



## NORMS CONSTRUCTION AND GRADING FOR PHYSICAL FITNESS TEST ITEMS

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### **Abstract:**

The present study was conducted to construct norms for selected physical fitness test items of handball players. For the purpose of the present study, forty eight (N=48), male Handball players of Panjab University, Chandigarh between the age group of 18-25 years were selected as subjects. The Muscular Strength was measured by Handgrip Strength Test, Muscular Power was measured by Vertical Jump Test, Muscular Endurance was measured by Pull-Up Test, Running Speed was measured by 20-Meter Dash, Running Agility was measured by Illinois Agility Test, Jumping Ability was measured by Standing Long Jump Test, Throwing Ability was measured by Overhead Medicine Ball Throw Test, Flexibility was measured by Sit and Reach Flexibility Test and Balance was measured by Stork Balance Stand Test. The data, which was collected by administering tests, was statistically treated to develop for all the test items. In order to construct the norms, Percentile Scale was used. Further, the scores were classified into five grades i.e., very good, good, average, poor and very poor. In Muscular Strength, the mean score was 49.562 and standard deviation score was 3.679. In Muscular Power, the mean score was 48.062 and standard deviation score was 2.276. In Muscular Endurance, the mean score was 6.958 and standard deviation score was 1.098. In Running Speed, the mean score was 4.6354 and standard deviation score was 0.143. In Running Agility, the mean score was 17.606 and standard deviation was 0.834. In Jumping Ability, the mean score was 2.7260 and standard deviation was 0.415. In Throwing Ability, the mean score was 13.562 and standard deviation score was 0.976. In Flexibility, the mean score was 4.625 and standard deviation score was 0.832. In Balance, the mean score was 46.354 and standard deviation score was 1.561 of Panjab University, Chandigarh.

**Keywords:** norms, muscular strength, muscular power, muscular endurance, running speed, running agility, jumping ability, throwing ability, flexibility and balance

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## 1. Introduction

There is consensus that regular physical activity (PA) can improve physical fitness (PF) and health and assist in the prevention of disease (S. N. Blair & T. S. Church, 2004). Several studies have shown that physically active adults are healthier and have a higher PF than inactive adults throughout different nations and populations groups (Kuh et al., 2005, Dionne et al., 2003). Physical activity is therefore promoted as part of a healthy lifestyle (World Health Organization, 2010).

There are more than fifteen battery tests for the assessment of the physical fitness of children and adolescents and several key components of physical fitness currently in use worldwide (Castro-Pinero et al., 2010).

There have been many studies in team sports linking fitness and/or anthropometric test scores to playing level and success in sports such as American football, (Fry A, & Kraemer W, 1991; Black W, & Roundy E, 1994) soccer, (Abrantes C, Macas V, Sampaio J, 2004) rugby union, (Quarrie KL, Handcock P, Waller AE, 1995) Australian rules football, (Young WB, Pryor L, 2007) field hockey, (Keogh JW, Weber CL, Dalton CT, 2003) volleyball (Gualdi-Russo E, Zaccagni L., 2001) and basketball (Drinkwater EJ, Hopkins WG, McKenna MJ, 2007; Hoare DG, 2000).

## 2. Material and Methods

### 2.1 Selection of Subjects

For the purpose of the present study, forty eight (N=48), male Handball players of Panjab University, Chandigarh between the age group of 18-25 years were selected as subjects.

## 3. Selection of Variables

The research investigator reviewed all the available scientific literature books, journals, periodicals, magazines and research papers pertaining to the study. Taking into consideration of the importance of variables and the relevance of the study the following variables were selected for this investigation.

### 3.1 Physical Fitness Test Items:

- a) muscular strength;
- b) muscular power;
- c) muscular endurance;
- d) running speed;
- e) running agility;
- f) jumping ability;
- g) throwing ability;
- h) flexibility;
- i) balance.

### 3.2 Procedure

The Muscular Strength was measured by Handgrip Strength Test, Muscular Power was measured by Vertical Jump Test, Muscular Endurance was measured by Pull-Up Test, Running Speed was measured by 20-Meter Dash, Running Agility was measured by Illinois Agility Test, Jumping Ability was measured by Standing Long Jump Test, Throwing Ability was measured by Overhead Medicine Ball Throw Test, Flexibility was measured by Sit and Reach Flexibility Test and Balance was measured by Stork Balance Stand Test.

