KINEMATICAL ANALYSIS OF HANG STYLE TECHNIQUE IN LONG JUMP DURING TAKE-OFF

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Abstract
Methods: The Purpose of the study was Kinematical Analysis of Hang Style Technique in Long Jump during Take-Off.
10 male long jumpers (in which, 5 right & 5 left take-off foot of the subjects) National/Inter university level athletes from Sub Centre Sports Authority of India, Lucknow; Guru Gobind Singh Sports College, Lucknow, Diesel Locomotive Workshop; Varanasi and Banaras Hindu University Varanasi who's age ranging between 16 to 28 years. The purpose of the study was explained to the subjects and requested to jump in their best effort during each take-off attempt. The data was analyzed by using two Casio EX-F1 high speed camera was used, which have frequency from 60 to300 frames per second (f/s).The data were recorded from sagittal plane and frontal plane. Camera-1 was placed perpendicular from the subjects at a distance of 8.80 meters and above from ground 1.40 meter height. Camera-2 placed perpendicular to camera-1 and in front of subject performing the Take-off in hang style technique at the distance 11.30 meters and above from ground 1.40 meter.
Results: The present study carried out on the National/Inter university level athletes from Sub Centre Sports Authority of India, Lucknow; Guru Gobind Singh Sports College, Lucknow, Diesel Locomotive Workshop; Varanasi and Banaras Hindu University Varanasi. After analyzing the data and results, it may be concluded that the right Angular Kinematical Variables shows the average performance of the long jumpers. Another left kinematic variables also shows average performance of the long jumpers the National/Inter university level athletes from Sub Centre Sports Authority of India, Lucknow; Guru Gobind Singh Sports College, Lucknow, Diesel Locomotive Workshop; Varanasi and Banaras Hindu University Varanasi.
Keywords : Kinematical, Long Jump, National/Inter university, Sports Authority of India Lucknow.

Introduction
"Biomechanics is the science that deals with applying mechanical principles to living things, particularly the locomotor system.The science that investigates the internal and external forces actingon the athlete and the athletic instruments in use as well as the effects created by these forces is known as sports biomechanics."The area of biomechanics known as kinematics is concerned with describing how bodies move.It tackles with issues including how far, how quickly, and how consistently a body travels.Since the beginning of the modern Olympic Games in 1896, the long jum has been a feature of competition.Dr. Stewart suggested the "running wide jump" as a standardised track and field technique in 1914.Women were not permitted to participate in the event at the Olympic level until 1928, though.In terms of biomechanics, the long leap falls under the categoy of complicated spatial movement, and in terms of motor activity, it falls under the category of unassisted, naturally occurring locomotion.The four phases of the long jump as an athletic event are the approach (runup) phase, the bounce off phase, the leap phase, and the landing phase.(Hay, 1986).Many jumpers use their maximum approach speed along with technique (the best technique is employed to run as fast as possible and to bounce off as much as possible) in an effort to cover the greatest distance (Bridgett, Galloway & Linthorne, 2002).The athlete's capacity to reach a high horizontal speed at the conclusion of the approach run determines

the long jump performance in large part (Lees et. al., 1993).The jumpers use their visual regulation in the final three steps tocontrol their acceleration as they approach (Glizen & Laurent, 1997).The athlete must employ the proper takeoff technique to propel the body into the air in order to make the most of the run-up speed (Bridgett and Linthorne, 2006).Since the advent of modern sports in the middle of the nineteenth century, the fundamental method for long jumping has not changed.The sportspersons along a runway, leaps off of a wooden takeoff board, and flies through the air before landing in a sand pit.Therefore, a successful long jumper must be a quick sprinter, have strong jumping legs, and have enough coordination to execute the relatively difficult takeoff, flight, and landing movements.The triple Jump has a more complicated biomechanical examination than the other jumps.The methodologies for biomechanical analysis that can be utilised to examine long jumps are brefly summarised in this text.The methods have often been used to examine the various long jump stages.

Objective Of The Study

The objective study was Kinematical Analysis of Hang Style Technique in Long Jump   during Take-off.

Criterion Measures

Variable	Tool	Unit
Height of highest performance of the subjects	Non Stretchable Tape	Meter
Angle of angular kinematical variables of long jump	Silicon Coach Pro-7 Motion Analysis Software	Degree

Methdology:

10 male long jumpers (in which, 5 right & 5 left take-off foot of the subjects) National/Inter university level athletes from Sub Centre Sports Authority of India, Lucknow; Guru Gobind Singh Sports College, Lucknow, Diesel Locomotive Workshop; Varanasi and Banaras Hindu University Varanasi who's age ranging between 16 to 28 years. The purpose of the study was explained to the subjects and requested to jump in their best effort during each take-off attempt. The data was analyzed by using two Casio EX-F1 high speed camera was used, which have frequency from 60 to300 frames per second (f/s).The data were recorded from sagittal plane and frontal plane. Camera-1 was placed perpendicular from the subject at a distance of 8.80 meters and above from ground 1.40 meter height. Camera-2 placed perpendicular to camera-1 and in front of subject performing the Take-off in hang style technique at the distance 11.30 meters and above from ground 1.40 meter.

