



HEALTH RELATED PHYSICAL FITNESS OF PHYSIOTHERAPY STUDENTS IN MONTENEGRO

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ABSTRACT

Physiotherapist are expected to have a good level of physical fitness to meet their profession demands. Physiotherapy professional bodies recommend for physiotherapist to adopt healthy lifestyle habits. As the physical fitness is the measurable outcome of physical activity and exercise it is important to evaluate physical fitness level. Physiotherapy students, future healthcare providers, need to carry out healthy lifestyle routine in everyday life so they can meet the demands of the profession. The aim of the study was to find out the health related physical fitness of physiotherapy students in Montenegro. The measured level of physical fitness was determined by using Boddy mass index, Waist hip ratio, Sit and reach test, Scratch test, Push-ups and Squat test. A total of 62 students (42 female, 20 male) of physical therapy aged from 19 to 25 years were enrolled in this study. Body composition of students was satisfactory. The muscle endurance was better in lower extremity than in upper extremity. The flexibility was better in upper extremity and better in female students. The health related physical fitness level was not satisfactory as compared to the physical demands of the profession. Our results suggest to improve the fitness level of physiotherapy students. The study reinforces the need to change students attitude toward regular physical activity.

KEYWORDS: physical fitness, physiotherapy students, muscular endurance, flexibility, body composition.

INTRODUCTION

Physical fitness has been defined as a set of attributes or characteristics that people have or achieve that relates to the ability to perform physical activity. Health-related physical fitness (HRPF), a more specific term, has been defined as consisting of those specific components of physical fitness that have a relationship with good health. HRPF is not a single entity, but rather a sum of five measurable components: cardiorespiratory fitness, body composition, muscular strength, muscular endurance and flexibility.^[1]

HRPF cannot be viewed without taking into account the aspect of physical activity. Physical activity has been shown to be related to health. The Centers for Disease Control and Prevention (CDC) defined physical activity as any bodily movement produced by the contraction of skeletal muscles that results in a substantial increase over resting energy expenditure.^[1] Physical activity is defined as any bodily movement, produced by skeletal muscles, which requires energy expenditure-including activities undertaken while working.^[2]

Regular physical activity is a well-established protective factor for the prevention and treatment of the leading noncommunicable diseases (NCD), namely heart disease,

stroke, diabetes, breast and colon cancer. It also helps prevent other important NCD risk factors such as hypertension, overweight and obesity, and is associated with improved mental health, delay in the onset of dementia and improved quality of life and well being. Beyond health, increasing participation in physical activity has multiple social and economic benefits.^[3] The WHO recommended for adults aged 18-64 to do at least 150 min of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or equivalent combination of moderate and vigorous-intensity activity.^[4]

Globally, 23% of adults and 81% of adolescents do not meet the WHO global recommendations on physical activity for health.^[3]

The challenges in public health associated with sedentary lifestyle underline the need to prepare medical workers to give appropriate medical counseling and exercise recommendation. American physical therapy association (APTA) published guidelines for physiotherapists to provide services but also to adopt healthy lifestyle choices for themselves that include engaging in active forms of transportation and meeting national guidelines

for participation in physical activity and exercise.^[5] It is exercise that promotes the maintenance or improvement in physical fitness. Physical fitness is the measurable outcome of a person's physical activity and exercise habits.^[1] Thus, the measurement of HRPF is becoming increasingly valued by many healthcare providers.

Physiotherapist and other healthcare providers themselves need to implement healthy lifestyle routine in everyday life not only for their own personal benefit, but because they should give the best recommendation to their patients by personal example.

