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The Impact of Daily Wearing of Medicinal-Prophylactic Clothes on The Evidence of Clinical Manifestations of Osteochondrosis Of The 2nd Degree and Platelet Activity in Persons Of The Second Mature Age.

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ABSTRACT

Notwithstanding the serious successes of modern medicine, osteochondrosis of spinal column is still rather widespread disease in the whole world. Special attention to this problem last years is caused by number increase of the given pathology cases among persons of the most efficient age. Persons of the second mature age with osteochondrosis of lumbar spine of the 2nd degree are noted in all the cases to have pain syndrome and rather often musculotonic and vegetovascular syndromes which significantly worsen general state of patients. Osteochondrosis of lumbar spine is also accompanied by strengthening of platelets' aggregative properties what worsens the processes of microcirculation. Daily wearing of medicinal-prophylactic clothes (the author's variant) for half a year was applied for the elimination of osteochondrosis signs in the observed persons. The patients receiving given correction, were noted to have gradual positive dynamics of accountable indices. Application of the author's variant of medicinal-prophylactic clothes to the observed patients was accompanied by fast elimination of osteochondrosis clinical manifestations and gradual weakening of platelets' aggregation. It approximated the accountable indices to the control values. Received results allow considering medicinal-prophylactic clothes as the valuable component of mass prophylaxis of osteochondrosis progression and one of the means of the internals' health keeping in persons having given disease.

Keywords: the second mature age, osteochondrosis, pain syndrome, platelets, aggregation, medicinal-prophylactic clothes.

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INTRODUCTION

Notwithstanding the serious successes of modern medicine, osteochondrosis of spinal column is still rather widespread disease in the whole world [1]. Special attention to this problem last years is caused by number increase of the given pathology cases among persons of the most efficient age. Progression of osteochondrosis always leads to worsening of the general state, increase of cases of temporary disability and coming of invalidism what brings significant economical damage [2,3]. It's known that osteochondrosis exacerbation worsens functioning of cardio-vascular system and indices of blood system [4,5,6]. It was shown earlier that thrombocytopathy developed at already insignificant disturbances in the spinal column worsening microcirculation and promoting quick augmenting of hypoxia in their cells [7]. Given situation progressively disturbs anabolic processes in tissues and worsens long-term prognosis [8].

Applied at present methods of osteochondrosis treatment cannot always have satisfactory health-improving effect [9,10]. It becomes clear that it's necessary to continue the search of effective approaches to its correction at obligatory account of their impact on not only evidence of its clinical manifestations but also parameters influencing microcirculation in tissues, including platelets' activity. Non-pharmacological impacts having no side effects [11] have special perspectiveness in this respect.

Possibilities of various medicinal impacts on a body in respect of platelets' aggregation [15] weakening with their help were earlier estimated in clinic [11,12] and in experiment [13,14]. In previous researches of children with scoliosis there was shown that lasting training consisting of medicinal exercises, could lower platelet activity [16]. At the same time, the bulk of working population is characterized by low attachment to regular physical training [17]. That's why, the further search of variants of non-pharmacological correction is necessary. It will be more popular among most patients [18,19] and will be able to not only steadily eliminate clinical manifestations of the disease but also positively influence platelets' aggregation which is rather significant for microcirculation. The authors considered daily wearing of medicinal-prophylactic clothes (MPC) as an alternative to medicinal physical training at osteochondrosis. From one side, the attachment to MPC among patients is incommensurably higher than to medicinal physical training [20]. From the other side, in previous researches there was established the possibility of correction of clinical and hematological disturbances caused by pathology of spinal column [21,22], with the help of MPC. So, we put the following aim in our research: to estimate the dynamics of clinical syndromes and platelets' aggregation activity in persons of the second mature age with osteochondrosis of the 2nd degree who daily wore the author's MPC for half a year.

