



## Peroxidation Of Saliva Lipids In Patients With Postcovid Syndrome During Hirudotherapy

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Submitted: 24 March 2023; Accepted: 18 April 2023; Published: 11 May 2023

### ABSTRACT

The prooxidant index of saliva lipids was studied in 63 patients with postcovid syndrome. Depending on the sensitivity of the organism to xenobiotics, the prooxidant lipid index was increased in the resistant, sensitive and very sensitive group by 25%, 62% and 100%, respectively. The use of traditional hirudotherapy in various doses in patients of the resistant, sensitive and very sensitive groups had an inhibitory effect on lipid peroxidation by 12.8%, 30.1% and 46.3%. The original (actovegin) hirudotherapy reduces the oxidant index relative to the traditional group by 10%, 15% and 20%, respectively.

**Keywords:** COVID-19, postcovid syndrome, sensitivity to xenobiotics, lipid peroxidation, traditional hirudotherapy, original hirudotherapy

### INTRODUCTION

COVID-19 is a dangerous, socially significant disease, the treatment and prevention of which is currently being developed. Oxidative stress and hypoxia play an important role in the pathogenesis of viral infections, therefore, antioxidants and antihypoxants in the complex treatment of these diseases can significantly improve the course of the disease [1]. With COVID-19, there are isolated reports of a change in the free radical oxidation of blood lipids in the body of patients [2], however, the state of the half-AOS of saliva remains unexplored. At the same time, the editors of three scientific medical journals have already adopted the author's concept of the name of the disease - "COVID - 19 - POST-COVID SYNDROME"

[3-5], which reflects the understanding that this is a single disease that has two phases: the first phase is an acute process, which usually lasts 2-3 weeks - ("COVID- 19") and the next phase is the development of a chronic process - ("POSTCOVID SYNDROME") which can last for 18-24 months. Such a definition of the new pandemic is important not only from a taxonomic point of view, but, above all, from a mental point of view, so it gives the doctor an understanding of the complexity of the course of the disease and requires monitoring patients during the entire specified period, for example, monitoring the dynamics: D-dimers, prothrombin time, platelet count and the level of fibrinogen in the blood of convalescents. These are the recommendations of the International Society on Thrombosis and Hemostasis (ISTH) [6-8]. Now these are the most

informative markers of the danger of thrombosis. The term “Long COVID” does not reflect the essence of the disease process [9,10].

### MATERIAL AND METHODS

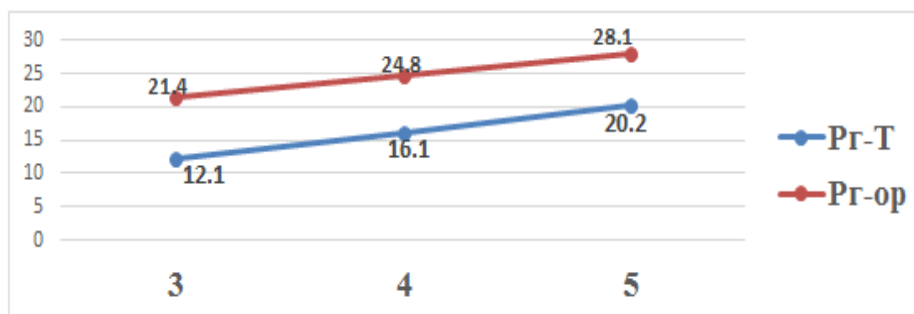
The saliva of 63 patients with postcovid syndrome (PCS) served as the object of the study. The individual sensitivity of patients to xenobiotics was determined using the isoniazid method[5]. According to the results of sensitivity to xenobiotics, patients were divided into groups: resistant, sensitive and very sensitive groups. During traditional breast therapy, medical leeches (ML) weighing 2.0 grams were used. The stages and points of MP staging were carried out according to the method of Serikbayeva S.Zh. [6,7] in different doses, while resistant patients took 6.0 units of medical leeches, sensitive - 10 pieces, very sensitive - 13 pieces. The original ML was obtained by keeping them in a specially prepared actovegin medium, for 24 hours. To assess lipid peroxidation in saliva, the content of lipid hydroperoxide (HPL), malondialdehyde (MDA) and schiff bases (ScB) was determined according to Volchegorsky I.A. et al. and A.I.Karpishchenko [7];. Statistical processing was carried out using the standard analysis package of the Statistika for Windows Microsoft program using the Student's t-test. The

differences were considered significant at  $p < 0.05$ .

