

MODERN APPROACHES FOR THE COURSE OF MEDICAL REHABILITATION OF PHYSICAL CULTURE IN ELDERLY PATIENTS WITH GONARTHROSIS

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Annotation. The effect of the complex exercise using static stretching along the axis of voluntary rehabilitation for elderly patients with gonarthrosis. The study involved 20 elderly women suffering from bilateral gonarthrosis 1-2 stages. Noted a more pronounced beneficial effect of locomotor functions and physical performance patients compared with conventional methods. The main group indicator function improving lower extremity and the Leken index exceeded those of the control group by 50%. Also significantly increased quadriceps muscle force in patients on the basis of 33.3% on the right and 25% left. Indicators extension in the knee joints in the study group achieved a 12% larger values than those in the control group. In the main group was significantly increased exercise performance by 32.6% as compared to the control group and reached the lower limit of the age norm.

Keywords: elderly, rehabilitation, gonarthrosis, stretching.

Introduction

Deforming osteoarthritis (OA) of knee joint is observed in 50.6% -54.5% of cases among patients, who suffer from dystrophic diseases of large joints of lower limb [1]. In 86% of cases gonarthrosis affects persons of workable age and in 6.5% -14.6% of cases results in disability [2]. Frequency of OA diseases increases with age and among persons, older than 60 years old it reaches 97% [3, 10], that determines social significance of the problem. Quantity of patients, having late stages of these diseases, (2nd and 3rd), reaches 75% [4]. Special scientific- popular literature, mass media contain numerous advices on organization of motion activity of patients, on carrying out of therapeutic gymnastics. These recommendations are not always adequate for patients, who have chronic pathology [5, 6]. All mentioned above preconditioned choice of our research's purpose.

The research was carried out in compliance with plans of scientific and research works of physical rehabilitation and human health department of Tavricheskiy national university, named after V.I. Vernadskiy, state registration number: 0112U003112 .

Purpose, tasks of the work, material and methods

The purpose of the work is studying of physical exercises complex's influence with application of static will axial stretching for rehabilitation of patients with gonarthrosis.

For achievement of this purpose the following *tasks* were solved:

1. Examination of anthropometric indicators, functional state of knee joints and indicators of physical workability of patients with gonarthrosis in control and main groups before rehabilitation.
2. Examination of anthropometric indicators, functional state of knee joints and indicators of physical workability of patients with gonarthrosis in control and main groups after rehabilitation.
3. Evaluation of effectiveness of complex rehabilitation, which was carried out with the help of physical exercises and will axial stretching, applied to patients with gonarthrosis.

Materials and methods

The research part of the work was fulfilled on the base of Center of social-domestic rehabilitation of pensioners and disabled in settlement Gresovskiy, in December2009 – January 2010. We examined 2 groups of women of 55-60 years old age, who had diagnosis "bilateral gonarthrosis of 1-2 stages, remission phase" in compliance with diagnostic criteria of EULAR [7].

The first group (n=10) was a control one, in this group rehabilitation was carried out as per generally accepted for this pathology schemas and included massage and therapeutic physical culture (TPC) as traditional therapeutic gymnastics (TG) and morning hygienic exercises (MHE) as well as thermo-galvanic-mud treatment with extract of therapeutic mud (deposit field – Saki).

The second group (n=10) was main one and passed rehabilitation as per offered by us methodic (besides massage, MHE and thermo-galvanic-mud treatment we applied TG complex by L.V. Korniyenko's methodic [8] with using of static will axial stretching).

In both groups before and after rehabilitation we determined the following diagnostic indicators: index of body mass (IBM), total algo-functional index of Leken <http://dic.academic.ru/dic.nsf/ruwiki/301540> - cite_note-9, evaluation of heaviness of lower limbs' functioning abnormalities, strength of quadriceps muscle of thigh. For studying of physical workability we conducted test "Time of 600 meters walking" at maximal pace with following calculation of PWC₁₇₀ [9].

We studied the following anthropometric indicators of patients with gonarthrosis: height (m), mass of body (kg) and index of body mass (kg.p.m²). In both groups of the examined we found increasing of body mass index up to 41.0±1.1 kg.p.m² in control group and up to 41.4±1.3 kg.p.m² in main group. IBM of both groups' patients corresponded to excessive mass of body.

Thus, both groups' patients had increased load on knee joints owing to excessive mass of body. This was also proved by the fact that before rehabilitation measures the state of knee joints of both groups' patients was characterized by limited scope of passive movements (see table 1).

