

# Assessment of Physical Fitness Among Physical Therapy Students

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**Abstract**— This study goals are to determine physical well-being among physical therapy students and it includes the segments that are cardio-respiratory endurance, muscular endurance. Muscular strength, flexibility, and body composition. It was a cross-sectional survey and (n=500) physical therapy students were part of this study. Mean BMI 21.44 with most of the students (55.4%) found in proper weight category of BMI fitness, mean of waist circumference is 32.11in. and maximum students fall in the light category of BORG scale i-e 65%. Mean of trunk lift 8.37in., motor fitness 47.96, 83% were able to perform right side shoulder stretches while only 54% were able to accomplish the task on the contrary side. 40.2% fall in the category of high fitness in dynamic sit ups and 56.4% fall in the same category in motor fitness. 81.8% were found in high fitness category of right shoulder & neck mobility and 71% on the left were found to be highly fit. 58.8% were having no cardiovascular risk according to the measurements of waist circumference.

**Index Terms**— ALPHAFIT, exercise, fitness Gram, physical activity, Physical fitness.

## I. INTRODUCTION

"Well being is riches" and Health is superior to anything riches" are outstanding and frequently rehashed expressions. These underline an essential unavoidable truth. Without great well being nothing is of much utilize. In the event that any sensible individual is asked what he would favor, well being or riches. He would quickly reply 'well-being'. Without great well being and physical fitness, life would into a weight and a dull thing. It additionally implies being sound as a main priority too. So, Good well being implies not just a condition of non-attendance of ailment in the body however a total physical, mental, social and additionally otherworldly prosperity of an individual. Well being goes far, much more remote than riches and some other thing in life. It is a certain key to progress. Without physical wellness and great well being no good thing or generous can be achieved. In sports exercises students involving themselves every week improves students' emphasis on school work, and also allow them to live more joyful, valuable lives. Normal physical action in youth and immaturity is critical for evolving long lasting well being and avoiding different well being conditions. The US Physical Activity Guidelines in 2008 for

Americans propose that youngsters and teenagers matured 6 to 17 years must have an hour (60 minutes) or a better amount of physical action each day. Physical inactivity also contributes to an increasing tobacco use and poor nutrition and diet. A lack of physical activity is one of the foremost causes of avoidable death worldwide.

## COMPONENTS OF PHYSICAL FITNESS:

In physical fitness there are five well-being related segments: cardio-respiratory endurance, muscular endurance, flexibility, body composition and muscular strength.

## CARDIO-RESPIRATORY ENDURANCE:

It is the ability to perform considerable muscle action, entire body practice at direct to high powers for prolonged tenures. Various terms have been utilized to indicate this segment of physical fitness, including aerobic fitness and aerobic capacity. Cardio-respiratory endurance can be evaluated in an assortment of ways and have an extensive variety of accuracy.

Assessment of cardio-respiratory endurance: It can be evaluated either in labs or in fields. Laboratory tests incorporate reviewed practice test and measuring VO<sub>2</sub>max. VO<sub>2</sub>max is ordinarily measured while a man performs maximal, evaluated practice on a treadmill or cycle ergo meter. The most normally utilized field tests include distance/timed runs of differing length (6 Minute walk test/ MWT or 400 meter walk test) and reviewed pace carry runs. 6MWT ought to be performed inside, along a long, flat, straight, encased hall with a hard surface that is rarely voyage. The strolling course should be 30 m long. A 100-ft passage is, subsequently, required. The length of the passageway ought to be denoted each 3 m. The pivot focuses ought to be set apart with a cone. After the test is performed, general weakness utilizing BORG SCALE is measured.



Fig. 1

**MUSCULAR STRENGTH:**

It is the maximal strength testing incorporates jump and reach test and estimation of trunk extensor quality utilizing trunk lift test.

**Assessment of muscular strength:**

Hand grip testing measures static grasp quality. An aligned hand dynamo-meter with customizable grasp is utilized. The subject remains in a straight upright position with the dynamometer in the favored hand. The arm is straight with the body. The grasp of the dynamo-meter is acclimated to the extent of the hand to take the second joint of the forefinger around to a correct point.