Figure-1

Diagram of Set-Up for Collection of Data
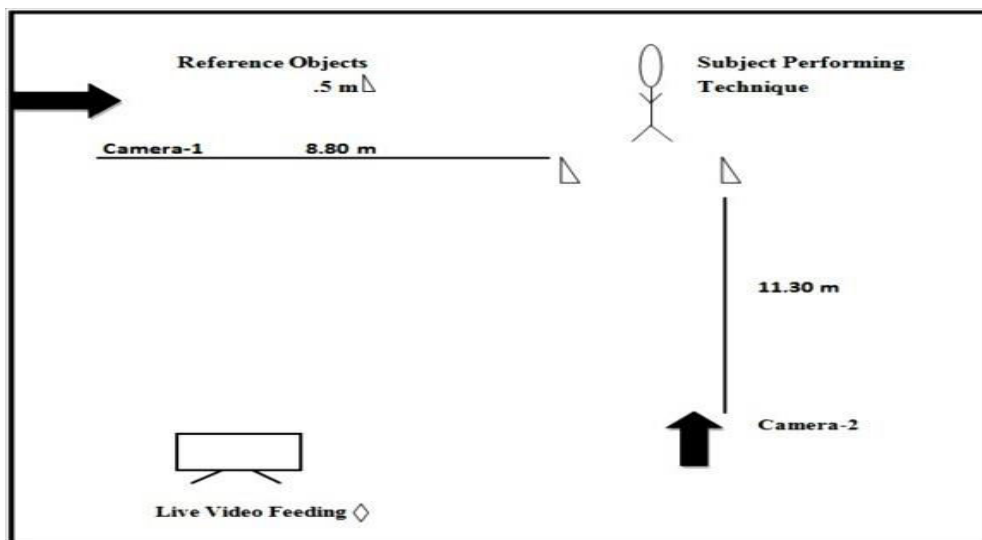
Selection Of Variables:

Angular variables

1. Ankle Joints (right & left)
2. Knee joints (right & left)
3. Shoulder Joints (right & left)
4. Hip joint (right & left)

Performance related variable:

1. Performance of the Long Jumpers

Results Of The Study

Table 1: Descriptive Statistics of Long Jumpers in Relation to Angular Kinematical Variables (Right Angle)

	N	Range	Min	Max	Mean		Std. Devi	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Err	Statistic	Statistic	Std. Err	Statistic	Std. Err
Ankle joint	10	48.00	88.00	136.00	1.067	6.45	20.42357	.523	.687	-1.984	1.334
Knee joint	10	114.00	63.00	177.00	1.150	14.31	45.26956	.303	.687	-1.979	1.334
Shoulder joint	10	35.00	31.00	66.00	50.90	3.61	11.43533	-.265	.687	-.789	1.334
Hip joint	10	138.00	68.00	206.00	1.32	16.82	53.21664	.440	.687	-1.769	1.334
Perform	10	.70	5.42	6.12	5.71	.08	.25579	.582	.687	-1.289	1.334
Valid N	10										

It is evident from table - 1 that mean, standard deviation, scores of angular kinematics variables in degree at Take-off in Hang Style Technique have been found as follow: Right Ankle Angle (1.067 ± 20.42357), Right Knee Angle (1.1500 ± 45.26956), Right Shoulder Angle (50.9000±11.43533), Right Hip Angle (1.3230±53.21664), Performance of the subjects (5.7150±.25579)

Respectively whereas standard Error and Range of scores was found as follow:

Right Ankle Angle (6.4585 ± 48.00), Right Knee Angle (14.315 ±114.00), Right Shoulder Angle (3.6161±35.00), Right Hip Angle (16.828±138.00), Performance of the subjects (.08089±.70).

Table 2: Descriptive Statistics of Long Jumpers in Relation to Angular Kinematical Variables (Left Angle)

	N	Range	Min	Max	Mean		Std. Dev	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Err	Statistic	Statistic	Std. Err	Statistic	Std. Err
Ankle joint	10	61.00	82.00	143.00	1.2100	5.393	17.0554	-1.384	.687	2.492	1.334
Knee joint	10	132.00	43.00	175.00	1.2630	16.276	51.4696	-.529	.687	-1.710	1.334
Shoulder joint	10	51.00	36.00	87.00	57.200	5.730	18.1218	.795	.687	-.345	1.334
Hip joint	10	130.00	81.00	211.00	1.5160	15.076	47.6776	-.374	.687	-1.665	1.334
Perform	10	.70	5.42	6.12	5.710	.08089	.25579	.582	.687	-1.289	1.334
Valid N	10										

It is evident from table - 2 that mean, standard deviation, scores of angular kinematics variables in degree at Take-off in Hang Style Technique have been found as follow: Left Ankle Angle (1.2100±17.0554), Left Knee Angle (1.2630±51.4696), Left Shoulder Angle (57.200±18.1218), Left Hip Angle (1.5160±47.6776), Performance of the subjects (5.710±..25579)**.**

Respectively whereas standard Error and Range of scores was found as follow: Left Ankle Angle (5.39341± 61.00), Left Knee Angle (16.2761±132.00), Left Shoulder Angle (5.73062±51.00), Left Hip Angle (15.0769±130.00), Performance of the subjects (.08089±.70).

Discussion And Findings:

The present study carried out on the National/Inter university level athletes from Sub Centre Sports Authority of India, Lucknow; Guru Gobind Singh Sports College, Lucknow, Diesel Locomotive Workshop; Varanasi and Banaras Hindu University Varanasi. After analyzing the data and results, it may be concluded that the right Angular Kinematical Variables shows the average performance of the long jumpers.

Another left kinematic variables also shows average performance of the long jumpers the National/Inter university level athletes from Sub Centre Sports Authority of India, Lucknow; Guru Gobind Singh Sports College, Lucknow, Diesel Locomotive Workshop; Varanasi and Banaras Hindu University Varanasi.

Conclusion

The finding of the present study shows that the average performance of the long jumpers were found in relation to right and left Angular Kinematical Variables.

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