

# PHYSICAL ACTIVITY LEVEL AND PHYSICAL FITNESS PARAMETERS IN PHYSIOTHERAPY STUDENTS

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## ABSTRACT

**Background:** Regular physical activity (PA) and health-related physical fitness are key indicators of health outcomes. Physiotherapy professional bodies are recognizing that physical activity and exercise are integral to professional practice and are core contributors to health along with reducing the risk of developing diabetes, hypertension, and cardiovascular diseases. PA also improves emotion and stress control.

**Objective:** The objectives of the study are to find the level of physical activity and compare physical fitness parameters in physiotherapy students by evaluating aerobic capacity, endurance and body composition in different levels of physical activity.

**Methods:** An observational study was conducted on 100 male and female physiotherapy students aged 18-24 years using random sampling. Subjects having severe back pain, recent fractures were excluded. Students were divided into three groups low PA, moderate PA, high PA based on their Physical activity score evaluated using international physical activity questionnaire-short form (IPAQ). Aerobic capacity was measured by Queens college step test, endurance of trunk extensor muscles (TE) was found by Sorenson's test and endurance of trunk flexor muscles (TF) by holding time of prone forearm plank position and body composition was calculated by Body mass index (BMI). Level of significance was kept at 5%.

**Results:** Data of 100 students was analysed. Forty one students were in low activity group, Thirty four students were in moderate activity group and twenty five students were in high activity group. Mean Aerobic capacity was  $42.94 \pm 8.31$  ml/min/kg, Trunk Flexor endurance was  $63.62 \pm 25.65$  s, Trunk extensor endurance was  $71.50 \pm 30.41$  s and BMI was  $23.33 \pm 4.02$  kg/m<sup>2</sup>. Comparing means of 3 groups by Kruskal Wallis test, Aerobic capacity  $\chi^2 = 51.019$ ,  $p < 0.001$ , TE endurance  $\chi^2 = 23.644$ ,  $p < 0.001$ , TF endurance  $\chi^2 = 15.832$ ,  $p < 0.001$ , BMI  $\chi^2 = 2.869$ ,  $p > 0.05$ .

**Conclusion:** Low to moderate level of physical activity was found among physiotherapy students. Physiotherapy students who were physically active in their routine life have better aerobic capacity, Trunk flexor endurance and Trunk extensor endurance and thus better physical fitness, compared to those with low levels of physical activity. The body mass Index was not significantly different in three groups.

**KEY WORDS:** Physical activity, Aerobic capacity, Trunk flexor endurance, Trunk extensor endurance, Body mass index.

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## INTRODUCTION

Physical fitness is a set of attributes that people have or achieve. Being physically fit has been defined as “the ability to carry out daily tasks with vigor and alertness, without undue fatigue and with ample energy to enjoy leisure-time

pursuits and to meet unforeseen emergencies” [1]. Although the definition may be conceptually sound, things such as vigor alertness, fatigue, and enjoyment are not easily measured. On the other hand, a number of measurable components do contribute to physical fitness.

The most frequently cited components fall into two groups: one related to health and the other related to skills that pertain more to athletic ability [2]. The health-related components of physical fitness are (a) cardiorespiratory endurance, (b) muscular endurance, (c) muscular strength, (d) body composition, and (e) flexibility.

Regular physical activity (PA) and health-related physical fitness are key indicators of health outcomes [3]. Physiotherapy professional bodies are recognizing that physical activity and exercise are integral to professional practice. They are core contributors to health along with reducing the risk of developing diabetes, hypertension, and cardiovascular diseases [4]. PA also improves emotion and stress control.

Physiotherapy students represent a group of young adults expected to have a good knowledge of physical activity. Promoting physical activity in physiotherapy students is a sensible strategy likely to help reduce physical inactivity levels and the associated disease burden in future generation. However, recent studies have shown a decline in physical activity levels among young-adults. So there was a need to evaluate the physical activity level of physiotherapy students and to determine their physical fitness level. The objectives of the study are to find the level of physical activity and compare physical fitness parameters in physiotherapy students by evaluating aerobic capacity, endurance and body composition in different levels of physical activity.

## MATERIALS AND METHODS

An observational study was conducted on 100 male and female physiotherapy students aged 18-24 years using simple random sampling. Ethics approval was taken from the institute. Written informed consent was taken from participants. Subjects having severe back pain, recent fractures were excluded.

