

# USING COACHING TECHNIQUES IN ASSESSING AND DEVELOPING THE STATIC AND DYNAMIC BALANCE LEVEL OF YOUNG VOLLEYBALL PLAYERS

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**Abstract:** *An important skill in today's volleyball game is dynamic and static balance, so our investigation focused on assessing and developing balance at young volleyball players using the Y balance test. The sample was formed by 25 female volleyball players with age between  $10.22 \pm 2.49$  years that were active at the ACS Alpha Sport Team from Sibiu. The results showed improved performances of our players from the initial testing compared with the final testing in all directions of movement, proving that balance skill training can be an important aspect in the modern volleyball game.*

**Key words:** *static and dynamic balance, assessing in volleyball, coaching techniques.*

## 1. Introduction

Volleyball has evolved into a fast-paced game played by both gender volleyball players in recent years, as a team sport with explosive power elements such as skip, spike, and block [4].

Volleyball is regarded as an occasional sport of commitment and rest [20]. During the play, the acts are of short duration

(one game phase lasts from one to ten seconds) and with longer rest duration (11 to 30 seconds) [27], [50].

Volleyball players must build strength and balance in order to do well [51]. They must maintain body balance in a proper mechanic when dropping after the spike and block; In other words, they must retain strength while maintaining equilibrium [31], [34]. Despite the minor

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variations between right and left leg muscle mass in volleyball, balance is critical [34].

Athletes' results are greatly influenced by their ability to maintain balance. Techniques in both departments are balanced in every way. A lack of balance ability in both male and female athletes has been linked to an increased risk of lower extremity injury in studies [8], [14] [21], [29]. Weight, stability, and plyometric tests of balancing exercises as joint components were found to reduce knee fractures in volleyball, basketball, and football players by 72 percent [13].

In the literature, several studies note a close association between equilibrium and force production [2], [5], [22], [23], [37]. Even if proprioceptors, sensory senses, and anti-gravity muscles perform well, the malfunction of the vestibular system adversely affects equilibrium in movement and static conditions [22].

Volleyball success, in particular, necessitates occasional bursts of high level of intensity in training accompanied by active pauses (for example stretching or low intensity exercises) [3], [9].

Adding feedback impulses, their detection and incorporation in the CNS, and a good motor feedback control produced by the CNS and worn out by the moving system were all required for balance [11].

Volleyball is a highly specialized sport in which each player performs specific roles based on their playing position [7]. It is also an activity that shifts between high level of motor speed and comparatively fewer moments of strained and intense play [10].

Volleyball players' improved athleticism in nowadays activity has given clubs the

chance to test out modern attacking skills and strategies [51]. Hinman requests that the weight center defense ability be balanced. Balance or equilibrium can also be described as a fast and adequate response of the body to the modification in weight center between movement and pause. This adjustment is created in the CNS by integrating proprioceptive, vestibular, and visual input [33].

Balance is needed in volleyball to stabilize the skills of attacking and blocking vertical jumping and landing, approach [30], [52]. Athletes with poor balance are more likely to sustain lower extremity injuries [52]. Balance is important in everyday activity and mainly in sports predominant with movement. Though sports exercises alter body control, body coordination must be protected in order to exercise technical elements effectively [6].

Furthermore, several factors influence equilibrium, including the proper functionality of the sensory system detail, articulation movement degree, and also articulation development and elasticity. This kind of movement aids in the prevention of sports-related accidents in diverse technological components [28].

## **2. Materials and Methods**

### **2.1. Objectives**

The main objectives of our research were to assess and develop the static and dynamic balance of a young group of volleyball players. Other secondary objectives were to verify if the implemented programs were efficient and significant improvements in balance skills.

## 2.2. Design of the research

The study consisted of a repeated-measures design carried out over six months (initial and final test). Each participant was submitted to three trials at the Y balance test, with a 30 min interval between them. At the "y balance" test, we followed the test protocol using the exact measurements and devices.

The protocol was approved by the institutional Ethics Committee ("Lucian Blaga" University Ethics Committee), and according to National Health Council Resolution 466/2012 and the Helsinki Declaration, all participants signed an informed consent document. The protocols were explained to the participants prior to their participation in the analysis, and they were given the option to withdraw at any time. All the volleyball players were minors, so we obtained the legal guardian's written agreement.

