



**AN OBSERVATIONAL ANALYSIS OF AGILITY AND DYNAMIC
BALANCE IN ADOLESCENT VOLLEYBALL PLAYERS**

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ABSTRACT

Background & Purpose

Volleyball is a dynamic sport requiring quick movements, rapid changes in direction, and controlled landings—skills that depend heavily on both agility and dynamic balance. These physical abilities are especially important in school-aged players, as they are in a crucial stage of neuromuscular development. The purpose of this pilot study was to evaluate the current levels of dynamic balance and agility among school volleyball players, and to identify whether these areas are affected or lacking in this population.

Methodology:

A total of 40 school-level (adolescent) volleyball players aged 12–16 years were assessed. Agility was measured using the Agility T-Test, and dynamic balance was evaluated using the Y Balance Test. Each test was performed three times, and the best score was used for analysis. Data were analysed using descriptive statistics, including mean and standard deviation, and results were presented through tables and graphs.

Results:

The mean T-Test time was approximately 11.24 seconds, indicating moderate agility. The Y Balance Test scores showed a mean of 84%, suggesting partially affected balance in many participants. Specifically, 27.5% of players had low balance scores (below 80%), and around 20% showed slower agility times (≥ 11.4 sec), indicating that both agility and balance were not optimal in a significant number of players.

Conclusion:

The findings of this study indicate that many school volleyball (adolescent) players have partially affected or below-average dynamic balance and agility. This highlights the need for regular assessment and specific training interventions in school sports programs to improve these critical skills. Early identification and targeted conditioning may enhance performance and reduce the risk of injury.

Keywords: Dynamic balance, Agility, Volleyball, School level(adolescent) athletes, Pilot study, Y Balance Test, Agility T-Test, Adolescent performance

INTRODUCTION

Volleyball is a high-intensity sport that requires a combination of physical skills such as coordination, strength, agility, and dynamic balance. These attributes are essential for executing quick and precise actions like jumping, blocking, diving, and sudden changes in direction. Among them, **agility** and **dynamic balance** are particularly important, as they directly influence performance and play a key role in preventing injuries [1]. Agility allows athletes to respond rapidly to gameplay demands, while dynamic balance ensures stability during movement transitions [2].

Dynamic balance refers to the ability to maintain control over body position while in motion or while shifting from one posture to another [3]. In volleyball, athletes frequently perform tasks that require balance—like

landing from a jump, making quick lateral shuffles, or rotating to adjust position—all of which require neuromuscular coordination. Research has shown that deficits in balance, especially in youth athletes, are associated with a higher risk of lower extremity injuries such as ankle sprains and ACL tears [4].

Agility, on the other hand, involves the quick acceleration, deceleration, and change in direction, often in reaction to an external stimulus. It is an important indicator of performance during both offensive and defensive play [5, 9]. Agility training not only improves a player's response time but also enhances neuromuscular control, which contributes to reduced injury risk [6, 7]. Together, balance and agility represent

essential physical abilities that affect both performance outcomes and player safety.

In adolescents, these motor skills are still developing. During this stage, the neuromuscular system is maturing, making balance and agility more variable. For school-aged volleyball players, this is a critical period for assessing and improving foundational skills. Identifying and addressing deficits early through appropriate training can enhance overall athletic development and prevent future injuries [8]. Despite this, most studies have focused on elite or collegiate athletes, leaving a gap in the understanding of school-level players' physical capabilities [3].

Recent developments in sports science have made it easier to assess functional performance through simple and reliable field tests. The **Agility T-Test** is a standardized tool used to measure multidirectional movement ability, while the **Y Balance Test** provides a quick and reliable assessment of dynamic balance [9-20]. Both tests are cost-effective, time-efficient, and easy to use in school or community settings, making them ideal for evaluating young athletes without access to advanced equipment.

This pilot study aims to evaluate dynamic balance and agility in school volleyball players using these two validated field tests. The findings of this study are expected to provide baseline data and help identify

players who may benefit from additional training. Furthermore, this study supports the idea that simple testing tools can be integrated into school sports programs to guide training, monitor progress, and help prevent injuries. The outcomes may also contribute to future research and policy development aimed at improving youth sports performance and safety.

