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Zasadność edukacji prozdrowotnej u leczonych ortodontycznie za pomocą aparatów stałych

Streszczenie

Wstęp. Zdrowie jamy ustnej jest ważnym elementem jakości życia każdego człowieka. Prawidłowa higiena jamy ustnej jest jedną z najważniejszych metod profilaktyki próchnicy zębów i chorób przyzębia.

Cel. Celem pracy była ocena wpływu prowadzonego stałego i jednorazowego instruktażu higieny jamy ustnej, u pacjentów leczonych ortodontycznie za pomocą aparatów stałych w badaniach dwuletnich.

Materiał i metody. Materiał stanowiło 60 pacjentów w wieku od 10 do 20 lat z zaburzeniami zębowo-zgryzowymi. Wyróżniono dwie grupy: A – pacjenci z zaburzeniami zębowo-zgryzowymi leczeni aparatami stałymi ze stałym instruktażem higieny, B – pacjenci z zaburzeniami zębowo-zgryzowymi leczeni aparatami stałymi z wstępnym jednorazowym instruktażem higieny. W grupie A prowadzono stały instruktaż higieny jamy ustnej w czasie T0, T1, T2, T3 i T4 oraz podczas wizyt kontrolnych, natomiast w grupie B wykonano wstępny jednorazowy instruktaż w czasie T0. Badanie przeprowadzono na podstawie pomiaru wskaźników płytkowych PlI, API oraz wskaźników dziąsłowych GI, SBI. Ocenę różnic między wynikami grup wykonano na podstawie analizy wariancji ANOVA i najmniejszej istotnej różnicy NIR.

Wyniki. Uzyskano potwierdzenie, że prawidłowa forma przekazu informacji dotycząca prawidłowej higieny jamy ustnej u pacjentów leczonych ortodontycznie aparatami stałymi oraz regularny kontakt z pacjentem na kontrolnych wizytach, poprawia stan przyzębia i higieny jamy ustnej.

Wnioski. Leczenie ortodontyczne nie pogarsza stanu zdrowia jamy ustnej pod warunkiem przeprowadzenia kompleksowego i szeroko rozbudowanego instruktażu higieny jamy ustnej.

Słowa kluczowe: płytka nazębna, leczenie ortodontyczne, profilaktyka.

The advisability of oral health education of patients treated with fixed orthodontic appliances

Abstract

Introduction. Oral health contributes much to people's quality of life. Proper oral hygiene is one of the most important methods of preventing the development of caries and periodontopathy.

Aim. The aim of the study was to evaluate the impact of providing oral health instructions to orthodontic patients once and more frequently in a 2-year study.

Material and methods. The study group consisted of 60 patients with malocclusion aged 10-20 years. The patients were divided into 2 groups: group A – patients with malocclusion treated using fixed dental appliances to whom dental hygiene instructions were provided on a regular basis, group B – patients with malocclusion treated using fixed dental appliances to whom dental hygiene instructions were provided only once. Group A received dental hygiene instructions at several points in time (T0, T1, T2, T3, T4 and during check-up appointments), whereas group B was presented with the instructions at T0 only. The study was performed using the plaque indices PlI and API, and the gingival indices GI and SBI. The differences between the groups were evaluated using the ANOVA test and the NIR value.

Results. It has been confirmed that correct form of providing information about oral hygiene to patients undergoing orthodontic treatment with fixed orthodontic appliances and regular contact with the patients during check-up appointments is beneficial for the state of periodontium and oral hygiene in general. For this reason, it decreases the risk of complications during orthodontic treatment.

Conclusions. Orthodontic treatment is not detrimental to oral health provided that comprehensive oral hygiene instructions are given to the patient.

Keywords: dental plaque, orthodontic treatment, prophylaxis.

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FIGURE 1. Basic and additional oral hygiene aids designed for maintaining oral hygiene during treatment with a fixed dental appliance.

INTRODUCTION

Oral health contributes much to the overall quality of life of every human being. Meticulous oral hygiene is one of the most important methods of preventing caries and periodontal disease. Dental biofilm may cause gingivitis, which manifests itself in oedema, erythema and haemorrhage of the gingivae. On the one hand, patients who are treated with fixed dental appliances are much more prone to dental plaque retention and problems with plaque removal from the areas adjacent to the elements of the appliance [1,2]. This, in turn, creates high risk of caries [3,4] and periodontopathy [5-7] development. On the other hand, orthodontic treatment of malocclusion with fixed appliances requires the patient to perform oral hygiene tasks more often and use a greater variety of aids designed for maintaining a satisfactory level of oral hygiene [8-11].

