Original Article / Özgün Araştırma

Prevalence of Chronic Periodontitis, Bruxism and Temporomandibular Joint Disorders in Patients with Fibromyalgia Syndrome

Fibromiyalji Sendromu Olan Hastalarda Kronik Periodontitis, Bruksizm ve Temporamandibular Eklem Rahatsızlığı Prevalansı

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Bruxism, chronic periodontitis, fibromyalgia syndrome, temporomandibular joint disorders

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Abstract

Objective: Chronic periodontitis is a world-wide infectious and inflammatory disease and may have a relationship with other inflammatory diseases such as fibromyalgia syndrome (FMS). The aim of this study was to determine whether the prevalence of periodontitis is increased in individuals with FMS or not.

Materials and Methods: Sixty-four patients with FMS and 70 systemically healthy individuals were included in the present study. Fibromyalgia patients did not have any other systemically disease. All subjects had at least 20 functioning teeth and underwent detailed oral and radiographic examination, in addition, bruxism and temporomandibular joint (TMJ) examinations were performed. All clinical attachment levels, plaque and gingival indices were recorded.

Results: Fibromyalgia patients tend to have higher gingival index scores than healthy individuals. There was a significant difference in the presence of bruxism between the study groups ($p<0.05$) but not in the presence of TMJ disorders. There was no significant difference regarding to periodontal disease between individuals under age 45 years. The prevalence of periodontitis was increased in healthy group aged above 45 years ($p<0.05$) but not changed in equivalent FMS patients ($p>0.05$).

Conclusion: We found that the prevalence of periodontitis was not changed in FMS patients but was increased in healthy subjects above age 45.

Öz

Amaç: Kronik periodontitis dünya çapında yaygın bir enfeksiyöz ve enflamatuvar hastalıktır ve fibromiyalji sendromu (FMS) gibi diğer enflamatuvar hastalıklar ile bir ilişkisi olabilir. Bu çalışmanın amacı, FMS ve kronik periodontitis arasında bir ilişki olup olmadığını tespit etmektir.

Gereç ve Yöntemler: Bu çalışmaya 64 FMS'li ve 70 sistemik sağlıklı hasta dahil edilmiştir. Fibromiyalji hastalarının başka bir sistemik rahatsızlığı bulunmamaktadır. Tüm hastaların detaylı oral ve radyografik incelemeleri, bruksizm ve temporomandibular eklem (TME) muayenesi gerçekleştirilmiş ve ağızlarında en az 20 fonksiyonel diş bulunduğu doğrulanmıştır. Tüm klinik ataçman seviyeleri, plak ve gingival indeks skorları kaydedilmiştir.

Bulgular: Fibromiyalji hastalarının gingival indeks skorları sağlıklı gönüllülere göre daha yüksek olarak bulunmuştur. Çalışma grupları arasında TME rahatsızlığı açısından fark bulunmazken, bruksizm açısından istatistiki anlamlı fark saptanmıştır ($p<0,05$). Kırk beş yaş üstü hastalarda fibromiyalji ve periodontitis hastaları arasında negatif bir ilişki saptanırken, 45 yaşın altındaki bireylerde periodontal hastalık ile ilgili herhangi bir fark saptanmamıştır ($p<0,05$).
Sonuç: Sonuçlar, FMS'nin periodontal problemleri arttırmadığını, ancak 45 yaşın üzerindeki hastalarda semptomlar için reçete edilen anti-enflamatuvar ve analjezik ilaçların, periodontal kayıpların şiddetini azaltabileceğini göstermektedir.

Introduction

Fibromyalgia syndrome (FMS) is a common chronic pain syndrome accompanied by some other symptoms such as stiffness, tenderness of specific anatomic sites (tender points), depression, anxiety, fatigue, sleep disturbances, irritable bowel syndrome and paresthesia (1,2). FMS mostly affects females with a prevalence range 1-4% (3-7). Along with other symptoms, diffuse pain and functional disability caused by FMS reduce the quality of life of patients (1,8). Although mechanisms believed to be involved in the disease are unclear, there may be similarities with periodontitis pathogenesis, such as imbalance in oxidant/antioxidant status and up-regulation of pro-inflammatory cytokines. Furthermore, there is no study reporting any possible association between FMS and chronic periodontitis.

