

A Comparison of Patients' Satisfaction after Functional and Camouflage Orthodontic Treatments in cl II Malocclusion

Luay Ali Zaidan* and Nisreen M. Saleh

Ramadi First Sector for Healthcare, Al-Anbar Health Directorate, Ramadi, Anbar, Iraq.

(Received : 10 February 2022; Accepted : 29 March 2022; First published online: 25 April 2022)

ABSTRACT

Background: Functional and camouflage orthodontic treatments in cl II malocclusions are different treatment methods that are usually used in orthodontic practice. A comparison of patients' satisfaction with these two treatment groups is an important tool for the evaluation of treatment outcomes.

Objectives: We aimed to compare patients' satisfaction with orthodontic treatment subjectively (according to the opinion of patients) between functional and camouflage orthodontic treatments in patients with class II malocclusion.

Materials and methods: The sample of the study was formed from individuals whose treatments were finished between February 2017 and July 2020 at the Department of Orthodontics, Faculty of Dentistry at Suleyman Demirel University, Turkey. A satisfaction questionnaire was used to evaluate the satisfaction of the patients with the treatment process at the end of their treatment. The subjects of the study were selected from 2 genders and a total of 146 cases of average age 11-22 years. The research material consists of a satisfaction questionnaire that was given at the time of treatment end.

Results: The general satisfaction questionnaire score was found to be higher in the patients who received functional orthodontic treatment (P-value = 0.011). In the subgroups, the total questionnaire scores among the treatment subgroups were found to be quite similar.

Conclusion: In our study, the satisfaction level of the quality of life questionnaire was found to be high, while in response to more specific questions on satisfaction, some departments of the questionnaire found less satisfaction or dissatisfaction in patients.

Keywords: Patient satisfaction; Quality of life questionnaire; Class II malocclusion; Functional and camouflage orthodontic treatment.

DOI: [10.33091/amj.2022.174529](https://doi.org/10.33091/amj.2022.174529)

© 2022, Al-Anbar Medical Journal



INTRODUCTION

The general purpose of orthodontic treatment is to provide good treatment results that ensure patient satisfaction at a reasonable cost and time for this purpose, three basic elements should be considered; screening, information, and treatment. The management system must be efficient with the right interventions at the right time, by the right person, for different target groups [1]. Patient satisfaction is very important for achieving overall success in the provision of healthcare services, so patients' opin-

ions and expectations should be fully understood. Considering past systematic studies, the effect of malocclusion on quality of life has been identified. It was observed that there is a significant relationship between aesthetically serious malocclusions and their effect on the emotional and social dimensions of the patient [1], and according to that, there is a decrease in the quality of life in patients affected by malocclusions [2].

Patients interest in treatment quality and quality assurance has increased in recent years. This includes the positive results of research and treatment results developed over the years. One of the most important reasons for the widespread use of orthodontic treatment and the increase in patients has been identified as aesthetic improvement and the reduction of psycho-social problems to a minimum [3]. It has been

* Corresponding author: E-mail: luayali82@gmail.com
Phone number: +9647826420407

concluded that dentofacial problems have definite effects on patient satisfaction since they affect aesthetics, performance, and function [4, 5]. It has been concluded that people who are not satisfied with the appearance of their faces are generally caused by the aesthetic appearance of their teeth [4, 5].

Many sociocultural and psychological factors and personal behaviors affect the perception of physical attraction [6]. Research in the field of community psychology shows that physical attractiveness has an important place in social interaction and the impression of people changes the impression of social skill [7]. It is predicted that when orthodontic treatment improves facial aesthetics, it also increases the patient's self-confidence and self-respect.

Quality of healthcare services is accepted as a multidimensional concept that has different meanings in the literature. Patients' opinions about what is important about the health services they receive can be seen as a part of the quality of health services, and if patient satisfaction is increasing gradually, this is an important indicator of the quality of health services [8, 9]. Several studies, like Flanary and Alexander [1] and Kiyak et al. were conducted on the patients' satisfaction following orthodontic surgery regarding one aspect only [10, 11]. Besides, there is no study compare the patients' satisfaction between the functional and camouflage orthodontic treatments in patients with class II malocclusion. Therefore, we tried in our study to cover as much as possible all aspects that lead to evaluate the factors affecting patients' satisfaction with treatment outcome, and the contribution of this treatment to their lives and satisfaction.

