The Effect of Orthodontic Intervention on Mental Health and Body Image

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Abstract

AIM: Physical health especially oral and dental health can play a leading role in individuals' mental health status. Therefore, determining the relationship between orthodontics, mental health, and body image can provide solutions for the development of treatment services and provision of greater accessibility of communities to them.

METHODS: The present study was natural experimental research conducted to determine the relationship between orthodontic treatment, mental health, and body image. To conduct this research, individuals referring to orthodontic clinics in the city of Kermanshah and meeting the inclusion criteria in the study were selected using convenience sampling method and then they were assessed before and after undergoing orthodontics via the standardised Goldberg's General Health Questionnaire (GHQ) and Multidimensional Body-Self Relations Questionnaire (MBSRQ).

RESULTS: The mean scores of mental health problems in the study participants reduced and such a difference calculated by Wilcoxon signed-rank test with a 95% confidence level was significant (P = 0.001). Moreover, all the subscales of GHQ in the study participants showed a significant decrease after orthodontics compared to the stage before that (P < 0.05). The mean score of MBSRQ before orthodontics was equal to 171.78 and this value reached 172.51 after that, indicating individuals' increased scores and their high levels of satisfaction with their body image. Nevertheless, the given difference was trivial, and it was not statistically significant (P = 0.751).

CONCLUSIONS: The results of the present study showed that orthodontic treatment could significantly increase mental health status in the clients and also improve multidimensional attitudes towards body image.

Introduction

The World Health Organization (WHO) has introduced the issue of mental health as one of the main health problems in the world [1]. Today, biological, mental, and social dimensions are of utmost importance in the field of dentistry [2]. In this regard, the effects and complications of oral and dental diseases can have their own psychological and social aspects contributing to mental health in individuals, which have been less considered in previous decades [3].

Health and particularly oral health, the appearance, shape, and position of the teeth, as well as treatments of these disorders are among the significant factors that can affect mental health and well-being in individuals [4]. Malocclusion is considered as an inappropriate condition, grasped by many people as a deviation from the beauty norms [5]. People who have a higher level of personal satisfaction on their face are also endowed with a higher degree of self-esteem. Besides, the total appearance of the teeth and the face can have an impact on an individual's mental image of one's body, and such an image can contribute to personal satisfaction [6].

Teeth and jaw can be treated using

orthodontic tools. Making coordination between the upper and lower teeth, orthodontic intervention can improve the performance of chewing and crushing and, consequently, prevent indigestion in the long run. Together with tooth alignment, orthodontics can improve the health of the teeth and the gums [7]. Since orthodontic treatments can directly change clients' appearance and face, there is a need for orthodontic experts to recognize the underlying issues of social psychology and facial attractiveness theory [8]. Besides, studies have revealed that orthodontics can significantly influence the quality of life in children and adolescents although no impacts on their daily activities particularly their mental-psychological ones can be observed [3].

In addition to the structural and anatomical factors of the face, personal satisfaction with one's face is under the impact of self-assessment. When there is a slight difference between one's current face and their ideal one, the level of personal satisfaction is assumed to be high; but whenever such a difference is big, one's attitude toward his/her face will be at low levels. In other words, the beauty of the face in the eyes of an individual is a set of personal attitudes to one's face accompanied by social and mental acceptability [9]. For this reason, one of the most important benefits of orthodontic treatments and cosmetic surgeries is improving the beauty of the teeth and the face, which is accompanied by social and mental satisfaction [2].

In this regard, aesthetic beliefs are divided into traditional and new ones. Considering changes in aesthetic beliefs of the youth from traditional to new ones, dissatisfaction among this age group toward body image has raised, and they have greater desire to manipulate their body to fulfil their aspirations of this image [10]. Moreover, according to studies in this field, it seems that the stimulus of orthodontic intervention is associated with clients' perception and understanding of how far their dentofacial appearance is from sociocultural norms [6]. Therefore, efforts made to deal with this situation in communities are growing [5] because the need to receive treatments in clients is a feeling that can raise necessary motivation and the ability to get the mentioned services [3]. Today, orthodontic intervention is considered a successful and appropriate treatment to improve the position of the teeth and to increase physical attractiveness within communities [11].

