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Efficacy of Photodynamic Therapy and Traumeel S in the Treatment of Chronic Periodontitis

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Abstract Despite the existing large number of drugs, currently there are no optimal methods for influencing on the mechanisms of the pathogenesis of inflammatory periodontal diseases, and the problem of treating active inflammatory-destructive processes in the periodontium continues to be relevant. This study was conducted to investigate the efficacy of antimicrobial photodynamic therapy and Traumeel S. The purpose was to evaluate of the effectiveness of homeopathic and photodynamic therapy in the treatment of chronic periodontitis. 120 patients with generalized periodontitis were examined at the Department of Hospital Therapeutic Dentistry, Tashkent State Dental Institute clinics. After the treatment concluded Traumeel S the highest results were achieved, where the value of PMA decreased from 45.60 ± 3.09 to 2.67 ± 0.05%, PI was 1.26 ± 0.09, CPI was 0.63 ± 0.04. So the effectiveness of topical use of PDT and "Traumeel S" was confirmed by the results of clinical, instrumental and laboratory studies.

Keywords Periodontitis, Laser Doppler Flowmetry (LDF), Polymerase Chain reaction (PCR), Photodynamic Therapy (PDT), Traumeel S

1. Introduction

Inflammatory periodontal diseases occupy the second place among dental diseases after dental caries. This level has been maintained for a long time, however in recent years there has been a tendency to increase the incidence of diseases among younger people. According to the world health Organization, a high frequency of periodontal diseases is noted at the age of 20 – 44 years (65 – 95%), severe forms of periodontal diseases are detected in 5-25% of the adult population, moderate forms are 30-45%, and only 2-8% of people have healthy periodontal tissue at the age of 35-45 years. [1, 2, 3, 5]. Periodontal disease dramatically reduces the quality of life of patients. Thus, periodontal disease is a problem that has not only medical but also social significance. The solution of these issues is of particular relevance for modern society. In 2014 the prevalence of periodontal disease was 72.9% in Uzbekistan [J. A. Rizayev, 2015].

Considering that pathological processes in periodontal disease develop against the background of many common diseases, as well as the influence of periodontal diseases on many body functions, including natural defense mechanisms, treatment of patients should be directed not only at eliminating the pathological process in periodontal tissues, restoring their functio, but also for the rehabilitation of the general condition, the restoration of normal homeostasis, the stimulation of the body's defences [4, 7, 8].

Despite the existing large number of drugs, currently there are no optimal methods for influencing on the mechanisms of the pathogenesis of inflammatory periodontal diseases, and the problem of treating active inflammatory-destructive processes in the periodontium continues to be relevant [6, 9, 10].

2. Object of Research

Increase the effectiveness of complex treatment of inflammatory periodontal diseases by improving the system of diagnosis and treatment. Evaluation of the effectiveness of homeopathic and photodynamic therapy in the treatment of chronic periodontitis.

3. Material and Methods of Research

The study was performed for the period from 2017 to 2018 at the Department of Hospital Therapeutic Dentistry, Tashkent State Dental Institute. Studies were conducted in 120 patients. All the patients have signed the written consent to studies carried out at the department. 90 patients with

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generalized periodontitis of moderate severity (MGP) were the main group. The control group consisted of 30 patients without periodontal disease. The age group of patients is from 20 to 65 years.

Depending on the applied complex therapy, 3 groups of patients with MGP were identified: 1 group, concluded 30 patients, received traditional treatment and local antimicrobial therapy using fixing bandage with metronidazole (Metrogyl-denta gel) in an amount of 10 g during 5-7 days. The 2nd group, concluded 30 patients, received traditional treatment and antimicrobial therapy using photodynamic therapy with the help of "UFD-1" device (Uzbekistan) for 2 minutes during 5 days. The 3rd group, concluded 30 patients, received Traumeel S drugs in the form of an injection along the transitional fold in addition to therapeutic measures for 5 days.

