Jurnal Medical Aradean (Arad Medical Journal)
Vol. XXI, issue 2, 2018, pp. 8-11

THE NEGATIVE INFLUENCE OF SMOKING ON PERIODONTAL STATUS

Raluca Dima[1], Ioana Lile[2], Albinita Cuc[1] Ligia Vaida[1],

[1]University of Oradea, Faculty of Medicine and Pharmacy, Department of Dentistry
[1]Western University "Vasile Goldis" of Arad, Faculty of Dental Medicine, Department of Dentistry

ABSTRACT. Currently, the number of smokers around the world is about 1.1 billion and their number is constantly increasing. Despite the worldwide debates concerning the harmful effects of smoking, the constant prophylactic campaigns have had unsatisfactory results until now. Smoking is dangerous not only for general health but can stand in the way of proper treatment when it comes to orthodontics or dental implants. Our study groups consisted of 172 patients (96 women - 55.82% and 76 males - 44.18%) previously diagnosed with periodontal disease which were divided into two groups: the first group1- nonsmokers and the second group smokers with periodontal disease. Our findings were that there is a correlation between periodontal disease and smoking and the risk increases proportionally with the number of cigarettes per day and the time of practicing the vicious habit.
KEYWORDS: dental sealing, minor lesions, sealants, composite, erosion

INTRODUCTION

Periodontal diseases are opportunistic bacterial chronic inflammatory disorders encompassing destructive and nondestructive pathology of infectious origin that affects the supporting tissues of the teeth (gum, alveolar bone, cement, and dento-alveolar ligaments). The epidemiology of this disease is multifactorial, but the main factor involved is bacteria (Page, 1997). This pathology begins with gingivitis, a ubiquitous nondestructive disease affecting children and adults globally. Aggressive periodontitis with the destruction of supporting tissues is characterised by severe and rapid loss of periodontal attachment. The infection caused by dental plaque then leads to an abnormal inflammatory response of the host causing the destruction of tissues. In addition to the bacterial factor, there are aggravating factors: harmful occlusion, iatrogenic restorations, certain medications, stress, systemic diseases (diabetes), tobacco etc. (Dumitriu, 2009).

The list of general diseases caused by smoking includes: pulmonary inflammation, abdominal aortic aneurysm, acute myeloid leukaemia, cataract, cervical cancer, kidney cancer, pancreatic cancer, chronic lung diseases, oral and lung cancer, acneea vulgaris. (Johnson , 2012)

Marginal periodontal disease is a problem concerning orthodontic treatment due to the fact that the destruction of the dental support, especially the dentoalveolar ligaments will subsequently harden the response of the tissues to the orthodontic forces. Regardless of the form of periodontal damage or its gravity, the orthodontic treatment can only take place when the periodontium is healthy, both the bone and the mucosal support. All changes in the oral cavity microbiocenosis or the saliva's quantity and quality, may affect the orthodontic treatment and may be a cause of failure. The tobacco is a secondary etiological factor in triggering and maintaining the periodontal disease. (Dumitriu, 2009)

Since the discovery of tobacco in central America, its use has spread throughout the world. The tobacco is a plant of the genus Nicotiana, the Solanaceae family. There are over 70 tobacco plants in the world, the most commercially available being Nicotiana tabacum. Dried tobacco leaves are smoked in cigarettes, cigars and pipes (Petersen P, 2005) Europe discovers tobacco with Christopher Columbus who brings it to Spain. The oldest evidence on the use of tobacco in our country is the pipes discovered in the ruins of the Suceava fortress (Rose L, 2004)

According to the World Health Organization (WHO), there are 1.1 billion smokers worldwide, which means that one in five people aged over 15 is a smoker. According to a study conducted by the Romanian Institute for Evaluation and Strategy (IRES), between 21-25 January 2016, one quarter of the adults in Romania are declared smokers. According to a 2010 global World Health Organization (WHO) study, about 600,000 people die annually because of passive smoking, one third of them are children who are exposed to cigarette smoke at home.[6]

Tobacco is one of the first causes of avoidable mortality, which is why many countries have begun measures to reduce consumption by advertising shocking images on cigarette packs, and banning smoking in public places. Smoking increases mortality and morbidity of cardiovascular origin, and is supposed to cause pulmonary cancer. Among women, smoking can cause infertility, many extra-uterine pregnancies. In pregnant women it can produce, low birth weight of the fetus or sudden infant death. And among men it can produce sexual impotence (Centers for Disease Control and Prevention (US), 2010).

Smoking has many harmful effects on both teeth and oral tissues. Consequently, smoking causes the oral mucosa microbiological alteration in the form of

keratoses or melanoses with increased risk of malignancy.

