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CHANGES OF THE MAXIMAL MUSCLE TORQUE IN WOMEN TRAINING POWER YOGA (ASTANGA VINYASA)

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ABSTRACT
Purpose. The aim of the study was to examine the changes of the maximal muscle torque in females during a six-month Power Yoga (Astanga Vinyasa) training. It was assumed that Power Yoga training caused changes of the maximal muscle torque in females during six months, but the topography of all muscle groups did not follow these changes. **Basic procedures.** Twelve untrained female subjects took part in the study. They practiced Power Yoga twice a week for six months. Muscle torque measurements in static conditions were performed on two dates: before the commencement of Power Yoga training and after its completion. Ten muscle groups were studied: flexors and extensors of the trunk, as well as flexors and extensors of the shoulder, elbow, hip and knee. **Main findings.** The differences between muscle torque values for flexors and extensors of the shoulder, elbow and hip, as well as flexors of the knee on the right side of the body were statistically significant between the 1st and 2nd measurement. On the left side of the body, only the muscle torque of the elbow extensors increased significantly. For flexors and extensors of the trunk, the changes were not significant. No changes of the flexors–extensors ratio for the shoulder, elbow, hip, knee joints and trunk were observed during the six months of training, with the exception of left shoulder muscles and right knee muscles. **Conclusions.** Power Yoga training caused changes of the maximal muscle torque in females after six months, but the changes in the muscle topography were also significant.

Key words: muscle torque, muscle topography, flexors–extensors ratio, Power Yoga (Astanga Vinyasa)

Introduction

The Hatha Yoga system descends from the philosophical tradition of ancient India, which treats yoga exercises as a preparation for higher meditation practices. There are three types of yoga exercises: asana – static body positions, vinyasa – dynamic sequences of asanas, and pranayama – respiratory exercises [1]. Depending on the training intensity and inclusion of individual exercises in a training session, different Hatha Yoga styles can be distinguished: Iyengara, Sivananda, Viniyoga, Pranayama and Astanga Vinyasa (commonly known as Power Yoga). Power Yoga is one of the most dynamic yoga varieties. It was popularized by an American instructor, Beryl Bendere Birch. Power Yoga features smooth and quick changes of body positions (vinyasa), combined with deep breaths (ujjayi) and various concentration techniques. The intensity of exercises is adjusted to the practitioners' individual needs and skills.

Hatha Yoga training affects the four main systems of human body: musculoskeletal, cardiopulmonary, nervous and endocrine [2]. Practicing different yoga systems enhances muscle and joint flexibility, improves muscle strength (static force, in particular) [2], and affects the lean body mass [3] and body composition [3, 4]. Yoga training was also observed to significantly increase muscle aerobic power [5–7] and to significantly decrease muscle anaerobic power [5].

The aim of the study was to observe the changes of the maximal muscle torque during a six-month Power Yoga training. The initial hypothesis was that a six-month Power Yoga training cycle caused a significant increase in the maximal muscle torque, whereas the topography of muscle torques remained unchanged.

Material and methods

The study was granted the approval of the Research Ethics Committee of the Institute of Sport in Warsaw. The group of subjects consisted of 24 untrained women; 12 of them resigned during the experiment. Only the results of the subjects who had obtained all measure-

