www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating 2017: 5.03
TPI 2017; 6(7): 01-05

www.thepharmajournal.com
Received: 01-05-2017
Accepted: 02-06-2017

Trishch Volodymyr
Department of Urology, Ivano-Frankivsk National Medical University, Ivano-Frankivsk Ukraine

Correspondence
Trishch Volodymyr
Department of Urology, Ivano-Frankivsk National Medical University, Ivano-Frankivsk Ukraine

Study of microelements level and antioxidant defense by patients with chronic nonbacterial prostatitis

Trishch Volodymyr

Abstract
Among men of working age chronic prostatitis is the most frequent urological sickness, and characteristic symptoms of it are frequent reason of the urological recourse. Therefore this excuses a search for new methods of examination and treatment of the patients with this pathology.
Purpose of the research: Purpose of our research was studying of level of essential microelements (Zn, Cu, Mg) in blood and ejaculate and specialty of antioxidant defense of the patients with chronic nonbacterial prostatitis and reasoning of polymicroelemental medication use.
Materials and methods: Under supervision were 84 patients with chronic nonbacterial prostatitis, among them 42 patients with inflammatory chronic pelvic pain syndrome (category IIIA) and 42 patients with noninflammatory chronic pelvic pain syndrome (IIIB). Microelements Zinc, Copper and Magnesium in whole blood an ejaculate were determined using atomic absorption spectrophotometry on C-115 PC. State of antioxidant defense was judged considering quantification of Catalase after A. Bach and S. Zubkova and Superoxide Dismutase.
Results: A certain decrease of microelements Zn, Cu, Mg was observed in both groups of patients with chronic nonbacterial prostatitis. More expressed decrease was observed in patients with inflammatory chronic pelvic pain syndrome. Also it was noted that with long duration of chronic nonbacterial prostatitis takes place the antioxidant enzymes level decrease. I.e. it was marked a clear connection between Catalase and Superoxide Dismutase decrease in patients' blood with chronic nonbacterial prostatitis and duration of disease. More expressed decrease was observed in patients with inflammatory chronic pelvic pain syndrome. As a result of correlation analysis it was found that there is certain dependence between level of Zn, Cu, Mg in blood and antioxidant defense enzymes.
Conclusion: With chronic nonbacterial prostatitis was observed decrease of Zn, Cu, Mg level in blood as well as in ejaculate of the patients. A shortage of this microelements certainly increases with a long anamnesis of sickness. More intense decrease of Zn, Cu, Mg is noted in patients with inflammatory chronic pelvic pain syndrome.
Metabolic changes with shortage of Zn, Cu, Mg correlate with antioxidant system disbalance, that is with antioxidant defense level decrease, which must be considered in treating of the patients with chronic nonbacterial prostatitis.

Keywords: Chronic nonbacterial prostatitis, Zinc, Copper, Magnesium, antioxidant defense

Introduction
According to different authors frequency of chronic prostatitis (CP) in male population is from 3 to 35% [3, 6, 7]. Among men of working age (before 50 years old) CP is the most common urological sickness, and characteristic symptoms of it are frequent (up to 8% of cases) reason of urological recourse. At the moment, they consider, that only 5-10% of chronic prostatitis cases have bacterial source, nearly 60-65%- are not bacterial prostatitis, 30-35% - prostatodynia [6, 7, 10, 17]. According to the offered G. Battalias theory, prostatitis is consequent of urine passage dysfunction – in number of cases the situation strengthens with microorganisms. In case of chronic prostatitis, as well as prostatodynia, pain is conditioned by urethral hypertonia.. Urethral sensitivity same as pain or discomfort are reflection of this hypertonia. High maximum urethral pressure, caused by increase of adrenergic stimulation which in it's turn is caused by local or general factors. All of it leads to reflux of urethral contents in peripheral zone of prostate and to chronic nonbacterial or, in case of bacterial factors adjunction, bacterial prostatitis [6, 15, 16, 17]. In 80% of cases cultural analysis of prostatic secretions the infectious factor of CP is not found. This form of CP according to classification of National Institutes of Health (NIH) USA is determined like chronic nonbacterial prostatitis or chronic pelvic pain syndrome (category III) (CPPS) [3, 12, 16, 17]. Without clear ideas about etiology and pathogenesis of CPPS the treatment of patients with this disease is empirical.

In addition, therapeutic measures are traditionally aimed at removal or reduction of pain intensity, correction of urination and psycho-emotional state and also concomitant dysfunctions are not considered.