MATERIALS AND METHODS

This retrospective cross-sectional study was approved by the Ethics Committee of Suleyman Demirel University Health Sciences Institute (reference number 10, 19.03.2019). The reason, purpose, approach, and methods of this research were examined and found appropriate, and it was decided that there was no ethical or scientific objection to the research in the orthodontic clinic. Informed consent was taken from every subject.

The sample of the study was formed from individuals whose treatments were finished between February 2017 and July 2020 at the Department of Orthodontics in the Faculty of Dentistry, Suleyman Demirel University, Turkey. This study included a total of 146 cases were selected between the ages of 11-22 years. More than half of the participants were female patients (56.2%). The participants were divided into two main groups and every group was divided into two sub-groups according to the treatment method; the first group made up of 58 patients (39.73%) whose growth potential continued to be treated with a removable ($n = 44$, 30.1%) or fixed ($n = 14$, 9.5%) functional appliances and then finished with a fixed appliance (Straight-wire) technique. The second group composed of 88 patients (60.27%) whose growth potential is reduced or finished to be treated with camouflage orthodontic treatment and was divided into extraction ($n = 49$, 33.5%) and non-extraction ($n = 39$, 26.7%) treatments with the help of extra-oral appliances (Headgear) and/or intermaxillary class II elastics and/or skeletal anchorage (mini-screw).

Inclusion and exclusion criteria include pre-and post-treatment materials are complete and clear, being in permanent dentition, no congenital anomaly, have not undergone orthognathic surgery, those whose treatments were started

and finished by the assistants working in the same clinic, does not have any medical illness that prevents them from understanding or completing the questionnaire, and that affects his compliance with the researcher, and reachable and willing to participate in the study.

The questionnaire was given to the patients by the clinic secretary on the day of treatment end and was filled by the participants physically without using their names. To evaluate the results of the treatment by the patients' opinion after orthodontic treatment, used a questionnaire with two parts; in the first part, we used the Quality of Life questionnaire that was developed by Kiyak et al. [10, 11].

The second part of the questionnaire was used to investigate several factors such as gender, total treatment duration, waiting time at appointments, treatment pain, the discomfort of applied appliances, treatment fee, and patient-orthodontist relationship that affect patient satisfaction.

- (A) Orthodontic Treatment Quality of Life Questionnaire:
Do you think the following criteria have worsened or improved after treatment?
1. Oral Function (a. chewing, b. biting food, c. proper closure of lower and upper posterior teeth, d. proper closure of lower and upper front teeth)
 2. General Health (a. clicking and similar sounds in the jaw joint; b. sinus issues)
 3. Appearance (a. speech, b. the appearance of the teeth, c. face profile, d. general appearance).
 4. Social interactions (a. Feelings about yourself, b. Socialization-communication, c. Success in your lessons, d. being in the community).
- (B) Evaluation of some factors affecting patient satisfaction during orthodontic treatment:
How satisfied are you with the following criteria?
5. The total length of treatment
 6. Waiting time for appointments
 7. Treatment pain
 8. Discomfort caused by appliances used
 9. Treatment cost
 10. Patient-orthodontist relationship

In scoring the questionnaire, individuals are asked to give numerical values between -3 and +3 (very much dissatisfied -3, moderately dissatisfied -2, slightly dissatisfied -1, neutral 0; somewhat Satisfied +1, moderately satisfied +2, and very much satisfied +3) as answers to each questionnaire (7-point Likert system) [10, 11]. The satisfaction questionnaire consisted of 10 sections. Sections 1, 3, and 4 consisted of four questions each, while section 2 consisted of two questions. Each question was graded as mentioned above. Therefore, the satisfaction scores for parts 1, 3, and 4 are between -12 and +12 for each section, and questions 2 are between -6 and +6. On the other hand, the remaining sections in the second part of the questionnaire consisted of a single question in each section. Each question was rated on a level from "-3: very unsatisfied" to "+ 3: very satisfied". For this reason, the total score of the satisfaction questionnaire after treatment for 10 sections consists of 20 sub-questions and reports a satisfaction level between -60 and +60. Reliability analysis was performed for the questionnaire items. Cronbach's alpha value was calculated as 0.745. Accordingly, it was decided that the questions were answered reliably.