### RESULTS

The concentration of HPL in the saliva of patients with PKS of the resistant, sensitive and very sensitive groups was increased by 22.6%, 63.5% and 100.6%, respectively. The content of the final products of lipid peroxidation – MDA, ScB increased by 22.6%, 63.5% and once (100.6%) relative to the data of healthy individuals taken as a control. The saliva peroxide index of patients with PKS, depending on sensitivity to xenobiotics, was higher than the values of the control groups by 25%, 62% and once (100.0%).

Traditional hirudotherapy at a dose of 12.0 g. after three, four and five procedures in resistant patients reduces the concentration of HPL by 12.1%, 16, 1% and 20.3% relative to the background indicator and reaches the value of the control groups after the fifth procedure. The original hirudotherapy in the same mode, but using a medical leech treated with actovegin, reduces the concentration of HPL – by 21.4%, 24.8% and 28.1% compared to the background indicator. The same change is established in relation to the MDA and ScB (Figure 1)



**FIGURE 1:** Reduction of the content of HPL in the oral fluid of resistant patients with PKS with traditional and original hirudotherapy

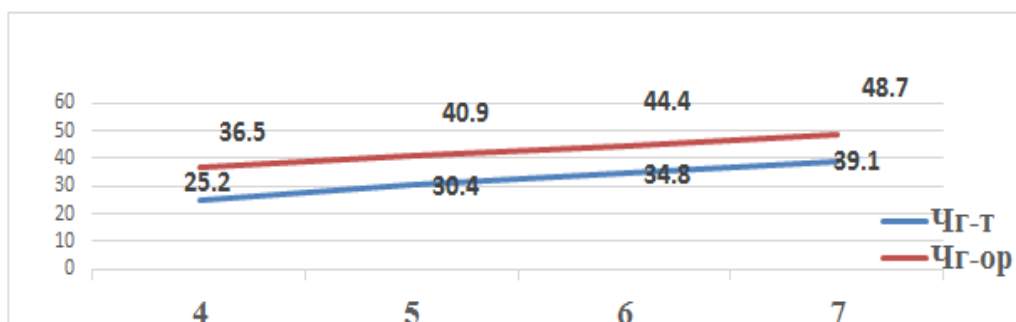
Note: RG-resistant group T-traditional,or-original,. 3,4 and 5 -the number of procedures.

As can be seen from Figure 1, in patients with PKS of the resistant group with the original hirudotherapy, the content of HPL is lower than the corresponding indicator of the traditional group by 9.3%, 8.7% and 7.9%, while

approaching the values of the control groups after a three-time procedure. The therapeutic use of medical leeches at a dose of 20.0 g (10.0 pieces) after four, five, six and seven procedures of traditional hirudotherapy in xenobiotic-sensitive

patients with PKS, there is a significant decrease in the concentration of HPL by 25.2%, 30.4%, 34.8% and 39.1%, respectively. At the same time, after the sevenfold use of traditional hirudotherapy, the content of HPL reaches the values of the control groups. The original

hirudotherapy in patients of the sensitive group exceeds the corresponding indicators of the standard group by 11.3%, 10.5% and 9.6% and 9.7% reaches the values of the control groups after a four-fold procedure (Fig.2). Similar changes were found in relation to MD and ScB.