According to the related studies, given that orthodontic services are costly and people with high socioeconomic backgrounds are practically looking for such services, and considering the results obtained by the given researchers, the present study was conducted to find the relationship between orthodontic treatment, mental health, and body image of individuals referring to orthodontic clinics in the city of Kermanshah in Iran in 2017.

Material and Methods

The present study is natural experimental research conducted to determine the relationship between fix orthodontic treatment, mental health, and body image. To carry out this study, 110 participants meeting the inclusion criteria were selected among the individuals referring to orthodontic clinics in the city of Kermanshah using convenience sampling method. Before receiving orthodontic services, the participants were assessed via a demographic characteristics form, standardized General Health Questionnaire (GHQ), and Multidimensional Body-Self Relations Questionnaire (MBSRQ). Six months after the end of fixed orthodontic treatments, the patients were re-assessed through the GHQ and the MBSRQ and the data obtained were analyzed. The inclusion and exclusion criteria of this work were as follows:

Inclusion Criteria: at least 14 years of age; patients with dental malocclusion that need to be fixed orthodontic treatment only; no skeletal discrepancy in jaw relationship or facial cleft and any craniofacial syndrome; the absence of body dysmorphic syndrome.

Exclusion Criteria: withdrawal from continuing orthodontic intervention during the study; completion rate of the questionnaires below 80%.

The statistical population of this study included all the clients referring to orthodontic clinics and performing this treatment in the city of Kermanshah, who were selected using convenience sampling method. The sampling context was private orthodontic clinics within this city. The sample size was determined by a minimum number of 58 individuals considering 95% confidence level. Moreover, body image values before and after the treatment were 7.72 and 5.41, respectively [8]. Given the probability of 30% sample attrition, the sample size was calculated about 90 people. To this end, 110 clients were selected and assessed. Finally, only 102 questionnaires were evaluated due to the presence of some incomplete ones.

The data collection instruments included a researcher-designed demographic characteristics form along with two specific questionnaires evaluating mental health (GHQ) and body image (MBSRQ) because they are reliable and valid tools for Iranian population [12] [13] [14].

Goldberg's General Health Questionnaire (GHQ)

This questionnaire included four subscales:

1) Physical symptoms including cases of individuals' feelings about their health status and their fatigue associated with physical symptoms from items 1 to 7;

2) Anxiety and sleep disorder symptoms

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comprised of causes related to sleeplessness and anxiety from items 8 to 14;

3) Social functioning as ability in individuals to deal with professional demands and daily life issues as well as revealing how people feel about coping with common life situations from items 15 to 21; and

4) Depression symptoms including chronic depression cases and suicidal orientations from items 22 to 28. Moreover, there was a score for each subscale, and a score was also assigned to the total score of individuals [12]. This questionnaire had been already used in Iran, and its internal consistency using Cronbach's alpha method had been reported [13]. Also, this scale has been standardised for the Iranians [12].

Multidimensional Body-Self Relations Questionnaire (MBSRQ)

This questionnaire includes 69 self-report items designed to evaluate individuals' attitudes toward different dimensions of body image including evaluation, recognition, behaviour, as well as an individual's orientation of one's health status or sense of illness [15]. Three physical dimensions dominant in the BSRQ were the appearance of the body, physical fitness, and health. Also, each of these sections contained two domains of evaluation and orientation: appearance evaluation and appearance orientation, fitness evaluation and fitness orientation, and health evaluation and health orientation. Other subscales of MBSRQ are illness orientation, body areas satisfaction, overweight preoccupation, and self-classified weight [16]. Each of these domains had 5 scores; so, score 1 was assigned to disagree strongly and score 5 was considered for strongly agree [15]. This scale has been standardized for the Iranians, as well [14].