Statistical Analyses

Statistical analysis of the study was performed using the SPSS 20.0 (IBM Inc., Chicago, IL, USA) program. Descriptive statistics were presented as mean \pm SD for continuous variables and frequency and percentage for categorical variables. The Kolmogorov-Smirnov test was used to assess the conformity of continuous numerical variables to the normal distribution. Independent group A Student t-test was used for comparisons of two independent groups, and a Mann-Whitney U test was used when parametric conditions were not met. Paired Student's t-test was used to compare PAR scores before and after treatment. One-Way Analysis of Variance (ANOVA) or Kruskal-Wallis tests was preferred for the comparison of multiple groups. The Tukey HSD post-hoc test was preferred for results found to be significant, and significant paired comparisons were shown in tables with similar exponential lowercase letters. Results found significant were visualized with relevant graphics. Measurement results were calculated using the inter-class correlation coefficient (ICC) to evaluate method error and to calculate intra-observer agreement values. The spearman's Rho correlation coefficients were calculated to determine the relationships between the various characteristics of the patients. In the whole study, the type-I error value was accepted as 5%, and P-value < 0.05 was considered statistically significant.

RESULTS

Satisfaction questionnaire results after functional and camouflage orthodontic treatment were compared between treatment types in Table 1. Reliability analysis was performed for the questionnaire items. Cronbach's alpha value was calculated as 0.745. Accordingly, it was decided that the questions were answered reliably. The level of satisfaction with these sections of the questionnaire; 1. oral function, 3. appearance, 5. treatment time, 6. waiting time at appointments, 8. the discomfort caused by the appliances, and 10. The relationship between the patient and orthodontist did not differ significantly between the main groups. While in the following sections: 2. General health problems, 4. social interaction, 7. treatment pain, and 9. treatment fee, and general satisfaction questionnaire score, the functional treatment group was significantly higher (P-value < 0.05). In subgroup 6. in the waiting period of the appointments section, the level of satisfaction in the fixed functional treatment group was found to be significantly higher. In the pain from treatment section, the level of satisfaction in the extraction treatment group was found to be significantly lower, and in the treatment fee section, the satisfaction level in the fixed functional treatment group was found to be lower. While in other sections of questionnaire items, there were no significant differences between the other subgroups.

The comparison results of the satisfaction questionnaire scores in the functional and camouflage orthodontic treatment groups between genders are presented in Table 2. In the functional orthodontic treatment group, treatment duration and patient-orthodontist relationship satisfaction scores differed significantly; they were significantly higher in males. In other sections, satisfaction scores did not differ significantly, and generally higher scores for males were observed. While in the camouflage orthodontic treatment group, it was observed that satisfaction levels for waiting time at appointments and treatment pain were significantly higher in males. In other sections, satisfaction scores did not differ significantly, and

generally higher scores for males were observed. While there was no significant difference between the genders in the functional orthodontic treatment group, it was found that the satisfaction level of males was higher in the camouflage orthodontic treatment group.

DISCUSSION

According to the scores collected from the questions in these sections (1. Oral function, 3. Appearance, and 4. Social interaction) of the quality of life questionnaire, in general in our two main groups and subgroups, the patients stated that they achieved a very high positive change after orthodontic treatment. Although some studies [12] stated that individuals started orthodontic treatment with an expectation of improvement in appearance rather than improvement in oral function, it was found that the individual was very satisfied with all of the oral function, appearance, and social aspects after orthodontic treatment.

