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CONSTRUCTION OF NORMS FOR MOTOR FITNESS TEST IN FOOTBALL

Kiran Chougule
Director of Physical Education &
Sports Hirachand Nemchand College Of Commerce Solapur.

ABSTRACT

Background: The purpose of this study is to construct the norms for evaluating performance based on Motor fitness tests of football players age raging between 18 to 23 years and who are studying in affiliated colleges and department of Solapur University, Solapur, Maharashtra, India.

For this purpose six hundred male college level Football players were randomly selected from affiliated colleges and department of Solapur University, Solapur, Maharashtra, India, and their age ranged from 18 to 23 years. The performance of Football players were assessed by using the Motor fitness test battery constructed by Kiran Chougule was chosen for this study.

The data collected by administering tests were summarized using the descriptive statistics like mean, standard deviations, mode, median, minimum, maximum, skewness and kurtosis for better understanding of distribution of test values. The norms were constructed by using 6 sigma (6σ) scale techniques analyzed through SAS. was developed to calculate the athletic potential ability performance scores. As the validity of 6s score is depends on statistical assumption normality, hence the normality assumption was tested for each performance test of football players using the Anderson-Darling test of normality. The histogram and normal probability curve were used for graphical understanding of distribution of performance tests.

Results: The scores were further classified into five grades i.e. excellent, good, average, satisfactory and poor.

KEYWORDS :Football, Motor fitness test, Norms, Scales, Grades.

INTRODUCTION

Through evaluation, a teacher/coach can know the extent to which learning has taken place. Hence, the teacher/coach must be aware of some evaluation techniques, which will enable him to measure the student's/player's fitness level objectively and classify them initially as well as by measuring the progress made by them. There are so many motor fitness tests in various physical activities, which help to measure the fitness level of the students/players in different games and sports motor fitness tests are designed to measure the fitness level of player which is required or demand of that specific sport. The motor fitness items collectively are called test battery. The motor fitness tests helps the students/players to evaluate their fitness level.

Football is a complex sports in which players need technical, tactical and physical skills to succeed. The game consists of two equal periods of 45 minutes, with a fifteen-minute break between. There are eleven players from each team on the field. The players may be divided into four groups: goalkeepers, defenders, midfielders, and forwards. During the game, players are required to perform activities like jogging, running (forward and backward), kicking, receiving, turning, heading and throwing. Individual skills are the key elements to successful. but having fitness can only make a good player better. Fitness is very important for everyone on the field. Therefore, evaluating training is important to improve the fitness of the players to prevent them from fatiguing easily, and to improve the skills and tactics of the game (Dereck Chan. 2008).

The procedure for developing norms starts with the collection of scores on the test from a large samples from the population for which the test was intended. The collected scores can be converted into some type of normative scores. On the basis of these norms performance and achievement can be adequately evaluated, scores can be properly interpreted and groups can be compared.

MATERIALS AND METHODS

For this purpose six hundred male college level Football players were randomly selected from various affiliated Colleges and department of Solapur University Solapur Maharashtra, India and their age ranged from 18 to 23 years. The performance of Football players were assessed by using the motor fitness test battery constructed by Kiran Chougule was chosen for this study.

The motor fitness test was administered to all the subjects by the research scholar with the help of eight specially trained Football coaches and physical education experts. The staff members were oriented with training in the procedures of accurate measuring and recording the scores in each test activity. The scores of each test items were recorded on the basis of performance in test. The subjects were given adequate demonstration, practice trials and required instructions for all the tests. The subjects were exhorted to give their best performance.

The below listed test items were chosen as the criterion measures.

Motor Fitness Tests Items	
Speed (Acceleration)	Thirty Meter Run
Muscular Strength (Power)	Three Hop Test
Muscular Endurance	Pushup / Press Up Test
	Curl Up / Sit Up / Crunch Test
	Leg Strength Forward Jumps
Cardiovascular Endurance	Recovery Run
Flexibility	Bend and Reach Test
Co-ordination (Agility, Balance)	Six X Ten Meters Shuttle Run

Administration of Motor Fitness Test Items

The detailed descriptions of the motor fitness test items conducted on the players are as follows:

30 meter run Test

Objective:To measure maximum running speed.