MATERIALS AND METHODS

The research was conducted on people living in Central Russia (Moscow City and Moscow region). Into our research we took 37 healthy people of both sexes (18 men and 19 women) of the second mature age (mean age 43.5 ± 2.5 years) who composed the control group. We also examined 43 people of both sexes (21 men and 22 women) of the same age (mean age 44.7 ± 1.9 years) with osteochondrosis of the 2nd degree who composed the group of observation. The diagnosis of osteochondrosis was confirmed clinically and rontgenologically. Existing in some persons from the group of observation concomitant chronic diseases (chronic bronchitis, chronic tonsillitis, chronic cholecystitis) were in the state of lasting persistent remission. In 93.0% of patients, the duration of exacerbation of the disease exceeded 2 weeks, with 88.4% of patients receiving treatment (medication, physiotherapy, massage, reflexology) for osteochondrosis, which in all cases was not effective enough. This research is approved by the local Ethics Committee of the Russian State Social University on May, 14th, 2015 (Record №5). All the examined persons gave written informed consent on participation in conducted research.

Patients underwent a clinical neurologic examination, neuropsychological testing using a visual analogue pain scale [23], as well as surface electromyography of the muscles of the trunk and lower limbs.

In our research we determined the activity of the processes of lipids' peroxidation (LPO) in blood plasma which was registered according to the content of thiobarbituric acid (TBA)-active products in it with the help of a set produced by the firm "Agat-Med" (Russia) and to the level of acylhydroperoxides (AHP) [24]. We also registered antioxidant activity of blood [25].

We determined molecules' concentrations of P-selectin and PECAM-1 (Bender MedSystems GmbH, Austria) by enzymeimmunoassay in plasma.

After platelets' washing and resuspending we estimated quantitatively the levels of cholesterol (CS) by enzymatic colorimetric method with the help of a set produced by the firm "Vital Diagnostikum" (Russia) and common phospholipids (CPL) according to the quantity of phosphorus contents in them [26].

The evidence of intraplatelet LPO processes was determined in washed and resuspended platelets according to concentration of malondialdehyde (MDA) in the reaction of thiobarbituric acid reduction and quantity of AHP [24].

Platelets' quantity in children's capillary blood was calculated with the help of Gorjaev's box. Platelets' aggregation (AP) was estimated by visual micromethod with application of ADP (0.5×10^{-4} M), collagen (dilution 1:2 of the basic suspension), thrombin (0.125 un/ml), adrenaline (5.0×10^{-6} M) and hydrogen peroxide (7.3×10^{-3} M) as inductors [27].

All the persons from the group of observation were recommended to wear designed by the authors medicinal-prophylactic clothes [28] every day to correct osteochondrosis manifestations. The applied MPC consisted of belt-cast with warming effect which was composed of two details – backplate and breast-plate. There were elements of their mutual connection. The belt-cast was also provided with vertical pockets of different width. Stiffening ribs of elastic material were inserted into one of them, warming elements – into the others. Both plates were made of two layers of fabric. Vertical stitches forming pockets, were made along whole their surface. Both layers of fabric were sewed between each other along the lower cut and sides. The upper cut was left open and was provided with a zipper. A set of salt heaters was used as warming element.

The patients from the group of observation were examined at the beginning and in 3 months, 6 months of constant MPC wearing. The control group was examined once.

Received in our research results were processes by Student's (t) criterion.

RESULTS OF INVESTIGATION AND DISCUSSION

At the beginning the main complaint in all the 43 patients was on the pain in lumbar region with irradiation to one or both lower extremities (lumbar ischialgia). The pain was aching in most patients (83.7%) and only in 16.3% of cases it was acute. In 88.4% of cases the pain syndrome had constant character strengthening at changing of body position and moving. Apart from complaints on pains in lumbar field the patients complained on limitation of movements and sensation of stiffness in lumbar field (81.4% of patients). The existence of paresthesia in lower extremities was noted in 44.2% of patients and weakening of legs' muscles was noted in 9.3% of patients.

The development of sparing gait was noted in 62.8% of patients, limitation of active movements in lumbar field of spinal column – in 69.7% of patients, tension of paravertebral muscles – in 79.1%, positive Lasegue's sign – in 86.0% of patients. The examined patients were also found to have the existence of extravertebral syndromes. Tonus rise of gluteuses and back group of thigh muscles was noted more often than others. On the whole these phenomena were detected in 76.7% of patients. Vegetovascular syndrome and neurodystrophic disturbances were met more seldom (46.5% and 25.6%, respectively). The patients had two syndromes in 32.5% of cases, and in 4.6% of cases they had three syndromes at once.

At indices' estimation of visually-analogous pain scale it was detected that pain level at the beginning was equal on average to 6.3 points (at maximal level – 10 points), i.e. 63.0%.

