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THE EFFECT OF TARGETED PHYSICAL ACTIVITY OF AN AEROBIC TYPE ON THE STATE OF MUSCULAR FUNCTIONS IN WOMEN AT THE AGE OF MATURUS I AND II

INTRODUCTION

The mid-age period of life in women is characterised by climacteric, respectively pre- or postclimacteric changes that can substantially interfere with and change the quality of life [4]. The improvement of physical condition, which is often accompanied by improved mental endurance and stability, can help women overcome various illnesses that appear at this age in connection with the high intensity of mental stress, fast pace of life and the onset of regressive somatic changes (arthrosis, arthritis, reduced joint mobility, alternation of locomotive stereotypes or bone structure), orthopaedic problems, the risk of heart attack, ischaemic heart disease, increased risk of cancer, liver problems etc. That is why aerobic exercise has been offered to mid-aged women to improve their physical condition.

METHODS

In autumn 2005 complex somatodiagnostics was performed in the groups of women at the age of maturus I. (n = 33) and maturus II. (n = 17).

The women from the Olomouc Region of the Czech Republic, at the mean age of 48.2 years underwent a complex anthropometrical, kinesiologic, physiological and psychological monitoring. Before the commencement of aerobic activity the state of tonic and phasis muscles with regard to movement stereotypes was examined [1, 2]. The subjects attended the course for six months, three times a week for 60 minutes. Repeated measurements were performed in April 2006 and after the termination of the course. The obtained data were processed with the aid of ANTROPO and STATISTIKA software packages (Statsoft, Inc., 2001).

RESULTS AND DISCUSSION

The analysis of somatic characteristics in both age groups (maturus I – 40-50 years old; maturus II over 50 years of age), and in repeated monitoring, body weight and body height corresponded to the Czech reference values. The BMI average values reached the overweight category in more than 70% of subjects from both groups; the average values of risk of abdominal obesity amounted to 56.4% of subjects from both groups and exceeded the risk limit. The average somatotypes were in the mesomorph-endomorph category. In many cases they were situated off-limits of the somatograph. The changes of selected parameters in repeated measurements in terms of age categories were not statistically significant (Table 1).

The subjects' state of support-locomotor system was by no means satisfactory. The testing of tonic muscles of lower limbs showed, like in other population groups [3], that the highest frequency of shortenings was in hip and leg and knee flexors in the maturus II group. The shortening of muscle tensor fasciae latae causes the patela deviation together with the shortening of m. Rectus femoris and have destabilising effects on the knee joint. Regarding the muscular shortening of the trunk and the upper limbs, the worst cases were trapezial muscles and inner rotators of the arm in the maturus II group as well as inadequate extent of trunk sideways bending (m. quadratus lumborum), (Table 2).

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Table 1. Descriptive characteristics of somatic parameters in maturus I and maturus II groups

Parameters	1st measurement				2nd measurement			
	Maturus I (n = 33, 1 pr. = 3.03%)				Maturus I (n = 29, 1 pr. = 3.45%)			
	M	SD	Min.	Max	M	SD	Min.	Max
Age	44.60	2.68	39.91	49.67	45.34	2.60	40.68	49.83
Height	167.03	4.98	158.40	177.40	167.47	4.86	160.10	178.00
Weight	74.90	14.40	54.00	115.00	73.48^{NS}	13.04	53.00	109.00
BMI	26.37	4.77	19.67	37.77	25.89^{NS}	4.21	19.68	36.09
RI	1.58	0.29	1.12	2.16	1.55^{NS}	0.25	1.14	2.14
WHR	85.70	6.42	73.87	103.30	84.80^{NS}	6.29	71.20	95.90
Endomorphy	6.10	1.40	3.70	9.00	5.66^{NS}	1.26	3.40	8.60
Mesomorphy	5.60	1.60	3.00	10.00	5.24^{NS}	1.28	2.80	8.70
Ectomorphy	0.80	1.60	0.50	4.20	1.10^{NS}	1.40	0.50	4.00
Parameters	1st measurement				2nd measurement			
	Maturus II (n = 16, 1 pr. = 6.25%)				Maturus II (n = 16, 1 pr. = 6.25%)			
	M	SD	Min.	Max	M	SD	Min.	Max
Age	53.68	3.73	50.27	64.76	53.81	3.71	50.02	65.31
Height	162.15	3.84	155.80	168.40	162.57	4.80	153.40	173.40
Weight	70.91	9.69	54.00	90.00	68.63^{NS}	9.45	53.00	89.00
BMI	26.97	3.67	19.84	34.25	26.20^{NS}	3.94	19.29	35.20
RI	1.67	0.23	1.20	2.11	1.60^{NS}	0.26	1.11	2.21
WHR	87.08	6.66	75.97	98.96	85.90^{NS}	5.21	74.07	92.82
Endomorphy	6.30	1.40	3.80	9.00	5.85^{NS}	1.23	3.40	8.20
Mesomorphy	5.70	1.20	3.20	7.70	5.73^{NS}	1.17	2.80	8.50
Ectomorphy	1.00	0.70	0.50	3.40	0.76^{NS}	1.49	0.50	4.20