Activity Procedure: The player is starting from a stationary position with a foot behind the starting point,with no rocking movements. After a ready caution, on the whistle the player begins running from the first cone gateas fast as possible across the finish gate which is marked 30 meter away.

Time is started as the player moves from starting point and Time is stopped when the player crosses the finish gate.

Each player will perform the activity two times.

Guidelines: Players are instructed to make sure that they are sprinting through the entire 30-meter.

For recording most accurate times it is recommend that the staff timer be positioned to the side and in the center of the 30meterareas in a triangle shape.

Three Hop Test

Objective: To measure horizontal and vertical power of the legs with a component of balance and coordination. The aim of this activity is to measure three consecutive double-leg hops as far as possible.

Activity Procedure:The player starts by standing behind a line marked in between the marker cone on the ground with feet shoulder width apart.When ready, the player should perform three consecutive broad jumps non-stop, using a forward as well as a vertical jump style that allows him to gain maximum distance. He is able to use their arms assist the explosive movement and for balance.For the ease of measurement for this activity by extending a tape measure out along the expected path in front of the player.The measurement is taken from take-off line to the nearest point of contact on the landing of the third jump (back of the heels).Two attempts are allowed.

Guidelines: Apart from two attempts the best attempt was recorded in meters.

Recording data: The measurement is taken from take-off line to the nearest point of contact on the landing of the third jump (back of the heels).The longest distance covered by player was recorded from the best of two attempts. The measurement is recorded to the nearest 10 cm.

Push up/Press up Test

Objective: The goal is to measure how many push-ups can be done in one minute.

Activity Procedure: When the staff member starts the stop watch, the player will attempt as many push-ups as possible in the one minute time period. The player must perform a proper push-up in order for it to count towards the final score.A complete and proper push-up is one in which the player pushes their chest away from the large coaching disc until the arms are fully extended.

Guidelines: The player must hold their body straight and bring their chest to within 4-inches of the ground (the height of a large coaching disc). Players may stop, rest, and resume push-ups at any time during the one minute period. The player may rest in any position they are comfortable with.

Once time is ended the counter records the total number of correct Push-ups completed.

Recording data: The counter records the total number of proper push-ups the player completes in the

one minute interval.

Curl Up / Sit-Up / Crunch Test

Objective: The goal is to measure how many sit-ups can be done in one minute.

Activity Procedure: When the staff member starts the stop watch, the player will attempt as many sit-ups as possible in the one minute time period. When the timer starts the players raise up their chest until the chest is parallel with the upright position off large coaching disc and perpendicular to the ground. They must keep their arms crossed and on their chest. The player then lies down completely and begins the next sit-up.

Guidelines: The player must cross their arms on their chest and bring their shoulders up equal to or past 90-degrees. Their knees can be bent. Players may stop, rest, and resume sit-ups during the one minute time period. The player may rest in any position they are comfortable with.

Recording data: The counter records the total number of proper sit-ups the player completes in the one minute interval.

Leg strength, forward & side to side Jumps

Objective: To measure the number of consecutive jumps completed in one minute both sideways and forward and back over six small coaching discs.

Activity Procedure:The player(s) starts out by standing beside the disc rectangle so that the three rows are either to the left or right of the player's feet.

The player performs side-to-side jumps by jumping over the 24-inch area with their feet together.

Count the highest number of consecutive jumps within one minute that occur without hitting or touching a disc. Each time a player jumps over the disc is counted as one jump, over and back would be 2. Repeat the procedure with the player standing in front of the rectangle in a position that faces the two columns of three discs.

Guidelines: The player cannot touch or land on any of the coaching discs.If they do, the counter starts counting again from zero.

