

Two dimensional analysis of test–retest reliability and validity of selected temporal variables of anaerobic power tests of females sportsperson habitat of high altitude Northern India

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Abstract

Research scholar's has selected the topic with the purpose to find out reliability coefficient of selected temporal variables of selected Anaerobic Power test video graphically recorded and analyzed test – retest method. With the following objectives, to find out the “Two Dimensional Analysis of Test – Retest Reliability and Validity Coefficient of Selected Temporal Variables of Anaerobic Power Tests of Females Sportsperson Habitat of High Altitude Northern India”. The study was delimited to 80 female's habitat of high altitude of Northern India. Keeping in view the purpose of the study, 40 female sportsperson of Himachal Pradesh and 40 sportsperson of Jammu and Kashmir were randomly selected. To measure the reliability and validity of the anaerobic power test, two tests was selected, one being the Margaria Kalamann Power Test and the other the Squat Jump Burpee Test. The data were collected using 2 – D video recording system. The data were analyzed using test – retest method by video analysis (Kinovea 0.8.15) software. The age of the subjects were ranging from 18 ≥ 25 years. Pearson Product moment correlation statistical techniques were used for measure reliability, validity and used cronbach's alpha for internal consistency of the tests. In this research, the result is specified that the reliability and validity of all the variables of selected tests were ($r = 0.90^{**} \geq 1.00^{**}$, $p < 0.01$) and ($\alpha = .959 \geq .992$) which was a significant correlation at the 0.01 level.

Keywords: 2-D test re-tests, video graphic reliability and validity, coefficient of correlation, internal consistency, anaerobic power tests, Kinovea 0.8.15 software system

Introduction

The President's Council on Physical Fitness and Sports in 1971 offered one of the more widely used definitions, describing physical fitness as the ability to carry out daily tasks with vigor and alertness without undue fatigue and with ample energy to enjoy leisure-time pursuits and to meet unforeseen emergencies. Dr. H. Harrison Clarke wrote that physical fitness is the ability to last to bear up to withstand stress and to persevere under difficult circumstances where an unfit person would give up. Physical fitness is the opposite of being fatigued from ordinary efforts to lacking the energy to enter zestfully into life's activities, and to becoming exhausted from unexpected demanding physical exertion. It is a positive quality, extending on a scale from death to abundant life.

The ability to produce maximum force in the shortest time is called force. The two components of power are muscle speed and force strength. An effective combination of these two components allows a person to produce explosive movements such as required in jumping putting the shot and spiking throwing and hitting a ball. Anaerobic power is power used in high-intensity bouts of exercise lasting fewer than ten seconds; which is the peak amount of time for phosphocreatine reserves to empty as a primary fuel source. It is expressed in terms of watts of force per kilogram of bodyweight. Power is considered a crucial component in overall athleticism.

Reliability is the second technical standard that the teacher can use when selecting tests. A test is said to be reliable if it is dependable: if similar results occur when the test is repeated by the same group under like conditions. Reliability is related to the test performance itself. The tester is the same, the students are the same, and the test is the same. Assume that the test is administered and then re-administered. If the students' scores fall in the same positions, the test is reliable. The student who performed best the first time is still best, the poorest performer is still poorest, and all in between is approximately in the same order. A test is given to position students on a ladder, so to speak. If their positions are true indications of their skill, then the test is said to be valid; if their positions are dependable and consistent, then the test is considered to be reliable.

Validity is the most important of the technical standards because it tests the honesty of a test. The teacher wants to have confidence that a test selected to use as a measure of the tennis serve for example is indeed just that and not a test of shoulder girdle strength or of general motor ability. It must be a measure of a rather specific skill namely the tennis serves. It would be unfair to use a fitness test as one basis for assigning grades if the test were so complicated that an intelligence factor weighed heavily in the performance score of each student. If a test is presented as

a measure of the volleyball volley then to be valid it must measure volleying ability and.

The athlete's weight is determined in kilograms. The athlete is given a few practice runs up the steps to warm up. The athlete stands ready at the starting line 6 meters in front of the first step. On the command "Go", the athlete sprints to and up the flight of steps, taking three steps at a time (stepping on the 3rd, 6th and 9th steps), attempting to go up the steps as fast as possible. The time to get from the 3rd step to the 9th step is recorded (either using a stopwatch or using switch mats placed on the 3rd and 9th steps), starting when the foot was in first in contact with the 3rd step, and stopped when the foot contacts the 9th step. Allow three trials of the test, with 2 – 3 minutes recovery between each trial. The standard starting position for the squat jump burpee is standing erect with the arms by the side. From the standing position, squat down and place the hands on the floor in front of the feet. Putting the bodyweight on the hands, the legs are thrust back to a push-up position with a straight line from the shoulders to the heels. Next pull the legs back and return to the squatting position, then up back to the starting standing position. One complete burpee is from the standing back to the standing position

Materials and Method

Participants

Keeping in view the purpose of the study, 40 female sportsperson habitats of high altitude of Himachal Pradesh and 40 female

sportsperson habitat of high altitude of Jammu and Kashmir were randomly selected. The age of the subjects ranged from $18 \geq 25$ years. The randomly selected female subjects were sportsperson (i.e. at least state level participation).

