EFFECTS OF PLYOMETRIC TRAINING VS KETTLE BELL TRAINING ON MALE VOLLEYBALL PLAYER'S VERTICAL JUMP PERFORMANCE

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ABSTRACT
Objective: The goal of this experiment is to see how plyometric training and kettlebell swings compare in terms of enhancing vertical leap in volleyball players. Methodology: Thirty participants were separated into two groups: plyometric (n=15) and kettlebell (n=15) based on their ability to meet the inclusion criteria. Both groups were subjected to a pre-test study of vertical jump performance. For six weeks, Group A did plyometric exercise while Group B did kettlebell training. The statistical analysis was done using the paired 't-test' and unpaired 't-test' for the post-test analysis. Result: Plyometric training (Group A) accounted for 15 of the 30 individuals in the study, whereas kettlebell training accounted for 15 of them (Group B). When plyometric training (t=18.37) was compared to kettlebell training (t=8.20), there was a significant difference in vertical jump performance (t=2.04 at the 0.05 level). As a result, the research found that plyometric training improved by 95%.
Conclusion: The study found that 6 weeks of plyometric and kettlebell training increases male volleyball players' vertical jump performance. In compared to kettlebell training, plyometric exercise resulted in a substantial difference in vertical jump performance of male volleyball players, according to the findings of this study.

Keywords: Plyometric Training, Kettlebell, Vertical Jump.

INTRODUCTION
Volleyball is a famous team sport that is played all over the world. Short and fast patterns of movement, nimble and quick placement, hops and blocks are all part of the game(5). Aside from technical and tactical knowledge, suitable features of morphology (e.g., advanced body height and lean body mass), and speed/agility, For both sexes, jumping ability is one of the most important aspects of successful volleyball practise(27). In volleyball, vertical jumps (VJs) are used to serve, spike, or block (6). when performing a block leap VJs height indicates the assaulting opponent's possibility for diminished efficacy. When serving or spiking, the vertical jump height lets the player to make contact with the ball over the net (e.g., attack leap), allowing for greater spiking or serving angles.
The ability to jump vertically is critical in volleyball. The jump set, jump serve, blocking, and spiking all necessitate jumping. A player that is successful must be able to jump high, while simultaneously jumping quickly. This demands the ability to generate energy quickly (7).
In a variety of sports, Jump performance has been shown to improve with plyometric training. These workouts use the muscle’s myotatic stretch reflex to produce an explosive reaction by combining strength and speed of movement. Plyometrics is thought to be the link that connects speed and strength, comparable to the movements of power players in sports like volleyball, and multiple studies have shown that plyometric drills can improve power (8).
One of the most effective strategies to build explosive strength is to use plyometrics. During exercise, the athlete's plyometric movement is dominant. "Plyometrics, or Strength and speed are combined in speed strength training."(Marullo,1999, 13).
A kettlebell is a weight that is made of cast iron and has a ball-shaped handle (4). Kettlebells are commercially available in weights ranging from three pounds to one hundred pounds (or more). Kettlebell training has traditionally been done by Russian athletes and military personnel (3). The kettlebell, on the other hand, has become a popular piece of training equipment in health and fitness environments in recent years.

To develop power, an athlete must generate a force larger than the inertia provided by a stationary object. The athlete can swing the weight through a curvilinear arc with the Kettlebell handle. Kettlebell workouts aid in the development of an athlete's flexibility, strength, and power (3).

METHODS

The study included 30 male volleyball players who played both right and left side hitters, middle blockers, and were between the ages of 19 and 23 years old. They were divided into two groups based on convenience sampling: Group A (Plyometric training) n=15 and Group B (Kettlebell training) n=15. Soft tissue injuries, lower limb fractures, and lower limb surgeries were all omitted from this study. The Institutional Ethical Committee authorised all protocols for using human participants in this study, and subjects were explicitly told about the study and given written informed consent from those who satisfied the study's requirements.

Procedure

The Block jump test (BJ) was used to determine the vertical jump, which encompasses the explosive type of strength. The participant stands against the wall with both arm outstretched on the board next to the fixed measuring tape. The competitor takes off with both feet and contacts the board next to the steel measuring tape with the fingertips of both hands, which have been covered with chalk powder.

Training procedure

The two groups A and B were investigated for the pretest vertical jump, with group A receiving plyometric training and group B receiving kettlebell training for six weeks, with both groups having six sessions per week. A 20-minute warm-up and a 10-minute cool-down were included in the 60-minute practise. High knee jumps, arm swings, faster high knees, sidestepping, upper body rotations, run pace, and counter jumps were all part of the standard 20-minute warm-up. The traditional method of cooling off was to immerse yourself in cold water for 10 minutes (10).

GROUP A (Plyometric training):

Six weeks of plyometric training are followed by two weeks of other routines. Each exercise consists of two sets of 4-6 repetitions with a 1-2 minute time constraint. A two-minute rest period follows each session. For the first two weeks, the workout was done at a 50% intensity, then gradually raised by 10% every two weeks. Similarly, the repetitions were increased by 2-3 times every two weeks. According to the DAPRE concept, these are raised.