One can find many scientific papers concerning the advisability of oral hygiene instructions and basic and additional hygiene aids in orthodontic patients. Those studies are more concerned with the efficacy of using electric and manual toothbrushes, dental floss, mouth rinses, or particular brushing techniques in patients with fixed orthodontic appliances [8,11-15].

Therefore, it seemed reasonable to perform a long-term study concerning the education of patients undergoing orthodontic treatment with fixed appliances.

AIM

The aim of the study was to evaluate the effects of providing dental hygiene instructions once and more frequently to patients who are treated using fixed dental appliances.

MATERIAL AND METHODS

The study group consisted of patients aged 10-20 years with malocclusion. Materials obtained from a single patient included medical documentation, i.e. medical and orthodontic history, photographs and radiograms taken for diagnostic reasons. Complete clinical data was obtained for 60 patients who were divided into two groups according to the scheme of providing oral hygiene instructions. Each group consisted of the number of patients, which allowed statistical analysis. Group A comprised patients with malocclusion treated using fixed orthodontic appliances who received dental hygiene instructions repeatedly, group B consisted of patients with malocclusion treated using fixed orthodontic appliances to whom dental hygiene instructions were given only once.

After the patients had been placed into one of the groups, their oral health and state of periodontium was examined at T0, i.e. before the beginning of the treatment with the appliance. Further on, their oral hygiene and periodontium were observed at T1 (after 3 months), T2 (after 9 months) and T3 (after 12 months). Afterwards, oral health and periodontium was examined at T4, i.e. 3 months after the appliance had been removed. Group A received dental hygiene instructions at T0, T1, T2, T3 and T4 as well as during check-up appointments, whereas group B received the instructions at T0 only. Dental hygiene instructions were given according to a following scheme: the evaluation of oral hygiene, the description of brushing techniques, the presentation of basic oral hygiene instruments (toothpaste with fluoride, toothbrushes and mouth rinses), and the recommendation of additional aids designed for maintaining hygiene in interproximal spaces (dental floss, single-bundle toothbrushes, interdental toothbrushes, dental toothpicks).

All patients were recommended to use basic oral hygiene aids (toothpaste with fluoride, mouth rinses and toothbrushes appropriate in relation to their shape and hardness), as well as additional aids (Figure 1).

Dental hygiene instructions were given to each patient verbally, shown on appropriate models, and shown in practice. Also, each patient received written guidelines regarding the maintenance of oral hygiene (Figure 2).

In order to evaluate oral health, four indices were used. The indices used in the study were Plaque Index by Silness and Löe (PlI) (1964) [16] and Approximal Plaque Index (API) by Lange (1986) [17]. Modified API (without the use of disclosing agents) was used to determine tooth surface covered with plaque.

FIGURE 2. The direct provision of oral hygiene instructions over the course of orthodontic treatment.

Gingival Index (GI) by Löe and Silness (1964) [16] and Sulcus Bleeding Index (SBI) by Muhemann and Son (1971) [18] were used to evaluate the condition of the soft tissues of the periodontium (Table 1).

The measurements were made on subsequent appointments. Moreover, patients from group A received dental hygiene instructions.

The last stage of the study consisted of statistical analysis of the gathered data. Following values were measured – mean value, standard deviation and median. The differences between the two groups were evaluated using the ANOVA test and the NIR test.

RESULTS

Differences were analysed between two groups receiving treatment with fixed orthodontic appliances and with different frequency of providing dental hygiene instructions. The differences between both groups concerning oral hygiene and the state of periodontal tissues were evaluated at each stage of the study.

PlI was measured for each group separately at five points in time during the study (T0-T4) and had a mean value of 0.77-1.64 (Table 2). Mean value differences before, i.e. at T0, and after 3 months (T1), 9 and 12 months (T2 and T3) were not significant statistically. After the completion of treatment, mean value of PlI in the group treated with fixed orthodontic appliances and receiving repeated dental hygiene instructions turned out to be lower than in the group that had received dental hygiene instructions once at the beginning of the study (Table 2). API values reached the level of approximately 22.6-43.34. However, the differences between the two groups did not reach the significance level of $p<0.05$. There were no statistically significant differences in oral hygiene between the two groups before the orthodontic treatment (T0). Differences were noticeable after three months. In group B, that received dental hygiene instructions only once, mean value of the index appeared to be lower (22.67) than in the group treated using fixed orthodontic appliances, to whom dental hygiene instructions were given repeatedly (31.80). Moreover, an overall improvement in oral hygiene was observed. The downward trend in group A was noted until the third month after the placement of appliances on teeth. Further on, until the ninth month, the mean values of indices grew. Group B, on the other hand, showed an upward trend in mean values of the indices from the third month after the placement of the appliance until the twelfth month of the active phase of orthodontic treatment. Three months after the treatment was completed, mean values of indices sank. This shows that correct oral hygiene habits were retained (Figure 3).