Instrumentation

2 – D Camera was used for Video recording.



Fig 1: 2 – D video recording system

Selection of the Test items and Variables

The selected test items and variables has been documented in table

Table 1: Selected test items and variables

S.No	Test Item	Selected Variables	Abbreviations
1.	Margaria Kalamen Power Test	Time taken to cover first stair	(TT1 st S)
		Time taken to cover second stair	(TT2 nd S)
		Time taken to cover third stair	(TT3 rd S)
		Time taken to cover fourth stair	(TT4 th S)
		Time taken to cover fifth stair	(TT5 th S)
		Time taken to cover sixth stair	(TT6 th S)
		Time taken to cover seventh stair	(TT7 th S)
		Time taken to cover eighth stair	(TT8 th S)
		Time taken to cover ninth stair	(TT9 th S)
		Time taken to cover tenth stair	(TT10 th S)
		Time taken to cover eleventh stair	(TT11 th S)
		Time taken to cover twelfth stair	(TT12 th S)
2.	Squat Jump Burpee Test	Time taken to cover jump one	(TTJ1)
		Time taken to cover jump two	(TTJ2)
		Time taken to cover jump three	(TTJ3)
		Time taken to cover jump four	(TTJ4)

Data Acquisition

After the subjects properly warmed up and explain about Margaria kalamen power test and educated about its significance.

The Margaria Kalamen Power test was done in front of the subjects. Subjects performed the test and their performance was recorded by 2 - D video recording camera.



Fig 2: Margaria Kalamen Power Test Layout



Fig 3: Squat Jump Burpee Test Layout

Data Processing

The raw data acquired from the subjects were quantified with the help of Kinovea Software 0.8.15.

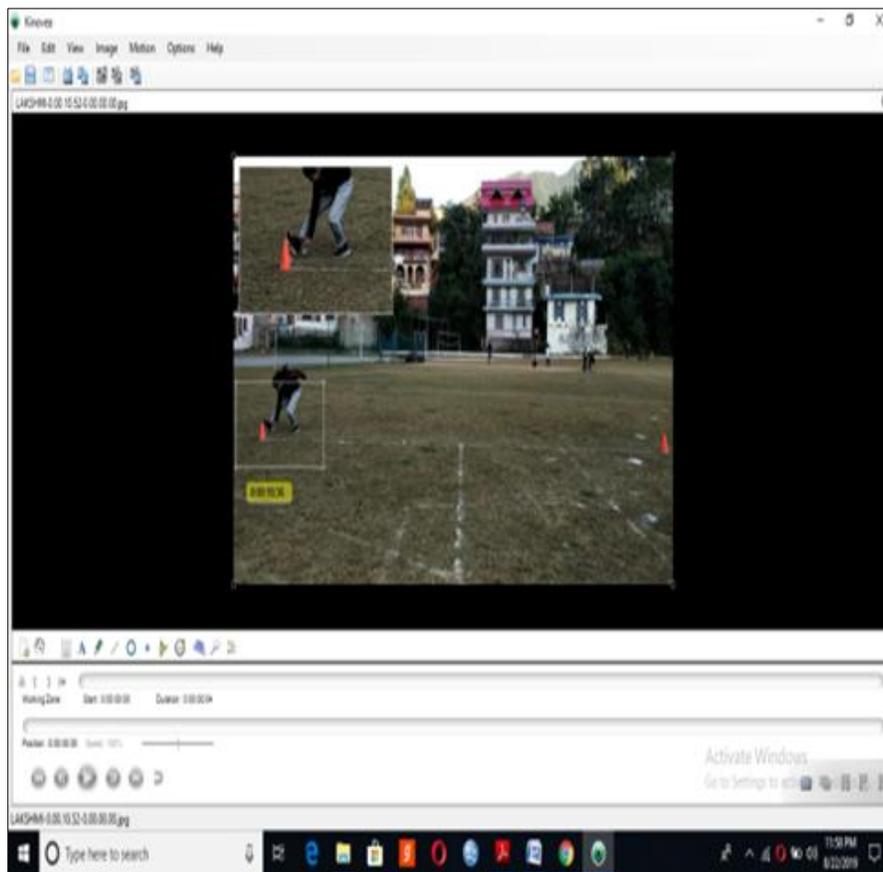


Fig 4: illustration of data processing

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.
4. 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 or reliability 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 Margaria Kalamen Power Test