Recording data: Record the highest number of consecutive jumps for both the side-to-side activity and the front-to-back activity.

Recovery Run

Objective:The recovery run measures a player's ability to recover after vigorous physical activity(Cardio-vascular Endurance).

Activity Procedure: The set of cones at the end line represent the starting line.

The player runs from the first set of cones to the second set of cones at the top of the Goal area and then runs back to the first set of cones. Without stopping, the player then runs from the first set of cones to the third set of cones at the top of the penalty area and then runs back to the first set of cones. With out stopping, the player then runs from the first set of cones to the fourth set of cones 60-yards away and then runs back to the first set of cones.The time keeping begins when the player starts at the first set of cones and then stops when the player finishes at the first set of cones when he returns from the 60-yard run. The player will complete two runs with a 45-second rest period in between.

Guidelines: The player must start the second run 45-seconds after the first run is completed.

Recording data: Record the time it takes to complete each of the two runs to the nearest one hundredth of a second (.01).

Bend and Reach Test

Objective: The objective of this activity is to measure the flexibility of lower back and hamstring muscles.

Activity Procedure: The player should remove his shoes and stand on the step surface (baseline) legs straight and feet together. Hands up and slowly bend forward and bring torso as close as possible towards the knees while hands travel along the measurement line and hold for 2-3 seconds.The staff member will record the distance between reached point and zero point.

Guidelines:Push hands downward three times and hold the fourth reach for 2-3 seconds.

Recording data: The score is recorded from the zero point to the nearest centimeter as the distance reached by the hand. The longest distance reached by player was recorded from the best of two attempts.

Six x Ten Meters Shuttle Run

Objective: To measure co-ordination (agility, quickness, change of direction and body control) of the player.

Activity Procedure: One or three players will participate at a time in defined area in this activity against the clock. The player starts from the starting line. Time keeping begins when the player moves. The player runs toward the opposite marker cone or line, turns and returns to the starting marker cone or line. This is repeated six times without stopping (covering 60 meters total).

The activity ends when the player has completes the sixth repetition. The staff member will stop the stopwatch when the player has completes the sixth repetition. Players are allowed up to 2 attempts for this activity.

Guidelines: The activity is repeated six times without stopping (covering 60 meters total). While turning the player must touch the marker cones or lines with his hand or feet.

The activity will not be counted if the player fails to touch the base of the cones or line during the activity.The best time of two successful trials to the nearest 0.1 seconds recorded.

Recording Data: The player's time will be recorded on the scoring sheet. The total time taken to complete the 60 meter course is recorded to the nearest one hundredth of a second (.01).

RESULTS

DEVELOPMENT OF NORMS

To construct the norms for evaluating performance based on Motor Fitness tests of six hundred male college level Football players were randomly selected from various affiliated Colleges and department of Solapur University Solapur Maharashtra, India and their age ranged from 18 to 23 years.

The data collected by administering tests were summarized using the descriptive statistics like mean, standard deviations, mode, median, minimum, maximum, skewness and kurtosis for better understanding of distribution of test values. The norms were constructed by using 6 sigma (6σ) scale techniques i.e. 3 standard deviations (s) above the mean (μ) and 3 standard deviations (s) below the mean (μ) was developed to calculate the athletic potential ability performance scores. As the validity of 6s score is depends on statistical assumption normality, hence the normality assumption was tested for each performance test of football players using the Anderson-Darling test of normality. The histogram and normal probability curve were used for graphical understanding of distribution of performance tests. The scores were further classified into five exclusive grades i.e. excellent, good, average, satisfactory and poor depending on six sigma values as given below.