TABLE 1. Criteria for the evaluation of the indices.

Plaque indices		
Oral hygiene status	**PlI** **Plaque Index** Measurement at the gingival margin of the teeth 16,11,24,36,31,44	**API** **Approximal Plaque Index** Measurement in interproximal spaces
	0-no plaque 1-thin film of plaque at the gingival margin, visible only when scraped with an explorer 2-moderate amount of plaque along the gingival margin, plaque visible with the naked eye 3-heavy plaque accumulation	0-no plaque 1-thin film of plaque at the gingival margin, visible only when scraped with an explorer 2-moderate amount of plaque along the gingival margin, plaque visible with the naked eye 3-heavy plaque accumulation
Gingival Indices		
Periodontal Status	**GI** **Gingival Index** Measurement at the gingival margin of the teeth 16,11,24,36,31,44	**SBI** **Sulcus Bleeding Index** Measurement at the gingival margin of the teeth 16,11,24,36,31,44
	0-normal gingiva 1-mild inflammation, no bleeding 2-moderate inflammation, bleeding on probing o r when pressure applied 3-severe inflammation, tendency towards spontaneous haemorrhage	0-normal gingiva, no bleeding 1-no changes in colour or contour, bleeding on probing 2-bleeding on probing, erythema 3-bleeding on probing, erythema, mild oedema 4-bleeding on probing, erythema, severe oedema 5-bleeding on probing or spontaneous haemorrhage, severe oedema with or without ulceration

TABLE 2. The comparison of mean value, median and standard deviation for plaque indices (PlI, API) and gingival indices (GI, SBI) in two study groups (A, B) before (T0), during (T1, T2, T3) and after (T4) orthodontic treatment .

Indices	Time	A			B			Significance level
		Mean value	median	SD	Mean value	median	SD	
PlI	T0	1.64	1.50	0.60	1.45	1.50	0.45	0.1504
	T1	0.92	1.00	0.35	0.81	0.66	0.33	0.2747
	T2	0.77	0.83	0.42	0.89	0.83	0.37	0.2572
	T3	0.83	0.83	0.39	0.97	0.92	0.51	0.2178
	T4	0.52	0.42	0.44	0.83	0.83	0.46	**0.0111**
API	T0	43.43	42.00	10.19	39.07	35.00	13.71	0.1624
	T1	31.80	33.00	7.55	22.67	20.00	8.47	**0.0002**
	T2	29.43	28.50	9.31	25.63	25.00	7.64	0.1096
	T3	31.77	33.00	9.57	28.40	25.00	12.12	0.2430
	T4	26.60	25.00	9.84	22.93	20.00	9.97	0.1986
GI	T0	1.46	1.33	0.60	1.31	1.42	0.52	0.2994
	T1	0.78	0.83	0.36	0.69	0.75	0.26	0.2925
	T2	0.70	0.66	0.41	0.82	0.83	0.30	0.2333
	T3	0.92	0.83	0.49	1.01	1.00	0.40	0.4492
	T4	0.60	0.66	0.38	0.75	0.66	0.47	0.2293
SBI	T0	2.14	2.17	0.93	1.64	1.66	0.78	**0.0116**
	T1	1.24	1.00	0.67	0.84	0.83	0.27	**0.0022**
	T2	1.26	1.00	0.67	1.00	1.00	0.23	**0.0342**
	T3	1.36	1.25	0.64	1.19	1.16	0.43	0.2138
	T4	1.02	0.83	0.66	0.89	0.66	0.53	0.3618

SD – standard deviation
PlI, API – plaque (oral hygiene) indices
GI, SBI – periodontal indices

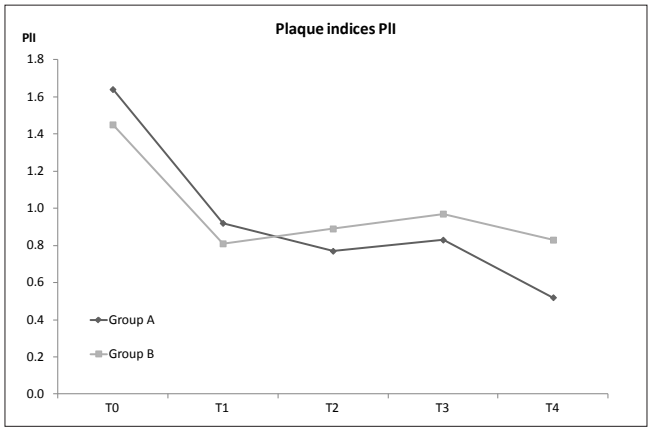

FIGURE 3. Differences in mean values of PII between group A and group B at T1-T2-T3-T4.

