International Journal of Applied Exercise Physiology
2322-3537 www.ijaep.com
Vol.9 No.1

The Impact of Yoga Practice on the Development of Flexibility Among the Female Student's Pedagogical Specialities in the Process of Physical Training of Higher Educational Institutions

Iryna Sereda[1], Halyna Lavrin[2], Tetiana Kucher[3], Igor Grygus[4], Radosław Muszkieta[5], Marek Napierała[6], Magdalena Hagner-Derengowska[7], Małgorzata Ostrowska[8], Olga Smoleńska[9] Walery Zukow[10*] and Alexander Skaliy[11]

1.2.Ternopil Volodymyr Hnatiuk National Pedagogical University, M. Kryvonosa 2 Str., 46027, Ternopil, Ukraine.

3.Taras Shevchenko Regional Humanitarian-Pedagogical Academy of Kremenets, Litseina 1 Str., 47003, Kremenets, Ukraine.

4.Institute of Health Sciences, National University of Water and Environmental Engineering, Soborna 11 Str., 33028, Rivne, Ukraine.

5.Rivne State Humanities University, Plastova St, 31, Rivne, 33000, Ukraine.

.6Faculty of Physical Education, Health and Tourism, Kazimierz Wielki University, 2 Sportowa Str., 85-064 Bydgoszcz, Poland.

7,8,9,10.Faculty of Earth Sciences, Nicolaus Copernicus University, Lwowska 1 Str., 87-100 Torun, Poland.

11.University of Economy, Bydgoszcz, Poland.

Corresponding author *

ARTICLE INFORMATION

Original Research Paper
Doi:
Received October. 2019
Accepted January. 2020

Keywords:
Fitness
flexibility
practicing Yoga elements
physical quality
the process of physical training of higher educational institutions

ABSTRACT

Annotation. The purpose is to define an efficient impact of the specifically formed activities through Yoga practice on the development of flexibility among the female student's in the process of physical training of higher educational institutions.

Material.

96 female students have been participated in the pedagogical experiment. The research has been conducted during the one academic semester. The impact of Yoga practice on the indicator of flexibility was assessed at the end of the pedagogical experiment. The state of its development before and after the experiment was determined and compared.

Results of the research. The results of the pedagogical experiment confirmed the successful influence of the offered activities through Yoga practice on the development of flexibility. It has been established that the systematic Yoga practicing contributes to the best manifestation of this physical quality. It has been proved that the use of Yoga practice has improved the flexibility indicators of the experimental group more in comparison with the control group.

Conclusions. Practicing Yoga has positively impacted on the development of flexibility among female students. Whereas this quality is one of the indicators for assessing the physical condition of the graduates (18-20 years), it is expedient to include Yoga practicing in the curriculum of physical education for students of higher educational institutions and introduce this method of flexibility development in the process of physical education.

1. Introduction

The main purpose of the process of physical education at universities is to formulate the need for physical activity and to direct educational activities to the physical development of students. To date, physical fitness is defined as the result of participation in the physical activity of the individual not only in Ukraine but also abroad [38; 43].

The Ministry of Youth and Sports of Ukraine has introduced a mandatory annual assessment of physical fitness of student youth in order to control the defined standards of performance indicators.

The analysis of indicators of the level of development of physical qualities in our university in recent years proves that the younger generation does not maintain certain standards at the proper level. The solution to this problem was the organization of the educational process with the obligatory introduction of new methods with interesting and unconventional means of physical culture for students.

One of the means that was introduced in the programs of physical education TNPU named V. Hnatyuk for beginners of pedagogical specialties is yoga for beginners.

The development of this type of fitness creates great opportunities for its use in the physical education system of student youth, which is confirmed by scientific research.

Thus, Collins C., Desikachar K, Bragdon L, Bossart C. emphasize the positive therapeutic effect of this wellness system on the body of individuals who spend a lot of time on mental activity. They claim that it is yoga that helps to find harmony between body and mind [26; 27].

Scientists emphasize that regular and properly organized activities increase activity, integrate the physical, mental and spiritual components of man [21; 22; 30]. It improves the fight against various stressful diseases, anxiety and depression. Yoga Helps Support Mental Health [23; 29; 34].

Yoga classes have a positive effect on all systems of the human body - circulation, respiratory, digestive, nervous, endocrine, immune, and covering.

