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Construction of physical fitness test battery norms of volleyball players

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Abstract

The present study was conducted to construct Physical Fitness Test Battery Norms of Volleyball Players. For the purpose of the present study, Eight Hundred (N=800), Male Volleyball Players of under-14 years were selected. 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.

Keywords: Muscular strength, muscular power, muscular endurance, running speed, running agility, jumping ability, throwing ability, flexibility, balance

1. Introduction

In volleyball, technical and tactical skills, anthropometric characteristics and individual physical performance capacities are most important factors that contribute to the success of a team in competitions (Hakkinen, 1993) ^[1]. Physiologically, a volleyball game is an intermittent exercise that requires the players to perform frequently short bouts of high-intensity activities such as jump and spike, followed by periods of low-intensity activities (Kuentlinger *et al.*, 1987, Viitasalo *et al.*, 1987) ^[2, 3]. Therefore the players should possess both high aerobic and anaerobic power.

The instant and explosive spiking and blocking over the net are intense enough to trigger anaerobic metabolism which means lactic acid may accumulate in the blood. Moreover, since the match time is not restricted, a match sometimes may last for more than two hours. Therefore, it also requires a high level of aerobic fitness (Chen, 2005) ^[4].

Volleyball is a team sport played at all competitive levels (e.g., youth, Olympic, and professional) and places an emphasis on explosive movements such as jumping, hitting, and blocking (Marques, Gonzalez-Badillo, & Kluka, 2006) ^[5]. It requires players to compete in frequent short bouts of high-intensity exercise, followed by periods of low-intensity activity (Gabbett & Georgieff, 2007) ^[6].

Volleyball players require well-developed muscular strength, power and endurance, speed, agility, and flexibility, and have a high level of jumping ability, fast reaction time and swift movements (She, 1999) ^[7]. Considerable demand is also placed on the neuromuscular system during sprints, jumps (blocking and spiking), and high-intensity court movements that occur repeatedly during competition. Versatility and speediness are the trend of development in modern volleyball sport.

2. Material and Methods

2.1 Selection of Subjects

For the purpose of the present study, Eight Hundred (N=800), Male Volleyball Players of under-14 years were selected.

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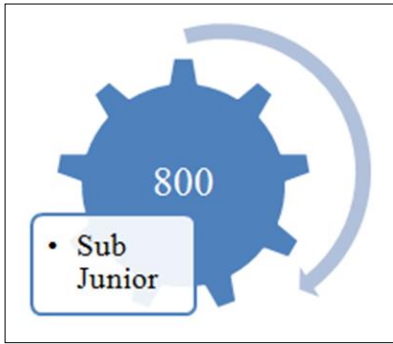


Fig 1: Distribution of Subjects

2.2 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.

1. Muscular Strength
2. Muscular Power

3. Muscular Endurance
4. Running Speed
5. Running Agility
6. Jumping Ability
7. Throwing Ability
8. Flexibility
9. Balance

3. 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.

4. Results

For each of the chosen variable, the result pertaining to Descriptive Statistics (Mean & Standard Deviation) and Percentile Plot (Hi & Low) of Physical Fitness Test Items of Volleyball Players are presented in Table 1:

Table 1: Descriptive Statistics (Mean & Standard Deviation) and Percentile Plot (Hi & Low) of Physical Fitness Test Items of Sub Junior level Volleyball Players (N=800)

S. No.	Test Items	Mean ± Standard Deviation		Hi	Low
1.	Muscular Strength	Mean	27.14	44.3	12.6
		SD	9.946		
2.	Muscular Power	Mean	34.81	40	30
		S.D	3.177		
3.	Muscular Endurance	Mean	4.05	6	2
		SD	1.266		
4.	Running Speed	Mean	4.08	4.20	3.95
		SD	0.0858		
5.	Running Agility	Mean	21.07	21.92	20.01
		SD	0.646		
6.	Jumping Ability	Mean	1.896	2.11	1.60
		SD	0.141		
7.	Throwing Ability	Mean	4.12	6	3
		SD	1.035		
8.	Flexibility	Mean	16.86	20	14
		SD	2.033		
9.	Balance	Mean	15.56	18	13
		SD	1.811		

Table 1 shows that in Muscular Strength, the mean score was 27.14 and standard deviation score was 9.946. In Muscular Power, the mean score was 34.81 and standard deviation score was 3.177. In Muscular Endurance, the mean score was 4.05 and standard deviation score was 1.266. In Running Speed, the mean score was 4.08 and standard deviation score was 0.0858. In Running Agility, the mean score was 21.07

and standard deviation was 0.646. In Jumping Ability, the mean score was 1.896 and standard deviation was 0.141. In Throwing Ability, the mean score was 4.12 and standard deviation score was 1.035. In Flexibility, the mean score was 16.86 and standard deviation score was 2.033. In Balance, the mean score was 15.56 and standard deviation score was 1.811.