## 2.3. Participants in the research

Participants to the research were 25 female players with age between  $10.22 \pm 2.49$  years; height between  $1.45 \pm 10.42$  cm; weight between  $32.62 \pm 10.15$  kg; and experience of  $1.2 \pm 2.4$  years played; with a four weekly training frequency from the ACS Alpha Sports Team Sibiu volleyball team, who had trained at least twice a week for the past two years and had no musculoskeletal leg injuries. In the middle of the season, both participants were

checked. However, the players did not engage in volleyball-specific preparation during the data collection week. All procedures were carried out in the afternoon, and the athletes were advised to eat and drink regularly before the exercise, while avoiding fatty foods.

## 2.4. "Y" balance test

The Y Balance Test (YBT) is a standard clinical dynamic balance evaluation tool [10]. It is a true and accurate measure of balance success that requires the person to maintain their balance while performing a maximal reach in three specified directions: anterior (ANT), posteromedial (PM), and posterolateral (PL) [15]. The test is traditionally scored by manually measuring the distance the individual travels outside of their support base [32]. To allow for fair comparisons between individuals and dominant and non-dominant legs, the reach distance is normally normalized to the individuals' leg length [10].

Each athlete received three trials for reaching in all directions, in the following order: proper anterior reach, left anterior reach, right posteromedial reach, left posteromedial reach, correct posterolateral reach, and left posterolateral reach. The best of three trials in either direction will be evaluated.

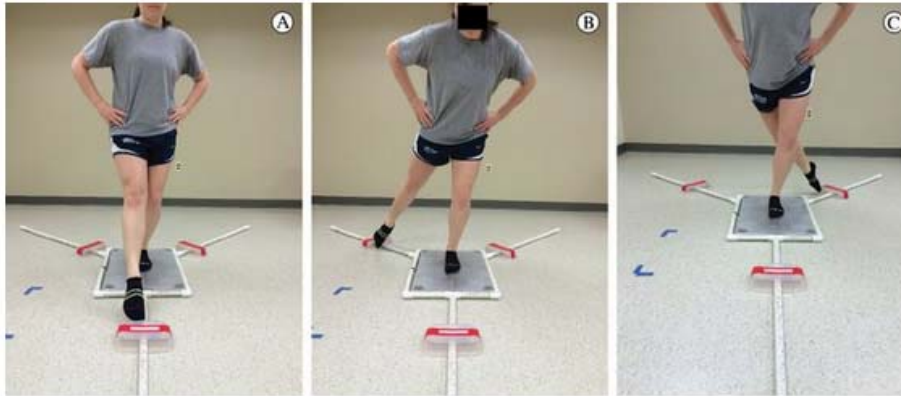


Fig. 1. The Y-balance test performed in the (A) anterior, (B) posterior medial, and (C) posterior lateral directions [35]

### 3. Results of the Research

The research was structured on two assessments, first in April 2019 – the initial test where we observed the initial balance skills of our volleyball players, followed by a period of training with specific balance exercises six months, then second testing in September 2019 to analyze the effects of balance training. The y balance test was taken two times in each direction anterior, posteromedial and posterolateral on both legs (right and left). The results were registered and compared in Table 1 and Figure 1 the initial results. In Table 2 and Figure 2 the final results.

Table 1

*Initial testing at the Y balance test (3 tries in every direction)*

Initial test	Subjects of the research (n=25)		
	1 <sup>st</sup> try	2 <sup>nd</sup> try	3 <sup>rd</sup> try
Right Anterior	60.51	61.22	<b>62.02</b>
Left Anterior	56.44	58.20	<b>59.20</b>
Right posteromedial	92.35	<b>94.75</b>	94.11
Left posteromedial	88.02	89.11	<b>91.22</b>
Right posterolateral	89.44	90.45	<b>90.49</b>
Left posterolateral	89.38	<b>90.02</b>	89.80