Mahlo L, Tiggemann M., Park C., Siegel P. and other scholars have paid great attention to studies of the influence of yoga on musculoskeletal system [35; 36; 39; 41]. Woodyard C. states that regular exercise (asanas) improves blood flow to the muscles and provides them with smooth bone work [44]. Collins C. and McCall add that the static retention of postures, the transition from one asana to another provide straightforward compression and lubrication of articular cartilage with synovial fluid. It enriches the joints with nutrients [26; 37]. Therefore, doing yoga helps to maintain the flexibility and mobility of the joints.

Yoga classes reduce the aging process [20; 24; 25; 32], approximate indicators of calendar age to biological [31; 40]. Therefore, the opinion of foreigners is generalized [26; 27; 45] and Ukrainian scientists [28; 33] that yoga is one of the important steps towards a fulfilling life.

Possibilities for maintaining at the proper functional level of all systems of the body have been identified, stimulating to check the influence of yoga means on the development of certain physical qualities. Analyzing scientific research, no work has been identified that addresses the problem of the development of specific physical qualities by means of yoga in students of pedagogical specialties.

Many Ukrainian and foreign authors have devoted their work to the study of various therapeutic aspects of yoga as a health system [4; 5; 9; 19].

Comprehensive coverage of the peculiarities of yoga classes for university students was investigated by Tolcheva G., Tsymbalyuk S., Belyak Y., Kabush E. and other scientists [3; 11; 16; 17].

Tolcheva G., Gulbani R., Taran A. and a number of foreign scientists devoted their research to the problems of studying yoga for women [1; 8; 15; 18].

Some Ukrainian authors have studied the impact of different yoga trends on the body of students. Thus, Pichurin

V. explored the influence of Sahaja Yoga on the processes of psychological and psychophysical preparation of students in physical education [12]. Tolcheva G., Dolgareva MG, Fedorina TE - Hatha Yoga and Late Yoga for the Comprehensive Development of the Physical Qualities of Female Students [10; 16].

To problems in combating posture and other diseases of students of special medical groups through yoga, they dedicated their research Atamanyuk SI, Kirichenko OV, Golovychuk I., Skurykhina NV, Kudryavtsev MD, Kuzmin V.A. ., SS Ermakov [2; 7; 14].

The lack of research where scientists would focus on the development of specific physical qualities by means of yoga, has pushed us to realize this problem. Many scientists associate yoga with a positive effect on joint mobility and the degree of muscle stretching, which are indicative of flexibility. Based on the theoretical information we have developed, we have set ourselves the task of revealing the impact of yoga on the development of this motor quality in students of a pedagogical college.

Research by Platonov V. [6; 13] and other domestic scientists indicate that the sensitive periods of flexibility are usually ages 10-12 and 14-15. In the future, without purposeful performance of exercises aimed at developing flexibility, its performance begins to decline significantly. In the age of 18-20 years, the body is not fully formed. Therefore, we consider it necessary to identify the possibility of influencing this physical quality in this age period.

Analyzing the methodological literature, it was found that the development of flexibility depends on external factors, in particular, on the time of day. Its smallest values are observed in the morning after bedtime. Then they gradually increase, reaching the daytime limit values. By the evening - gradually decrease. The highest rates of flexibility occur within 11-13 and 16-18 hours. In the morning and evening, joint mobility is reduced [6]. Therefore, in your study, it is worth checking whether the time of performing the experimental exercises will really affect the indicators of flexibility.

In view of the above, it is decided to try this type of classes with the first year students of the Faculty of Foreign Languages of TNPU named V. Hnatyuk during one academic semester. This study will help to identify the effectiveness of yoga for the development of flexibility, because its manifestation will affect the complex assessment of physical fitness for higher education (18-20 years).

Thus, the relevance of our study is due, on the one hand, to the wide possibilities of yoga in the implementation of the task of developing flexibility in the process of physical education of students, and on the other - the need to test in practice a number of methodological and pedagogical conditions for its development.

In view of the above, the purpose of our article is to determine the effectiveness and feasibility of introducing into the process of physical education yoga, for the development of flexibility as a physical quality in students of pedagogical specialties.

According to the purpose, the task of the article is defined:

1. Describe the impact of the developed method of employment on the indicators of the development of flexibility.

2. To confirm the expediency and effectiveness of the influence of the means of yoga for the realization of the task of physical education of students of the pedagogical university on the development of physical qualities and the need to introduce the proposed method of development of flexibility in the curriculum of physical education of students.

2. Method

2.1. Participants 2.2. Materials 2.3. Procedure

Participants. The experiment was attended by 96 first-year students of the Faculty of Foreign Languages TNPU named V. Hnatyuk, who were divided into a control group (CG, n = 47 girls) and an experimental group (EG, n = 49

girls). Participants of EG and CG were two groups of students, one specializing in English and the other specializing in German. The experiment involved students who were assigned to the main medical group for health reasons. All participants were informed and agreed to participate in the study.