Fig. 2

Trunk lift: The point of the test is to lift the abdominal area off the floor using the muscles of the back and hold the position for some time. The subject lies on the couch in a prone position. Place a marker on the floor in line with the client's eyes (a coin or other marker), over which he subject would keep continuing focusing till the end (to enable keep to head in arrangement). Whenever prepared, the client lifts the abdominal area off the floor, in a moderate and controlled way, to a most extreme tallness of 12 inches. The head ought to be kept up in a straight alignment with the spine. The most extreme score on this test is 12 inches; a value over this separation is recorded as 12 inches.



Fig. 3

**MUSCULAR ENDURANCE:**

It is the capacity to support, or rehash strong action over time. It parts into three spaces: upper body endurance testing, core endurance testing and lower body endurance testing.

Assessment of muscular endurance: Dynamic sit up: The client is laying on the couch with face up position, knees flexed to 90 degrees (knees and lower legs together). The analyzer underpins lower legs with his/her hands so that amid the test exhibitions feet of the client remain on the gym tangle. 5 reiterations of sit-ups are executed in 3 distinctive test levels (hand positions) as takes after: The initial 5 sit-ups: The point is to reach mid patella with fingertips of our hands from a straight laying position although the arms held straight and palms resting on thighs. The 2<sup>nd</sup> five sit-ups: cross our arms over the chest. The point is to achieve thighs with the b0th elbows. The last five sit-ups: Touch at back of ear cartilage with the tips of fingers. The point is to t0uch thighs with elbows. The test score is the quantity of correctly executed sit-ups (0-15).



Fig. 4



Fig. 5

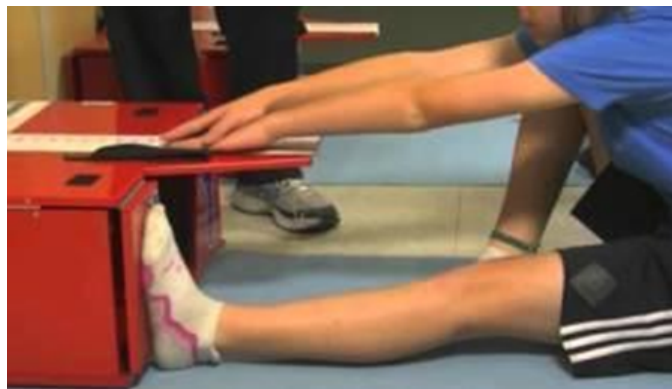


Fig. 7



Fig. 6

#### FLEXIBILITY:

It portrays the scope of movement of muscles at joint. It comprises of two testing strategies upper back flexibility that is measured by shoulder stretches while back saver sit and reach test lower back flexibility measured by

#### Assessment of flexibility:

**Back saver sit & reach test:** This tests just measures the adaptability of the lower back and hamstrings. Shoes ought to be expelled first. Client sits On the floor with right leg out straight and the other leg with the knee bowed and its foot level on the floor. The spread-out foot is set even against the estimation box. Setting the hands over each other and palms pronated, the subject reaches progressively forward along the measuring. After 3 trials, the fourth reach is apprehended for not as much of than one moment while the distance is recorded. The subject may rehash the test at least 3 times and the best score taken. The score is recorded to the accurate cm. or half inch as the separation came to by the tip of the fingers.

**Shoulder stretches:** This test is performed in the standing position. Subject places left hand behind the head and back over the shoulder, and reach beyond what many would consider possible down at the center of your back, your palm of hand touching your body and the fingers in downward direction. Place the other arm behind the back, palm facing outward and fingers upward direction and reaching up beyond what many would consider possible endeavoring to touch the fingers of each hand. Check whether the subject can touch their fingers. Test the right and left shoulders. The score noted down as either a NO or YES, for each side.



