present study is in consistent with those studies which concluded that the psychosocial impact of malocclusion was similar between sex.^[3,4,29]

Table 4: Mean and standard deviation of IOTN subscales and SI score in male and female students

Variable	Females (n=254)	Males (n=242)	Total (n=496)	P
Missing	0.33±0.06	0.47±0.14	0.40±0.10	0.01*
Overjet	1.25±2.42	1.34±2.51	1.29±2.46	0.56
Cross bite	0.78±0.33	0.60±0.24	0.70±0.29	0.02*
Crowding	1.15±1.31	1.29±1.23	1.22±1.27	0.14
Overbite	1.24±2.68	1.30±2.67	1.27±2.68	0.62
IOTN	1.17±2.45	1.30±2.45	1.23±2.45	0.12
SI	0.46±2.91	0.43±2.98	0.44±2.95	0.41

*P<0.05: Significant

Table 5: Spearman's correlation coefficient for the correlation of IOTN subscales, Rosenberg questions, and total score

		Missing	Overjet	Crossbite	Crowding	Overbite	IOTN
Question 1	Spearman's correlation	-0.049	0.033	0.053	-0.078	0.069	0.061
	P	0.22	0.20	0.20	0.11	0.14	0.17
Question 2	Spearman's correlation	0.023	0.034	0.045	-0.049	-0.096	0.041
	P	0.36	0.36	0.22	0.23	0.07	0.26
Question 3	Spearman's correlation	-0.019	-0.023	-0.006	-0.064	0.068	0.147
	P	0.38	0.36	0.46	0.16	0.14	0.01*
Question 4	Spearman's correlation	-0.072	-0.106	-0.012	-0.029	-0.022	0.100
	P	0.13	0.05	0.42	0.32	0.36	0.06
Question 5	Spearman's correlation	-0.049	0.001	0.034	-0.026	-0.065	0.27
	P	0.22	0.49	0.30	0.34	0.15	0.33
Question 6	Spearman's correlation	-0.078	0.051	0.056	-0.055	-0.052	-0.097
	P	0.11	0.21	0.19	0.19	0.21	0.06
Question 7	Spearman's correlation	-0.086	-0.031	-0.053	-0.068	-0.005	-0.117
	P	0.09	0.31	0.20	0.14	0.47	0.03*
Question 8	Spearman's correlation	-0.115	0.012	0.023	-0.035	-0.039	-0.009
	P	0.41	0.43	0.36	0.29	0.27	0.44
Question 9	Spearman's correlation	-0.005	-0.067	-0.007	0.014	-0.114	-0.071
	P	0.47	0.15	0.46	0.41	0.05	0.13
Question 10	Spearman's correlation	-0.001	0.000	0.046	-0.027	-0.063	-0.103
	P	0.50	0.50	0.23	0.34	0.16	0.05
Total score of SI	Spearman's correlation	-0.053	-0.21	0.031	0.050	-0.071	-0.115
	P	0.20	0.37	0.31	0.21	0.13	0.04*

*P<0.05: Significant

Self-esteem is a multifactorial phenomenon; the result of our study showed that it is affected more by other factors than malocclusion. This study had a cross-sectional design. Therefore, we attempted to search for inferences with regard to causal factors without establishing a temporal relationship; this can be considered as a limitation of this study.

Conclusions

1. The study results showed a weakly significant correlation between malocclusion and self-esteem
2. Students who studied in different municipal districts showed nonsignificant difference in IOTN-DHC score; however, students with low to moderate socioeconomic status showed less SI score compared to students with high socioeconomic status
3. Nonsignificant difference was found between males and females in total IOTN-DHC and self-esteem.

Declaration of patient consent

The authors certify that they have obtained all appropriate participant consent forms. In the form, the parents have given their consent for their children images and other clinical information to be reported in the journal. The parents understand that their children names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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