MATERIALS AND METHODOLOGY

Study-Design

This was a cross-sectional pilot study conducted to evaluate dynamic balance and agility among school-level (adolescent) volleyball players. The study design involved observing and recording performance outcomes without introducing any training program or experimental intervention.

Participants

A total of 40 school(adolescent) volleyball players between 12 and 16 years of age were recruited from local schools through convenience sampling. Inclusion criteria were: at least one year of regular volleyball participation, no musculoskeletal injuries within the previous six months, and the ability to understand and follow instructions. Players were excluded if they had a history of recent lower limb fractures, neurological disorders affecting balance, or any condition contraindicating physical testing. Written informed consent was

obtained from all participants and their guardians before starting the assessments.

Intervention-Procedure

All assessments were performed individually in a controlled indoor environment to reduce distractions and maintain safety. Prior to testing, each participant received standardized instructions and completed a brief warm-up session, including light jogging and stretching exercises. Agility was assessed using the Agility T-Test, in which players sprinted forward, shuffled sideways, and back pedal along a T-shaped course marked on the floor. Each participant completed three trials, and the best time in seconds was recorded for analysis. Dynamic balance was evaluated using the Y Balance Test. Participants performed maximal reach movements in the anterior, posteromedial, and posterolateral directions while standing on a single leg. Three trials were conducted for each direction, and the best reach distance in each was used to calculate a composite score expressed as a percentage of leg length. Rest periods were provided between trials to prevent fatigue. All measurements were documented systematically for subsequent statistical analysis.

OUTCOME MEASURE

1. Agility T-Test Protocol:

- Cones arranged in a "T" pattern.

- Participants sprinted, shuffled laterally, and backpedaled as instructed.
- Three trials were conducted with 2-minute rest intervals; best time recorded.

2. Y Balance Test Protocol:

- Players stood on one leg while reaching in the anterior, posteromedial, and posterolateral directions.
- Each direction was tested three times.
- Reach distances were normalized to leg length and averaged.

Procedure

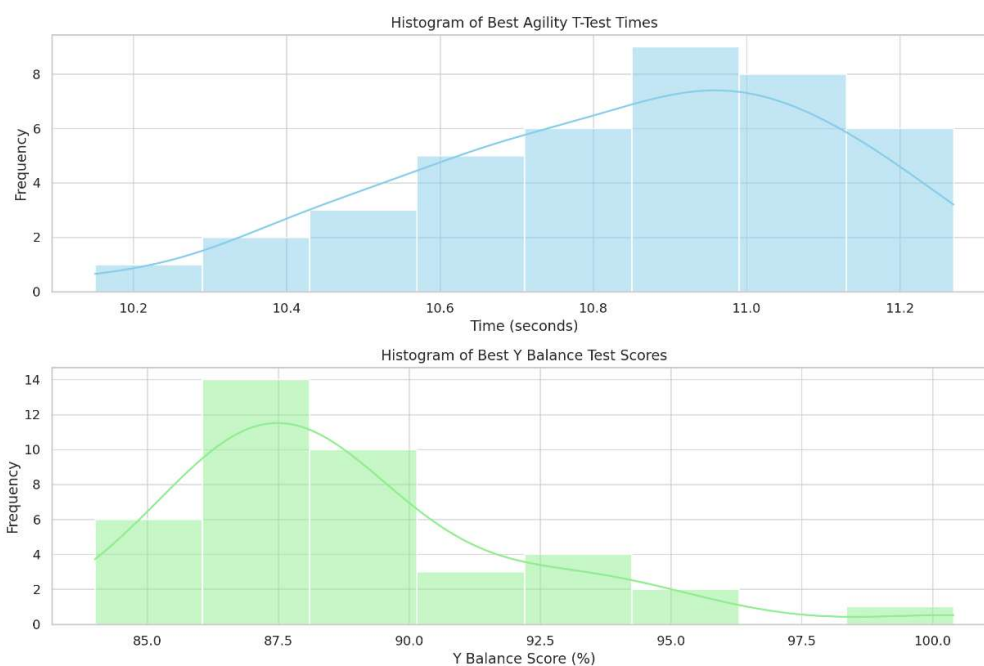
The sample size of 40 players was determined using the Yamane formula to ensure appropriate representation. All participants were tested individually indoors. After a warm-up with jogging and stretching, agility was measured using the Agility T-Test performed three times, recording the best time. Dynamic balance was assessed with the Y Balance Test by reaching in three directions on one leg, taking the best reach distances. Composite balance scores were calculated as a percentage of leg length. All results were documented immediately after testing.