Neuroendocrine alterations are considered to play a major role in the development of FSM (9,10). In addition, a pro-inflammatory state in FMS has also been reported (8). Fibromyalgia usually is not considered as an inflammatory disease (8,11,12). However, underlying mechanisms of the symptoms could be explained by over expression of certain cytokines responsible for immune and acute phase responses (8,13). In addition to cytokines and inflammation, oxidative stress has been reported to be involved in the pathophysiology of FMS as well as periodontal diseases (7,10,13). The role of oxidative stress in the etiopathogenesis of periodontal diseases is more evident than in FMS. To be specific, oxidant/antioxidant imbalance either as a direct result of excessive reactive oxygen species production or antioxidant deficiency cause periodontal tissue destruction (14) and alveolar bone loss (15,16). Unlike periodontitis, whether oxidative stress is an outcome or a causative factor in FMS is not clear (17-20).

Other than oxidative stress, there are a number of studies suggesting the involvement of innate immunity and increased cytokine profile in FMS (21,22). The pro-inflammatory cytokines and mediators that have been found to be elevated are interleukin (IL)-6, IL-8, IL-10, tumor necrosis factor-alpha (TNF-α), interferon-gamma, cortisol and C-reactive protein (11,13,23,24). Along with these, an increase in neutrophil functions and up-regulation of monocyte derived IL-1β, IL-18 and monocyte chemoattractant protein-1 levels were reported by Bote et al. (25). These cytokines are related to acute inflammation and inflammatory diseases and also were found to be elevated in periodontitis patients. Particularly, TNF-α has a major role in soft and hard tissue destruction by modifying matrix degrading enzymes and receptor activator of nuclear factor kappa B ligand (26-29). TNF-α also up-regulates other cytokines such as IL-1β and IL-6 and accelerates the destructive process (26,28,30-32).

There are also certain factors which were considered to be possible factors contributing to the development of FMS such as psychological factors (23), sleep disturbances and headache (33,34) A relationship of bruxism with migraine headache (35) and sleep problems (36) was suggested. These factors are also either causative factors or results of bruxism suggesting a potential correlation. Furthermore, pain caused by FMS could also trigger bruxism. On the other hand, bruxism might cause pain in the orofacial muscles and temporomandibular joint (TMJ) which might severe FMS symptoms.

Based on these studies reporting possible common pathogenetic features between FMS and periodontitis, it is hypothesized that FMS patients might suffer more severe periodontitis than systemically healthy individuals. Therefore, the aim of the present study was to determine whether the prevalence of periodontitis is increased in individuals with FMS or not. The prevalence of bruxism and TMJ disorder is also evaluated in order to provide an opinion regarding any potential causes of muscle and/or joint pain in the orofacial region and reveal any causative effect of FMS on bruxism.

Materials and Methods

This clinical parallel study was conducted between March 2015 and June 2016 in the Department of Periodontology at the Faculty of Dentistry of Gaziosmanpaşa University. During this period, 64 patients diagnosed with FMS (FMS group) and 70 systemically healthy volunteers (HV group), totally 134 female patients were included in the study. The diagnosis of fibromyalgia was confirmed by consultation under Department of Physical Medicine and Rehabilitation, Gaziosmanpaşa University, Faculty of Medicine according to the American College of Rheumatology. FMS patients were currently not receiving any treatment aimed to control their symptoms. All the participants were non-smokers, had at least 20 teeth in their mouth and did not receive any periodontal treatment, use antibiotics or any drugs in the previous 6 months. Written informed consents were obtained. The study protocol was approved by Clinical Trials Ethics Committee of Gaziosmanpaşa University Faculty of Medicine, Tokat, Turkey (15-KAEK-158).

All FMS patients and HV underwent detailed oral and radiographic examinations. Clinical periodontal measurements of all teeth were recorded. Bruxism and TMJ examinations were performed clinically and radiographically.

Periodontal Clinical Parameters

The clinical measurements were recorded from cemento-enamel junction to the bottom of the pocket including gingival recessions if any. Chronic periodontitis and gingivitis were diagnosed based on the clinical and radiographic criteria defined by the 1999 International World Workshop for a Classification of Periodontal Diseases and Conditions (37). Full mouth clinical attachment level (CAL), probing pocket depth (PPD), plaque index (PI) (38), gingival index (GI) (39) measurements at six sites per tooth (mesial, middle and distal aspects of both buccal and lingual/palatal surfaces) were performed. CAL and PPD levels were measured via a periodontal probe (Hu-Friedy Co., Chicago, IL, USA). CAL was calculated as the distance in millimeters from the cemento-enamel junction to the bottom of the periodontal pocket. PPD was measured in millimeters from the gingival margin to the base of the periodontal pocket.

