

A Study of Angular kinematics of Right Ankle and Right Knee at Delivery Stance and Performance in Shot Put

¹Biswajit Acharyya, ²Dr. Sumanta Kumar Mondal

¹Ph.D Scholar, ²Professor

^{1&2}Department of Physical Education

^{1&2} Visva-Bharati, Shantiniketan, West Bengal, India

Abstract : Shot put is technically demanding. Sequences of upper and lower extremity motions are important for shot put performance. The objective of the study was to find out the relationship of right ankle joint and right knee joint at delivery stance to the performance in shot put. The study was delimited to five (N=05) male International shot-putter. All of them adopted gliding technique. Only throwing side of the body was taken for kinematic analysis. To collect necessary data the researcher used the video graphs of the subjects, which were recorded during the actual competition and posted in YouTube. Kinovea Software-0.8.15 (copy right @ 2006-2011-Joan Charmant and Contrib.) was used to measure joints angles. Pearson's Product Moment Correlation Method was used to determine the relationship between angle of right ankle and right knee at the moment of delivery stance in shot put and the performances. There was no significant relationship between angles of right ankle and right knee at delivery stance to the performance in shot put where 'r' values 0.609 and -0.474 are less than the tabulated 'r' value 0.88 required for significant at 0.05 levels. Optimum angles of right ankle joint and right knee joint at delivery position are very important as it allows the musculature to generate maximum forces which ensures greater acceleration of the implementation.

IndexTerms - Shot Put, Ankle joint, Knee joint, Delivery Stance.

I. INTRODUCTION

The timing of initiation and the magnitude of the action of the lower extremity differ considerably between the glide and the rotational techniques. With all putting styles, the objective is to reach a high rotational body speed and to transfer the energy to the shot. Transfer of mechanical energy plays an essential role in analysis of the shot.

The objective of the study was to find out the relationship of right ankle joint and right knee joint at delivery stance to the performance in shot put.

The study was delimited to five (N=05) male International shot-putter. All of them adopted gliding technique. Only throwing side of the body was taken for kinematic analysis.

II. MATERIALS AND METHOD

The subjects for the present study were five (N=05) male International shot-putters from different countries. The joints angles were calculated at the moment of delivery stance. To collect necessary data the researcher used the video graphs of the subjects, which were recorded during the actual competition and posted in YouTube. Kinovea Software-0.8.15 (copy right @ 2006-2011-Joan Charmant and Contrib.) was used to measure joints angles. Pearson's Product Moment Correlation Method was used to determine the degree of relationship between selected angular kinematic variable of Gliding Technique at the moment of delivery stance in shot put and the performances.

III. FINDINGS OF THE STUDY

To find out the relationship of different angles of right ankle and right knee at the instant of delivery with the performances in shot put, Pearson Product Moment Correlation was employed.

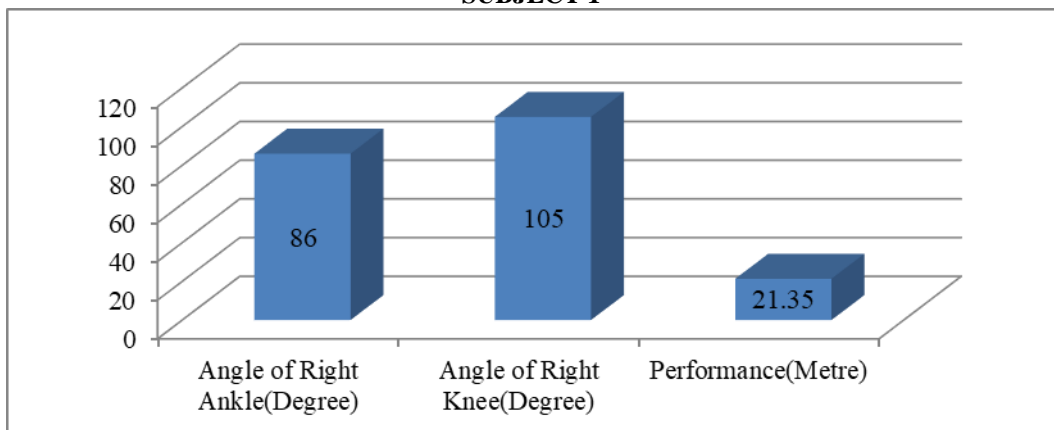
Sl. No.	Joint(R)	Mean Values of Angles	Performance(Metre)	'r' Value
1.	ANKLE	103	21.35	0.609
			21.88	
			22.12	
			21.13	
			21.75	
2.	KNEE	134.2	21.35	-0.474
			21.88	
			22.12	
			21.13	
			21.75	

