Research Paper

Volume : 5 | Issue : 3 | March 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Kinematic Analysis of Back Foot off-Drive At Execution Phase in Cricket

Physical Education

KEYWORDS : Kinematical analysis,Centre of gravity,Back foot off-drive.

Dr.Avijeet Mondal Assistant Professor, Saltora Netaji Centenary College,Saltora, Bankura (West Bengal)

ABSTRACT

Introduction-The study was conducted in order to the kinematical analysis of back foot off drive at execution phase in cricket .Twenty randomly selected male students aged 19 to 28 years and who have participated in the C.K.Naidu Trophy from U.P Team, Players of Combined University Camp and the players of Under 22 national Cricket Championship were selected as subjects for this study. Method/methodology-For the biomechanical analysis of selected batting skills in cricket High speed videography technique was employed. The two Casio Exilim EX-F1 high speed camera used for this purpose. Performance of subjects was recorded in control and favourable conditions. The data were recorded from both planes i.e. Sagittal plane and frontal plane. Siliconcoach Pro 7 Softwere was used in order to obtain the values of selected angular kinematics variables ankle, knee, elbow, hip, shoulder and wrist joint and height of centre of gravity from develop stick figures feature. The data was analyzed by use of descriptive statistics.Results & Discussion- The results have shown the values of descriptive statistics of selected angular kinematics variables at downswing and impact phase in front back off- drive the mean, median and mode for selected angular kinematic variables were nearly equal.

1. Introduction

Biomechanics is an applied form of mechanics and consequently the methods used to investigate it must be derived from those of mechanics. However, bio-mechanics have not developed in the wake of mechanics, but as a bordering science in other scientific disciplines such as anatomy, physiology and technique of sports.(Gerald Hochmuth, 1984)

Kinematics is the branch of biomechanics that is concerned with describing the motion of the bodies. It deals with such things that how far a body moves, how fast it moves and how consistently it moves.(Hay, **)**

The best method to analyze or evaluate is called cinematography. This is a quantitative method which is very accurate but at the same time costly and time consuming. The role of cinematography in the biomechanical research involved from a simple form of recording motion to a sophisticated means of computer analysis of motor efficiency. Over the year, new technique in filming and timing having been perfected to aid the research in achieving time measurement of both simple and complex locomotion pattern.

The back foot off drive stroke is played to score the runs without growing a catch against a short pitch ball with pitches in line or just outside the line of off stump.

Objective of the Study

The objective of the study was to assess the variation in angle of selected joint of body parts and centre of gravity of back foot off-drive at execution phase.

2. Methodology

Subjects

Twenty male cricket players aged between 19 to 28 years were selected for the purpose of this study. These subjects participated in the C.K.Naidu Trophy from U.P Team, Players of Combine University Camp and the players of Under 22 national Cricket Championship were selected as subjects for this study.

The study includes the following selected kinematical variables for analyzing the execution phase of back foot off drive in cricket.

Angular Kinematics
(A) Angles of ankle
(B) Angles of knee
(C) Angles of elbow
(D) Angles of hip joint.
(E) Angles of shoulder
(F) Angles of wrist

Linear Kinematics
(a) Height of Centre of Gravity of the body

Filming protocol

For the kinematical analysis of selected batting skills in cricket High speed videography technique was employed. The two Casio Exilim EX-F1 high speed camera used for this purpose. Performance of subjects was recorded in control and favourable conditions. The data were recorded from both planes i.e. sagittal plane and frontal plane. Camera-1was placed perpendicular from the subject at a distance of 8.00 meters and was mount at 1.30 meters height. Camera -2 was placed perpendicular to camera-1 and in front of subject performing the skill at the distance or 24.00meters and mount at 2.00 meters. The frequency of camera was set 300 frames/second.

Statistical Technique

To analysis data, descriptive statistic was used for the Kinematic Analysis of Back Foot Off-Drive at Execution Phase in Cricket.

Result and Findings

The descriptive statistics of angular kinematics variables of back foot off drive in execution phase are presented in Table-1.