Mann-Whitney U test, $p< 0.05$, ns – non significant

Table 2. The state of tonic muscles in the groups of maturus I and II

Tonic muscles	1st measurement				2nd measurement			
Number (n)	Maturus I		Maturus II		Maturus I		Maturus II	
	n=33,	1pr.=3.0%	n=17,	1pr.=5.8%	n=31,	pr.=3.2%	n=15,	1pr.=6.7%
	n	%	n	%	n	%	n	%
m. ilipsoas – D	21	63.64	9	52.94	8	25.81**	7	46.67
m. ilipsoas – S	21	63.64	9	52.94	7	22.58**	7	46.67
m. rectus femoris – D	19	57.58	13	76.47	15	48.39	8	53.33**
m. rectus femoris – S	15	45.47	13	76.47	10	32.26	6	40.00**
m. tensor fasc. l. – D	30	90.91	12	70.59	27	87.10	10	66.67
m. tensor fasc. l. – S	32	96.97	15	88.24	28	90.32	9	60.00**
m. triceps surae – D	15	45.45	11	64.71	13	41.94	11	73.33
m. triceps surae – S	16	48.48	11	64.71	13	41.94	11	73.33
mm. adductores – D	0	0.00	0	0.00	0	0.00	1	6.67
mm. adductores – S	0	0.00	0	0.00	0	0.00	1	6.67
mm.flexores genu – D	7	21.21	10	58.82	13	41.94**	9	60.00
mm. flexores genu – S	8	24.24	10	58.82	14	45.16**	9	60.00
m. pect. major – D	5	15.15	6	35.29	7	22.58	5	33.33
m. pect. major – S	8	24.24	7	41.18	6	19.35	3	20.00**
m. erector spinae	12	36.36	12	70.59	11	35.48	10	66.67
test of arms – D down	20	60.61	11	64.71	19	61.29	9	60.00
test of arms – S down	15	45.45	9	52.94	9	29.03	6	40.00
m. trapezius – D	24	72.73	15	88.24	22	70.97	14	93.33
m. trapezius – S	24	72.73	13	76.47	21	67.74	11	73.33
trunk sideways – D	15	45.45	11	64.71	12	38.71	9	60.00
trunk sideways – S	11	33.33	10	58.82	10	32.26	8	53.33

D – dexter, S – sinister, ** – significant differences between the 1st and 2nd measurements in individual age categories (test of good coincidence), shortening over 50% limit (shaded areas)

Table 3. The state of phasic muscles in the groups of maturus I and II

Phasic muscles	1st measurement				2nd measurement			
	Maturus I (n = 33, 1pr. = 3.0%)		Maturus II (n = 17, 1pr. = 5.8%)		Maturus I (n = 31, 1pr. = 3.2%)		Maturus II (n = 15, 1pr. = 6.7%)	
	n	%	n	%	n	%	n	%
m. rectus abd. – 1	3	9.09	0	0.00	5	16.13	1	6.67
m. rectus abd. – 2	6	18.18	1	5.88	14	45.16**	3	20.00
m. rectus abd. – 3	24	72.73	16	94.12	12	38.71**	11	73.33**
abduction lower E–D	3	9.09	3	17.65	3	9.68	6	40.00
abduction lower E–S	4	12.12	2	11.76	2	6.45	6	40.00
flexion of neck	12	36.36	8	47.06	19	61.29**	12	80.00**
push-up	32	96.97	17	100.00	24	77.42**	13	86.67
abduction upper E–D	25	75.76	10	58.82	14	45.16**	9	60.00
abduction upper E–S	24	72.73	10	58.82	14	45.16**	9	60.00

1 – EXCELLENT, 2 – GOOD, 3 – WEAK; LOW. – LOWER, UPP. – UPPER, E – EXTREMITY, D – DEXTER, S – SINISTER

Statistically significant differences in the occurrence of tonic muscles shortening in both groups in repeated measurements were not sufficient (Table 2). Positive changes were found in hip flexors. In Maturus I group there was a significant increase of knee flexors shortening which was probably due to inadequate stretching.

We found significant changes in the phasic muscles in the occurrence of m. rectus abdominis weakening. The physical activity probably led to abdominal muscles strengthening and that greatly affected the reduction of soreness in the lumbar spine area. In Maturus I group relaxation of the shoulder cingulum was observed, which led to improvement in the movement stereotypes of stretching arms sideways (Table 3). We found a high frequency of compensatory performance of lower limb extension in the coxal joint; in Maturus I and II the participation of hamstrings prevailed.

The observed reduction of soreness in hip joints, neck and lumbar spine area, despite the increase of soreness in feet (forefoot), was statistically significant. Not all women wore appropriate footwear for aerobics.

Conclusions:

- After the half-year effect of physical activity (aerobics), the selected somatic parameters changed to a small extent. Most women attending the course were overweight and according to the BMI index they were above the overweight category. Their body weight was not lowered markedly in the majority of cases (in individual cases, in six women). An increase was observed in some women. Also the somatotypes were classified into the endomorphic zone.
- Changes in the occurrence of shortenings of tested tonic muscles were found but we cannot talk about a considerable trend. We can positively state that in most cases the muscular imbalances (or movement stereotypes) improved, especially in the muscular groups affecting the pelvis area (abdominal muscles, hip flexors, soreness reduction).
- It is obvious that even six months of physical activity did not cause major changes. Nevertheless, even the minimal changes in the individual cases are success. If physical activity is reduced or not undertaken at all, we suppose that the original somatic state will be gradually restored.

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