ORIGINAL ARTICLE

The effect of orthodontic extraoral appliances on depression and the anxiety levels of patients and parents

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Abstract

Background: Psychosocial consequences and post-operative anxiety in patients after fixed orthodontic treatment are important parameters that must be evaluated by clinicians not to effect patient and their parent's psychosocial mood negatively.

Objective: The aim of this study was to evaluate the changes in depression and anxiety levels of orthodontic patients and their parents before the extraoral appliance therapy, and at a 1-year follow-up.

Materials and Methods: Patients and one of their parents responded to a series of questionnaires and evaluation scales in order to assess depression and anxiety levels. Two groups of patients and their parents were surveyed; one group that had not yet embarked on the treatment and another that had commenced extra-oral appliance therapy 1 year prior to the study.

Results: The 1-year-treatment group scored significantly higher than the pre-treatment group on the depression scale and the trait-anxiety scale. State-trait anxiety inventory scores did not differ significantly between the groups. The parents of the 1-year-treatment group also scored significantly higher on the Beck depression inventory than those of the pre-treatment group.

Conclusion: The results of this study emphasize the need for due consideration of psychological parameters before and during treatment with extra-oral appliances, particularly with regard to depression and anxiety.

Key words: Anxiety, depression, exoral appliances

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Introduction

Facial aesthetics have been shown to have a significant effect on self and social perceptions.[1] Concern relating to perceptions of facial appearance and social attractiveness can influence the psychological development of the individual from childhood to adulthood,[2,3] when facial appearance begins to change. With substantial internal and external body change, children start to develop body consciousness and vanity.[4-6] These years are also when most orthodontic treatments begin. Thus, the importance of these concerns cannot be overemphasized before and during orthodontic treatment, so as not to influence social behaviors and acceptance of children unfavorably.

A study by Kiyak and Bell.[7] found that a teacher's perceptions of a child's attractiveness have a large impact on the teacher's expectations and evaluation of the child. In addition, Vander.[8] Adams and Crane,[9] and Langlois and Stephan.[10] found similar results indicating that the

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perception that a child was more attractive caused peers to better accept them socially, and to perceive them as more intelligent and as having better social skills.

Caumo *et al*.,[11] have described anxiety as "a set of behavioral manifestations", and have subdivided it into 2 groups: State anxiety and trait anxiety. While state anxiety refers to a transitory emotional condition that varies in intensity and fluctuates, trait anxiety remains relatively stable over time.[12] High levels of anxiety in social life cause significant distress and impairment of daily activities.[13]

Extra appliances are a vital part of traditional orthodontic treatment protocols. Positional changes produced by orthodontic extraoral appliances in the maxilla, the mandible, and the cranial base have been reported by many investigators.[14-20] Considering the psychological characteristics of children, it is not easy for them to use an extra-oral appliance in daily life due to the possibility of being the object of curiosity, comments, and jokes.[21] Thus, orthodontic treatment can lead to negative social interactions, particularly when extra-oral appliances that make the patient less attractive are used to treat the malocclusion.

Orthodontic treatments result in aesthetic dental and skeletal improvement, increasing the social acceptance and self-concept of patients,[22] at the end of the treatment; but what of the facial appearance of the patient during the treatment period and the effects of it on the psychosocial status of children and their parents? Little is known about the effect of facial appearance on the psychosocial status of children and their parents during the orthodontic treatment period. Previous studies have reported psychosocial consequences and post-operative anxiety in patients after fixed orthodontic treatment and orthognathic surgery.[23-28] Yet, to our knowledge, no examinations have described the anxiety and depression levels of children and their parents during usage of extra-oral orthodontic appliances. Thus, the purpose of this study was to evaluate the changes in depression and anxiety levels of orthodontic patients and their parents throughout the extra-oral appliances therapy.

Materials and Methods

This cross-sectional questionnaire-based study was carried out at the orthodontic clinic of the faculty of dentistry in Gaziantep University between February 2011 and February 2012. Consent was obtained from the children and their parents, and the Research Ethics Board of the University of Gaziantep approved all study procedures.