### 4. Statistical Analysis

The data, which was collected by administering tests, was statistically treated to develop for all the test items. In order to construct the norms, Percentile Scale was used. Further, the scores were classified into five grades i.e., very good, good, average, poor and very poor.

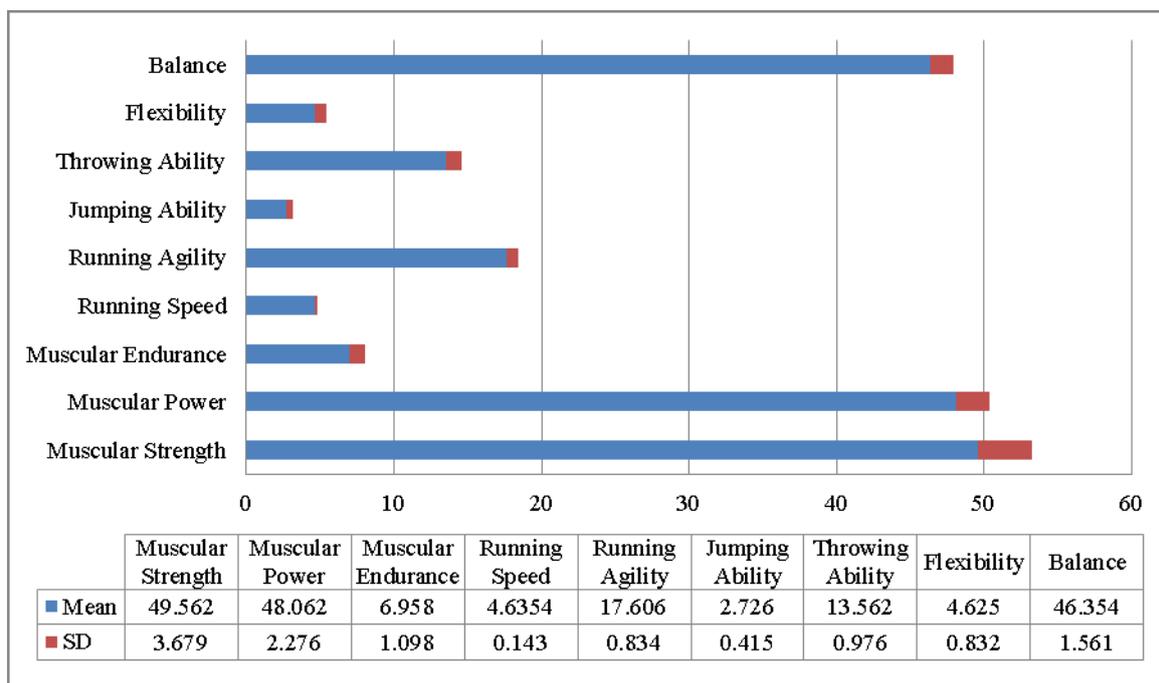
### 5. Results

For each of the chosen variable, the result pertaining to Descriptive Statistics (Mean & Standard Deviation) and Percentile Plot (Hi & Low) of selected physical fitness test items of handball players are presented in the following tables:

**Table 1:** Descriptive Statistics (Mean & Standard Deviation) and Percentile Plot (Hi & Low) of selected Physical Fitness Test Items of Panjab University, Chandigarh (N=48)

Sr. No.	Test Items	Mean ± Standard Deviation		Hi	Low
1.	Muscular Strength	Mean	49.562	57	42
		SD	3.679		
2.	Muscular Power	Mean	48.062	53	42
		S.D	2.276		
3.	Muscular Endurance	Mean	6.958	9	5
		SD	1.098		
4.	Running Speed	Mean	4.6354	4.9	4.2
		SD	0.143		
5.	Running Agility	Mean	17.606	19.4	15.9
		SD	0.834		
6.	Jumping Ability	Mean	2.7260	3.36	1.70
		SD	0.415		
7.	Throwing Ability	Mean	13.562	15	11
		SD	0.976		
8.	Flexibility	Mean	4.625	6	3
		SD	0.832		
9.	Balance	Mean	46.354	49	43
		SD	1.561		