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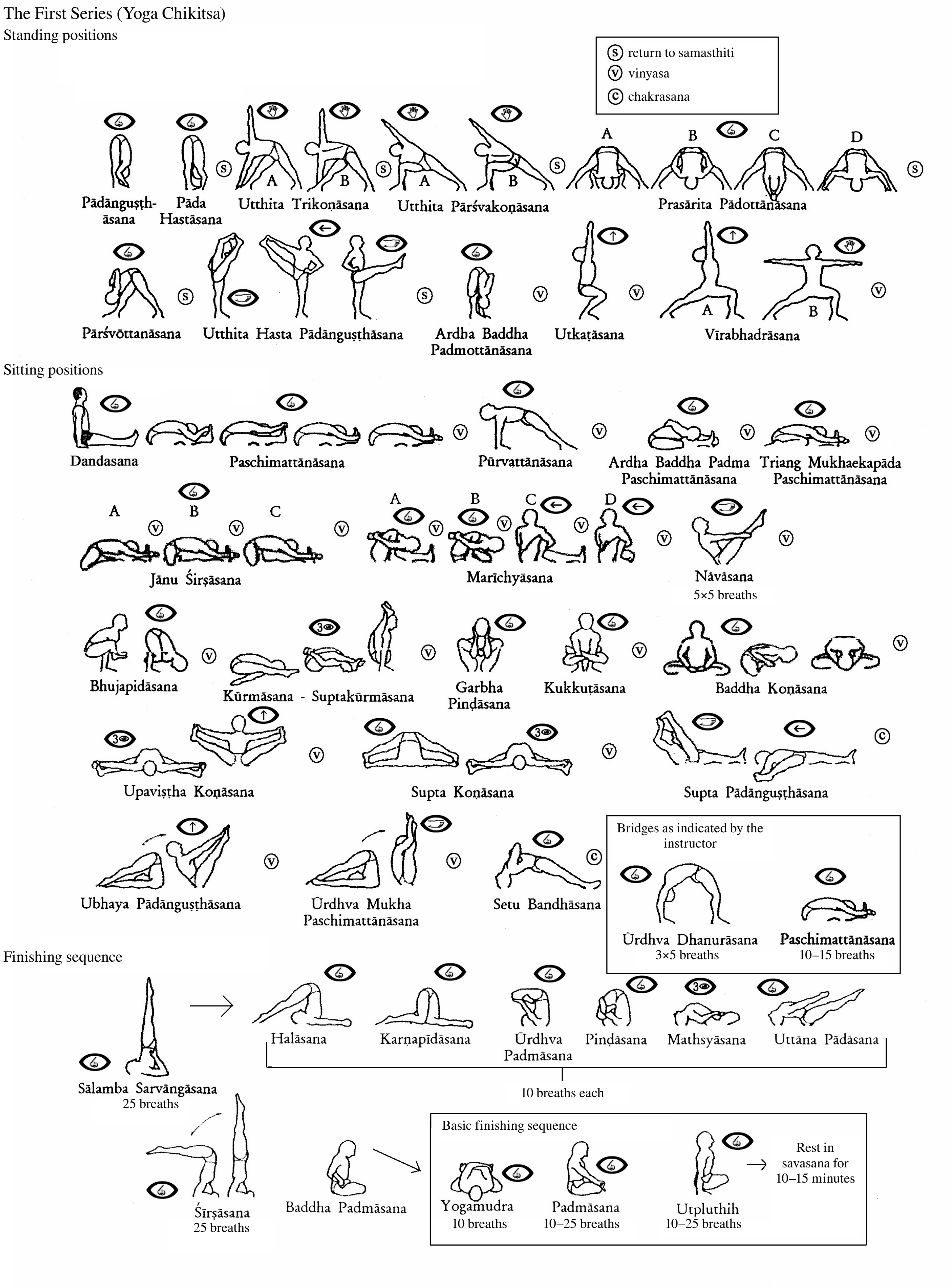