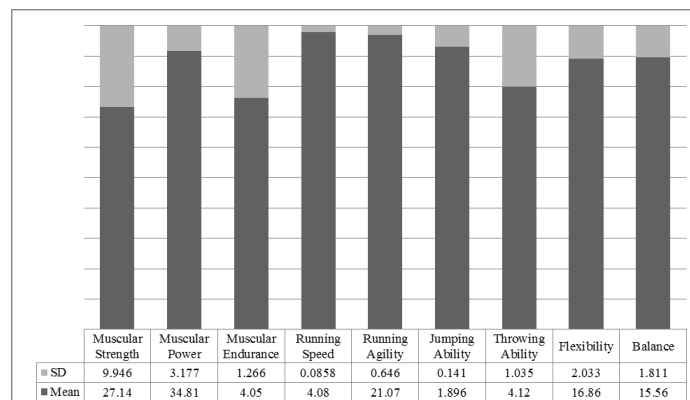


Fig 2: Descriptive Statistics (Mean & Standard Deviation) and Percentile Plot (Hi & Low) of Physical Fitness Test Items of Sub Junior level Volleyball Players (N=800)

Table 2: Distribution of Grades under Normal Distribution for the Physical Fitness Test Items of Sub Junior level Volleyball Players (N=800)

Test Items	Very Poor	Poor	Average	Good	Very Good
Muscular Strength	Less than (<) 7.248	7.248-17.194	17.194-37.086	37.086-47.032	Greater than (>) 47.032
Muscular Power	Less than (<) 28.456	28.456-31.633	31.633-37.987	37.987-41.164	Greater than (>) 41.164
Muscular Endurance	Less than (<) 1.518	1.518-2.784	2.784-5.316	5.316-6.582	Greater than (>) 6.582
Running Speed	Greater than (>) 4.252	4.252-4.166	4.166-3.994	3.994-3.908	Less than (<) 3.908
Running Agility	Greater than (>) 22.362	22.362-21.716	21.716-20.424	20.424-19.778	Less than (<) 19.778
Jumping Ability	Less than (<) 1.614	1.614-1.755	1.755-2.037	2.037-2.178	Greater than (>) 2.178
Throwing Ability	Less than (<) 2.05	2.05-3.085	3.085-5.155	5.155-6.19	Greater than (>) 6.19
Flexibility	Less than (<) 12.794	12.794-14.827	14.827-18.893	18.893-20.926	Greater than (>) 20.926
Balance	Less than (<) 11.938	11.938-13.749	13.749-17.371	17.371-19.182	Greater than (>) 19.182

- In Muscular Strength, the scores below 7.248 are considered very poor, from about 7.248 -17.194 is considered poor, 17.194 -37.086 is considered average, 37.086 -47.032 is considered good and the scores above 47.032 are considered very good.
 - In Muscular Power, the scores below 28.456 are considered very poor, from about 28.456-31.633 is considered poor, 31.633-37.987 is considered average, 37.987-41.164 is considered good and the scores above 41.164 are considered very good.
 - In Muscular Endurance, the scores below 1.518 are considered very poor, from about 1.518-2.784 is considered poor, 2.784-5.316 is considered average, 5.316-6.582 is considered good and the scores above 6.582 are considered very good.
 - In Running Speed, the scores above 4.252 are considered very poor, from about 4.252-4.166 is considered poor, 4.166-3.994 is considered average, 3.994-3.908 is considered good and the scores below 3.908 are considered very good.
 - In Running Agility, the scores above 22.362 are considered very poor, from about 22.362-21.716 is considered poor, 21.716-20.424 is considered average, 20.424-19.778 is considered good and the scores below 19.778 are considered very good.
 - In Jumping Ability, the scores below 1.614 are considered very poor, from about 1.614-1.755 is considered poor, 1.755-2.037 is considered average, 2.037-2.178 is considered good and the scores above 2.178 are considered very good.
 - In Throwing Ability, the scores below 2.05 are considered very poor, from about 2.05-3.085 is considered poor, 3.085-5.155 is considered average, 5.155-6.19 is considered good and the scores above 6.19 are considered very good.
 - In Flexibility, the scores below 12.794 are considered very poor, from about 12.794-14.827 is considered poor, 14.827-18.893 is considered average, 18.893-20.926 is considered good and the scores above 20.926 are considered very good.
 - In Balance, the scores below 11.938 are considered very poor, from about 11.938-13.749 is considered poor, 13.749-17.371 is considered average, 17.371-19.182 is considered good and the scores above 19.182 are considered very good.
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5. Acknowledgements

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6. References

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