Human Nature Journal of Social Sciences
Vol.5, No.1 (March, 2024), Pp.275-285
ISSN(online): 2788-5240, ISSN(print):2788-5232

Original Article **https://hnpublisher.com**

The Effect of Core Stability Exercises on Dynamic Balance on Novice Cricket Players (Male)

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ABSTRACT

Aim of the Study: The purpose of this study is to investigate the effect of core stability exercises on the balance (dynamic & static) of novice male cricket players.

Methodology: A total of 44 novice male cricket players distributed into experimental group (N=30) and control group (N=14) through simple random sampling technique. A group of ten Normal Control subjects were also selected for further comparison. The tentative group underwent a 6 week core stability exercise program, as the other group did not participate in any specific core training as they perform their normal activities. All the participants were assessed by standardize Johnson Modification Bass of Dynamic Balance (JMBD) before and after the training. The subjects were selected from all cricket clubs of Lahore. This experimental research utilized purposive sampling technique, normality has been checked through Shapiro-Wilk test and data was analyzed through SPSS-32 along with paired sample t-test has been utilized in this study.

Findings: These findings suggest that core stability exercises can be effective in enhancing the dynamic balance of novice male cricket players. The study concluded that a significant improvement in dynamic balance in the experimental group compared to the control group.

Conclusion: In conclusion, this study demonstrated that core stability exercises have a significant positive effect on the dynamic balance of novice male cricket players. The study indicate that incorporating a structured core stability exercise program into training regimens can enhance postural control, stability, and balance during cricket-specific movements. The study provides empirical support for the integration of core stability training into the training programs of novice cricket players.

Keywords: Core Stability Exercises, Dynamic Balance, Novice Cricket Players, Male Athletes.

Article History

Received:
February 11, 2024

Revised:
March 26, 2024

Accepted:
March 28, 2024

Published:
March 30, 2024

Introduction

Cricket is a popular sport played by millions of individuals worldwide, with a rich history and a wide range of physical demands. One of the essential components and crucial module is balance, it enables the athlete to help in maintaining stability, balance and execute precise movements during various actions such as batting, bowling, and fielding. It also refers to the capability of an athlete body to maintain postural steadiness or equilibrium as in movement or during dynamic tasks (Hrysomallis et al., 2011; Huxel and Anderson, 2013; Gill, Bilal & Maqsood, 2023). The position of the body to be in a stable position while in performing of movement or oscillate in different directions with maintaining stability with center of gravity as performing is stated as dynamic balance (Miller et al., 2006; Hrysomallis et al., 2011; Tallat, Arshad S. A. G. Z. (2018); Gill et al., 2023). Core stability is a crucial component of performance in cricket, as it enables players to maintain control and stability along with stretching while executing various movements on the field and responses the muscular activity to stable within the center point (Hides et al., 2008; Huxel and Anderson, 2013; Sarkar & Dhapola, 2022; Gill, Bilal & Maqsood, 2023). This muscular activity may happen through any source of external and internal disturbance during dynamic activity, the center of pressure moves between the base of support boundaries and sometimes outside the base of support (Kahle & Gribble, 2009; Silva et al., 2019). Core stability exercises have been suggested as a means to enhance stability by improving core strength and neuromuscular control. As, it involves the coordination of multiple body segments and the integration of sensory information to make appropriate adjustments and corrections during motion not in active athletes but also in rehabilitation procedure (Kibler at al., 2006; Granacher et al., 2014; Gill et al., 2021; Gill et al 2022; Gill et al., 2023). It plays a significant role in the execution of cricket skills, such as quick changes in direction, sprinting, and jumping. The development of dynamic balance is particularly important for novice cricket players, as they are in the initial stages of learning and mastering the fundamental skills of the sport which not only help in enhance sports performance but also played a vital role in prevention of injuries (Huxel and Anderson, 2013; Gill et al., 2023). However, limited research has been conducted specifically focusing on the effect of core stability exercises on the dynamic balance of novice cricket players, particularly male students. Core stability exercises are designed to enhance the strength, endurance, and coordination of the muscles in the trunk region, including the abdomen, lower back, and pelvis (Kibler et al., 2006). Core stability exercises have been widely recognized for their potential benefits in improving overall athletic performance and reducing the risk of injuries. While several studies have investigated the influence of core stability training on balance and stretching in other sports such as soccer, cricket, basketball, and gymnastics, the unique demands and movement patterns of cricket necessitate a specific focus on this sport (Verhagen *et al.,* 2004; Hrysomallis et al., 2011; Granacher *et al.,* 2014; Gill et al., 2023).