One of the essential part of physiotherapist's work, in addition to professional competence, is physical fitness. The everyday working practice demands physiotherapist to demonstrate an optimal level of physical fitness to be able to deliver quality service to their clients and patients. The physical task involve safe handling and moving of patients, gait training and using body segments to provide support and resistance during treatment sessions.^[6] Awkward postures when administering treatments such as massages or when transferring immobile patients can lead to musculoskeletal complaints.^[7,8]

Physiotherapy students, future physiotherapists don't have awareness about their actual fitness level as required for the professional demands. There is need for the awareness campaign as well as proper assessment of the students before admission because the job demands and professional work demands for the physiotherapy students were different from other fields.^[9]

The transition to university results in changes in lifestyle, a distancing from the family nucleus, greater independence and an increase in social relations with the peer group. Many university students assume new responsibilities, becoming a vulnerable population group from the point of view of nutrition and lifestyle. These new responsibilities can provoke a reduction of the time dedicated to do physical activity and as a consequence, the body composition and physical fitness of the students can worsen considerably during the years of university.^[10]

University time is considered a critical period in an individual's lifetime. The leisure activities in which university students participate, the lifestyle habits they have, and the exercise habits they form, all have significant impacts on their health, university life and on their work life after graduation.^[11]

It is important to evaluate in this field and determine physical fitness of physiotherapy students. This evaluation can help, on one hand, to prepare students for the demands of the future profession and, on the other hand, to change students attitude toward regular physical activity.

It is well known that present physical activity is the best predictor of future physical activity.^[12]

Physiotherapy students are expected to have a good working knowledge of physical activity and related health benefits. The aim of this study is to evaluate health related physical fitness level of physiotherapy students in Montenegro.

MATERIAL AND METHODS

This cross-sectional study was performed during first three months in 2016. From the total population of 230 physiotherapy students, a sample of 62 students was formed. Students were recruited on a voluntary basis. We included students of both sexes, aged 19-25 years. Inclusion criteria were met for participation in the study. We excluded students with chronic medical illness, cardiac and/or respiratory disease and professional sports. Prior to testing, students signed informed consent to participate in the research.

Health related physical fitness assessment included a set of tests. Body composition was evaluated using the Body mass index (BMI) and Waist hips ratio (WHR). Upper extremity (UE) muscle endurance was evaluated using a push-up test. Lower extremity (LE) muscle endurance was assessed using a squat test. Flexibility of the UE and LE was assessed with the modification of Appley test - Scratch test and the Sit and reach test, respectively. Before testing students were asked for short warm-up.

Body composition

BMI: Each student's height and weight were measured and BMI was calculated (1). Students are classified into one of four categories.

Table 1: The categories of BMI.

Categories	BMI (kg/m ²)
Underweight	<18.5
Normal	18.5-24.9
Overweight	25.0-29.9
Obesity	>30

WHR: The waist circumference was measured at the smallest circumference above the umbilicus and below the xiphoid process. The hip circumference was measured as the largest circumference around the buttocks, above the gluteal fold. The WHR was calculated by dividing the waist circumference by the circumference of the hips.^[13] Students were classified into one of two categories: normal or risk WHR.

Table 2. The categories of WHR by gender.

WHR (cm) Categories	Gender	
	Female	Male
Normal	<0.8	<0.9
Risk	>0.8	>0.9

Flexibility (Scratch test and Sit and reach test)

The Scratch test: Students were required to stand up straight, actively place one arm over the shoulder, and then reach the other arm up the back in an attempt to touch the fingers of the opposing upper extremities. The distance in cm between the middle fingertips of the left L and right R hand was measured twice: when the left arm was behind the head-L and when the right arm was behind the head-R. With this modification, the original test is simplified and it is possible to quantify the extent of shoulder movement.^[14,15] The score with fingers overlapping was recorded like negative number and with fingers touching was recorded like 0. As a result we recorded average value of both measurements: L and R. Students were classified into one of four categories.

Table 3: The categories of Scratch test.

Fingers overlap	Excellent
Fingers touch	Good
Distance < 5 cm	Average
Distance > 5cm	Poor

Sit and Reach test: It was recommended to refrain from fast, jerky movements. Students sat with shoes removed and the soles of the feet flat against the measuring box. They slowly reached forward with both hands together as far as possible, holding end position for 2 s. Fingers were in contact with the yardstick and the score was the most distant point in cm reached with the fingertips. The best of two trial was recorded. We ensured that the knees of the students were extended. The test protocol with foot line marked at 23 cm was published by the Canadian Society for Exercise Physiology. The used norms are for measurement with sit and-reach box in which the zero point is set at 23 cm so we subtracted 3 cm from original values, as recommended (1). Students were classified into one of five categories.