Organization of research. The pedagogical experiment was conducted during one academic semester. At the beginning of the experiment, the homogeneity of the groups was determined by analyzing the results of testing the flexibility index.

Physical education classes with experimental group students were conducted using beginner yoga tools. With the students of the control groups, classes were traditionally conducted in accordance with the current program of physical education for students of foreign languages TNPU named V. Hnatyuk.

Together in CG and EG was only the main part of the class. It envisaged the implementation of the tasks identified in the program by means of badminton, frisbee, basketball, volleyball, track and field and football. Students mastered the technique of performing the above types, participated in educational games, mini competitions.

The EG student training program was designed for 15 classes (30 classroom hours). The first two sessions involved determining the initial level of fitness, including flexibility, as well as getting acquainted with the theoretical aspects of yoga and the rules of exercise. For this purpose, students were offered visual videos of the exercises, the emphasis was on the choice of clothing for the class.

The following lessons were of a practical nature. They provided for the direct study and execution of asanas in the preparatory part of the lesson, instead of the traditional warm-up. It took 20-30 minutes. Started performing two or three repetitions of one bunch of exercises, gradually increasing to 5-6 times. At first, it was suggested that you perform one or two exercises. Further, their number also increased as the study of asanas and adaptation of students to the load.

Thus, during the first practical classes, students were offered the initial classic Surya Namaskar complex (The Sun God), consisting of 12 asanas (The 12 Names of Surya) (Fig. 1) [42]. All of them are performed in strict sequence and in a certain rhythm of breathing.

Research methods.

For diagnostics of the flexibility indicator, the Ministry of Youth and Sports of Ukraine proposed in accordance with the Decree of the Cabinet of Ministers of Ukraine of December 10, 2015 No. 1045 "On Approval of the Procedure for the Annual Assessment of Physical Preparedness of the Ukrainian Population" and tests and points (Table 1).

Statistical analysis. The results of the study were processed by the method of variational statistics with the determination of the arithmetic mean (M), arithmetic error (m), root mean square deviation (σ), the significance of differences by Student's criterion (p).

Research results. At the beginning of the experiment, there were no significant differences in the development of flexibility in students from both groups ($p > 0.05$).

Indicators of development of flexibility of students of EG and CG practically did not differ ($p > 0,05$). In CG students, on average, they tilted forward by 13 cm, and in EG by 12 cm. Only 5% of CG students and 3% of EG showed flexibility for an excellent indicator. A score of 4 was fulfilled by a standard of 38% of CG students and 35% of EGs. Below the average level of flexibility development was shown by 40% of CG students and 45% of EG. 17% of students in both groups fulfilled the lowest score. Thus, the ascertainment experiment recorded below average flexibility in both groups.

Taking into account the results of the ascertainment experiment, interests and wishes of students to include the means of yoga, experimental exercises and pedagogical conditions for the development of flexibility in the process of physical education at the university were proposed.

4. Results

Table 1. Testing the level of fitness for higher education applicants (18 - 20 years old)

№	Types of tests	Sex	Standards, points			
			5	4	3	2
1	Even running 3000 m, min, 2000 m, min	m	13,0	13,3	14,2	15,3
		w	10,3	11,15	11,5	12,3
2	Pulling on the crossbar, once, or long jump from place, cm	m	14	12	11	10
			260	240	235	205
	Bending and extension of arms in emphasis lying, fold, or long jump from place, cm	w	25	21	18	15
			210	200	185	165
3	100 m Run, sec.	m	13,2	14,0	14,3	15,0
		w	14,8	15,5	16,3	17,0
4	Shuttle running 4 x 9 m, sec.	m	9,0	9,6	10,0	10,4
		w	10,4	10,8	11,3	11,6
5	Tilt the torso forward from the sitting position, cm	m	13	11	9	6
		w	20	18	16	9

After the introduction of the means of yoga students into the physical education process, the results of testing the physical quality - flexibility were re-evaluated. The use of experimental exercises and the introduction of pedagogical conditions for their implementation had a positive effect on the improvement of the previously found indicators of diagnosis of flexibility in EG students, compared with CG ($P < 0.05$).

Thus, the average rate of fulfillment of the norm in CG was 14 cm, and in EG - increased to 17 cm. In excellent estimation, 17% of EG students performed the control test, whereas in CG of this level only 8% of students reached. 50% of the EG and only 39% of the students in the CG were able to get a good grade. Below the average level of flexibility development showed only 23% of students of EG, in CG this percentage remained unchanged and made 40%. The percentage of students with low levels of flexibility in EG decreased to 10%, in CG low level of development in 14% of students. Thus, the ascertainment experiment recorded above average levels of flexibility development in EG students and below average in CG.