Figure 1. An example set of exercises for the classical training series

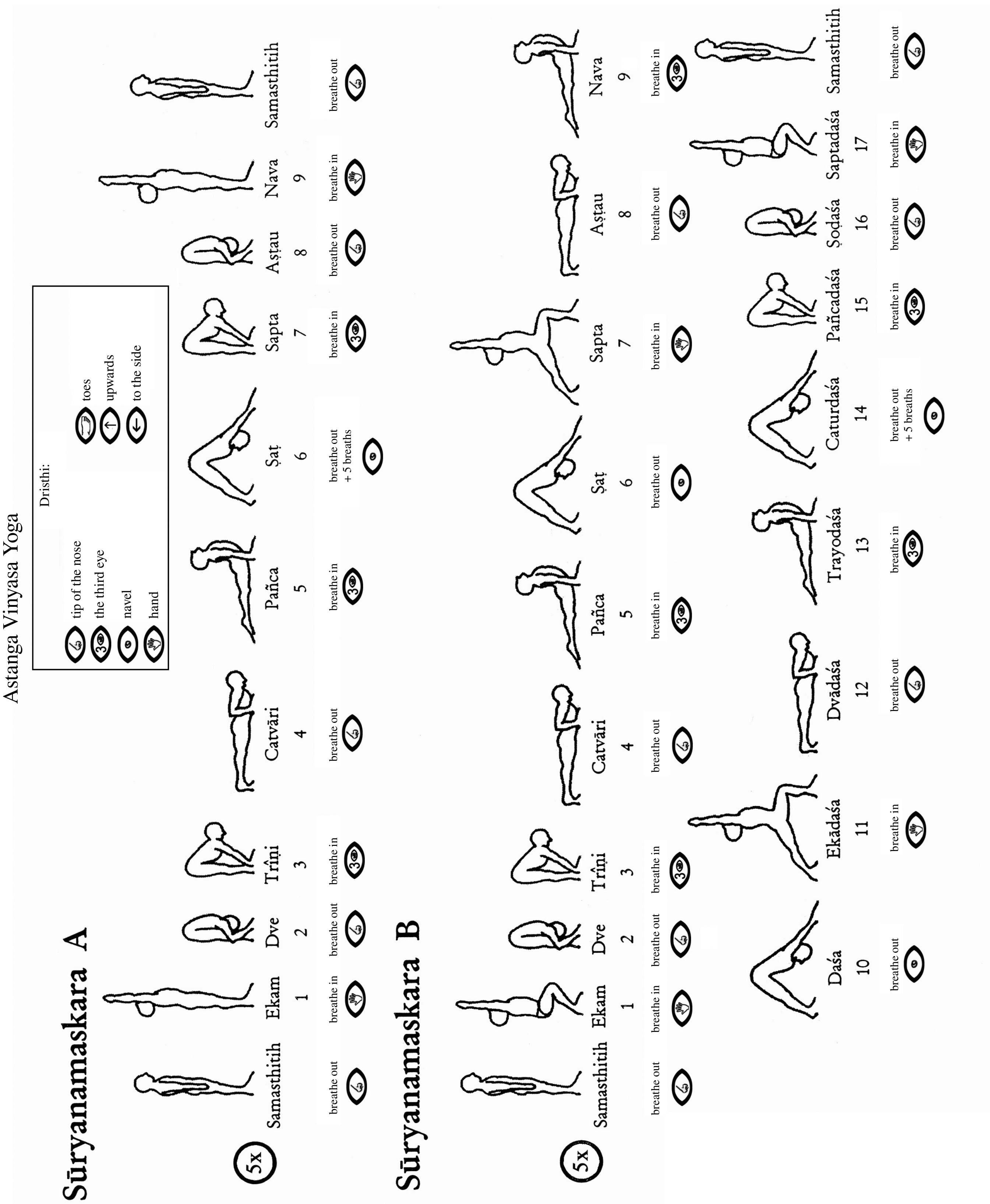

Figure 2. Example exercise sequences in the Suryanamaskara positions (Sun Salutation)

ments (n = 12) were taken into account. The subjects' profile included the following characteristics: age (24.8 ± ± 6.1 years), body height (168.4 ± 6.2 cm), body mass (60.1 ± 7.1 kg before the training, 59.4 ± 6.4 kg after the training), and BMI (21.242 ± 2.683 before the training, 21.013 ± 2.661 after the training). The body mass did not change significantly between the 1st and 2nd measurement periods.

The yoga training sessions were conducted by a Power Yoga instructor, twice a week for six months. Each subject performed the traditional sequence of exercises at their own pace, following their own respiratory rate. During the six months the subjects mastered about one half of the First Series exercises, i.e. Mysore classes (Fig. 1). The subjects' mean attendance amounted to 30 ± 7 out of 50 completed classes (60%).

A typical Astanga Yoga session during the six-month training cycle included the following elements:

1. *Sun Salutation* – two dynamic cycles of strengthening and extension exercises, during which an exerciser moves from one pose to another, following their own respiratory rate. During each cycle there is a break in one of the poses to take five deep breaths. Each cycle (A and B) is repeated five times. The Sun Salutation pose is aimed to warm up the body and prepare it to perform the subsequent exercises (Fig. 2). Duration: 12 minutes.
2. *Standing Poses* – series of stretching exercises which strengthen, first of all, leg muscles. The exerciser remains in each static pose for the duration of five breaths. The transitions between the poses are made through dynamic but short moves and jumps. Each asana together with its vinyasa (entry into and exit from the pose) begins and ends in the position of attention (Samasthiti). The exercise intensity and the body warming up increase gradually throughout this entire stage. Duration: 15 minutes.
3. *Seated Poses* – series of various static poses promoting, first of all, muscle flexibility, assumed in a sitting position (Dandasana). An exerciser remains in each pose for the duration of five deep breaths. In order to maintain the warming up of the body, cyclical Sun Salutation elements are used as vinyasa between the asanas. In the cycle of the Seated Poses, the exercises are performed at a high and stable level. Duration: about 30 minutes.
4. *Finishing Poses* – cycles of static poses maintained for a longer time (from 10 to 25 breaths) aimed to calm down the body and gently conclude the exercises. The cycle starts with a deep forward bend (Paścimottanasana), followed by a shoulderstand (Sarvangasana), headstand (Shirshasana), and a series of Lotus Poses with crossed legs. Duration: about 15 minutes.
5. *Scale Pose* (Tolasana) – the last of the finishing poses. An exerciser lifts the hips and legs in the Lotus Pose away from the floor and remains suspended on the palms on the floor for the longest time possible (25 deep breaths, or 100 breaths in advanced practitioners). During this pose, the pulse and pulmonary ventilation increase rapidly. It is the last intensive exercise before the final relaxation. The whole body is flexed and then easily and quickly relaxed in the next stage. Duration: up to 1 minute.
6. *Corpse Pose* (Śavasana), i.e. lying and relaxing on one's back – used as final relaxation. Duration: from 5 to 10 minutes.

The classic Astanga Yoga training session described above was the final objective of the six-month training cycle. For the first three months, the exercises were modified according to the following pattern:

1. *Soft warm-up exercises*. In a classic yoga training session, the warm-up consists of Sun Salutation and Standing Poses, which require some muscle flexibility and strength. For the beginners, a softer warm-up might be more suitable, such as simple static and dynamic exercises aimed at warming up the wrists and arms, spinal elongation, preparation of the body for forward bends and stretching of leg muscles.
2. *Standing Poses* – like during a classic session. Initially, many exercises were preceded with easier preparatory exercises.
3. *Modified finishing sequence* – a few calming exercises. At the beginning of the training, headstands and shoulderstands were not exercised.
4. *Lying on one's back as final relaxation.*

After the first three months, the subjects were able to perform most exercises from the classic First Series of Astanga Yoga, with the exception of a few most difficult exercises from the Seated Poses, requiring great muscle flexibility.

During the second three months, the exercises were customized for each subject. The subjects performed exercises following their own respiratory rate, while the instructor provided them with manual corrections, guidance and help in completing more difficult exercises.

After that, each subject learned and performed exercises individually: the individual sets were different. This type of yoga training, called Mysore, is the basic form of Astanga Yoga practiced in India and in traditional yoga schools worldwide.

The measurements of maximal muscle torques were taken in ten muscle groups on the sagittal plane: flexors and extensors of the trunk, shoulder, elbow, hip and knee, using stations for measurement of muscle torque in static conditions [8, 9].

The torque measurement of elbow flexors and extensors was performed in the sitting position, with the arm lying on a rest. The angle in the shoulder joint equalled 90 degrees. The forearm was situated perpendicularly to the shoulder; the trunk was stabilized.

The measurement of the torque of shoulder flexors and extensors was taken in the sitting position. The angle in the shoulder joint during extension equalled 70 degrees, and during flexion 50 degrees. The trunk was leaning against the station and became stabilized with the chest pressed against the backrest by the assistant.

The torques of knee and trunk flexors and extensors were measured in the sitting position. The angle in hip and knee joints equalled 90 degrees. A subject was stabilized at the level of anterior iliac spines and the distal parts of the thigh. The arms rested on the chest.

The torque of hip extensors was measured in the prone position, and the torque of hip flexors – in the supine position. The angle in the hip joint equalled 90 degrees. The subject's trunk was stabilized.

