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THE EFFECTS OF HATHA YOGA ON STUDENTS PHYSICAL FITNESS VAN LANG UNIVERSITY, VIETNAM

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Abstract:

Hatha Yoga practice is considered to be a method of improving and maintaining total wellness. The goal of the topic is to evaluate the effects of Hatha Yoga on students' phisycal fitness.

Methods: The thesis uses a convenient sampling method, anthropometric method, pedagogical test method, pedagogical experimental method, and statistical mathematical method.

Results: After 30 weeks of Hatha Yoga practice, students in the experimental group had forearm strength increased 6.68% in men and 7.83% in women, abdominal strength increased 12.62% in men and 16.05% in women, the strength of lower limbs increased 4.05% in men and 3.49% in women, overall endurance increased by 8.83% in men and 8.63% in women, body flexibility increased by 30.01% in men and 30.14% in women, left knee increased by 13.35% in men and 16.79% in women, movement amplitude of the right knee increased by 13.24% in men and 20.98% in women, the likelihood of holding an equal standing in one-legged position increased by 20.02% in men and 24.81% in women, all statistically significant with $p < 0.05$ or $p < 0.001$. Particularly, the ability to coordinate motor coordination of both male and female students increased not significantly, the difference was not statistically significant with $p > 0.05$. As for the fitness of the control students, there was no significant change after 30 weeks ($p > 0.05$).

KEYWORDS: *Hatha Yoga, physical fitness, student.*

I. Introduction

Sports are becoming increasingly important to increase confidence, stay healthy, socialize with peers, compete, and strengthen family affection. sports for all activities combined with people's daily schedules (work, school, leisure) and other components of a healthy lifestyle are decisions that enhance effective longevity. in

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promoting, restoring, and maintaining health and will contribute to reducing the burden of non-communicable diseases in order to improve a person's overall quality of life (Baumann, 2000; Yamaguchi, 2004; Lytvynenko, 2005; Dutchak, 2009; Khimenes, 2016; Galan, 2016). However, only regular physical activity and a healthy lifestyle can positively affect the human body (Platonov, 2006; Pityn, 2013; Andrieieva, 2017).

Hatha Yoga is one of the three sub-branches of Raja Yoga, and Raja Yoga is just one of the four branches of Yoga. This theory shows that the beginning in Yoga is the practice of Hatha Yoga. So what is Hatha Yoga? It is the science of training human health by properly breathing (pranayama) and exercise (asana).

Hatha Yoga is an ancient practice method of the Indians, it has been introduced to Vietnam for nearly 5 decades. Up to now, Hatha Yoga has been widely disseminated in Vietnam to all subjects, except the popularization of this subject is limited in schools. Partly because there are very few research topics on the effects of Hatha Yoga on the health of young people in Vietnam to serve as a scientific basis or to convincing evidence that more educational managers in Vietnam support Hatha Yoga in college.

In the world, there have been many studies confirming that practicing Hatha Yoga helps young people improve their physical and mental health, including strengthening physical strength. According to Chanavirut R, Khaidjapho K, Jaree P, and Pongnaratorn P (2006), short-term Hatha Yoga practice increases thoracic dilation and lung gas volumes in young adults. Some studies by Mark D. Tran, Robert G. Holly, Jake Lashbrook, Amsterdam, Ezra A (2001), and Vishaw Gaurav (2011) show that practicing Hatha Yoga affects muscle strength and endurance, joint flexibility, cardiovascular function, body composition, and youth lung function.

II. Materials and Methods

Evaluating the effect of Hatha Yoga on student fitness at Van Lang University is the content of the research before - after the experiment, so the sample size should be selected according to the formula:

$$n = \frac{2 \times C \times (1 - r)}{(ES)^2} = \frac{2 \times 7.85 \times (1 - 0.8)}{(0.4)^2} = 19.625$$

Where C is constant, r is the correlation coefficient and ES is the influence coefficient.

Therefore, the topic selected 20 males and 20 females for each study group.

Anthropometric method:

Use this method to check your standing height (cm), weight (kg), and BMI (kg / m2).