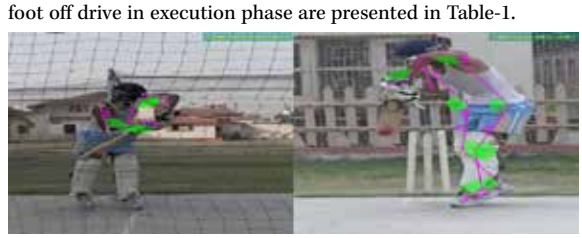

Figure 1: Back foot-Off Drive at Execution Phase

Table No: 1
Descriptive Analysis Of back foot-Off Drive At Execution Phase in Cricket

Angle	N	Range	Minimum	Maximum	Mean	Std. Deviation
Right Ankle	20	9	90.00	99.00	94.30	3.04
Right Knee	20	18	153.00	171.00	162.25	4.63
Right Hip	20	14	132.00	146.00	139.50	3.85
Right Shoulder	20	9	62.00	71.00	66.90	2.84
Right Elbow	20	20	100.00	120.00	114.40	4.84
Right Wrist	20	12	148.00	160.00	153.05	3.33
Left Ankle	20	17	98.00	115.00	107.15	5.00
Left Knee	20	21	152.00	173.00	165.00	5.04
Left Hip	20	22	126.00	148.00	138.35	7.24

Left Shoulder	20	20	79.00	99.00	92.15	5.91
Left Elbow	20	20	130.00	150.00	141.35	5.99
Left Wrist	20	28	141.00	169.00	157.10	8.11
CG	20	0.8	0.98	1.06	1.018	.025

The mean, standard deviation and range of angles for angular kinematics for different variables in degree are as follows: Right Ankle Joint (94.00±3.04), range of angle is 9, Right Knee Joint (162.25± 4.63), range of angle is 18, Right Hip Joint (139.50 ± 3.85), range of angle is 14, Right Shoulder Joint (66.90 ± 2.84), range of angle is 9, Right Elbow Joint (114.1 ± 4.84), range of angle is 20, Right Wrist Joint (153.05 ± 3.33), range of angle is 12, Left Ankle Joint (107.15 ± 5.04), range of angle is 21, Left Knee Joint (165.00 ± 5.04), range of angle is 21, Left Hip Joint (138.35 ± 7.24), range of angle is 22, Left Shoulder Joint (92.15 ± 5.91), range of angle 20, Left Elbow Joint (141.35 ± 5.99), range of angle is 20, Left Wrist Joint (157.10 ± 8.11), range of angle is 34.The height of centre of gravity shows value of mean and standard deviation (1.01±0.25) respectively .

Conclusion:

The back foot stroke so far describe requires the batsman to step behind the bat by moving the rear foot back and across towards the off stump while simultaneously bringing the bat down to make contact with the ball in front of the eyes .more power must be applied to the stroke and therefore the batsman must generate sufficient bat speed at ball contact, arm swing and wrist action are combined to generate bat speed .The perfect balance is not only optimizes a batsman ability to move forward and back but also aids in the generation of power.

The right knee, right shoulder, right wrist and left hip, left elbow, left wrist had maximum contribution on the back foot off-drive at downswing and impact phase.

Recommendations

1. Based on the conclusions drawn in this study the following recommendations have been made.
2. A study may be undertaken with large number of variables and subjects such as different angles as the factors contributing to performance of batting skills.
3. Similar study can also be conducted on female cricket players.
4. Similar study can also be conducted on different level cricket players.
5. A different batting skill may be taken in to consideration for such analysis.
6. Bowling skills and fielding skills can be also analysed with such equipments.

References:

1. Gerald Hochmuth, **Biomechanics of Athletic Movement** (Berlin: Sportberlog, 1984), p.9
2. Hay,J.G .**The Biomechanics of Sports Technique**, p.13
3. John Newton, John Aroncher and Dec Abramson, "Inexpensive Timing Method for Cinematography", Research Quarterly 42:2 (May 1971), P.480
4. S.Mustaq Ali, **How to Play Cricket** (New Delhi: Vikas Publishing House Pvt. Ltd., 1981), p.80.
5. Mathur N.L., **The Encyclopedia of Indian Cricket** (Udaipur : Rajhans Prakashan, 1967).
6. Thani Yograj, **"Encyclopaedia of Cricket"** Gian publishing house" Vol.1991.
7. Giatsis G et.al, "Biomechanical differences in elite beach-volleyball players in vertical squat jump on rigid and sand surface". **Journal of Sports Biomechanics**. 2004 Jan; 3(1);145-58.
8. Hoover DL. et.al, "Biomechanical analysis of women weightlifters during the snatch"., journal of strength and conditioning research,2006 Aug; 20(3). Journal of Sports Science and Engineering (Vol. 05 (2011) No. 01.
9. Inocenti B et.al, " Analysis of biomechanical quantities during a squat jump: evaluation of a performance index". Journal Of Strength And Conditioning Research.2006 Aug; 20(3).
10. Kouvelioti Vasiliki et.al, " Biomechanical Analysis of Shooting In Basketball: Relating Research With Training Practice",Journal of Inquiries In Sport & Physical Education; (2006,Vol. 4).
11. Kristensen LB et.al, "Optimizing segmental movemental movement in the jumping header in Soccer", Journal of Sports Biomechanics. 2004 Jul;3(2):195-208.