ISSN: 2278-4632
Vol-10 Issue-8 No. 5 August 2020

ASSESSMENT OF LINEAR RELATIONSHIP BETWEEN KINEMATIC DATA ON VARIOUS JUMPS AND THE PERFORMANCE OF SPECIAL JUDO FITNESS TEST

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ABSTRACT

This study was conducted for the assessment of association between kinematic data of various Jumps and performance of Special Judo Fitness test. A sample of six All India Inter-Varsity level Judokas of L.N.I.P.E. Gwalior was chosen purposively. The data on various jumps like Squat jump, Counter movement jump, Counter movement jump with arm thrust, repeated Counter movement jump and drop jump were recorded with the help of sophisticated device G-sensor. The average height of all jumps were recorded with the help of this G-sensor. This device produces metric data. For the calculation of physical fitness index of Special Judo Fitness Test (S.J.F.T.), subjects throwing performance was measured using standard protocol suggested by Prof. Sterkowicz Stanislaw and the heart rate of the subjects was measured with Polar FT1 heart rate monitor. Pearson's product moment correlation was implied as the statistical tool for the establishment of statistical authenticity of research findings. All the statistical processes were performed using I.B.M. S.P.S.S. software. The results of the study suggests that out of five(5) different jumps, Drop jump was the only variable which was found to be significantly correlated with the performance of Special Judo Fitness test at 0.05 level of significance.

Keywords: *S.J.F.T., Drop jump, G-sensor, Polar FT1.*

INTRODUCTION

Our lives are made easy by latest technological advancement which took place in almost every field: be it Medicine, Agriculture, I.T., Sports, Infrastructure or any other field. As like other fields, sports have also been highly benefitted with the use of latest technologies. For instance earlier Calisthenic exercises were used for the improvement in strength, but now we are using Various Isometric, Isotonic, and Isokinetic machines for the same purpose which are very much capable of providing graded resistance and monitoring gain in strength quantitatively. Some other advanced equipment are available in the market which can identify any abnormality in gaite. These devices (G-sensor) are commonly being used for two purposes: The first in the order is rehabilitation and second is Sports research. The device is useful in quantifying the sports performances like stride length, stride frequency, stride rate, jump height, impact force etc. The findings of the study are based on the outputs presented by G-sensor device. The game of Judo is a body contact sport where one athlete tries to defeat another using various throwing, holding, locking, and choking skills. To apply these skills in sports one need to possess a good level of explosive strength, endurance, speed, agility and excellent coordinative abilities. Several

ISSN: 2278-4632
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studies have been conducted attempting to identify some responsible factors which affect Judo performance largely. As a result of those long term studies now we are in a position to conclude all responsible factors into some valuable variables. The present study has been conducted under the influence of one such study conducted by Georgios Zaggelidis and Savvas Lazaridis(2013). The results of the study presented enough evidences regarding importance of jumping ability in Judo performance. Trained Judokas shown better neuromuscular adaptation at their knee joint for the quick execution of selected Judo throwing techniques. This thought leads to find out linear relationship between these jumping performances and performance of Special Judo Fitness Test. There is a similarity in various forms of jump and Judo hip throwing techniques that greater the stretch shortening cycle better the throwing performance. This experiment was conducted identify which jump's performance is the better indicator of Judo fitness test.

METHODOLOGY

Six subjects were selected randomly from Judo match practice of L.N.I.P.E. Gwalior. The subjects were told about the purpose of the study and a written consent was received. There jumping performance was tested inside the Institute's Biomechanics laboratory and the data were collected with the help of G-sensor device. Later the subject's performance was tested on Special Judo fitness test inside the Judo hall of the Institute. For this test their heart rate was measured with the help of Polar FT1 heart rate monitor and the index was calculated. To observe the association between SJFT (special judo fitness test) and jumping performances, Pearson's product moment correlation technique was implied. Level of significance was set at 0.05. All kinds of statistical processes were performed using IBM SPSS software.

