EFFICACY OF NON–SURGICAL PERIODONTAL THERAPY FOR DECREASING THE INDIVIDUAL PERIODONTAL RISK

Article *in* Scripta Scientifica Medicinae Dentalis · September 2020

1 author:

Irena Georgieva
Medical University of Varna
23 PUBLICATIONS   **15** CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:

Project

Clinical and morphological features of periodontium in the aesthetic zone of maxilla View project

EFFICACY OF NON-SURGICAL PERIODONTAL THERAPY FOR DECREASING THE INDIVIDUAL PERIODONTAL RISK

Irena Georgieva

Department of Periodontology and Dental Implantology, Faculty of Dental Medicine, Medical University of Varna

ABSTRACT

INTRODUCTION: Individual periodontal risk assessment may determine the risk of susceptibility to occurrence of future periodontal disease, as well as the risk of recurrence or progression of the disease in patients already suffering from periodontitis. A functional diagram (including 6 risk vectors – bleeding on probing, residual pockets, teeth loss, bone loss/patient's age, systemic diseases, environmental factors) for determining the periodontal risk at patient level, can help the clinician in determining the frequency of follow-up visits during the maintenance phase of therapy, as well as in motivating the patient during periodontal therapy.

AIM: The aim of this article is to show the efficiency of controlling the modifying risk factors during non-surgical periodontal therapy for the reduction of periodontal risk level at the re-evaluation assessment.

MATERIAL AND METHODS: The periodontal risk is assessed in 41 individuals (14 males and 27 females) and determined using the functional diagram proposed by Tonetti & Lang (2003). All assessed individuals are divided into 2 groups according to the gender: males and females. Statistical analysis is done with a descriptive analysis using IBM SPSS Statistics version 19 software.

RESULTS: The mean risk polygon surface at the initial assessment is 61.5243 for all individuals, and at the re-evaluation is 33.2573.

CONCLUSION: The adequately performed non-surgical periodontal therapy leads to significant decrease in the periodontal risk level in both sexes.

Keywords: *risk assessment, risk level, periodontal disease, polygon risk surface*

INTRODUCTION

The prevention and treatment of periodontal diseases are based on accurate diagnosis, reduction or elimination of pathogens, elimination of inflammation and periodontal pockets, decreasing of the periodontal risk and the consequences of periodontal disease. Individual periodontal risk assessment may determine the risk of susceptibility to occurrence of future periodontal disease, as well as the risk of re-

currence or progression of the disease in patients already suffering from periodontitis.

A functional chart (including 6 risk vectors) for determining the periodontal risk at patient level, can help the clinician in determining the frequency of follow-up visits during the maintenance phase of periodontal therapy, as well as in motivating the patient during periodontal therapy. Identifying different risk factors and controlling them could facilitate the maintenance of periodontal health and prevent the occurrence of any form of periodontal diseases.

LITERATURE SURVEY

The diagnostic process is based on continuous monitoring of the patient's risk profile for periodontal disease. The American Academy of Periodontology determines the periodontal risk assessment as a process of qualitative or quantitative assessments of the possibility of exposure to certain risk factors (1).

The individual risk profile and assessment of the risk level of progression of periodontal disease is used to determine the frequency of follow-up visits in the supportive periodontal therapy. Patients suffering from periodontitis should be included in maintenance therapy, which provides adequate supportive care to maintain the stability of clinical attachment levels obtained after active periodontal therapy. Determining the risk profile will prevent both inadequate treatment and excessive treatment of periodontal disease during maintenance therapy (2).
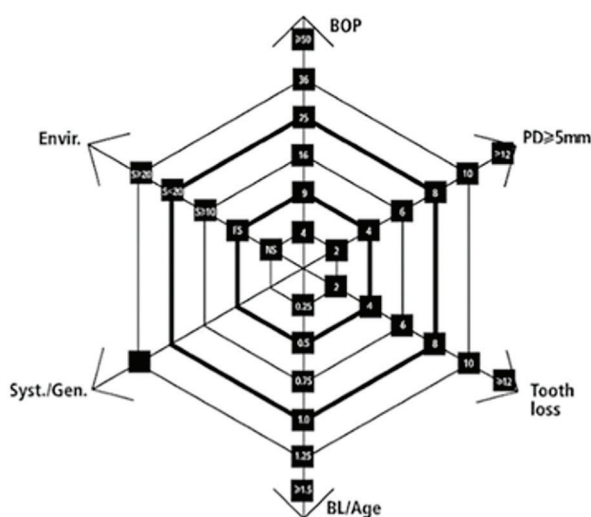