Nowadays there is written a big amount of works, dedicated to research of content and distribution of different microelements in organism, their physiological role, elements disbalance in organism and development of related diseases.

There is no doubt in importance of the ME in human's ogranism vital activity. Learning microelemental status by different sicknesses is especially interesting. According to modern conceptions, every disease has some deviation in elemental compound. So, for example, atherosclerosis is always accompanied with Zinc and Vanadium shortage. Except Iodine disbalance as a causal factor of thyroid gland with endemic and nonendemic origin, were found specific violations of Zinc and Chrome by diabetes, Copper absorbing violation in gastrointestinal tract, as a result of X chromosome dysfunction – Menkes disease, Copper toxemia – Wilson's disease. Herewith elemental homeostasis disbalance does not only accompany, but also provokes development of different sicknesses, potentiates the flow, transfers it in a chronic form. Besides, violated mineral metabolism also changes pharmacokinetic and pharmacodynamic reaction on medicines. Among pathogenetic mechanisms in kidneys disease some role is played by microelemental homeostasis, in particular essential microelements shortage and heavy metal overage, which causes strengthening of inflammatory process [9].

Long treating of patients with CP using antibiotics leads to oppression of the main cellular and humoral immunity sections mechanisms. It is also known, that chronic microelemental shortage causes expressed immune changes that are accompanied by immune resistance decrease. Therefore learning of the ME participation in antioxidant defense mechanisms in patients with CPPS turned important and necessary. In organism of an adult is contained from 1 to 2 g (98% intracellular) of Zinc, which is a part of more than 200 enzymes. The main part of Zin c is contained in prostate, testicles, muscles and bones. Participation in gonads metabolism is very important function of Zinc, which has an influence on trophic processes of prostate and testicles. Zinc actively affects on antioxidant defense processes [1, 2, 9]. Copper is one of the most important indispensable ME and in serum is present only in form, associated with ceruloplasmin (95%) and albumin (5%). Ceruloplasmin is a protein, which takes part in defense of the lipid membranes from peroxidation. One of the most important elements in organism is Magnesium, which participates as a cofactor in more than 300 chemical reactions. Together with Calcium and Potassium, Magnesium is important in activity of immune cells by inflammatory process in prostate. Also Magnesium influences on antiseptic properties of prostatic fluid [9].

Superoxide Dismutase (SOD) and Catalase (C) belong to antioxidant enzymes, which protect the organism from toxic oxide radicals. SOD catalyze dismutation of superoxide to oxygen and hydrogen peroxide. Hydrogen peroxide in it's turn exposes to Catalase. Enzymes have active sites, which contain Copper or Zinc(Cu/Zn- Superoxide Dismutase). So, the decrease of antioxidant system's activity is related with shortage of separate ME in organism [5, 9].

Purpose of the research

Purpose of our research was studying of level of essential microelements (Zn, Cu, Mg) in blood and ejaculate and specialty of antioxidant defense of the patients with chronic nonbacterial prostatitis and reasoning of polymicroelemental medication use.

Materials and methods

Under supervision were 84 patients with chronic nonbacterial prostatitis, among them 42 patients with inflammatory chronic pelvic pain syndrome (ICPPS) (category IIIA) and 42 patients with noninflammatory chronic pelvic pain syndrome (NCPPS) (category IIIB). Average age of the patients was 33,6-35 years old (from 20 to 50 years), duration of the sickness from 8 months to 7 years (in average 4,2 months-1,3 years). Both groups of patients were divided on three subgroups according to the duration of the disease: the first subgroup with duration under 3 years, the second subgroup from 3 to 6 years, the third - more than 6 years of the illness. The amount of patients with ICPPS (category IIIA) with duration of thesickness under 3 years was 10, respectively 8,4%, from 3 to 6 years there were 17(20,2%), over 6 years-15(17,8%). The patients with duration of the disease under 3 years with NCPPS (category IIIB) reached 8 men (9,5%), from 3 to 6 years – 21(25%), over 6 years – 13 (15,4%). A control group, representing the main group, obtained 25 practically healthy men, aged between 20 and 50 years. A diagnose was verified based on prostate(P) finger study, prostatitis in anamnesis, laboratory tests: a) prostate fluid analysis; b) urethral fluid testing on specific and nonspecific flora; c) prostate fluid microbiological analysis and prostate ultrasonography [6, 7].

