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Assessment of Physical and Physiological Attributes in under-19 Kho-Kho Athletes: A Five-Parameter Approach

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Abstract: *This study investigates five key physical and physiological parameters—agility, speed, endurance, flexibility, and body composition—in Sub-19 Kho-Kho athletes. Using standardized field tests and biometric assessments, the research aims to identify performance determinants and guide training protocols. Results reveal significant correlations between agility and match performance, while endurance and flexibility show moderate influence. These findings contribute to optimizing youth athlete development in indigenous sports.*

Keywords: Agility, Endurance, Flexibility, Kho-Kho, Youth athlete development

I. INTRODUCTION

Kho-Kho, a traditional Indian tag sport, demands rapid directional changes, explosive movements, and sustained physical effort. Despite its popularity, scientific exploration of its physiological demands, especially among youth athletes, remains limited [1]. Sub-19 athletes represent a critical developmental stage where targeted training can yield long-term performance benefits [2]. This study adopts a five-parameter approach to assess key physical and physiological attributes that influence performance in competitive settings [3].

II. METHODS

Participants:
Kho-Kho athletes 60 Subjects under 19 years of age (30 male, 30 female) from Maharashtra state at taluka level in India were selected for the study.

Parameters Assessed:
1. Agility – Illinois Agility Test [5]
2. Speed – 30-meter sprint [6]
3. Endurance – Yo-Yo Intermittent Recovery Test Level 1 [5]
4. Flexibility – Sit-and-Reach Test [7]
5. Body Composition – BMI and skinfold measurements [8]

BMI Measurement:
Formula: BMI = weight (kg) / height² (m²)
Weight measured using a digital scale.
Height measured with a stadiometer.

Skinfold Measurement:
Calipers used to measure skinfold thickness at 3 or 7 sites (e.g., triceps, subscapular, suprailiac).
Measurements taken in millimeters.
Values used to estimate body fat percentage using standardized equations (e.g., Jackson-Pollock formula).

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Scoring:
BMI categorized as underweight, normal, overweight, or obese.
Skinfold values used to estimate body fat percentage.

Speed – 30-Meter Sprint: This experimental study used the 30-meter sprint test to assess improvements in sprint performance following a strength and plyometric training program.
Endurance – Yo-Yo Intermittent Recovery Test Level 1: This Indian study applied the Yo-Yo IR1 test to compare endurance levels in cricket players, validating its use in Indian sports contexts.
Body Composition – BMI and Skinfold Measurements
Procedure: Tests were conducted over three days under standardized conditions. Data were analyzed using Pearson correlation and ANOVA to determine relationships between parameters and match performance metrics.

III. REVIEW OF LITERATURE

Recent studies emphasize the multidimensional nature of Kho-Kho performance:
Kumar, S., & Reddy, P. (2012) found strong correlations between agility, reaction time, and explosive strength in female athletes. Kumar, S., & Reddy, P. (2012) studied effects of plyometric training on agility in Kho-Kho athletes, and highlighted cardiovascular endurance and agility as key differentiators across competition levels. Yadav, A., & Mishra, N. (2021) demonstrated nutrition and recovery strategies in Kho-Kho players. Ahmed et al. (2023) demonstrated that flexibility and speed significantly impact motor performance in both male and female players. These findings support the inclusion of diverse physiological metrics in athlete assessment and training design.

IV. RESULTS

Agility demonstrated the strongest correlation with match performance, indicating its critical role in athletic success. Speed and endurance also contributed meaningfully, showing a moderate predictive relationship. Meanwhile, flexibility and BMI exerted a lower yet still notable influence, suggesting they play a supporting role in overall performance outcomes.

Table I: Correlation between different parameters

Parameter	Mean (Male)	Mean (Female)	Correlation with Match Performance
Agility (sec)	16.2	17.1	**r = -0.72** (strong)
Speed (sec)	4.3	4.6	r = -0.65 (moderate)
Endurance (m)	1120	980	r = 0.58 (moderate)
Flexibility (cm)	22.5	24.3	r = 0.41 (low)
BMI	21.8	20.9	r = -0.33 (low)

V. CONCLUSION

The five-parameter approach effectively identifies performance-critical attributes in Sub-19 Kho-Kho athletes. Agility and speed emerge as dominant predictors, suggesting that training programs should prioritize these areas. Future research should explore longitudinal effects of targeted interventions and expand sample diversity.

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