Fig. 1. Functional diagram proposed by Tonetti & Lang (2003)

All risk factors should be evaluated together. For this purpose, a functional diagram, proposed by Tonetti & Lang (2003), is filled in (Fig. 1) (2). This functional diagram includes the following six risk factors: bleeding on probing (BoP); prevalence of residual pockets deeper than 4 mm (≥5 mm); tooth loss (from a total of 28 teeth); loss of alveolar bone in relation to the patient's age; systemic or genetic factors; environmental risk factors (such as smoking, stress, malnutrition) (2).

Each risk factor has its own scale, defining low, moderate and high risk level. All factors must be evaluated simultaneously, with the relatively low risk area located in the center of the hexagon, while the high risk area is located beyond the periphery of the second black ring. Between the two black rings is the area of relatively medium risk. A detailed analysis of the functional diagram gives information on the polygon risk surface and about the individual risk profile (3,4).

At a low level of periodontal risk, all risk factors must be in the low risk scale, and at most one of the six parameters can be in the scale of moderate risk. At the medium level of periodontal risk, there are at least two factors in the range of the moderate risk and at most one parameter in the high-risk scale. In a patient at high risk of periodontal disease, there are at least two parameters in the high-risk scale outside the second black ring (2).

Identifying the risk factors and controlling them, as well as taking preventative measures to reduce individual periodontal risk, help clinicians to maintain periodontal health and prevent the onset of any form of periodontal disease (5). Some risk factors can be modified to reduce the risk of periodontal disease onset or its progression (such as smoking, bleeding on probing, decreasing the number of residual periodontal pockets), while other factors are impossible to be modified, such as age and genetic factors (6).

In patients at high periodontal risk who show a high percentage of BoP index and a large number of periodontal pockets, the risk of progression of periodontal disease may be reduced to moderate or even low level if proper non-surgical periodontal therapy is performed. These two parameters (BoP and residual pockets) can easily be affected by non-surgical

therapy, while other parameters such as the number of missing teeth or systemic and genetic diseases are irreversible and cannot be influenced. Some other criteria such as smoking cessation can also be influenced by additional patient's efforts. The factor that determines the ratio between the percentage of alveolar bone loss and the patient's age can only be reduced over the years (2).

Bleeding on probing is an objective criterion that demonstrates the presence and prevalence of inflammation in soft gingival tissues. Prevalence of more than 25% can be considered as a limit line between patients who would maintain the stability of the periodontal apparatus for 4 years in the future and patients with recurrence of the disease for the same period of time (6). Other studies indicate that a bleeding on probing index of more than 30% is associated with a high risk of disease progression (7). In assessing the risk of periodontal disease progression, BoP demonstrates the patient's ability for proper personal plaque control, especially when only a few residual pockets are left after active periodontal therapy. Thus, the BoP index is used as the first risk factor in the assessment of periodontal risk in the functional diagram. The scale of this vector increases at 4, 9, 16, 25, 36 and >49% are the critical values of the bleeding on probing criteria (2) (Fig. 1). According to this risk factor, individuals with BoP index values <10% of bleeding sites can be considered as patients at low risk of recurrence of the disease, while individuals with BoP index values ≥25% - at high risk level (8).