Method of pedagogical test:

This method is used in the form of specialized motor tests to determine the physical qualities of the student's agility, strength, endurance, flexibility, and motor coordination. There are 8 tests selected*: dominant forcehand (kg), supine position (times / the 30s), bounce far away in place (cm), running 4x10m (s), running depending on strength for 5 minutes (m), bending body (cm), knee joint flexibility (degree), static balance (s)*.

Experimental conditions:

+ Experimental group for Hatha Yoga practice should ensure safety and personalization in the classroom, there is a Hatha Yoga teacher teaching throughout the session, the spacious gym is about 80m2, ensuring light, Quiet, clean, airy, students have dressed appropriately, have personal practice mat and fully attend 80% of the sessions or more.

+ Control group practice group games should ensure safety, personalization in the classroom, have a general responsibility, and have at least 5 core members participating in the instruction, the total area of the training ground is about 300m2, students are dressed appropriately and fully attend 80% of the sessions or more.

- Both experimental and control groups maintained a normal diet, stopped smoking, and did not drink alcohol.

III. Results

80 volunteers are in normal health, at the beginning of the experiment 18 years old. They are students studying at Van Lang University, Vietnam, divided into 2 groups, the experimental group has 20 males and 20 females, the control group also has 20 males and 20 females. They have the following common characteristics:

Table 1: Some general characteristics of research subjects

	Experimental group		Control group		P^1	P^2
	Male[1]	Female[2]	Male[1]	Female[2]		
N	20	20	20	20		
Age begins experiment	18	18	18	18		
Height (cm)	165.75±4.44	153.70±4.26	164.80±2.66	153.38±6.33	>0.05	>0.05
weight (kg)	53.75±6.00	45.62±4.66	53.07±8.43	46.40±6.94	>0.05	>0.05
BMI (kg/m^2)	19.54±1.77	19.34±2.24	19.50±2.79	19.76±2.97	>0.05	>0.05

M± SD; BMI the body index.

The general characteristics of the experimental group and the control group for men and women were not statistically significant (p> 0.05). Height, weight, and BMI are all within the normal range of 18-year-old Vietnamese youth.

By the pedagogical experimental method, with most of the 30-week training sessions, the students of the experimental group were allowed to practice Hatha Yoga exercises including 2 breathing exercises Kapalabhati (Skull Shining Breath) and Anuloma Viloma (Alternate Nostril Breathing) in 20 minutes; warm-up post-Surya Namaskar (Sun Salutation) 15 minutes; The 18 asanas are Sirshasana (Head Stand), Sarvangasana (Shoulder Stand), Halasana (Plow Pose), Setu Bandhasana (Bridge Pose), Charkrasana (Wheel Pose), Matsyasana (Fish Pose), Paschimothanasana (Seated Forward Bend), Purvottanasana (Upward) Plank Pose), Bhujangasana (Cobra Pose), Salabhasana (Locust Pose), Dhanurasana (Bow Pose), Kapothasana (Pigeon Pose), Ardha Matsyendrasana (Half Spinal Twist), Kakasana (Crow Pose), Mayurasana (Peacock Pose), Vriksasana (Tree Pose), Pada Hasthasana (Standing Forward Bend), Trikonasana (Triangle Pose) in 50 minutes; and Savasana (Corpse Pose) relaxation pose for 5 minutes. The results before and after the experiment are summarized in tables 2 and3.

Table 2: Comparison of male student fitness test results before and after the experiment