In our study, 95% of the patients reported that they had a positive change from the treatment in the appearance section, just like to that finding more than 90% of the patients in a study of Tulloch et al. [12] reported that they were satisfied with their profile, smile, aesthetics, and general appearance. It can be explained by the finding of Ostler and Kiyak [13], who reported that individuals think they get to benefit from the treatment even if there are no dramatic changes in their faces after orthodontic treatment. People who took part in our study saw a positive change in their lives as a result of the treatment, which is in line with other studies that say the level of patient satisfaction with the treatment is high.

Regarding the scores for section 2 (general health issues) was found that the patients in the functional and camouflage orthodontic treatment groups showed a low level of satisfaction. However, to be able to say that temporomandibular joint disorders are directly affected by orthodontic treatment, it may be necessary to follow up before, during, and after orthodontic treatment. Dibbets et al. [14], stated that there was no relationship between orthodontic treatment protocols and the presence and symptoms of temporomandibular joint disorders. Henrikson et al. [15], studied 65 females undergoing orthodontic treatment in their study, and the presence of temporomandibular joint disorders was investigated with anamnesis and clinical evaluations before, during, and after treatment, and it was reported that the presence of symptoms decreased after treatment.

In section 5 of the questionnaire (duration of treatment), patients in the main groups and subgroups showed, on average, low satisfaction levels with the duration of the treatment. Although the treatment period was approximately 1.75 months longer in the functional orthodontic treatment group, the patients were more satisfied, but the difference between the levels of satisfaction, for functional (0.55 ± 1.147) and camouflage (0.09 ± 1.59) treatment was not significant.

Regarding section 6 of the questionnaire (Waiting time for appointments), patients in the main groups and subgroups showed an average good level of satisfaction with the waiting time at appointments, and this was significantly higher in fixed functional orthodontic treatment patients. Since the appointments given by our faculty are given at a certain time for each patient, they will not wait long in the waiting room, and we think that they will show a good level of satisfaction from this section.

Table 1. Shows the distribution of the sample’s satisfaction questionnaire in the functional and camouflage orthodontic treatment groups.

Treatment types Satisfaction Level	A) Removable functional treatment			P-value sub-groups	B) Extraction Non-extraction			P-value sub-groups	P-value Main groups
	Functional treatment	Removable functional treatment	Fixed functional treatment		Camouflage treatment	Extraction	Non-extraction		
1) Oral function(-12)-(+12)	7.74±1.97	7.50±2.04	8.50±1.60	0.100	7.82±1.68	7.8±1.70	7.87±1.69	0.835	0.773
2) General health (-6) -(+6)	1.65±1.70	1.75±1.72	1.35±1.64	0.457	1.17±1.15	1.27±1.24	1.05±1.05	0.392	0.042*
3) Appearance (-12)-(+12)	8.31±1.73	8.11±1.81	8.92±1.32	0.128	8.47±1.58	8.47±1.66	8.49±1.5	0.959	0.550
4) Social interaction (-12)-(+12)	8.34±2.21	8.22±2.40	8.71±1.48	0.478	7.46±1.68	7.53±1.80	7.38±1.55	0.689	0.007*
5) Duration of treatment (-3) -(+3)	0.55±1.47	0.59±1.52	0.42±1.34	0.091	0.09±1.59	-0.08±1.53	0.22±1.65	0.382	0.081
6) Waiting time for appointments (-3) -(+3)	1.55±0.95	1.43±1.04	1.92±0.47	0.018*	1.25±1.45	1.31±1.45	1.18±1.48	0.688	0.168
7) Treatment pain(-3)-(+3)	0.84±0.87	0.81±0.94	0.92±0.61	0.685	-0.04±1.40	-0.13±1.4	0.82±1.42	0.024*	0.001*
8) Discomfort of appliances (-3) -(+3)	0.22±1.17	0.31±1.17	-0.07±1.14	0.282	0.55±1.19	0.51±1.23	0.62±1.16	0.684	0.099
9) Treatment fee (-3)-(+3)	1.28±0.55	1.57±0.89	0.99±0.21	0.019*	0.44±1.38	0.51±1.37	0.36±1.4	0.612	0.001*
10) Patient-orthodontist relationship (-3) -(+3)	1.84±0.41	1.79±0.40	2.00±0.39	0.105	1.87±0.75	1.88±0.78	1.87±0.73	0.972	0.781
Scores of the total survey (-60) -(+60)	32.53±8.94	31.97±9.84	34.28±5.07	0.257	29.11±7.00	28.62±6.78	29.51±7.22	0.555	0.011*

* Refers to a significant P-value.