Fig. 8

Shoulder and neck mobility testing: The client stands with his back against the wall; the feet ought to be put at a distance of about half foot length from the partition. The butt, back and scapula lean against the divider. The analyzer demonstrates the right execution. No training is permitted. There is just a single test trial. Outcome is independently scored for the privilege and left sides.



Fig. 9

**BODY COMPOSITION:** structure of body alludes to the division of aggregate body weight (mass) into parts, most usually fat mass and without fat mass.

Assessment of body composition: waist circumference: A pointer is utilized to check the accompanying anatomic locales on the skin of the subject. The measuring tape is put round the body somewhere between the imprints evenly, with the goal that the tape is tight around the body yet does not press into the skin. The client is standing in an upright position with feet 20-30 cm wide separated before the analyzer, client must follow the normal breathing pattern. Result is perused in light exhalation and it is the mean of the three estimations adjusted to the closest 0.5cm. In the event that these 3 estimations contrast more than 1 cm from each other, 2 extra estimations are performed.



Fig. 10

**Body mass index:** Height and weight are being measured & the scores are adjusted to the closest 0.5 cm and 0.5 kg. Weight is documented, using the scale. To figure BMI, weight taken in kilograms is partitioned by height in squared meter.

$$\text{BMI} = \text{kg/m}^2.$$

Another Segment of physical wellness incorporated into ALPHA-FIT BATTERY is Motor fitness.

#### MOTOR FITNESS ASSESSMENT:

**One leg stand test:** It measures the control of our posture while the territory of help is lessened. The client can pick the leg to stand on by himself. The rear area of the contrary foot is set at knee against the inward side of the supporting leg (heel at the level of the knee joint) with the goal that thigh is pivoted outwards. Arms hanging loose aside while the eyes are open. The maximal span of the test is six seconds.



Fig. 11

No reporting of physical fitness using objective tools and there's no evidence that shows the usage of all objective tools and all components of physical fitness.

Objectives of study:

- A. To determine body composition, Aerobic Capacity, Abdominal Strength, Flexibility & endurance of students.
- B. To determine Motor fitness of students.
- C. To determine MSK fitness of students & o determine Trunk extensor strength and flexibility of students.

## II. MATERIALS AND METHODS:

Design:

This was cross-sectional survey to determine the physical fitness among physical therapy students of twin cities.

Source of data:

- A. MIHS (Margalla institute of health Sciences),
- B. IMDC (Islamic international medical and dental college Islamabad)
- C. Shifa Tameer e Milat University.

Duration:

This study was completed in 6 months.

Sampling technique:

- A. The sampling technique used here was non probability, convenience sampling (includes study units that happened to be available at the time of data collection.)

Sample size:

- B. The total sampling size was about 500 which included university students.

Data collection tool:

- C. A questioner was used , which was sectioned into students demographic data whereas components like flexibility and trunk extensor strength and flexibility were derived from fitnessGram while other domains were assessed using ALPHAFIT Battery.

Sample criteria:

- D. The sample was based on young healthy physical therapy university students of age 17 to 30, male, female, married, unmarried were included in the study.
- E. Inclusion criteria:
- F. Students with age 17-30 years
- G. Physical therapy students.
- H. Both genders.
- I. Physical therapy students of twin cities.
- J. Students willing to participate.

Exclusion criteria:

- A. Students with any diagnosed disease, disability or any MSK disorder.
- B. Students with any psychological illness.
- C. Students unable to comprehend and adhere to our test instructions.

Data collection tools:

Flexibility and trunk extensor strength and flexibility components were derived from fitness Gram while other domains were assessed using ALPHAFIT Battery.

Statistical analysis:

In this study we have calculated mean values and standard deviations for the average values

Mean (X): It provides us the average usual value of the whole range of given data. Its value is attained by adding all the items & by dividing this total by number of items.