Test value	Norm
Above μ+2σ	Excellent
μ+1σ to μ+2σ	Good
μ-1σ to μ+1σ	Average
μ-2σ to μ-1σ	Satisfactory
Below μ-2σ	Poor

All statistical analysis were performed using the statistical Analysis System (SAS 9.1)

Motor Fitness Tests:

SPEED:

Thirty Meter Run Test

Descriptive Statistics								
N	Mean	Std Deviation	Median	Mode	Min	Max	Skewness	Kurtosis
300	3.78	0.23	3.79	3.90	3.35	4.15	-0.16	-1.21
Test for normality								
Test			Statistic			P-Value		
Anderson-Darling			5.35			p-value <0.005		

From above table it is indicated that, Thirty Meter Run of football players (p-value <0.005) follows normal distribution with mean 3.78 seconds and Std Deviation 0.23 seconds. Also Thirty Meter Run of football players is ranging from 3.35seconds to 4.15 seconds.

Six Sigma Norm for Thirty Meter Run.

Norm	Twenty Meter Run
Excellent	Below 3.32
Good	3.32 to 3.55
Average	3.55 to 4.01
Satisfactory	4.01 to 4.25
Poor	4.25 above

The values listed in above table gives norms for Thirty Meter Run of football playersto measure maximum running speed. That is football player having Thirty Meter Run scores above 4.25 seconds is graded as poor player, from 4.01 to less than or equal to 4.25 seconds is graded as satisfactory player, from 3.55 to less than or equal to 4.01 seconds is graded average player, from 3.32 to less than or equal to 3.55 seconds is graded as good player and player having the Thirty Meter Run scores below 3.32 seconds is graded as excellent.

MUSCULAR STRENGTH (POWER)

Three Hop Test

Descriptive Statistics								
N	Mean	Std Deviation	Median	Mode	Min	Max	Skewness	Kurtosis
300	671.33	33.35	680	680	620	750	0.05	-0.73
Test for normality								
Test			Statistic			P-Value		
Anderson-Darling			7.01			p-value <0.005		

From above table it is indicated that, Three Hop Test of football players (p-value <0.005) follows normal distribution with mean 671.33 cm and Std Deviation 33.35 cm. Also Three Hop Test of football players is ranging from 620.00 cm to 750.00 cm.

Six Sigma Norm for Three Hop Test

Norm	Three Hop Test
Excellent	738 above
Good	704to 738
Average	637to 704
Satisfactory	604.6 to 637
Poor	Below 604

The values listed in above table gives norms for Three Hop Test of football players, which measure horizontal and vertical power of the legs with a component of balance and coordination. That is football player having Three Hop Test scores above 738cm is graded as excellent player, from 704 cm to less than or equal to 738 cm is graded as good player, from 637.99 cm to less than or equal to 704 cm is graded average player, from 604 cm to less than or equal to 637 cm is graded as satisfactory player and player having the Three Hop Test scores below604 cm is graded as poor.

MUSCULAR ENDURANCE

Pushup / Press Up Test

Descriptive Statistics								
N	Mean	Std Deviation	Median	Mode	Min	Max	Skewness	Kurtosis
300	36	3.35	36.00	35.00	31.00	43.00	0.18	-0.91
Test for normality								
Test			Statistic			P-Value		
Anderson-Darling			5.26			p-value <0.005		

From above table it is indicated that, Pushup / Press Up Test of football players (p-value <0.005)

follows normal distribution with mean 36 per minute and Std Deviation 3.35per minute Also Pushup / Press Up Test of football players is ranging from 31.00per minute to 43.00per minute.

Six Sigma Norm for Pushup / Press up Test.

Norm	Pushup / Press Up Test
Excellent	43above
Good	40 to 43
Average	33 to 40
Satisfactory	30 to 33
Poor	Below 30

The values listed in above table gives norms for Pushup / Press Up Test of football players to measure core group muscular endurance. That is football player having Pushup / Press Up Test scores above 43per minute is graded as excellent player, from 40 to less than or equal to 43per minute is graded as good player, from 33 to less than or equal to 40per minute is graded average player, from 30 to less than or equal to 33per minute is graded as satisfactory player and player having the Pushup / Press Up Test scores below 30per minute is graded as poor.

