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Video graphic (Biomechanical) reliability and validity Coefficient of forty yards shuttle run test of Females of high altitude Himachal Pradesh

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Abstract

Research scholar has selected the topic with the purpose to find out reliability coefficient of selected forty yards shuttle run test variables video graphically recorded and analyzed repeatedly of female habitat of Himachal Pradesh University of Shimla. With the following objectives. To find out the “Vedio graphic Biomechanical Reliability and Validity of Selected Variable of Forty Yards Shuttle Run Test of Females of High Altitude Himachal Pradesh”. The study was delimited to 30 female students of physical education Himachal Pradesh University, Shimla. (High altitude = 2276 meters). The data were collected using 2D video recording system. The data were analyzed using 2D video analysis (Kinovea 0.8.15). The age of the subjects were ranging from 18 to 25 years.

Keywords: Video graphic (Biomechanical) Reliability and Validity, Agility, Forty Yards Shuttle Run Test

Introduction

Physical fitness is a multidimensional state of being. Physical fitness is the body's ability to function efficiently and effectively. It is a state of being that consists of at least five health-related and six skill related physical fitness components each of which contributes to total quality of life. Physical fitness is associated with a person's ability to work effectively enjoy leisure time be healthy resist hypokinetic diseases or conditions and meet emergency situations. It is related to but different from, health and wellness. Although the development of physical fitness is the result of many things optimal physical fitness is not possible without regular physical activity. The health-related components of physical fitness are directly associated with good health. The five components of health related physical fitness are body composition, cardiovascular fitness flexibility muscular endurance and strength. Each health related fitness characteristic has a direct relationship to good health and reduced risk for hypokinetic disease.

Possessing a moderate amount of each component of health-related fitness is essential to disease prevention and health promotion, but it is not essential to have exceptionally high levels of fitness to achieve health benefits. High levels of health related fitness relate more to performance than to health benefits. For example moderate amounts of strength are necessary to prevent back and posture problems, whereas high levels of strength contribute most to improved performance in activities such as football and jobs involving heavy lifting. Agility is important in sports such as basketball soccer and racquetball in which the participant must change direction rapidly and at the same time maintain proper body control.

Agility as define refers to the ability to change your entire body position in space rapidly with accuracy and speed. Sports coach Brian Mac offers a slightly different perspective defining agility as the ability to perform a successive series of powerful explosive movements quickly in opposing directions. Agility is typically measured by performing a timed shuttle run. Sports teams use zigzag drills to enhance agility. The effects of high altitude on humans are considerable. The percentage oxygen saturation of hemoglobin determines the content

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of oxygen in blood. After the human body reaches around 2,100 m 7,000 feet above sea level, the saturation of ox hemoglobin begins to decrease rapidly. However the human body has both short term and long term adaptations to altitude that allow it to partially compensate for the lack of oxygen. There is a limit to the level of adaptation mountaineers refer to the altitudes above 8,000 meters 26,000ft as the death zone where it is generally believed that no human body can acclimatize. For athletes high altitude produces two contradictory effects on performance. For explosive events sprints up to 400 meters long jump triple jump the reduction in atmospheric pressure means there is less resistance from the atmosphere and the athlete's performance will generally be better at high altitude. For endurance events races of 800 meters or more, the predominant effect is the reduction in oxygen, which generally reduces the athlete's performance at high altitude. The 1968 Summer Olympics were held at altitude in Mexico City. With the best athletes in the world competing for the most prestigious title, most short sprint and jump records were set there at altitude.

40 yards Shuttle run tests involved repetitive running back and forth, either over the same distance or with changing distances. Depending on the distance, duration and intensity, two marker cone s were placed at the yards line 10 yards apart. The athletics started from one end, runs 10 yards and back to the start, 10 yards and back, then 10 yards and finishes at the start line. A total of 40 yards distance.

The video graphic (biomechanical) reliability and validity of selected sixty yards shuttle run testis very high because reliability and validity are authentic and high speed measuring is a challenge

Hence the purpose of the study was to record the performance of selected agility test item by adopting video graphic (biomechanical) measurement system to test the reliability and validity of the selected test item.

2. Materials and method

2.1 Participants

Keeping in view the purpose of the study, 30 female students of Himachal Pradesh University, Shimla were randomly selected. The age of the subjects ranged from 18 to 25 years. The randomly selected female subjects were sportsperson (i.e. at least state level participation).