Data extraction and analysis were conducted using the SPSS Software (Version 25). This analysis was performed via descriptive statistics (tables of frequency distribution and calculation of concentration and distribution indices) and analytical methods. To perform statistical tests in the analytical section, first, all distance variables (including the GHQ scores and its subscales before and after the intervention, as well as the mean scores of the MBSRQ and its subscales before and after the treatment) were evaluated by Kolmogorov-Smirnov test for normal distribution. The results revealed that only the mean scores of the MBSRQ and the subscale of fitness orientation before and after the intervention were following a normal distribution. To compare the scores before and after the intervention, paired t-test was used, and other variables were found not to follow a normal distribution, which inevitably led to using its nonparametric equivalent; i.e. Wilcoxon signed-rank test.

Ethics approval and consent to participate

After obtaining the letter of permission from Kermanshah University of Medical Science Ethical Committee (KUMS.REC.1396.60), a written informed consent form was prepared and then was completed and signed by the researchers and the participants after providing brief and clear explanations about the given form.

Results

The mean age of the participants was 20.03 ± 6.29 years with a minimum of 14 and a maximum of 46 years old. The average monthly household income was 391 ± 200\$; ranging from a minimum of 180\$ to a maximum of 1500\$. Other sociodemographic data of the subjects are presented in Table 1.

Table 1: Participant's demographic characters

Variable		N (%)
Sex	Female	81 (79.4)
	Male	21 (20.6)
Married State	Single	92 (90.2)
	Married	10 (9.8)
Graduate level	Elementary	11 (10.8)
	High School	47 (46.1)
	University	44 (43.1)
Job	Housewife	15 (14.7)
	Worker	7 (6.8)
	Employee	12 (11.8)
	Student	68 (66.7)
Residence	City	96 (94.1)
	Village	6 (5.9)
Fathers job state	Worker	20 (19.6)
	Employee	48 (47.1)
	Missing Data	34 (33.3)
Fathers graduate level	Under diploma	9 (8.8)
	Diploma	26 (25.5)
	Upper diploma	32 (31.4)
	Missing Data	35 (34.3)
Mothers job state	Housewife	35 (52)
	Employee	15 (14.7)
	Missing Data	34 (33.3)
Mothers graduate level	Under diploma	17 (16.7)
	Diploma	25 (24.5)
	Upper diploma	26 (25.5)
	Missing Data	34 (33.3)

As can be seen, the mean scores of the GHQ obtained by the study participants were reduced from 20.68 before the orthodontics to 17.78 after this treatment, suggesting a statistically significant difference considering Wilcoxon signed-rank test at the 95% confidence level (P = 0.001).

Likewise, all the subscales of the GHQ as physical symptoms, anxiety and sleep disorder symptoms, social functioning, and depression symptoms (Table 2) showed a significant decrease in the study participants after orthodontic intervention compared to those before dentofacial orthopaedics (P < 0.05). Therefore, it was found that orthodontic intervention had reduced mental health problems and consequently enhanced mental health status among the clients.

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Table 2: GHQ and subscale's score in participants for pre and post-orthodontic interventions

Variable	Pre-orthodontic intervention		Post-orthodontic intervention			
	Mean	SD	Mean	SD	t	Sig
GH problems	20.68	10.897	17.78	8.72	-3.41	0.001
Physical symptoms	4.84	3.74	3.98	2.87	-2.74	0.006
Anxiety and sleep disorder symptoms	4.96	3.82	4.26	3.12	-2.15	0.031
Social functioning	7.07	2.79	6.08	3.05	-3.69	0.001
Depression symptoms	4.25	4.48	3.1	3.598	-3.22	0.001

According to the guidelines of this research instrument, obtaining higher scores suggests higher levels of satisfaction with body image. As shown in Table 3, the mean scores of the MBSRQ before orthodontics was 171.78 and it reached 172.51 after this treatment, showing an increase in scores and an individual's satisfaction with their body image. It should be noted that such a difference was negligible and was not statistically significant (P = 0.751).

