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RENATA ŚLEBODA
Department of the Methodology of Physical Education
The Eugeniusz Piasecki University School of Physical Education in Poznań, Poland

FULL SPINAL MOBILITY IN 8-YEAR OLD CHILDREN PRACTICING HATHA YOGA

INTRODUCTION

Hatha yoga is a part of a philosophical system of the yogis which refers to the physical condition of a human being. It focuses on the body, its well-being and strength as well as on the ways to improve and maintain the natural and healthy state.

Whenever mental balance is shaken giving way to fear or anxiety states, physical condition gets worse as well. As a direct result, muscle tone changes, which can lead to posture defects and reduced joint mobility. A lasting muscle hypertonia can cause postural reflex impairments which then lead to changes in the body posture and eventually make it difficult to relax [2].

The main purpose of hatha yoga, in terms of psychophysiological processes, is improving joint mobility, blood circulation and blood supply to the brain and internal organs.

In practicing hatha yoga, body posture is an inner experience stimulating a person's attitude and emotions which are directly connected with sensational, perceptive and motor experiences [1].

The aim of this research is to determine the influence of hatha yoga on the range of full spinal mobility in 8-year old children.

METHODS

Altogether, there were 216 children aged 8 taking part in this experiment (110 in experimental – 66 girls and 44 boys; 106 in a control group – 56 girls and 50 boys). The selection of the class to the experimental and the control groups was done randomly.

Hatha yoga classes were conducted once a week for the period of 10 months. There were three subsequent

tests carried out: 1. before the experiment; 2. at the end of a 10-month training programme; 3. after a 2-month holiday break.

In order to establish the range of spinal mobility in 8-year olds, their full forward spinal bend [CL] was measured starting from the external occipital protuberance up to the base of the sacrum [3, 8]. The measurements were taken with a soft measuring tape.

For the analysis of the collected research material, *Statistica PL* software package was used. Apart from that the following descriptive statistical characteristics were used: an arithmetic mean (M), a standard deviation (SD) and a variation coefficient (V). To determine the differences between the tested groups, a Student's t-test was used.

RESULTS

Tables 1 and 2 show only the difference between the initial and the final positions during the full range measurement of the forward spinal bend (CL-R).

The mean values of the above-mentioned difference in both female groups in the three tests are presented in Table 1.

Test 1 showed no differences in the forward spinal bend measurements between the two groups tested. The average value of CL-R difference in the experimental group was 8.47 cm, whereas in the control group – 7.91 cm. The difference of the mean values of CL-R between the two groups recorded in Test 2 was 1.55 cm, to the experimental group's advantage ($\alpha \leq 0.01$). The difference of 1.17 cm recorded in Test 3 was statistically significant, and it was higher in the experimental group.

Table 1. CL-R difference in the full forward spinal bend in girls from the experimental and control groups in the three subsequent tests [cm]

Variable	Experimental group			Control group			Student's t-test
	M	SD	V	M	SD	V	
CL-R	8.47	1.76	20.85	7.91	1.56	19.69	1.30
CL-R	9.37**	1.30	13.83	7.82**	1.69	21.57	4.05
CL-R	8.91**	1.46	16.37	7.74**	1.87	24.12	2.74

Level of significance: ** $\alpha \leq 0.01$

The three tests of the full forward spinal bend and the analysis of their results show greater (and statistically important) spinal mobility in girls from the experimental group (practicing hatha yoga) as compared with the girls from the control group. The average values for the analyzed variable recorded in Tests 2 and 3 show further consolidation of the feature tested.

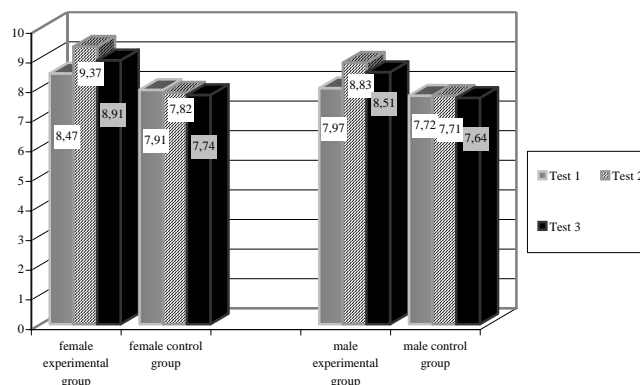
Table 2 shows the average values of the full range measurement of the forward spinal bend (CL-R) in both male groups in the three tests.

In Test 1 the average value of the difference between the initial and final positions (CL-R) in the male experimental group was 7.97 cm whereas in the control group – 7.72 cm. The difference of the average values between the two groups was 0.24 cm. The difference of the average values of CL-R between the two groups recorded in Test 2 was 1.12 cm, to the experimental group's advantage ($\alpha \leq 0.05$). The difference of 0.87 cm recorded in Test 3 was statistically significant and it was higher in the experimental group.

Table 2. CL-R difference in the full forward spinal bend in boys from the experimental and control groups in the three subsequent tests [cm]

Variable	Experimental group			Control group			Student's t-test
	M	SD	V	M	SD	V	
CL-R	7.97	1.69	21.16	7.72	1.87	24.25	0.47
CL-R	8.83*	1.75	19.84	7.71*	2.02	26.15	2.02

Level of significance: * $\alpha \leq 0.05$

**Figure 1.** Full spinal mobility of children in experimental and control groups in course of 3 tests [cm]

The three tests of the full forward spinal bend and the analysis of their results show greater spinal mobility in boys from the experimental group as compared with their peers from the control group. The differences in the average values of the analyzed variable CL-R recorded in Test 2 are of statistical significance.

The changes in the range of the full forward spinal bend within the three tests are illustrated in Figure 1 below.

DISCUSSION

The issue of yoga and its influence on human body (including children) is often raised by researchers [4, 5, 6]. However, the problems discussed usually concern pedagogical, psychological and sociological aspects of practicing hatha yoga, not its effect on the spinal and joint mobility. So far, no research has been recorded on the connection of children's spinal mobility and practicing hatha yoga. Therefore, the present analysis of the results achieved is difficult and limited. As the literature shows, there has been a similar research (fragmentary though) but done among adults, that is people of 18 years old and more [8]. Despite that we can attempt to determine to what extent the average values of spinal mobility in children (CL-R – Table 1 and 2) correspond with the values adopted for adults. What can be noticed is that after introducing a hatha yoga training programme into the experimental groups of both girls and boys, these values increased by 10%.

Due to the lack of other scientific resources for comparison, the issue of the full range of spinal mobility requires further research on a larger population of children in the early school age.

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