The formula used is:

$$X = \frac{\sum X}{N}$$

1. Were, X = Arithmetic Mean
2.  $\sum$  = Sum of all the variables
3. N = Number of observations

Standard Deviation (SD):

It measures the absolute distribution (or variability of distribution). The smaller the amount of variability or dispersion, the lesser the standard deviation will be. It indicates magnitude's deviations of the values as of their mean. It can be calculated using the formula:

$$s = \sqrt{\frac{1}{(N-1)} \sum_{(i=1)}^N xi - \bar{x}}$$

Suggests,  $\sum_{(i=1)}^N xi - \bar{x}$  = Square of sum of deviation of variables from the mean

N = Number of observations.

## III. RESULTS

### BODY COMPOSITION OF STUDENTS.

TABLE III  
BODY COMPOSITION

Body composition	mean±S.D
BMI score	21.43±4.24
Waist circumference(inches )	32.11±3.57

TABLE IV  
WAIST CIRCUMFERENCE ACCORDING TO CV RISK

Evaluation was done for measuring CV risk according to waist circumference.

The table shows a vast majority of participants had no CV risk according to their waist circumference and they comprised 58.8%. Moderate CV risk constituted about 26.6%. Clearly elevated risk was found to be 14.6%.

Waist circumference CV Risk	
No risk	58.8%
Moderate risk	26.6%
Clearly elevated risk	14.6%

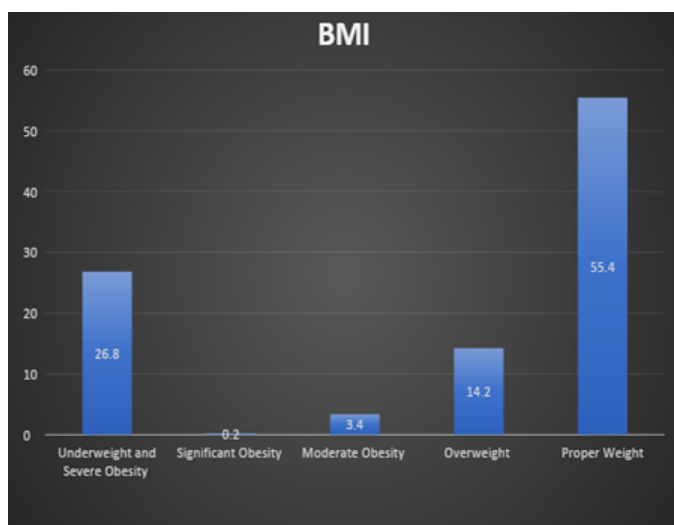


Fig. 14

Above chart shows about different categories of BMI. Majority were found in proper weight category of BMI, having a percentage of 55.4%. Underweight and severe obesity had same percentage i-e 26.8%. 14.2% in over-weight category and 3.4% in moderate obesity. While significant obesity was found in 0.2% students.

**AEROBIC CAPACITY**

Table no. 5 – aerobic capacity

This component of ALPHA FIT battery was measured by using BORG SCALE. A scale that measures rate of perceived exertion. 6 min walk test was done for aerobic capacity and at the end of the test, level of exertion was checked using this particular scale.

The table and chart illustrates the percentages of students according to the level of exertion they felt. Majority of them experienced light exertion i-e 65% & 0.6% felt no exertion.

Borg Scale	
No exertion	0.6%
Light	65%
Somewhat hard	30%
Hard	4.4%

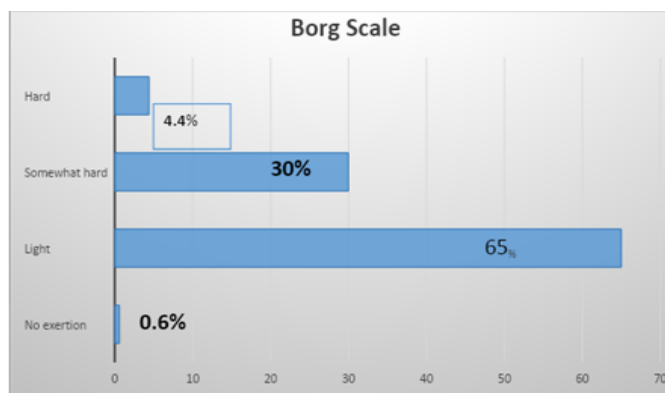


Fig. 15

**FLEXIBILITY**

Another component of physical fitness is flexibility. It was measured by performing shoulder stretches and back saver sit and reach test.