Students were divided into three groups low PA, moderate PA, high PA based on their Physical activity score evaluated using international physical activity questionnaire-short form (IPAQ) [5]. Scoring a HIGH level of physical activity on the IPAQ means physical activity levels equate to approximately one hour of activity per day or

more at least a moderate intensity activity level. Those who score HIGH on the IPAQ engage in vigorous intensity activity on at least 3 days achieving a minimum total physical activity of at least 1500 MET minutes a week. Scoring a MODERATE level of physical activity on the IPAQ means doing some activity more than likely equivalent to half an hour of at least moderate intensity physical activity on most days. Those who score MODERATE on the IPAQ engage in 5 or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum total physical activity of at least 600 MET minutes a week. Scoring a LOW level of physical activity on the IPAQ means not meeting any of the criteria for either MODERATE or HIGH levels of physical activity. Aerobic capacity was measured by Queens college step test [6]. The queens college step test is one of many variations of step test procedures, used to determine aerobic fitness, the participant was asked to step up and down on a platform of height 41.3cm at a rate of 22 steps per minute for females and at 24 steps per minute for males. The participants were asked to step using a four-step cadence, 'up-up-down-down' for 3 minutes. The participant stopped immediately on completion of the test, and the heart beats were counted for 15 seconds from 5-20 seconds of recovery. This 15 second reading was multiplied by 4 to give the beats per minute (bpm). An estimation of  $VO_{2max}$  was calculated from the test results, using this formula.

$$\text{men: } VO_{2max} \text{ (ml/kg/min)} = 111.33 - (0.42 \times \text{heart rate (bpm)})$$

$$\text{women: } VO_{2max} \text{ (ml/kg/min)} = 65.81 - (0.1847 \times \text{heart rate (bpm)})$$

Endurance of trunk extensor muscles (TE) was found by Sorenson's test [5]. Subjects were asked to lie prone on the examining table with the upper edge of the iliac crests in alignment with the edge of the table. The lower body was fixed to the table by three straps around the pelvis, knees and ankle respectively. With the arms folded across the chest, the patient isometrically maintained the upper body in a horizontal position while time was recorded.

Endurance of trunk flexor muscles (TF) [7] was assessed by holding time of prone forearm plank position. The forearm were placed on the ground with the elbows aligned below the shoulders,

and arms parallel to the body at about shoulder-width distance and the time was recorded. Body composition was calculated by Body mass index (BMI) <sup>(8)</sup>. Body mass index (BMI) is a measure of body fat based on height and weight that applies to men and women. The formula is  $BMI = \text{kg}/\text{m}^2$  where kg is a person's weight in kilograms and  $\text{m}^2$  is their height in metres squared.

Appropriate statistical tests were applied to data collected. Level of significance was kept at 5%.

## RESULTS AND DISCUSSION

Data of 100 students was analysed using SPSS version 16.0. There were 58 females and 42 males. Forty one students were in low activity group, Thirty four students were in moderate activity group and twenty five students were in high activity group.

Mean Aerobic capacity was  $42.94 \pm 8.31 \text{ ml}/\text{min}/\text{kg}$ , Trunk Flexor endurance was  $63.62 \pm 25.65 \text{ s}$ , Trunk extensor endurance was  $71.50 \pm 30.41 \text{ s}$  and BMI was  $23.33 \pm 4.02 \text{ kg}/\text{m}^2$ .

Means of fitness parameters in three group low PA, Moderate PA, High PA was done using Kruskal Wallis test. Comparing means of 3 groups by Kruskal Wallis test, Aerobic capacity  $\chi^2 = 51.019$ ,  $p < 0.001$ , TE endurance  $\chi^2 = 23.644$ ,  $p < 0.001$ , TF endurance  $\chi^2 = 15.832$ ,  $p < 0.001$ , BMI  $\chi^2 = 2.869$ ,  $p > 0.05$ .

Table 1: Shows the mean aerobic capacity of the participants were  $42.94 \pm 8.31$ , Trunk flexors endurance  $63.62 \pm 25.65$ , Trunk extensors endurance  $71.50 \pm 30.41$  and BMI  $23.33 \pm 4.02$ .

**Table 1:** Mean $\pm$ SD of outcome measures.

Variable	Mean $\pm$ SD
Age (years)	21.57 $\pm$ 1.40
Aerobic capacity (lit/m)	42.94 $\pm$ 8.31
Trunk flexors endurance (s)	63.62 $\pm$ 25.65
Trunk extensor endurance (s)	71.50 $\pm$ 30.41
BMI (kg/m <sup>2</sup> )	23.33 $\pm$ 4.02

**Table 2:** Mean difference in 3 groups.

Variable	Mean (Low PA)	Mean (mod PA)	Mean (high PA)	H-value	P-value
Aerobic capacity (lit/m)	35.01	42.45	47.32	51.019	$p < 0.001$
Trunk flexors endurance(s)	28.23	54.02	89.2	15.832	$p < 0.001$
Trunk extensor endurance(s)	32.45	62.34	103.1	23.644	$p < 0.001$
BMI(kg/m <sup>2</sup> )	24.54	26.87	23.7	2.869	$p > 0.05$

Table 2 Shows the mean difference in all the three groups that is Low PA, Moderate PA and High PA where H value for the Aerobic capacity was  $H=51.019$  and  $p < 0.001$ , Trunk flexors endurance was  $H=15.832$  and  $p < 0.001$ , Trunk extensor endurance was  $H=23.644$  and  $p < 0.001$  where all the three physical fitness parameters shows a statistically significant difference in their groups but BMI H value= $2.869$  and  $p > 0.05$  which is not showing any significant difference.