Tab r.05 (3) =0.88

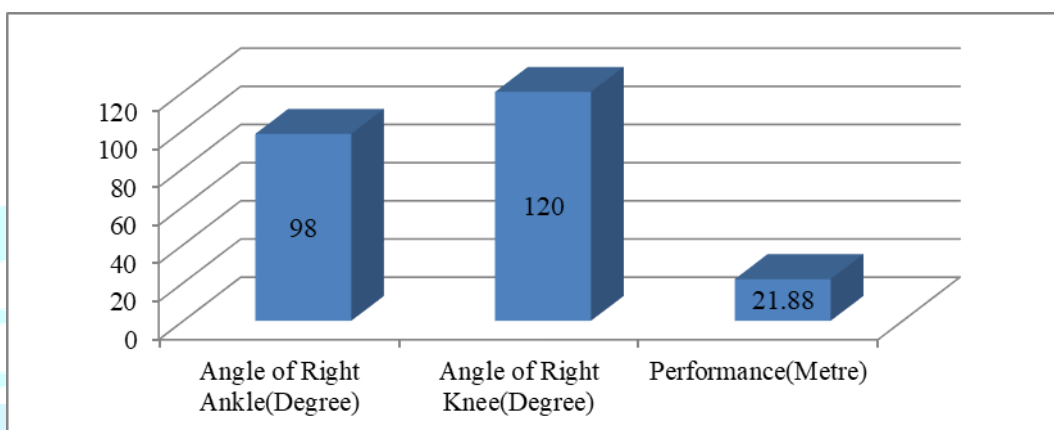
Table shows that there was no significant relationship between angles of right ankle and right knee at delivery stance to the performance in shot put where 'r' values 0.609 and -0.474 are less than the tabulated 'r' value 0.88 required for significant at 0.05 levels.

