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# Effects Of Postures And Lower Limbs Fatigue Induced On Volleyball Digging Accuracy In Male University Players

## Introduction

Motor skill relies on the function of a human's brain, bones, joints and nervous system. According to the familiarity of humans, we can perform a different degree of fine motor skills with higher agility. In volleyball, one of the basic skills is digging and it is widely used in competition. Players' skills will make an influence on the game a lot and the movements of them is having great importance. (Sozen, 2012) In a game, there is at most 5 sets in total, 25 points in the first 4 sets and 15 points at last. Each time when the ball arrives, the team can do at most 3 hits with defend and attack. To defend, digging is the safest way. As we can see, digging is important in volleyball competitions. (Marcelino, Monteiro and Mesquita, 2009) Yet, the way we do the ready position and the degree of fatigue will contribute to our performance during the competition. A correct ready position can enable us to move faster and more accurately; a perfect dig can lead to victory as it can both defend to avoid losing marks and assist in gaining marks. Yet, players will have fatigue during the games which will cause bad performance. To identify how posture affects digging accuracy and influence from lower limbs fatigue, we are going to measure the number of successful digs with different conditions.

## Methodology

In order to bring out the result of this experiment, we are going to study the number of digging in different standing postures, upright standing (URS) and athletic postures (AP), as well as the lower limb fatigue (LIF). 30 digs should be done in each condition.

## Subjects and Venue

6 male volleyball players from university with collegiate level will be the players. To be fair, all of them will have an average height of  $1.75 \pm 0.22\text{m}$ , bodyweight  $72.6 \pm 1.4\text{kg}$  and number of years of volleyball training experience  $4.8 \pm 0.3$  years. The whole test will be done in a standard volleyball court with a width of 9 m and length 18 m.

## Factors to be measured

For the first factor, different standing postures of ready position, the player needs to stand with 2 positions. The first one is upright standing with feet together. Another one is the athletic position with feet marginally wider than the shoulder, trunk incline forward to around 45 degrees and knee flexed to around 45 degrees. (Fig. 3)

For the second factor, lower limbs fatigue induced, the player has to do 4 sets of heavyweight leg press exercise with 12 repetitions each set and 1-minute rest between sets. Afterward, they have to do digging with the athletic position, which is the same as the one in AP.

## Methods

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The player will stand at the centre of the back zone in the court. (yellow cross in Fig. 1) A spiker will stand at the top (Fig. 2) in front of the net (red cross on Fig. 1) and randomly spike the ball 30 times to either left or right of the player (dotted cross on Fig. 1) with 15 spikes on each side in each condition. 10 seconds is offered for resting between trials and a 3-minute break after finish testing one condition. He will move to the left or right side with 2 meters distance to dig the spike.

To indicate the effect, the sequence of testing condition for the first 3 players is URS AP LIF and the other 3 is AP URS LIF. They must hit the ball with their arms (lower limbs are not counted) before the ball hit the floor and the ball must fall in the court.

According to the results, generally, players with AP are having more successful digs by comparing with URS and LIF. The results of LIF is slightly less than AP, which has 10% of difference and URS is significantly less than the other two, which has less than 20% of accuracy. Moreover, the performance of the first 3 subjects on AP and LIF are better than the other 3 apparently, while the results of URS are similar.

## Discussion

As the results have shown above, players with the athletic position are performing the best among 3 conditions. As an athletic position can make it possible for the digger to be balanced and steady, players can be more flexible to choose the direction of moving or even dive for the ball. Therefore, players can have higher accuracy when they can move quicker. In addition, the first 3 players performed better than the other 3 in AP and LIF. Due to the muscle memory, when players dig the ball in URS, they have kind of warmed up. Since then, they could perform better in AP as they have been used to the movement and athletic positions can even increase their performance by allowing them to raise their speed. Afterward, inasmuch as the heavyweight leg press exercise is done before LIF, even players adopt athletic position into the condition, they are not performing as good as in AP due to muscle fatigue. Yet, aforementioned, the first 3 players achieved better owing to muscle memory. They have done AP before so that they can have a better sense of the ball and dig it smoother.

When players get fatigued, it may affect the accuracy of digging badly. The digging accuracy is depending on the agility and judgment of players. Fatigue is caused as the ability of nerve and the contraction of the muscle fibre is limited. With the longer time of the player use their muscle, so players are unable to generate power continuously. Players may need a longer reaction time to let their actions go through the sensory-motion system and information processing system. (Tavahomi, Shanbehzadeh and Abdollahi, 2017) As a result, the accuracy is lowered.

Though the results have concluded how the effect is done, there are still limitations on this experiment by dividing into players and spiker.

For players, though the height, weight, age and experience are similar, their ability of digging still have differences. When one of the players has a weaker skill in digging by comparing with other players, his performance must be worse than the other. Furthermore, the status of players will affect the experiment. For instance, the player has not slept on the previous day, it will make him have no enough energy to be tested.

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For the spiker, every spike will have different intensity even by the same spiker. It is not a stable variable as the spike may be easier to dig or sometimes harder, it all depends on the speed of the spike. On the other hand, the spiker will be tired after dozens of spikes. When the spiker is tired, his/her stability of each spike will be on different points at different speeds. It will make the experiment hard to be accurate.

## Conclusion

All in all, the test has shown the relationship between digging and ready position. Lower limbs fatigue also one of the factors that may affect how the digging is present. When the player is standing in an athletic position, he can hit the ball accurately; conversely, the accuracy of digging by the player in upright standing has low accuracy. Besides, muscle memory can make the player has better results in the test. Nonetheless, lower limbs fatigue will cause a worse performance.

## Practical Implication

As the performance of the first 3 players is better, we can apply the sequence into training. To train the digging skills of the player, the coach can try to let players kneel on the court and dig the ball by the only upper body to have a better sense of ball at the beginning of training. Then, players can use the athletic position as a ready position and digging. At last, the heavyweight leg press can be done at the end of the session and performed several diggings to end the training of digging.

## Reference

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