Table 4: The categories of Sit and reach test by gender and selected age.

Sit and reach test		Age (20-29)	
CATEGORY	SEX	Female	Male
Excellent		38cm	37cm
Very good		34-37cm	31-36cm
Good		30-33cm	27-30cm
Fair		25-29cm	22-26cm
Needs improvement		24cm	21cm

Muscular endurance (Push-ups and Squats)

Push-ups: UE muscle endurance test was administered with male students starting in the standard position: hands pointing forward and under the shoulder, back straight, head up, using the toes as the pivot point and female subjects in the modified „knee push-up“ position: legs together using the knees as the pivot point. The students raised the body by straightening the elbows and returned to the down position, until the chin touched the mat. The maximal number of push-ups performed correctly, with same cadence, regulated with counting, without rest, was registered as the score. The test was

stopped when the students strained forcibly or were unable to maintain the appropriate technique within two repetitions (1). As a result of testing the number of correctly performed push-ups was recorded and the students were classified into one of five categories.

Table 5: The categories of Push-up test by gender and selected age.

		AGE: 20-29	
CATEGORY	SEX	Female	Male
Excellent		30	36
Very good		21-29	29-35
Good		15-20	22-28
Fair		10-14	17-21
Needs improvement		9	16

The squat test: Students were standing in front of a chair, facing away from it with their feet shoulders width apart. They squatted down and lightly touched the chair with their backside before standing back up. They kept doing this with same cadence regulated with counting. We recorded the number of regular squats completed.^[16] The students were classified into one of seven categories.

Table 6: The categories of Squat test by gender and selected age.

Rating (Age 18-25)	Squat test (female)	Squat test (male)
Excellent	>43	>49
Good	37-43	44-49
Above average	33-36	39-43
Average	29-32	35-38
Below average	25-28	31-34
Poor	18-24	25-30
Very poor	<18	<25

Data were collected and analyzed using the IBM SPSS Statistics 23. The categorical data were represented by number (n) and percentage (%) of observations. The results of physical fitness assessment were analyzed using descriptive statistics and Pearson's Chi-squared (χ^2) test was used to evaluate relationship between variables. The level of significance for all tests was accepted as 0.05.

RESULTS AND DISCUSSION

The sample consisted of 62 physiotherapy students who were recruited on a voluntary basis. There were 42 (67.75%) female and 20 (32.3%) male students. The average age of students was 21.87 ± 1.43 years.

The analyze of BMI showed that majority of the students (62.9%) were of normal weight as also was found in similar studies.^[17,18,19] Overweight in male students can be explained by increased muscle mass due to more intense exercise. High prevalence of obesity was found among students in other studies.^[20,21] In total number of 62, 61 students (98.4%) had a normal WHR and only 1 (1.6%) had a risk WHR. The WHR indicated that students were not at risk of abdominal, central obesity. The attention should be paid for the potential hidden health risk in university students with normal body mass index but excessive fat mass.^[22] For a more reliable conclusion it would be necessary to include an evaluation of the other parameters such as skinfold measurement and body fat percentage estimation.

Table 7: Distribution of students according to BMI categories and gender.

	Body Mass Index			Total
	Normal body weight	Overweight	Obesity	
Male n	7	12	1	20
% within gender	35.0%	60.0%	5.0%	100.0%
Female n	32	9	1	42
% within gender	76.2%	21.4%	2.4%	100%
Total n	39	21	2	62
% within BMI category	62.9%	33.9%	3.2%	100%

The correlation between categories of Body Mass Index and gender was examined by Pearson's Chi-squared test. The test showed that there was an approximate correlation between the BMI categories and the gender: $p = 0.007$.

UE flexibility was assessed using Scratch test with students classified into one of four categories. 38 (61%)

students had excellent and only 1 (1.6%) had poor flexibility. There were more female 30 (71.4%) than male 8 (40%) students in the excellent category so female students scored higher on UE flexibility test. More than 50% of the students have poor shoulder flexibility in similar study. The lack of flexibility in shoulder of physiotherapy students may become a risk factor for the musculoskeletal disorder.^[19]

Table 8: Distribution of students according to Scratch test categories and gender.