Table 2. A comparison of the distribution of satisfaction levels by gender for functional and camouflage orthodontic treatment groups.

Satisfaction Level	A) Functional treatment		P-value	B) Camouflage treatment		P-value
	Male	Female		Male	Female	
	[N=21]Mean ±SS	[N= 37]Mean ±SS		[N=43]Mean ±SS	[N=45]Mean ±SS	
1) Oral function	7.81±1.86	7.61±2.20	0.726	7.75±1.93	7.90±1.39	0.673
2) General health	1.91±1.72	1.19±1.60	0.118	1.40±1.40	0.93±0.76	0.054
3) Appearance	8.27±1.66	8.38±1.90	0.818	8.60±1.81	8.34±1.30	0.457
4) Social interaction	8.40±2.16	8.23±2.34	0.785	7.51±2.05	7.41±1.21	0.797
5) Duration of treatment	1.08±1.18	-0.38±1.49	0.001*	0.31±1.71	-0.13±1.44	0.1871
6) Waiting time for appointments	1.70±0.77	1.28±1.18	0.160	1.64±1.17	0.83±1.61	0.009*
7) Treatment pain	1.00±0.57	0.57±1.20	0.138	0.40±1.32	-0.51±1.35	0.002*
8) Discomfort of appliances	0.37±1.08	-0.04±1.28	0.208	0.75±1.15	0.34±1.21	0.110
9) Treatment fee	1.59±0.59	1.23±1.09	0.178	0.66±1.38	0.20±1.35	0.121
10) Patient-orthodontist relationship	1.94±0.32	1.66±0.48	0.025*	2.00±0.79	1.74±0.69	0.113
Scores of the total survey	34,10±7,37	29,76±10,83	0,075	31,04±8,50	27,09±4,19	0,007*

* Refers to a significant P-value.

In section 7 of the questionnaire; while the level of satisfaction with treatment pain was low in functional orthodontic treatment patients (0.84±0.87), a very high dissatisfaction was found in camouflage orthodontic treatment patients (-0.04±1.40). Removable and fixed functional orthodontic treatment patients were similar between the two subgroups at low satisfaction levels. It was found to have significantly lower satisfaction with the treatment pain in the extraction treatment patients. As it is known, the average age of patients in the camouflage orthodontic treatment group was older, and the pain threshold can be explained by the findings of sev-

eral studies reporting that the pain threshold decreases with age [16].

Concerning section 8 of the questionnaire (Discomfort caused by appliances), the satisfaction level was found to be low in two groups. Appliance discomfort was reported to be less in patients who received removable functional orthodontic treatment, and less discomfort in patients treated with non-extraction. Orthodontic treatment can be an uncomfortable experience. Orthodontic appliances are foreign objects that are placed in sensitive areas of the body and cause both physical and psychological discomfort [14]. The discomfort

attributed to orthodontic appliance use was significantly associated with chewing, oral hygiene, and speech difficulties, as well as tooth mobility, bad breath, impaired taste, and gum bleeding. Such a disorder can harm the patient's desire to undergo treatment, cooperation, quality of treatment, and quality of life [17]. The main factors related to the discomfort experienced by orthodontic patients are; the type of the appliance, the amount of force applied in the early stages of treatment, previous pain and emotional experiences, and cognitive and environmental aspects such as culture, gender, and age [18].