At the enrollment of patients into the research 37 of them (86.0%) were found to have indices' disturbances of electromyography consisting in lowering of amplitude and frequency indices from both sides.

In the result of 4 weeks' MPC wearing the patients had reduction of lumbar ischialgia manifestations. In the course of consequent observation there was noted no case of pain syndrome recidivation. Positive impact of MPC wearing on pain syndrome dynamics was confirmed by data which were received with the help

of visually-analogous pain scale. With its help there was confirmed pain elimination in a month of MPC wearing and absence of its recurring till the end of observation. In the same terms there was noted the elimination of other neurologic disturbances (antalgic postures, disorders of tendon reflexes, lowering of sensitivity, tonus and muscles' strength).

In the result of MPC wearing the patients were noted to have gradual improvement of electromyography indices. To the end of observation the amplitude of muscle contractions in patients increased in 5.5 times ($p < 0.01$), and frequency of muscle fibers' contractions – in 2.3 times ($p < 0.01$).

Daily wearing of MPC was accompanied by weakening of LPO processes in plasma of persons with osteochondrosis. So, already in 3 months of observation the quantity of AHP and TBA products in plasma lowered from 2.45 ± 0.48 D₂₃₃/1 ml and 4.48 ± 0.52 mkmol/l (control values – 1.77 ± 0.23 D₂₃₃/1 ml and 3.26 ± 0.29 mkmol/l, respectively) till 2.05 ± 0.52 D₂₃₃/1 ml and 3.91 ± 0.42 mkmol/l, respectively. By the 6th month of MPC application the content of AHP in plasma of persons with osteochondrosis reached 1.80 ± 0.29 D₂₃₃/1 ml at the decrease of TBA-active compounds in it till 3.30 ± 0.34 mkmol/l against the background of plasma AOA strengthening from $23.8 \pm 0.41\%$ at the beginning till $32.2 \pm 0.32\%$ by the end of observation (control values – $32.6 \pm 0.49\%$).

Table: The dynamics of morpho-functional and hematological characteristics of examined children with scoliosis against the background of medioprophyllactic clothes' wearing

Parameters	A group of children with scoliosis against the background of medioprophyllactic clothes' wearing, n=39, M±m			Control, n=34, M±m
	initial state	3 months	6 months	
acylhydroperoxides of plasma, D ₂₃₃ /l ml	2.45±0.48 p< 0.01	2.05±0.52 p ₁ < 0.05 p ₁ <0.01	1.80±0.29	1.77±0.23
thiobarbituric acid-products of plasma, mkmol/l	4.48±0.52 p< 0.01	3.91±0.42 p ₁ < 0.05 p ₁ <0.01	3.30±0.34	3.26±0.29
antioxidant activity of plasma, %	23.8±0.41 p< 0.01	27.5±0.38 p ₁ < 0.05 p ₁ <0.01	32.2±0.32	32.6±0.49
cholesterol of platelets, common phospholipids of	1.07±0.012 p< 0.01	0.92±0.009 p ₁ < 0.05 p ₁ <0.01	0,83±0.008	0.82±0.016
acylhydroperoxides of platelets, D ₂₃₃ /10 ⁹ platelets	4.08±0.017 p< 0.01	3.50±0.012 p ₁ < 0.05 p ₁ <0.01	3.10±0.015	3.08±0.012
malonicdialdehyde of	1.85±0.012 p< 0.01	1.60±0.010 p ₁ < 0.05 p ₁ <0.01	1.38±0.014	1.37±0.009
AP with ADP, s	31.9±0.18 p< 0.01	36.8±0.12 p ₁ < 0.05 p ₁ <0.01	41.9±0.09	42.2±0.11
AP with collagen, s	23.5±0.19 p< 0.01	27.6±0.22 p ₁ <0.05	32.0±0.15 p ₁ <0.01	32.3±0.09
AP with thrombin, s	41.0±0.14 p< 0.01	48.3±0.10 p ₁ < 0.05 p ₁ <0.01	56.0±0.08	56.1±0.14
AP with ristomycin, s	33.2±0.15 p< 0.01	39.0±0.12 p ₁ < 0.05 p ₁ <0.01	46.0±0.09	45.8±0.10
APwith c H ₂ O ₂ , s	35.1±0.25 p< 0.01	40.0±0.18 p ₁ < 0.05 p ₁ <0.01	47.0±0.15	46.7±0.20
AP with epinephrine, s	72.2±0.33 p< 0.01	82.4±0.28 p ₁ < 0.05 p ₁ <0.01	93.8±0.30	93.6±0.036
P-selectin, ng/ml	119.9±0.49 p< 0.01	107.7±0.51 p ₁ <0.05	98.1±0.39 p ₁ <0.01	98.4±0.42
PECAM-1, ng/ml	58.6±0.38 p< 0.01	52.1±0.33 p ₁ <0.05	48.0±0.25 p ₁ <0.01	47.3±0.27