ICPPS (category IIIA) was diagnosed based on following criterions: periodic or constant pain over bosom, in perineum, scrotum, sacrum during a long time (over 3 months), with or without violation of urination; increase of leukocytes amount (>10 in sight) in prostate fluid microscopic analysis; negative results in prostate fluid microbiological analysis. NCPPS (category IIIB) was also diagnosed based on standard criterions: periodic or constant pain over bosom, in perineum, scrotum, sacrum during a long time (over 3 months); with or without violation of urination; normal amount of leukocytes (<10 in sight) in prostate fluid microscopic analysis; negative results in prostate fluid microbiological analysis [10-12, 17].

There was also conducted a survey according to modified international system of prostate sickness symptoms evaluation. Microelements Zinc, Copper and Magnesium in whole blood an ejaculate were determined using atomic absorption spectrophotometry on C-115 PC. State of antioxidant defense was judged considering quantification of Catalase after A. Bach and S. Zubkova and Superoxide Dismutase.

Results and Discussion

For patients of the first group with ICPPS (category IIIA) were more typical frequency and expression of urination's violations, and for patients of the second group with NCPPS (category IIIB) more expressed was pain syndrome, that influenced on lower life quality of the patients if this group. So, according to survey among patients of the first group (category IIIA), general IPPS mark reached 15,3±0,28; life quality index L-3,3±0,05; evaluation of general state in a sum of marks (S+L)-18,6±0,36, and according to survey of the second group of patients (category IIIB), general IPPS mark reached 17,3±0,16; life quality index L-3,7±0,05; evaluation of general state in a sum of marks (S+L)-21,0±0,24. Also it was noted the increase of symptoms expression with duration of the illness.

Table 1: Results of the symptoms' evaluation

Indicator	Patients with ICPPS (category IIIA)		
	I subgroup < 3 years (n=10)	**II subgroup 3-6 years (n=17)**	**III subgroup >6 years (n=15)**
IPSS	13,6±0,31	15,6±0,18*	16,7±0,05**
L	3,1±0,05	3,3±0,05*	3,5±0,05**
S+L	16,7±0,3	18,9±0,2*	20,2±0,1**
	Patients with NCPPS (category IIIB)		
Indicator	I subgroup < 3 years (n=8)	II subgroup 3-6 years (n=21)	III subgroup >6 years (n=13)
IPSS	15,8±0,28	17,4±0,1*	18,9±0,05**
L	3,3±0,05	3,7±0,05*	4,2±0,05**
S+L	19,1±0,26	21,1±0,2*	23,1±0,05**

Remark: *p<0,05;**p<0,05

1.*p-probability of indicator difference of II, III subgroups comparing to I subgroup

2.**p-probability of indicator difference of III subgroup comparing to II subgroup

We observed the dependence between content of Zinc, Copper and Magnesium in blood and ejaculate of the patients and duration of the sickness in both groups of the patients. Certain decrease of this ME was observed in both groups of the patients with chronic nonbacterial prostatitis (CNP). More expressed decrease was noted in patients with ICPPS. With lengthening of the illness duration level of Zinc, Copper and Magnesium dynamically decreased in blood as well as in ejaculate in the patients of both groups. (table2).