ANALYSIS OF DATA

The data on various jumps were recorded with the help of G-sensor and analyzed by using G-studio software out of various jump outputs the average height attained by the subject in each jump was recorded. An index was calculated for SJFT using the formula: Heart rate (i)+ Heart rate(f)/ total no. of throws in 3 rounds. At last whole parametric data was analyzed with the help of IBM SPSS software for its statistical significance. The score obtained from subjects on different variables were first analyzed for its normality. Then Pearson's product moment correlation was implied.

FINDINGS

On the basis of present data following findings were observed:

- The mean performance of subject on counter moment jump was found to be 35.12cm with SD 2.60
- The mean performance of subject on squat jump was found to be 33.25cm with SD 2.87.
- The mean performance of subject on counter moment jump with arm thrust was found to be 36.57cm with SD 2.47.

ISSN: 2278-4632
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- The mean performance of subject on repeated counter moment jump was found to be 31.00cm with SD 3.54.
- The mean performance of subject on drop jump was found to be 30.80cm with SD 3.33.
- The mean performance of subject on SJFT index was recorded as 10.16cm with SD 1.11.

Table 1 Test of Normality

	Shapiro-Wilk		
CMJ	.911	6	**.444**
SJ	.853	6	**.166**
CMJAT	.866	6	**.211**
RCMJ	.857	6	**.179**
DJ	.907	6	**.415**
F_INDEX	.986	6	**.979**

Table 2 Descriptive Statistics of selected variables

Variable	Mean	Std. Deviation	N
CMJ	35.1267	2.60881	6
SJ	33.2550	2.87885	6
CMJAT	36.5700	2.47576	6
RCMJ	31.0017	3.54971	6
DJ	30.8033	3.33108	6
F_INDEX	10.1617	1.11435	6

Table 1 shows that corresponding values of all the selected independent variables are higher than 0.05 hence it can be inferred that the present data satisfies the normality assumption. Since Shapiro-Wilk test is significant, parametric tests can be applied on the present data.

In table 2 mean and standard deviation of all the selected independent variables have been reported.

Table 3 Correlations matrix of all the jumps with SJFT Index

ISSN: 2278-4632
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		CMJ	SJ	CMJAT	RCMJ	DJ	F_INDEX
Counter Moment Jump	Pearson Correlation	1	.280	**.884***	.773	.294	.065
	Sig. (2-tailed)		.591	.019	.071	.572	.903
	N	6	6	6	6	6	6
Squat Jump	Pearson Correlation		1	.673	.194	-.496	-.506
	Sig. (2-tailed)			.143	.713	.317	.306
	N		6	6	6	6	6
Counter Moment Jump with Arm Thrust	Pearson Correlation			1	.675	-.024	-.157
	Sig. (2-tailed)				.142	.964	.767
	N			6	6	6	6
Repeated Counter Moment Jump	Pearson Correlation				1	.647	.350
	Sig. (2-tailed)					.165	.496
	N				6	6	6
Drop Jump	Pearson Correlation					1	**.856***
	Sig. (2-tailed)						.030
	N					6	6
Special Judo Fitness Test_INDEX	Pearson Correlation						1
	Sig. (2-tailed)						
	N						6

* Correlation is significant at the 0.05 level (2-tailed).

In table 3 correlation matrix have been presented for various independent variables with one dependent variable. Only one variable "Drop Jump" was found to be significantly correlated with the S.J.F.T. Index. When we look at the inter-relationship amongst variables, significant correlations have been observed between Counter Moment Jump and Counter Moment Jump with Arm Thrust.

CONCLUSIONS

On the basis of present sample the following conclusions were drawn:

- Drop jump performance is the best indicator of SJFT index amongst all the selected jump variables.
- The r-value of drop jump was found to be .856 which means that 85.6% change in SJFT Index score may be claimed due to Drop Jump Performance.

ISSN: 2278-4632
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- Significant positive correlation have been observed between counter moment jump and Counter moment jump with arm thrust (r=.884) which can be due to the naturally Identical nature of two jumps.
- For the development of test battery drop jump can be the one of the important variables for the determination of skillful Judokas.

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