Bruxism and Temporomandibular Joint Examination

Oral soft and hard tissue examination including jaw-muscle hypertrophy, linea alba in the cheeks, impressions of the teeth in the tongue or lips, tooth wear, and/or tooth or implant fracture, was performed and bruxism was diagnosed as per the following criteria:

1. A history of tooth grinding occurring ≥3 nights per week,
2. Experience of morning jaw stiffness, and
3. Clinical presence of tooth wear (40,41).

TMJ examination including pain history, palpation of the TMJs, compression and traction, auscultation of the TMJs for joint sounds, palpation of the masticatory muscles, limitations or disturbances of mandibular movements, dental status, and dynamic and static occlusion. Examination and diagnosis were performed according to the Research Diagnostic Criteria for Temporomandibular Disorders which classifies TMJ disorders into 3 groups as group 1 (muscle disorders), group 2 (disk displacement), and group 3 (arthralgia, osteoarthritis, and osteoarthrosis). Regarding TMJ disorder, presence of group 1 or further TMJ disorder was scored as '1' and absence was scored as '0' (42,43). The same examiner, who was unaware of the treatment allocation, performed bruxism and TMJ examination in the participants.

Intra-examiner Reproducibility

One calibrated periodontics specialist, who was not aware of the study groups, performed all the measurements. The examiner underwent calibration training at the beginning of the study in order to provide standard measurements of CALs. The examiner examined 10 patients, not related to the present study, at two separate sessions, 48 h apart. Calibration was accepted if percentage agreement between measurements at baseline and after 48 h was more than 90%.

Statistical Analysis

Data were expressed as mean and standard deviation, scores and percentage as appropriate. Analysis of normality was performed and parametric tests were used based on the distribution of the data. Independent samples t-test and chi-square test were used. All statistical analyses were performed via SPSS program (v.20.0) and a p value of less than 0.05 was considered statistically significant.

Results

Table 1 summarizes the results of this study. Mean age of the FMS and HV groups were 43.89±9.74 (27-63) years and 44.45±9.96 (27-63) years, respectively. There were no significant differences in age and PI between the groups (p=0.74 and p=0.38, respectively). The mean PI value was 1.70±0.63 in FMS patients and 1.70±0.72 in HV, respectively. The mean GI value was 1.80±0.50 in FMS group and 1.65±0.70 in HV group. This difference was found to be statistically significant (p=0.01). The mean CAL was 2.72±1.06 and the prevalence of periodontitis was 15.62% in the FMS group while the values were 3.35±1.30 and 41.42% in the HV group. There was a significant difference in CALs between the groups (p=0.003). When quantitative data is converted to nominal data based on CAL values, as healthy and gingivitis=score 0 and periodontitis=score 1, the chi-square test also showed significant difference (p=0.001). When all participants were classified into three groups according to their age as young (age ≤30, n=8 in FMS patients, n=10 in healthy group), early middle age (31-45, n=24 in FMS patients, n=26 in healthy group) and late middle age (≥46, n=32 in FMS patients, n=34 in healthy group); the prevalence of periodontitis was 0 under age 30 in both groups, 14.28% in early middle aged FMS patients and 29.41% in early middle aged volunteers. There were no significant differences in periodontitis prevalence in both young and early middle aged participants between the two groups (p>0.05). The prevalence of periodontitis in late middle aged participants was 16.66% in FMS patients and 59.37% in volunteers (Figure 1). The difference was found to be significant (p=0.001). Furthermore, when CAL was classified into three categories as healthy, mild and medium attachment losses (CAL ≤3 mm=0, CAL 3-5 mm=1 and CAL >5 mm=2); the rates in the FMS group were 84.37%, 3.13% and 12.50%, respectively. The rates in the volunteers were 57.15%, 15.71% and 27.14%, respectively.

The prevalence of TMJ disorder was 31% and 19% in FMS patients and HV, respectively. The prevalence of bruxism was 50% and 20 % in FMS patients and healthy individuals, respectively (Figure 2). The chi-square test results revealed a significant difference in bruxism (p=0.001). Young and late middle aged FMS patients had higher prevalence of bruxism compared to young and early middle aged controls (p=0.03, p=0.01, respectively). However, no difference was found in the prevalence of TMJ disorders between the groups (p=0.08).

