Journal of Advances and Scholarly Researches in Allied Education
Vol. 18, Issue No. 6, October-2021, ISSN 2230-7540

Comparison of Knee Extensor Asymmetry in dominant leg of Interuniversity and College Handball Players Using CSMI HUMAC NORM Isokinetic Dynamometer

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Abstract - This research paper studies the asymmetry in knee extensor strength of dominant leg between Interuniversity and College Handball Players. Utilizing the CSMI HUMAC NORM Isokinetic Dynamometer, measured knee extensor strength in Newton meters (Nm) in both groups, comprising 30 subjects (15 in each group) from LNIPE, NERC, Guwahati, Assam. The study aimed to determine if there were significant differences in knee extensor strength of dominant leg of the handball players asymmetry between these two categories of handball players. The statistical analysis employed a t-test to compare the means of the two groups.

Keywords - Knee Extensor, Interuniversity, dominant leg, CSMI HUMAC NORM Isokinetic Dynamometer

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INTRODUCTION

Handball is a physically demanding sport that places significant stress on the lower limbs, particularly the knee extensors (quadriceps). Maintaining balanced strength between the quadriceps muscles is crucial for athletes to optimize performance and prevent injuries (Knapik, J. J, 1991). Imbalances in knee extensor strength can lead to various issues, including reduced athletic performance and an increased risk of musculoskeletal injuries (Worrell, T. W et.al, 1989).

This study focuses on comparing the asymmetry in knee extensor strength between two categories of handball players: interuniversity and college. It is hypothesized that interuniversity handball players, with more advanced training and experience, may exhibit less knee extensor strength of dominant leg of the handball players asymmetry than college players. To explore this hypothesis, we employed the CSMI HUMAC NORM Isokinetic Dynamometer to assess knee extensor strength and conducted a t-test to compare the two groups.

METHODOLOGY

Participants:

A total of 30 male handball players participated in this study, with 15 as interuniversity-level players and 15 as college-level players from LNIPE, NERC, Guwahati, Assam. The participants' demographic characteristics are detailed in Table 1.

Table 1. Demographic Information of Participants

	Interuniversity Players	College Players
Age (years, mean ± SD)	20.4 ± 1.5	19.8 ± 1.2
Height (cm, mean ± SD)	176.2 ± 6.3	175.6 ± 5.8
Weight (kg, mean ± SD)	78.7 ± 7.1	73.4 ± 6.9

Strength Assessment:

The CSMI NORM Isokinetic Dynamometer was used to assess knee extensor strength of dominant leg of the handball players. Each participant's knee extensor strength was measured individually. The dynamometer recorded peak torque in Newton meters (Nm) during concentric contractions at an angular velocity of 60°/sec (Kannus, P. et.al., 1993).

Statistical Analysis:

To compare the variance F-test for two-sample variances was performed and to compare the mean knee extensor strength of dominant leg between interuniversity and college handball players, performed an independent samples t-test. The significance level was set at $p < 0.05$.

RESULTS

Table 2. The table you provided presents the results of an F-test for two-sample variances comparing the vertical jump variances between Inter-university players and College players

F-Test Two-Sample for Variances		
	Interuniversity Players	*College Players*
Mean	213.2666667	204.7333333
Variance	313.0666667	363.352381
Observations	15	15
df	14	14
F	0.861606207	
P(F<=f) one-tail	0.392187992	
F Critical one-tail	0.402620943	

The F statistic (0.8616) is less than the critical F value (0.4026) for a one-tailed test.

The associated p-value (0.3922) is greater than the chosen significance level (alpha), which is typically set at 0.05. the variances appear to be reasonably similar between the two groups. So, t-Test: Two-Sample Assuming Equal Variances was employed in MS-Excel to find the Mean difference of both the groups.

Table 3. The results of the knee extensor strength of dominant leg assessments are summarized.

t-Test: Two-Sample Assuming Equal Variances		
	Knee Extensor Strength (Nm)	
	Interuniversity Players	*College Players*
Mean	213.2666667	204.7333333
Variance	313.0666667	363.352381
Observations	15	15
Pooled Variance	338.2095238	
Hypothesized Mean Difference	0	
df	28	
t Stat	1.270739196	
P(T<=t) one-tail	0.107139175	
t Critical one-tail	1.701130934	
P(T<=t) two-tail	0.214278349	
t Critical two-tail	2.048407142	

Table 3. Knee Extensor Strength (Nm) of dominant leg of the handball players in Interuniversity and College Handball Players. The average value of some measure for Interuniversity Players is 213.27 and the average value of the same measure for College Players is 204.73. The calculated t-statistic (1.27) is less than the critical t-value for both one-tailed (1.7011) and two-tailed (2.0484) tests. The p-value for a one-tailed test (0.1071) is greater than the chosen significance level (alpha), typically set at 0.05. The p-value for a two-tailed test (0.2143) is also greater than 0.05. There is no statistically significant difference in the means of the two groups. The observed difference in means could be due to random variability.

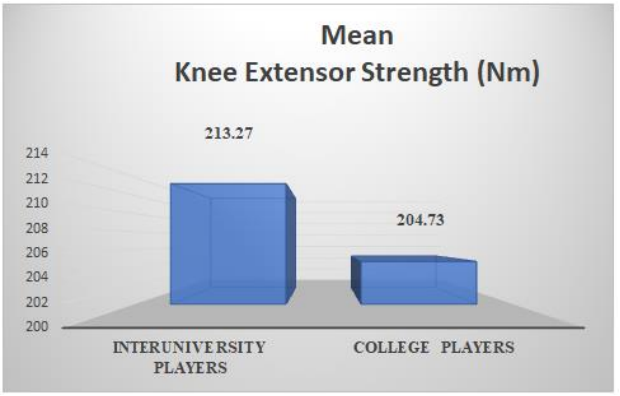

Figure 1. Knee Extensor Strength of dominant leg of interuniversity players and collage level players.

DISCUSSION

The results of this study show that there is no significant difference in knee extensor strength of dominant leg between interuniversity and college handball players. Our initial hypothesis, suggesting that interuniversity players would exhibit less knee extensor strength asymmetry, was not supported by the data.

It is important to consider several factors that may have contributed to these findings. Both Inter-university and College handball players likely engage in similar training regimens and physical demands associated with the sport, potentially leading to comparable quadriceps strength levels.

CONCLUSION

In this study, we compared knee extensor strength asymmetry between Interuniversity and College handball players using the CSMI NORM Isokinetic Dynamometer. The results showed no significant difference in knee extensor strength of dominant leg between the two groups. This finding suggests that both interuniversity and college handball players may exhibit similar levels of quadriceps strength.

Future research could investigate other factors contributing to lower limb strength and performance asymmetry in handball players, such as neuromuscular coordination, muscle activation patterns, or training protocols.

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