	Scratch test categories				Total
	Excellent	Good	Average	Poor	
Female n	30	6	6	0	42
% with. gender	71.4%	14.3%	14.3%	0%	100%
Male n	8	7	4	1	20
% with. gender	40%	35%	20%	5%	100%
Total n	38	13	10	1	62
% with.cat.	61,3%	21%	16.1%	1.6%	100%

The association between categories of Scratch test with gender of the students was found to be of an approximate significance, $p = 0.062$,

LE flexibility was assessed using the Sit and reach test. The students were classified into one of five categories. Score was excellent in 23 (37.1%) and needs improvement was found in 3 (4.8%) students. In other

categories, the distribution of students was approximate so we can conclude that student scored average on LE flexibility test and it wasn't satisfactory as also was found in other study.^[23] Female students scored significantly higher than male on flexibility test.^[6,24] There was found better LE flexibility than UE flexibility^[9] and satisfactory LE flexibility in similar studies.^[25]

Table 9: Distribution of students according to Sit and reach categories and gender.

	Sit and reach categories					Total
	Excellent	Very good	Good	Fair	Needs improvement	
Women n	17	6	9	9	1	42
% within gender	40.5%	14.3%	21.4%	21.4%	2.4%	100%
Men n	6	4	3	5	2	20
% within gender	30%	20%	15%	25%	10%	100%
Total n	23	10	12	14	3	62
% within.cat.	37.1%	16.1%	19.4%	22.6%	4.8%	100%

The association between categories of Sit and reach test with gender of the students was found to be not significant ($p=0.615$).

With Push-ups students were classified into one of five categories. There were more male (60%) than female (30.9%) students in excellent and very good category.

This result showed that UE muscle endurance was better in male students which can be explained by the different physical constitution of men. The similar result was reported in other study.^[26] The poor level of endurance of physiotherapy students is an important cause of concern for future demands of profession.

Table 10: Distribution of students according to push-ups categories and gender.

	Push-ups categories					Total
	Excellent	Very good	Good	Fair	Needs improvement	
Women	8	5	7	9	13	42
	19%	11.9%	16.7%	21.4%	31%	100%
Men	6	6	4	4	0	20
	30%	30%	20%	20%	0%	100%
Total n	14	11	11	13	13	62
% within cat	22.6%	17.7%	17.7%	21%	21%	100%

The association between Push-ups categories with gender of the students was found to be statistically significant ($p=0.05$).

LE muscle endurance was assessed using a squat test. Respondents were classified into one of six categories.

The majority or 56 (90.3%) students were in the excellent category so we can conclude that muscle endurance was better in LE than in UE which can be explained by location of physiotherapy study programme in small sea town with very many stairs.

Table 11: Distribution of students according to Squat test categories and gender.

	Squats categories							Total
	Excellent	Good	Above average	Average	Below average	Poor	Very poor	
Women n	37	1	1	1	0	1	1	42
% within gender	88.1%	2.4%	2.4%	2.4%	0%	2.4%	2.4%	100%
Men n	19	0	0	0	0	0	1	20
% within gender	95%	0%	0%	0%	0%	0%	5%	100%
Total n	56	1	1	1	0	1	2	62
% within cat	90.4%	1.6%	1.6%	1.6%	0%	1.6%	3.2%	100%

The Pearson's correlation test showed there was no significant correlation between gender and lower limb muscle endurance, $p=0.811$.

The discrepancy between study results may be attributed to the differences in the assessment methods used and participant characteristics such as age, dietary characteristics, lifestyle, and ethnicity. Despite these

differences between our study and previous investigations, our results indicated a potential hidden health risk for future profession.

CONCLUSION

The findings of our study showed that students had good body composition and LE muscle endurance but other tested parameters of HRPF were not satisfactory as compared to the physical demands of the future physiotherapy profession. There is clear need to improve the fitness level of physiotherapy students and to investigate further in the field of other components of physical fitness: muscular strength and cardiorespiratory fitness. Physical activity level and attitudes toward physical activity should be assessed in the future. We suggest to incorporate physical education classes in regular students curriculum.

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