Test	Group	n	BeforeExperimental (a)		After Experimental(b)		W (%)	P_{a-b}
			M	SD	M	SD		
Dominant force hand (kg)	Experimental(1)	20	43.95	4.50	46.99	4.64	6.68	<0.05
	Control(2)	20	43.67	4.88	44.08	4.75	0.92	>0.05
	P_{1-2}		>0.05		<0.05			
Supine position (times / the 30s)	Experimental (3)	20	19.30	3.16	21.90	3.46	12.62	<0.05
	Control (4)	20	19.90	2.63	20.30	2.79	1.99	>0.05
	P_{3-4}		>0.05		<0.05			
Bounce far away in place (cm)	Experimental (5)	20	221.35	26.12	230.50	25.64	4.05	<0.05
	Control(6)	20	220.65	29.51	224.15	27.57	1.57	>0.05
	P_{5-6}		>0.05		>0.05			
Running 4x10m (s)	Experimental (7)	20	10.50	0.68	10.46	0.69	-0.39	>0.05
	Control(8)	20	10.46	0.70	10.43	0.71	-0.34	>0.05
	P_{7-8}		>0.05		>0.05			

Test	Group	n	Before Experimental (a)		After Experimental(b)		W (%)	P_{a-b}
			M	SD	M	SD		
Running depending on strength for 5 minutes (m)	Experimental (9)	20	920.5	95.53	1005.50	120.87	8.83	<0.05
	Control (10)	20	928.40	151.44	934.50	147.64	0.65	>0.05
	P_{9-10}		>0.05		<0.05			
Bending body (cm)	Experimental(11)	20	12,49	5.41	16.90	7.39	30.01	<0.05
	Control (12)	20	12.55	6.05	12.69	5.99	1.11	>0.05
	P_{11-12}		>0.05		<0.05			
Left knee joint flexibility (scale)	Experimental(13)	20	39,15	9,00	34,25	8,35	-13.35	<0.001
	Control(14)	20	39,15	4,75	38,60	4,84	-1.41	>0.05
	P_{13-14}		>0.05		<0.05			
The right knee joint is flexible (scale)	Experimental(15)	20	38.25	7.60	33.50	7.24	-13.24	<0.001
	Control(16)	20	38.45	4.80	37.85	4.98	-1.57	>0.05
	P_{15-16}		>0.05		<0.05			
Static balance (s)	Experimental(17)	20	18.47	2.30	22.57	4.88	20.02	<0.05
	Control(18)	20	19.93	6.27	19.84	4.60	-0.50	>0.05
	P_{17-18}		>0.05		<0.05			

Table 3: Comparison of female student fitness test results before and after the experiment

Test	Group	n	Before Experimental (a)	After Experimental (b)	W	P_{a-b}

			M	SD	M	SD	(%)	
Dominant force hand (kg)	Experimental (1)	20	28.82	1.86	31.16	2.22	7.83	<0.001
	Control (2)	20	28.72	3.26	29.15	3.48	1.49	>0.05
	P_{1-2}		>0.05		<0.05			
Supine position (times / the 30s)	Experimental (3)	20	11.75	2.86	13.80	3.38	16.05	<0.001
	Control (4)	20	11.80	1.61	12.25	1.68	3.74	>0.05
	P_{3-4}		>0.05		<0.05			
Bounce far away in place (cm)	Experimental (5)	20	160.50	9.45	166.20	14.33	3.49	<0.05
	Control (6)	20	160.00	13.38	162.50	11.18	1.55	>0.05
	P_{5-6}		>0.05		>0.05			
Running 4x10m (s)	Experimental (7)	20	12.51	0.86	12.45	0.86	-0.46	**>0.05**
	Control (8)	20	12.49	0.57	12.46	0.59	-0.25	>0.05
	P_{7-8}		>0.05		>0.05			
Running depending on strength for 5 minutes (m)	Experimental (9)	20	737.50	50.98	804.00	86.82	8.63	<0.001
	Control (10)	20	738.0	84.05	747.0	87.74	1.21	>0.05
	P_{9-10}		>0.05		<0.05			
Bending body (cm)	Experimental (11)	20	12.40	7.16	16.80	5.13	30.14	<0.001
	Control (12)	20	12.35	6.77	12.90	6.85	4.36	>0.05
	P_{11-12}		>0.05		<0.05			
Left knee joint flexibility	Experimental (13)	20	29.05	5.52	24.55	4.85	-16.79	<0.001
	Control (14)	20	27.95	6.35	27.45	6.91	-1.81	>0.05