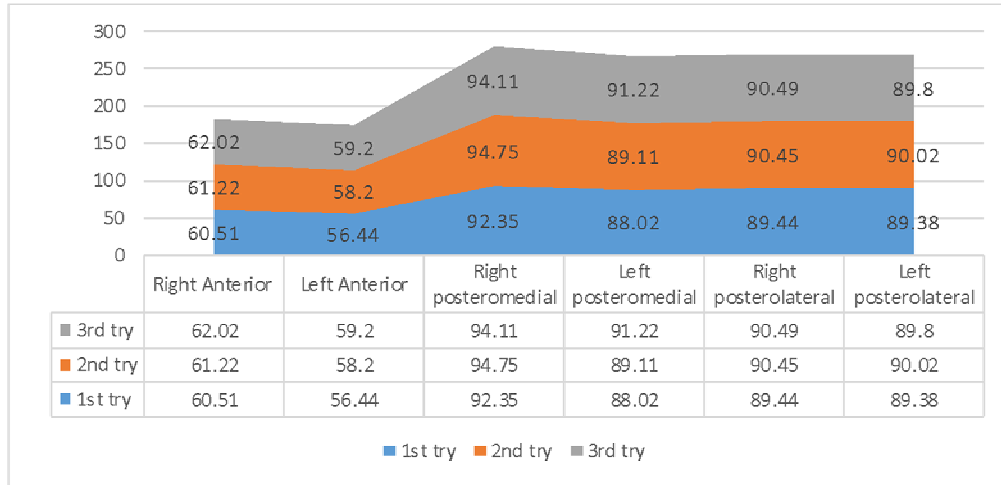


Fig. 2. Graphical representation of initial testing at the y balance test

Initial testing at the Y balance test (3 tries in every direction) Table 2

Final test	Subjects of the research (n=25)		
	1 <sup>st</sup> try	2 <sup>nd</sup> try	3 <sup>rd</sup> try
<b>Right Anterior</b>	61.54	<b>63.18</b>	62.68
<b>Left Anterior</b>	57.38	57.43	<b>60.75</b>
<b>Right posteromedial</b>	93.65	95.05	<b>95.85</b>
<b>Left posteromedial</b>	89.29	89.45	<b>90.33</b>
<b>Right posterolateral</b>	90.13	91.22	<b>91.49</b>
<b>Left posterolateral</b>	90.33	<b>90.55</b>	89.88

