



(RESEARCH ARTICLE)



Descriptive analysis of the elevation in the third time of volleyball through the "Tracker" program

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Abstract

In the game of volleyball, the correct elevation of the ball for offensive shots is essential to exert an adequate ball hit and achieve points in favor. The objective of the present investigation was to establish a range in the elevation of the third time towards position 4 to improve the attack in volleyball players. For this investigation, a protocol was created that equalizes the conditions and executions that are carried out during an official volleyball match, this protocol was applied to 13 players in the position of male lifter from different selective teams in Puebla city. The method of observation and measurement by videometry was used and 13 elevators from the state of Puebla selected in a non-probabilistic way were compared, each one made 10 elevations as established by the protocol, each one of the subjects to be studied was recorded and each one was cut video to a direction of 3 to 5 seconds with the help of the online video trimmer, once the cuts were made, it was analyzed with the help of the "Tracker" program that analyzes the parabolic shot, as is the elevation in volleyball, this program locates the ball by points and with a Cartesian plane as well as with its respective calibration offers numbers in meters according to each point that the program locates. With the data obtained, the range for elevation can be known and thus the coach can have one more tool on how to evaluate his player in the point guard position.

Keywords: Analysis; Sports gestures; Elevation; Videometry; Volleyball

1. Introduction

Throughout history we have verified that ball games existed in Mesoamerica, the "tlachtli with the Mayas or the pok-tapok" with the Zapotecas, to mention some cultures in which this ancient game existed. In such a way, the human being has modified his forms of movement for different causes and reasons, out of necessity, to survive and to stand out among other aspects and with the passing of time different competitions were invented, in teams or individually, always expressing or trying to be better than others, and thus games were invented that would later become sports, movements that would become techniques, attack and defense strategies that would later become tactics. The rapid development of competitive sports in the world demands from volleyball players not only a good physical condition, but also the ability to understand and comprehend advanced techniques and tactics [1,2].

With the evolution of humanity, there were many other sports inventions such as soccer in 1863, basketball in 1891, baseball in 1893, American football in 1895 and volleyball in 1895, mentioning these sports because of their popularity among ball sports and because except for soccer, all the others were created in the United States of America [1].

In each of the sports disciplines there are different situations that can be analyzed according to the different scenarios that can occur in each one, such as fouls, shots, baskets and shots [3].

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Man has made use of different tools to study sports processes in greater detail, in such a way that different technologies and didactic resources are used to obtain greater precision and vision [3,4].

In volleyball, being more precise in the foundation of the volley or the elevation, it is extremely difficult for the player to be able to perform an ideal execution in a short time due to the complexity of the fine motor skills that this requires, if each of the errors that are analyzed. He commits and understands what he must do so that everything turns out in the best way, it is when this foundation changes to become the best weapon of the volleyball player, mainly for attack.

As tools there are also the different programs that can be used, as is the case of "Tracker" that helps to measure the parabolic shot, and in particular in volleyball practice it is used to evaluate the elevation [5,6].

Today there are multiple ways to evaluate the player in any sport, there are different tests that evaluate multiple abilities so that the coach can carry out a good planning and make his players the most outstanding. The objective of the present investigation was to establish a range in the elevation of the third time towards position 4 to improve the attack in volleyball players.

2. Material and methods

The present investigation was characterized by being based on the scientific method since it is possible that it is reproduced not only in people or in different places, but also with other technical elements of volleyball, or any motor gesture that is desired. In addition, the type of research is quantitative in which measurement was used as a fundamental method, due to obtaining numerical data that were obtained from the "Tracker" program and the assignment of values at the time of the athletes execution to be able to rely on statistical procedures. The test was named for the specific execution to evaluate the elevation in the third time in volleyball.

The maximum height of the ball was measured and it was located that it reached the third third of the field, ensuring that the elevation was as close as 1 meter away from the band line in position 4, likewise the parabola of the ball was observed to locate an ideal range for the shot in the third time.

The placement of the ball was made pleasing each of its attackers, and to choose them according to the different situations of the game. In fact, the basic technique must be learned, but only in order to take advantage of it and develop your own physical and technical qualities.