Table 2: Result of Zn, Cu, Mg level determination of patients with CNP

Indicator	Control (n=25)	Patients with ICPPS (category IIIA)		
		I subgroup < 3 years (n=10)	**II subgroup 3-6 years (n=17)**	**III subgroup >6years (n=15)**
Zn mcg/g (BL.)	7,42±0,011	5,02±0,011 p<0,01	4,18±0,008 p<0,01 $p1$<0,05	3,92±0,009 p<0,01 $p1$<0,05 $p2$<0,05
Zn mcg/g (Ejac.)	20,24±1,24	15,12±1,02 p<0,01	14,37±1,06 p<0,01 $p1$<0,05	12,03±1,04 p<0,01 $p1$<0,05 $p2$<0,05
Cu mcg/g (BL.)	1,91±0,011	1,21±0,011 p<0,01	0,96±0,009 p<0,01 $p1$<0,05	0,72±0,008 p<0,01 $p1$<0,05 $p2$<0,05
Cu mcg/g (Ejac.)	1,36±0,011	0,97±0,008 p<0,01	0,79±0,009 p<0,01 $p1$<0,05	0,60±0,008 p<0,01 $p1$<0,05 $p2$<0,05
Mg mcg/g (BL.)	37,20±1,22	31,26±1,06 p<0,01	24,14±1,04 p<0,01, $p1$<0,05	20,07±1,02 p<0,01 $p1$<0,05 $p2$<0,05
Mg mcg/g (Ejac.)	21,20±1,24	19,30±1,02 p<0,01	16,06±1,04 p<0,01, $p1$<0,05	14,05±1,02 p<0,01 $p1$<0,05 $p2$<0,05
Indicator	Control (n=25)	Patients with NCPPS (category IIIB)		
		I subgroup < 3 years (n=8)	II subgroup 3-6 years (n=21)	III subgroup >6 years (n=13)
Zn mcg/g (BL.)	7,42±,0011	6,24±0,009 p<0,01	6,08±0,009 p<0,01 $p1$<0,05	4,85±0,008 p<0,01 $p1$<0,05 $p2$<0,05
Zn mcg/g (Ejac.)	20,24±1,24	18,12±1,04 p<0,01	17,06±1,06 p<0,01 $p1$<0,05	14,86±1,02 p<0,01 $p1$<0,05 $p2$<0,05
Cu mcg/g (BL.)	1,91±0,011	1,77±0,011 p<0,01	1,61±0,009 p<0,01 $p1$<0,05	1,47±0,008 p<0,01 $p1$<0,05 $p2$<0,05
Cu mcg/g (Ejac.)	1,36±0,011	1,14±0,009 p<0,01	1,02±0,008 p<0,01 $p1$<0,05	0,98±0,009 p<0,01 $p1$<0,05 $p2$<0,05
Mg mcg/g (BL.)	37,20±1,22	34,3±1,02 p<0,01	32,27±1,04 p<0,01 $p1$<0,05	30,66±1,04 p<0,01 $p1$<0,05 $p2$<0,05
Mg mcg/g (Ejac.)	21,20±1,24	19,74±1,04 p<0,01	18,32±1,06 p<0,01 $p1$<0,05	16,95±1,02 p<0,01 $p1$<0,05 $p2$<0,05

1. p- probability of difference between indicators of I, II, III subgroups comparing to the group of healthy men.
2. p1- probability of difference between indicators of II,III subgroups comparing to I group.
3. p2- probability of difference between indicators of III subgroup comparing to II subgroup.

Significance in development of inflammatory, dystrophic, degenerative states is assigned to activation of lipid peroxidation (LPO) processes, therefore also an important place take membrane pathological processes, caused by LPO activation and violation of antioxidant defense (AOD) in chronic prostatitis pathogenesis. Considering literature data that in patients with CP is observed activation of membrane destructive processes because of disbalance in AOD system, we analyzed expression of this changes depending on duration of the sickness. Results of indicators AOD are aligned in table 3, according to them we can affirm, that by long duration of chronic nonbacterial prostatitis takes place antioxidant enzymes level decrease. So, comparing to control, K and SOD level in patients with duration of the disease under three years was certainly lower ($p1<0,05$), and comparing to other subgroups higher ($p1<0,05$). Namely, it was noted clear connection between Catalase and Superoxide Desmutase with duration of the sickness. Obviously, this is a reaction on continued increase of free radical processes, which led to exhaustion of organism antioxidant defense. Also it was observed expressed decrease of K and SOD in patients with ICPPS (table 3).

Table 1: Results of determination of Catalase and Superoxide Desmutase level in blood of patients with CNP

Indicator	**Control (n=25)**	**Patients with ICPPS (category IIIA)**		
		I subgroup < 3 years (n=10)	**II subgroup 3-6 years (n=17)**	**III subgroup >6 years (n=15)**
Кат.мг H2O2/ml	11,44±0,12	8,76±0,09 *p*<0,05	8,51±0,11 *p*<0,05 *p*1<0,05	8,07±0,08 *p*<0,001 *p*1<0,05 *p*2<0,05
SOD %	64,16±1,24	48,5±1,02 *p*<0,001	43,7±0,68 *p*<0,001 *p*1<0,05	37,9±1,06 *p*<0,001 *p*1<0,05 *p*2<0,05
Indicator	Control (n=25)	Patients with NCPPS (category IIIB)		
		I subgroup < 3 years (n=8)	II subgroup 3-6 years (n=21)	III subgroup >6 years (n=13)
Кат.мг H2O2/ml	11,44±0,12	9,90±0,11 *p*<0,05	9,64±0,12 *p*<0,05 *p*1<0,05	8,94±0,09 *p*<0,001 *p*1<0,05 *p*2<0,05
SOD %	64,16±1,24	55,0±1,02 *p*<0,001	48,7±0,68 *p*<0,001 *p*1<0,05	44,8±1,06 *p*<0,001 *p*1<0,05 *p*2<0,05

1. p- probability of difference between indicators of I, II, III subgroups comparing to the group of healthy men.
2. p1- probability of difference between indicators of II,III subgroups comparing to I group.
3. p2- probability of difference between indicators of III subgroup comparing to II subgroup.