S. No	Variables	Minimum	Maximum	Mean	Std. Deviation
1.	TT1 st ST1	.06	.16	.1133	.02631
	TT2 nd ST1	.23	.43	.3370	.04822
	TT3 rd ST1	.46	.66	.5407	.05356
	TT4 th ST1	.63	.93	.7717	.07302
	TT5 th ST1	.83	1.26	1.0110	.10899
	TT6 th ST1	1.06	1.63	1.2687	.12867
	TT7 th ST1	1.26	1.96	1.5447	.15549
	TT8 th ST1	1.56	2.29	1.8087	.17880
	TT9 th ST1	1.73	2.59	2.0677	.19989
	TT10 th ST1	1.96	2.86	2.3163	.21859
	TT11 th ST1	2.19	3.19	2.5897	.25425
	TT12 th ST1	2.43	3.49	2.8473	.28093
2.	TT1 st ST2	.06	.16	.1137	.02760
	TT2 nd ST2	.23	.43	.3380	.05047
	TT3 rd ST2	.43	.66	.5387	.05526
	TT4 th ST2	.63	.93	.7717	.07400
	TT5 th ST2	.83	1.26	1.0090	.10678
	TT6 th ST2	1.06	1.63	1.2687	.12867
	TT7 th ST2	1.26	1.96	1.5437	.15575
	TT8 th ST2	1.53	2.29	1.8087	.17955
	TT9 th ST2	1.73	2.59	2.0677	.19989
	TT10 th ST2	1.96	2.86	2.3163	.21859
	TT11 th ST2	2.19	3.19	2.5907	.25488
	TT12 th ST2	2.43	3.49	2.8463	.28230
3.	TT1 st ST3	.06	.19	.1157	.02837
	TT2 nd ST3	.23	.43	.3380	.04838
	TT3 rd ST3	.43	.66	.5377	.05587
	TT4 th ST3	.63	.93	.7717	.07400
	TT5 th ST3	.83	1.26	1.0090	.10649
	TT6 th ST3	1.06	1.63	1.2687	.13027
	TT7 th ST3	1.26	1.96	1.5427	.15507
	TT8 th ST3	1.53	2.29	1.8107	.18242
	TT9 th ST3	1.73	2.59	2.0687	.19993
	TT10 th ST3	1.96	2.86	2.3163	.21859
	TT11 th ST3	2.19	3.19	2.5907	.25488
	TT12 th ST3	2.43	3.49	2.8473	.28093

N = 80 all measurements of Margaria Kalamen Power Test in seconds

T1 = Trail One, T2 = Trail Two and T3 = Trail Three

According to table 4 the selected test item margaria kalamen power test trail one temporal variables namely time taken to cover first stair (TT1stST1) trail one the mean and SD were.1133 \pm .02631, time taken to cover second stair (TT2ndST1) trail one the mean and SD were.3370 \pm .04822, time taken to cover third stair (TT3rdST1) trail one mean and SD were.5407 \pm .05356, time taken to cover fourth stair (TT4thST1) trail one the mean and SD were.7717 \pm .07302, time taken to cover fifth stair (TT5thST1) trail one the mean and SD were 1.0110 \pm .10899, time taken to cover sixth stair (TT6thST1) trail one the mean and SD were 1.2687 \pm .12867, time taken to cover seventh stair (TT7thST1) trail one the mean and SD were 1.5447 \pm .15549, time taken to cover

eighth stair (TT8thST1) trail one mean and SD were 1.8087 \pm .17880, time taken to cover ninth stair (TT9thST1) trail one mean and SD were 2.0677 \pm .19989, time taken to cover tenth stair (TT10thST1) trail one mean and SD were 2.3163 \pm .21859, time taken to cover eleventh stair (TT11thST1) trail one mean and SD were 2.5897 \pm .25425, time taken to cover twelfth stair (TT12thST1) trail one mean and SD were 2.8473 \pm .28093.

According to table 4 the selected test item margaria kalamen power test trail two temporal variables namely time taken to cover first stair (TT1stST2) trail two the mean and SD were.1137 \pm .02760, time taken to cover second stair (TT2ndST2) trail two the mean and SD were.3380 \pm .05047, time taken to cover third

stair (TT3rdST2) trail two mean and SD were.5387 ±.05526, time taken to cover fourth stair (TT4thST2) trail two the mean and SD were.7717 ±.07400, time taken to cover fifth stair (TT5thST2) trail two the mean and SD were 1.0090 ±.10678, time taken to cover sixth stair (TT6thST2) trail two the mean and SD were 1.2687 ±.12867, time taken to cover seventh stair (TT7thST2) trail two the mean and SD were 1.5437 ±.15575, time taken to cover eighth stair (TT8thST2) trail two mean and SD were 1.8087 ±.17955, time taken to cover ninth stair (TT9thST2) trail two mean and SD were 2.0677 ±.19989, time taken to cover tenth stair (TT10thST2) trail two mean and SD were 2.3163 ±.21859, time taken to cover eleventh stair (TT11thST2) trail two mean and SD were 2.5907 ±.25488, time taken to cover twelfth stair (TT12thST2) trail two mean and SD were 2.8463 ±.28230.

