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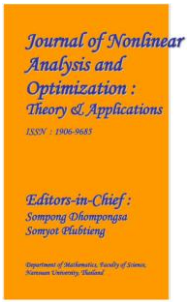

ANALYZING CORE STRENGTH VARIATIONS AMONG PLAYERS OF DIFFERENT TEAM SPORTS

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Abstract
This study aimed to compare core strength among players of various team sports. A total of eighty male University/National-level athletes from Varanasi and nearby regions participated, with sixteen players representing each sport: cricket, hockey, basketball, volleyball, and football. The participants were aged between 17 and 25 years. The research employed a static group comparison design, with core strength as the dependent variable and the type of team sport (cricket, hockey, basketball, volleyball, and football) as the independent variable. Core strength was assessed using the Side Plank Test. To analyze differences in core strength among the athletes from different sports, an analysis of variance (ANOVA) was conducted, with the significance level set at 0.05.
The results indicated that there was no statistically significant difference ($p > 0.05$) in core strength among players of the different team sports. This suggests that, despite the varying physical demands and training regimens associated with each sport, core strength levels among these athletes were relatively similar.

Keywords:
Core strength, team sports, cricket, hockey, basketball, volleyball, football, university athletes, national-level athletes, Side Plank Test, static group comparison design,

1. GENERAL INTRODUCTION

Core strength and stability, concepts widely recognized in health and fitness professions, gained prominence in the early 1990s. They are utilized by physicians, physical therapists, biomechanists, and chiropractors to educate patients on injury recovery and prevention. Fitness professionals also apply these concepts to enhance physical fitness and athletic performance. Despite their widespread usage, core stability remains a broad term that is poorly defined and understood (Panjabi, 1992). There is no universally accepted definition or standardized method for assessing core stability, complicating efforts to measure its influence on athletic performance (Nesser, Huxel, Tincher, & Okada, 2008) and its connection to athletic injuries (Heiderscheit & Sherry, 2007).
It is commonly believed that a strong core facilitates the efficient transfer of forces from the lower extremities through the torso to the upper body, and sometimes to an external implement (Behm et al., 2005; Cissik, 2002; McGill, 2004). Conversely, a weak core is thought to disrupt this energy transfer, potentially reducing athletic performance and increasing the risk of injury to underdeveloped muscle groups. This belief has led to the assumption that enhancing core strength will improve sports performance. As a result, core training has become popular among strength coaches and personal trainers aiming to boost performance and minimize injury risks, despite limited empirical evidence supporting these claims.
Although the importance of core strength and various training methods have been widely publicized, few studies have quantitatively demonstrated its role in strength and performance. For example, Scibek et al. (2001) examined core strength and swimming performance in high school swimmers, Tse et al. (2005) assessed rowing performance in college-aged rowers, and Stanton et al. (2004) investigated running performance and economy in high school touch football and basketball athletes. In each study, groups that underwent core training showed improvements in core strength according to their

respective measurement criteria but did not exhibit significant enhancements in swimming, rowing, or running performance. Similarly, Nesser et al. (2008) explored the relationship between core strength and various sport performance metrics in Division I football players, finding only weak to moderate correlations.

Several factors may explain the lack of strong relationships in these studies, including inconsistent methods for measuring core strength, variations in the performance variables assessed, and differences in the populations studied. Alternatively, it is possible that no direct relationship exists between core strength and athletic performance. Despite its prevalence in medical and fitness fields, core stability remains a relatively novel concept with numerous unresolved issues, one of the most significant being the absence of a standardized assessment method. Hibbs, Thompson, French, Wigley, and Spears (2008) suggested that the lack of a gold standard for evaluating core stability may contribute to the scarcity of research on its relationship with athletic performance.

The concept of core strength originated from research conducted at the University of Queensland, aimed at identifying appropriate exercises for patients with low back pain. The term 'core strength' refers to the muscular control of the axial skeleton, including the lumbar spine and pelvic girdle, to maintain functional stability. Strength training programs have increasingly focused on enhancing core muscles, given that all movements originate from the core and extend to the limbs. A solid foundation of core strength is essential, as insufficient coordination in the core musculature can lead to inefficient movements, compensatory patterns, strain, overuse, and injuries.

