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A COMPARATIVE STUDY OF DIFFERENT AGILITY COMPONENTS AND THEIR EFFECTS ON ATHLETIC PERFORMANCE BETWEEN FUTSAL AND BASKETBALL PLAYERS

A Cross-Sectional Study

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Abstract : Agility depends on several linked abilities, including acceleration, braking, change of direction, balance and coordination. This cross-sectional comparative study examined whether these abilities differ between players of two court sports, futsal and basketball. Sixty-two players aged 16 to 22 years (32 futsal, 30 basketball) were recruited by purposive sampling at TMV's Jayantrao Tilak College of Physiotherapy and associated courts in Pune over six months. Each player completed the Illinois Agility Test, a 10-m acceleration sprint, a 10-m deceleration drill, a Y-Balance based dynamic balance assessment (composite %), a 30-second wall-catch test and a timed coordination task. Groups were compared with Welch's t-test, and sex distribution with the chi-square test (SPSS 26); Holm–Bonferroni adjustment covered the six performance outcomes. Futsal players were faster on the Illinois test (14.625 ± 0.354 vs 16.022 ± 0.217 s), 10-m acceleration (1.740 ± 0.125 vs 1.907 ± 0.098 s), 10-m deceleration (2.242 ± 0.141 vs 2.635 ± 0.112 s) and coordination task (9.375 ± 0.380 vs 11.653 ± 0.312 s), and scored higher on dynamic balance (99.469 ± 1.870 vs 87.423 ± 1.790 %) and wall catches (34.406 ± 1.215 vs 26.000 ± 1.852); all adjusted $p < 0.001$. The groups also differed in sex distribution, height, body weight and weekly training sessions (10.50 vs 4.17), so the gap cannot be credited to the sport alone. The design shows association, not cause. Assessing several agility components together may help physiotherapists plan sport-specific conditioning and rehabilitation.

IndexTerms **- Agility, Futsal, Basketball, Acceleration, Deceleration, Dynamic Balance, Coordination, Athletic Performance.**

I. INTRODUCTION

Agility is the capacity to move the whole body quickly while changing speed or direction in answer to a stimulus [1]. It is therefore broader than running speed. Strength, power, balance, coordination and technique contribute to it, and so do perception, anticipation and decision-making [1,2]. Players in court sports use these abilities every few seconds, for example when they sprint to a loose ball, brake before an opponent, turn, and set off again.

Futsal and basketball both demand this kind of movement, yet the settings differ. Futsal is played in a compact indoor space where the ball is controlled mainly with the feet, so players make many short bursts, stops and turns in tight areas. Basketball is played over a larger floor and adds jumping, landing, rebounding and lateral defensive movement. Both sports are intermittent, with high-intensity actions interrupted by lower-intensity play. Earlier work shows that change-of-direction performance differs between elite athletes in different team sports [3], and that sprint mechanics are linked with change-of-direction ability in female futsal players [4]. These studies, however, did not set futsal against basketball across a full set of agility components.

Five components were examined here. Acceleration is how quickly speed is gained over a short distance. Deceleration is the ability to slow down under control, which relies on eccentric lower-limb strength and good posture. Change-of-direction speed was measured with the Illinois Agility Test, a planned course; because the athlete knows the route in advance, it does not capture reactive agility [1]. Dynamic balance is the ability to stay stable while moving, and it draws on visual, vestibular and somatosensory input. Coordination is the smooth, well-timed organisation of body movements. Testing these separately can show where an individual is strong or weak, and the Y-Balance Test, used here for balance, has acceptable reliability [5].

The aim of this study was to compare change-of-direction speed, acceleration, deceleration, dynamic balance and coordination between futsal and basketball players. The specific objectives were to measure each component with a field test and to compare the two groups statistically.

II. MATERIALS AND METHODS

2.1 Study design and setting

A cross-sectional comparative observational study was carried out over six months at TMV's Jayantrao Tilak College of Physiotherapy and associated athletic court facilities in Pune, India. Clearance was obtained from the college before data collection began.

2.2 Participants

Sixty-two competitive players were selected by purposive sampling: 32 futsal players and 30 basketball players. Males and females aged 16 to 22 years who trained or competed regularly in either sport and who gave written informed consent were eligible.

Players were excluded if they had a musculoskeletal injury of the upper or lower limb, or surgery, within the previous six months; a neurological disorder affecting balance or reaction time; or a concussion within the previous six months. These exclusions follow concerns about balance and neuromuscular control after injury and concussion [7,8]. No sample-size calculation was performed.

2.3 Outcome measures

Six outcomes were recorded. (i) Change-of-direction speed: Illinois Agility Test time in seconds. (ii) Acceleration: time over a 10-m maximal sprint. (iii) Deceleration: time for a 10-m drill that ended in a controlled stop. (iv) Dynamic balance: composite percentage score from the Y-Balance Test. (v) Coordination, wall catches: number of successful catches in 30 seconds. (vi) Coordination, task time: seconds taken to finish a set coordination task. Shorter times and higher balance and catch scores indicate better performance. Timing used digital stopwatches or timing gates, with cones, floor tape and a measuring tape to mark the courses.