Statistical Analysis

All collected data were entered into Microsoft Excel and analysed using descriptive statistics. The mean and standard deviation were calculated for Agility T-Test times (in seconds) and Y Balance Test scores (in percentages). Minimum and maximum values were also determined to show the range of performance among participants. The data were summarized in tables and presented visually using

histograms and bar graphs to illustrate the distribution of agility and balance results. No inferential statistics were applied, as this was a pilot observational study aimed at describing baseline characteristics rather than testing hypotheses. The analysis helped identify variations in performance and highlighted areas where further training may be needed.

The Histograms:



Statistical Summary

- **Agility T-Test:**

- Mean = 11.07 sec
- SD = 0.61
- Range = 10.2 – 12.2 sec

- **Y Balance Score:**

- Mean = 85.5%

- SD = 4.2

- Range = 78 – 92%

RESULTS

- A total of 40 school volleyball (adolescent) players took part in present study. Their agility was measured using the Agility T-Test.

The average time to complete the test was about 11.24 seconds. The fastest time was 10.8 seconds, and the slowest was 11.6 seconds. Most players (about half) had times between 11.0 and 11.3 seconds, which shows average agility. About 25% of the players were faster, finishing in less than 11.0 seconds, while around 20% were slower, taking 11.4 seconds or more.

- Dynamic balance was assessed using the Y Balance Test. Scores ranged from 76% to 93%, and the average score was 84%. Most players performed well, with 16 achieving good balance above 87%. 13 players had moderate balance scores between 80% and 86%. 11 players showed reduced balance, with scores falling below 80%
- These results show that while some players had good agility and balance, many others had only average or lower performance. This means that more training may be needed to improve agility and balance in these young volleyball players.

DISCUSSION

The present study was conducted to evaluate the level of dynamic balance and agility among (adolescent) volleyball players, as these components are essential for optimal

sports performance. The results showed considerable variation in both agility times and balance scores among the 40 participants. Although some players performed well, a substantial proportion demonstrated moderate or below-average results, indicating that balance and agility are areas of concern in this group. This variability supports the need for systematic assessment and targeted training to improve functional skills in young athletes.

The Agility T-Test results revealed that many players required more time to complete the test compared to expected norms for youth athletes. Agility is critical in volleyball, as it allows players to quickly move to receive the ball, change direction, and maintain body control during dynamic plays. Slower agility times may reflect limited neuromuscular coordination, insufficient strength, or lack of sport-specific conditioning. These findings highlight that agility is partially affected in this sample, suggesting an opportunity for improvement through structured training programs.

Similarly, the Y Balance Test scores indicated that dynamic balance was not optimal for a significant number of participants. Balance is necessary for safe landings, jumping, and directional changes in volleyball. Lower balance scores increase the risk of ankle sprains and knee injuries, which are common in the sport. The results

show that many players had difficulty maintaining stability while reaching in multiple directions, further demonstrating that dynamic balance is affected and warrants attention.

These findings justify the focus of this research. By identifying deficits in balance and agility at an early stage, coaches and physiotherapists can design specific interventions to address these weaknesses. This approach can enhance overall performance and reduce the likelihood of injury during practice and competitions. The use of simple field-based tools, such as the Agility T-Test and Y Balance Test, makes it feasible to monitor these parameters in school settings without requiring expensive equipment.

Overall, this pilot study emphasizes the importance of evaluating functional skills in young volleyball players. The data collected provide a baseline understanding of current performance levels and highlight that many players have room for improvement. Such information can guide training priorities and support evidence-based practices in youth sports development.

CONCLUSION

This study showed that many school (adolescent) volleyball athletes had only average or below-average balance and agility. These skills are very important for good performance and to prevent injuries while playing. The findings suggest that

regular testing and special training programs are needed to help players improve these areas. By identifying these problems early, coaches and physiotherapists can plan exercises to make players quicker and more stable. In the future, more studies should look at how training can improve balance and agility over time. Overall, checking and improving these skills is important for safer and better volleyball performance in young players.

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