The primary purpose of doctors, trainers, and professional personnel's adopted core stability program to create stability lumbo-pelvic hip region where all the weight has been centered (center of gravity) to prevent buckling and regain the state of stability after acute and chronic trauma (Leetun, et al., 2004; Akuthota & Nadler, 2004). As it provided stability to the muscles of the abdominal, par spinal, and lumbo pelvic region along with gluteus muscles which led to help in better control and balance (Carpes, Reinehr & Mota, 2008). Muscles firming one after the other produce desired movement and are contrasted to help in creating movements, balance posture, and spinal stabilization. Each joint and muscle senses position and links to joints with muscles to react in building the body as a unit. It also produced improvements support athletics' dynamic movements and whole body activities (Collins, 2008). The study of Reyegani et al. (2011) depicted that the core stability exercise improved balance, muscle strength and hitting performance in cricket players. Similarly, Kumar et al. (2014) reported that core stability training enhanced throwing accuracy and balance in young cricketers. All these exercises aim to improve muscular strength, endurance, and control of the core region, leading to enhanced stability and control of the body during movement (Willson et al., 2005). Lack of control in the core may contribute to the bodies' inability to achieve dynamic stability or could lead to a situation that can cause injury. Core stability is a vital component of overall physical fitness and plays a fundamental role in maintaining proper posture, providing stability for the spine, and transferring force between the upper and lower body

during movement of core stability muscles are a group of muscles that work together to provide stability and support to the spine and pelvis. Understanding the anatomical and structural functionality of these muscles is essential for developing effective training programs, preventing injuries, and improving athletic performance (Hanan et al., 2021). It is the ability of an athlete to maintain postural control as performing movements that involve changing directions, speed, or external perturbations (Schwesig et al., 2017). The core stability exercise program consisted of a variety of exercises targeting the muscles of the core areas including the abdominal, lower back, knee shoulders, hip muscles dynamic and static stretching also played a vital role in stabilization of joints muscles, tendons and ligaments. The stability exercises uses 30% effort and 70% concentration, it usually needs neuromuscular coordination along with high attention which resulted in gaining strength, proprioception and balance as well (Compton & Gill, 2006; Tallet, Gill and Arshad 2018; Gill, Noor & Eqra, 2019; Gill, Bilal, Maqsood, 2023; Gill et al., 2023). The exercises were progressively challenging and focused on improving core strength, stability, and control which resulted the participants who underwent the core stability exercise program exhibit better balance, control movements, improved postural structure, and better stability during dynamic movements (Yalfani et al., 2017; Szafraniec, Baranska, and Kuczynski, 2018).The core muscles, including the abdominals, back extensors, and hip muscles, play a crucial role in stabilizing the spine and transferring forces between the upper and lower body during movements and the control group did not perform any sort of activities (Hibbs et al., 2008; Swargiary, 2023). The core muscles, including the muscles of the abdomen, back, and pelvis, provide a stable base for limb movement and transfer forces between the upper and lower body (McGill et al., 2016). Developing core stability through specific exercises has been shown to enhance stability, strength performance, and reduce the risk of injuries in various sports (Willson et al., 2005; Hassan, 2017). The key is the base of support where athletes changed its controlled position with stability. Elite athletes have complete control on their body movement and therefore achieve higher active stability (Roetert et al., 2001). The weak core muscles lead to lower body injuries and posture disorder; strong core muscles produced good balance and balance came from strong core stability of muscles (Kilber et al., 2006). An improved ability to control this movement has the potential to decrease excessive forces on the lower extremity. Abdominal and pelvic muscles are the segmental links between the upper and lower body and act as the fulcrum, whereas the upper and lower body acts as the movable levers (Kreighbaum & Barthels, 2017). There is not a insufficient harmonization in core musculature and deficit muscular collaboration (synergy) of the lower back stabilization which can cut down the efficiency of mobilization, & non compensatory patterns resulted in strain and overuse injuries (Akuthota et al., 2008). The effectiveness of core stability exercises has been widely studied in various sports and athletic populations, demonstrating positive outcomes in terms of performance enhancement, injury prevention, and functional movement patterns (Hibbs et al., 2008; Huxel et al., 2013). It involves the coordination of multiple body segments, muscles, and sensory systems to stabilize the body's center of gravity and maintain postural control (Gribble & Hertel, 2004). A variety of studies concluded that there is a strong bond among balance of lower body and postural injuries in cricket athletes (Marquez, et al., 2007; Verhagen, et al., 2004; Sadeghi, Shariat, Asadmanesh, & Mosavat, 2013; Gill et al., 2021). As the lower extremity joints supported with strong stabilizers with forces and bear the affected area by muscle strength during landing positions in various sports and activities (Kean, Behm, & Young, 2006). The core stability exercises directly impacted on the static and dynamic balance (Rahimi et al., 2023).