The maximal extension of the extremity in the elbow, knee and hip joint was accepted as 0 degrees. For the shoulder joint, the situation of the arm along the trunk was accepted as 0 degrees. The trunk in the prone position was accepted as 0 degrees. The rotation axis of the examined joint corresponded to the rotation axis of the torquemeter. The measurements were taken on both upper and lower extremities, separately on the right and left extremity, always in the flexion-extension sequence. Before the measurements, the subjects got acquainted with the measurement equipment and protocols and performed warm-up exercises involving the measured muscle groups. Each subject was to produce the maximal power output.

The total error in the measurement of the maximal muscle torque did not exceed 4% [9]. The maximal error

Table 1. Changes in the mean values (± SD) of the maximal muscle torque (N·m) of the elbow, shoulder, hip and knee flexors (F) and extensors (E), and the trunk flexors and extensors, and the total muscle torque of the arm (TMTA), of the leg (TMTL), of the trunk (TMTT) and of ten muscle groups (TOTAL) during a six-month Power Yoga training cycle

Joint		Right extremity		R (%)	Left extremity		R (%)
		1	2		1	2	
Elbow	F	35.7 ± 5.6	36.9 ± 5.0	4.0	35.1 ± 6.2	35.4 ± 6.4	1.1
	E	22.6 ± 3.6	25.6 ± 5.3[a]	13.5	23.3 ± 3.7	26.7 ± 4.7[a]	14.7
Shoulder	F	30.9 ± 5.8	40.1 ± 7.6[a]	31.0	30.4 ± 7.3	33.7 ± 6.5	14.5
	E	39.2 ± 7.3	46.1 ± 7.1[a]	19.6	39.6 ± 4.8	41.8 ± 7.7	5.6
Knee	F	79.4 ± 15.9	86.4 ± 14.5[a]	10.1	77.6 ± 17.5	80.9 ± 15.7	6.5
	E	174.2 ± 36.7	173.3 ± 31.2	0.5	177.9 ± 37.6	181.6 ± 34.8	3.2
Hip	F	68.4 ± 11.8	71.0 ± 11.8[a]	4.2	68.9 ± 11.7	68.3 ± 12.3	–0.9
	E	289.6 ± 47.1	309.2 ± 45.1[a]	7.3	299.8 ± 47.4	297.8 ± 44.1	0.0
Trunk	F	95.8 ± 28.5	99.8 ± 19.6	7.7			
	E	312.2 ± 56.5	329.9 ± 50.9	7.1			
TMTA		128.3 ± 17.6	148.8 ± 20.5[a]	16.2	128.3 ± 17.1	137.6 ± 21.9[a]	7.1
TMTL		611.6 ± 94.2	639.8 ± 91.9[a]	4.9	624.2 ± 96.7	628.6 ± 89.2	1.1
TMTT		408.0 ± 72.7	429.7 ± 62.4	6.4			
TOTAL		1900.4 ± 270.3	1984.4 ± 256.9[a]	4.7			

1 – measurement before the commencement of the training, 2 – measurement after the completion of the training, [a] – the mean values are significantly different from the first measurement, $p < 0.05$, R – percentage change between the two measurement periods

of repeatability, expressed by the coefficient of variability, was 4.2%; for particular muscle groups it amounted to 1.8% for knee extensors, 2.1% for hip extensors, 4.9% for hip flexors and 6.3% for shoulder extensors [8].

The flexors–extensors ratios were calculated from the measured maximal muscle torque values for elbow, shoulder, hip, knee and trunk flexors and extensors [9, 10].

The maximal muscle torque values of particular muscle groups were also represented as constituents of the total muscle torque, i.e. muscle topography.

In the statistical analysis, ANOVA variance analysis was used. The statistical significance between the mean values was estimated with Scheffe's post-hoc test. The correlation between the muscle torques and body mass was calculated using Pearson's coefficient or correlation. The level of statistical significance was set at $p < 0.05$. All statistical calculations were performed with STATISTICA (v. 5.5, StatSoft) software.

Results

Tab. 1 and 2 show the obtained maximal muscle torque values (M_m) and relative muscle torque values in subjects under study. A significant increase in the maximal muscle torque was observed between the two measurement periods in right elbow, shoulder and hip extensors and in knee flexors. As for the left side of the body, only the muscle torque of left elbow extensors increased significantly. The total value of the maximal torque of both arms and the right leg, as well as the total value of the torque of the ten examined muscle groups increased significantly between the 1st and 2nd measurement periods.