Test	Group	n	Before Experimental (a)		After Experimental (b)		W (%)	P_{a-b}
			M	SD	M	SD		
(scale)	P_{13-14}		>0.05		<0.05			
The right knee joint is flexible (scale)	Experimental (15)	20	28.70	4.21	23.25	3.78	-20.98	<0.001
	Control (16)	20	26.95	6.39	26.35	6.95	-2.25	>0.05
	P_{15-16}		>0.05		<0.05			
Static balance (s)	Experimental (17)	20	15.93	2.64	20.44	3.88	24.81	<0.001
	Control (18)	20	16.49	4.26	17.39	5.23	5.32	>0.05
	P_{17-18}		>0.05		<0.05			

If comparing the experimental group with the control group at different times, the results show that: Before the experiment, the results of fitness tests of both male and female students in the experimental group were not different from the control group. with p> 0.05, the difference in mean values of the two groups was only random and the initial fitness test results of students of the two groups were similar. After the experiment, the results of testing the force of dominant hand squeezing, lying on the back and flexing the abdomen, running depending on strength for 5 minutes, flexural flexion, knee joint flexibility, the static balance of both male and female students of the experimental group were different from that control group with p <0.05 or p <0.001. The other two tests, which were to be far from the spot and run a 4x10m shuttle, of both male and female students of the experimental group were not different from the control group with p> 0.05.

But if we compare the experimental group with itself at different times, the result is: After the experiment, only the 4x10m shuttle test results are not different from the previous experiment with p> 0.05. The test results of the remaining contents were completely different from the previous experiments with p <0.05 or p <0.001.

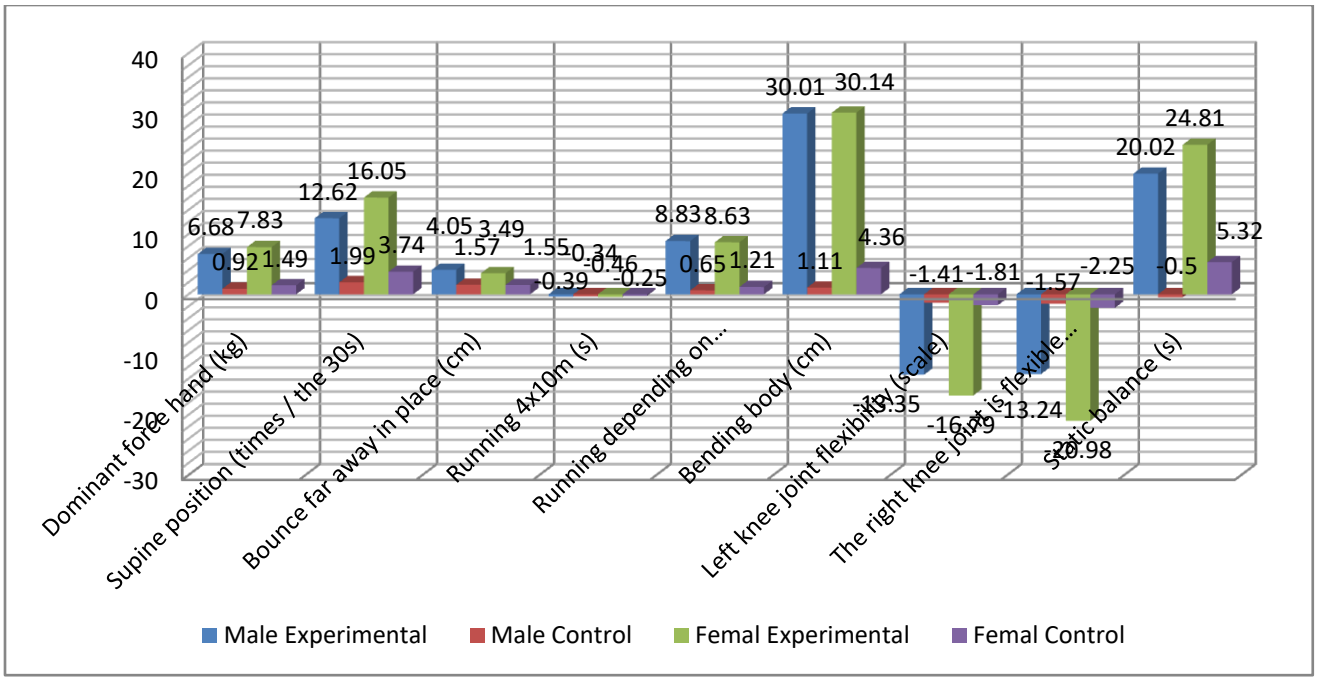

Chart 1: Comparison of growth rate (W%) of students' fitness before and after the experiment

