Acta Kinesiologiae Universitatis Tartuensis, 2019. Vol. 25, pp. 88–96
https://doi.org/10.12697/akut.2019.25.07

PHYSICAL FITNESS OF PHYSIOTHERAPY STUDENTS

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ABSTRACT

One of the inevitable and crucial elements of a physiotherapist's work, in addition to professional competence, is physical fitness. The aim of the study was to evaluate and compare the level of health and physical fitness of the first year physiotherapy program students in Tartu Health Care College (THCC) and Kaunas College of Applied Sciences (KCAS). The subjects were 20 and 29 physiotherapy students, respectively. The students' physical fitness has been assessed by the following tests: Hand grip test, Stork test, ACSM's push up test, Biering–Sorensen test, ACSM's curl up test, YMCA sit– and– reach test, and Harvard step–test. The physical fitness level of THCC students were average and below average in different categories. Only the endurance of the abdominal muscle of THCC male students was "excellent". However, the health indicators (BMI and waist-hip ratio) of both gender of THCC remained within normal range. In most tests, both male and female students from KCAS received a good grade and their avarage fitness level was better than students from THCC. Despite the fact that BMI results of KCAS students remained within normal range and did not differ from THCC students result, their waist–hip ratio was higher. This may indicate an increased abdominal obesity and thereby health risk. In conclusion, the fintess level of the first-year physiotherapy students of THCC is not satisfactory that can negatively affect their future health and coping with future work.

Keywords: *physical fitness, physiotherapy students, health parameters*

INTRODUCTION

A physiotherapist who is a health promotion specialist has a key role to promote a healthy lifestyle. In addition, the physical fitness of a physiotherapist enables them to cope with their daily work responsibilities and activities [4,10]. Therefore, a student studying physiotherapy could lead an active

lifestyle and be aware of their physical abilities, which will ensure success in their studies and future work as a physiotherapist.

The aim of the study was to determine the health indicators and physical fitness level of the first year students of the Tartu College of Health (THCC) physiotherapist curriculum and to compare them with the health indicators and physical fitness level of the first year students of Kaunas College of Applied Scienses (KCAS).

MATERIALS AND METHODS

The study was conducted in collaboration with Kaunas College of Applied Scienses. The study was coordinated with the Ethics Committee of the University of Tartu (permission of the Ethics Committee No. 276 / T-17 18.12.17)

Subjects

The subjects were first year students from THCC and KCAS Physiotherapist Curriculum who volunteered to participate in the study. Twnty two (6 males and 16 females) THCC students and 29 (10 males and 19 females) KCAS students agreed to participate in the study. The descriptive characteristics are given in Table 1. Students with serious health problems or conditions that did not allow for maximum physical exertion (chronic pain syndromes, acute inflammation, fractures and traumas, malignancies, severe cardiovascular disease, pregnancy and chronic diseases) were excluded from the study.

Based on the anthropometric parameters of the subjects, the body mass index (BMI) and waist-hip ratio, which indirectly reflects body composition, were calculated (Table 1).

Table 1. The descriptive characteristics of the subjects. (Mean±SD)

	THCC	KCAS
Age (y)	20.91± 3.82	19 ± 2.2
Height (cm)		
Female	166.50±7.16	171.13±7.49
Male	185.67±5.65	186.70±7.20
Body weight (kg)		
Female	59.42±8.22	62.61±8.30
Male	83.68±14.95	86.80±16.94
BMI (kg/m^2)		
Female	21.57±2.75	21.25±2.24
Male	24.22±3.36	24.83±4.19
Waist-hip ratio		
Female	0.71±0.17	0.87±0.07*
Male	0.80±0.04	0.95±0.03*

Note: THCC – Tartu Health Care College; KCAS – Kaunas College of Applied Sciences *p<0.01.

Procedures

Physical fitness tests were conducted before noon, and the day before the test was asked to leave without training. The handgrip strength dynamometry, Stork test, ACSM's (American College of Sport and Medicine) push up test, Briering-Sorensen test for back muscles, ACSM's curl up test, YCMA (Young Men's Christian Association) Sit-and-reach test and Harvard step-test were used to find out the subject's fitness level.