Table 1

Anthropometric indicators, functional state of knee joints and indicators of physical workability of patients with gonarthrosis in control and main groups before rehabilitation

Indicators		Control group (n=10)	Main group (n=10)
Group			
Height, m		1.67±0.04	1.68±0.1
Weight, kg		76.4±5.2	78.2±3.8
Index of body mass, kg.p.m ²		41.0±1.1	41.4±1.3
Leken's index, points		2	2
Disorders of lower limbs' functions %		20	20
Angle of bending, °	Right leg	89.1±1.3	89.3±1.1
	left leg	90±0.5	89.9±3.6
Angle of unbending, °	Right leg	72.3±2.5	71.7±2.4
	left leg	71.9±2.5	72.7±1.9
Strength of quadriceps muscle of thigh, points	Right leg	3	3
	left leg	3	3
PWC ₁₇₀ , kgm.p.min		355.1±70.4	379±30.6

Scope of passive bending in sagittal plane was 89.1±1.3⁰ (right leg) and 90±0.5⁰ (left leg) in control group; in main group is was: 89.3±1.1⁰ and 89.9±3.6⁰ (right and left legs accordingly). Such values of scope were about 75% from normal value of passive bending.

Scope of passive unbending in sagittal plane was 72.3±2.5⁰ (right leg) and 71.9±2.5⁰ (left leg) in control group; In main group is was: 71.7±2.4⁰ and 72.7±1.9⁰ (right and left legs accordingly). Such values of scope were about 80% from normal value of passive unbending.

Disorders of knee joints' functions were accompanied also by reduction of strength of quadriceps muscle of thigh. This indicator was 3 points for right leg and for left one in both control and main groups that pointed at expressed reduction of this muscles' strength.

Changes of knee joints' functional state were accompanied by expressed pain syndrome and constraint in the morning that was pointed at by Leken's index (2 points for both groups).

Heaviness of abnormalities of lower limbs functions was evaluated as 20% in both groups that corresponded to middle level of disease's heaviness.

Disorders of loco-motor function of patients with gonarthrosis were accompanied by expressed reduction of their physical workability. Indicator PWC₁₇₀ was 355.1±70.4 kgm.p. min. in control group and 379±30.6 kgm.p.min. in main group, that is about 50% of this age norm.

Thus, lesion of knee joints resulted in expressed disorders of loco-motor functions and reduction of general workability of patients, who suffer from bilateral gonarthrosis.

After two courses of rehabilitation, the following changes in state of patients with gonarthrosis, were registered (see table 2).

IBM unconfidently changed by 1% in control group and by 5.3% - in main. Nevertheless, reduction of load on knee joints resulted in confident improvement of functional state of the latter in main group, that was proved by decreasing of Leken's index up to 1 (p<0.05) and by reduction of lower limbs state heaviness up to 8.5% (p<0.01), i.e. by 50 % from initial values. In control group the mentioned coefficients did not significantly change.

Table 2

Effectiveness of complex rehabilitation with using of physical exercises and static will axial stretching of patients with gonarthrosis

Indicators		Control group (n=10)	Main group (n=10)	p contr.- main.
Height, m		1.67±0.04	1.68±0.1	-
Weight, kg		75.4±4.6	73.5±3.8	-
Index of body mass, kg.p.m ²		40.6±0/9	39.2±1.9	
Leken's index, points		2	1*	0.05
Disorders of lower limbs' functions %		17	8.5**	0.05
Angle of bending, °	Right leg	96.8±1.5**	99.5±0.7**	-
	left leg	96.8±1.3**	99.4±0.6**	-
Angle of unbending, °	Right leg	80.1±1.9**	89.5±0.5**	0.05
	left leg	80.1±3.2*	89.7±0.5**	0.05
Strength of quadriceps muscle of thigh, points	Right leg	3	4*	0.05
	left leg	4	5*	0.05
PWC ₁₇₀ , kgm.p.min		437.4±44.7	580±56**	0.05

Notes: differences are confident in respect to background researches, where * - p<0.05; ** - p<0.01; Confidentiality of Leken's index, functions of lower limbs and strength of quadriceps muscle were determined by criterion T-White.

P_{contr./main} – confidentiality's degree with comparing of groups after course of correction.

Scope of movements of lower limbs of both groups' patients confidently increased. In control group sagittal bending increased by 8.6% (right leg) and by 7.6% (left leg) (p<0.01), unbending – by 10.8% (right leg) and by 11.4% (left leg) (p<0.05). In main group the scope of bending increased by 11.4% (right leg) and by 10.56% (left leg) (p<0.01). Scope of knee joints' unbending in the mentioned group increased by 25% (right leg) and by 24% (left leg) (p<0.01).

At the same time, together with increasing of knee joints' mobility, the strength of quadriceps muscle of thigh increased and reached confident values in main group (4 points – right leg and 5 points – left leg) (p<0,05).

Improvement of strength characteristics and flexibility of lower limbs resulted in increasing of physical workability, the level of which reached confident values only in main group (increasing by 53%) (p<0,01), comparing with control group.

Thus, the carried out rehabilitation influenced positively on loco-motor function and physical workability of patients, who suffered from bilateral gonarthrosis of 1st-2nd stage in remission phase.

In our researches we stated that complex rehabilitation with using of physical exercises and static will axial stretching influences more positively on loco-motor function and physical workability of patients, who suffered from bilateral gonarthrosis of 1st-2nd stage in remission phase, in comparison with traditional methodic (see table 2).

First of all in main group indicators of lower limbs' function increased the same indicator of control group by 50% (p<0.05); Correlation of Leken's coefficients in both groups (p<0.05) was the same. It was evident that that mentioned positive dynamics became possible at the account of knee joints' flexibility improvement, which was achieved owing to application of stretching and relaxing TPC techniques in our complex.