2.2 Instrumentation

2D Camera was used for Video recording.



Fig 1: 2D video recording camera

2.3 Selection of the variables

The selected variables has been documented in table-1.

Table 1: Selected test and variables

S.No	Test Item	Selected variables	Abbreviations
1.	Forty Yards Shuttle Run	Time taken to cover first 10 yards Time taken to cover second 10 yards come back Time taken to cover third 10 yards Time taken to cover forth 10 yards Performance 40 yards (Total time taken)	(TT1-10Y) (TT2-10YCB) (TT3-10Y) (TT4-10YCB) (PTT40Y)

2.4 Data acquisition

After the subjects properly warmed up and explain about Sixty yards shuttle run test and educated about its

significance. The Sixty yards shuttle run test was done in front of the subjects. Subjects performed the test and their performance was recorded by 2D video recording camera.



Fig 2: Sixty Yards Shuttle Run Test Layout

2.5 Data processing

The raw data acquired from the subjects were quantified with

the help of Kinovea Software 0.8.15.



Fig 3: Illustration of data processing

3. Statistical analysis

Following statistical techniques were applied for analysis.

1. Descriptive statistics (Mean and Standard Deviation).
2. Cronbach's Alpha.
3. Product moments correlation for obtaining reliability and validity coefficient.

For the purpose of evaluating the reliability coefficient. Kirkendall *et al.*, (1987) criteria was followed as given in table 2

Table 2: Kirkendall *et al.*, (1987) Criterion of Reliability

Value of Reliability of Coefficient	Reliability Rating
0.00 to 0.59	Unacceptable
0.60 to 0.79	Average
0.80 to 0.89	High
0.90 to 1.00	Excellent

A commonly accepted rule for describing internal consistency using Cronbach's alpha is as on Table 3.

Table 3: Internal Consistency Reliability Ratings

Cronbach's alpha (α)	Internal consistency
$0.9 \leq \alpha$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

Table 4: Distributive statistics of selected variables of forty yards shuttle run test

Variables	Minimum	Maximum	Mean	Std. Deviation
TT10YT1	1.76	3.03	2.5142	.26515
TT10YCBT1	4.26	6.59	5.4858	.50665
TT10YT1	6.99	9.96	8.3926	.67043
TT10YCB	9.69	13.36	11.2250	.82150
TT10YT2	1.73	3.03	2.5076	.26742
TT10YCBT2	4.23	6.56	5.4761	.50882
TT10YT2A	6.97	9.93	8.3958	.67346
TT10YCBT2	9.71	13.36	11.2271	.82401
TT10YT3	1.76	3.03	2.5116	.26526
TT10YCBT3	4.26	6.56	5.4821	.50891
TT10YT3	6.96	9.96	8.3905	.67275
TT10YCBT3	9.69	13.36	11.2289	.82243
TFYTT	68.01	98.04	82.8374	6.61455

N = 38; all measurements in seconds

According to table 4 the selected variables of Forty Yards Shuttle Run Test namely Time taken to cover first 10 yards (TT1-10YT1), Time taken to cover second 10 yards come back (TT2-10YT1), Time taken to cover third 10 yards (TT3-10YT1), Time taken to cover fourth 10 yards come back, (TT4-10YT1), Performance Total time taken (P-40TT) measuring in seconds.

Time taken to cover first 10 yards (TT1-10YT2), Time taken to cover second 10 yards come back (TT2-10YT2), Time taken to cover third 10 yards (TT3-10YT2), Time taken to cover fourth 10 yards come back, (TT4-10YT2), Performance Total time taken (P-40TT) measuring in seconds.

Time taken to cover first 10 yards (TT1-10YT3), Time taken to cover second 10 yards come back (TT2-10YT3), Time taken to cover third 10 yards (TT3-10YT3), Time taken to

cover forth 10 yards come back, (TT4-10YT3), Performance Total time taken (P-40TT) measuring in seconds.