IV. GRAPHICAL PRESENTATION OF ANGLE OF RIGHT ANKLE AND ANGLE OF RIGHT KNEE AT DELIVERY STANCE AND PERFORMANCE

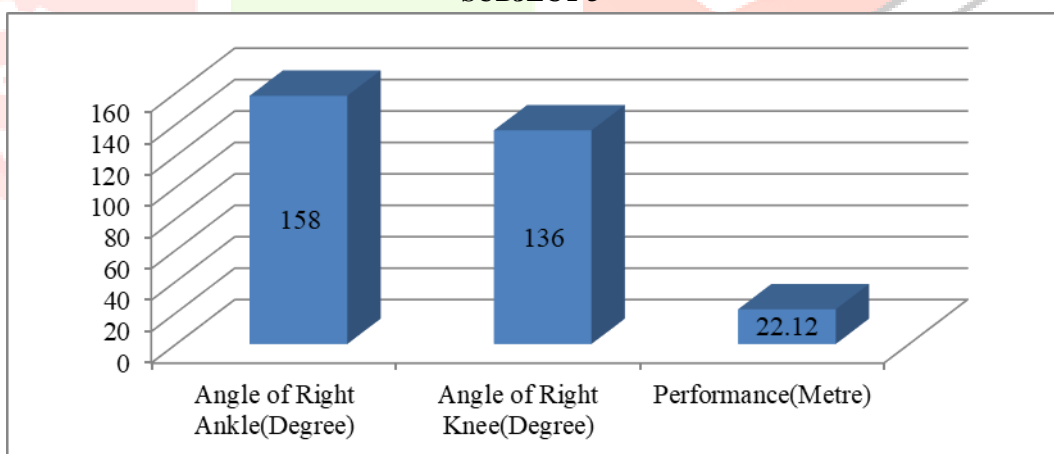
SUBJECT 1



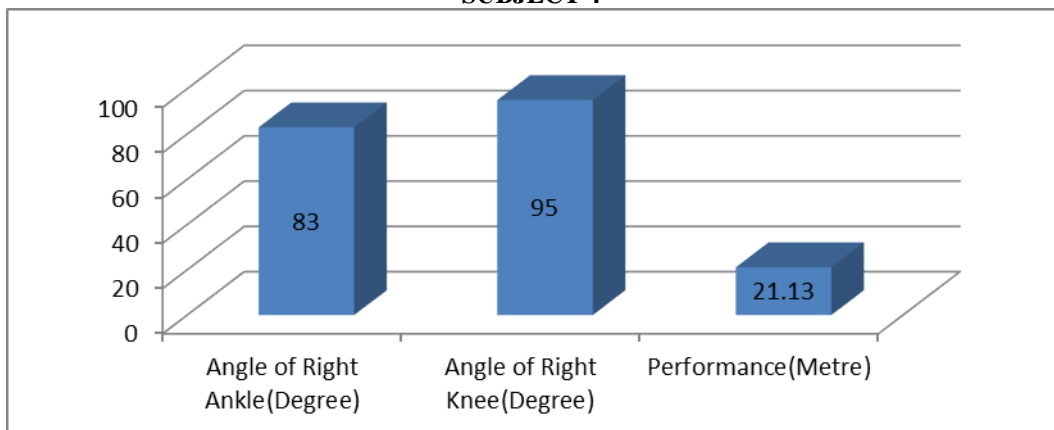
SUBJECT 2

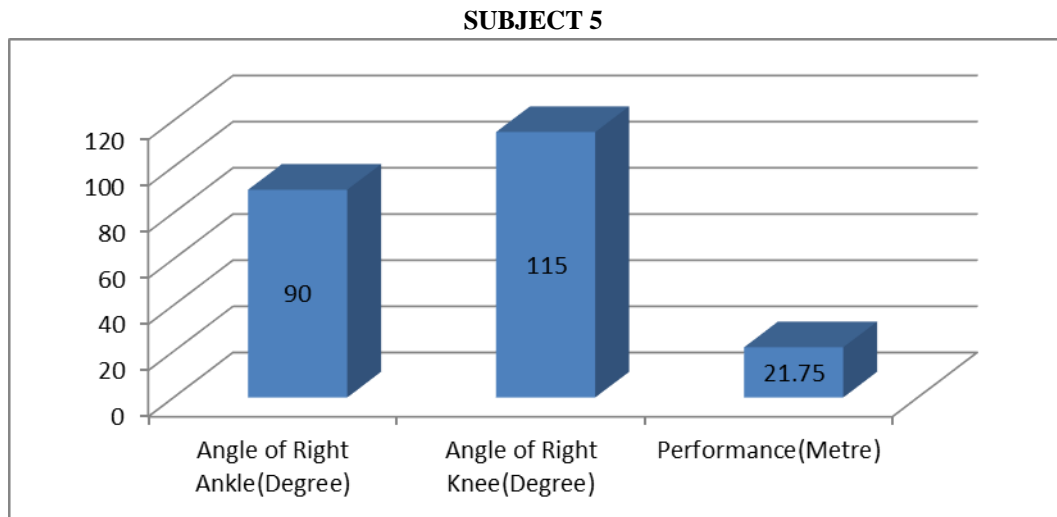


SUBJECT 3



SUBJECT 4





V. DISCUSSION OF FINDINGS

Performance of a throwing technique is impossible without power and conversely. Delivery stance position is also known as power position which indicates that a thrower has to develop maximum force and transfer energy to the shot. In this position angle of right ankle and right knee are the key elements to produce greater force. Angles in the ankle should be such that the resultant vector of gravity of the whole body is in the area of the forefoot. During delivery phase, body weight is transferred from the back foot to the front foot to increase the body's range of movement and the path of the implement. This transfer of body weight is a crucial component of the throw. The front leg should extend almost completely at the moment of release.

The findings of the present study showed no significant results. Here, positive value of coefficient correlation in case of right ankle joint and negative coefficient of correlation in case of right knee joint. Increased angle of right ankle joint at delivery stance leads to excessive forward inclination and improved the shot put performance. Optimum angle of right ankle joint and right knee joint at delivery position are very important as it allows the musculature to generate maximum forces which ensure greater acceleration of the implement.

VI. CONCLUSION

1. Optimum angle of right ankle joint at delivery position are very important as it allows the musculature to generate maximum forces which ensure greater acceleration of the implement.
2. Angle of right ankle and angle of right knee are the key elements to produce greater force.
3. Higher angle at the ankle joint and knee joint at delivery stance leads to excessive forward inclination

REFERENCES

1. J.M.Williams (2012) " Lower body kinetics during the delivery phase of the rotational shot put technique" Brigham young University Byu Scholars Archive 2012-03-07 Theses and dissertations.
2. D.Dinu, F.Natta and N.Houel (2014). "Does the use of a light shot put modify the throwing pattern of elite athletes?" conference of the International Sports Engineering Association.
3. Singh, Rana and Yadav (2013) "Kinematic comparison of different technique of putting the shot at the moment of release" Journal of education and Practice Vol 4, No 4 (2013).
4. G.Kaur "Kinematical analysis of glide technique in shot put " International Journal of Behavioral Social and movement Sciences ISSN: 2277-7547.
5. Kim "Kinematic analysis of gliding type and delivery phase in each trials during shot-putting focusing on Lee, Hyung-Keun, player in men's high school youth group" Korean Journal of Sport Biomechanics Volume 22, Issue 2, pp. 159-171.
6. J.S. Riju "Kinematic difference according to success and failure of shot putting" Korean Journal of Sports Biomechanics Vol. 21, No. 2, June 2011, 161-171.