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# Underhand Serve Skill Profile of Elementary School Sepak Takraw Extracurricular Participants

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## Abstract

**Objectives:** This study described the underhand serve skill profile of students participating in the sepak takraw extracurricular program at UPTD SPF SDN Tanah Bara.

**Materials and Methods:** A quantitative cross-sectional descriptive survey was conducted with all 15 students enrolled in the program. Underhand serve performance was assessed using the serve component a basic sepak takraw skill test, reported in the source manuscript to have validity of 0.667 and reliability of 0.757. Scores were summarized using the mean, standard deviation, minimum, maximum, frequencies, and percentages. Performance was classified into five categories using mean-and-standard-deviation criteria.

**Results:** Scores ranged from 13 to 42, with a mean of 27.47 and a standard deviation of 8.31. One student (6.67%) was classified as very good, 4 (26.67%) as good, 5 (33.33%) as fair, 4 (26.67%) as poor, and 1 (6.67%) as very poor. The fair category was the modal category. Five students were above fair and five were below fair.

**Conclusions:** Underhand serve performance was heterogeneous and centered on the fair category. Coaches should use individual scores to differentiate practice, emphasizing consistent toss timing, supporting-leg balance, foot-ball contact, and target placement. Standardized reassessment is recommended after a documented training cycle.

**Keywords:** extracurricular sport; skill assessment; students; sepak takraw; underhand serve

## Introduction

Sepak takraw is a net game in which players control and project the ball primarily with the feet, legs, trunk, and head. Its technical actions place substantial demands on lower-limb coordination, balance, flexibility, and precise timing. Anthropometric and physiological research has also characterized sepak takraw as an intermittent, physically demanding sport requiring specific preparation (Jawis et al., 2005; Udomtaku & Konharn, 2020).

The serve initiates each rally and can immediately create an attacking advantage. For the tekong, successful serving requires coordination between the feeder's toss, postural control on the supporting leg, an appropriately timed kicking action, and placement into the opponent's court. Biomechanical analyses show that serve variants have distinguishable movement characteristics, confirming that serving is a complex motor task rather than a simple kick (Sujae & Koh, 2008; Kaharuddin et al., 2018). Technology-assisted analysis has likewise been used to explain and classify sepak takraw techniques (Sujae et al., 2008; Tan et al., 2022).

School extracurricular programs provide structured opportunities to develop these skills. Objective assessment is important because group-level impressions may conceal large differences among learners. A profile of current performance can help coaches identify students requiring foundational support, students ready for accuracy or tactical challenges, and priorities for subsequent training. Previous descriptive work found that physical condition and basic sepak takraw techniques can vary considerably within a club, reinforcing the value of diagnostic testing (Purwanto, 2022).

At UPTD SPF SDN Tanah Bara, 15 upper-grade elementary students participated in sepak takraw extracurricular training three times per week. Although the team had participated successfully in inter-school events, coaches lacked a consolidated assessment of underhand serving ability, and some students had difficulty sending the ball over the net or into the legal court. Therefore, this study aimed to describe the distribution of underhand serve skill levels among all program participants. The study was designed as a local diagnostic profile and did not test the effectiveness of an intervention.

## Materials and Methods

### Study Design

This study used a quantitative, cross-sectional descriptive survey design. It measured current underhand serve performance without manipulating training or testing causal hypotheses. The study was conducted in the sepak takraw extracurricular program at UPTD SPF SDN Tanah Bara, Bambanglipuro District, Indonesia.



## Study Participants

The population comprised 15 students enrolled in the program, and all 15 were included through total sampling. The source manuscript described them as upper-grade elementary school students but did not report their ages, sex distribution, grade distribution, training experience, attendance, health status, or inclusion and exclusion criteria. These characteristics should be added from the original records before submission.