Table 5: Reliability coefficient of selected variables of forty yards shuttle run test

S.No.	Variables	Between Trails	Reliability coefficient (r)	Evaluations
1	TT1-10Y	T1 vs T2	.999	Excellent
		T2 vs T3	.999	Excellent
		T1 vs T3	.998	Excellent
		T1 vs TT	.905	Excellent
2	TT2-10YCB	T1 vs T2	.999	Excellent
		T2 vs T3	.998	Excellent
		T1 vs T3	.999	Excellent
		T1 vs TT	.975	Excellent
3	TT3-10Y	T1 vs T2	1.00	Excellent
		T2 vs T3	.999	Excellent
		T1 vs T3	1.00	Excellent
		T1 vs TT	.989	Excellent
4	TT4-10YCB	T1 vs T2	1.00	Excellent
		T2 vs T3	.914	Excellent
		T1 vs T3	1.00	Excellent
		T1 vs TT	.997	Excellent

N = 38, all measurements in seconds

T1 = Trail One, T2 = Trail two, T3 = Trail three, TT = P- 40 TT

According to table 5 the reliability Coefficient of correlation of TT1-10Y between T1 and T2 was found .999 which was highly reliable as per Kirkendall *et al.*, (1987) Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T2 and T3 was found .999 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T1 and T3 was found .998 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T1 and TT was found .905 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation of TT2-10YCB between T1 and T2 was found .999 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T2 and T3 was found .998 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T1 and T3 was found .999 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T1 and TT was found .975 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation of TT3-10Y between T1 and T2 was found 1.00 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T2 and T3 was found .999 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T1 and T3 was found .1.00 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T1 and TT was found .989 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation of TT4-10YCB between T1 and T2 was found 1.00 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T2 and T3 was found .914 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T1 and T3 was found .1.00 which was highly reliable as per Kirkendall *et al.*, (1987).

According to table 5 the reliability coefficient of correlation between T1 and TT was found .997 which was highly reliable as per Kirkendall *et al.*, (1987).

Table 6: Reliability Coefficient of selected variables of forty yards shuttle run test

S.No.	Variables	Between Variables	Reliability coefficient (r)	Evaluations
1	TT1-10Y	10Y vs 10YCB	.910	Excellent
		10Y vs 10Y-A	.863	High
		10Y vs 10YCB	.835	High
2	TT2-10YCB	10Y vs TT	.905	Excellent
		10YCB vs 10Y	.910	Excellent
		10YCB vs 10Y-A	.963	Excellent
		10YCB vs 10YCB-A	.914	Excellent
		10YCB vs TT	.975	Excellent
3	TT3-10Y	10Y-A vs 10Y	.863	High
		10Y-A vs 10YCB	.963	Excellent
		10Y-A vs 10YCB-A	.959	Excellent
		10YCB-A vs 10Y	.989	Excellent
4	TT4-10YCB	10YCB-A vs 10Y	.835	Excellent
		10YCB-A vs 10YCB	.914	Excellent
		10YCB-A vs 10Y-A	.959	Excellent
		10YCB-A vs TT	.977	Excellent
		10YCB-A vs TT	.977	Excellent

N = 38 all measurements in seconds

According to table 6 the reliability coefficient of correlation of TT1-10Y between 10Y and 10YCB was found .910 which was highly reliable as per table 2 Kirkendall *et al.*, (1987).

According to table 6 the reliability coefficient of correlation of TT1-10Y between 10Y and 10Y-A was found .863 which was highly reliable as per table 2 Kirkendall *et al.*, (1987).

According to table 6 the reliability coefficient of correlation of TT1-10Y between 10Y and 10YCB was found .835 which was highly reliable as per table 2 Kirkendall *et al.*, (1987).

According to table 6 the reliability coefficient of correlation of TT1-10Y between 10Y and TT was found .905 which was highly reliable as per table 2 Kirkendall *et al.*, (1987).

According to table 6 the reliability coefficient of correlation of TT2-10YCB between 10YCB and 10Y was found .910 which was highly reliable as per table 2 Kirkendall *et al.*, (1987).

According to table 6 the reliability coefficient of correlation of TT2-10YCB between 10YCB and 10Y-A was found .963 which was highly reliable as per table 2 Kirkendall *et al.*, (1987)

According to table 6 the reliability coefficient of correlation of TT2-10YCB between 10YCB and 10YCB-A was found .914 which was highly reliable as per table 2 Kirkendall *et al.*, (1987) Kirkendall *et al.*, (1987).