Various Research showed that an individual's dynamic balance influenced by a range of factors, including core stability, muscle strength, proprioception, and neuromuscular control (Bressel et al.,2007; Pau et al., 2013). Novice cricket male atletes refer to individuals who are new to the sport of cricket and have limited experience with less skill level in the game, as they have lack the technical proficiency and physical capabilities of more experienced players, making them an important population to study in terms of performance enhancement and injury prevention. Numerous studies have investigated the relationship between core stability exercises and dynamic balance in various athletic populations. A study by Negahban et al. (2013) resulted, core stability exercises found significantly improvement in dynamic

balance in female athletes participating in different sports. Similarly, Arazi and Asadi et al. (2011), reported significant improvements in dynamic balance following a core stability exercise program in male basketball players. These findings suggest a positive association between core stability exercises and dynamic balance in athletes.

To assess dynamic balance in the context of this study, the Johnson Modification of the Bass test of Dynamic Balance will be utilized. As described by Johnson and Leach et al., (1986), the test is performed using both feet in an alternating order to jump to and from tape markers along a course. The distance of the tape markers is fixed and remains the same for every test subject. The tape markers are to be covered entirely with the foot on landing. No additional instructions are given concerning arm and hand placement. No comment on landing and/or technique can be made. The Johnson Modification of the Bass test of Dynamic Balance is a widely used tool for measuring dynamic balance in athletes (Bressel et al., 2007). In the context of cricket, limited research has been conducted on the effect of core stability exercises on dynamic balance specifically in novice male students.

Significance of the Study

This study aims to investigate the effect of core stability exercises on the dynamic balance of novice male cricket students. It will explore the hypothesis that incorporating with a core stability exercise program into the training regimen of novice cricket players can lead to improvements in their stability and balance (static and dynamic) positions, thus enhancing their overall performance on the cricket field. Understanding the impact of core stability exercises on the balance (static and dynamic) of novice cricket players has a great significance in the performance. It will not only helpful for the cricket but it also enhanced the performance of other spots as producing stability and balance in body positioning.

Hypotheses

H0: Core stability exercises improve the dynamic & static balance of novice cricket players.

H1: Core stability exercises do not improve the dynamic & static balance of novice cricket players.

Research Question

Is stability exercises improves the Dynamic & static balance of novice cricket players?

Research Methodology

The study is concerned with effect of core stability exercises on dynamic balance on novice cricket (male) athletes with quantitative research approach utilized for this researcher. The subjects were selected through purposive sampling and consent also taken from the participants. The subjects were participated from Lahore city clubs having proper cricket facilities. There are 164 clubs in Lahore (city) Punjab (province), among them 132 are registered and 32 are not registered clubs included in this study. The experiment consists of two groups (Experimental & Control). Forty four respondents were chosen selectively for achieving the purpose of the study. The study utilized Johnson Modification of the Bass test of Dynamic Balance to evaluate the balance and coordination of an individual while performing dynamic movements. A group of 10 Normal Control subjects were also selected for further comparison. The research of the core stability activity flow showed in the above Figure1.

