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## **Estudio técnico del pase para el equipo escolar masculino de Voleibol de Villa Clara**

### *Technical study of the pass for the Villa Clara men's school volleyball team*

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#### **Resumen**

En el voleibol moderno el equipo que mejor aprenda y aplique la técnica en el juego, estará en mejores condiciones de alcanzar la victoria. Por lo que resulta de vital importancia que los niños desde tempranas edades dominen los elementos básicos de esta disciplina deportiva, entre ellos el pase; y sean capaces de ejecutar con el menor margen de errores este elemento técnico-táctico, permitiéndoles dar mejores soluciones a los diferentes problemas que se le presenten en la construcción del juego. Para el desarrollo del trabajo se utilizaron diferentes métodos científicos tales como: la observación, la medición, la modelación; la triangulación y del estadístico matemático. En el diagnóstico realizado se constató la existencia de dificultades en la ejecución técnica del pase por los atletas del equipo escolar de Voleibol masculino de Villa Clara, por esa razón los autores se trazaron el objetivo de elaborar el patrón técnico del pase en los sujetos estudiados, a partir del análisis cinemático de la técnica del pase. Como resultado se obtuvo un patrón biomecánico que les permita a los entrenadores realizar una mejor planificación y corrección del entrenamiento de este elemento de juego, básico para la construcción del juego de Voleibol.

**Palabras clave:** Pase, Técnica, Voleibol, Propuesta

#### **Abstract**

*In modern volleyball, the team that best learns and applies the technique in the game will be in the best position to achieve victory. Therefore, it is vitally important that children from an early age*

*master the basic elements of this sport, including the pass; and they are capable of executing this technical-tactical element with the least margin of errors, allowing them to give better solutions to the different problems that arise in the construction of the game. For the development of the work, different scientific methods were used such as: observation, measurement, modeling; triangulation and the mathematical statistic. In the diagnosis made, the existence of difficulties in the technical execution of the pass by the athletes of the Villa Clara men's Volleyball school team was found, for that reason the authors set the objective of developing the technical pattern of the pass in the subjects studied, from the kinematic analysis of the passing technique. As a result, a biomechanical pattern was obtained that allows coaches to better plan and correct the training of this element of the game, basic for the construction of the Volleyball game.*

**Keywords:** *pass, technique, Volleyball, proposal*

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## **Introduction**

Nowadays, Volleyball has become a much more demanding sport. At present, strength, agility and having a good stature are basic requirements to be able to practice it. This increases the importance of the pins in the game. This means that the team that best learns and applies the technique in the game, among other aspects, will be the one in the best condition to achieve victory. In his reflections Donskoi. D. D and Zatsiorski. V (1988) expressed that, from the most general point of view, biomechanics decisively influences the level of effectiveness with which the forces are applied to achieve the planned objective, with this purpose it is about finding the optimal forms for realization of physical exercises in the context of sports preparation.

Sports biomechanics as a scientific discipline facilitates the study of the structure, properties and motor functions related to the improvement and rationality of the technique in Volleyball: in the stops, movements, receipts, passes of the ball, the spikes, the blocking and in take outs.

There are several studies that have ventured into the issue of the use of Biomechanics as an auxiliary science in the preparation of volleyball players of different ages and in both sexes, it constitutes a scientific background for this research "The biomechanical analysis of the front forearm receipt in Volleyball by athletes in the category 13-15 years (male) of the EIDE Martires de Barbados, Pelawaththa. K, Herrera, I. G. Napoles, S. A. (2017); The ,Great Brain, The armer/ Lifter, Black, J. (2017) and "Exercises to contribute to the improvement in the execution of the block in the central school volleyball players, Navelo. R, M. Santana. J, L. et al. (2017) that starts from the

biomechanical study of the technical execution of the blockade to determine the main mistakes that athletes make.

Also important are the study by Cardona, Oscar and Yolima Román Chalarca (2012) who carried out the biomechanical analysis of the technical execution of the finishing gesture in the female youth team, belonging to the Risaraldense Volleyball League 2012 and the work of Pelawaththa, K, Herrera, IG Napoles, SA (2017) who analyzed from the biomechanical point of view the receipt of the frontal forearm in Volleyball by the athletes of the 13-15 year-old category (male) of the EIDE Mártires de Barbados.

In the research reviewed, despite its importance, the goal of biomechanical analysis of the pass is not established, with a biomechanical pattern as a result, which allows coaches to better plan and correct the training of this basic element of the game for the construction of the Volleyball game. This makes relevant the research whose result is presented, which is distinguished by its interdisciplinary approach aboarding the passing technique.