According to table 6 the reliability coefficient of correlation of TT2-10YCB between 10YCB and TT was found .975 which was highly reliable as per table 2 Kirkendall *et al.*, (1987)

According to table 6 the reliability coefficient of correlation of TT3-10Y-A between 10Y-A and 10Y was found .863

which was highly reliable as per table 2 Kirkendall *et al.*, (1987)

According to table 6 the reliability coefficient of correlation of TT3-10Y-A between 10Y-A and 10YCB was found .963 which was highly reliable as per table 2 Kirkendall *et al.*, (1987)

According to table 6 the reliability coefficient of correlation of TT3-10Y-A between 10Y-A and 10YCB-A was found .959 which was highly reliable as per table 2 Kirkendall *et al.*, (1987)

According to table 6 the reliability coefficient of correlation of TT3-10Y-A between 10Y-A and TT was found .989 which was highly reliable as per table 2 Kirkendall *et al.*, (1987).

According to table 6 the reliability coefficient of correlation of TT4-10YCB-A between 10YCB-A and 10Y was found .835 which was highly reliable as per table 2 Kirkendall *et al.*, (1987).

According to table 6 the reliability coefficient of correlation of TT4-10YCB-A between 10YCB-A and 10YCB was found .914 which was highly reliable as per table 2 Kirkendall *et al.*, (1987).

According to table 6 the reliability coefficient of correlation of TT4-10YCB-A between 10YCB-A and 10Y-A was found .959 which was highly reliable as per table 2 Kirkendall *et al.*, (1987).

According to table 6 the reliability coefficient of correlation of TT4-10YCB-A between 10YCB-A and TT was found .977 which was highly reliable as per table 2 Kirkendall *et al.*, (1987).

Table 7: Internal Consistency of selected variables of forty yards shuttle run test

S.No.	Variables	Cronbach's Alpha(α)	Performance
1	TT1-10YT1 TT2-10YCBT1 TT3-10YT1 TT4-10YCBT1	.933	Excellent
2	TT1-10YT2 TT2-10YCBT2 TT3-10YT2 TT4-10YCBT2	.934	Excellent
3	TT1-10YT3 TT2-10YCBT3 TT3-10YT3 TT4-10YCBT3	.934	Excellent

N = 38 all measurements in seconds

According to table 7 the internal consistency of TT1-10YT1, TT2-10YCBT1, TT3-10YT1-A, TT4-10YCBT1-A was found .933 which was excellent as per given table 3.

According to table 7 the internal consistency of TT1-10YT1, TT2-10YCBT1, TT3-10YT1-A, TT4-10YCBT1-A was found .934 which was excellent as per given table 3.

According to table 7 the internal consistency of TT1-10YT1, TT2-10YCBT1, TT3-10YT1-A, TT4-10YCBT1-A was found .934 which was excellent as per given table no 3.

4. Discussion and Findings

1. Variable namely Time taken to cover first 10 yards (TT1-10Y), Time taken to cover second 10 yards come back (TT2-10Y), Time taken to cover third 10 yards (TT3-10Y), Time taken to cover fourth 10 yards come back, (TT4-10Y), Performance Total time taken (P-40TT) found to be having excellent reliability coefficient for the test item Forty Yards Shuttle Run Test.
2. Variable namely Time taken to cover first 10 yards (TT1-

10Y) T1, T2 and T3 Time taken to cover second 10 yards come back (TT2-10Y) T1, T2 and T3 Time taken to cover third 10 yards (TT3-10Y) T1, T2 and T3 Time taken to cover fourth 10 yards come back, (TT4-10Y) T1, T2 and T3 Performance Total time taken (P-40TT) T1, T2 and T3 found to be having excellent internal consistency for the test item Forty Yards Shuttle Run Test.

5. Conclusions

Within the limitations of the present study, the following have been concluded

Analyzing by using Kinovea (0.8.15) open source software for two dimensional video analysis of all variables are highly reliable in regard to selected variables namely Time taken to cover first 10 yards (TT1-10Y), Time taken to cover second 10 yards come back (TT2-10Y), Time taken to cover third 10 yards (TT3-10Y), Time taken to cover fourth 10 yards come back, (TT4-10Y), Performance Total time taken (P-40TT)

found to be having excellent reliability coefficient for the test item Forty Yards Shuttle Run Test.

The selected temporal variables are highly reliable for selected test namely Forty yards shuttle run test.

Analyzing by using open source software Kinovea (0.8.15) for two dimensional video analysis of agility has highly reliable and validity.

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