Contact was made near and above the forehead, with the hands cupped open, offering the ball a concave surface on which the index fingers and thumbs formed a diamond shape. Visual contact with the ball and fingers (diamond) were maintained at the time of the volley. Contact with the ball was made only and exclusively with the inner and upper surface of the fingers (distal phalanx).

The cushioning of the trajectory of the ball occurred as the ball approached the player, the latter accompanied the downward trajectory with a flexion of the joints of the elbows, hips, knees and ankles, maintaining tension in the wrist joint.

Ball projection, the kinetic chains of the joint knots were extended in an upward and forward direction (parabola), depending on the desired trajectory (height and direction). This movement of flexion and extension of the body limited the errors in the direction of the passes, resembling this foundation to the action of a projectile fired from a short barrel.

From the forward elevation, from the correct contact position, with the ball in front of and above the eyes, the extension angles of the joints affected the type of trajectory desired.

Three cones were placed in position 1, two on the attack line at a distance of 3 meters from the touch line and one more on the midfield line at the center of the field at three meters from the touch line.

Cones were placed in the position 4 zone with a distance of 1 meter forming a square on the midfield line and on the sideline.

The coach threw balls into the elevator from position 5 or 6 in order to carry out 10 elevations in the third time to position 4.

The camera was placed at a height of 2.43 meters in order to observe the net and the field in its entirety, as well as the height of the gym.

The camera was located at a distance of 2.50 meters from the final line of the field, guaranteeing a total view of the field and the player.

The lifter with the bases already established made his elevations with the objective that they arrive continuously, performing the elevation in the third time (in static) with these the information was obtained to quantify the precision of the parabola and the maximum point of the ball. Once the videos were taken, they were cut from 3 to 5 seconds so that the "Tracker" program would perform a better function when focusing the videos (Figure 1).

Each participant was told that they had to perform ten elevations in the third time and that they would only have one opportunity to perform them, emphasizing that they should perform them as they were taught and in this case with the best possible execution, an individual was evaluated by each occasion (Figure 2).

The qualification was with the range that was established with the data collected from each elevation and with the help of the "Tracker" program that facilitated locating the maximum, minimum height and the parabola of the elevation.

The data record included: name, years of sports experience, "Tracker" program. Once having the videos to evaluate, they were opened in the program one by one. The Cartesian plane was generated and located at the reference point to be measured. The program was calibrated with a sign already placed in the real situation of the exercise, in this case it was a green ribbon placed on the right post of the volleyball net and the calibration measurement was placed in the box, and the the balloon with the selection of "Create point mass" (Figure 3).

