Relationship of Selected Kinematic Variables with the Performance of Extension Aerial Diving in Soccer

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Abstract

The purpose of this study was to investigate the relationship of selected kinematic variables with the performance of Extension Aerial Diving in Soccer. The subjects of the study were five National level male goalkeepers from Lakshmibai National University of Gwalior (M.P) and Visva Bharati University of West Bengal, the age of subjects between 18 to 24 years.

Nikon D3200 camera was used for registering that complex moment. Supply of the Football for the skill performance given by football feeding machine (Globus) and the velocity of the ball 29.1667m/s. Football feeding machine placed at the distance of 14mt.

The various angles were obtained by the use of Silico coach software. The most critical moment selected for the analysis (flight phase at moment of contact with the ball in Extension Aerial Diving in Soccer). Segmentation method was employed in order to assess the center of gravity of the body during flight phase. The best performance of Extension Aerial Diving has taken as a criterion measures for this study. The data was analyzed by using Pearson’s product moment correlation coefficient to ascertain the relationship the selected kinematic variables with the performance of Extension Aerial Diving in Soccer.

The findings show that there was significant relationship between selected linear kinematic variables with the performance of Extension Aerial Diving in Soccer. We may conclude by saying in this technique, the moment of contact in flight phase contribute very important role to make an accurate save and Significant relationship is observed between center of gravity with the performance to ensure optimum height of the body, maintaining a dynamic body balance in the air and make an accurate catching position.

KEYWORDS: kinematics, center of gravity, joints angles, Extension Aerial Diving.

Introduction: Biomechanical or movement analysis is often thought of as just that- the process of observing (measuring) the performance of a skill, identifying faults in the performance, and providing feedback to the performer to help correct those fault. Indeed, these steps are part of a biomechanical analysis. The ultimate goal of exercise and sports biomechanics is performance improvement in exercise or sport. Soccer goalkeeping technique is focused on the mechanics of catching the ball, or at least deflecting it around the goal. Catching is important, since sloppy catching technique can allow the ball to slip through the hands and into the net. Proper positioning allows the keeper to cover the largest portion of the goal possible, but occasionally a desperate diving attempt must be made to catch or deflect difficult shots. Finally, remember the goalkeeper is the last line
of defense and the first line of attack - a keeper has to know the best way to get the ball to their teammates after the save has been made. In Extension Aerial Diving technique goalkeeper must generate extra power to drive the body both horizontally and vertically to get into catching position. In addition, the landing will be a bit more difficult since the keeper will be "falling" from higher up.

The purpose of this study was to investigate the relationship of selected kinematic variables with the performance of Extension Aerial Diving technique in Soccer.

Methodology: The subjects for this study were five National level male goalkeepers from Lakshmibai National University of Gwalior and Visva Bharati University of West Bengal, the age of subjects between 18 to 24 years. The study was delimited selected Angular kinematic & Linear Kinematic variables, Angular kinematic variables were Angle at Elbow joints, shoulder joints, hip joints, knee joints, Ankle joints at the moment of contact during flight phase & in linear kinematic variable was Height of center of gravity at the moment of contact during flight phase.

The action of the Extension Aerial Diving technique of National Level goalkeepers were recorded by a sequential Camera using the basic principles of scientific photography. The best trial out of five was used for analysis. Extension Aerial Diving technique performance of each subject was collected on the basis of three judge’s evaluation. The average of three judges was considered as the final point obtained by each goalkeeper. Further, to easy calculation it was reduced out of five points. To obtain reliable measurement the instruments which were used for the purpose of the present study available at the research laboratory of Lakshmibai National University of Physical Education, Gwalior, and there reliability was ensured by the manufacturers. All measurement pertaining to the kinematics variables were taken by the research scholar under experts. So, the data collection for the present study was considered reliable. For meaning data collection, great care was taken in setting up the filming site & arranged the camera for accurate spatial and temporal measurement.

Analysis of movements was done by freeze frame technique. The angle of various joint was measured by the Siliconcoach software. Segmentation method was employed in order to assess to the center of gravity of the body during flight phase. The data was analyzed by using Pearson’s product moment correlation coefficients and the alpha level was set at .05 level of significant. The data were analyzed on the basis of laws and principles of mechanics.

