



ISSN: 2277- 7695
TPI 2016; 5(6): 121-123
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www.thepharmajournal.com
Received: 20-04-2016
Accepted: 21-05-2016

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Index estimation of periodontal tissues in patients with chronic hepatitis C

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Abstract

Rising prevalence of periodontal diseases in patients with chronic hepatitis C requires in-depth study of periodontal condition for further optimization of health care regimen. Objective of our study was to conduct index estimation of periodontal tissues and oral hygiene of patients with chronic hepatitis C. To determine the periodontal condition dental examination of 122 patients with chronic hepatitis C in their history and 94 people without concomitant pathologies was conducted. All patients underwent a complete clinical examination and index estimation of periodontal tissues using PMA index modified by C. Parma, papillary bleeding index and periodontal index. To assess oral hygiene state Fedorov-Volodkina oral hygiene index has been used. High prevalence of periodontal diseases in patients with chronic hepatitis C ($91.80 \pm 2.48\%$) has been determined. Assessment of severity of inflammation of periodontal tissues by PMA, PBI and PI indices revealed statistically significantly higher values in patients with chronic hepatitis C compared with values of patients without viral liver disease. Research of periodontal indices enabled to examine the condition of periodontal tissues of patients in the settings of HCV-infection. Due to abnormal liver function in chronic hepatitis C and poor oral hygiene the severity and prevalence of periodontal diseases increases.

Keywords: periodontal tissues, generalized periodontitis, periodontal index, chronic catarrhal gingivitis, chronic hepatitis C.

1. Introduction

The progressive increase of HCV-infection in population draws attention of scientists to such infection. The total morbidity rate of HCV-infection reaches 2.35% with estimated 160 million chronically infected patients^[1, 2], in its range and number of infected persons it is 4-5 times higher than the prevalence of HIV infection^[1]. According to WHO experts in the absence of adequate and timely measures against infection in the next 10-20 years the mortality from hepatitis C and its consequences will increase by 2-3 times and significantly exceed the index of HIV-infected people^[2].

In 2013 the European region was overcome by a hidden epidemic of hepatitis C, where the number of infected people reached 15 million. Two-thirds of those live in Eastern European countries of the region^[3]. Ukraine is among the countries with medium prevalence of hepatitis C. According to approximate estimation, nearly 3% of the adult population is infected with hepatitis C, which is about 1.17 million people^[4].

In recent years it was found that the infection of the liver with hepatitis C, causing profound changes in the homeostasis, plays a significant role in the pathogenesis of diseases of tissues and organs of the oral cavity^[5]. As a result of the occurrence of a number of immunopathological events in patients with chronic hepatitis C (CHC) the periodontal structures are naturally affected being a risk factor for periodontal diseases and complicating their clinical course^[6].

Periodontal diseases are considered to be one of the most complicated problems of modern dentistry and they are a major cause of anodontia in adults. According to WHO functional disorders of the maxillofacial system caused by tooth loss due to periodontal diseases, develop 5 times more often than due to dental complications^[7].

The main cause of hepatitis complications and occurrence of dental pathology is suppression of both general and local immunity, which develops as a result of tissue hypoxia, deficiency of antioxidant system, reduction of nonspecific resistance, disorders of microcirculation and metabolism in the settings of the disturbances of homeostasis in the body^[8]. In fact the formation of secondary immunodeficiency necessitates the study of periodontal tissues in patients with liver disease^[9].

Thus, the aim of our study was to assess periodontal condition of patients with CHC by studying the index estimation of periodontal tissues and oral hygiene.

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2. Materials and Methods

To determine periodontal condition dental examination was conducted with 122 patients with chronic hepatitis C in their history aged 19 to 55 who were admitted to hepatology department of Lviv regional hospital of infectious diseases. The criteria for selection of patients were as follows: no complications of CHC such as cirrhosis and hepatocellular carcinoma. Thorough dental examination was performed at the department of preventive dentistry of the faculty of postgraduate education (FPGE) at the basis of dental medical centre of Danylo Halystky Lviv National Medical University. The control group (94 patients) comprised randomly selected patients who came for routine dental treatment at the Department of Therapeutic Dentistry of FPGE, and their general examination confirmed the absence of a history of CHC and related pathologies.