2.4 Procedure

The tests were explained to each player, who then completed a standard 10-minute dynamic warm-up. The test battery followed in randomised order, with enough rest between trials. Age, sex, height, weight, dominant leg, playing experience and weekly training sessions were also noted on an individual data sheet, and all scores were later pooled for analysis.

2.5 Statistical analysis

Analysis was done in SPSS version 26. Continuous data are shown as mean ± standard deviation, and categories as counts and percentages. Welch's independent-samples t-test, which does not assume equal variances, compared the groups on continuous variables, and the chi-square test compared sex distribution. Holm–Bonferroni adjustment was applied across the six performance comparisons to limit false-positive results. Significance was set at $p < 0.05$. The demographic p-values in Table 1 are unadjusted.

III. Results

3.1 Participant characteristics

Table 1 gives the profile of the two groups. Age was similar ($p = 0.066$). The futsal group had a larger share of females (40.6% vs 13.3%), while basketball players were taller (172.1 vs 167.8 cm) and heavier (65.2 vs 55.6 kg). The largest gap was in training exposure: futsal players reported 10.50 sessions a week against 4.17 for basketball players.

Table 1: demographic characteristics of the participants

Variable	Futsal (n = 32)	Basketball (n = 30)	p-value
Age (years)	18.59 ± 1.82	19.47 ± 1.95	0.066
Female, n (%)	13 (40.6%)	4 (13.3%)	0.016*
Male, n (%)	19 (59.4%)	26 (86.7%)	—
Height (cm)	167.8 ± 8.1	172.1 ± 9.4	0.023*
Weight (kg)	55.6 ± 9.2	65.2 ± 7.8	0.004*
Training frequency (sessions/week)	10.50 ± 3.21	4.17 ± 0.70	<0.001*

Values are mean ± SD unless stated. * $p < 0.05$. Welch's t-test for continuous variables; chi-square test for sex.

3.2 Agility and performance outcomes

Futsal players did better on every outcome (Table 2, Fig. 1). They finished the Illinois Agility Test 1.397 s faster, the 10-m acceleration 0.167 s faster, the 10-m deceleration drill 0.393 s faster and the coordination task 2.278 s faster. Their dynamic balance score was 12.045 percentage points higher, and they made 8.406 more wall catches in 30 seconds. After Holm–Bonferroni adjustment all six comparisons had $p < 0.001$.

Table 2: comparison of agility and performance components between futsal and basketball players

Performance variable	Futsal (n = 32)	Basketball (n = 30)	Mean difference (F − B)	Holm-adjusted p
Illinois Agility Test (s)	14.625 ± 0.354	16.022 ± 0.217	−1.397	<0.001*
10-m acceleration time (s)	1.740 ± 0.125	1.907 ± 0.098	−0.167	<0.001*
10-m deceleration time (s)	2.242 ± 0.141	2.635 ± 0.112	−0.393	<0.001*
Dynamic balance score (%)	99.469 ± 1.870	87.423 ± 1.790	+12.045	<0.001*
Coordination catches (30 s)	34.406 ± 1.215	26.000 ± 1.852	+8.406	<0.001*
Coordination task time (s)	9.375 ± 0.380	11.653 ± 0.312	−2.278	<0.001*

Values are mean ± SD. F = futsal; B = basketball. * Significant at $p < 0.05$ after Holm–Bonferroni adjustment (Welch's t-test).