Following pie chart and table shows the percentage of students who were able to perform this test. 83% of participants were able to accomplish the task while 17% failed to touch tip of fingers on right side.

TABLE VI  
SHOULDER STRETCHES (RIGHT)

Yes	82.6%
No	17.4%

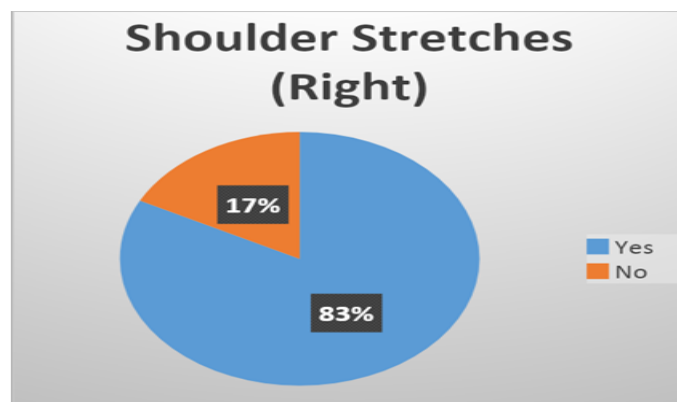


Fig. 16

Following pie chart and table shows the percentage of students who were able to perform this test on left side.54% were able to accomplish the task while 46% failed to perform.

TABLE VII  
SHOULDER STRETCHES (LEFT)

Yes	54%
No	46%

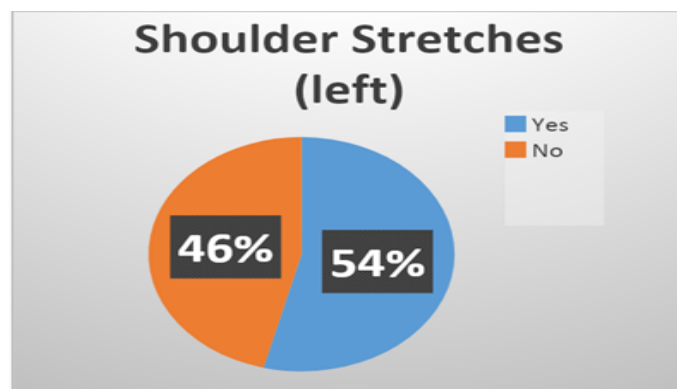


Fig. 17

Another sub-category of flexibility is back saver sit and reach test. It is a measure of lower back flexibility, by keeping back straight, one leans forward and measurement is taken by using a measurement scale.

Following table illustrates the readings, when the test is performed on both sides (right and left). Mean of 6.46 was found on right side with standard deviation of 2.88. While on the contrary side mean was found to be 6.61 with standard deviation of 2.84.

Back Saver Sit and Reach test (Right)	mean±S.D 6.46±2.88
Back Saver Sit and Reach test (Left)	mean±S.D 6.61±2.84

ABDOMINAL STRENGTH AND ENDURANCE

Component of physical fitness that measures the strength of abdominals is named as abdominal strength and endurance. It has 3 levels with 5 repetitions each.

Following pie chart and table shows 3 fitness categories of dynamic sit ups.40.2% were found in high fit and low fit category of fitness. While 19.6% in mid fit category.