Tab. 3 presents mean constituent contributions of particular muscle groups to the total torque value. A significant change of the topography of muscle torques was observed in the group of left elbow extensors and right shoulder flexors and extensors. The contribution of the total torque value of the right arm muscles increased significantly, whereas the total torque value of the left leg decreased, in the total torque value of all ten examined muscle groups.

The calculated flexors–extensors ratios for the elbow, shoulder, hip and trunk muscles were not changed in the six-month training cycle, with the exception of the right knee and the left shoulder muscles (Tab. 4).

Table 2. Changes in the mean values (± SD) of the maximal relative muscle torque ($N \cdot m\,kg^{-1}$) of the elbow, shoulder, hip and knee flexors (F) and extensors (E), and the trunk flexors and extensors, and the total muscle torque of the arm (TMTA), of the leg (TMTL), of the trunk (TMTT) and of ten muscle groups (TOTAL) during a six-month Power Yoga training cycle

Joint		Right extremity 1	Right extremity 2	R (%)	Left extremity 1	Left extremity 2	R (%)
Elbow	F	0.60 ± 0.09	0.63 ± 0.09[a]	5.1	0.59 ± 0.10	0.60 ± 0.09	2.3
	E	0.38 ± 0.06	0.43 ± 0.09[a]	14.7	0.39 ± 0.07	0.45 ± 0.08[a]	15.9
Shoulder	F	0.52 ± 0.11	0.68 ± 0.14[a]	32.6	0.51 ± 0.12	0.57 ± 0.12	15.9
	E	0.66 ± 0.15	0.79 ± 0.16[a]	21.1	0.67 ± 0.11	0.71 ± 0.14	6.7
Knee	F	1.33 ± 0.28	1.46 ± 0.23[a]	11.3	1.30 ± 0.32	1.37 ± 0.28	7.8
	E	2.90 ± 0.50	2.92 ± 0.40	1.5	2.97 ± 0.54	3.06 ± 0.50	4.3
Hip	F	1.14 ± 0.18	1.20 ± 0.17[a]	5.3	1.15 ± 0.17	1.15 ± 0.19	0.1
	E	4.87 ± 0.89	5.25 ± 0.83[a]	8.5	5.04 ± 0.86	5.04 ± 0.76	1.1
Trunk	F	1.60 ± 0.42	1.68 ± 0.28	8.8			
	E	5.21 ± 0.81	5.55 ± 0.60	8.2			
TMTA		2.16 ± 0.35	2.53 ± 0.41[a]	17.6	2.15 ± 0.32	2.33 ± 0.38[a]	8.3
TMTL		10.25 ± 1.54	10.82 ± 1.44[a]	6.1	10.46 ± 1.59	10.63 ± 1.42	2.2
TMTT		6.80 ± 0.96	7.24 ± 0.73	7.5			
TOTAL		31.82 ± 4.29	33.55 ± 3.89[a]	5.8			

1 – measurement before the commencement of the training, 2 – measurement after the completion of the training, [a] – the mean values are significantly different from the first measurement, $p < 0.05$, R – percentage change between the two measurement periods

No correlation was observed between the body mass and muscle torque in static conditions in the six-month training cycle, with the exception of the right knee extensors (r = 0.58) and trunk extensors (r = 0.69).

Discussion

In the diagnosis of the training condition of athletes' motor function, changes in the maximal muscle torque can be indicative of the effects of applied training loads. Most frequently, the maximal muscle torque values of the arm, leg and trunk flexors and extensors are used in static and dynamic conditions [9, 11–14]. The muscle torques can also be presented as contributions to the total muscle torque value, i.e. muscle topography [9, 12, 13, 15].