The presence of deep residual pockets, as well as deepening of pockets during the maintenance periodontal phase, is associated with a high risk of progression of periodontal disease. When assessing the individual periodontal risk, the number of residual pockets with a probing depth ≥5 mm was evaluated as the second risk factor for recurrence or disease progression in the functional chart in the risk assessment (Fig. 1). The scale increases in linear order 2, 4, 6, 8, 10, and ≥12% is the critical value of the vector (2,9). Individuals who have up to 4 residual pockets can be considered as patients at a relatively low risk, while patients with more than 8 residual pockets as patients at high risk of recurrence (10,11).

Tobacco consumption, predominantly in the form of cigarette smoking, affects susceptibility to periodontal disease as well as treatment outcome in patients with chronic periodontitis (12). Smoke heat can favor attachment loss, increases calculus formation and respectively dental plaque retention. Nicotine can reduce collagen synthesis and protein secretion and inhibit alveolar bone formation. These mechanisms lead to impaired healing processes and increased susceptibility to periodontal diseases, which may limit the success of treatment outcome (13). In young patients (between 19-30 years of age), 51-56% of periodontal diseases are associated with smoking. The correlation between smoking and progression of periodontal disease is dose-dependent (14). The risk of occurrence and progression of periodontal disease increases with the number of cigarettes smoked per day. In addition, it is proved that smoking can affect treatment outcome after non-surgical periodontal therapy (15), access flap surgical techniques (16), and regenerative periodontal therapy (17). The high prevalence of the so-called refractory patients is fully linked to smokers (13). Smokers show a less satisfactory healing response both during re-evaluation and in the maintenance therapy (18).

Environmental factors (such as smoking) should be considered as the sixth risk factor in the functional chart (Fig. 1). The non-smokers or ex-smokers (more than 5 years of cigarette cessation) show a relatively low risk of recurrence of periodontal disease, while heavy smokers (>20 cigarettes per day) have a definitely high periodontal risk level. Occasional smokers (<10 cigarettes per day) and moderate smokers (between 10-19 cigarettes per day) - show a medium risk of disease progression (2). Smokers have a higher risk of severe bone loss than non-smokers, ranging from 3.25 for light smokers and 7.28 times higher risk for heavy smokers, respectively (19).

AIM

The aim of this epidemiologic study is to investigate the influence of controlling the modifying risk factors, such as BoP, number of residual pockets and cigarette smoking during the non-surgical periodontal therapy, for the assessment of individual periodontal risk. In addition, it aims to assess and generalize the changes in the risk polygon surface in the

functional diagram among both sexes in the Bulgarian population.

MATERIALS AND METHODS

The study includes 41 individuals (14 males and 27 females) between 29 and 68 years old – mean age 47.67 years. The sex distribution shows 66% females and 34% males (Fig. 2).
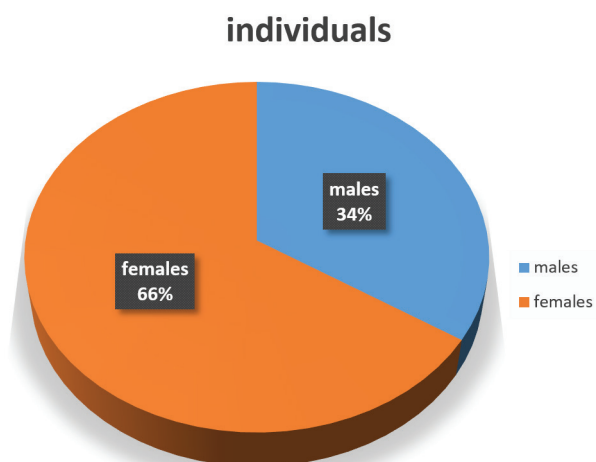
individuals

Fig. 2. Sex distribution of examined individuals

The test group includes only individuals who are over 18 years old.