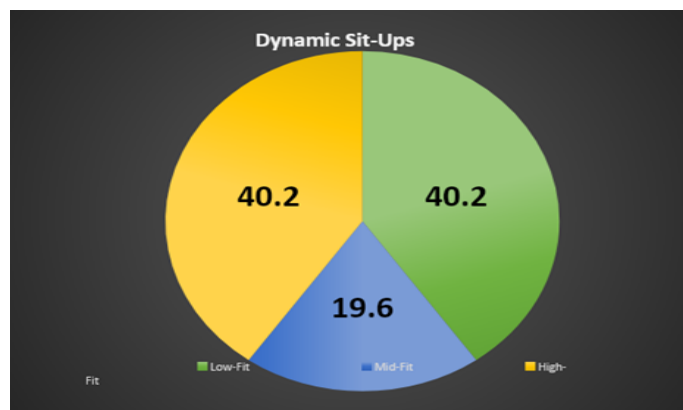


Fig. 18

TABLE IIX  
ABDOMINAL STRENGTH AND ENDURANCE

Low-Fit	40.2%
Mid-Fit	19.6%
High-Fit	40.2%

MOTOR FITNESS

Another component uses a test one leg stand for measuring motor fitness. This test actually measures the balance with a duration of 60 seconds.

Following table and chart shows different fitness categories of this particular test. Participants able to maintain balance without assistance for 60 seconds were in high fit category, with percentage of 56.4%. Mid fit category constituted about 24.8% and low fit category having 18.8% population.

TABLE IX  
MOTOR FITNESS

Low-Fit	18.8
Mid-Fit	24.8
High-Fit	56.4

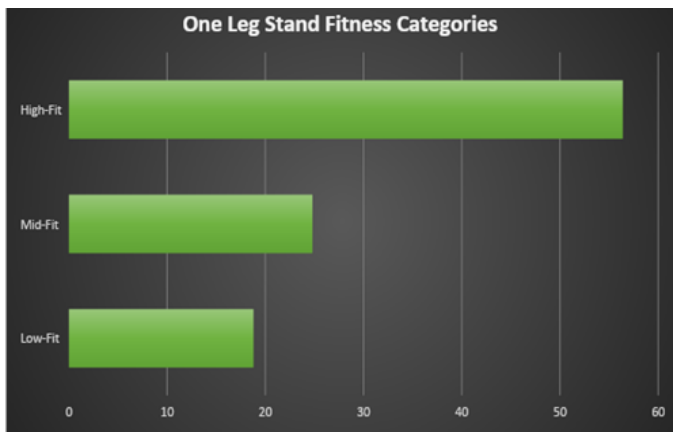


Fig. 19

**TRUNK EXTENSOR STRENGTH AND FLEXIBILITY**

Second last component of fitness includes trunk extensor strength and flexibility. This is assessed by performing a trunk lift test in prone position and participant is asked to lift his/her upper trunk. Mat to chin measurement is taken using a scale.

The chart illustrates that mean of 8.37 was found while performing trunk lift (indicating that most were able to lift their trunk up to 8 inches) and with standard deviation of 2.02.

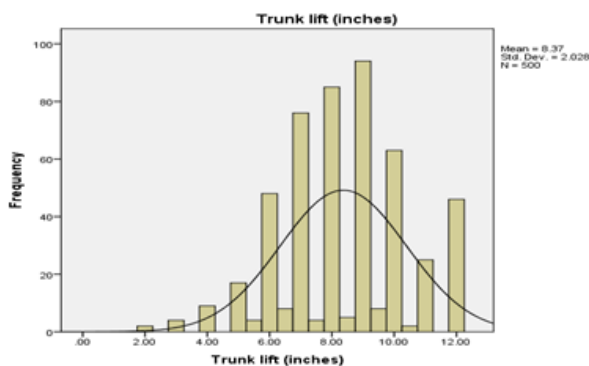


Fig. 20

**MSK FITNESS**

Last component of physical fitness is MSK fitness which is assessed by performing shoulder and neck mobility testing on both sides. Participant stands against a wall and is given a command to elevate shoulders and try to touch his/her dorsum of hand against wall.

Following table shows the percentages of students found in different fitness categories. 81.8% on right side and 71.6% on left side were found in high fit category.