Table 1 shows that in Muscular Strength, the mean score was 49.562 and standard deviation score was 3.679. In Muscular Power, the mean score was 48.062 and standard deviation score was 2.276. In Muscular Endurance, the mean score was 6.958 and standard deviation score was 1.098. In Running Speed, the mean score was 4.6354 and standard deviation score was 0.143. In Running Agility, the mean score was 17.606 and standard deviation was 0.834. In Jumping Ability, the mean score was 2.7260 and standard deviation was 0.415. In Throwing Ability, the mean score was 13.562 and standard deviation score was 0.976. In Flexibility, the mean score was 4.625 and standard deviation score was 0.832. In Balance, the mean score was 46.354 and standard deviation score was 1.561 of Panjab University, Chandigarh.



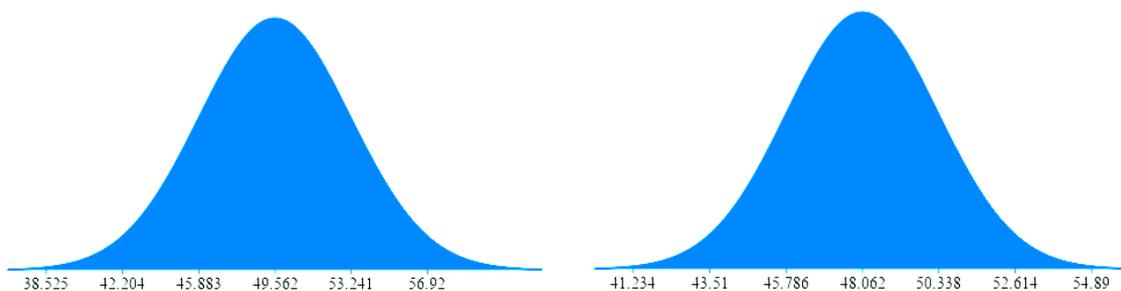
**Figure 1:** Descriptive Statistics (Mean & Standard Deviation) and Percentile Plot (Hi & Low) of selected Physical Fitness Test Items of Panjab University, Handball players

**Table 2:** Grading for the selected Physical Fitness Test Items of Panjab University, Chandigarh (N=48) Handball players

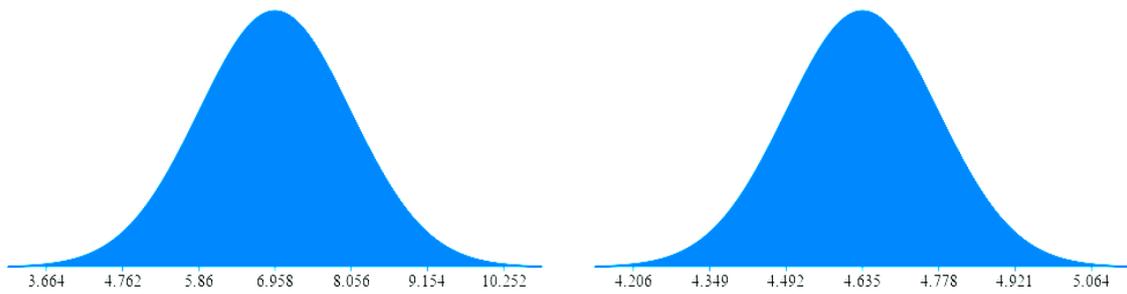
Test Items	Very Poor	Poor	Average	Good	Very Good
Muscular Strength	Less than (<) 42.204	42.204-45.883	45.883-53.241	53.241-56.92	Greater than (>)56.92
Muscular Power	Less than (<) 43.51	43.51-45.786	45.786-50.338	50.338-52.614	Greater than (>)52.614
Muscular Endurance	Less than (<) 3.253	3.253-5.86	5.86-8.056	8.056-9.154	Greater than (>)9.154
Running Speed	Greater than (>)4.921	4.921-4.778	4.778-4.492	4.492-4.349	Less than (<) 4.349
Running Agility	Greater than (>)19.274	19.274-18.44	18.44-16.772	16.772-15.938	Less than (<) 15.938
Jumping Ability	Less than (<) 1.896	1.896-2.311	2.311-3.141	3.141-3.556	Greater than (>)3.556
Throwing Ability	Less than (<)	11.61-	12.586-	14.538-	Greater than