To assess periodontal tissues all patients underwent a complete clinical examination (obtaining medical history, extra- and intraoral examination). Index estimation of periodontal tissues was used for a detailed estimation of periodontal condition. The extent of gingivitis was determined by papillary marginal alveolar (PMA) index modified by S. Parma (1960) [10], quantitative assessment of papillary bleeding index (H.R. Muhlemann, S. Son, 1971) [11] and periodontal index - PI (A.L.

Russel, 1956) [12] were performed. To assess the state of oral hygiene of patients in the study and control groups Fedorov-Volodkina oral hygiene index was used (1971) [13].

The diagnosis of periodontal diseases was verified by conventional clinical and radiological criteria in accordance with the classification by M.F. Danilevsky (1994) recommended in Ukraine for research, educational and medical work [14]. Statistical analysis of data was performed utilizing a computer program Statistica 8.0.

3. Results

High prevalence of periodontal diseases was determined in patients with CHC, which was 91.80±2.48% vs. 75.53±4.43% in the control group, $p < 0.01$.

Data on the obtained values of Fedorov-Volodkina oral hygiene index (OHI) in the groups are presented in Table. 1. Obtained OHI index values show a good level of oral hygiene in people with healthy periodontal tissues of control group (1.36±0.03 points) and the satisfactory state of oral hygiene in people with healthy periodontal tissues of the study group (1.55±0.08 points). It should be mentioned that the difference between the above listed values of OHI was significant ($p < 0.05$).

Table 1: Values of Fedorov-Volodkina oral hygiene index in the observation group (M±m).

Condition of periodontal tissues		Healthy periodontal tissues	CCG	GP (total)	- including GP of the given severity level			Parodontosis
					Early -I	II	III	
Study group	OHI	1.55 ±0.08	2.47 ±0.11	4.09 ±0.08	2.85 ±0.07	4.16 ±0.06	4.67 ±0.03	2.20
	Number of patients (n=122)	10	22	89	20	31	38	1
Control group	OHI	1.36 ±0.03*	2.38 ±0.06	3.36± 0.10***	2.81 ±0.16	3.56± 0.04***	3.91± 0.06***	2.17± 0.07
	Number of patients (n=94)	23	31	37	14	14	9	3

Note. The significance of the difference, calculated by Fisher test with the Metropolis algorithm, between values of distribution in subgroups: * - $p < 0.05$; ** - $p < 0.01$; *** - $p < 0.001$.

Poor hygiene was found in people with chronic catarrhal gingivitis (CCG) (2.47±0.11 points in the study group and 2.38±0.06 points in the control group, $p > 0.05$). Among patients who were diagnosed with generalized periodontitis (GP), the state of oral hygiene was "poor" in the control group (3.36±0.10 points) and «very bad» (4.09±0.08 points) in the study group. The difference between the values was statistically significant ($p < 0.001$).

Data on the obtained values of PMA index, PBI index and PI index in the groups are presented in Table. 2. PMA index values in patients of the study group were statistically significantly higher than in the control group of patients who were diagnosed with CCG (30.18±1.09% vs. 26.52±0.49%, $p < 0.05$) and GP (51.84±1.46% vs. 33.86±0.58%, $p < 0.001$). No statistically significant difference has been established between PMA values in both groups with periodontitis (12.00% vs. 14.67±3.84%, $p > 0.05$). PMA index values in patients with GP in both groups increased with increasing severity of GP. In all levels of severity of GP PMA was significantly higher in patients of the study than of the control group (34.55±0.81% vs. 31.00±0.46%, $p < 0.01$ in first severity (I) level of GP; 45.26±0.82% vs. 33.71±0.65%, $p < 0.001$ in the second (II) severity level of GP; 66.32±0.65% vs. 38.56±0.60%, $p < 0.001$ in the third (III) severity level of GP).