The first group consisted of 50 patients (21 girls and 29 boys) with an age range of 12-17 years, awaiting orthodontic treatment and that had not received orthodontic treatment yet, and one parent (age range 32-50 years) for each patient. The second group comprised 45 patients (18 girls and 27 boys) with the age range of 10-18 years, who had been undergoing treatment for a period of 1 year with orthodontic extra-oral appliances (headgear, chin cup, or reverse headgear), and one parent (age range 32-50 years) for each patient. The average ages were 14.48 ± 1.31 years for group 1 and 14.87 ± 2.02 years for group 2. Patients in group 2 participating in this study were selected from one orthodontist's active patients using extra-oral appliances to eliminate the effect of different patient-doctor relationships on the psychosocial status of the children. All patients in group 2 had undergone a similar treatment procedure without extraction of teeth. To increase the reliability of this cross-sectional study, patients having same socioeconomic status and two parents in the household were selected. Personal information and the depression scale for children, body image scale, self-report for childhood anxiety related disorders, and the childhood state-trait anxiety inventory (STAI) were given to the children in both groups. There were no time limitations to complete the tests. The questionnaires were completed by children in group 1 at their initial appointments without the assistance of parents or doctors. The patients in group 2 completed the same tests after undergoing orthodontic treatment with extra-oral appliances for 1 year. For parents, the Beck anxiety inventory and Beck depression inventory were administered to all groups. All of the questionnaires were completed by patients and parents in a quiet room of the clinic.

Measures

The body cathexis scale

The BCS,[29] was used to measure body satisfaction in this study. The measure contains 40 items that assess the degree of a person's satisfaction with various parts or processes of their body. The highest score is 400. The child is asked to rate satisfaction with each of the body parts on a 5-point Likert-type scale, ranging from 1 ("have strong feelings and wish change could somehow be made") to 5 ("consider myself fortunate"). Higher scores indicate greater body satisfaction. Hovardaoğlu,[30] has conducted a validity study of the BCS in the Turkish population.

The children's depression inventory

The CDI,[31] was used to screen for serious depressive symptoms. There are 27 items quantifying symptoms such as depressed mood, hedonic capacity, vegetative functions, self-evaluation, and interpersonal behaviors. It covers the consequences of depression as they relate to children and functioning in school and with peers. For each item, the child has 3 possible answers: 0 indicating the absence of symptoms, 1 the presence of mild symptoms, and 2 the definite presence of symptoms. The total score ranges from

0 to 54. In a Turkish adaptation study,[32] the respondents who received a CDI score of 19 or more were classified as having high levels of depressive symptoms.

The screen for child anxiety related emotional disorders

The SCARED,[33] was used to screen for serious anxiety problems. The SCARED is a self-report scale for children suffering from anxiety disorders. It contains 66 items, describing different emotions and behaviors. For each item, the child is asked to report the frequency of that emotion or behavior, using a 3-point scale (1 = never, 3 = frequently). Summing all items yields a total anxiety score. Higher scores indicate greater anxiety. Although a Turkish adaptation study has not been conducted to date, this scale has demonstrated acceptable internal and test-retest consistency.[33]

STAI for children

Levels of anxiety were assessed using the STAI-C.[34] STAI-C contains 2 separate 20-item subscales that measure state (transitory) and trait (baseline) anxiety. The STAI-C places distress on a continuum, with a higher score indicating greater anxiety. Turkish standardization of the scale has been conducted by Ozusta.[35]

The anxiety and depression levels of parents were evaluated by the Beck Anxiety Scale (BAS) and the Beck Depression Scale (BDS). BAS is a Likert-type scale developed by Beck *et al*.,[36] to determine the frequency of anxiety symptoms, which is composed of 21 items, graded between 0 and 3. The sensitivity and reliability of this scale in a Turkish population has been verified by Ulusoy *et al*.,[37] The BDS is designed to determine the depression risk, level of depression symptoms and changes in violence.[38] The sensitivity and reliability of the scale in a Turkish population has been verified by Hisli,[39] and the cut-off point was determined to be 17.