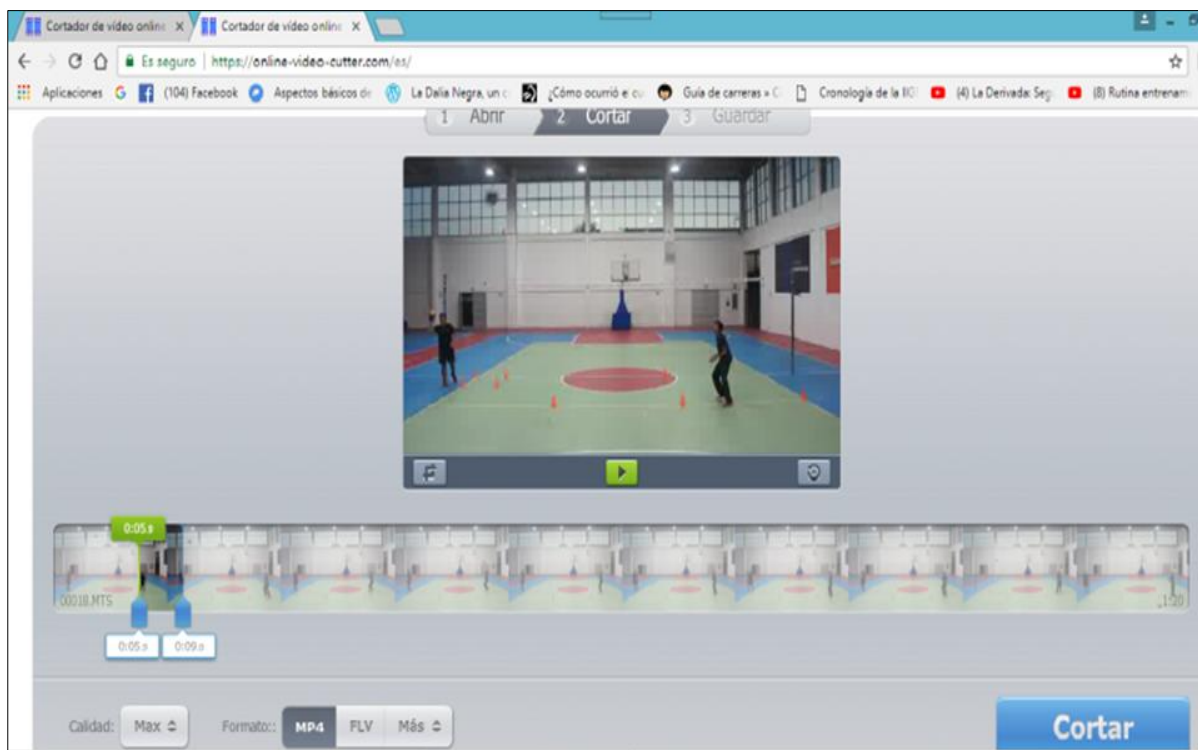


Figure 1 Editing of the videos in the "Tracker" program to improve focus

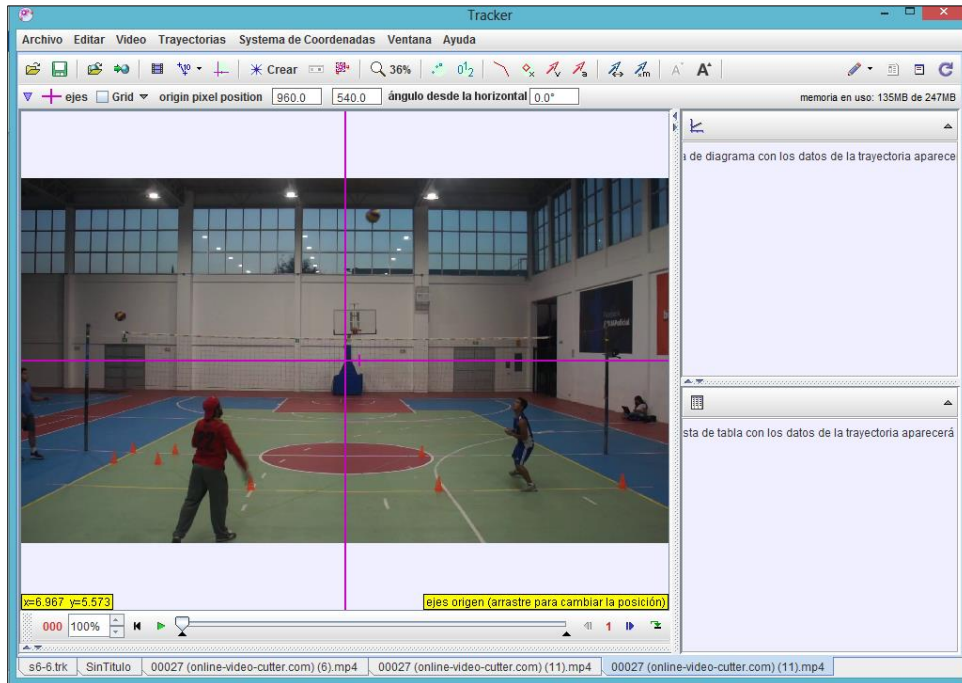


Figure 2 Cartesian plane generation and location of the reference point

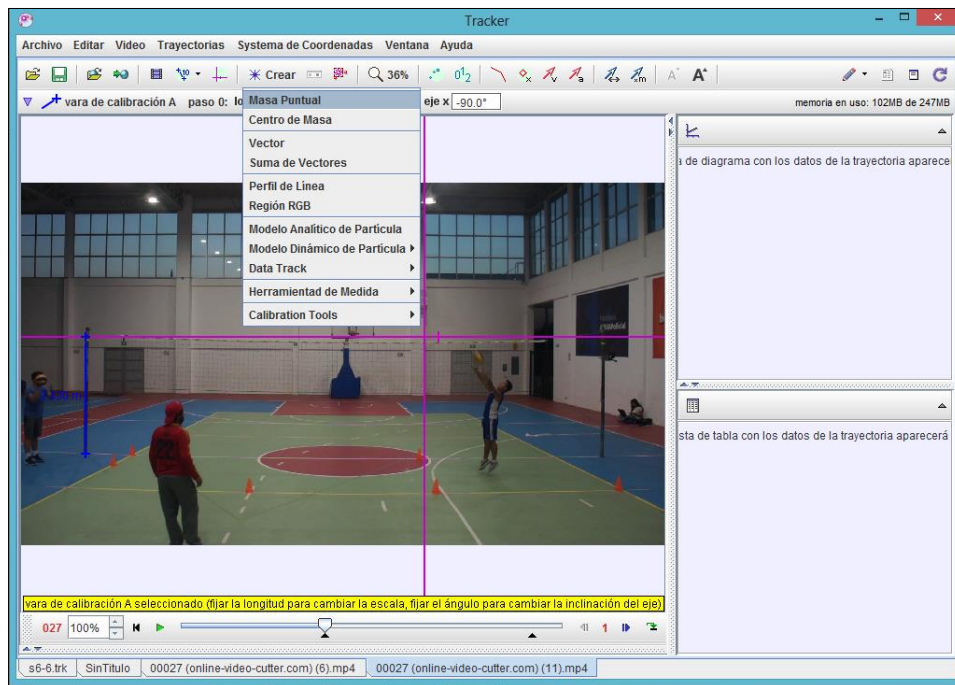


Figure 3 Location of the ball with the selection of “Create point mass”

The program located the different points of the elevation until its culmination and in the lower right box it presented the elevation data.

With the data processed by the "Tracker" program, it was possible to transfer them to a database for each elevation (Figure 4).

The data obtained in the "Tracker" program and the Excel database were used for each of the elevations of the subjects to be evaluated. Measures of central tendency and standard deviation were used to summarize all the data taken in this study into a single value, with a total of 130 higher points per elevation.