For determining the individual periodontal risk, a functional diagram (hexagon), proposed by Tonetti and Lang (2003) and Periodontal Risk Calculator (PRC), is used. The individual data for the six risk factors are filled in the diagram.

In each individual the periodontal risk is assessed at the initial state before the non-surgical periodontal therapy and again during the re-evaluation after the mechanical periodontal treatment. The results of both risk assessments are compared and statistically analyzed with a descriptive analysis using IBM SPSS Statistics version 19 software.

These results are generalized into 2 groups, according to the sex of individuals.

RESULTS

At the initial assessment of periodontal risk level in all 41 individuals, we have received the following results (Fig.3):

⬦ 29 individuals – high risk level

⬦ 9 individuals – medium risk level
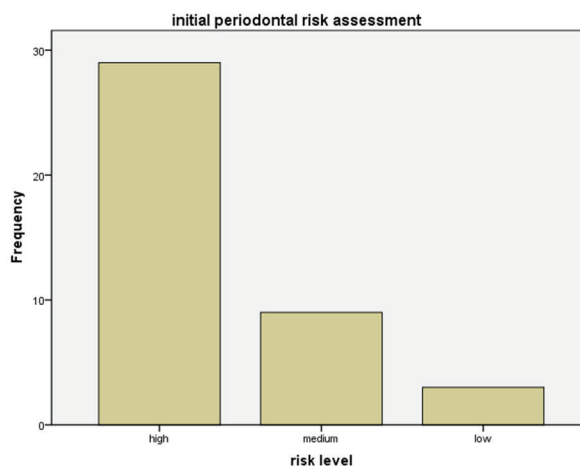
⬦ 3 individuals – low risk level

Fig. 3. Distribution of risk level in all individuals at the initial assessment

The mean risk polygon surface at the initial assessment is 61.5243 for all assessed individuals.

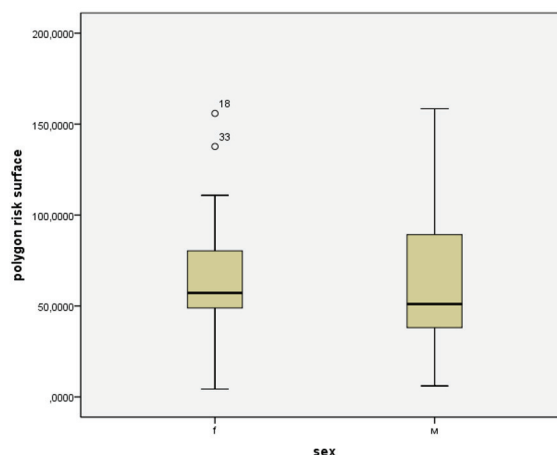In males the values of the polygon risk surface vary in wider range (Fig.4).

Fig. 4. Variations in the risk polygon surface in both sexes at the initial assessment

At the re-evaluation, the assessment of periodontal risk level in same individuals, has reported the following results (Fig.5):

⬦ 18 individuals – high risk level

⬦ 17 individuals – medium risk level

⬦ 6 individuals – low risk level

The mean periodontal risk polygon surface at the re-evaluation is 33.2573 for all individuals.
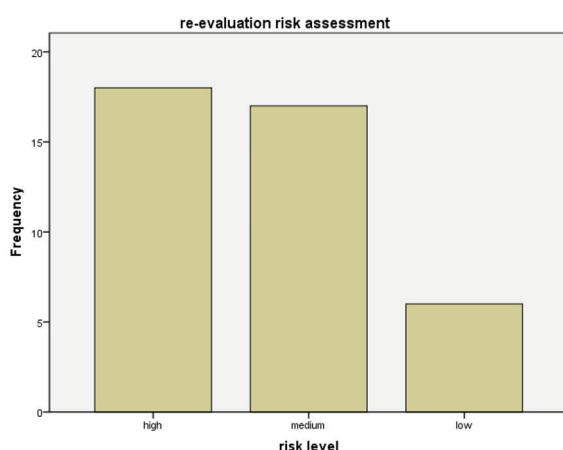
Fig. 5. Distribution of periodontal risk level in all individuals at the reevaluation