According to table 4 the selected test item margaria kalamen power test trail three temporal variables namely time taken to cover first stair (TT1stST3) trail three the mean and SD were.1157

±.02837, time taken to cover second stair (TT2ndST3) trail three the mean and SD were.3380 ±.04838, time taken to cover third stair (TT3rdST3) trail three mean and SD were.5377 ±.05587, time taken to cover fourth stair (TT4thST3) trail three the mean and SD were.7717 ±.07400, time taken to cover fifth stair (TT5thST3) trail three the mean and SD were 1.0090 ±.10649, time taken to cover sixth stair (TT6thST3) trail three the mean and SD were 1.268 ±.13027, time taken to cover seventh stair (TT7thST3) trail three the mean and SD were 1.5427 ±.15507, time taken to cover eighth stair (TT8thST3) trail three mean and SD were 1.8107 ±.18242, time taken to cover ninth stair (TT9thST3) trail three mean and SD were 2.0687 ±.19993, time taken to cover tenth stair (TT10thST3) trail three mean and SD were 2.3163 ±.21859, time taken to cover eleventh stair (TT11thST3) trail three mean and SD were 2.5907 ±.25488, time taken to cover twelfth stair (TT12thST3) trail three mean and SD were 2.8473 ±.28093.

Table 5: Reliability Coefficient of Selected Variables of Margaria Kalamen Power Test

S. No.	Variables	Between Trails	Reliability coefficient (r)	Evaluations
1.	TT1 st S	T1 vs T2	.942	Excellent
		T2 vs T3	.963	Excellent
		T1 vs T3	.949	Excellent
2.	TT2 nd S	T1 vs T2	.982	Excellent
		T2 vs T3	.988	Excellent
		T1 vs T3	.994	Excellent
3.	TT3 rd S	T1 vs T2	.980	Excellent
		T2 vs T3	.985	Excellent
		T1 vs T3	.987	Excellent
4.	TT4 th S	T1 vs T2	.994	Excellent
		T2 vs T3	1.00	Excellent
		T1 vs T3	.994	Excellent
5.	TT5 th S	T1 vs T2	.998	Excellent
		T2 vs T3	.997	Excellent
		T1 vs T3	.995	Excellent
6.	TT6 th S	T1 vs T2	1.00	Excellent
		T2 vs T3	.998	Excellent
		T1 vs T3	.998	Excellent
7.	TT7 th S	T1 vs T2	.998	Excellent
		T2 vs T3	.999	Excellent
		T1 vs T3	.999	Excellent
8.	TT8 th S	T1 vs T2	.998	Excellent
		T2 vs T3	.998	Excellent
		T1 vs T3	.997	Excellent
9.	TT9 th S	T1 vs T2	1.00	Excellent
		T2 vs T3	1.00	Excellent
		T1 vs T3	1.00	Excellent
10.	TT10 th S	T1 vs T2	.998	Excellent
		T2 vs T3	.998	Excellent
		T1 vs T3	.997	Excellent
11.	TT11 th S	T1 vs T2	1.00	Excellent
		T2 vs T3	1.00	Excellent
		T1 vs T3	1.00	Excellent
12.	TT12 th S	T1 vs T2	1.00	Excellent
		T2 vs T3	1.00	Excellent
		T1 vs T3	1.00	Excellent

N = 80; all measurements in second

T1 = Trail one, T2 = Trail Two, T3 = Trail Three

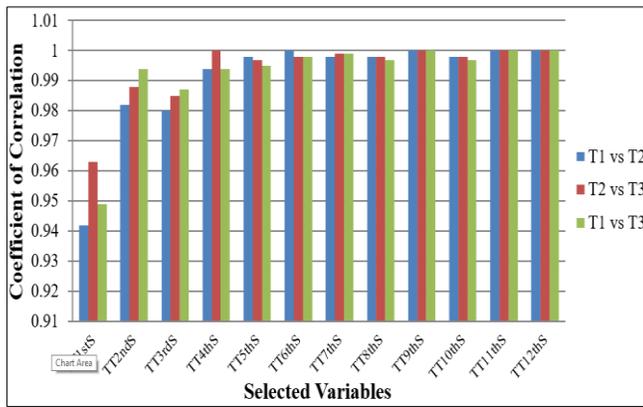


Fig 5: Graph represent of coefficient correlation of selected margaria kalamen power test

According to table 5 the reliability and validity coefficient correlation of selected test Margaria kalamen power test variable namely total time taken to cover first stair TT1stS correlation between T1 and T2 was found ($r = 0.942^{**}, p < 0.01$), T2 and T3 was found ($r = 0.963^{**}, p < 0.01$), T1 and T3 was found ($r = 0.949^{**}, p < 0.01$). The result is specified that which was a significant correlation at the 0.01 and there were all variables are highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to table 5 the reliability and validity coefficient correlation of variable namely time taken to cover second stair TT2ndS correlation between T1 and T2 was found ($r = 0.982^{**}, p < 0.01$), T2 and T3 was found ($r = 0.988^{**}, p < 0.01$), T1 and T3 was found ($r = 0.994^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2. According to table 5 the reliability and validity and validity coefficient correlation of variables time taken to cover third stair TT3rdS correlation between T1 and T2 was found ($r = 0.980^{**}, p < 0.01$), T2 and T3 was found ($r = 0.985^{**}, p < 0.01$), and T1 and T3 was found ($r = 0.987^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01, which was highly reliable and valid as per given criteria Krikendall et.al, (1987) table 2.