2. Objective of the Study

The primary objective of this study was to compare core strength among players from different team sports.

3. RESEARCH METHODOLOGY

Subjects:

Eighty male players at the University/National level, representing various team sports, were selected from Varanasi and surrounding areas. The sample included sixteen players each from cricket, hockey, basketball, volleyball, and football. The participants' ages ranged from 17 to 25 years.

Variables:

Core strength was designated as the **dependent variable**, while the different team sports served as the **independent variable**.

Criterion Measure:

Core strength was assessed using the **Side Plank Test** (also referred to as the Side Ramp Test). This test evaluates the control and endurance of the lateral muscles. The subject maintains a straight back while in the side plank position, and the time is recorded until they can no longer keep the back straight and begin to lower. After a five-minute rest period, the test is repeated on the opposite side. The total core strength score is the sum of the times achieved on both sides.

Design of the Study:

A **static group comparison design** was employed for the study. Participants were divided into five groups based on their respective sports: cricket, hockey, basketball, volleyball, and football.

Statistical Analysis

To compare core strength among players from different team sports, **descriptive statistics** and **Analysis of Variance (ANOVA)** were utilized. The significance level was established at **0.05**.

4. RESULTS AND DISCUSSIONS

Table 1: Descriptive Statistics of Core Strength of Different Team Games Players of BHU

Dependent Variables	**Descriptive Statistics**	**Different Team Games Players of BHU**				
		Cricket	Hockey	Basketball	Volleyball	Football
Right Core	Mean	75.12	75.3	5.56	80.06	78.75
	Std. De	9.905	10.719	9.416	7.325	8.970
	Skewness	550	.764	.588	845	.514
	Kurtosis	920	.993	.694	.662	.961
Left Core	Mean	78.9	73.62	75.12	78.9	76

	Std. De	8.322	10.178	9.472	6.923	10.159
	Skewness	.196	884	.703	.522	.756
	Kurtosis	.956	.099	.309	.030	.791

Table 2: Analysis of Variance of Core Strength of Different Team Games Players of BHU

Variables	Source of Sum of	Sum of Squares	off	Mean Square	f	Sig.
	Between Groups	333.825	4	83.56		
Right Core					.957	.436
	Within Groups	6537.06	75	87.16		
	Between Groups	351.334	4	87.12		
Left Core					1.063	.382
	Within Groups	6205.132	75	82.134		

Table 2 showed that the obtained F" values of 0.957 for right core and 1.063 for left core were insignificant at the 0.05 level because they were less than the tabulated value of 2.49 at 4, 75 d.

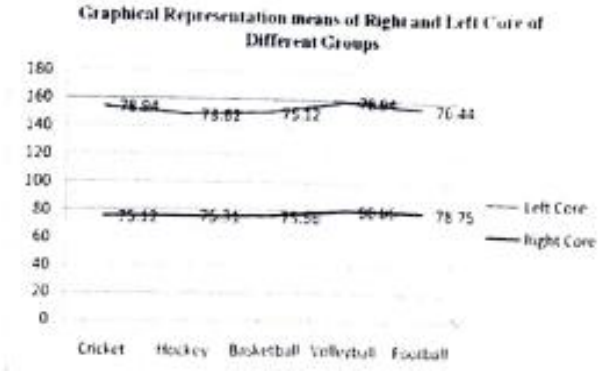

Figure 1

The results of the study indicate that there was no significant difference in core strength among the participants from various team sports. This can be attributed to the fact that all the selected sports cricket, hockey, volleyball, basketball, and football require similar athletic movements and performance levels, particularly at the university level. Additionally, the players shared comparable daily routines, athletic training regimens, and socio-economic backgrounds, contributing to the uniformity in core strength outcomes. Over the past few decades, athletic performance across all sports has improved significantly due to various factors, including advancements in training techniques and a better understanding of physical conditioning. Core strength has emerged as a critical factor in the success of athletes, whether they are cricketers, hockey players, volleyball players, or basketball players. It not only enhances athletic performance but also plays a vital role in overall functional fitness, daily activities, and the correction of postural imbalances.