Statistical analysis

Data analysis was performed using the statistical program SPSS 23. The Shapiro-Wilk test was used to determine normal distribution of the data. Student-independent t-test was used to compare between-group characteristics that were similar to normal distribution. The Mann-Whitney U test was used to compare between-group characteristics that did not resemble normal distribution. Statistical significance level was calculated at $p<0.05$.

RESULTS

KCAS male subjects had significantly better results (Tables 2 and 3) than THCC male subjects in ACSM's push up test, both dominant and non-dominant handgrip strength test, stork test in both right and left leg, Briering-Sorensen test for back muscles and ACSM's curl up test.

Table 2. The results of fitness tests of the THCC and KCAS male subjects which were with normal distribution (Mean±SD)

	THCC (n=6)	KCAS(n=10)
ACSM's push up test (reps)	24.5±4.2	36.6±11.3*
Briering-Sorensen test for back muscles (s)	158.17±30.5	231.1±66.9*
YMCA Sit and-reach test (cm)	52.5±7.1	50.7±14.6
Harvard step- test (score)	84.8±15.3	98.7±16.3

Note: THCC – Tartu Health Care College; KCAS – Kaunas College of Applied Sciences *p≤0,05; reps – repetitions

Table 3. The results of fitness tests of the THCC and KCAS male subjects which were not with normal distribution (Median; IQR)

	THCC (n=6)	KCAS (n=10)
Dominant handgrip strength (kg)	43; 30–53.5	49.5; 48–55**
Nom-dominant handgrip strength (kg)	41.5; 28.3–52.5	50; 41.5–54.3**
Stork test on right leg (s)	18.5; 6.50–35.50	48.50; 47.5–50.5*
Stork test on the left leg (s)	15; 03–31.5	48.00; 46–50**
ACSM's curl up test (reps)	75; 75–75	51; 40–75*

Note: THCC – Tartu Health Care College; KCAS – Kaunas College of Applied Sciences *p≤0.05; **p≤0.01; reps – repetitions.

THCC female subjects achieved significantly weaker results than female KCAS subjects in both hand, stork test on both legs, ACSM's curl up test, ACSM's push up test, Briering-Sorensen test for back muscles, and Harvard step test (Table 4 and 5).

Table 4. The results of fitness tests of the THCC and KCAS female subjects which were with normal distribution (Mean±SD)

	THCC (n=16)	KCAS (n=19)
ACSM's push up test (reps)	17.0±10.1	34.5±9.8*
Briering-Sorensen test for back muscles (s)	177.1±51.0	281.7±72.1*
YMCA Sit and-reach test (cm)	52.5±7.1	54.4±11.5*

Note: THCC – Tartu Health Care College; KCAS – Kaunas College of Applied Sciences *p≤0,001; reps – repetitions

Table 5. The results of fitness tests of the THCC and KCAS female subjects which were not with normal distribution (Median; IQR).

	THCC (n=16)	KCAS (n=19)
Dominant handgrip strength (kg)	18; 16.5–18.8	30; 25–36*
Nom-dominant handgrip strength (kg)	18; 14–23	28; 22–35*
Stork test on right leg (s)	7.5; 5.2–16.3	48; 46–50*
Stork test on the left leg (s)	9.5; 05.8–17.8	49; 47–50*
ACSM's curl up test (reps)	41.5; 21.3–41.5	45; 40–60*
Harvard step-test (score)	37; 28.3–67	106; 87–114*

Note: THCC – Tartu Health Care College; KCAS – Kaunas College of Applied Sciences; * p≤0,001; reps – repetitions.

DISCUSSION

Based on the World Health Organization [19] norms, a person's body mass is considered normal for his / her height if the body mass index is between 19 and 25 kg/m^2. The mean BMI values of THCC male and female subjects were within the normal range, similarly to the Ääremaa [22] study. KCAS subjects had significantly higher waist-hip ratio in comparison with the THCC subjects. Studies [15,17] have been shown that waist-hip ratio gives a more accurate measure of abdominal obesity compared to BMI, increased rates may indicate increased abdominal obesity in KCAS subjects, which in turn increases the risk of metabolic syndrome, vascular disease [16] and type 2 diabetes [11].