According to table 5 the reliability and validity coefficient correlation of variable namely time taken to fourth stair TT4thS correlation between T1 and T2 was found ($r = 0.994^{**}, p < 0.01$), T2 and T3 was found ($r = 1.000^{**}, p < 0.01$) and T1 and T3 was found ($r = 0.994^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to table 5 the reliability and validity coefficient correlation of selected variables namely time taken to cover fifth stair TT5thS correlation between T1 and T2 was found ($r = 0.998^{**}, p < 0.01$), T2 and T3 was found ($r = 0.997^{**}, p < 0.01$) and T1 and T3 was found ($r = 0.995^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et al, (1987) table 2.

According to table 5 the reliability and validity coefficient correlation of selected variables namely time taken to cover sixth stair TT6thS correlation between T1 and T2 was found ($r = 1.000^{**}, p < 0.01$), T2 and T3 was found ($r = 0.998^{**}, p < 0.01$) and

T1 and T3 was found ($r = 0.998^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to table 5 the reliability and validity coefficient correlation of selected variable namely time taken to cover seventh stair TT7thS correlation between T1 and T2 was found ($r = 0.998^{**}, p < 0.01$), T2 and T3 was found ($r = 0.999^{**}, p < 0.01$) and T1 and T3 was found ($r = 0.999^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to table 5 the reliability and validity coefficient correlation of selected variable namely time taken to cover eighth stair TT8thS correlation between T1 and T2 was found ($r = 0.998^{**}, p < 0.01$), T2 and T3 was found ($r = 0.998^{**}, p < 0.01$) and T1 and T3 was found ($r = 0.997^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to table 5 the reliability and validity coefficient correlation of selected variable namely time taken to cover ninth stair TT9thS of between T1 and T2 was found ($r = 1.000^{**}, p < 0.01$), T2 and T3 was found ($r = 1.000^{**}, p < 0.01$) and T1 and T3 was found ($r = 1.000, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to table 5 the reliability and validity coefficient correlation of selected variable namely time taken to cover tenth stair TT10thS correlation between T1 and T2 was found ($r = 0.998^{**}, p < 0.01$), T2 and T3 was found ($r = 0.998^{**}, p < 0.01$) and T1 and T3 was found ($r = 0.997^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to table 5 the reliability and validity coefficient correlation of selected variable namely time taken to eleventh stair TT11thS correlation between T1 and T2 was found ($r = 1.000^{**}, p < 0.01$), T2 and T3 was found ($r = 1.000^{**}, p < 0.01$) and T1 and T3 was found ($r = 1.000, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to table 5 the reliability and validity coefficient correlation of selected variable namely time taken to cover twelfth stair TT12thS correlation between T1 and T2 was found ($r = 1.000^{**}, p < 0.01$), T2 and T3 was found ($r = 1.000^{**}, p < 0.01$) and T1 and T3 was found ($r = 1.000^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

Table 6: Internal Consistency of Selected Variables of Margria Kalamen Power Test

S. No.	Variables	Cronbach's Alpha (α)	Performance
1.	MKPT-T1	.959	Excellent
2.	MKPT-T2	.960	Excellent
3.	MKPT-T3	.959	Excellent

N = 80; all measurements in second

T1 = Trail one, T2 = Trail Two, T3 = Trail Three

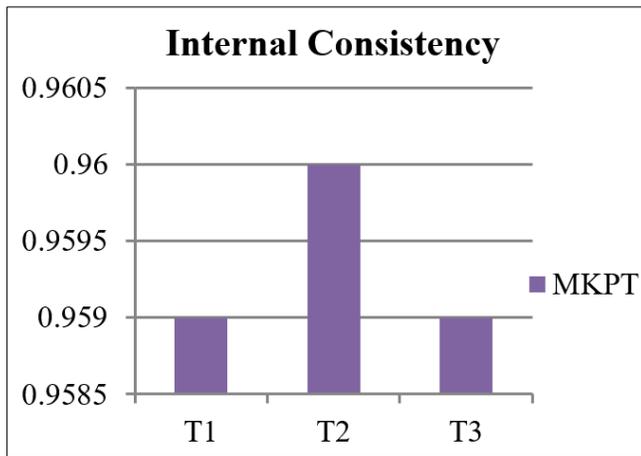


Fig 6: Graph represents Coefficient Correlation of selected variables of Margaria Kalamen test

According to table 6 the internal consistency of variable namely TT1stT1, TT2ndT1, TT3rdT1, TT4thT1, TT5thT1, TT6thT1, TT7thT1, TT8thT1, TT9thT1 TT10thT1, TT11thT1 and TT12thT1 was found ($\alpha = .959$) which was excellent internal consistency as per given criteria Cronbach's Alpha table 2.