By the method of pedagogical test and the data obtained in chart 1, the student's fitness after the experiment is also evaluated as follows:

The right-left knee joint (degree) test is measured with a Goniometer protractor, which assesses the movement amplitude of the knee joint during flexing and stretching movements, if the lower leg cannot stretch with the thigh, then they will angle fold, the larger the folding angle, the smaller the flexibility. The test results showed that, after the experiment, the knee joint movement amplitude of male students in the experimental group increased by 13.24% in the right knee and 13.35% in the left knee with $p < 0.001$; while the knee joint movement amplitude of female students in the experimental group increased by 20.98% in the right knee and 16.79% in the left knee with $p < 0.001$). While having the same test content, both male and female students of the control group had no difference after an experiment with $p > 0.05$.

The 4x10m (second) shuttle test is a test evaluating the ability to coordinate movement, the achievement is calculated by paper, if completed in a short time, the faster the ability to coordinate movement. The test results show that, after the experiment, the motor coordination ability of the experimental group students increased slightly with $p > 0.05$, the students of the control group also had similar results.

Flexibility test (cm) assesses body flexibility (that is, the working range of the spinal joints and the elasticity of groups of back and hamstrings). The test results show that, after the experiment, the body plasticity of experimental group students increased by 30.01% in men and 30.14% in women with $p < 0.05$ and $p < 0.001$), the control group students had increased results. up insignificant with $p > 0.05$.

Static balance test (sec) assesses balance in standing with one leg on tiptoe. The test results showed that, after the experiment, the ability of students to hold equilibrium in a one-legged posture of experimental group students increased by 20.02% in men and 24.81% in women with $p < 0.05$ and $p < 0.001$), the control group students had an insignificant increase in results with $p > 0.05$.

The lap test (number of times / 30 seconds) is a test to evaluate the strength of the abdominal muscle group. The test results showed that, after the experiment, the abdominal muscle strength of the experimental group students increased to 12.62% in men and 16.05% in women with $p < 0.05$ and $p < 0.001$, and the control group students had the results. the results did not increase significantly with $p > 0.05$.

The 5-minute (meter) dependency test is a general endurance test. The test results show that, after the experiment, the overall strength of the experimental group students increased by 8.83% in men and 8.63% in women with $p < 0.05$ and $p < 0.001$, the results of the control group students increased. insignificant with $p < 0.05$.

The forehand force test (kg) is the test assessing the strength of the forearm muscle group. The test results show that, after the experiment, the forearm muscle group strength of the experimental group students increased by 6.68% in men and 7.83% in women with $p < 0.05$ and $p < 0.001$). the result is not significantly increased with $p > 0.05$.

Far-field pop-up test (cm) is a test to evaluate the strength of the lower limb muscle group. The test results show that, after the experiment, the strength of the lower limb muscle group of the experimental group students increased by 4.05% in men and 3.49% in women with $p < 0.05$, the students in the control group did the results increase. significant with $p > 0.05$.

Overall, the growth rate of the experimental group students in each test content was not equal. Test results of flexural bending had the highest growth rate, followed by static balance, knee joint flexibility ..., while the 4x10m shuttle test had the lowest growth rate compared to the remaining tests. Thus, with the scope of the study object, Hatha Yoga practice has the greatest effect of increasing body flexibility (that is the range of activity of the spinal joints and the elasticity of the back and tendon muscle groups. on stilts), followed by the increased balance in standing with one leg on a tiptoe, increasing the movement amplitude of the knee joint in knee joint contractions and stretching movements, increased abdominal strength, overall strength, strengthen the forearm muscles and strengthens the lower extremities. However, the practice of Hatha Yoga has a negligible effect on time-calculated coordination.