4. The Results of the Study

Before the treatment patients complained of pain and gum bleeding, bad breath, hypersensitivity to cold and hot stimuli, mobility of teeth. During the examination, there were stagnant hyperemia of the interdental, marginal and part of the alveolar gums, abundant gray-yellow plaque on the gums, mobility of teeth of I – II degree, periodontal pockets up to 5.0 mm in depth with abundant serous purulent discharge determined (Figure 1). PI (3.95 ± 0.04) reflected the presence of inflammation in the gums. The value of PMA (45.60 ± 3.09) indicated the localization of the inflammatory process in the marginal gingival margin. The average CPI value was 2.79 ± 0.17, which corresponds to the diagnosis. To make a more accurate diagnosis, the quantitative and qualitative composition of periodontal pathogens was investigated by molecular genetic method (PCR in real time). The contents of periodontal pockets were taken with the help of sterile excavators, probes. The instrument was inserted into a periodontal pocket (in patients diagnosed with "generalized periodontitis of moderate severity") or a furrow (in the case of control). The tool was placed in a polypropylene vial with a lid with a volume of 1.5 ml containing "Sample-rapid" solution. A comparative study of the composition of periodontal microflora in the content of periodontal pocket (PP) found that the frequency of occurrence of periodontal microflora was high enough. At the same time, the frequency of detection of all periodontal pathogenic bacteria studied by us in patients with periodontitis and in the control group was statistically significantly different from each other ($P<0.05$). In general, in the control group contents of the PC periodontopathogenic microorganisms (total bacterial mass) was varied in the range of 3.5 to 6.5 Lg., in patients with MGP it was 8.5-9.7 Lg. When examining patients in the MGP of 73.33% of cases in detachable PC there were B. forsynthus; the corresponding dynamics of T. denticola to 46.7% detected; P. gingivales made up of 66.67%; P. intermedia was 61,11%; A. actinomycetencomitans was 13,33%. The concentration of Porphyromonas gingivalis, Tannerella forsythensis and Prevotella Intermedia, Treponema denticola and the amount of total bacterial mass was higher in patients with moderate-severe periodontitis compared to the control group. ($P<0.05$).

Also, to determine the severity of periodontitis, the state of microcirculation in the periodontal vessels was studied by laser Doppler flowmetry (LDF) using the laser analyzer of capillary blood flow "LAK-02", produced by NPP "Lazma" (Russia, Moscow). Studied surfaces were marginal and alveolar surfaces of the gums and the zone of attachment of the gums in the projection of the roots of the studied teeth. In patients with periodontitis relative to the control group, there was a significant increase in basal blood flow (2.3 times), there were sharp fluctuations in blood flow (1.9 times increase in RMS), there was an increased susceptibility to regulatory effects (1.3 times increase in Cv) and a significant decrease in the effectiveness of regulatory effects (decrease in IFM less than 1.5). It should be noted that high susceptibility against the background of low efficiency of regulatory influences at IFM less than 1.5 allowed us to conclude about persistent subcompensated changes in hemodynamics of the periodontium of the 2nd degree.

After the end of the course of therapy, patients/ complaints and the symptoms of inflammation were absent (Figure 2), positive dynamics of changes in the index indicators of periodontal status was noted, but the highest results were achieved in the 3rd group, where the value of PMA decreased from 45.60 ± 3.09 to 2.67 ± 0.05%, PI from 3.95 ± 0.04 points to 1.26 ± 0.09, CPI from 2.79 ± 0.17 to 0.63 ± 0.04.

During treatment, the level of basal blood flow and the degree of its variability under the action of modulations are restored, as evidenced by the parameters of M and RMS, which do not differ significantly from those in the control group. Plasticity perfusion to the regulatory influences is restored, the integrated indicator of the effectiveness of the regulatory influences of IPM is also improved, reaching a level of control. According to the classification of VI. Kozlov, 2012 after treatment in patients with periodontitis of FC there is 1 degree (mild) of hemodynamic disorders (blood flow reduction of less than 10%), which are reversible (Table 1).