Bleeding gums were more pronounced in patients with CHC than in patients without infectious diseases. Thus, the PBI indices of CCG patients in the study group were 1.76±0.08

points, while those in the control group were 1.43±0.03 points; in patients diagnosed with GP - 3.12±0.07 vs. 2.25±0.09 points, respectively. The differences between the indices were statistically significant ($p < 0.01$). Differences between higher PBI values were also statistically significant in patients of the study group in the all severity levels of GP than in corresponding patients of the control group. Thus, PBI index in first severity level of GP in patients of the study group was at the level of 1.99±0.05 vs. 1.77±0.05 in patients of the control group ($p < 0.01$); in the second severity level of GP - 3.29±0.05 vs. 2.38±0.12, respectively ($p < 0.001$); in the third severity level of GP - 3.57±0.02 vs. 2.79±0.12 ($p < 0.001$). No statistically significant difference has been established between the levels of PBI index in both groups of patients who suffered from parodontosis.

Comparative estimation of periodontal index values of PI patients with different condition of periodontal tissues of groups under the study revealed statistically significant higher PI index values in patients of the study group compared with patients in the control group who suffered from CCG and GP. Thus, in patients diagnosed with CCG PI index values were on the level of 2.01±0.11 points in the study group, while PI index of the same patients in the control group was 1.59±0.08 ($p < 0.05$). PI index of patients with GP in the study group was 1.5 times higher than the corresponding value for patients with GP in the control group (4.68±0.16 vs. 3.01±0.14 points, $p < 0.001$).

Table 2: Values of PMA, PI and PBI indices in observation groups (M±m).

Groups of patients	Condition of periodontal tissues	PMA (%)	PBI (points)	PI (points)	
Study group (n=122)	Healthy periodontal tissues (n=10)	0	0	0	
	CCG (n=22)	30.18±1.09	1.76±0.08	2.01±0.11	
	GP (n=89)	51.84±1.46	3.12±0.07	4.68±0.16	
	Severity level of GP	Early – I level (n=20)	34.55±0.81	1.99±0.05	2.68±0.08
		II level (n=31)	45.26±0.82	3.29±0.05	4.10±0.12
		III level (n=38)	66.32±0.65	3.57±0.02	6.20±0.11
Parodontosis (n=1)	12.00	0.78	0.83		
Control group (n=94)	Healthy periodontal tissues (n=23)	0	0	0	
	CCG (n=31)	26.52±0.49*	1.43±0.03**	1.59±0.08*	
	GP (n=37)	33.86±0.58***	2.25±0.09***	3.01±0.14***	
	Severity level of GP	Early – I level (n=14)	31.00±0.46**	1.77±0.05**	2.18±0.04***
		II level (n=14)	33.71±0.65***	2.38±0.12***	3.22±0.19***
		III level (n=9)	38.56±0.60***	2.79±0.12***	4.00±0.03***
Parodontosis (n=3)	14.67±3.84	0.71±0.07	0.76±0.20		

Note. The significance of the difference between the main group and the comparison group: * - $p < 0.05$; ** - $P < 0.01$; *** - $P < 0.001$.

The level of PI index for patients with GP in both groups increased with increasing severity of GP. The values of this index in patients with GP of the corresponding level of the study group were statistically significantly ($p < 0.001$) higher than values in patients of the control group (2.68±0.08 vs. 2.18±0.04 points at an early stage – first level of GP; 4.10±0.12 vs. 3.22±0.19 points in the second level of GP; 6.20±0.11 vs. 4.00±0.03 points - in the third level of GP). No statistically significant difference has been established between the values of PI index in both groups of patients who suffered from parodontosis (0.83 vs. 0.76±0.20 points, $p > 0.05$).

4. Conclusions

Evaluation of prevalence and severity of inflammation in periodontal tissues of patients in the study and control groups using PMA, PBI and PI indices revealed statistically significantly higher values of the above mentioned indices in patients of the study group in comparison with values in the control group among the patients who suffered from CCG and GP. The level of PMA, PBI and PI indices for patients with GP in both groups increased with increasing severity of GP. PMA, PBI and PI index values in patients with the corresponding level of GP in the study group were statistically significantly higher than the corresponding values in the control group of patients. No statistically significant difference has been established between the values of PMA, PBI and PI indices in both groups of patients who suffered from parodontosis.

Based on the analysis of estimated periodontal indices we can conclude that the pathological disorders in the organisms of patients with CHC in the settings of poor oral hygiene promote early manifestations, rapid onset and more intense course of catarrhal gingivitis and its transformation into generalized periodontitis, which leads to a significant prevalence of such pathology in patients with chronic hepatitis C.

5. Conflict of interest

None declared.

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