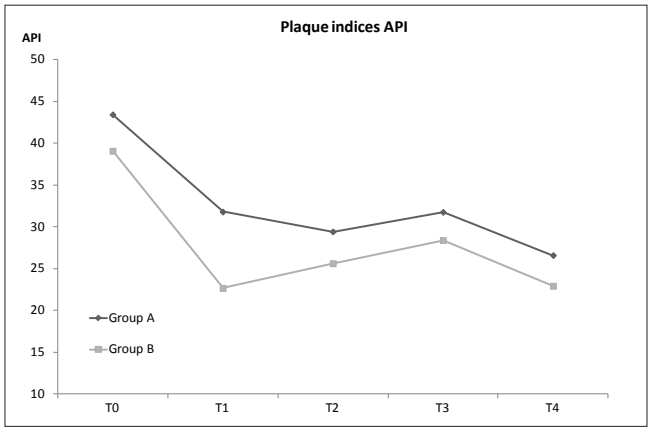

FIGURE 4. Differences in mean values of API between group A and group B at T1-T2-T3-T4.

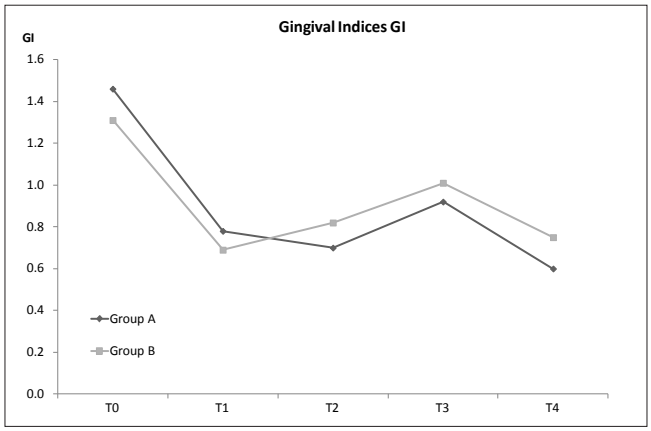

FIGURE 5. Differences in mean values of GI between group A and group B at T1-T2-T3-T4.

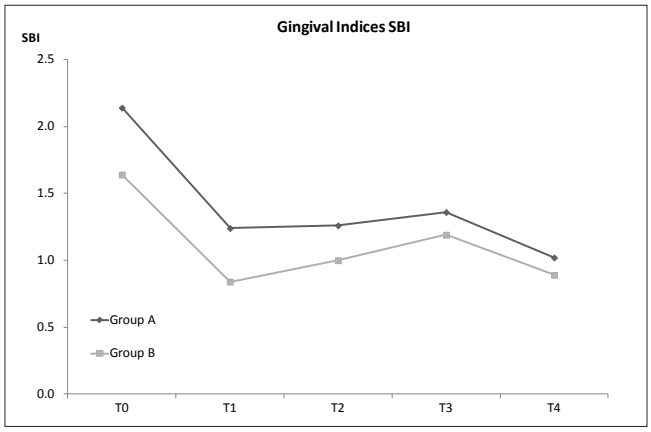

FIGURE 6. Differences in mean values of SBI between group A and group B at T1-T2-T3-T4.

There was no statistically significant difference in the mean value of GI in both groups A and B as it had the value of 0.60-1.46. Mean values of GI decreased between the third and ninth month of the study (T1-T2) in the group that received repeated dental hygiene instructions. In contrast, mean values of GI grew over the same period and extended until the twelfth month of the active phase of treatment (T3) in the other group. Later, i.e. over the 3 months after the treatment had been completed (T3-T4), the values of GI became lower in both groups, which may suggest that oral hygiene habits improved. Mean values of SBI amounted to approximately 0.84-2.14 and fluctuated in the T0-T4 period. Mean values of SBI sank in group B from T0 to T2; also, they were lower in group A. However, one could observe an increase in mean values of SBI between the ninth and the twelfth month of treatment (T2-T3). Mean values of SBI became lower 3 months after the completion of the treatment (T4).

During the treatment, the values of indices were changing. Nevertheless, they did not reach initial values (Figure 5,6).

