

A Study on Two Different Indigenous Female Performers on Reaction Time, Balance and Explosive Leg Strength

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Abstract

Background: Kho-Kho and Chhau are two important indigenous activities in India that have historically been male-dominated, but women are increasingly participating and achieving recognition at the district, state, national, and international levels. Both activities involve complex movements that require well-developed motor abilities, such as reaction time, balance, and explosive leg strength. Therefore, the present study was undertaken to compare selected motor abilities among female Kho-Kho players and Chhau dancers.

Objective: The study aimed to estimate and compare reaction time, balance, and explosive leg strength between state-level female Kho-Kho players and professional female Chhau dancers and to determine how the movement patterns and functional characteristics of the two indigenous activities influence these physical characteristics.

Methods: Seventy female participants aged between 18 and 25 years were randomly selected and comprised 35 state-level Kho-Kho players and 35 professional Chhau dancers. The participants were regular performers, had no significant injuries during the previous six months, and practised at least three sessions per week. Reaction time was measured through the Ruler Drop Test, balance was measured using the Stork Stand Test, and explosive leg strength was measured using the Standing Broad Jump Test. Three trials were conducted after a 10-minute warm-up, and the best score was recorded. The data were analysed through descriptive statistics and an independent-samples *t*-test in Jamovi at the 0.05 level of significance.

Results: Statistically significant difference was not found between Kho-Kho players and Chhau dancers in reaction time ($t = 1.83, p = 0.072$) and balance ($t = 1.67, p = 0.100$). However, a significant difference was observed in explosive leg strength ($t = 2.45, p = 0.017$). Kho-Kho players demonstrated better performance (1.77 ± 0.167 m) compared with Chhau dancers (1.67 ± 0.175 m). In respect of reaction time, Chhau dancers recorded a better mean value, but in respect of balance and explosive leg strength, Kho-Kho players showed better mean performance.

Conclusion: The findings indicate that both Kho-Kho and Chhau dance contribute to the development of important motor abilities among female performers. While reaction time and balance did not significantly differ between the two groups, Kho-Kho players demonstrated significantly greater explosive leg strength.

The findings suggest that both indigenous activities develop important motor abilities. The specific movement and performance demands of indigenous activities may contribute differently to selected physical characteristics.

Keywords: Kho-Kho, Chhau Dance, Indigenous, Reaction Time, Balance, Explosive Leg Strength

1. Introduction:

The study was conducted on females because earlier, both indigenous activities, such as the Indigenous game kho-kho and the Indigenous folk dance Chhau, were dominated by male practitioners. However, in recent years, women and girls have been contributing to these Indigenous activities. Presently, we can see that each district, such as Purulia, has a female Kho-Kho team that participates in state, national, and even international competitions. Similarly, folk dances like Chhau are no longer restricted to the district level; they are flourishing at the state, national, and international levels. Even females are showing a very good gesture and are participating in the female Chhau dance. From that perspective, the researcher sought to determine whether females who play kho-kho and those who participate in dance are developing physical qualities such as reaction time, explosive leg strength, and balance through their respective lifestyles. That is why the researcher formulated the topic “A Study on Two Different Indigenous Female Performers on Reaction Time, Balance and Explosive Leg Strength.”

In recent times, women are excelling in all areas. Now, women in India are not only doing well in science, the arts, and other areas, but also excelling in sports and indigenous activities.

India is a nation with a cultural heritage. People across India practise many Indigenous activities. Among these, Indigenous Kho-Kho and Chhau are two distinct indigenous activities.

Chhau is an Indigenous Folk Dance performed mainly by the People of West Bengal, Odisha, and Jharkhand. Among them, the primary focus on the main practitioners is found in Purulia District. Similarly, kho-kho is one of the leading indigenous sports, played by people across India, but West Bengal and Maharashtra are the main centres of kho-kho.

Kho-Kho & Chhau are both performed only by men, & men have dominated them for the last several years. However, in modern times, women are also excelling in both activities. Even though the contemporary female Kho-Kho players participate in the district, state, national, and international levels. Similarly, female Chhau dancers are not limited to the district level; they are also achieving at the state, national, and international levels. From this point of view, the researcher thought that whether these two different types of Indigenous activity played any role in the development of their physical structure or physical performance, mainly focusing on reaction time, balance ability & explosive leg strength of female practitioners, and that is why the researcher formulated the topic like "A Study on Two Different Indigenous Female Performers on Reaction Time, Balance and Explosive Leg Strength."