In males there is again a bigger range in the variations of values of polygon risk surfaces (Fig. 6).
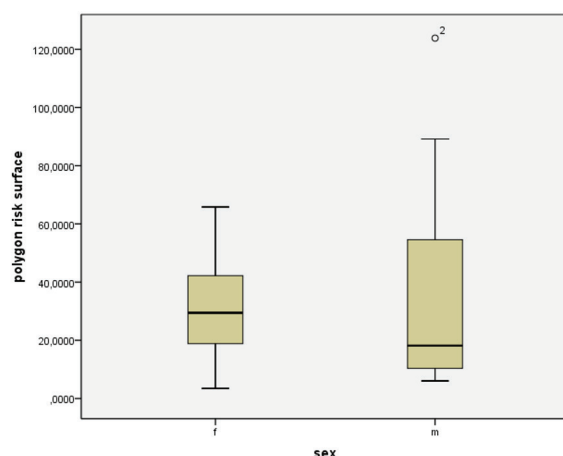

Fig. 6. Variations in risk polygon surface in both sexes at the reevaluation

DISCUSSION

Assessing the individual periodontal risk for the occurrence and progression of periodontal disease is an important factor in treatment planning. It is assessed at the initial diagnosis, at the re-evaluation and during the maintenance phase. The use of periodontal risk assessment allows dentists to improve the ability to achieve better results in periodontal therapy, focusing on early identification and prevention of dental diseases and especially periodontal diseases and peri-implant infections (20,21).

While some risk factors, such as smoking, BoP, pocket depths, may be modified to reduce the level of periodontal risk, others, such as age and genetic diseases, are non-modifying, but should be considered in the overall risk assessment (22).

The aim of proper diagnosis, treatment planning, and adequate periodontal therapy is to minimize the risk of subsequent periodontal disease. Periodontal risk assessment supports the treatment plan, facilitates the prognosis, enables the patient to better understand the essence of the disease, to encourage his efforts and motivate him for better compliance in relation to risk factors from the environment (20). Bleeding on probing and the depth of periodontal pockets can be modified to reduce the risk level of periodontal disease onset or its progression (4).

The results of our research, confirm the fact that controlling the modifying factors due to non-surgical periodontal therapy, leads to a decrease in the periodontal risk polygon surface of the functional diagram in all individuals in two consistent periodontal risk assessments (2).

CONCLUSION

The adequately performed non-surgical periodontal therapy leads to a significant decrease in periodontal risk level in both sexes.

REFERENCES

1. American Academy of Periodontology. American Academy of Periodontology statement on Risk Assessment. J Periodontol 2008;79(2):202. doi: 10.1902/jop.2008.082001.

2. Lang NP, Tonetti MS. Periodontal risk assessment (PRA) for patients in supportive periodontal therapy (SPT). Oral Health Prev Dent. 2003;1(1):7-16.

3. Pihlstrom B. Periodontal risk assessment, diagnosis and treatment planning. Periodontol 2000. 2001;25(1):37–58. doi: 10.1034/j.1600-0757.2001.22250104.x.

4. Georgieva I. Periodontal risk profile assessment - a review. Varna Med Forum. 2019; 8(2):138-45.

5. Mullins J, Even J, White J. Periodontal management by risk assessment: a pragmatic approach. J Evid Based Dent Practice. 2016, 16 Suppl:91-8. doi: 10.1016/j.jebdp.2016.01.020.

6. Page RC, Krall EA, Martin J, Mancl L, Garcia RI. Validity and accuracy of a risk calculator in predicting periodontal disease. J Am Dent

Assoc. 2002; 133(5):569-76. doi: 10.14219/jada.archive.2002.0232.