Such changes in indicators of development of flexibility of students, in a rather short time, we associate with the introduction of experimental pedagogical conditions, which increased the efficiency of the selected exercises.

It is worth noting the positive impact of the pedagogical condition - performing exercises at a favorable time of day. Comparing the results of the control test in the experimental groups, they were 2% better at the students who enrolled at the time most favorable to performing the exercises for flexibility.

Exercise monitoring has helped to improve the subjective assessment of joint mobility during exercise and the degree of muscle stretching in EG students. So, at the beginning of the experiment, some of its participants could not perform most of the asanas at all, bring their hands to the castle behind their backs, reach with the floor with their fingers, etc. After the application of the experimental exercises and the introduction of pedagogical conditions, the students improved their coordination of movements, ability to maintain balance, posture, body flexibility and joint mobility.

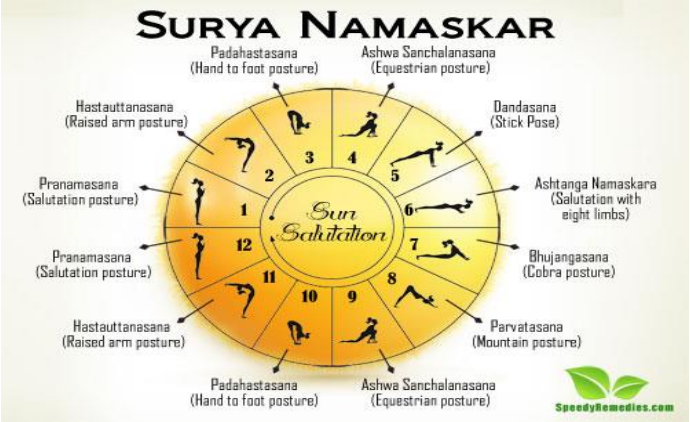

Fig. 1. Surya Namaskar Exercise Complex [42]
Surya Namaskar «Salutations to the Sun»

The implementation of this complex was accompanied by uniform and smooth breathing according to the following scheme: 1st asana - inhalation and exhalation; 2nd asana - inhalation; 3rd asana - exhale; 4th asana - inhalation; 5th asana - exhale; 6th asana - inhalation and exhalation; 7th asana - inhalation; 8th asana - exhale; 9 asanas - inhalation; 10th asana - exhale; 11th asana - inhalation; the 12th asana is exhaled.

In the future, the asanas were replaced by others, or their sequence changed. Exercise complexes included: Anantasana (Side elevated pose) - Anantasana (Side-Reclining Leg Lift); Adho Mukha Shvanasana (Downward Facing Dog) - Adho mukha shvanasana (Downward Facing Dog); Ardha Matsyendrasana (Sitting Twist Pose) - Ardha Matsyendrasana (Half Spinal Twist Pose); Artha Chakrasana (Half Wheel Pose) - Ardha Chakrasana (Half Wheel Pose); Baddha Konasana (Butterfly Pose) - Baddha Konasana (Bound Angle Pose) and other exercises.

The main idea of the study was realized in the final part of the lesson. For 20 minutes, students performed specially selected yoga exercises to develop flexibility. Example:

- **stretching of the feet and back of the legs.** Starting position: sit on the floor, stretching your legs and pulling your feet up. Lean forward and touch the hands of the toes, with the knees and back should be straightened and the head raised forward.

- **stretching the muscles of the hips and back.** Starting position: sitting on the floor, legs spread apart as wide as possible. Lean to the right, grasp your feet and pull yourself, then perform the exercise to the left. Keep feet and back even. Then tilt forward and try to touch the floor with your chest. The legs can be extended wider to make it easier to perform asanas.

- **stretching the inner muscles of the thighs and back.** Asana is performed in a sitting position, legs bent, knees apart. Five should be on line with your knees, back straight. Grasp your toes with your hands, then rhythmically lift and lower your knees, reaching them to the floor. The movements should not be sharp but soft and natural. Then lean forward, touching the floor head.

- **stretching the back muscles and stretching the spine.** Starting position: Sit down with your feet under your arm. Turn right and put your hands behind you, describing them with a large circle in the air. Gradually tilt your head to the floor so that it is between your hands. Then repeat the twist to the other side.

- **stretching of the back muscles.** Starting position: lying down, with his feet tucked under him, his back touches the floor, his arms extended above his head. Alternately turn to the sides, leaning on the shoulder. At the same time the knees should not be detached from the floor, and the hands should be pulled towards the turn. To facilitate the

performance of the asana, you can put a small pillow under the waist.