Table 3: MBRSQ and subscales' scores in participants for pre and post-orthodontic interventions

Variable	Pre-orthodontic intervention		Post-orthodontic intervention			
	Mean	SD	Mean	SD	T / Z	Sig
MBSRQ*	171.78	23.07	172.51	18.57	-0.319	0.751
Appearance evaluation	17.23	3.78	18.87	2.59	-3.51	0.0001
appearance orientation	29.07	5.43	28.34	6.43	-1.69	0.091
fitness evaluation	6.96	2.28	7.77	1.82	-3.45	0.001
fitness orientation*	31.08	4.7	33.83	6.56	-4.002	0.0001
health evaluation	16.42	2.41	14.65	3.06	-5.096	0.0001
health orientation	20.27	4.4	20.72	3.75	-1.36	0.171
illness orientation	13.98	2.69	17.34	3.35	-6.22	0.001
body areas satisfaction	5.1	1.18	5.53	1.15	-3.24	0.001
subjective weight	2.46	0.65	2.33	1.22	-3.25	0.001
weight preoccupation	5.73	0.83	2.83	0.48	-8.29	0.0001

*Paired T-test.

In relation to the MBSRQ subscales illustrated in Table 3, the scores of the subscales of appearance evaluation, fitness evaluation, fitness orientation, fitness orientation, illness orientation, and body areas satisfaction before orthodontics demonstrated a significant rise compared to that before this treatment, which was significant in most cases (P < 0.05) except for the subscales of health and appearance orientation. Therefore, considering the mentioned subscales, individuals' levels of satisfaction had been boosted.

As shown in the table, scores obtained by the study participants were reduced after orthodontics considering the subscales of to have appearance orientation, health evaluation, subjective weight, and weight preoccupation compared to those after this treatment. In other words, the levels of satisfaction in the study participants were lowered, and such a descending trend was not statistically significant for the subscale of to have appearance orientation (P > 0.05), and they were significantly reduced in the three other subscales (P < 0.05).

Discussion

This study was conducted to determine the relationship between mental health, body image, and orthodontics using a natural experimental research design.

The results showed that orthodontic intervention had resulted in increased levels of mental health in the study participants. Many investigations have also highlighted the relationship between mental health and orthodontics. The results of related studies have shown that self-confidence can significantly be increased by performing orthodontics and correcting the teeth [17]. The results of the present study indicated that mental health subscales of GHQ were promoted after the orthodontics. Additionally, the findings revealed improved physical health, decreased anxiety, and depression, and increased social work. These results are in line with those of many other previous works. In numerous investigations, the results suggested an increase in health-related quality of life after this treatment [18]. Also, orthodontics could significantly be contributed to the quality of life of children in Mehrzarom School in Turkey [3]. Minghui et al., (2017) also found that orthodontic interventions could increase not only self-awareness but also had a positive impact on adolescent mental health [19].

Johal et al., (2014) also observed no statistically significant difference after 6 months of orthodontic intervention in the quality of life of the clients [17]. In this study, the mental health status of the participants was examined, and it was found that orthodontics caused a significant increase in this variable, which positively affected individuals' quality of life. Other investigations showed an increase in the mental health status related to the quality of life [20]. This difference could be associated with the study population, study time, and even the results of the orthodontic effect. As can be seen, all related studied emphasize the positive impacts of orthodontic services on mental health status.

The results of this study showed that the symptoms of depression in the subjects were decreased after the orthodontic intervention. Studies have also highlighted the existence of degrees of depression in the problems of periodontal [21] [22]. Topcuoglu et al., conclude that the extraoral appliance therapy has negative effects on the mental health of individuals, and their levels of depression and anxiety are increased [23]. This difference can result from the use of orthodontic intervention method.