## Study Organization

Underhand serve skill was assessed using the serve component of a basic sepak takraw playing-skill test. The source manuscript reported a validity coefficient of 0.667 and a reliability coefficient of 0.757 but did not identify the validation sample, coefficient type, test-retest interval, number of attempts, target zones, scoring rules, ball specification, feeder standardization, warm-up, practice trials, or assessor training. These details and the complete primary instrument citation should be verified and restored to ensure replicability.

## Statistical Analysis

The score distribution was summarized using the minimum, maximum, arithmetic mean, sample standard deviation, frequency, and percentage. Categories were derived from the observed mean ( $M = 27.4667$ ) and standard deviation ( $SD = 8.3141$ ): very good,  $X \geq M + 1.5SD$ ; good,  $M + 0.5SD \leq X < M + 1.5SD$ ; fair,  $M - 0.5SD \leq X < M + 0.5SD$ ; poor,  $M - 1.5SD \leq X < M - 0.5SD$ ; and very poor,  $X < M - 1.5SD$ . Percentages were calculated as frequency divided by  $15 \times 100$ . No inferential statistics were used.

## Ethical Considerations

The source manuscript did not report institutional ethics approval, school authorization, parental consent, child assent, confidentiality procedures, or safety arrangements. Because the participants were children, these details must be verified and reported before submission. No identifying participant information is included in this revision.

## Results

The 15 underhand serve scores ranged from 13 to 42. The mean was 27.47 and the standard deviation was 8.31, indicating substantial variation relative to the mean. Table 1 presents the descriptive statistics.

**Table 1.** Descriptive statistics for underhand serve scores ( $n = 15$ )

| Variable              | n  | Minimum | Maximum | Mean $\pm$ SD    |
|-----------------------|----|---------|---------|------------------|
| Underhand serve score | 15 | 13      | 42      | 27.47 $\pm$ 8.31 |

The largest category was fair ( $n = 5$ ; 33.33%). Good and poor each contained four students, while the two extreme categories each contained one student. Thus, five participants (33.33%) were above fair, five (33.33%) were fair, and five (33.33%) were below fair.

**Table 2.** Distribution of underhand serve skill categories

| Score interval | Category  | Frequency | Percentage |
|----------------|-----------|-----------|------------|
| $\geq 39.94$   | Very good | 1         | 6.67%      |
| 31.62–39.93    | Good      | 4         | 26.67%     |
| 23.31–31.61    | Fair      | 5         | 33.33%     |
| 15.00–23.30    | Poor      | 4         | 26.67%     |
| $< 15.00$      | Very poor | 1         | 6.67%      |
| —              | Total     | 15        | 100.00%    |

Because the thresholds were calculated from this small group's own mean and standard deviation, the categories express relative standing within the assessed group. They are not external age-referenced standards and should not be interpreted as population norms.

## Discussion

The principal finding was a heterogeneous distribution centered on the fair category. One-third of participants scored above fair, one-third were fair, and one-third were below fair. This pattern is more informative than reporting only the modal category because it shows that a single uniform training task may be insufficient. Purwanto (2022) similarly used physical and technical profiles to identify areas requiring attention in sepak takraw athletes, supporting the use of assessment as a basis for program planning.

Serving is technically demanding because it combines perception of the toss, single-leg support, lower-limb range of motion, segmental sequencing, and direction control. Technique analyses of the kuda and sila serves demonstrate that serve styles involve distinct movement solutions (Sujae & Koh, 2008), while depth-camera motion capture has been applied to quantify tekong pre-serve mechanics (Kaharuddin et al., 2018). The present test did not separate errors in toss timing, balance, contact, trajectory, or placement, so an identical total score may reflect different technical needs.

The spread of scores may partly reflect differences in physical and coordinative readiness, although these factors were not measured. Jawis et al. (2005) documented the specific anthropometric and physiological profile of sepak takraw players.



More recent work found that flexibility and eye-foot coordination contributed to basic playing skills (Bais et al., 2023), and knowledge plus physical qualities—including power, flexibility, and coordination—were associated with learning sepak takraw techniques (Henjilito et al., 2021). Strength-conditioning work has also been linked with playing skills (Jufrianis, 2023). These findings justify combining technical observation with age-appropriate physical screening, but they do not establish the causes of the present students' scores.