Both Chhau dance and Kho-Kho are indigenous activities. Historically, both were male-dominated, but women now participate in them as well. Both have gained international recognition; Chhau dance has been designated as a UNESCO Intangible Cultural Heritage, and a World Cup has been introduced for Kho-Kho. These activities both require and foster physical fitness. Therefore, the researcher aims to examine the similarities between these two forms.

2. Objectives

- To assess reaction time, balance, and explosive leg strength among two different groups of indigenous

female performers.

- To compare differences in these motor abilities between the two groups.
- To evaluate how specific movement patterns of each performance style contribute to distinct physical characteristics.
- To analyse how cultural and functional differences in performance styles influence physical characteristics.

3. Hypotheses

- **H₀₁:** There will be no significant difference in reaction time between Kho-Kho players and Chhau Dancers.
- **H₀₂:** There will be no significant difference in balance between Kho-Kho players and Chhau Dancers.
- **H₀₃:** There will be no significant difference in explosive leg strength between Kho-Kho players and Chhau Dancers.

4. Methodology

4.1 Selection of the Subjects:

- To conduct this study, 70 female subjects (35 Kho-Kho players and 35 Chhau Dancers) were randomly selected.
- Kho-Kho players who participated at the state level from the State Institute of Physical Education for Women, University of Calcutta, Kolkata, West Bengal, India.
- Chhau dancers from 2 different teams (Palashkura Digbijoyi Mahila Chhau Samity and Matangini Hazra Mahila Chhau Nritya Dal) in Purulia, West Bengal, India, have been practising for 5 years.
- The subjects are aged between 18 and 25 years.

4.2 Inclusion Criteria

- Regular performers
- No significant injury in the last six months
- Minimum three practice sessions per week

4.3 Tools and Tests

Variable	Test Used	Measurement
Reaction Time	Ruler Drop Test	in centimetres
Balance	Stork Stand Test	Time in seconds
Explosive Leg Strength	Standing Broad Jump Test	Jump in meters

4.4 Procedure

The study was conducted in a controlled outdoor performance space.

Three trials for each test were conducted after a 10-minute warm-up; the best score was recorded. Data were analysed using means, standard deviations, and independent t-tests.

Selection of Variables:

The following variables were selected for the study

- Reaction Time
- Balances

- Explosive Leg Strength

Statistical Analysis

In this study, differences in Reaction Time, Balance, and Explosive Leg Strength between Kho-Kho players and Chhau dancers were calculated using Jamovi Software. The data for the selected variables were analysed using Descriptive statistics and an Independent-Samples T-Test. The level of significance was set at 0.05.

Results:

Table 1:

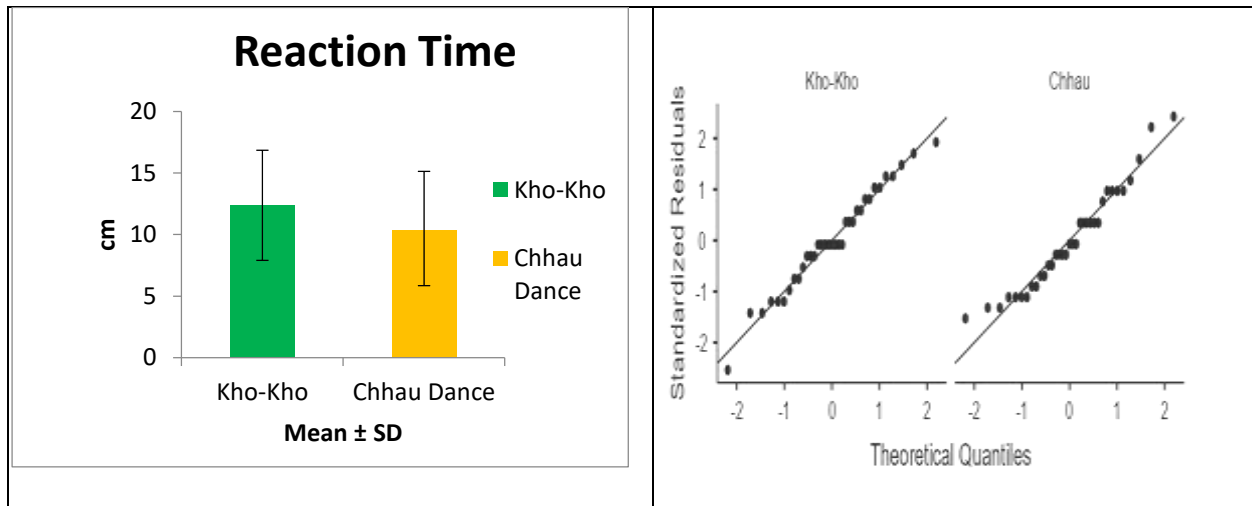
	Group	Reaction Time	Balance	Explosive Leg Strength
Sample Size (N)	Kho-Kho	35	35	35
	Chhau	35	35	35
Mean	Kho-Kho	12.4	23.7	1.77
	Chhau	10.3	18.4	1.67
Std. error mean	Kho-Kho	0.757	2.58	0.0283
	Chhau	0.812	1.88	0.0296
Median	Kho-Kho	12	22.6	1.78
	Chhau	10	15.4	1.67
Standard deviation	Kho-Kho	4.48	15.3	0.167
	Chhau	4.80	11.2	0.175
Skewness	Kho-Kho	-0.193	0.760	-0.108
	Chhau	0.596	0.671	0.290
Kurtosis	Kho-Kho	-0.0212	0.215	1.66
	Chhau	-0.0906	-0.621	-0.462
Shapiro-Wilk W	Kho-Kho	0.979	0.931	0.969
	Chhau	0.953	0.920	0.963

Table 2:

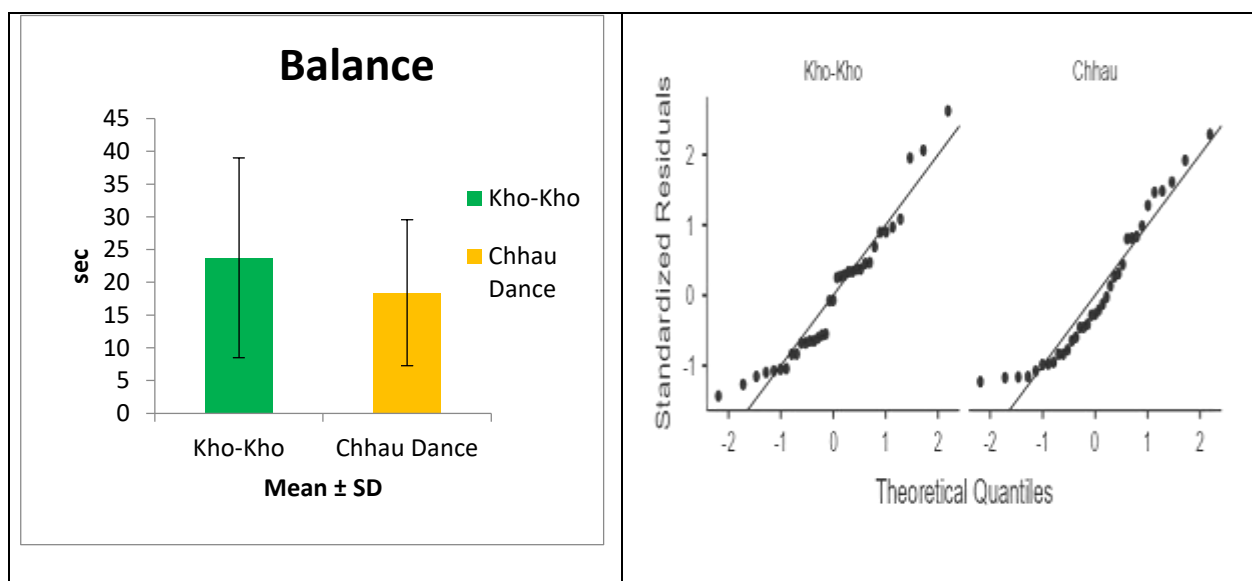
Variables	Group	Number	Mean	Standard Deviation	P Value	Student's t- test
Reaction Time	Kho-Kho	35	12.4	± 4.48	0.072	1.83
	Chhau Dance	35	10.3	± 4.80		
Balance	Kho-Kho	35	23.7	± 15.3	0.100	1.67
	Chhau Dance	35	18.4	± 11.2		
Explosive Leg Strength	Kho-Kho	35	1.77	± 0.167	0.017	2.45
	Chhau Dance	35	1.67	± 0.175		