Statistical analysis

The results are expressed as means ± standard deviation, and percentages. The statistical significance of the differences observed between the groups was evaluated using the Chi-square and independent sample *t*-tests. Correlational analysis between the groups was conducted using the Pearson's *r* method. The statistical program SPSS (Statistical Package of the Social Sciences Program for windows 15.0) was used for statistical calculations. $P < 0.05$ was regarded as indicating statistical significance in all of the analyses.

Results

Statistically no significant differences were found, when an intragroup comparison was performed for each group ($P > 0.05$). Table 1 represents the depression scale scores for children in groups 1 and 2. Their mean scores were 6.42 ± 3.54 and 9.18 ± 5.17, respectively. Group 2 had substantially higher scores than group 1. The higher scores for group 2 differed significantly from those of group 1 ($P = 0.003$). In addition, increased scores for the Trait Anxiety Inventory in group 2 (39.8 ± 9.29) differed significantly from the scores of group 1 (34.9 ± 8.12, $P = 0.021$). However, State Anxiety Inventory scores did not differ significantly between groups 1 and 2 (34.03 ± 9.61 and 30.57 ± 6.18, respectively; $P = 0.086$). For parents in group 2, Beck depression inventory scores were high, and the scores differed significantly between groups 1 and 2 (8.03 ± 6.04 and 5.45 ± 4.79, respectively; $P = 0.046$). For both groups, the effects of the ages of participants on the results of tests were found to be statistically insignificant.

Table 1: Represents the scales scores and statistical analyses; age and gender distributions for all groups

	Group 1	Group 2	*P* value
Age	14.48±1.31	14.87±2.02	0.102
Sex (m/f)	16/24	18/17	0.089
Body image scale score	71.58±17.68	64.81±16.94	0.105
Childhood anxiety score	21.10±15.62	21.29±12.02	0.955
Childhood depression score	6.42±3.54	9.18±5.17*	0.003
Trait anxiety score	34.9±8.12	39.8±9.29*	0.021
State anxiety score	30.57±6.18	34.03±9.61	0.086
Parents beck depression score	5.45±4.79	8.03±6.04*	0.046
Parents beck anxiety score	8.26±7.24	9.48±8.52	0.512

*$P<0.05$

The mean scores for body image scale of groups 1 and 2 (71.58 ± 17.68 and 64.81 ± 16.94, respectively; $P = 0.105$) and self-reported childhood anxiety related disorders (21.10 ± 15.62 and 21.29 ± 12.02, respectively; $P = 0.955$) were within the normal range, as were the mean scores for Beck anxiety inventory of parents in both groups (8.26 ± 7.24 and 9.48 ± 8.52, respectively; $P = 0.512$).

Discussion

In the literature, the impact of orthodontic treatment on anxiety, depression, body image, childhood anxiety related disorders, and parent's anxiety and depression has not been extensively investigated in the context of wearing orthodontic extra-oral appliances. Thus, in this cross-sectional study, our aim was to investigate whether extra-oral appliances such as headgear, chin cups or reverse headgear had any effects on patients and their parent's emotional and psychological profile.

In the present study, higher levels of the patient and parent state anxiety and depression were found at the end of 1 year of active treatment with extra-oral orthodontic appliances. The results do not accord with an earlier study by Sari *et al*.,[28] which found higher anxiety levels of both patients and parents for the trait and state anxiety at the beginning of the orthodontic treatment.