The reason, Hatha Yoga practice helps students improve fitness as described above is due to the impact of the Hatha Yoga exercise system together with students practicing correct breathing, proper warm-up, correct postures, and true relaxation.

According to Sri Swami Sivananda (2009), some exercises/postures affecting the head, brain, ears, eyes, and nose area are Kapalabhati (Skull Shining Breath), Sirshasana (Head Stand), and Sarvangasana (Shoulder Stand); some neck and shoulder exercises/poses are Sarvangasana (Shoulder Stand), Halasana (Plow Pose) and Matsyasana (Fish Pose); some exercises/postures that impact the chest, lung, and heart area are Bhujangasana (Cobra Pose), Salabhasana (Locust Pose), Dhanurasana (Bow Pose) and Anuloma Viloma (Alternate Nostril Breathing); Some

exercises/postures that impact the internal organs, stomach, pancreas, liver, and intestines are Matsyasana (Fish Pose), Paschimottanasana (Seated Forward Bend), Dhanurasana (Bow Pose), Ardha Matsyendasana (Half Spinal). Twist) and Padahasthasana (Standing Forward Bend); Some of the limbs are Kakasana (Crow Pose), Mayurasana (Peacock Pose), Pada Hasthasana (Standing Forward Bend), and Trikonasana (Triangle Pose); The rest of the relaxation position is Savasana (Corpse Pose). Referring to research by Dr. Sivananda, our study also shows the same system of Hatha Yoga exercises. And it is affirmed that the practice of Hatha Yoga has a comprehensive effect on the physical students.

According to Dinesh Thangavel, Girwar Singh Gaur, Vivek Kumar Sharma, Ananda Balayogi Bhavanani, Rajajeyakumar M, Syam Sunder A (2014), practicing fast and slow breathing in Hatha Yoga reduces sympathetic activity, leading to mental relaxation and decreased activation. enjoys autonomy, thus reducing force fluctuations during isometric contraction, improving hand force, and hand strength. Referring to our research, students also practice Kapalabhati (Skull Shining Breath) and slow breathing Anuloma Viloma (Alternate Nostril Breathing), one of the factors that increase the force of hand squeeze or increase group strength. forearm muscles.

According to Milind V. et al (2011), the daily practice of Surya Namaskar (Sun Salutation) increases the strength of the muscles of the upper body, increases leg muscle strength, and strengthens the arms, chest, and muscles. back. Like this author, our research obliges to use the Surya Namaskar (Sun Salutation) in the Hatha Yoga exercise system.

According to Vinayak P. Doijad, Prathamesh Kamble, Anil D. Surdi (2013) there are 6 reasons that help Hatha Yoga improve VO2 max, which is: 1) Increasing oxygen consumption by the muscles, thereby increasing muscle blood flow. corn; 2) Helps convert some fast muscle fibers into slow muscle fibers during exercise. The slow-twitch yarn has high aerobic strength; 3) The yoga posture involving isometric contraction is known to increase skeletal muscle strength; 4) The greater involvement of active muscle mass from different parts of the body; 5) Increase muscle endurance and delay the onset of fatigue; 6) Improved lung function and better oxygen utilization at the cellular level. Therefore, increased circulatory and muscle endurance leads to an increase in overall endurance. The author uses a system of exercises including Omkar Prayer and Recitation, Naukasana (Boat Pose), Matsyasana (Fish Pose), Bhujangasana (Cobra Pose), Salabhasana (Locust Pose), Dhanurasana (Bow Pose), Savasana. (Corpse Pose) and Kapalabhati (Skull Shining Breath) breathing exercises, Anuloma Viloma (Alternate Nostril Breathing), Bhastrika (Bellows Breath), Bhramari (Bee Breath).