Overhead throw, chest pass, side throw, bunny hops, lateral over cones, and bounding are the activities for the first two weeks. Power drop, side throw, catch and throw a pass, single leg hop, depth jump, jump and reach are the activities for the third and fourth weeks. The previous two weeks' workouts included backward throws, chest passes, overhead throws, squat leaps, single leg hops, and hurdle hops.

GROUP B (Kettlebell Training):

Participants in Group B worked out with a Kettlebell of 16kg (Dragon door kettlebells, United States of America). The exercise protocol is mentioned in the below table.1

This shows that the kettlebell training program is from 1st to 6 weeks. By combining the increase in volume and movement speed and a focus on technique.

STATISTICAL EVALUATION

The data is reported in terms of mean and standard deviation, and to evaluate the hypothesis, a dependent 't'-test was used for intra-group analysis and an independent 't'-test was employed for inter-group analysis.

RESULTS

The study included 30 participants, 15 of whom did plyometric training (Group A) and 15 of whom did kettlebell exercise (Group B) (Group B). The pretest and posttest values were calculated using the data collected from the subjects.

In groups A and B, the vertical leap was measured using a block jump. Group A has a mean value of 42.22 and Group B has a mean value of 48.30, as shown in table 5. 1.28 is the value of the standard deviation. Block leap has a paired "t" test value of 18.37. For a 0.05 percent threshold of significance at 14 degrees of freedom, the paired "t" test value is greater than table value 2.145. Group B has a mean score of 39.31 while Group C has a mean value of 42.06. 1.34 is the value of the standard deviation. For block leap, the paired "t" test value is 8.20. For a 5% level of significance at 14 degrees of freedom, the paired "t"
test value is greater than table value 2.04. The estimated 't' value is lower than the 't' table value, showing that the pre- and post-test jumping performance of volleyball players differs significantly.

The estimated unpaired 't' test was 7.04, as shown in table 6. For a 0.05 percent threshold of significance at 28 degrees of freedom, the calculated 't' values were greater than the table values 2.04. Because the calculated 't' value is less than the 't' table value, the aforementioned value indicates that plyometric exercise-trained volleyball players improved significantly at the end of the training when compared to kettlebell-trained volleyball players.

Table 1: Rehabilitation protocol

<table>
<thead>
<tr>
<th>SL.No</th>
<th>Exercise</th>
<th>1st to 3rd week</th>
<th>4th to 6th week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kettlebell swing</td>
<td>1st set 3 rep</td>
<td>1st set 4 rep</td>
</tr>
<tr>
<td>2</td>
<td>Accelerated swing</td>
<td>1st set 4 rep</td>
<td>2nd set 3 rep</td>
</tr>
<tr>
<td>3</td>
<td>Goblet squats</td>
<td>1st set 4 rep</td>
<td>3rd set 6 rep</td>
</tr>
</tbody>
</table>

Table 2: Value of paired t test for group A and B

<table>
<thead>
<tr>
<th>Parameter (block jump)</th>
<th>Mean</th>
<th>SD</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A Pre</td>
<td>42.22</td>
<td>1.28</td>
<td>18.87</td>
</tr>
<tr>
<td>Group A Post</td>
<td>48.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B Pre</td>
<td>39.31</td>
<td>1.34</td>
<td>8.20</td>
</tr>
<tr>
<td>Group B Post</td>
<td>42.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Unpaired t-test for vertical jump

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>48.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>42.06</td>
<td>1.28</td>
<td>7.04</td>
</tr>
</tbody>
</table>

DISCUSSION:

After 6 weeks of training, both plyometric and kettlebell training improved the vertical jump performance of male volleyball players. The current study's findings, however, revealed that plyometric training was superior than kettlebell training in terms of enhancing jumping performance.

When compared to kettlebell training, 6-week plyometric training resulted in much larger improvements in vertical leap in male volleyball players, confirming our prediction.

Alptekin et al. (2013) investigated the effects of an 8-week plyometric training programme on sprint and jumping performance in 24 volunteer football players aged 13 to 15, finding a significant difference in sprint and leaping ability.

Coburn et al. (2012) investigated the benefits of weightlifting vs. kettlebell training on vertical leap, strength, and body composition in people aged 19 to 26, and discovered that both groups improved their vertical jump height significantly.

Chelly et al (2015) conducted a 10-week experiment with the plyometric protocol in young male track athletes and discovered that the plyometric training programme greatly enhanced jumping performance.

Over the course of eight weeks, Hermas et al (2014) studied the effects of plyometric training on repeated sprint ability, leg power, and jump performance in 24 male elite handball players and discovered that plyometric exercise increased vertical leap and physical performance.

CONCLUSION

Six weeks of plyometric exercise, according to the conclusions of the study boosted leg muscular strength, resulting in a substantial increase in the vertical leap of volleyball players when compared to kettlebell training.

REFERENCES

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