Much of the theoretical framework linking core stability to athletic performance is grounded in the idea that athletic power is generated and transferred through the trunk of the body (Santana, 2003). Santana (2003) further explains that the muscular structure of the core is arranged in a crisscross pattern, resembling a *serape*, a traditional colorful blanket commonly worn in Mexico and other Latin American countries (Logan & McKinney, 1977). From this analogy, the concept of the *Serape Effect* was developed. This effect is crucial during dynamic athletic movements, as it involves the coordinated activation of muscles such as the rhomboids, serratus anterior, external obliques, and internal obliques. These muscles contribute to the generation of internal forces, which are then effectively transferred from the large muscles of the lower extremities to the upper body (Logan & McKinney, 1977). The *Serape Effect* has been observed to be more pronounced in skilled athletes compared to their less-skilled counterparts, highlighting its importance in advanced athletic performance.

5. CONCLUSION

Based on the findings of this study, along with previous research, it is evident that team sport players from BHU exhibit similar levels of core strength. It is widely accepted that core training is essential for achieving optimal sports performance and should be an integral component of any athletic training program. However, to fully understand the role of core strength and stability in sports performance,

further research is needed, including the development of sport-specific methods to evaluate its effectiveness.

REFERENCES

1. Leonard, A. M., Young, W. B., Bonsey, W. A. C., & Mackinnon, S. N. (2005). Trunk muscle electromyographic activity with unstable and unilateral exercises. *Journal of Strength and Conditioning Research, 19*(1), 193-201.
2. Cissik, J. M. (2002). Programming abdominal training: Part one. *Journal of Strength and Conditioning, 24*(1), 9-15.
3. Heiderscheit, B. C., & Sherry, M. A. (2007). What effect do core strength and stability have on injury prevention and recovery? In D. MacAuley & T. M. Best (Eds.), *Evidence-Based Sports Medicine* (2nd ed., pp. 59-72). Hoboken, NJ: Wiley-Blackwell.
4. Hibbs, A. E., Thompson, K. G., French, D., Wrigley, A., & Spears, I. (2008). Optimizing performance by improving core stability and strengthening. *Sports Medicine, 38*(12), 995-1008.
5. Logan, G. A., & McKinney, W. C. (1977). The serape effect in athletic performance: Improving anatomic core stability through kinesiology and strength training. In *Kinesiology and Strength* (2nd ed., pp. 197-208). Dubuque, IA: Wm. C. Brown & Company Publishers.
6. McGill, S. M. (2004). *Ultimate Back Fitness and Performance* (2nd ed.). Ontario, Canada: Wabuno Publishers.
7. Nesser, T. W., Huxel, K. C., Tincher, J. L., & Okada, T. (2008). The relationship between core stability and performance in Division I football players. *Journal of Strength and Conditioning Research, 22*(6), 1750-1754.
8. Panjabi, M. M. (1992). The stabilizing system of the spine: Part I. Function, dysfunction, adaptation, and enhancement. *Journal of Spinal Disorders, 5*(4), 383-389.
9. Santana, J. C. (2003). The serape effect: A kinesiological model of core training for functional performance. *Journal of Strength and Conditioning, 25*(2), 73-74.
10. Scibek, J. S., Guskiewicz, K. M., Prentice, W. E., Mays, S. R., & Davis, J. M. (2001). The effect of core stabilization training on short-term performance in swimming. *Master's Thesis*, University of North Carolina, Chapel Hill.
11. Stanton, R., Reaburn, P. R., & Humphries, B. (2004). The effect of short-term Swiss ball training on core stability and running economy. *Journal of Strength and Conditioning Research, 18*(3), 522-528.
12. Tse, M. A., McManus, A. M., & Masters, R. S. W. (2005). Development and validation of a core endurance intervention program: Implications for performance in college-aged rowers. *Journal of Strength and Conditioning Research, 19*(3), 547-552.