7. Joss A, Adler R, Lang NP. Bleeding on probing. A parameter for monitoring periodontal conditions in clinical practice. J Clin Periodontol. 1994; 21(6):402-8. doi: 10.1111/j.1600-051x.1994.tb00737.x.

8. Claffey N, Nylund K, Kiger R, Garrett S, Egelberg J. Diagnostic predictability of scores of plaque, bleeding, suppuration, and probing pocket depths for probing attachment loss. 3 1/2 years of observation following initial therapy. J Clin Periodontol. 1990; 17(2):108-14. doi: 10.1111/j.1600-051x.1990.tb01071.x.

9. Lang NP, Adler R, Joss A, Nyman S. Absence of bleeding on probing. An indicator of periodontal stability. J Clin Periodontol, 1990; 17(10):714-21. doi: 10.1111/j.1600-051x.1990.tb01059.x.

10. Reners M. Periodontology made easy. (L'Information Dentaire), 2018,chapter 3:33-49

11. Tonetti, MS, Muller-Campanile V, Lang NP. Changes in the prevalence of residual pockets and tooth loss in treated periodontal patients during a supportive maintenance care program. J Clin Periodontol. 1998; 25(12):1008-16. doi: 10.1111/j.1600-051x.1998.tb02406.x.

12. Qandil R, Sandhu HS, Matthews DC. Tobacco smoking and periodontal diseases. J Canad Dent Assoc. 1997;63(3):187-92, 194-5.

13. Chaffee BW, Couch ET, Ryder MI. The tobacco-using periodontal patient: role of the dental practitioner in tobacco cessation and periodontal disease management. Periodontol 2000. 2016;71(1):52-64. doi: 10.1111/prd.12120.

14. Bergström J, Eliasson S, Dock J. Exposure to tobacco smoking and periodontal health. J Clin Periodontol. 2000; 27(1):61-8. doi: 10.1034/j.1600-051x.2000.027001061.x.

15. Haber J, Wattles J, Crowley M, Mandell R, Joshipura K, Kent RL. Evidence for cigarette smoking as a major risk factor for periodontitis. J Periodontol. 1993;64(1):16-23. doi: 10.1902/jop.1993.64.1.16.

16. Preber H, Bergström J. Occurrence of gingival bleeding in smoker and nonsmoker patients. Acta Odontol Scand. 1985;43(5):315-20. doi: 10.3109/00016358509046515.

17. Preber H, Bergström J. Effect of cigarette smoking on periodontal healing following surgical therapy. J Clin Periodontol. 1990; 17(5):324-8. doi: 10.1111/j.1600-051x.1990.tb01098.x.

18. Heitz-Mayfield LJ. Peri-implant diseases: diagnosis and risk indicators. J Clin Periodontol. 2008; 35(8 Suppl):292-304. doi: 10.1111/j.1600-051X.2008.01275.x.

19. Badersten A, Nilvéus R, Egelberg J. Scores of plaque, bleeding suppuration and probing depth to predict probing attachment loss. J Clin Periodontol. 1990; 17(2):102-7. doi: 10.1111/j.1600-051x.1990.tb01070.x.

20. Tonetti MS, Pini-Prato G, Cortellini P. Effect of cigarette smoking on periodontal healing following GTR in infrabony defects. A preliminary retrospective study. J Clin Periodontol. 1995;22(3):229-34. doi: 10.1111/j.1600-051x.1995.tb00139.x.

21. Koshi E, Rajesh S, Koshi Ph, Arunima PR. Risk assessment for periodontal disease. J Indian Soc Periodontol. 2012; 16(3):324–8. doi:10.4103/0972-124X.100905.

22. Page RC, Beck JD. Risk assessment for periodontal diseases. Int Dent J. 2011; 47(2):61-87. doi.org/10.1111/j.1875-595X.1997.tb00680.x.