Table 1: Summary of periodontal tobacco effects

Saliva and oral cavity microflora	In acute, a slight increase in salivary flow due to stimulation of the salivary glands determining an alkaline pH and subsequent the proliferation of gram negative, anaerobic bacteria: treponema denticola, porphyromonas gingivalis
Gingival fluid	Decreased pro-inflammatory cytokines, chemokine and decreased secretion of regulators of T-cells and N-K cells[16]
Dental plaque	Determined mostly by oral hygiene, no significant changes
Inflammation	Decreased inflammatory reaction and early phases of dysplasia
Loss of attachment	Increasing the periodontal depth of the periodontal pouch and increasing attachment loss. The number of years, the amount and the daily consumption of cigarettes negatively influence the loss of attachment
Increased bone loss	Loss of periodontal bone is obviously related to smoking in adults with good oral hygiene [17]
Tooth loss	Higher prevalence of tooth loss and edentulism [18]

In the bone tissue, smoking inhibits osteoblastic activity, lowers vitamin D levels, decreases calcium absorption, decreases parathyroid hormone, increases blood cholesterol levels, lowers estrogen levels by increasing metabolism; estrogen being one of the most important hormones in maintaining bone mass. Smoking is associated with increased free radicals and oxidative stress, which stimulates bone resorption and affects osteoblastic function, macrophage activation, and pulmonary inflammation. The various harmful substances in tobacco also exert a direct toxic effect on bone cells. Smoking has a negative influence on all forms of periodontal therapy, and up to 90 percent of refractory periodontitis patients are smokers. Tobacco determines, multiple treatment failures, more postoperative complications, delayed healing (Ciavoi G, 2018)

A periodontal study involving identical twins revealed that the extent of alveolar bone loss was greater in long life smoking twins than in their no smoking twin partners, advocating that in spite of genetic favouring factors, smoking damages connective tissue and bone.

Nicotine in tobacco smoke was reported to be vasoconstrictive (Clarke NG, 1981). The main reason of the poor inflamatory response in smokers is due to the vasoconstrictive effect of the chemicals contained in the smoke inhaled. At the vestibular gingival level, the blood vessels of the smokers revealed a higher proportion of small vessels and a lower proportion of large vessels, hence the decrease in gingival bleeding but also a lesser healing capacity (Zee KY, 2009).

In addition to these harmful effects on the human body, tobacco gives a very strong physical and mental addiction. Tobacco is qualified as a tough drug. Nicotine through various chemical reactions determines a reward circuit to the origin of psychological dependence. Psychological dependence is installed, while the cigarette is part of the daily routine and is associated with moments of the day or with people so it becomes a pshycho-social routine (Olayaki, LA, 2008). The stripping becomes harder then.

HYPOTHESES

Hypothesis 1: There is a link between smoking and periodontal disease

Hypothesis 2: The number of cigarettes have any effect on the severity of the periodontitis

MATERIALS AND METHODS:

The study was conducted on patients aged between 15–67 years in Crișana region, in accordance with the World Medical Association (WMA) Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects approved by the Ethics Committee of the University of Oradea, Romania. All patients were included in the study with their or their parents' consent.[19]

172 patients (96 women - 55.82% and 76 males - 44.18%) diagnosed with periodontal disease, were divided into to groups: the 1- nonsmoker group diagnosed with periodontal disease, the 2 nd smokers with periodontal disease. The anamnesis, clinical examination, paraclinical examinations and a smoking related questionnaires were performed: non-smoker, passive smoker, ex-smoker, smoking period (less than 1 year, 1-5 years, 6-10 years old, over 10 years) and the number of cigarettes per day (1-10, 11-20, over 20).

It was used Periodontal Disease Index (PDI) - Ramfjord to asses the loss of gingival attachment. [20]

The study was conducted over a period of 2 years (2016-2018) in dental practices in Oradea and the following aspects were followed:

- Correlation between the number of cigarettes per day and the severity of periodontal disease
- Correlation between the time of tobacco use and the severity of periodontal disease

RESULTS AND DISCUSSIONS

Based on responses we centralize all the data, such as followed. The questionnaires and graphical tables were compiled:

- gender, age, age (4 age groups: 15-30 years, 31-45 years, 46-60 years, over 60 years old),
- level (old, middle, upper),
- smoker (active, passive, former smoker),
- old vicious habits (under 1 year, 1-5 years, 6-10 years, over 10 years old)
- day (1-10 cigarettes / day, 11/20 cigarettes / day, over 20 cigarettes / day).

Patients' periodontal events (bleeding, sensitivity, mobility, spontaneous loss of teeth) have also been summarised.

From Graph 1 chart analysis, it is noticeable that periodontal disease occurs more frequently in male smokers. In non-smoker patients there are no significant gender differences.