TABLE X  
MSK fitness

Shoulder and Neck Mobility (Right)	Shoulder and Neck Mobility (Left)
1.2%	2.8%
17%	25.6%
81.8%	71.6%

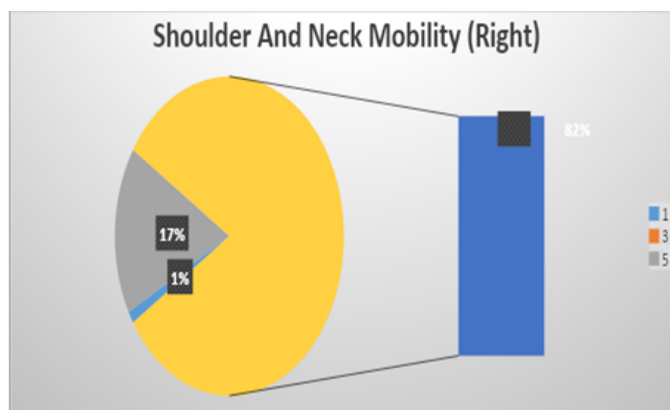


Fig. 21

Above pie chart shows distribution of students in different fitness categories of shoulder and neck mobility test. Majority of students were found to be in high fit category, which means they were able to touch whole dorsum of hand against wall and they constituted about 82% population. 1% in low fit category and 17% in mid fit category on right side.

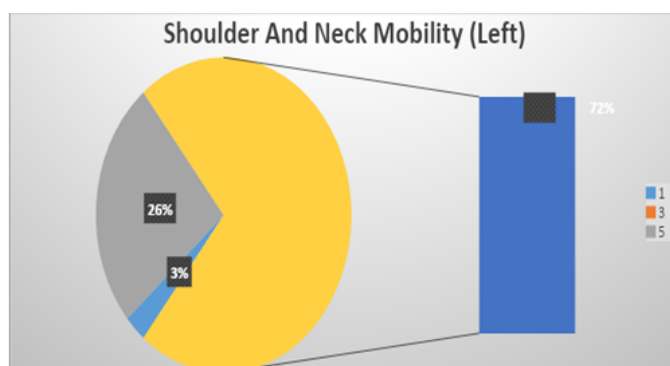


Fig. 22

Above pie chart shows distribution of students in different fitness categories of shoulder and neck mobility test. Majority of students were found to be in high fit category i.e 71% . Mid fit category having 26% population and 3% in low fit category on left side.

#### IV. CONCLUSION

It is concluded that in most of the components of physical fitness there is significant difference among male and female students. Whereas there is no significant difference of right side flexibility of hamstrings in male and female students. And results also shows no significant difference of Aerobic Capacity among male and female students.

#### V. DISCUSSION:

Many studies support the use of ALPHA-FIT test battery and fitness gram for assessing physical fitness of students. (8, 10, 11) Aries.L(2008)suggested obese and overweight children have low PF level compared to normal weight peers. These findings are consistent with our study. (10)

Joshi (2012) found 60% had healthy BMI's, overweight 18%, obese 22% & 1% were underweight. While in our study 55% were having proper weight, 14.2% overweight & 26.8% were obese and underweight. Girls had higher percentages of obtaining HFZ in shoulder stretches, but no significant difference was found in our findings are consistent with our study. (13)

In our study mean of almost 6.5 was found in back saver sit and reach test and was found low for boys as compared to Girls. But according to Jennie Gilbert (2009), it was extremely poor for boys and girls with coefficient of 0.58 for right leg and 0.22 for left leg. (14)

Hatem Alameri (2009) suggested that small but significant difference was found in Borg scale values 13 while in our study 65% were under the light category of Borg and had non-significant difference. (15)

Joshi and Praphul 2012 suggested that boys have higher percentages Of participants in HFZ for curl ups 11 while in our study equal proportion Was found in low and high fitness category with a mean of 9.79 i.e. (201 in low and high fit & 98 in mid fit). (13)

Same study suggested that 80.1% were in HFZ of trunk lift(9-12) while we founded mean Equivalent to 8.37 which indicates most student Fall below HFZ. (13)

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