Curl Up / Sit Up / Crunch Test

Descriptive Statistics								
N	Mean	Std Deviation	Median	Mode	Min	Max	Skewness	Kurtosis
300	40	4.40	40.00	43.00	32.00	50.00	0.35	-0.54

Test for normality		
Test	Statistic	P-Value
Anderson-Darling	4.53	p-value <0.005

From above table it is indicated that, Curl Up / Sit Up / Crunch Test of football players (p-value <0.005) follows normal distribution with mean 40 per minute and Std Deviation4.40.per minute Also Curl Up / Sit Up / Crunch Test of football players is ranging from 32.00per minute to 50.00 per minute.

Six Sigma Norm for Curl Up / Sit Up / Crunch Test.

Norm	Curl Up / Sit Up / Crunch Test
Excellent	48above
Good	44to 48
Average	35to 44
Satisfactory	31 to 35
Poor	Below 31

The values listed in above table gives norms for Curl Up / Sit Up / Crunch Test of football players

to measure core group muscular endurance. That is football player having Curl Up / Sit Up / Crunch Test scores above 48 per minute is graded as excellent player, from 44to less than or equal to 48per minute is graded as good player, from 35 to less than or equal to 44per minute is graded average player, from 31to less than or equal to 35per minute is graded as satisfactory player and player having the Curl Up / Sit Up / Crunch Test scores below 31is graded as poor.

Leg Strength For Side To Side Jumps

Descriptive Statistics								
N	Mean	Std Deviation	Median	Mode	Min	Max	Skewness	Kurtosis
300	44	7.71	42.00	38.00	32.00	65.00	0.86	0.23
Test for normality								
Test			Statistic			P-Value		
Anderson-Darling			28.21			p-value <0.005		

From above table it is indicated that, Leg Strength for Side to Side Jumps of football players (p-value <0.005) follows normal distribution with mean 44 per minute and Std Deviation 7.71. Also Leg Strength for Side to Side Jumps of football players is ranging from 32.00 to 65 per minute.

Six Sigma Norm for Leg Strength For Side To Side Jumps

Norm	Leg Strength For Side To Side Jumps
Excellent	59 above
Good	51 to 59
Average	44 to 51
Satisfactory	36 to 44
Poor	Below 36

The values listed in above table gives norms for Leg Strength for Side to Side Jumps of football players to measure core group muscular endurance. That is football player having Leg Strength For Side To Side Jumps scores above 59 per minute is graded as excellent player, from 51 to less than or equal to 69 per minute is graded as good player, from 44 to less than or equal to 51 per minute is graded average player, from 36 to less than or equal to 44 per minute is graded as satisfactory player and player having the Leg Strength For Side To Side Jumps scores below 36 per minute is graded as poor.

Leg Strength Forward Jumps

Descriptive Statistics								
N	Mean	Std Deviation	Median	Mode	Min	Max	Skewness	Kurtosis
300	58	7.29	56.00	52.00	48.00	77.00	1.27	0.66
Test for normality								
Test			Statistic			P-Value		
Anderson-Darling			18.21			p-value <0.005		

From above table it is indicated that, Leg Strength Forward Jumps of football players (p-value <0.005) follows normal distribution with mean 58 per minute and Std Deviation 7.29. Also Leg Strength Forward Jumps of football players is ranging from 48.00 to 77.00 per minute.

Six Sigma Norm for Leg Strength Forward Jumps

Norm	Leg Strength Forward Jumps
Excellent	72above
Good	65 to 72
Average	50 to 65
Satisfactory	43 to 50
Poor	Below 43

The values listed in above table gives norms for Leg Strength Forward Jumps of football players to measure core group muscular endurance. That is football player having Leg Strength Forward Jumps scores above 72per minute is graded as excellent player, from 65 to less than or equal to 72 per minute is graded as good player, from 50to less than or equal to 65 per minute is graded average player, from 43 to less than or equal to 50per minute is graded as satisfactory player and player having the Leg Strength Forward Jumps scores below 43 per minute is graded as poor.