The isometric handgrip strength is one of the most important components of physical performance, indicating the strength of the upper limb and, indirectly, the whole body [1]. Based on age group norms [21], the

isometric handgrip strength of dominant and non-dominant hand in THCC male subjects can be assessed as satisfactory, while the female result was deficient in hand grip strength. Similarly, poor hand grip strength test results were also obtained by Sobush and Fehring [17] in the first study that assessed the physical performance of students in the physiotherapist curriculum. Compared to the THCC, the isometric handgrip strength of KCAS subjects of both genders was significantly higher. It can be assumed that KCAS subjects are more involved in physical activity and sports, with more involves of the upper limbs and handgrip. The possible differences in the hand dynamometer used by both colleges as well as possible differences in the test methodology (hand position, number of repetitions, length of rest periods) could also play a major role.

Based on existing standards [21] the result of stork test on both legs assessed to be deficient in both THCC male and female subjects. The stork test has not been used before for physiotherapists and students, but the used flamingo test results has also been poor [7, 20]. The ability to maintain balance on both legs of both male and female KCAS subjects were significantly better than THCC subjects and rated as 'good'. The reason for this big difference may be that KCAS subjects has better integration of the musculoskeletal system [11] and the use of balance-building exercises in daily training.

Based on the age norms suggested by Henriques et al. [9], the evaluation of upper body muscular endurance revealed that THCC male subjects' upper body muscular endurance could be considered "satisfactory", whereas female subjects were "deficient". Given the results obtained, THCC subjects should pay more attention to its development, as upper body resilience allows for better coping with the physiotherapist's daily work. Earlier study [14] has also recorded results lower than average in upper body muscle endurance. Comparison of the results of the two higher education institutions showed that the ACSM's push up test scores of KCAS subjects of both genders were significantly higher and rated as "excellent" compared to those of THCC. It is likely that KCAS will pay more attention to developing this type of physical fitness in their training.

Based on the norms outlined in the study by Adedoyin et al. [1], static endurance of spinal muscles in THCC male subjects can be assessed as "satisfactory" and in female subjects as "good". The static endurance of the spinal muscles of KCAS subjects in both genders was significantly better than the result of THCC subjects and rated as "excellent" in both genders. When evaluating abdominal muscular endurance [2], THCC male subjects score was "excellent", while female subjects score was "good". Instead,

Cieśla [7] used in her study the 30s upper body lift test from the EUROFIT test package. The results of the test showed that the abdominal muscular endurance of male subjects studying physiotherapy was "good" and that of female subjects was equivalent to "average" [7]. In our study, the result of ACSM's curl up test was significantly better in KCAS male subjects, assessed as "good" than THCC male subjects. Although the average scores of female subjects in KCAS were significantly higher to those of female subjects in the THCC, the abdominal muscular endurance of both colleges were in good level.

According to the established norms [8], THCC had a good level of flexibility in both male and female subjects. In Bello et al. [3] study, the flexibility of physiotherapy students was observed as "lower than average", while the results of Boraczyński et al. [5] showed an excellent level of flexibility among physiotherapy students. Compared to THCC and KCAS subjects of both genders, the KCAS subjects' flexibility also corresponds to the level of "good" and no statistical difference was observed between the subjects of the higher education institutions.

According to the norms outlined in Brouha [6] study, THCC may assess the cardiorespiratory performance of male subjects as "good". However, the mean score of female subjects in the THCC corresponded to a rating of "deficient", indicating their very low cardiorespiratory ability. KCAS male and female subjects scored higher than THCC of both genders and rated "excellent". Studies evaluating the level of cardiorespiratory ability of 17–23-year-old physiotherapist students using a modified Harvard step-test protocol also found unsatisfactory outcomes [13, 14]. As in the previous tests, it can be assumed that the reason for the difference in the level of cardiorespiratory ability of the subjects may be the low physical activity of the subjects and the lack of aerobic exercise.

In conclusion, the fitness level of the first-year physiotherapy students of THCC is not satisfactory that can negatively affect their future health and coping with future work.

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