In section 9 of the questionnaire (treatment fee), they showed a moderate satisfaction level in functional orthodontic treatment patients and a low level in camouflage orthodontic treatment patients. Functional orthodontic treatment patients reported that they were more satisfied with the treatment fee than camouflage orthodontic treatment patients. It was found that patients who received removable functional orthodontic treatment were significantly more satisfied with the treatment fee. Treatment fee satisfaction was found to be similar between patients who received treatment with and without extraction. In the functional orthodontic treatment group, the patients showed a higher level of satisfaction as the treatment fee was paid by the government, as the patients were younger at the beginning of the treatment. However, some patients in the camouflage orthodontic treatment group showed a lower level of satisfaction because the government did not cover the treatment fee due to their age. The reason why the satisfaction levels of the removable and fixed functional orthodontic treatment patients are significantly different may be due to that the fixed functional orthodontic treatment patients show a lower level of satisfaction because their appliances are more expensive and they buy extra materials from their own pockets other than straight wire materials.

Regarding section 10 of the questionnaire (Patient-orthodontist relationship), the level of satisfaction was found to be moderate in both main groups and subgroups. Bos et al. [19] and Keles et al. [20], they were found that the most important factor contributing to patient satisfaction is the

doctor-patient relationship. In our study, the level of satisfaction in this section was found to be quite compatible with previous studies [21, 22].

The general satisfaction questionnaire score, which was created with all the statements directed, was found to be higher in the patients who received functional orthodontic treatment. Total questionnaire scores between treatments in subgroups were found to be quite similar. We think that the overall satisfaction level was lower in the camouflage orthodontic treatment group because the patients were older. Our study showed parallelism with other studies reporting that satisfaction decreases with age [7, 23–25]. It can be explained by the findings of others who reported that adult patients expressed more concern about general dental health than younger age groups [26].

CONCLUSION

According to the results of the quality of life questionnaire scores of the two treatment groups, the patients achieved a higher level of satisfaction with oral function, appearance, and social departments following the treatment. While in response to more specific questions about satisfaction, they recorded less satisfaction or dissatisfaction in the other departments of the questionnaire. The general satisfaction questionnaire score was found to be higher in the patients who received functional orthodontic treatment. Total questionnaire scores between treatments in subgroups were found to be quite similar. We think that the overall satisfaction level was lower in the camouflage orthodontic treatment group because the patients were older at the beginning of the treatment. The comparison results of the satisfaction questionnaire in functional and camouflage orthodontic treatment groups between genders found generally higher scores for males than females because females are more concerned about esthetics.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

- [1] C. M. Flanary and J. M. Alexander. Patient responses to the orthognathic surgical experience: factors leading to dissatisfaction. *J. oral Maxillofac. Surg.*, 41(12):770–774, 1983.
- [2] Y.-H. Chen, Y.-F. Liao, C.-S. Chang, T.-C. Lu, and K.-T. Chen. Patient satisfaction and quality of life after orthodontic treatment for cleft lip and palate deformity. *Clin. Oral Investig.*, 25(9):5521–5529, 2021.
- [3]
- [4] E. Bradley *et al.* Patient-reported experience and outcomes from orthodontic treatment. *J. Orthod.*, 47(2):107–115, 2020.
- [5] G. D. Slade and A. J. Spencer. Social impact of oral conditions among older adults. *Aust. Dent. J.*, 39(6):358–364, 1994.
- [6] A. Aljughaiman, A. Alshammari, A. Althumairi, A. Alshammari, N. Almasoud, and M. A. Nazir. Patient satisfaction with orthodontic treatment received in public and private hospitals in dammam, saudi arabia. *Open access Maced. J. Med. Sci.*, 6(8):1492, 2018.
- [7] W. C. Shaw. The influence of childrens dentofacial appearance on their social attractiveness as judged by peers and lay adults. *Am. J. Orthod.*, 79(4):399–415, 1981.
- [8] C. Jenkinson, A. Coulter, S. Bruster, N. Richards, and T. Chandola. Patients experiences and satisfaction with health care: results of a questionnaire study of specific aspects of care. *Qual. Saf. Heal. care*, 11(4):335–339, 2002.
- [9] M. E. Bennett and C. L. Phillips. Assessment of health-related quality of life for patients with severe skeletal disharmony: a review of the issues. *Int. J. Adult Orthodon. Orthognath. Surg.*, 14(1):65–75, 1999.
- [10] T. Lazaridou-Terzoudi, A. E. Athanasiou H. A. Kiyak and, R. Moore, and B. Melsen. Long-term assessment of psychologic outcomes of orthognathic surgery. *J. oral Maxillofac. Surg.*, 61(5):545–552, 2003.
- [11] H. A. Kiyak. Patients and parents expectations from early treatment. *Am. J. Orthod. Dentofac. Orthop.*,