According to table 6 the internal consistency of variable namely TT1stT2, TT2ndT2, TT3rdT2, TT4thT2, TT5thT2, TT6thT2, TT7thT2, TT8thT2, TT9thT2 TT10thT2, TT11thT2 and TT12thT2 was found ($\alpha = .960$) which was excellent internal consistency as per given criteria Cronbach's Alpha table 2.

According to table 6 the internal consistency of variable namely TT1stT3, TT2ndT3, TT3rdT3, TT4thT3, TT5thT3, TT6thT3, TT7thT3, TT8thT3, TT9thT3 TT10thT3, TT11thT3 and TT12thT3 was found ($\alpha = .959$) which was excellent internal consistency as per given criteria Cronbach's Alpha table 2.

Table 7: Distributive Statistics of Selected Variables of Squat Jump Burpee Test

S.No.	Variables	Minimum	Maximum	Mean	Std. Deviation
1.	TTJ1T1	1.33	4.64	2.6891	.79485
	TTJ2T1	3.66	8.02	5.6303	1.12033
	TTJ3T1	5.80	12.17	8.6340	1.69405
	TTJ4T1	7.93	16.99	11.5317	2.21407
2.	TTJ1T2	1.33	4.64	2.6900	.79216
	TTJ2T2	3.66	8.02	5.6294	1.11798
	TTJ3T2	5.80	12.17	8.6357	1.69290
	TTJ4T2	7.93	16.99	11.5300	2.21293
3.	TTJ1T3	1.33	4.64	2.6874	.79350
	TTJ2T3	3.66	8.02	5.6286	1.11965
	TTJ3T3	5.80	12.17	8.6357	1.69290
	TTJ4T3	7.93	16.99	11.5300	2.21293

N = 80; all measurements in seconds
T1 = Trail One, T2 = Trail Two and T3 = Trail Three

According to table 7 the selected squat jump burpee test variables namely time taken to cover jump one (TTJ1T1) trail one the mean and SD were $2.6891 \pm .79485$, Time taken to cover jump two (TTJ2T1) trail one the mean and SD were 5.6303 ± 1.12033 , Time taken to cover jump three (TTJ3T1) trail one the mean and SD were 8.6340 ± 1.69405 , Time taken to cover jump four (TTJ4T1) trail one the mean and SD were 11.5317 ± 2.21407 .

According to table 7 the selected squat jump burpee test variables namely Time taken to cover jump one (TTJ1T2) trail two the mean and SD were $2.6900 \pm .79216$, Time taken to cover jump two (TTJ2T2) trail two the mean and SD were 5.6294 ± 1.11798 ,

Time taken to cover jump three (TTJ3T2) trail two the mean and SD were 8.6357 ± 1.69290 , Time taken to cover jump four (TTJ4T2) trail two the mean and SD were 11.5300 ± 2.21293 .

According to table 7 the selected squat jump burpee test variables namely Time taken to cover jump one (TTJ1T3) trail three the mean and SD were $2.6874 \pm .79350$, Time taken to cover jump two (TTJ2T3) trail three the mean and SD were 5.6286 ± 1.11965 , Time taken to cover jump three (TTJ3T3) trail three the mean and SD were 8.6357 ± 1.69290 , Time taken to cover jump four (TTJ4T3) trail three the mean and SD were 11.5300 ± 2.21293 .

Table 8: Reliability Coefficient of Selected Variables of Squat Jump Burpee Test

S. No.	Variables	Between Trails	Reliability coefficient (r)	Evaluation
1.	TTJ1	T1 vs T2	1.00	Excellent
		T2 vs T3	1.00	Excellent
		T1 vs T3	1.00	Excellent
2.	TTJ2	T1 vs T2	1.00	Excellent
		T2 vs T3	1.00	Excellent
		T1 vs T3	1.00	Excellent
3.	TTJ3	T1 vs T2	1.00	Excellent
		T2 vs T3	1.00	Excellent
		T1 vs T3	1.00	Excellent
4.	TTJ4	T1 vs T2	1.00	Excellent
		T2 vs T3	1.00	Excellent
		T1 vs T3	1.00	Excellent

N = 80; all measurements in seconds
T1 = Trail One, T2 = Trail Two, T3 = Trail Three