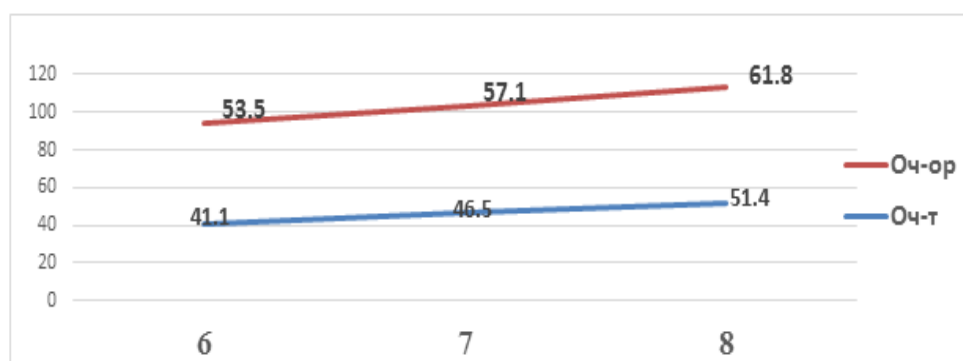


**FIGURE 2:** Reduction of the content of HPL in the oral fluid of sensitive patients with PKS with traditional and original hirudotherapy

Note: T-traditional, or-original, Hg- sensitive group, 4,5,6 and 7 -the number of procedures.

The use of medical leeches at a dose of 26.0g (13.0 pieces) with traditional hirudotherapy once a day after six, seven and eight-fold procedures in a very sensitive to xenobiotic group of patients with PKS, there is a decrease in the concentration of HPL by 41.1%, 46.5% and 51.4%, respectively, compared to the background indicator. At the same time, after the eighth procedure of traditional hirudotherapy, HPL reaches the indicators of healthy individuals. The original hirudotherapy after six, seven and eight

times the procedure reduces the concentration of HPL saliva in patients of a very sensitive group by 53.5%, 57.1% and 61.8% and exceeds the standard group by 12.4%, 10.6% and 10.4%, respectively. The content of HPL in the original hirudotherapy approaches the values of the control groups after a six-fold procedure (Fig. 3). Similar corresponding shifts were found in the study of MDA and ScB saliva of patients with PKS.



**FIGURE 3:** Reduction of the content of HPL in the oral fluid of very sensitive patients with PKS with traditional and original hirudotherapy

Note: Och - is a very sensitive group; t is traditional, or is original, 6,7 and 8 are the number of procedures

Normalization of saliva floor parameters with traditional hirudotherapy occurs in resistant, sensitive and very sensitive patients after the 6th, 7th and 8th procedures, and when using the original hirudotherapy, these shifts are observed after the 3rd, 4th and 6th procedures (Table 1).

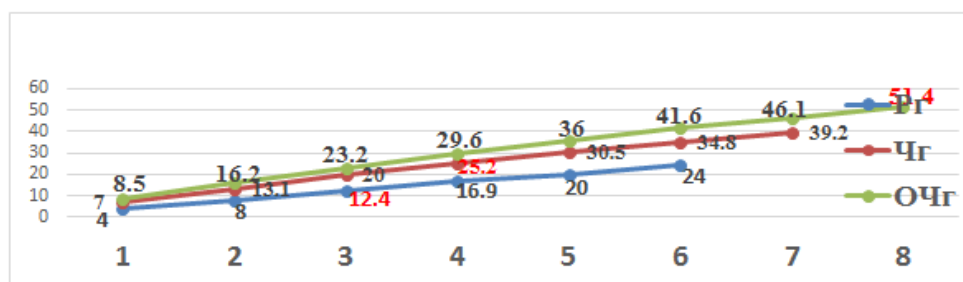
**TABLE 1:** Contents saliva sex products in patients with breast therapy (X±m)