- «**rocking» exercise.** In a sitting position, cross your legs in front of you so that the left foot is forward of the right at a distance of 20 cm and the right is under the thigh, keep your back straight. Put your hands on your feet, slightly tilt your head forward and swing backwards with swinging movements. When the feet are up, return to the starting position. After that, change the stop position and repeat the rolling.

Much attention was paid to the varieties of breathing during warm-up and direct exercise for the purposeful development of flexibility. Students were encouraged to perform exercises with full yogic breathing, including lower (diaphragmatic) breathing - while inhaling, the abdomen was slightly protruding, on exhalation - being drawn while simultaneously pulling the pelvic floor muscles. Medium (chest) breathing was used - performed by expanding the chest during exhalation and lowering it during exhalation.

Some exercises were accompanied only by upper (clavicle) breathing - due to the raising and lowering of the clavicles. The simplest exercises of the Pranayama system were also used, namely: breathing with frequent and rapid changes in breaths and exhalations; breathing of the nose with alternating nostrils; breathing with breaths through the right nostril and exhalations through the left nostril; breath with stepped delays during inhalation or exhalation; mouth breathing; breath accompanied by vibrating sound during exhalation or inhalation; Breathing with emphasis on a sharp exhalation through the nose, with a tightening of the abdomen to the spine (20-30 breathing cycles).

The effectiveness of the experimental exercises was ensured by the pedagogical conditions of their realization: creation of a positive psycho-emotional atmosphere by acquiring the skills of proper breathing and relaxation of the body and musical accompaniment (slow music with natural motives if the classes were conducted in the hall); outdoor activities (weather permitting); performing exercises at a favorable daily time for the development of flexibility (3-4 pairs, about 12-14 hours); regular repetition of all suggested exercises at home.

To test the most favorable daily development period, the flexibility of students in the experimental group was divided into two subgroups. In the training schedule of the first subgroup, classes took place in the morning (8.00-9.20), and the second subgroup worked from 12.45 to 14.05.

To implement the latter condition, students were offered video materials (videos in the MOODLE distance learning system, which served as an example for homework exercises). Thus, they stimulated the habit of exercising independently [46; 47].

5. Discussion and Conclusion

The analysis of the results of the diagnosis of the indicators of the development of flexibility confirmed the data that yoga has a positive effect on the indicators of flexibility, namely the degree of muscle stretching [6; 36; 44] and joint mobility [26; 35; 37; 39].

The results of our study revealed the effectiveness of the proposed Surya Namaskar "Salutations to the Sun" exercise set and the other yoga exercises listed in the article to successfully accomplish the task of purposefully developing a specific physical quality - flexibility. It is proved that systematic performance of exercises allows to improve the level of development of flexibility outside of sensitive periods, namely at the age of 18-20 years.

The feasibility of the proposed exercises is consistent with the interests of students in this type of study, which confirms the results of our previous studies [40].

Dependence of influence of time of day on development of flexibility is checked. The opinion of leading scientists is confirmed that the highest rates of flexibility manifest within 11-13 hours, and in the morning the mobility in the joints is reduced [6; 13].

Significant improvements in students' static balancing, coordination, posture, are consistent with the view of

scientists that regular exercise (asanas) helps maintain muscle strength, tone and balance throughout the body [35; 36; 39; 41].

New is the data on the peculiarities of studying the means of yoga in order to improve certain physical qualities, in particular, the flexibility of female students of pedagogical specialties. Due to the fact that for first-year students, yoga was a new and unknown type of physical activity, we have once again proved the possibility of mastering and performing such exercises independently in higher education at home and at home, with a purposeful influence on specific physical quality.

According to the results of assessment of the level of development of flexibility in students, it is found that inclusion in the program of physical education of higher education institutions of yoga will allow not only to maintain, but also to improve its index, and therefore to have a positive influence on physical fitness.

Conclusions. The introduction of experimental methods of yoga classes improved the flexibility of female students EG ($P < 0.05$). In addition, they have increased interest in physical education and the desire to perform exercises at home independently.

The results of the study indicate the positive impact of yoga on the development of flexibility in college students and their increased interest in this type of exercise. Therefore, it is important to include yoga in the program of physical education of students in universities.

Research prospects. This study does not fully cover all aspects of the effectiveness of yoga, as it involved only 15 classes. In the future, we set the task to check its effectiveness and influence on the state of physical fitness of students.

Conflict of interests. The authors declare that there is no conflict of interest.

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