For the aforementioned, it is vitally important that children from an early age master the basic elements of this sport, including the pass; and they are able to execute it in a positive way, allowing them to give better solutions to the different problems that arise in the construction of the game. The modern scientific conception of the training process has caused a spectacular advance in the level of sports results, the use of Biomechanics as an auxiliary science, is of great importance for the determination of the mechanical causes of development of movements in activities sports in general and Volleyball in particular.

In the observations made at the training sessions, it was found that the passers make mistakes in the pass volley technique, fundamentally in the location on the ground and the precision in this technique, both in place and with movement. The objective of the work is to elaborate the technical pattern of the pass in the studied subjects, based on the kinematic analysis of the pass technique.

This research is aimed at solving the problems of the passing technique in the male school team in the province of Villa Clara, from the kinematic analysis of the technique based on a biomechanical

model and contributing to the creation of intermediate models between the standard technique and individual, hence its importance.

## **Materials and methods**

### **Procedure to determine the technical pattern of the pass in athletes of the school men's Volleyball team**

To determine the steps in the analysis of the technical pattern of the pass in athletes of the male Volleyball school team, a meeting was held where take part teachers of this sport of the Faculty of Physical Culture at the Central University "Marta Abreu" de Las Villas and the coaches of the Villa Clara men's Volleyball school team. In the meeting, the steps of the methodological procedure and the establishment of the model to be applied are presented; which are submitted to discussion and finally accepted by the coaches.

The procedure is specified in the following steps:

- Biomechanical pattern model.
- Filming of the actions of the pass during training.
- Obtaining the videos, considering the biomechanical requirements established for the pass technique.
- Digitalization of images.
- Obtaining the results through biomechanical software.
- Processing and statistical analysis of the results.

Two-dimensional (2D) analysis of several frontal and sagittal repetitions was carried out to obtain the images, with the support on a computer, for subsequent analysis, through the Kinovea biomechanical software. The images obtained compile a set of actions performed by the passers under study.

**The study variables are specified in the following kinematic parameters:**

Ball departure angle

Arm Angle (front)

Initial ball velocity

Taking into account the phases of the technical execution divided into three moments according to the model:

- Before contact: Arm movements towards the meeting.
- During contact: cushioning and ball exit.
- After contact: Accompanying movement of the arms.

**Biomechanical model established by Ivoilov, A. V., & Lago, O. A. (1988) for the pass.**

Table 1. Biomechanical model

Measurements	Model
Ball departure angle	60°
Arm Angle (Front)	90°
Initial velocity	11 m/s
Ball approach	0.09s
Cushioning and ball exit	0.1s
Ball accompaniment	0.1s

**Analysis of the technique of the passers under study.**

After going through the different steps of the procedure used for the analysis of the technique, the following results are achieved in the tables that are shown below, from the analysis of the technical execution of the pass through the subjects studied, in this the parameters are analyzed biomechanics object of study.

Table 2. Subject 1

Phases	Ex 1	Ex 2	Ex 3
Arm movements towards the meeting	0.25s	0.50s	0.46s
Cushioning and ball out	0.08s	0.08s	0.12s
Accompanying movement of the arms	0.29s	0.33s	0.38s

**Ex 1:** Exercise 1, **Ex 2:** Exercise 2, **Ex:** Exercise 3

Table 3. Subject 2

<b>Phases</b>	<b>Ex 1</b>	<b>Ex 2</b>	<b>Ex 3</b>
Arm movements towards the meeting	0.17s	0.25s	0.29s
Cushioning and ball out	0.08s	0.12s	0.12s
Accompanying movement of the arms	0.42s	0.33s	0.33s

**Ex 1:** Exercise 1, **Ex 2:** Exercise 2, **Ex 3:** Exercise 3

Table 4. Subject 1

<b>Parámetros</b>	<b>Ex 1</b>	<b>Ex 2</b>	<b>Ex 3</b>
Ball departure angle	65.6°	66.1°	63.5°
Initial Ball Velocity	8.03 m/s	7.85 m/s	9.5 m/s
Angle of front arms	60°	38°	73°

**Ex 1:** Exercise 1, **Ex 2:** Exercise 2, **Ex 3:** Exercise 3

Table 5. Subject 2

<b>Parámetros</b>	<b>Ex 1</b>	<b>Ex 2</b>	<b>Ex 3</b>
Ball departure angle	71°	56.6°	60°
Initial Ball Velocity	9.43 m/s	9.19m/s	9.05m/s
Angle of front arms	73°	70°	75°

**Ex 1:** Exercise 1, **Ex 2:** Exercise 2, **Ex 3:** Exercise 3

As can be seen, the subjects studied do not adjust to the biomechanical parameters for the pass according to the model, the departure angles of the ball are very varied in the different executions performed by about 11 °, leading to the variation in the initial speed of the ball that is much more than the ideal 2m / s.