The obtained results failed to definitely confirm the assumed hypothesis that a six-month Power Yoga training cycle would increase the maximal muscle torque in all ten examined muscle groups, and that the topography of the muscles would remain unchanged. The measurements revealed a significant increase in the maximal muscle torque in the muscles of the right extremities, and in their total torque values between the commencement of training (1) and after its completion

Table 3. Changes in the mean values (± SD) of topography of the muscle torque (%) of the elbow, shoulder, hip and knee flexors (F) and extensors (E), and the trunk flexors and extensors, and the total muscle torque of the arm (TMTA), of the leg (TMTL) and of the trunk (TMTT) during a six-month Power Yoga training cycle

Joint		Right extremity		Left extremity	
		1	2	1	2
Elbow	F	1.88 ± 0.21	1.87 ± 0.18	1.85 ± 0.28	1.78 ± 0.21
	E	1.20 ± 0.20	1.29 ± 0.18	1.24 ± 0.19	1.35 ± 0.21[a]
Shoulder	F	1.64 ± 0.30	2.02 ± 0.28[a]	1.60 ± 0.33	1.70 ± 0.23
	E	2.08 ± 0.37	2.34 ± 0.29[a]	2.10 ± 0.27	2.11 ± 0.27
Knee	F	3.60 ± 0.43	3.57 ± 0.30	3.62 ± 0.38	3.43 ± 0.36
	E	15.23 ± 1.13	15.57 ± 1.06	15.79 ± 1.24	15.02 ± 1.25
Hip	F	4.18 ± 0.68	4.35 ± 0.50	4.10 ± 0.79	4.07 ± 0.61
	E	9.13 ± 1.01	8.71 ± 0.84	9.32 ± 1.02	9.13 ± 1.07
Trunk	F	4.99 ± 1.08	5.02 ± 0.71		
	E	16.44 ± 1.84	16.68 ± 01.97		
TMTA		6.80 ± 0.84	7.51 ± 0.58[a]	6.80 ± 0.74	6.93 ± 0.66
TMTL		32.14 ± 01.21	32.20 ± 1.31	32.83 ± 01.39	31.66 ± 1.37[a]
TMTT		21.43 ± 01.61	21.70 ± 2.00		

1 – measurement before the commencement of the training, 2 – measurement after the completion of the training, [a] – the mean values are significantly different from the first measurement, $p < 0.05$

Table 4. Changes in the mean values (± SD) of the flexors–extensors ratio (FER) after a six-month Power Yoga training cycle

Ratio	Right extremity		Left extremity	
	1	2	1	2
Elbow FER	1.596 ± 0.245	1.471 ± 0.219	1.524 ± 0.287	1.348 ± 0.286
Shoulder FER	0.797 ± 0.106	0.874 ± 0.140	0.774 ± 0.186	0.808 ± 0.083[a]
Hip FER	0.238 ± 0.039	0.230 ± 0.026	0.232 ± 0.038	0.229 ± 0.028
Knee FER	0.465 ± 0.099	0.506 ± 0.094[a]	0.446 ± 0.104	0.457 ± 0.114
Trunk FER	0.311 ± 0.100	0.305 ± 0.061		

1 – measurement before the commencement of the training, 2 – measurement after the completion of the training, [a] – the mean values are significantly different from the first measurement, $p < 0.05$

(2). As for the left side of the body, a significant increase in the relative maximal muscle torque was noted in the elbow extensors. In all other groups of flexors and extensors of the left extremities, the maximal muscle torque remained unchanged. Also the increase in the maximal muscle torque of trunk extensors and flexors (8.2% and 8.8%, respectively) was not statistically significant. The observed percentage changes after the first measurement were higher than those reported by Trzaskoma [9] in a study of competitive athletes after a two-year training cycle. Trzaskoma et al. [16], in their study of female judokas after a six-month training cycle, observed changes from 4.3% to 0.8%. So far, there has been no research on the maximal muscle torque during practicing different yoga systems. The available studies report on significant changes in grip strength: 4.1–6.5% after a ten-day training [17], 21.0% after a twelve-week training [18], and 15.4% after an eight-week training [19]. The changes for particular muscle groups noted in this study ranged from 5.1% to 32.6%. The topography of the maximal muscle torques, however, remained unchanged, with the exception of the right shoulder flexors and extensors and the left elbow extensors. An interesting fact is that in the case of the left extremities, almost two-time lower, non-significant changes were observed, with the exception of the left elbow extensors. We are not able to provide any rational explanation of this observation. Individual asanas appear to be "symmetric" exercises, thus the changes in the muscle torque should be similar on both sides of the body.