The results showed the development of social functioning in subjects after the orthodontic intervention. In this regard, Tamme et al., (2017) concluded that the combined orthodontic and maxillofacial surgical treatment increased the quality of life and improved their social functioning [24]. Other

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studies found that orthodontic intervention leads to an increase in the self-esteem of adolescent girls and their influence on their social functioning [25][26]. These results show the direct effects of orthodontic interventions on the external situation, self-esteem, and ultimately the behavioural functioning of clients, which confirm the results of our study and stresses the importance of the impact of orthodontic interventions on social activities.

In general, the results of this study showed that multidimensional body-self relations were increased after orthodontic intervention, but such a rising trend was not statistically significant. Results of various studies were to some extent consistent with the findings of this investigation. In this regard, Varela and Garcia-Camba (1995) showed that orthodontic services in the short term from 1 to 4 weeks after this treatment had no effects on self-esteem in adolescents; however, such services led to an increase among this age group within 6 months [27]. In another study published in China in 2018, various aspects of life-related psychology such as self-esteem and body image after the orthodontic intervention were improved and a decline were observed regarding negative effects after orthodontics [20]. Moreover, another study by Cifter and Cura (2016) showed that orthodontic intervention for clients with cerebral palsy and spastic quadriplegia raised their self-esteem and self-confidence [28]. In the study by Alanko et al., (2017), the clients were also examined within one year before orthodontics and one year after that, and the results revealed a decline in the quality of life and body image and an increase in symptoms of psychiatry after one year [29]. This difference in the results would be due to small sample size (752 individuals in the given study) as well as follow-up period of 6 months. In the present study, the number of samples was low, and the duration of the follow-up was 6 months after the start of orthodontics. Perhaps, if the duration of the follow-up was longer, the results could be different; thus, a short follow-up period and the small number of samples could be considered as the limitations of the present study.

The results of this study showed that the subscales of the MBSRQ were changed after orthodontic services, wherein appearance evaluation, fitness orientation, and illness orientation among the clients were significantly improved. However, a significant decline was observed in the subscales of health evaluation, body areas satisfaction, subjective weight, and weight preoccupation among the study participants. Furthermore, the mean age of the clients was 20 years old, and these people needed special attention to body weight and fitness in this age group. Accordingly, performing orthodontics due to treatment and follow-up problems could reduce the time of exercise and physical activity of such individuals and challenge their concerns for weight, health evaluation, and health orientation. In this regard, Bremen et al., (2016) concluded that once the orthodontic intervention was finished, the clients could be affected with an increase in their body mass index (BMI), which was also considered as a risk factor for such individuals. It was suggested that the longer the treatment, the higher the weight and ultimately the BMI, which should be addressed in treatments [30]. This study was consistent with the findings of the present investigation and could reasonably be accounted for preoccupations, mental health problems, and attention to physical well-being in the clients.

This study was completed within a year. Restrictions on sampling and no willingness among the samples to cooperate were the most important limitations of this study, which inevitably led to a 6-month follow-up after the orthodontic intervention to avoid further sample attrition. Also, the study samples were in the age range of 14 to 46 years with the mean age of 20 years, suggesting younger study participants that could have an impact on the results. Furthermore, the questionnaires were completed by the samples, and the co-researcher provided samples with information if needed; thus, the answers in this study were assumed accurate. Although this study achieved significant results, more accurate and reliable results could be obtained if more studies were conducted with larger sample size and longer follow-ups.

In general, the results showed that orthodontic treatments could increase mental health and its subscales in clients undergoing orthodontic intervention and also bring about a non-significant increase in multidimensional body-self relations. Considering the subscales associated with health evaluation, subjective weight, and weight preoccupation, we identified that orthodontic services not only could not lead to an improvement but also reduce the clients' status which needed more attention to these subscales in this domain.

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