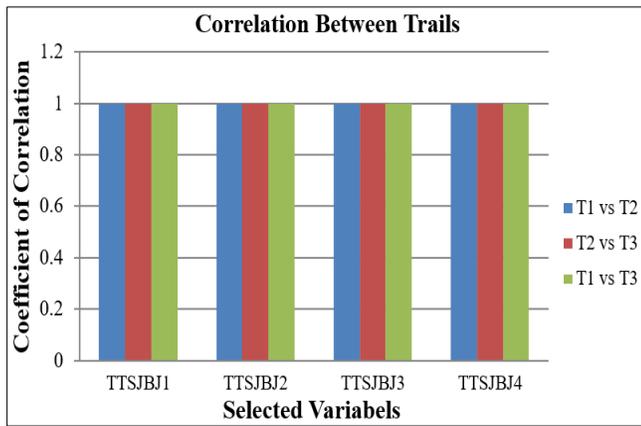


Fig 7: Graph represents Coefficient Correlation of Selected Variables of Squat Jump Burpee Test

According to Table 8 the reliability and validity coefficient correlation of selected test squat jump burpee test variables namely time taken to complete jump one (TTJ1) correlation between T1 and T2 was found ($r = 1.00^{**}, p < 0.01$), T2 and T3 was found ($r = 1.00^{**}, p < 0.01$) and T1 and T3 was found ($r = 1.00^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to Table 8 the reliability and validity coefficient correlation of selected test squat jump burpee test variables namely time taken to complete jump two (TTJ2) between T1 and T2 was found ($r = 1.00^{**}, p < 0.01$), T2 and T3 was found ($r = 1.00^{**}, p < 0.01$) and T1 and T3 was found ($r = 1.00^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to Table 8 the reliability and validity coefficient correlation of selected test squat jump burpee test variables namely time taken to complete jump three (TTJ3) correlation between T1 and T2 was found ($r = 1.00^{**}, p < 0.01$), T2 and T3 was found ($r = 1.00^{**}, p < 0.01$) and correlation between T1 and T3 was found ($r = 1.00^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

According to Table 8 the reliability and validity coefficient correlation of selected test squat jump burpee test variables namely time taken to complete jump four (TTJ4) correlation between T1 and T2 was found ($r = 1.00^{**}, p < 0.01$), T2 and T3 was found ($r = 1.00^{**}, p < 0.01$) and T1 and T3 was found ($r = 1.00^{**}, p < 0.01$). The result is specified that there was a significant correlation at the 0.01 which was highly reliable and valid as per given criteria of Krikendall et.al, (1987) table 2.

Table 9: Internal Consistency of Selected Variables of Squat Jump Burpee Test

S. No.	Variables	Cronbach's Alpha (α)	Performance
1.	TTJ1T1	.992	Excellent
	TTJ2T1		
	TTJ3T1		
	TTJ4T1		
2.	TTJ1T2	.992	Excellent
	TTJ2T2		
	TTJ3T2		
	TTJ4T2		
3.	TTJ1T3	.992	Excellent
	TTJ2T3		
	TTJ3T3		
	TTJ4T3		

N = 80; all measurements in seconds
T1 = Trail One, T2 = Trail Two, T3 = Trail Three

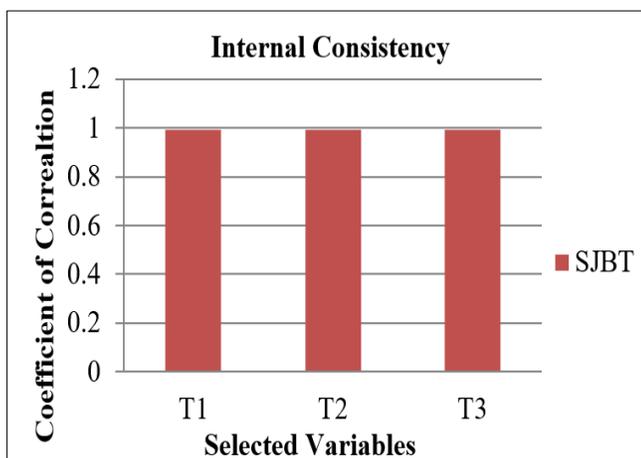


Fig 8: Graph represents coefficient correlation selected variables of squat jump burpee test.

According to table 10 the internal consistency of selected test squat jump burpee test variables namely TTJ1T1 TTJ2T1, TTJ3T1 and TTJ4T1 trail one was found ($\alpha = .992$) which was excellent internal consistency as per given criteria of Cronbach's Alpha table 2.

According to table 10 the internal consistency of selected test squat jump burpee test variables namely TTJ1T2 TTJ2T2, TTJ3T2 and TTJ4T2 trail one was found ($\alpha = .992$) which was excellent internal consistency as per given criteria of Cronbach's Alpha table 2.

According to table 10 the internal consistency of selected test squat jump burpee test variables namely TTJ1T3 TTJ2T3, TTJ3T3 and TTJ4T3 trail one was found ($\alpha = .992$) which was excellent internal consistency as per given criteria of Cronbach's Alpha table 2.