	11.61	12.586	14.538	15.514	(>)15.514
Flexibility	Less than (<) 2.961	2.961- 3.793	3.793- 5.457	5.457- 6.289	Greater than (>)6.289
Balance	Less than (<) 43.232	43.232- 44.793	44.793- 47.915	47.915- 49.476	Greater than (>)49.476

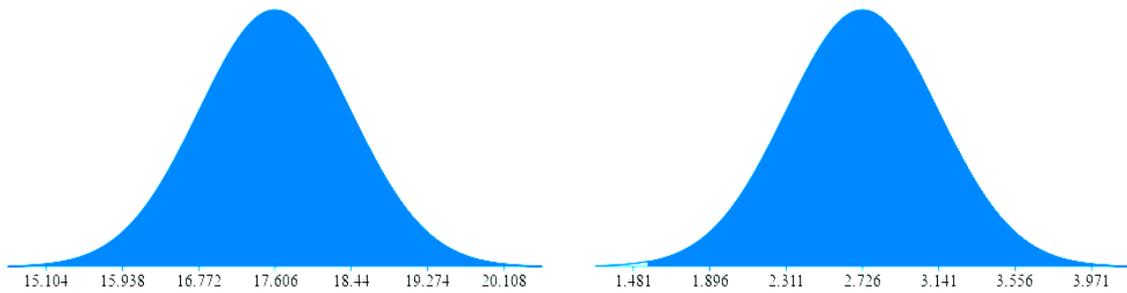
The values listed in Table 2 gives a guide to expected scores of Panjab University, Chandigarh for the selected Physical Fitness Test Item. In Muscular Strength, the scores below 42.204 are considered very poor, from about 42.204-45.883 is considered poor, 45.883-53.241 is considered average, 53.241-56.92 is considered good and the scores above 56.92 are considered very good. In Muscular Power, the scores below 43.51 are considered very poor, from about 43.51-45.786 is considered poor, 45.786-50.338 is considered average, 50.338-52.614 is considered good and the scores above 52.614 are considered very good. In Muscular Endurance, the scores below 3.253 are considered very poor, from about 3.253-5.86 is considered poor, 5.86-8.056 is considered average, 8.056-9.154 is considered good and the scores above 9.154 are considered very good. In Running Speed, the scores above 4.921 are considered very poor, from about 4.921-4.778 is considered poor, 4.778-4.492 is considered average, 4.492-4.349 is considered good and the scores below 4.349 are considered very good. In Running Agility, the scores above 19.274 are considered very poor, from about 19.274- 18.44 is considered poor, 18.44-16.772 is considered average, 16.772-15.938 is considered good and the scores below 15.938 are considered very good. In Jumping Ability, the scores below 1.896 are considered very poor, from about 1.896-2.311 is considered poor, 2.311-3.141 is considered average, 3.141-3.556 considered good and the scores above 3.556 are considered very good. In Throwing Ability, the scores below 11.61 are considered very poor, from about 11.61-12.586 is considered poor, 12.586-14.538 is considered average, 14.538-15.514 is considered good and the scores above 15.514 are considered very good. In Flexibility, the scores below 2.961 are considered very poor, from about 2.961-3.793 is considered poor, 3.793-5.457 is considered average, 5.457-6.289 is considered good and the scores above 6.289 are considered very good. In Balance, the scores below 43.232 are considered very poor, from about 43.232-44.793 is considered poor, 44.793-47.915 is considered average, 47.915-49.476 is considered good and the scores above 49.476 are considered very good.