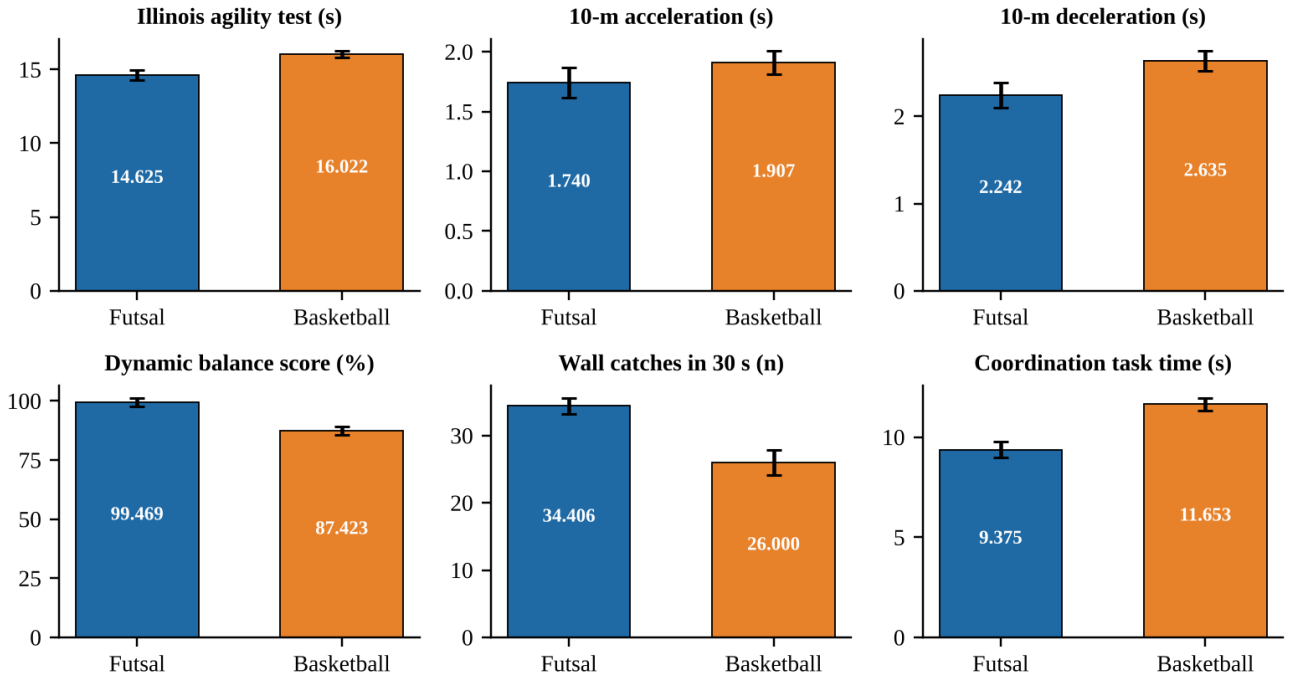

Fig. 1: mean ± sd of the six performance outcomes in futsal (n = 32) and basketball (n = 30) players

IV. Discussion

Futsal players in this sample outperformed basketball players on all six tests. The gaps were consistent in direction across change of direction, acceleration, braking, balance and coordination, which suggests a broad difference in the physical profile of the two groups rather than a single isolated one.

Several explanations are plausible, and none can be confirmed here. Futsal is played in a small area with constant starts, stops and turns, which may give players frequent practice of quick repositioning. This could relate to the lower Illinois and deceleration times, although time alone says nothing about stopping distance, joint loading or eccentric strength. Sprint force and power have been tied to change-of-direction ability in female futsal players [4], and acceleration also depends on strength, technique and body mass, none of which were measured here. The Illinois test follows a fixed route, so it reflects planned change of direction and not the reactive, perception-driven agility needed in a match [1,2].

The balance result deserves care. A systematic review of the Y-Balance Test lower quarter reported population differences by sport, with soccer players scoring higher than basketball players, and advised that scores be read against population-specific expectations [5]. Our direction of difference is consistent with that pattern, although soccer is not futsal, and the futsal mean of 99.5% is close to the ceiling of the scale, and the report does not describe the balance protocol in full, so the value should be read as specific to this procedure. The wall-catch and coordination-time tasks measure one aspect of coordination and do not stand in for ball handling, passing or rebounding. Training practice with catching was not recorded either.

The most important caution concerns confounding. Futsal players trained far more often (10.50 vs 4.17 sessions a week), and the groups differed in sex mix, height and weight. Each of these can influence sprinting, balance and coordination, and no covariate adjustment was reported. A session count is also a crude measure of load, because it ignores duration, intensity and recovery. Finally, the cross-sectional design leaves open whether the sport shaped these abilities or whether players with certain abilities gravitated to a sport. Prior work comparing sports likewise stresses that specific training and playing demands shape change-of-direction performance [2,3].

Because very large between-group differences were seen with small standard deviations in a purposive sample, the findings are best treated as preliminary and need confirmation in larger, better-matched groups.

V. Limitations

The design is cross-sectional, so cause and effect cannot be inferred. The sample of 62 was modest, came from one region by purposive sampling, and had no power calculation, which limits generalisation. Sex, height, weight and training frequency differed between groups and were not statistically controlled. The tests were field based: the Illinois test is planned rather than reactive, the 10-m drills give times but no force or movement-quality data, stopwatch timing can introduce reaction-time error, and the report gives no reliability data. The balance and coordination protocols are described only briefly, which limits replication. Confidence intervals, effect sizes and test statistics were not reported. Match performance, injury and training load were not assessed.

VI. Clinical Implications

Testing acceleration, braking, change of direction, balance and coordination together gives a fuller picture than one agility score, and can show an athlete who is quick in a straight line but weak at stopping or stable turning. These results may help physiotherapists and coaches shape sport-specific conditioning, such as short accelerations and tight turns for futsal, and deceleration, lateral movement and landing control for basketball. In rehabilitation, return-to-sport decisions should combine symptoms, strength, function and sport-specific tolerance, and not rest on one agility time. Group means from this study should not be used as cut-offs for clearance or talent selection. Lower-limb injuries are common in collegiate sport [6], but because injury was not measured here, nothing in

these results shows that either sport carries a lower injury risk. Testing conditions such as warm-up, footwear, surface and timing method should be kept constant when assessments are repeated.

VII. Conclusion

In this sample of 62 players, futsal players performed significantly better than basketball players on the Illinois Agility Test, 10-m acceleration, 10-m deceleration, dynamic balance and both coordination measures (adjusted $p < 0.001$). Differences in sex, body size and especially training frequency mean the result cannot be credited to the sport alone, and the design does not show causation. Future studies should use larger, better-matched groups, record training load in detail, add reactive agility and objective biomechanical measures, and follow players over time.

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