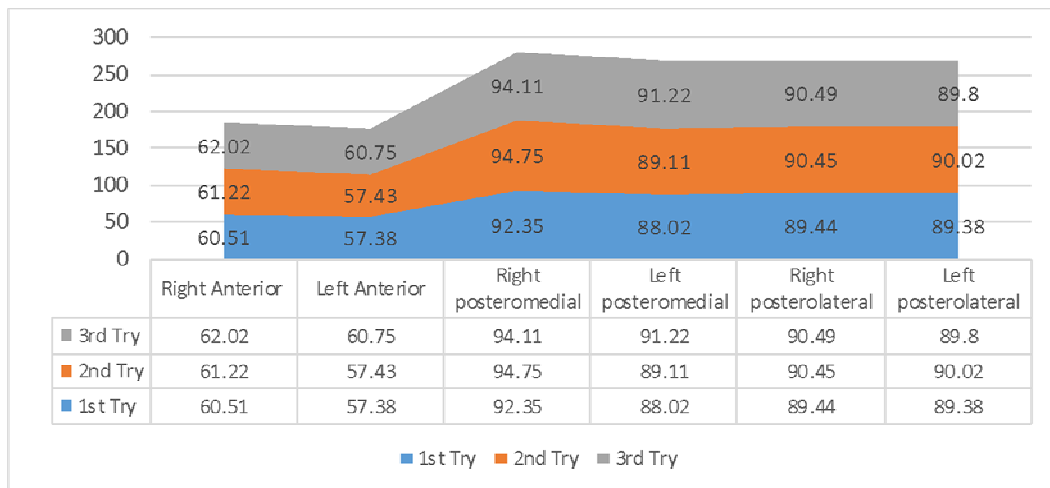


Fig. 3. Graphical representation of initial testing at the y balance test

*Comparison between the initial testing and final testing*

Table 3

Initial test	Subjects of the research (n=25)				
	Initial testing	Final testing	Difference	Delta (right-left)	Composite score (right-left)
Age (years)	10.22	10.56	0.34	-	-
Mass (kg)	32.62	33.25	0.63	-	-
Height (cm)	145.10	148.33	3.23	-	-
Lower member length	75.25	76.33	1.08	-	-
Body mass index	15.50	15.10	-0.40	-	-
Right Anterior	62.02	<b>63.18</b>	1.16	R-L anterior	Left composite score = 83.51
Right posteromedial	94.75	<b>95.85</b>	1.1	2.43	
Right posterolateral	90.49	<b>91.49</b>	1	R-L post-med	Right composite score = 80.54
Left Anterior	59.20	<b>60.75</b>	1.55	5.52	
Left posteromedial	91.22	<b>90.33</b>	-0.89	R-L post-later	
Left posterolateral	90.02	<b>90.55</b>	0.53	0.94	

#### 4. Discussions

This notion has recently been bolstered by emerging empirical research linking daily physical exercise to a variety of physical and mental health effects [38].

Specialists affirm that in performance sports can be found a wide variety of ways and methods for improvements from different fields like math, info or physics domain, varying regarding type and sophistication, that have advanced in nowadays regarding their flexibility and technological possibilities, the degree of their destination of use, and the ease with which they are currently put in practice [42].

The results of our research showed that balance skill is a vital motor quality used in volleyball that can be developed in training.

The investigation discovered good improvements in balance skill, starting from the initial testing where we had a 62.02 average result at the right foot anterior movement compared with the final testing where we registered an average result of 63.18 with a 1.16 cm

improvement. At the right posteromedial direction, we started with an average result at the initial testing of 94.75 cm and reached at the final testing an average result of 95.85 with an improvement of 1.1 cm, and also at the right foot posterolateral movement direction, we started from a value of 90.49 and improved 1 cm to a value of 91.49 cm at the final test.

At the left foot, we registered the following results: at the left anterior movement, we had a 59.20 value at the initial test and improved 1.55 cm until we reached a value of 60.75 cm at the final testing; at the left posteromedial direction, we registered a value of 91.22 at the initial testing and a decrease value of 90.33 at the final test due to some injuries; and at the left posterolateral direction, we registered a 90.02 cm value in the initial testing and a 90.55 cm value at the final testing with a value of 0.53 cm improvement.

The left composite final score was 83.51 cm compared with the right side composite final score of 80.54 cm. Also, the comparison between left and right leg

was analyzed and discovered the following: comparison between right and left anterior direction was of 2.43 cm, at the posteromedial direction the difference between dominant and non-dominant foot was 5.52 cm, and for the post lateral direction, the difference between right and left was better with the left leg -0.89 cm.

Several researches on cricket players [19], basketball players [1], and soccer players [26] found that 4-6 weeks of balance preparation increased dynamic balance as well as agility efficiency when measured using different performance measurements and functional agility testing methods.

After four weeks of progressive balancing training, which included exercises with critical components such as the hop to aim, single-leg standing, and practices with single leg standing, high school basketball players aged 15-20 years saw a substantial improvement in results [12].

A 9-week core conditioning program for active volleyball players resulted in no meaningful change in balance consistency [35].

Other researchers discovered that encouraging judo instruction has a positive impact on athletes' learning and balancing skills [17].

Many interdisciplinary specialized studies deal with the importance of biomechanics [44] in the sciences of motor skills, bio-psycho-motor [45], [46], development and hand-eye coordination [47] and balance [48]. All this is closely related to the game of volleyball among young volleyball players.

Hudson, Garrison, and Pollard (2016) researched the equilibrium success of 19 high level female volleyball sportives on

right and left sides in various directions. The Y-balance test was used to determine the balance efficiency. There were no major equilibrium variations between directions in the left and right foot at the end of the analysis [15].

In healthy males, no meaningful association was observed between isometric muscle strength and coordination, and it was stated that these capacities may be independent of one another and may need to be measured and trained [24].

In recent decades, high-performance sports have undergone a surge, with the findings made possible by appealing to and introducing innovative research methods in different areas of the concerned sector [49].

## 5. Conclusions

The advancement of modern culture produces exponential quantitative and qualitative progress in all fields, including athletic success [40].

The new volleyball game is distinguished by its pace and range of movements, as a result of constant progress in procedures, tapping the ball increasingly taller, ingenuity in constructing attack and defense combinations, and more substantial and reliable service, since service is the first factor in winning a point [41].

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