Significant at 0.05 level, $t(0.05)_{68} = 1.995$

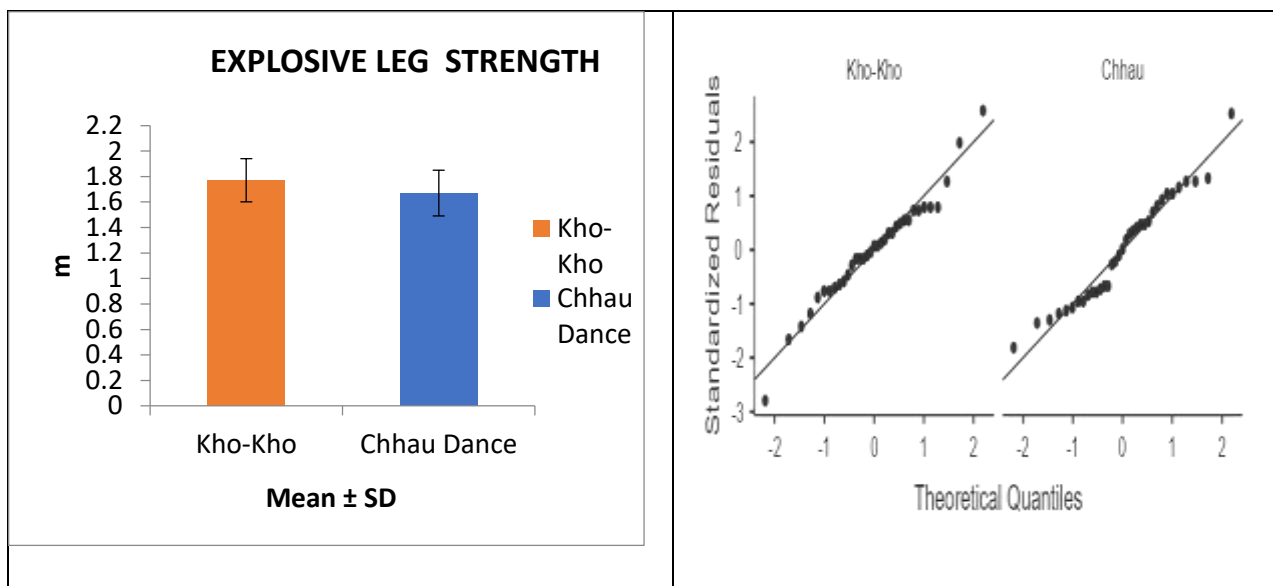
Regarding Reaction Time, the Table shows that the mean values for State-level Kho-Kho players and professional Chhau dancers were **12.4** and **10.3**, respectively. The standard deviation of State-level Kho-Kho players was ± 4.48 , and that of Professional Chhau Dancers was ± 4.80 . The p-value is 0.072, which is greater than 0.05. The Student's t-test value is 1.83, which is less than the table value of 1.995 for $df = 68$ at the 0.05 level of significance. The results show that Chhau dancers outperform Kho-Kho players in Reaction Time. Based on both the p-value and the calculated value, there was no significant difference in Reaction Time between state-level Kho-Kho players and professional Chhau dancers.



Regarding Balance, the mean values for State-level Kho-Kho players and professional Chhau dancers were 23.7 and 18.4, respectively. The standard deviation of State-level Kho-Kho players was ± 15.3 , and Professional Chhau Dancers was ± 11.2 . The p-value is 0.100, which is greater than 0.05. The Student's t-test value is 1.67, which is less than the table value of 1.995 for $df = 68$ at the 0.05 level of significance. The above table shows that Kho-Kho players are better than Chhau dancers at Balance. With respect to both the p-value and the calculated value, it was concluded that the Balance of State-level Kho-Kho players and professional Chhau dancers did not differ significantly.