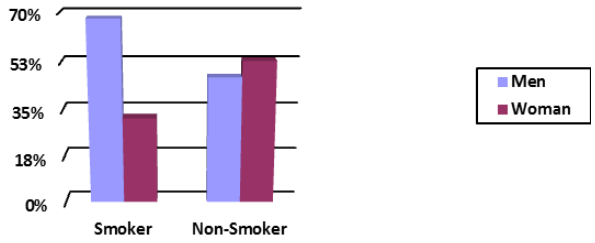

Figure1. Graph 1 - Smoker sex reparation

From Graph 2 chart analysis, we notice that periodontal disease is more common in urban patients, smokers or nonsmokers.

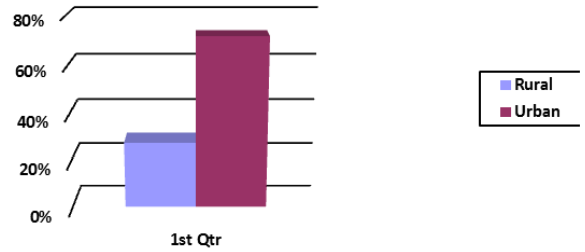

Figure2. Graph 2 - Urban-rural total patient

There is a correlation between the patient's age and the periodontal condition. Smokers over 60 have almost all some degree of periodontal disease (Graph 3).

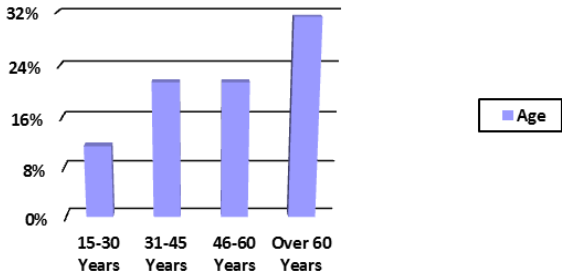

Figure3. Graph 3 - Age Smokers distribution-periodontal disease

There are no significant differences between patients with periodontal disease smokers and ex-smokers but there is a significant correlation between total smokers and periodontal disease Graph 4).

Figure4. Graph 4 - Distribution depending on the type of smoker

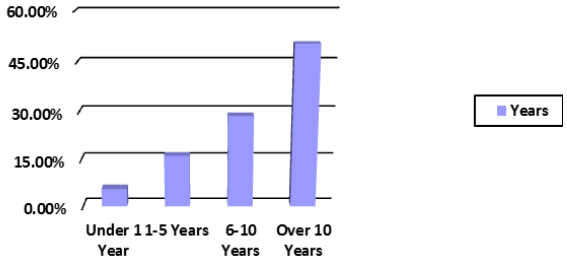

Figure5. Graph 5 - The smoking time and Periodontal disease

There are significant differences concerning the time the patients practiced the harmful habit. It is clear that patients who smoked for over 10 years have affected the periodontium in a percentage almost equal to the other summed intervals.

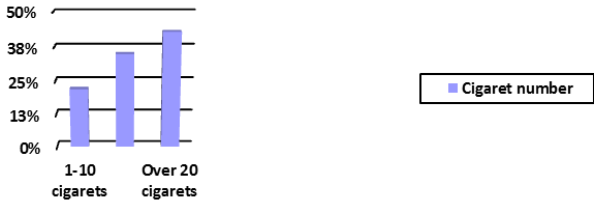

Figure6. Graph 6-Number of cigarets/day

The increase in the number of cigarettes is directly proportional to the number of patients with periodontal disease.

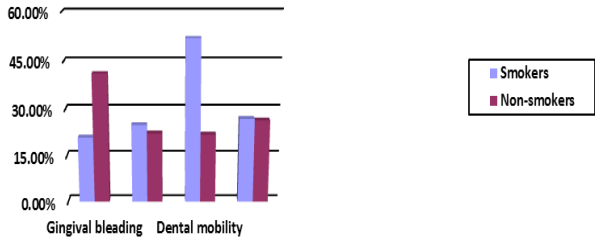

Figure6. Graph 7 - Clinical manifestations of periodontal disease

Due to the vasoconstriction and irreversible alterations of the gum tissues caused by smoking, the number of smokers who experience gingival bleeding is much lower than that of non-smokers. Dental sensitivity was approximately equal in both groups of patients. Dental mobility was more present in smokers. Spontaneous loss of teeth is not affected by smoking (Graph 7).

Smoking has an important impact at the periodontal level because it is considered as an aggravating factor for periodontal disease. Similar to the findings of other studies we discovered on our smoking patients important vertical bone losses and connective tissue

destruction that subsequently leads to loss of teeth, causing malnutrition and also social anxiety.[8]

All patients in our study who had previous or undergoing orthodontic appliances treatment were more affected at the periodontal level.