Table 1. Summary of the results of the study

Study groups/ parameters	FMS patients n=64 Mean±SD	Healthy volunteers n=70 Mean±SD
Age	43.89±9.74	44.45±9.96
Plaque index	1.70±0.63	1.70±0.72
Gingival index	1.80±0.50	1.65±0.70
Probing pocket depth	3.12±1.39 mm	3.98±1.19 mm
Bruxism prevalence	0.46±0.59	0.20±0.40
TMJ disorder prevalence	0.31±0.46	0.18±0.39
Clinical attachment level	2.72±1.06 mm	3.35±1.30 mm

SD: Standard deviation, FMS: Fibromyalgia syndrome, TMJ: Temporomandibular joint

Discussion

This is the first study to evaluate the relationship between FMS and chronic periodontitis. It was found that the prevalence of periodontitis increased with age in healthy individuals while remained the same in FMS patients. In order to evaluate cumulative effect of age on both periodontitis and FMS, age was assessed as three parts: young adults, early middle-aged adults and late middle-aged adults. The prevalence of

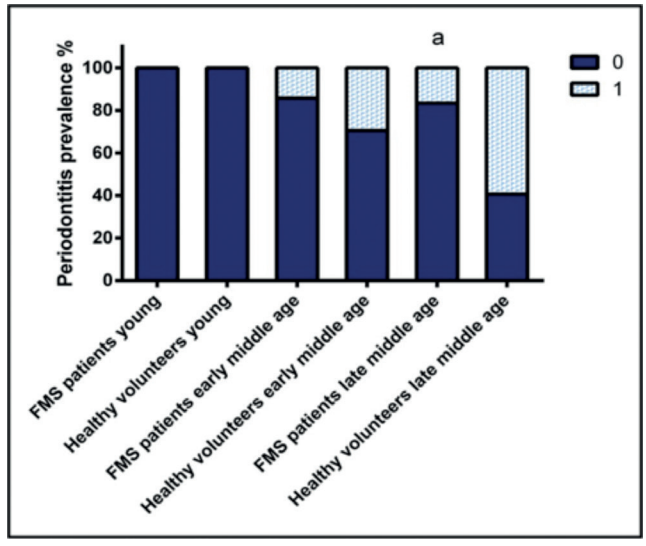

Figure 1. Periodontitis prevalence in fibromyalgia syndrome patients and healthy volunteers

0: without periodontitis, 1: with periodontitis, [a]p<0.05 vs. healthy volunteers late middle age, FMS: Fibromyalgia syndrome

periodontitis in late middle-aged patients significantly increased in HV that could be interpreted as the effect of advancing age, however, the prevalence was same in equivalent FMS patients. It was shown that FMS patients had a higher prevalence of bruxism than healthy individuals but there were no TMJ disorders.

FMS is a disease of unknown etiology in which some factors are believed to be involved. These factors include psychosocial and environmental influences, neuroendocrine alterations (23), autonomic nervous systems problems, and genetic factors (2,12). Santos-Garcia et al. (3) confirmed that myocardial dysfunction that typically present in patients with FM, does not occur as a consequence of periodontitis. However, the fact that fibromyalgia patients have the low values of bleeding on probing while they have a high rate of dental plaque. This indicates very low susceptibility of patients to bleeding and thus periodontal disease. Unlike this report, it was found that PI was same between FMS and periodontitis patients while GI was higher in FMS patients. Though it is not a proved fact, this difference in PI and GI between the groups might result from unsteady oral hygiene behaviors of FMS patients which could be affected by general pain status of the patients. Similar to PI results, it was found that the prevalence of periodontitis was same in both groups under age 45. The results also showed that the prevalence of periodontitis was increased in healthy group above 45 years of age. This result is compatible with the literature (44). However, interestingly, it was observed that FMS patients above 45 years of age had lower prevalence of periodontitis.

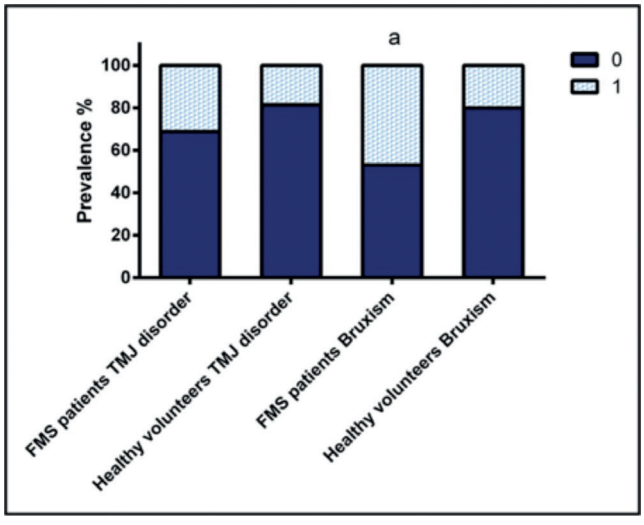

Figure 2. Bruxism and temporomandibular joint disorder prevalence in fibromyalgia syndrome patients and healthy volunteers