Products oxidation of lipids in saliva					
Groups	PL	GPL( OTB/ ml)	MDA( mkmol/l)	Shn (OTB /ml)	P
Control group		0,71±0,09	0,21±0,01	0,12±0,006	1,0±0,05
PKS, a resistant group	Dl	0,89±0,04*	0,27±0,013*	0,15±0,009*	1,25±0,05*
	3	0,78±0,02	0,24±0,015*	0,13±0,001*	1,13±0,05*
	3a,	0,70±0,03#	0,21±0,012#	0,12±0,001#	0,98±0,05#
	4	0,74±0,02	0,22±0,01*	0,12±0,01	1,04±0,05
	4a	0,67±0,02#	0,20±0,007#	0,11±0,001#	0,94±0,05#
	5	0,71±0,03	0,21±0,008*	0,12±0,001	1,00±0,05
	5a	0,64±0,01#	0,19±0,07#	0,11±0,004#	0,90±0,05**
PKS, a sensual group	Dl	1,15±0,05*	0,34±0,016	0,20±0,005*	1,62±0,05
	4	0,86±0,04*	0,25±0,012*	0,15±0,007*	1,21±0,05*
	4a	0,73±0,02#	0,21±0,014#	0,13±0,006*#	1,03±0,05#
	5	0,80±0,02	0,24±0,012	0,14±0,004*	1,13±0,05*
	5a	0,68±0,03#	0,20±0,010#	0,12±0,005#	0,96±0,05#
	6	0,75±0,02	0,22±0,010	0,13±0,004*	1,06±0,05
	6a	0,64±0,02	0,19±0,007#	0,11±0,003#	0,90±0,05*
	7	0,70±0,03	0,21±0,011	0,12±0,004	0,98±0,05
PKS is a very sensitive group	Dl	1,42±0,07*	0,43±0,023**	0,25±0,005*	2,00±0,09*
	6	0,83±0,04*	0,25±0,012**	0,15±0,007*	1,17±0,09*
	6a	0,66±0,05#	0,20±0,011#	0,12±0,006#	0,93±0,09#
	7	0,76±0,03*	0,23±0,018*	0,13±0,006*	1,07±0,09*
	7a	0,61±0,02#	0,18±0,014#*	0,11±0,005#	0,86±0,09**
	8	0,69±0,04	0,21±0,012	0,12±0,004	0,97±0,09
	8a	0,55±0,02#*	0,17±0,008#*	0,10±0,003#*	0,77±0,09**

Note: N is the number of procedures of traditional and original breast therapy (Na;) \* P<0.05 compared to the control group,#P<0.05 compared to the traditional group.

Activation of lipid peroxidation and increased cytokinin attack in pathogenic foci when exposed to the virus are one of the pathogenetic

mechanisms of the formation of small blood clots in the vessels of the body [8].



Note: 1,2,3,4,5,6,7, and 8–The number of procedures of traditional and original breast therapy, \* P<0.05 compared with the control group,#P<0.05 compared with the traditional group.Rg is a resistant group,Chg is a sensitive group,OCh is a very sensitive group

Thus, the results of the conducted studies indicate a significant increase in the intensity of free radical lipid oxidation in postcovid syndrome, an increase in the prooxidant index of saliva associated with the sensitivity of the body to xenobiotics. The work carried out made it possible to determine the feasibility of using a medical leech for the rehabilitation of patients with PKS, depending on sensitivity to xenobiotics. The use of hirudotherapy inhibits the intensity of free radical oxidation processes, makes it possible to prevent the development of oxidative stress.

### CONCLUSION

1.PKS is characterized by activation of the processes of lipoperoxidation of saliva, an increase in the content of primary, secondary and final POL products in it. The degree of increase in the prooxidant index in the saliva of patients with PKS depends on the sensitivity of the body to xenobiotics.

2. The use of traditional and original breast therapy in patients with PKS inhibits excessive accumulation of free radical oxidation products in the oral cavity. At the same time, the indicators of original hirudotherapy exceed the indicators of traditional hirudotherapy in resistant patients by an average of 10%, sensitive – by 15% and very sensitive – by 20%.

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