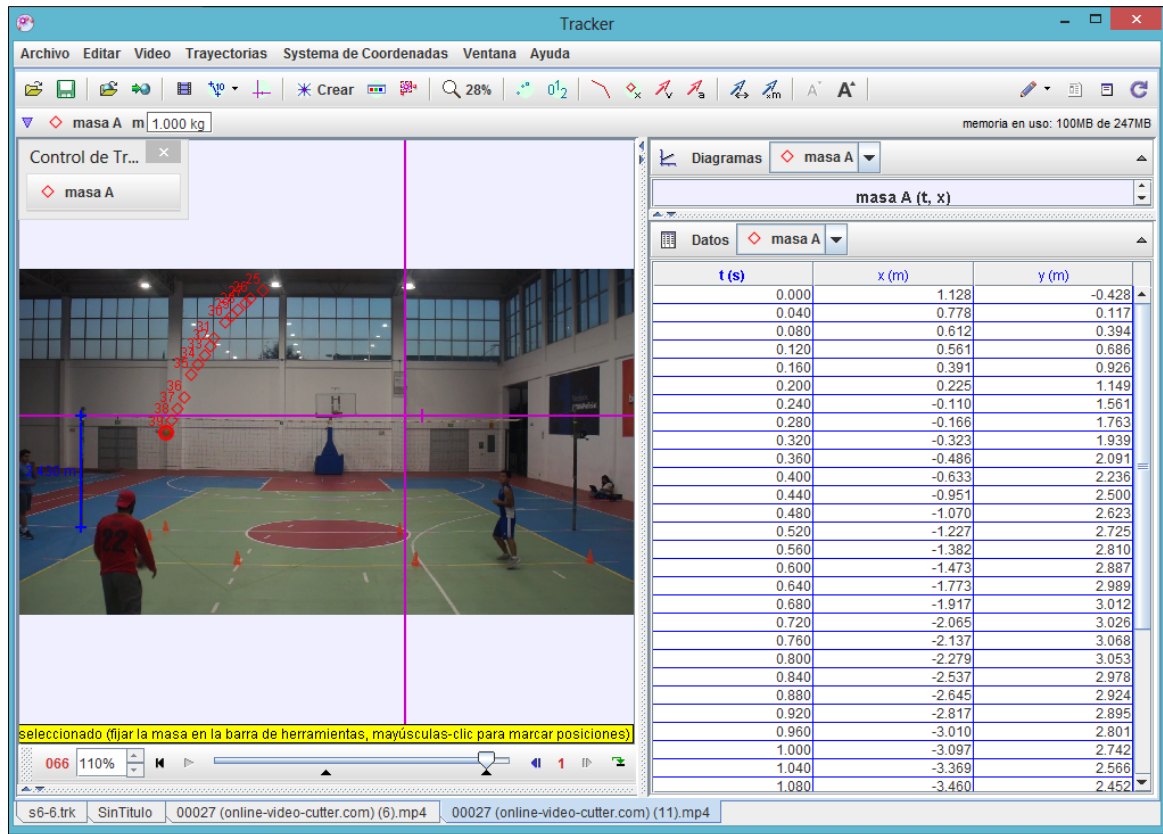


Figure 4 The program determined the different elevation points and the elevation data was presented in the lower right box

3. Results

The results were obtained after carrying out the protocol with the 13 selected subjects and were evaluated with the "Tracker" program, where each player showed a result of the highest point of each elevation making a total of 130 (Table 1).

The maximum point found among all the elevations of each of the individuals evaluated was 3.78 meters with the program and 6.21 meters with the calibration and addition of the volleyball net, along with the lowest point that was 1.48 meters and 3.90 meters with the addition of the height of the volleyball net (2.43 meters) respectively.

The average of all the lifts was 5.17 (+2.43), the latter data being the ideal for the lift in the third time in the direction of position 4. With the standard deviation, the error data for the total of the lifts is obtained. 0.413620144, the player who equals the standard deviation number has to modify his training habits or modify his forms in order to do a better job in the future.

Table 1 Records with the "Tracker" program of the 13 participants, showing the highest point of each elevation.

s1	A	s2	A	s3	A	s4	A	s5	A
2.970	5.400	2.970	5.400	2.974	5.404	2.248	4.678	2.440	4.870
3.194	5.624	2.471	4.901	2.569	4.999	3.237	5.667	2.332	4.762
3.407	5.837	2.55	4.98	2.297	4.727	2.621	5.051	2.130	4.560
3.226	5.656	1.998	4.428	2.785	5.215	2.259	4.689	2.135	4.565
3.260	5.690	1.958	4.388	2.478	4.908	2.451	4.881	1.972	4.402
2.767	5.197	1.801	4.231	2.869	5.299	2.370	4.800	2.041	4.471
2.737	5.167	2.080	4.510	2.720	5.150	2.259	4.689	2.157	4.587
3.787	6.217	1.484	3.914	3.044	5.474	2.351	4.781	1.916	4.346
3.367	5.797	2.180	4.610	2.680	5.110	2.581	5.011	2.700	5.130
3.095	5.525	2.105	4.535	2.936	5.366	2.501	4.931	1.999	4.429
s6	A	s7	A	s8	A	s9	A	s10	A
2.410	4.840	2.928	5.358	3.165	5.595	3.194	5.624	2.535	4.965
3.284	5.714	3.207	5.637	3.165	5.595	2.354	4.784	2.337	4.767
2.968	5.398	2.938	5.368	3.069	5.499	2.473	4.903	2.603	5.033
2.318	4.748	2.880	5.310	3.147	5.577	2.530	4.960	2.445	4.875
3.013	5.443	3.217	5.647	2.943	5.373	2.194	4.624	2.661	5.091
2.947	5.377	2.845	5.275	3.208	5.638	2.792	5.222	2.647	5.077
3.039	5.469	2.928	5.358	2.864	5.294	2.594	5.024	2.422	4.852
3.086	5.516	2.931	5.361	3.272	5.702	2.353	4.783	2.643	5.073
2.743	5.173	2.913	5.343	3.208	5.638	2.768	5.198	2.538	4.968
3.077	5.507	3.149	5.579	3.334	5.764	2.725	5.155	2.572	5.002
s11	A	s12	A	s13	A				
2.745	5.175	3.236	5.666	2.686	5.116				
2.988	5.418	3.460	5.890	2.701	5.131				
2.819	5.249	3.438	5.868	2.828	5.258				
2.963	5.393	3.239	5.669	2.592	5.022				
2.845	5.275	3.459	5.889	2.693	5.123				
2.596	5.026	3.286	5.716	2.586	5.016				
2.848	5.278	2.826	5.256	2.620	5.050				
3.252	5.682	3.213	5.643	2.970	5.400				
2.878	5.308	3.211	5.641	2.448	4.878				
3.179	5.609	2.765	5.195	2.593	5.023				