TMJ: Temporomandibular joint, FMS: Fibromyalgia syndrome, 0: without periodontitis, 1: with periodontitis, [a]p<0.05 vs. healthy volunteers bruxism prevalence

The etiology of FMS is not well-known, however, the number of studies evaluating the symptoms of FMS is rapidly increasing. Recently, it has been reported that FMS was associated with impairment of sexual functions in men (4). Furthermore, Gurbuzler et al (45). found that FMS caused vocal deteriorations such as decrease in vocal quality and intensity in women. In terms of genetics, Yigit et al. (12) demonstrated an association between IL-4 gene polymorphism and risk of FMS development. Fujarra et al. (46) evaluated TMJ disorder symptoms in FMS patients and found that FMS patients were suffering TMJ symptoms with muscle disorders, disc displacement and myofascial pain with limited mouth opening. Oral manifestations of FMS, such as TMJ dysfunction, xerostomia, hypo-salivation and burning mouth syndrome have also been suggested (34,47). Ghurye and McMillan (48) also suggested that pain in the TMJ might be associated with other chronic pain conditions such as FMS, irritable bowel syndrome and migraine. Pain caused by FMS might also trigger bruxism in patients and in order to evaluate this, the prevalence of bruxism and TMJ disorders were determined in the present study. As a result, it was found that FMS patients had a higher prevalence of bruxism but there were no pain or discomfort related to TMJ or any orofacial muscle function. In addition, none of the patients reported xerostomia, hypo-salivation or burning mouth in their dental and medical history. It might be reasonable to expect these problems in FMS patients as all these symptoms are somehow related to musculoskeletal malfunctions (34,46,48). However, studies on oral manifestations of FMS or orofacial complaints of FMS patients are limited (49).

Apart from the factors responsible for FMS development, some predictors of FMS have been suggested. These predictors are pain in the neck and back, sleep disturbances, headache, and overweight (33,34). Some of these could be related to another disorder with overlapping symptoms (34). Fibromyalgia patients generally use more anti-inflammatory drugs for their chronic pain management (50). The use of modulating agents, including blocking production of pro-inflammatory cytokines and

prostaglandins with anti-inflammatory drugs has been postulated to be of therapeutic value as an adjunctive therapy to the management of chronic periodontitis. Non-steroidal anti-inflammatory drugs may have a potential adjunctive role in periodontal therapy or at least decrease the severity of existing disease (51). FMS patients involved in the present study were not under drug therapy within the previous 6 months. Nevertheless, people with pain tend to use painkillers and effects of these drugs if any, would be clearer in time especially in long time periods such as 45 years. Un-changed prevalence values in patients above 45 years of age might be due to previous drug use which was not within the time period of the present study.

Any disease modifying immune response, influencing cytokine profile and/or disrupting oxidant/antioxidant balance might be related to periodontal inflammation. The relationship between FMS and periodontal diseases to be better understood, parameters regarding to systemic inflammation, immune response and oxidative stress should be determined.

A limitation of the present study is that in this study, patients with FMS as well as systemically healthy group were chosen among the individuals who applied to the Faculty of Dentistry for their routine dental control or the treatment of various dental problems such as caries, and periodontal diseases. FMS group or systemic healthy group may have higher possibility of having periodontal diseases.

The present study evaluated only the clinical periodontal parameters, bruxism and TMJ problems and it was found that the prevalence of periodontitis was not changed in FMS patients, and plaque accumulation was same in both groups. Any biochemical parameters, such as gingival crevicular fluid and serum markers of inflammation and oxidative stress were not determined. An explanation for this limitation is that if there was a relationship, it should have manifested clinical changes in periodontal parameters.

Conclusions

In conclusion, it was found that the prevalence of periodontitis was lower in patients above 45 years of age. It was also found that FMS patients had an increased prevalence of bruxism and this could be due to the pain caused by FMS. TMJ disorders were not found to be related to FMS in our study. Studies with large samples and determining cytokine levels in serum and gingival crevicular fluid might help reveal other aspects of these two diseases that are not covered in this study.

Ethics

Ethics Committee Approval: The study protocol was approved by Clinical Trials Ethics Committee of Gaziosmanpaşa University Faculty of Medicine, (15-KAEK-158), Informed Consent: Written informed consents were obtained.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: A.İ., Ö.G., Concept: H.B.Y., Ö.G., Design: H.B.Y., H.A.T., Data Collection or Processing: H.B.Y., A.İ., Analysis or Interpretation: H.B.Y., H.A.T., Literature Search: Ö.G., H.B.Y., Writing: H.B.Y., V.B.

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