Discussion and Findings
Major Findings

1. In the present study, the result is specified that all the variables of selected Margaria kalamen power test namely time taken to cover first stair (TT1stS), time taken to cover second stair (TT2ndS), time taken to cover third stair (TT3rdS), time taken to cover fourth stair (TT4thS), time taken to cover fifth stair (TT5thS), time taken to cover sixth stair (TT6thS), time taken to cover seventh stair (TT7thS), time taken to cover eighth stair (TT8thS), time taken to cover ninth stair (TT9thS), time taken to cover tenth stair (TT10thS), time taken to cover eleventh stair (TT11thS) and time taken to cover twelfth stair (TT12thS) was found ($p < 0.01$) there was a significant coefficient of correlation at the 0.01 level which was highly reliable and valid.
2. The selected margaria kalamen power test variables namely margaria kalamen power test trail one (MKPT-T1), margaria kalamen power test trail two (MKPT-T2) and margaria kalamen power test trail three (MKPT-T3) was found excellent internal consistency which was highly reliability and validity between of all three trails.
3. The selected squat jump burpee test variables namely time taken to complete first jump (TTJ1), time taken to complete third jump (TTJ3) and time taken to complete fourth jump (TTJ4) of between all three trails T1, T2, and T3 was found ($p < 0.01$) there was a significant coefficient of correlation at the 0.01 level which was highly reliable and validity.
4. The selected squat jump burpee test variables namely (TTJ1T1), (TTJ2T1), (TTJ3T1) and (TTJ4T1), (TTJ1T2), (TTJ2T2), (TTJ3T2) and (TTJ4T2) and (TTJ1T3), (TTJ2T3), (TTJ3T3) and (TTJ4T3) was found excellent internal consistency between of all three trails, trail one, trail two and trail three which is highly reliability and validity.

Conclusion

Within the limitations of the present study, the following conclusions are drawn on the basis of obtaining results.

- The average reliability and validity coefficient correlation of selected margaria kalamen power test variables namely TT1stS ($r = 0.949^{**}$, $p < 0.01$), TT2ndS ($r = 0.988^{**}$, $p < 0.01$), TT3rdS ($r = 0.985$, $p < 0.01$), TT4thS ($r = 0.994^{**}$, $p < 0.01$), TT5thS ($r = 0.997$, $p < 0.01$), TT6thS ($r = 0.998^{**}$, $p < 0.01$), TT7thS ($r = 0.999^{**}$, $p < 0.01$), TT8thS ($r = 0.998^{**}$, $p < 0.01$), TT9thS ($r = 1.00^{**}$, $p < 0.01$), TT10thS ($r = 0.998^{**}$, $p < 0.01$), TT11thS ($r = 1.00^{**}$, $p < 0.01$) and (TT12thS) ($r = 1.00^{**}$, $p < 0.01$) which was a significant correlation at the 0.01 level there were found highly reliability and validity between of all three trails, trail one, trails two and trail three as per given criteria of Krikendall et.al, (1987) table 2.
- The average internal consistency of selected margaria kalamen power test variables namely MKPT – T1, MKPT – T2 and MKPT – T3 was found ($\alpha = 0.959$) was found excellent internal consistency which is highly reliability and validity between of all three trails as per common rule of Cronbach's Alpha table 3.
- The average reliability and validity coefficient correlation of selected squat jump burpee test (TTJ1T1) (TTJ2T1), (TTJ3T1) and (TTJ4T1), was found ($r = 1.00^{**}$, $p < 0.01$),

(TTJ1T2), (TTJ2T2), (TTJ3T2) and (TTJ4T2) was found ($r = 1.00^{**}$, $p < 0.01$) (TTJ1T3), (TTJ2T3), (TTJ3T3) and (TTJ4T3) was found ($r = 1.00^{**}$, $p < 0.01$) which is excellent and highly reliability and validity between of all three trails T1, T2 and T3 as per given criteria of Krikendall et.al, (1987) table 2.

- The average internal consistency of selected squat jump burpee test variables namely (TTJ1T1), (TTJ2T1), (TTJ3T1) and (TTJ4T1), (TTJ1T2), (TTJ2T2), (TTJ3T2) and (TTJ4T2) and (TTJ1T3), (TTJ2T3), (TTJ3T3) and (TTJ4T3) all three trails, trail one, trail two and trail three was found ($\alpha = 0.992$) which is excellent and highly reliability and validity as per common rule of Cronbach's Alpha table 3.

Recommendations

- Open source software Kinovea (0.8.15) test is valid to use. You can use smoothly this Kinovea (0.8.15) test to measure any physical activity.
- We can do similar research studies to analyze three dimensional videos analysis.
- Kinovea (0.8.15) test is an efficient and cheap platform for analysis of movement (Motion), but very few components can be measured.
- The increasing demand for physical education in the world and the latest research method for the development of sports are being emphasized daily. Keeping this in mind, the Kinovea (0.8.15) test is not fruitful.

Acknowledge

The author's acknowledged all the Volunteers, Students and Sportsperson of Jammu and Kashmir and State of Himachal Pradesh for their voluntary participation in the study. Special acknowledge and thanks to Mr. Anuj Sharma for handling 2 – D video recording system.

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