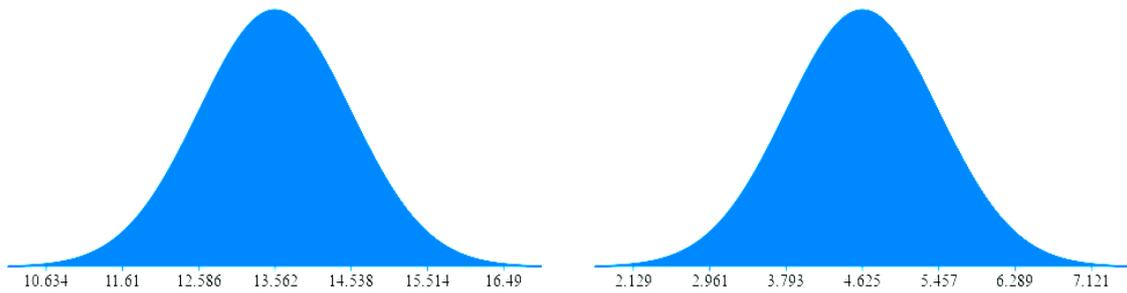
(a) (b)



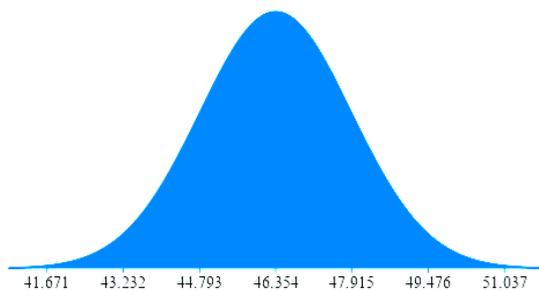
(c) (d)



(e) (f)



(g) (h)



(i)

**Figure 2:** Normal distribution of selected Physical Fitness Test Items (i.e., a. Muscular Strength, b. Muscular Power, c. Muscular Endurance, d. Running Speed, e. Running Agility, f. Jumping Ability, g. Throwing Ability, h. Flexibility & i. Balance) of Panjab University, Chandigarh (N=48) for Handball players

## 6. Conclusions

1. To conclude, it is evident that in Muscular Strength, the scores below 42.204 are considered very poor, from about 42.204-45.883 is considered poor, 45.883-53.241 is considered average, 53.241-56.92 is considered good and the scores above 56.92 are considered very good.
2. To conclude, it is evident that in Muscular Power, the scores below 43.51 are considered very poor, from about 43.51-45.786 is considered poor, 45.786-50.338 is considered average, 50.338-52.614 is considered good and the scores above 52.614 are considered very good.
3. To conclude, it is evident that in Muscular Endurance, the scores below 3.253 are considered very poor, from about 3.253-5.86 is considered poor, 5.86-8.056 is considered average, 8.056-9.154 is considered good and the scores above 9.154 are considered very good.
4. To conclude, it is evident that in Running Speed, the scores above 4.921 are considered very poor, from about 4.921-4.778 is considered poor, 4.778-4.492 is considered average, 4.492-4.349 is considered good and the scores below 4.349 are considered very good.
5. To conclude, it is evident that in Running Agility, the scores above 19.274 are considered very poor, from about 19.274- 18.44 is considered poor, 18.44-16.772 is considered average, 16.772-15.938 is considered good and the scores below 15.938 are considered very good.
6. To conclude, it is evident that in Jumping Ability, the scores below 1.896 are considered very poor, from about 1.896-2.311 is considered poor, 2.311-3.141 is considered average, 3.141-3.556 considered good and the scores above 3.556 are considered very good.
7. To conclude, it is evident that in Throwing Ability, the scores below 11.61 are considered very poor, from about 11.61-12.586 is considered poor, 12.586-14.538 is considered average, 14.538-15.514 is considered good and the scores above 15.514 are considered very good.
8. To conclude, it is evident that in Flexibility, the scores below 2.961 are considered very poor, from about 2.961-3.793 is considered poor, 3.793-5.457 is considered average, 5.457-6.289 is considered good and the scores above 6.289 are considered very good.
9. To conclude, it is evident that in Balance, the scores below 43.232 are considered very poor, from about 43.232-44.793 is considered poor, 44.793-47.915 is considered average, 47.915-49.476 is considered good and the scores above 49.476 are considered very good.

## 7. Recommendations

Physical education teachers, coaches and athletic trainers may utilize the findings of handball players.

The study can be broadened by involving players of different performance levels (i.e. state, national, and international).

A similar study may be undertaken using larger sample for overall better consistency of result.

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