In this study out of hundred students ( $n=100$ ) forty one ( $n=41$ ) were in low PA group, thirty four ( $n=34$ ) were moderate PA group and twenty five ( $n=25$ ) were in high PA group. Maximum number (75%) of physiotherapy students were in low PA and moderate PA group. Fitness levels in this present study of physiotherapy students lies at a Moderate level.

Table 1 Shows the mean aerobic capacity of the participants were  $42.94 \pm 8.31$ , Trunk flexors endurance  $63.62 \pm 25.65$ , Trunk extensors endurance  $71.50 \pm 30.41$  and BMI  $23.33 \pm 4.02$ .

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Low to moderate level of physical activity was found among physiotherapy students. A recent systematic review highlighted that the majority of Asians are physically inactive. Our study results support these findings. This may lead to reduced fitness levels as seen in present study [9]. Adequate levels of physical activity, may help to maintain good physical fitness which may be important to prevent complications like back pain, diabetes, hypertension, cardio-vascular problems etc [9].



Similar to present study, Sonia Pawaria et al did a cross-sectional correlational study in 2017 to assess the cardio-respiratory fitness of Physiotherapy students. Height and weight were measured to calculate the BMI of the students. VO<sub>2</sub> max, and Physical fitness index of the students were evaluated through Harved step test. Results of the study revealed that cardio-respiratory fitness of the Physiotherapist students was average. There was a strong positive correlation between VO<sub>2</sub> max, and Physical fitness index. They came out with a conclusion that to achieve good cardio-respiratory fitness students should engage themselves in physical activities. Institutions should include some physical exercises in their curriculum [10]. N.K.Multani et al [11] did a study to evaluate the level of physical fitness among physiotherapy students in Punjab and Haryana state. The students of Bachelor of Physiotherapy programme from various colleges of Punjab and Haryana participated in the study. The measured levels of physical fitness was determined by using toe touch test, shoulder flexibility test, BMI, push-ups, wall squat test and Harvard step test. Out of 250 students who participated in the study only 47.6 percent perform physical exercises regularly. More than 50 percent of the students reported the presence of musculoskeletal pains. On measured fitness level, maximum number of students had poor endurance and 23 percent students were underweight. However, the students performed good on flexibility and strength testing. The physical fitness level of students is not satisfactory as compared to the physical demands of the profession. The measured fitness levels are less than the perceived levels.

Kaminska Irena et al [12] did a study to evaluate physical activity relation to health-related physical fitness in students. All participants filled in physical activity questionnaire about duration of their daily activities of slow walking, fast walking, sport exercises at university and additional sport exercises. Health-related physical testing included several core components: aerobic and/or cardiovascular fitness, body composition, abdominal muscle strength and endurance, and lower back and hamstring flexibility. Results showed there were significant

differences between physical activity level of Physical Education students and Physiotherapy students. Physical activity positively correlates with waist-to hip-ratio, muscle mass, grip strength and cardio-respiratory fitness parameters, and negatively with body fat. Levels of aerobic capacity, trunk flexors endurance and trunk extensors endurance were statistically different in different groups of physical activity levels, in the present study too.

The fitness levels required by the physiotherapy professional are high due to professional demands and also because physiotherapy professionals are projected as fitness expert in the society [9]. Physiotherapy Students needs to change their level of physical activity as it may improve their physical fitness level. Physiotherapy students who are physically active and fit have higher chances of doing well in their profession than those who are not physically active in their daily routine life. Physiotherapy is a profession which requires physical activity and adequate level of physical fitness.

Future studies can be conducted to find out the musculoskeletal discomfort in physiotherapists according to their level of physical activity and fitness levels, and to find out the stress and anxiety level in physiotherapist who are involved in no or low level of physical activity and correlate with their fitness levels.

## CONCLUSION

Low to moderate level of physical activity was found among physiotherapy students. There is a difference in aerobic capacity, Trunk flexor endurance and Trunk extensor endurance in Physiotherapy students who were physically active in their routine life and thus better physical fitness, compared to those with lower levels of physical activity. The body mass Index was in the overweight category for Asians with no significant difference in three groups.

**Conflicts of interest: None**

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