Conventional signs: p – signification of parameters' differences of children with scoliosis and control group. p_1 – dynamics' signification of accountable indices of children with scoliosis in the course of correction in comparison with the beginning.

The persons with osteochondrosis were noted to have gradual lowering of initially increased concentrations of accountable adhesion molecules in plasma in the result of MPC wearing (table). In half a year's MPC wearing the persons with osteochondrosis were found to have reliably lowered levels of P-selectin and PECAM-1 on 22.2% and 22.1%, respectively. These indices nearly approached the control ones.

Already in 3 months of daily MPC wearing there was detected lowering of CS level to 0.92 ± 0.009 mkmol/ 10^9 platelets and increase of CPL to 0.69 ± 0.006 mkmol/ 10^9 platelets (initially 1.07 ± 0.012 mkmol/ 10^9 platelets and 0.61 ± 0.009 mkmol/ 10^9 platelets, respectively) in platelets' membranes of persons with osteochondrosis. Continuation of MPC application allowed additional optimization of platelets' lipid composition (CS 0.83 ± 0.008 mkmol/ 10^9 platelets, CPL 0.73 ± 0.007 mkmol/ 10^9 platelets). Its value nearly approached the control one (CS 0.82 ± 0.016 mkmol/ 10^9 platelets and CPL 0.73 ± 0.007 mkmol/ 10^9 platelets).

Initially activated LPO in platelets of persons with osteochondrosis (AHP 4.08 ± 0.017 D₂₃₃/ 10^9 platelets, MDA 1.85 ± 0.012 nmol/ 10^9 platelets) weakened already in 3 months of daily MPC wearing. In 6 months of constant usage of MPC the contents of LPO products in platelets of persons with osteochondrosis additionally lowered (AHP to 3.10 ± 0.015 D₂₃₃/ 10^9 platelets and MDA to 1.38 ± 0.014 nmol/ 10^9 platelets, respectively) and nearly approached the control level (AHP 3.08 ± 0.012 D₂₃₃/ 10^9 platelets, MDA 1.37 ± 0.009 nmol/ 10^9 platelets, respectively).

Application of MPC to persons with osteochondrosis conditioned positive dynamics of platelet hemostasis. Platelets' quantity in their blood didn't change and remained on the normal level. At that, initially accelerated platelets' aggregation in persons with osteochondrosis began to get inhibited against the background of MPC. In the result of daily MPC wearing the observed patients were registered to have AP inhibition in response to all the applied inductors to the level which was near to the control one. At that, the most evident reaction of their platelets was on collagen, ADP and ristomicin; AP was less active with H₂O₂ and thrombin. The persons with osteochondrosis wearing MPC had maximal duration of AP appearance in response to adrenaline – 93.8 ± 0.30 s (table).

CONCLUSION

Persons of the second mature age with osteochondrosis of the 2nd degree are characterized by development of pain, musculotonic and vegetovascular syndromes. It is accompanied in them by strengthening of lipids' peroxidation processes in plasma and platelets and increase of platelet aggregation. Daily wearing of medicinal-prophylactic clothes for 6 months reduces symptomatology of osteochondrosis weakening the processes of lipids' peroxidation in plasma and platelets. Besides, daily wearing of medicinal-prophylactic clothes by persons with osteochondrosis is accompanied by the indices' improvement of platelets' aggregative activity which approach the control level in 6 months of observation. Received results allow considering medicinal-prophylactic clothes as the valuable component of mass prophylaxis of osteochondrosis progression and one of the means of the internals' health keeping in persons having given disease.

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