CONCLUSIONS

Based on the results and observations during the study we came to the following conclusions:

1. There is an obvious correlation between smoking and periodontal disease.
2. The risk of developing periodontal disease increases proportionally with the number of cigarettes per day and the duration of practicing the vicious habit
3. We have not noticed significant differences concerning gender and the background of patients
4. There are differences in age groups, as the severity of the diseases increases with age
5. The periodontal disease is significantly increased in patients who smoke more than 20 cigarettes per day.
5. There are no significant changes between patients who have quit smoking for more than 10 years and patients who smoked less than 5 years.
6. Reducing smoking will increase the success of periodontal and orthodontic treatment and implicitly the rate of maintenance of dental implants.

REFERENCES

1 .Page RC, Kornmann K.S., The pathogenesis of periodontitis1997;(14):9-11

2 .Dumitriu TH, Dumitriu S, Dumitriu A, Parodontologie, 2009; p. 216-219

3.Petersen P, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C, The global burden of oral diseases and risks to oral health. BullWorld Health 2005; (83):661-669

4. Rose L, Mealey B, Periodontics, 2004; p. 119-140

5. Johnson C, Han Y, Hughart N, McCarra J, Alpini G, Meng F, Interleukin-6 and its receptor, key players in hepatobiliary inflammation and cancer. Transl Gastrointest Cancer. 2012; 1(1):58–70.

6. https://www.who.int/news-room/fact-sheets/detail/tobacco

7. *** How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease - A Report of the Surgen, Chapter 3: Chemistry and toxicology of cigarette smoke and biomarker of exposure and harm,-How tobacco smoke causes disease, Centers for Disease Control and Prevention (US); National Center for Chronic Disease Prevention and Health Promotion (US); Office on Smoking and Health (US). Atlanta (GA): Centers for Disease Control and Prevention (US), 2010

8. Ciavoi G, Tirb A, Bechir ES, Bechir F, Suciu I. Effects of Smoking and Lipid Profile of the Patient on the Onset and Maintenance of Periodontal Disease, Rev Chim (Bucharest), 2018; 69 (10): 2648-2651

9. Johnson GK, Slach NA. Impact of tobacco use on periodontal status. Journal of Dental Education. 2001; 65(4):313-21

10. Fanchineti F, Amandei F, Gepetti P, Tarantino F, Di Serio C, Dragotto A, Gigli PM, Catinel S, Civelli M, Patachini R. Alpha, beta-unsaturated aldehydes in cigarette smoke release inflammatory mediators from human macrophages. American Journal of Respiratory Cell and Molecular Biology. 2007;37(5): 617–23

11. Clarke NG, Shephard BC, Hirsch RS. The effects of intra-arterial epinephrine and nicotine on gingival circulation. Oral Surg Oral Med Oral Pathol 1981;52(32):551-5.

12. Zee KY. Smoking and periodontal disease. Australian Dental Journal 2009; 54:S44-S50)

13. Finklea J F., Sandifer S H; Smith D D., Cigarette smoking and epidemic influenza, American Journal of Epidemiology 1969, 90(5):390-9

14. Ene CD, Ene C, Tampa M, Matei C, Georgescu SR, Effect of Tobacco Alkaloids on the Endocrine System, Rev. Chim. (Bucharest); 2015,66(5):628-33

15. Olayaki, LA., Edeoja EO, Jimoh OR, Ghazal OK, Olawepo A, Jimoh AJ, Biliaminu SA, Effects of cigarette smoking on urinary testosterone excretion in men. Biokemistri, 2008; 20:29-32

16.Tymikow D.T ,Thunnell D.H ,Georgia K .Johnson;The influence of smoking on gingival crevicular fluid cytokines in severe chronic periodontitis, Wiley on line Library,2010.

17. Bergstrom J,Eliasson S, Preber H, Cigarette Smoking and Periodontal Bone Loss, Journal of Periodontology,Volume 62, (4)1991

18.Tonetti M.S.Cigarette Smoking and Periodontal Disease: etiology and management of disease;Annals of Periodontology, 1998;3(1),88-101

19. 7. ***WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects. 1983. Available on: http:// www.wma.net/cgi-bin/ext_form2mail.cgi)

20. Yoshimura A, Mori H, Ohishi M, et al. Negative regulation of cytokine signaling influences inflammation. Curr Opin Immunol. 2003;15:704–8.

CORRESPONDENCE

Ligia Vaida, University of Oradea, Faculty of Medicine and Pharmacy, Department of Dentistry, Oradea, Bihor, Str. Piața 1 Decembrie, nr. 10, ligia_vaida@yahoo.com

Lile Ioana, "Vasile Goldiș" Western University Arad, Faculty of Dental Medicine, Department of Dental Medicine, Arad, Str. Liviu Rebreanu, nr. 86, Romania, Tel. +40-(745)-305221, email: drlileioana@yahoo.com