Analysis of Data & Findings: The relationship of selected linear and angular kinematic variables with the dependent variable (performance of Extension Aerial Diving) has been presented separately in the following tables.
Relationship of selected linear kinematic variable with the performance of Extension Aerial Diving in Soccer

<table>
<thead>
<tr>
<th>Subject no</th>
<th>Height of the center of gravity</th>
<th>Coefficient of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OY</td>
<td>OX</td>
</tr>
<tr>
<td>Sub 1</td>
<td>4.83505</td>
<td>8.06</td>
</tr>
<tr>
<td>Sub 2</td>
<td>5.54545</td>
<td>8.4615</td>
</tr>
<tr>
<td>Sub 3</td>
<td>5.6264</td>
<td>8.40365</td>
</tr>
<tr>
<td>Sub 4</td>
<td>5.8694</td>
<td>9.5729</td>
</tr>
<tr>
<td>Sub 5</td>
<td>6.88124</td>
<td>12.3132</td>
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</table>

Relationship of selected Angular kinematic variables with the performance of Extension Aerial Diving in Soccer

<table>
<thead>
<tr>
<th>S.No</th>
<th>Various joints</th>
<th>Angels of subject 1</th>
<th>Angels of subject 2</th>
<th>Angels of subject 3</th>
<th>Angels of subject 4</th>
<th>Angels of subject 5</th>
<th>Coefficient of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Left Ankle</td>
<td>149</td>
<td>126</td>
<td>146</td>
<td>152</td>
<td>100</td>
<td>-.436</td>
</tr>
<tr>
<td>2</td>
<td>Left Knee</td>
<td>79</td>
<td>32</td>
<td>158</td>
<td>167</td>
<td>99</td>
<td>.571</td>
</tr>
<tr>
<td>3</td>
<td>Left hip</td>
<td>89</td>
<td>2</td>
<td>145</td>
<td>100</td>
<td>57</td>
<td>.193</td>
</tr>
<tr>
<td>4</td>
<td>Left Shoulder</td>
<td>153</td>
<td>152</td>
<td>160</td>
<td>134</td>
<td>155</td>
<td>-.176</td>
</tr>
<tr>
<td>5</td>
<td>Left Elbow</td>
<td>166</td>
<td>180</td>
<td>171</td>
<td>180</td>
<td>180</td>
<td>.653</td>
</tr>
<tr>
<td>6</td>
<td>Right Ankle</td>
<td>109</td>
<td>122</td>
<td>174</td>
<td>121</td>
<td>161</td>
<td>.669</td>
</tr>
<tr>
<td>7</td>
<td>Right Knee</td>
<td>101</td>
<td>165</td>
<td>160</td>
<td>149</td>
<td>142</td>
<td>.538</td>
</tr>
<tr>
<td>8</td>
<td>Right Hip</td>
<td>118</td>
<td>170</td>
<td>159</td>
<td>172</td>
<td>162</td>
<td>.716</td>
</tr>
<tr>
<td>9</td>
<td>Right Shoulder</td>
<td>134</td>
<td>160</td>
<td>143</td>
<td>153</td>
<td>138</td>
<td>.085</td>
</tr>
<tr>
<td>10</td>
<td>Right Elbow</td>
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<td>155</td>
<td>124</td>
<td>147</td>
<td>144</td>
<td>.331</td>
</tr>
</tbody>
</table>
Photo of subject no 5 and Stick figure after Calculation of center of gravity
The findings show that there was significant relationship between the Height of the center of gravity (linear kinematic variable) in the flight phase at moment of contact with the ball on extension aerial diving performance in soccer because the value (.903) was more than the significant value .This may be due to the technical part of this skill, goalkeeper try lift his body high to catch aerial ball and save the goal with a graceful performance.

Other selected angular kinematics variable show that there was no significant relationship between the angles of various joints in the flight phase at moment of contact with the ball in Extension Aerial Diving performance in Soccer because the value obtain less than required values at 0.05 level of significant. This may be cause of pervious adopted method of performing this techniques little different for every goalkeeper.

**Conclusion:** There was significant relationship between the Height of the center of gravity (linear kinematic variable) and other selected angular kinematics variable show that there was no significant relationship with the performance of Extension Aerial Diving in Soccer.The moment of contact in flight phase contribute very important role to make an accurate save and significant relationship is observed between center of gravity with the performance to ensure optimum height of the body, maintaining a dynamic body balance in the air and make an accurate catching position.

**References**

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