The obtained muscle torque values for the arm muscles and the topography of the muscle torques indicate a beneficial influence of Power Yoga training on the development of these muscle groups. It is an important observation in view of the current tendencies in sports to "neglect" the development of these muscle groups, and of a decline in the muscle torque of the arm in, e.g. male basketball players [20] and female judokas [9].

A number of studies focus on calculating the so-called flexors–extensors ratio on the basis of the maximal muscle torque measurements in static conditions [9, 10, 15, 21, 22]. In Bober and Hay [15], the flexors–extensors ratios in untrained subjects amounted to 0.46 in the knee joint and 0.47 in the hip joint. In Jaszczuk et al. [22], the ratio in athletes representing nine sports disciplines ranged from 0.39 to 0.57 in the knee joint and from 0.18 to 0.25 in the hip joint; however, the ratio of the knee joint changed within a narrow scope from 0.49 to 0.54 for athletes representing six sports. In the study of female judokas by Trzaskoma [9], the flexors–extensors ratios for the elbow, shoulder, knee, and hip joints and for the trunk amounted to 1.375 ± 0.262, 0.855 ± ± 0.137, 0.501 ± 0.109, 0.200 ± 0.034 and 0.327 ± 0.060, respectively. In the study of Trzaskoma and Trzaskoma [23], the flexors-extensors ratios in the hip and knee joints, in seventy athletes representing different sports disciplines, equaled 0.20 and 0.43, respectively. The flexors-extensors ratios for the knee and hip joints calculated in the present work correspond to the results of Buśko [12], Jaszczuk et al. [22] and Trzaskoma [9], obtained in their studies of untrained and trained subjects. Contrary to the values of the flexors–extensors ratio obtained by Shealy et al. [24] in their study of human torque velocity adaptations to sprint following an eight-week sprint training, no significant changes of this ratio were observed in the present study for any examined joints, except for the right knee and the left shoulder joint, after a six-month training cycle.

The correlation between muscle force and body mass has been discussed in several studies [21, 25]. Le Chevalier et al. [25] showed that the mass of the thigh quadriceps muscle was significantly correlated with the isokinetic torque measured in the knee joint (r = 0.78), but they found no significant correlation between the body mass and the isometric muscle torque (r = 0.33). Dworak et al. [21] observed a significant correlation between the body mass and muscle torque of the hip and knee flexors and extensors.

Different results were obtained by Pietraszewski et al. [26], who did not observe any significant correlation between the body mass, the lean body mass and the total muscle torque of flexors and total muscle torque of extensors in both knee joints. Also Trzaskoma [9] found no relationship between the body mass and muscle torque in women in a three-year training cycle. In a study of junior and senior female basketball players, a statistically significant correlation between the body mass and muscle torque was only found for the total torque of eleven muscle groups [12]. In individual muscle groups the correlation was not significant. Similarly, Janiak et al. [27] found no correlation between the body mass and muscle torque of the right and left knee and hip extensors, with the exception of the left knee extensors in untrained subjects. In trained subjects, this correlation was significant in all muscle groups under examination.

No significant correlation was found in the present study between the body mass and muscle torque in particular muscle groups in a six-month training cycle, except for the torque values of the right knee extensors and the trunk extensors. These results correspond to the earlier results obtained by Buśko [12], Janiak et al. [27], and Pietraszewski et al. [26].

Conclusions

1. During the six-month training cycle, an increase was observed in the maximal muscle torque in individual muscle groups in the right arm and the right leg.

2. A significant increase in the maximal muscle torque on the left side of the body was only noted in the elbow extensors.

3. A significant increase in the total value of the maximal muscle torque for the right leg muscles, both arms and all the ten examined muscle groups was observed after the six-month Power Yoga training cycle.

4. The percent contributions of the maximal muscle torque values for the left elbow extensors and right shoulder flexors and extensors, the total torque of the right arm muscles and left arm muscles, and the total torque values of both legs and both arms, to the total torque value of all the ten examined muscle groups were significantly changed.

5. The flexors–extensors ratios remained unchanged after the six-month Power Yoga training cycle, with the exception of the left shoulder and the right knee muscles.

6. A significant correlation between the body mass and maximal muscle torque was only found in the case of the right knee extensors and the trunk extensors. In all other cases, the muscle torque values were not significantly correlated with the body mass during the six-month Power Yoga training cycle.

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