DISCUSSION

The study presents an evaluation of the impact of the frequency of dental hygiene instructions on oral health based on particular parameters. The study shows a comparison between group A to which dental hygiene instructions were given repeatedly, and group B which received dental hygiene instructions once. As has been shown, the mean values of dental plaque indices and periodontal indices became lower in both groups, which in turn led to an improvement in overall oral health.

Yetkin et al. [19] studied methods of improving oral hygiene in 150 patients undergoing orthodontic treatment (mean value of age – 15.2) by measuring PI and GI before the treatment and 1 week and 1 month after providing dental hygiene instructions. His study shows that the best outcome was obtained in the group who received comprehensive oral hygiene instructions. The scheme combined verbal instructions, pictures demonstrating methods of maintaining oral hygiene, and demonstration of the methods by patients under the supervision of the dentist. Bardal et al. [20] conducted research concerning the impact of education, prevention and motivation to maintain oral hygiene among patients undergoing orthodontic treatment. The team observed that oral hygiene improved over 6, 12 and 24 months after dental hygiene instructions were provided to 27 patients (mean value of age – 16.9 years old). The improvement was observed in that the mean values of plaque and gingival indices fell. The data from our study is, therefore, similar to the data in literature, in spite of its being conducted over a short period with the use of a limited number of indices.

However, Naranjo et al. [7], Ristic et al. [21] and Babacan et al. [22] observed a reverse trend in the changes in dental plaque and gingival indices. Naranjo et al. [7] observed an increase in the values of PlI and GI, i.e. the decrease in oral hygiene, among 30 teenage patients over the period of three months of the active phase of orthodontic treatment. It should be noted that the authors did not provide professional oral hygiene instructions to patients during the treatment. Ristic et al. [21] also observed an increase in the value of PlI. Patients received verbal dental hygiene instructions

three weeks prior to the beginning of treatment with a fixed orthodontic appliance. Maximal values for PlI were observed at T3, i.e. three months after the appliance had been placed. The values rose from 0.56 to 1.25. According to the researchers, the increase in the values may relate to the changes in the balance of the oral microflora over the first three months. The increase can be also explained by the fact that dental hygiene instructions were given to patients only once. Babacan et al. [22] conducted a study into halitosis on 21 patients. The authors observed an increase in the values of PI and GI both one week and four weeks after the beginning of the treatment with fixed orthodontic appliances. According to the authors, it might be caused by the higher level of dental plaque retention to appliances and by patients' lack of skills in brushing the surfaces adjacent to the elements of appliances. However, it should be mentioned that the authors did not provide professional oral hygiene instructions. It should be taken into account that patients achieved better results in our study after three months because dental hygiene instructions were provided verbally, in writing and by demonstration on a model. Moreover, patients were asked to repeat the instructions on the model under the supervision of the professional.

The analysis of the changes over time has shown that mean values of plaque and ginvival indices decreased in both groups over three months after the introductory oral hygiene instructions had been provided to the patient. This downward trend extended up to the ninth month of the treatment in group A, i.e. the group which received repeated oral hygiene instructions. This proves that monitoring is beneficial for oral health. Group B, i.e. patients who received oral hygiene instructions before the beginning of the treatment only, demonstrated an increase in the mean value of indices between the third and twelfth month of treatment. However, these values did not reach values from T0. Furthermore, they fell after the treatment had been completed. It can be assumed that it happened due to the fact that oral hygiene procedures were easier to perform after the removal of the appliances and the correction of malocclusion.

The results of this study concerning the differences between two groups in respect of the state of oral hygiene and periodontium in patients with malocclusion over the period of two years show that providing oral hygiene instructions, regardless of its frequency, results in an improvement in oral health. It should be underlined that using two indices to assess oral health has proven that providing oral hygiene instructions in the right form on a regular basis is more understandable and effective for the patients.

CONCLUSIONS

Orthodontic treatment is not detrimental to oral health provided that comprehensive oral hygiene instructions are given to the patient.

The study shows that providing oral hygiene instructions correctly to the patients with malocclusion treated using fixed dental appliances during the whole treatment is beneficial for oral health. It has been confirmed that the right form of providing information about oral hygiene to orthodontic patients leads to an improvement in the state of periodontium and oral hygiene. This, in turn, decreases the risk of complications during orthodontic treatment. It would seem essential that guidelines in improving oral hygiene during orthodontic treatment should be created. The guidelines would allow the patient to correct bad habits, perform oral hygiene procedures more meticulously, and cooperate with the orthodontist more consciously.

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