In order to establish the relationships between the content of Zn, Cu, Mg and AOP indicators we conducted a correlation analysis between the content of given ME in blood and levels of catalase and superoxide dismutase. Analyzing the results, found that between the content of Zn, Cu, Mg in blood and enzymes AOP was established reliable relationship.

Thus, summarizing the literature data and the results of our research, it can be assumed that the deficiency of zinc, copper and magnesium in patients with CNP reduces antioxidant defense, which leads to further progression and chronic pathological process.

Conclusion

1. With chronic nonbacterial prostatitis was observed decrease of Zn, Cu, Mg level in blood as well as in ejaculate of the patients. A shortage of this microelements certainly increases with a long anamnesis of sickness. More intense decrease of Zn, Cu, Mg is noted in patients with inflammatory chronic pelvic pain syndrome.
2. Metabolic changes with shortage of Zn, Cu, Mg correlate with antioxidant system disbalance, that is with antioxidant defense level decrease, which must be considered in treating of the patients with chronic nonbacterial prostatitis, using polymicroelemental medicines.

Reference

1. Gorpinchenko II, Gurzhenko JN, Spiridonenko VV. Research of efficiency of monotherapy with preparation Zinkit in patients with chronic prostatovesiculitis complicated by hypofertility. Man's health. 2013; 1:55-58. [in Ukrainian]
2. Gorpinchenko II, Gurzhenko JN. Experience of using preparation Sitoprostat in therapy of men with chronic nonbacterial prosratitis complicated by lower urinary tract syndrome. Man's health. 2013; 4:94-98. [in Ukrainian]
3. Gorpinchenko II, Migov VG, Bilogolovskaya VV. Chronic pelvic pain syndrome. New problem – new solution? Man's health. 2013; 4:35-42 [in Ukrainian]
4. Kamyshnev VS. Clinical biochemical research and laboratoty diagnostics.Moscow: 2004, 476[in Russian]
5. Lytvynets YeA. Dynamics of lipid peroxidation and antioxodoc defense in treatment of patients with chronic nonbacterial prostatitis using fitopreparations.Man's health. 2009; 4:76-78. [in Ukrainian]
6. Lytvynets YeA, Sandurski OP, Vintoniv OR. Efficiency of combined therapy in treatment of patients with

noninflammatory chronic pelvic pain syndrome (category III B). Man's health. 2012; 2:37-38. [in Ukrainian]
7. Lytvynets YeA. Efficiency of suppositories Distreptaza in treatment of patients with chronic nonbacterial prostatitis (syndrome of inflammatory chronic pelvic pain, category IIIA). Man's health. 2011; 2:86-88. [in Ukrainian]
8. Loran OB, Valiev EI, Zhivov AV. Chronic prostatitis – the only disease? Urology. 2009; 1:70-75. [in Russian]
9. Oberlis DN. New approach to problem of microelements shortage. Microelements in medicine. 2004; 3(1):2-7. [in Russian]
10. Pushkar DJ, Rasner PI. Prostatitis. Russian journal of Medicine. 2013; 18:14-19. [in Russian]
11. Tiusikov IA. Interdependence of system factors in pathogenesis of male chronic pelvic pain syndrome. Urology 2012; 6:49-51. [in Russian]
12. Alaev J, Pshihachev A, Vashavski V. Clinico-morphological aspects of chronic prostatitis. Doctor. 2010; 6:17-19. [in Russian]
13. Forrest JB. Interstitial cystitis, chronic nonbacterial prostatis and chronic pelvic pain syndrome in men. The Journal of Urology. 2004; 172:2561-2562.
14. Kaplan SL,Volpe M, Te AA. Prospective, 1-year trial using saw palmetto versus finasteride in the treatment of category III prostatitis. Jörn. Urol. 2004; 171:284-288.
15. Nickel JC. Clinical evaluation of the patients pressing with prostatitis. Europ. Urol. 2003; 2:11-14.
16. Nickel JC. Prostatitis: diagnosis and classification. Curr Urol Rep. 2003; 4:259-260.
17. Nickel JC, Patel AA, Cameron M. Chronic prostatitis/chronic pelvic pain syndrome: finding a way forward in the United Kingdom. Rev. Urol. 2008; 10(2):160-163.