The latter was proved by achievement of higher by 12% indicators of bending in knee joints in main group in comparison with the same indicators of control group (p<0.05).

Methodic, in which static will axial stretching is used, includes also in work red muscle fibers and improves condition of white muscles fibers. In our researches it was proved by confident increasing of strength of quadriceps muscle of thigh of main group's patients by 33% (right leg) and by 25% (left leg) (p<0.05) comparing with analogous indicators of control group.

Slow fulfillment of exercise, stipulated by our methodic, permits to approach muscles contraction to isometric and to obtain increment of their strength against the background of static will stretching of axial muscles, limbs' muscles in initial position, lying on back, on abdomen, on side. The mentioned positive influences on supporting motor system in general and on lower limbs in particular resulted in expressed confident increasing of physical workability of main group's patients by 32% (p<0.05) in comparison with the same indicators of control group and its reaching lower

boundary of age norm. Due to the fact that we evaluated physical workability by test “Time of 600 meter’ walking”, improvement of lower limbs’ functions undoubtedly played positive role in restoration of physical workability of main group’s patients.

When analyzing of the obtained data it became clear that execution of physical exercises in kneeled, on all fours positions influences negatively on knee joints’ state, facilitates aggravation of arthrosis, progressing of synovial symptoms. Fulfillment of developed by us complex influence positively on knee joints’ state: clinical symptoms of gonarthrosis of all main group patients reduced.

All above presented witnesses about positive influence of rehabilitation treatment’s complex, in which static will stretching is used, on regulation of loco-motor function of main group’s patients.

Including of such exercises in TPC influences mobilizing on motor neuron system and facilitates restoration of lost functions in the quickest way. Fulfillment of movements in smooth, slow manner permits to switch in work both white (phase) and red (tonic) muscular fibers. Optimization of tonic muscles’ functions of axial muscular system facilitate maintaining of correct vertical posture. With carrying out of static will axial stretching muscular and ligament structures of SMS are mobilized and, owing to this fact, both: functions of mechanical receptors and ligament organs of Goldgy are normalized, together with normalization of muscular tonus [8, 11].

Thus, there is ground for application of physical exercises with using of static will axial stretching in complex of therapeutic measures and for prophylaxis of gonarthrosis and combination of gonarthrosis and osteochondrosis. The conducted complex treatment with application of the developed physical exercises is more effective both: in respect to pathologies in lumbar spine and in knee joint

Conclusions:

1. Before rehabilitation knee joints of both groups’ patients were excessively loaded owing to increased by 37% (comparing with normal) IBV. The state of joints was characterized by reduced mobility in sagittal plane up to 75-80% from normal scope of movements, that resulted in disorders of lower limbs’ functions up to 20% by indicator of lower limbs’ functions and changing of knee joints state up to 2 points as per algo-functional Leken’s index. Abnormalities of knee joints’ functions were accompanied by reduction of strength of quadriceps muscle of thigh up to 3 points (right and left legs) in both groups. The mentioned changes resulted in reduction of physical workability in both groups by 50% from age norm.

2. After two rehabilitation courses there happened confident improvement of knee joints’ state in main group, that was p[roved by decreasing of Leken’s index up to 1 ($p < 0.05$) and by decreasing of heaviness of lower limbs’ state by 50% from initial values ($p < 0.01$). The mentioned coefficients did not change significantly in control group. Scope of affected joints’ movements of both groups’ patients confidently increased. In control group sagittal bending increased by 8.6% (right leg) and by 7.6% (left leg) ($p < 0.01$), unbending – by 10.8% (right leg) and by 11.4% (left leg) ($p < 0.05$). In main group scope of bending increased by 11.4% (right leg) and by 10.56% (left leg) ($p < 0.01$). Scope of unbending of knee joints in the mentioned group increased by 25% (right leg) and by 24% (left leg) ($p < 0.01$). Strength of quadriceps muscle of thigh increased and reached confident values in main group (4 points (right leg) and 5 points (left leg) ($p < 0.05$)). Level of physical workability reached confident values only in main group; it increased by 53% ($p < 0,01$) comparing with initial of the same group.

3. Complex rehabilitation with using of physical exercises and static will axial stretching influences positively more strongly on loco-motor function and physical workability of main group’s patients with bilateral gonarthrosis of 1st-2nd stage in remission phase, in comparison with traditional methodic. In main group indicator of lower limbs functioning’s improvement and Leken’s coefficient were better than the same of control group by 50% ($p < 0.05$); besides, strength of quadriceps muscle of thigh of main group’s patients confidently increased by 33.3% (right leg) and 25% (left leg) ($p < 0,05$) comparing with the same indicators of control group. Indicators of unbending in knee joints of main group reached more by 12% values in comparison with the same of control group ($p < 0.05$). The patients of main group has had confident increase of physical workability by 32.6% ($p < 0.05$) comparing with the same indicators of control group and reached lower boundary of age norm.

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