Regarding the phases of the movement, there is a variation of 0.3s between the executions of the first phase, in the second phase the movement is varied by 0.4s and in the last phase of 0.3s, which reaffirms the presence of unnecessary movements that influence in the technical execution of these players and therefore the quality of the pass, predominating the high passes and this implies greater difficulty for attackers who are forced to face a greater number of blockers.

## Results and Discussion

### Proposal of technical pattern of the pass in athletes of the men's school Volleyball team

With the completion of this work, from the study of the athletes it can be affirmed that they present difficulties in the technical execution of the pass in a general way, in each of the phases and parameters, considering a deficient work in the initial speed of the ball, the instability given in the phases of the technical execution that leads to the angular variation of the exit of the ball and the placement of the arms in contact. Therefore, a proposal is made of the angles and phases studied that must be corrected from the ideal pattern, which will allow a better link between the ideal technique and the individual characteristics of the athlete and its personal technique.

In compliance with the general objective of this work, based on the theoretical study and the diagnosis carried out, the technical pattern of the pass of the team athletes is proposed, intermediate between the individual and the ideal technique. It is important for the understanding of the proposal to clarify the meaning of the following aspects:

**Angles, initial ball velocity and duration time in phases:** these are taken as essential aspects for the analysis.

**Results obtained:** they are determined by the software, which provides the measures involved in the action.

**Official model:** the official measurements set out in the model are assumed.

Tabla 6.

Parameters	Model	Model Results	Technical pattern
Ball departure angle	60°	63.6°	<b>61.8°</b>
Arm Angle (Front)	90°	64.8°	<b>77.4°</b>
Initial velocity	11 m/s	8.84m/s	<b>9.92m/s</b>
Ball approach	0.09s	0.32s	<b>0.2s</b>
Ball cushioning and release	0.1s	0.1s	<b>0.1s</b>
Accompanying the ball	0.1s	0.35s	<b>0.2s</b>

s, seconds; m / s, meters per second; °, degrees

**Proposal:** It consists of the measures for the creation of the technical pattern, which is the objective of this work, it should be noted that for the suggestion of these measures, the previous ones were averaged, resulting in the above. In the first phase of the movement, movement of the arms to meet

the ball - the legs, trunk and arms are extended. This movement is executed without interruption in the course of 0.2s. Even before the moment of contact of the fingers with the ball, the angles between the arm and the forearm and between the forearm and the hand increase.

In the first phase of the movement, as a result of the flexion of the legs at the joints, the center of gravity drops and the arms prepare to receive the ball at an angle of approximately  $77.4^\circ$ , later in the main phase legs and hands are extended and go to meet the ball.

The second sub phase of the work phase (transmitting a new movement to the ball, and its exit) lasts for 0.1s. Transmitting a new movement to the ball in a given trajectory requires increased muscular efforts. These manifests themselves in an uninterrupted and coordinated movement of the legs, trunk and arms. If the flight path of the ball is directed at an angle of  $60^\circ$  to the horizontal, the volleyball player's trunk is in a vertical position, the legs continue to be extended, and the body's center of gravity shifts slightly upward and forward.

With the increased efforts applied to the support, the heels lift off the floor and the weight of the body is transferred to the balls of the feet. The fingers and hands, after flexing backwards and interacting with the ball, stretch elastically, giving the ball a new translational movement with a departure angle of  $61.8^\circ$  and exiting with an average initial speed of  $9.92\text{m/s}$ .

In the final phase (the accompaniment of the ball with the arms) the legs continue to extend until they become almost fully extended with a duration of 0.2s. The player's trunk and arms also extend and move up and back. The degree of muscle tension gradually reduces and returns to the initial level.

So far the proposal, which can be perfectible, so it is considered pertinent to recall the statement of Kurt Meinel (1979) when he states that "there is not and cannot be a sports technique of absolute and immutable validity", emphasizing the idea of continuous development and the uninterrupted process of improvement experienced by sports technique.



## Conclusiones

1. In the diagnosis made, it was found that the athletes have difficulties in the technical execution of the pass in the movements for the subsequent placement under the ball, in the flexion and extension of the legs and arms in a coordinated way, and the completion of the movement accompanying the ball.
2. The elaborated procedure allowed to determine the technical pattern of the pass in the athletes of the Villa Clara men's school volleyball team, intermediate between the individual and the ideal technique.
3. With the proposal of the angles and phases studied, errors can be corrected from the designed pattern, which allows a better link between the ideal technique and the individual characteristics of the athlete and his personal technique.

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