Research by Tarsem S., Amandeep S, Sandeep K. (2015) found the effects of 8 weeks of Hatha Yoga practice on core muscle strength, abdominal muscles, and muscle strength caught in the Sarvangasana postures (Shoulder Stand), Charkrasana (Wheel Pose), UtthitaParsvakonasana (Extended Side Angle), Trikonasana (Triangle Pose), Halasana (Plow Pose), Bhujangasana (Cobra Pose), Dhanurasana (Bow Pose), Ustrasana (Camel Pose), Gomukasana (Cow Face) Pose), Paschimothanasana (Seated Forward Bend), Ardha Matsyendrasana (Half Spinal Twist) and Hanumanasan (Monkey Pose). Our study uses most of the yoga poses mentioned above except for the poses UtthitaParsvakonasana (Extended Side Angle), Ustrasana (Camel Pose), Gomukasana (Cow Face Pose), and Hanumanasan (Monkey Pose).

From the research results of the topic, combined with the research results of the above authors, we identified that each group of yoga exercises/poses in the Hatha Yoga exercise system will have separate effects. to create a comprehensive effect on student fitness. This content is shown in table 4.

Table 4: Effects of each group of yoga exercises / poses on student fitness (x)

No	Exercises / poses	Effect 1	Effect 2	Effect 3	Effect 4	Effect 5	Effect 6	Effect 7
1.	Skull Shining Breath		X			X	X	
2.	Alternate Nostril Breathing		X			X	X	
3.	Sun Salutation	X	X	X	X	X	X	X
4.	Head Stand		X			X		
5.	Shoulder Stand		X		X	X		
6.	Plow Pose	X		X	X	X		
7.	Bridge Pose	X			X	X		
8.	Wheel Pose	X			X	X		
9.	Fish Pose	X				X		
10.	Seated Forward Bend	X		X	X	X		
11.	Upward Plank Pose				X	X		
12.	Cobra Pose	X			X	X		
13.	Locust Pose	X			X	X		
14.	Bow Pose	X				X		
15.	Pigeon Pose	X				X		
16.	Half Spinal Twist				X	X		
17.	Crow Pose					X	X	

18.	Peacock Pose				X	X	X	
19.	Tree Pose		X	X		X		X
20.	Standing Forward Bend	X	X	X		X		X
21.	Triangle Pose		X	X		X		X
22.	Savasana (Corpse Pose)					X		

Note:

Effect 1: increase the working range of the spinal joints and the elasticity of the back muscles and hamstrings when performing the bending body (cm).

Effect 2: increases balance in standing with one leg up when performing the static balance (sec).

Effect 3: increase the movement amplitude of the knee joint during contraction and stretching when performing knee joint flexibility test (degree)

Effect 4: increase the endurance of abdominal muscles when performing the supine position test (times / 30 seconds).

Effect 5: increases overall endurance when performing the test running depending on strength for 5 minutes (meters).

Effect 6: increase the strength of the forearm muscle group when performing the dominant force hand (kg).

Effect 7: increase the strength of the lower limb muscle group when performing the test of bounce far away in place (cm).

IV. Discussion and Conclusions

After 30 weeks of Hatha Yoga practice, students in the experimental group had forearm strength increased by 6.68% in men and 7.83% in women, abdominal strength increased by 12.62% in men and 16.05% in women. lower limb muscle group increased 4.05% in men and 3.49% in women, overall endurance increased by 8.83% in men and 8.63% in women, body flexibility increased by 30.01% in men and 30.14% in women, movement amplitude of the knee joint left increased by 13.35% in men and 16.79% in women, movement amplitude of the right knee increased by 13.24% in men and 20.98% in women, the likelihood of holding an equal standing in one-legged position increased by 20.02% in men and 24.81 % in women, all statistically significant with $p < 0.05$ or $p < 0.001$. Particularly, the ability to coordinate motor coordination of both male and female students increased not

significantly, the difference was not statistically significant with p> 0.05. As for the fitness of the control students, there was no significant change after 30 weeks (p> 0.05).

This study shows that Hatha Yoga is considered to be an exercise system that complements or replaces students' physical performance.

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