In respect of Explosive Leg Strength, the mean values between State-level Kho-Kho players and professional Chhau dancers were 1.77 and 1.67, respectively. The standard deviation of State-level Kho-Kho players was ± 0.167 , and that of Professional Chhau Dancers was ± 0.175 . The p-value is 0.017, which is less than 0.05. The Student's t-test value is 2.45, which exceeds the critical value of 1.995 for $df = 68$ at the 0.05 level of significance. The above table shows that the kho-kho players are comparatively better than the chhau dancers in Explosive Leg Strength. Based on both the p-value and the calculated value, it was concluded that State-level Kho-Kho players and professional Chhau dancers differed significantly in Explosive Leg Strength.



In Homogeneity of Variances Tests (Levene's & Variance ratio), all the data of Reaction Time, Balance, and Explosive Leg Strength are homogeneous. In the Tests of Normality (Shapiro-Wilk W), all Reaction Time & Explosive Leg Strength data are Normal.

Discussions:

The purpose of the study was to investigate Reaction Time, Balance and Explosive Leg Strength between State-Level Kho-Kho Players and Professional Chhau Dancers. Statistical analysis of the collected data showed no significant difference between state-level Kho-Kho players and professional Chhau Dancers in Reaction Time and Balance. Still, there was a significant difference in Explosive Leg Strength.

Sana (2026) found that Bharatanatyam dancers exhibit significantly better results in abdominal muscular strength endurance, back and hamstring flexibility, and balance. However, Chhau dancers have significantly better explosive leg strength than Bharatanatyam dancers.

Mahato and Mitra (2024) found a significant difference ($F = 29.395$) among the three selected Chhau dancer groups in explosive strength, with Group-1 and Group-2 performing better than Group-3.

Saha (2022) found significant differences in reaction time between junior-level female kabaddi and Kho-Kho players.

Shrivastava et al. (2022) found that, in respect of balance, there was a significant difference between kabaddi and Kho-Kho players.

Durai (2013) found a significant difference in the balance between Kho-Kho and Kabaddi players.

Saha and Mukhopadhyay (2011) found no significant differences among National-Level Gymnasts, Kho-Kho Players, and Professional Chow-Dancers in Reaction ability.

In Kho-Kho and Chhau dance, the ability to react quickly and effectively to various signals and changing situations is required. Reaction time is the component of reaction ability that refers to the time necessary to respond. Most movements in Chhau dances are executed to the music, so the timing of the bits is essential for excellent performance. In Kho-Kho, players are required to move in a specific direction and perform the required movements. Again, in Chhau dance, where weapons are moved in mock war, and in Kho-Kho, where opponents and teammates are positioned, reaction time is very important for high-level performance. Thus, in all movements, the performers should possess a high degree of responsiveness. The capacity to maintain an erect posture while moving or standing stationary is known as balance. In all types of activities, Kho-Kho players and Chhau dancers must maintain balance to facilitate smooth movements and high-level performance. Both activities required Reaction Time and Balance to a similar degree. That was the reason for the lack of a significant difference in Reaction Time and Balance among the individuals participating in the above activities.

In Kho-kho, players have to rise from the box, move explosively towards the runner, turn, dive, dodge, etc., during a game. Chhau dancers, while performing their art, have to move in different directions, spin in the air, jump, and crash-land on the floor. All these activities require speed and strength in movement, i.e., explosive strength of varying degrees. That was the reason for the significant difference in Explosive Leg Strength among the individuals participating in the above activities. This study revealed that, in terms of Reaction Time, Chhau Dancers were better than Kho-Kho players. This study also revealed that, in the Balance and Explosive Leg Strength tests, Kho-Kho players performed better than the Chhau Dancers.

No significant differences were observed regarding reaction time and balance between Chhau dancers and Kho-Kho players. However, in explosive leg strength, significant differences were observed. A comparison of mean values reveals that the Kho-Kho player group outperformed the Chhau dancer group in all three areas: reaction time, balance, and explosive leg strength. This is because both Chhau dance and Kho-Kho are indigenous activities that develop physical fitness and share similar characteristics.

Conclusions:

The results of the study show no significant differences in Reaction Time and Balance. However, a significant difference was found for Explosive Leg Strength between state-level Kho-Kho players and professional Chhau Dancers. The result further indicated that, with respect to Reaction Time, Chhau Dancers outperformed Kho-Kho players. However, in the Balance and Explosive Leg Strength Kho-Kho, players outperformed the Chhau Dancers.

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