In the course of basic anti-microbial, anti-inflammatory therapy, the incidence of periodontopathogenic microorganisms have changed and these changes were specific for each group of features (Table 2).

Table 1. The parameters of the LDF-grams in patients with periodontitis

Group surveyed	M	RMS	Cv	IFM
The control (healthy patients), n=30	19,1 ± 2,3	5,9 ± 1,0	18,6 ± 6,2	1,31 ± 0,16
Patients with periodontitis before treatment, n=90	44,1 ± 3,1*	17,5 ± 1,0*	40,3 ± 2,6*	1,75 ± 0,12*
After treatment	26,1 ± 2,3**	8,3 ± 2,6**	27,8 ± 2,1**	1,48 ± 0,14**
* - significantly relative to control-1, p<0.05 ** - significantly relative to pre-treatment, p<0.05				

Table 2. The parameters of PCR

Group	Time (months)	Periodontal pathogens				
		Actinobacillus actinomycetemcomitans	Porphyromorans gingivalis	Prevotella intermedia	Tannerella forsythensis	Treponema denticola
After treatment	Before treatment	1,35 ± 0,08	6,4 ± 0,04	6,7 ± 0,47	7,4 ± 0,85	7,2 ± 0,34
1st	1	0,17± 0,34*	2,5 ± 0,05*	2,65 ± 0,04*	4,45 ± 0,07*	3,76 ± 0,05*
	3	1,02 ± 0,04*	2,58 ± 0,05*	3,75 ± 0,05*	5,86 ± 0,07*	3,84 ± 0,05*
	6	1,34 ± 0,25*	4,45 ± 0,07*	4,56 ± 0,05*	6,32 ± 1,02*	4,36 ± 0,07*
	12	1,65 ± 0,06*	5,84 ± 0,04*	5,89 ± 0,03*	7,01 ± 0,82*	6,76 ± 0,08*
2nd	1	-*	-*	-*	1,09 ± 0,07*	0,70 ± 0,02*
	3	0,23 ± 0,02*	1,24 ± 0,05*	0,82 ± 0,08*	2,46 ± 0,05*	1,86 ± 0,05*
	6	1,43 ± 0,02*	2,24 ± 0,08*	2,42 ± 0,03*	3,56 ± 0,05*	2,46 ± 0,05*
	12	2,73 ± 0,02*	4,24 ± 0,05*	3,82 ± 0,05*	4,34 ± 0,08*	3,22 ± 0,07*
3rd.	1	-*	-*	-*	1,05 ± 0,07*	0,75 ± 0,02*
	3	-*	0,54 ± 0,05*	0,34 ± 0,06*	1,62 ± 0,05*	0,96 ± 0,05*
	6	0,43 ± 0,02*	1,24 ± 0,08*	1,27 ± 0,03*	2,54 ± 0,05*	1,52 ± 0,05*
	12	1,33 ± 0,02*	2,04 ± 0,05*	1,54 ± 0,05*	3,32 ± 0,06*	2,34 ± 0,05*
* - significantly relative to pre-treatment, p<0.05						

Figure 1. Patient X. The state of periodontium before treatment

Figure 2. Patient X. The state of periodontium before treatment after treatment

5. Conclusions

After the treatment concluded Traumeel S and PDT the highest results were achieved, where the value of PMA decreased from 45.60 ± 3.09 to 2.67 ± 0.05%, PI was 1.26 ± 0.09, CPI was 0.63 ± 0.04. The effectiveness of topical use of PDT and the drug "Traumeel S" was confirmed by the results of clinical, instrumental and laboratory studies. The results of treatment proved the high efficiency of this complex for the treatment of chronic generalized periodontitis of moderate severity, which allows us to recommend this drug for use in periodontal practice.

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