CARDIOVASCULAR ENDURANCE

Recovery Run Test

Descriptive Statistics								
N	Mean	Std Deviation	Median	Mode	Min	Max	Skewness	Kurtosis
300	25.45	0.64	25.51	25.63	24.27	26.96	0.27	0.36
Test for normality								
Test			Statistic			P-Value		
Anderson-Darling			6.51			p-value <0.005		

From above table it is indicated that, Recovery Run of football players (p-value <0.005) follows normal distribution with mean 25.45 second and Std Deviation 0.64.seconds Also Recovery Run of football players is ranging from 24.27seconds to 26.96 second.

Six Sigma Norm for Recovery Run Test.

Norm	**Recovery Run**
Excellent	Below 24.17
Good	24.17 to 24.81
Average	24.81 to 26.09
Satisfactory	26.09 to 26.73
Poor	26.73 above

FLEXIBILITY

Bend and Reach Test

Descriptive Statistics								
N	Mean	Std Deviation	Median	Mode	Min	Max	Skewness	Kurtosis
300	14.05	2.44	14.00	14.00	10.00	20.00	-0.02	-0.54
Test for normality								
Test			Statistic			P-Value		
Anderson-Darling			4.51			p-value <0.005		

From above table it is indicated that, Bend And Reach Test of football players (p-value <0.005) follows normal distribution with mean 19.12cm and Std Deviation 2.44 cm. Also Bend And Reach Test of football players is ranging from 10.00 to 20.00 cm.

Six Sigma Norm For Bend And Reach Test.

Norm	Bend And Reach Test
Excellent	18.94 above
Good	16.49 to 18.94
Average	11.61 to 16.49
Satisfactory	9.16 to 11.61
Poor	Below 9.16

The values listed in above table gives norms for Bend and Reach Test of football players to measure the flexibility of lower back and hamstring muscles. That is football player having Bend And Reach Test scores above 18.94 cm is graded as excellent player, from 16.49 cm to less than or equal to 18.94 cm is graded as good player, from 11.61 to less than or equal to 16.49 cm is graded average player, from 9.16 to less than or equal to 11.61cm is graded as satisfactory player and player having the Bend And Reach Test scores below 9.16 cm is graded as poor.

CO-ORDINATION (AGILITY, BALANCE)

Six X Ten Meters Shuttle Run Test

Descriptive Statistics								
N	Mean	Std Deviation	Median	Mode	Min	Max	Skewness	Kurtosis
300	15.23	0.49	15.27	15.36	14.14	15.99	-0.49	-0.46
Test for normality								
Test			Statistic			P-Value		
Anderson-Darling			3.81			p-value <0.005		

From above table it is indicated that, Six X Ten Meters Shuttle Run of football players (p-value <0.005) follows normal distribution with mean 15.23seconds and Std Deviation0.49.seconds Also Six X

Ten Meters Shuttle Run of football players is ranging from 14.14 seconds to 15.99 seconds.

Six Sigma Norm for Six X Ten Meters Shuttle Run Test.

Norm	SixXTen Meters Shuttle Run
Excellent	Below 14.24
Good	14.24 to 14.74
Average	14.74 to 15.72
Satisfactory	15.72 to 16.21
Poor	16.21 above

The values listed in above table gives norms for Six X Ten Meters Shuttle Run of football players to measure co-ordination (agility, quickness, change of direction and body control). That is football player having Six X Ten Meters Shuttle Run scores above 16.21 seconds is graded as poor player, from 15.72 seconds to less than or equal to 16.21 seconds is graded as satisfactory player, from 14.74 seconds to less than or equal to 15.72 seconds is graded average player, from 14.24 seconds to less than or equal to 14.74 seconds is graded as good player and player having Six X Ten Meters Shuttle Run scores below 14.24 seconds is graded as excellent.

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