They hypothesized that a lack of information about the orthodontic treatment resulted in the increased anxiety levels observed at the beginning of treatment. It is expected that an improvement to the appearance of the dental malocclusion would influence psychosocial responses positively,[27] because it would enhance the overall attractiveness of patients.[40] However, the current study was focused on the anxiety level of patients and parents during orthodontic treatment with extra-oral appliances. We did not consider the psychological status of individuals at the end of the orthodontic treatment, after they had experienced an improvement in appearance. Maj *et al*.,[21] have stated that 61% of the children wearing orthodontic appliances perceived themselves as ugly and 50% had the fear of being boycotted by peers during treatment, due to such appliances. Tung and Kiyak.[2] have claimed that facial appearance and social attractiveness can influence the psychological development of individuals.[3] A rational way to explain these findings is that the negative effect of extra-oral appliances on facial appearance and social attractiveness,[41] caused the higher anxiety levels evident in those after a year of treatment as compared to those at the beginning of the treatment.

Matthews,[42] has stated that children who have a deficiency in physical health can be affected by even minor stress from the environment, and that this stress is enough to induce circumstances that facilitate the emergence of anxiety. If those wearing extra-oral appliances are perceived as ugly, leading to a stressful situation.[21] Extra-oral appliances, as a factor resulting a poor physical appearance, can lead parents to project stress onto their children unwittingly. Spielberger has suggested that anxiety can be transferred from one individual to others in close proximity (such as from parent to child).[43,44] Furthermore, it has been shown in previous studies that a child's anxiety is strongly affected by the state and trait anxiety of their parents.[45,46] In accordance with these results, parents should not be ignored when evaluating a child's psychosocial condition.

Contrary to expectations, there were no statistically significant differences between the groups in terms of body image scale. According to this result, it may be concluded that environmental stress may be a more influential factor with regard to high levels of anxiety in patients using extra-oral appliances than self-body image perception. In addition, no significant relation was found between groups, when anxiety level and body image scale were compared.

The term "trait anxiety" is used to refer to a person's anxiety that is stable over a long time. In the present investigation, there were no statistically significant differences between the trait anxiety levels of patients and parents waiting for orthodontic treatment, and those who had undergone orthodontic treatment for 1-year with extra-oral appliances. The anxiety levels of group 2 were stable during orthodontic treatment, similar to the anxiety levels of group 1. In line with the findings of Sari *et al*.,[28] the anxiety levels of parents whose children had undergone orthodontic treatment for 1 year were not significantly different from those whose child's orthodontic treatment had not started yet. However, they found high anxiety levels in both groups. These differences may be explained by the differences in psychosocial situation of the parents in the two studies. Despite the fact that different anxiety levels were found, the most important finding of these two studies is that trait anxiety levels were unchanged during orthodontic treatment for all groups. Considering these results, it can be suggested that wearing extra-oral appliances for 1-year does not affect the trait anxiety levels of patients or their parents, based on the similar scores observed for body image and childhood anxiety-related disorders.

Being a cross-sectional study is the main limitation of the present study. Because depression and anxiety levels of different individuals having different malocclusions and using different extra-oral appliances were compared in this study. According to the results of this cross sectional study, it is difficult to conclude that extra-oral appliances have negative effects on patients' mood. However, to eliminate the effects of different skeletal patterns in depression and anxiety levels of patients, patients with Class I skeletal pattern were included and by the way patients with severe skeletal malocclusion were excluded in the present study. So, the indication for extra-oral appliances in this study was only to improve dental malocclusion. By doing so, we prevented profil changes, related to skeletal improvements obtained with different extra-oral appliances, to affect the psychological status of patients. A known fact is that a longitudinal study is required to get better, valuable and comparable results.

The findings of this study highlight the importance of considering psychological parameters and the need to provide greater psychosocial support for such patients and their parents throughout orthodontic treatment with extra-oral appliances, due to higher anxiety levels. This could be offered by either the orthodontist or a psychologist or psychiatrist. It is absolutely essential that the use of extra-oral appliances in treatment be carefully contemplated beforehand and it must be evaluated with regard to relative advantages and disadvantages, so as not to affect the patient's psychological mood negatively.

Conclusion

Although this study has some limitations, it can be concluded that extraoral appliances have negative effects on patients and their parent's anxiety level. Therefore, alternative treatment regimens should always be kept in mind of the clinicians.

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