The range of the elevation is obtained from the addition of a standard deviation and the subtraction of a standard deviation, this gives us a total range of 82 cm for the elevation in the third time presented in the following Likert scale (Table 2).

Table 2 Likert scale for elevation in the third time

Elevation over range	< 5.61
Median + 1 standard deviation	5.61 Ideal elevation
Median elevation	5.19 Ideal elevation
Median - 1 standard deviation	4.78 Ideal elevation
Low height lift	> 4.78

According to the results of the standard deviation, only one of the participants had the greatest range of error, since the standard deviation of their lifts was equal to the standard deviation of the total lifts evaluated, with 92.31% of the participants being those who they managed to complete the test with 4.5 and 6 meters tall.

64.61% of the elevations (84/130) are in the ideal range for a shot in the third time in the direction of position 4, 16.92% of the elevations (22/130) are low in height for a shot in the third time in direction to position 4, 18.46% (24/130) of the elevations exceed the ideal range for a shot in the third time in the direction of position 4.

4. Discussion

Volleyball is a sport that requires speed, power and dynamic capacities, which implies developing explosive strength and resistance, therefore the fundamental objectives of volleyball training are characterized by the work of elevation in attacks as a way to win in the confrontation between attackers and defenders [7,8].

Different investigations have led to the proposal of the use of technologies and the design of diagnostic tests that allow determining the relationship between the speed of the shot and the reaction time of the players before and after different matches, using the radar gun at 4, 5, 6, 7, 8 and 9 meters from the net, orienting it towards the ideal position in which the hits would be made. Together with this test, a controller is used that is placed behind the handball goal to measure the speed of the shot with the pistol. A scorer accompanies the controller to write down the speed that the players perform during 10 shots. In addition, a video camera is used that is located to the side of the players, at an adequate distance, to document the movements of the shot and the control of the time from the touch of the ball hit until it makes contact with the floor, this being one of the examples where technology is used to improve the conditions of the game [9-12].

Since the shot is the main technical attacking gesture of a team, it is the element that culminates the offensive phase of a play, having as its mission to overcome the net and the opposing defense, both blocking and field defense, hence the importance of this work that allows to evaluate the correct elevation of the ball. It must be considered that the structure of technical execution varies from one to another, the moment of the start of the race and, above all, the moment of the beat. Then, the kick takes place immediately before the ball is hit by the setter, so that the moment of his finger touch coincides with the start of the spiker's elevation. The present investigation where the ideal elevation for an adequate spike was evaluated will allow for better offensive actions and ensure offensive positioning [13-16].

5. Conclusion

Given that all the subjects evaluated individually have a standard deviation lower than that of the total lifts evaluated, it can be stated that the lift is ideal for a shot in the third time from position 2 to position 4. The best elevations are those that are close to the median of all elevations (5.19 meters high).

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that they have no competing interests.

Author's contributions

All authors contributed equally to the conception and development of the work.

Statement of informed consent

Informed consent obtained from each of the total participants in the present investigation.

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