Serve practice should be individualized and progressive. Students in the lower categories may begin with stable tosses, low-intensity contact, large target areas, and immediate technique feedback. Those in the fair category can progress toward narrower targets and variable toss locations, while higher-scoring students can practise tactical placement and serve-receive sequences. A flexibility-training model has been developed specifically to support sepak sila and tekong service skills (Syafaruddin & Ramadhan, 2020). Coordination-focused practice is also defensible because structured sport participation can improve lower-limb coordination (Akpinar, 2022).

Technology can improve feedback when used selectively. Video replay or simple motion tagging may help students connect body position with ball outcome. Technology-enhanced coaching has previously been demonstrated for complex sepak takraw skills (Sujae et al., 2008), machine-learning research can distinguish kick types from kinematic information (Tan et al., 2022), and computational approaches have modeled kicking range (Maseleno et al., 2016). For elementary programs, however, technology should support rather than replace clear demonstrations, safe repetition, and coach observation.

Physical preparation should remain specific to the task. Sepak takraw match analysis indicates meaningful energy and movement demands (Udomtaku & Konharn, 2020). Adequate ankle range of motion and dynamic balance are relevant because differences have been observed between recreational players with and without ankle injury (Xin et al., 2021). Coaches should therefore incorporate balance, mobility, coordination, and controlled kicking exercises while avoiding premature high-intensity serving loads in children.

The present categories are internally referenced. By definition, mean-and-standard-deviation cutoffs tend to distribute a small group around its own center, so “fair” does not indicate achievement against a national or developmental standard. Future assessment should use an independently validated, age-appropriate reference and report item-level or trial-level performance. Range-of-motion assessment also requires standardized procedures if flexibility is included in future profiling (Cejudo, 2022).

## 1 Practical Implications

Coaches should retain each student's raw trial scores and error pattern, not only the final category. An instructional cycle can include: consistent feeder tosses and contact drills; supporting-leg balance and controlled swing practice; progressively smaller target zones; and serve-receive games. Attendance, repetitions, successful serves, and perceived difficulty should be recorded. The identical test protocol should be repeated after a predetermined cycle to evaluate change.

## Limitations

This descriptive study involved only 15 students from one school and used internally derived categories. Participant characteristics and complete testing procedures were unavailable, and the stated validity and reliability evidence could not be independently evaluated from the manuscript. No comparison group, repeated measurement, biomechanical observation, or physical-fitness assessment was included. The results therefore describe this group at one time and cannot establish causes, training effects, or population norms.

## Conclusions

Underhand serve scores among 15 sepak takraw extracurricular participants ranged from 13 to 42 ( $27.47 \pm 8.31$ ). One student (6.67%) was very good, 4 (26.67%) were good, 5 (33.33%) were fair, 4 (26.67%) were poor, and 1 (6.67%) was very poor. The group was heterogeneous and centered on the fair category. The findings provide a local diagnostic basis for differentiated serving practice, but the categories should not be treated as external norms. Standardized reassessment after a documented training cycle is recommended.

## Acknowledgments

1 The authors thank UPTD SPF SDN Tanah Bara, the participating students and their families, the extracurricular coach, and Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Medan, for supporting this study.

## Author Contributions

1 M. Haris Suganda Bancin: conceptualization, methodology, investigation, data collection, project administration, and writing—original draft. Eka Abdurrahman: data analysis, interpretation, supervision, and writing—review and editing. Both authors approved the final manuscript and accept responsibility for the integrity of the work.

## Conflict of Interest

The authors declare no conflict of interest.



## Funding

This research received no external funding.

## Data Availability

The aggregate data are presented in this article. De-identified individual scores may be made available by the corresponding author upon reasonable request, subject to ethical and institutional requirements.

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