- 129(4):S50–S54, 2006.
- [12] J. F. C. Tulloch, W. C. Shaw, C. Underhill, A. Smith, G. Jones, and M. Jones. A comparison of attitudes toward orthodontic treatment in british and american communities. *Am. J. Orthod.*, 85(3):253–259, 1984.
- [13] S. Ostler and H. A. Kiyak. Treatment expectations versus outcomes among orthognathic surgery patients. *Int. J. Adult Orthodon. Orthognath. Surg*, 6(4):247–255, 1991.
- [14] J. M. H. Dibbets and L. T. Van der Weele. Long-term effects of orthodontic treatment, including extraction, on signs and symptoms attributed to cmd. *Eur. J. Orthod.*, 14(1):16–20, 1992.
- [15] T. Henrikson, M. Nilner, and J. Kurol. Symptoms and signs of temporomandibular disorders before, during and after orthodontic treatment. *Swed. Dent. J.*, 23(5-6):193–207, 1999.
- [16] L. Wong, F. S. Ryan, L. R. Christensen, and S. J. Cunningham. Factors influencing satisfaction with the process of orthodontic treatment in adult patients. *Am. J. Orthod. Dentofac. Orthop.*, 153(3):362–370, 2018.
- [17] S. Alajmi, A. Shaban, and R. Al-Azemi. Comparison of short-term oral impacts experienced by patients treated with invisalign or conventional fixed orthodontic appliances. *Med. Princ. Pract.*, 29(4):382–388, 2020.
- [18] D. Wiechmann, J. Gerss, T. Stamm, and A. Hohoff. Prediction of oral discomfort and dysfunction in lingual orthodontics: a preliminary report. *Am. J. Orthod. Dentofac. Orthop.*, 133(3):359–364, 2008.
- [19] A. Bos, N. Vosselman, J. Hoogstraten, and B. Prahl-Andersen. Patient compliance: a determinant of patient satisfaction? *Angle Orthod.*, 75(4):526–531, 2005.
- [20] F. Keles and A. Bos. Satisfaction with orthodontic treatment. *Angle Orthod.*, 83(3):507–511, 2013.
- [21] P. K. Sinha, R. S. Nanda, and D. W. McNeil. Perceived orthodontist behaviors that predict patient satisfaction, orthodontist-patient relationship, and patient adherence in orthodontic treatment. *Am. J. Orthod. Dentofac. Orthop.*, 110(4):370–377, 1996.
- [22] H. Kerosuo, E. Kerosuo, M. Niemi, and H. Simola. The need for treatment and satisfaction with dental appearance among young finnish adults with and without a history of orthodontic treatment. *J. Orofac. Orthop. der Kieferorthopädie*, 61(5):330–340, 2000.
- [23] C. Pacheco-Pereira, J. Brandelli, and C. Flores-Mir. *Am. J. Orthod. Dentofac. Orthop.*, 153(6):834–841, 2018.
- [24] S. J. Cunningham, M. S. Gilthorpe, and N. P. Hunt. Are orthognathic patients different? *Eur. J. Orthod.*, 22(2):195–202, 2000.
- [25] A. Bos, J. Hoogstraten, and B. Prahl-Andersen. Expectations of treatment and satisfaction with dentofacial appearance in orthodontic patients. *Am. J. Orthod. Dentofac. Orthop.*, 123(2):127–132, 2003.
- [26] B. W. Larsson and K. Bergström. Adolescents perception of the quality of orthodontic treatment. *Scand. J. Caring Sci*, 19(2):95–101, 2005.