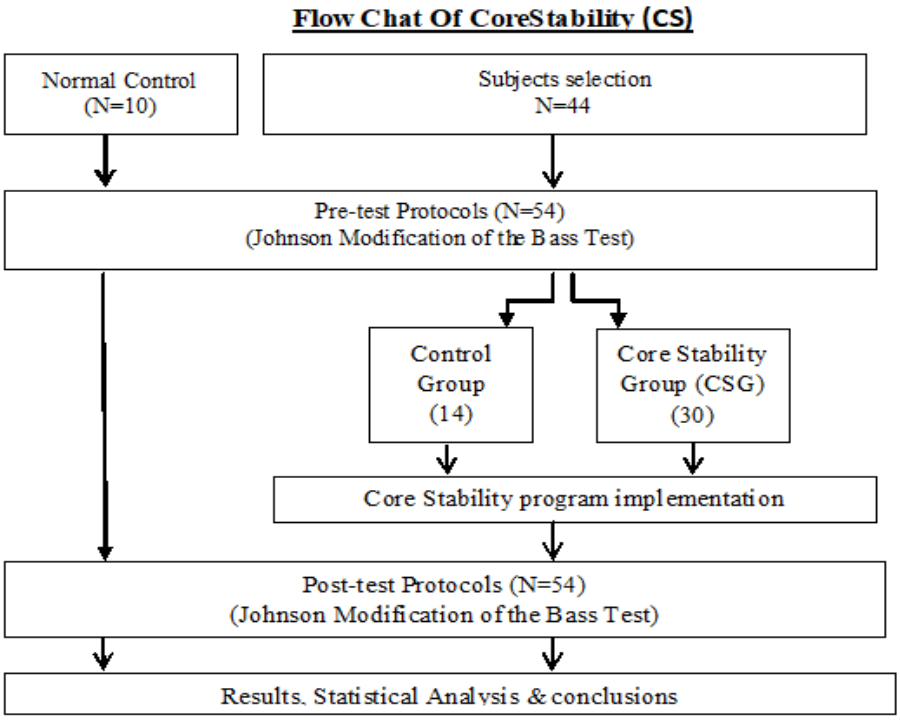

Figure 1

The above figure 1 showed the flow chart of the core stability research along with normal control subjects. The participants were divided into two groups: Control & Experimental group. The experimental group engaged in a 6 week core stability exercise program, while the control group did not participate in any specific core stability exercises. Both groups underwent a pretest assessment using the Modified Bass Test for Dynamic Balance to establish their baseline dynamic balance abilities. After six weeks, both groups were reassessed using the same test for post test evaluation to measure any changes in their dynamic balance. For the collection of required information, the researcher developed a professional and certified trainer exercise plan as it is given in the below Table 1.

Table 1: *Showed the 1 week training plan of core stability exercises along with frequency, Intensity, Time and Type as well.*

Exercise	Frequency	Intensity	Time	Type Isometric/Dynamic
		DAY-1		
Plank	2 sets Hold for 30 sec	Light to moderate	One time a day	Isometric
Lying Bridge	2 sets 12-15 reps	Light to moderate	One time a day	Dynamic
Side Plank	2 sets Hold for 30 sec	Light to moderate	One time a day	Isometric
Superman	2 sets hold 12-15 sec	Light to moderate	One time a day	Dynamic
		DAY- 2		
Plank	3 sets Hold for 45 sec	Light to moderate	One time a day	Isometric
Bear Hold	3 sets Hold for 30 sec	Light to moderate	One time a day	Isometric
Lying Zipup	3 sets 12-15 sec	Light to moderate	One time a day	Isometric
Glute medius	2 sets 15-20 reps	Light to moderate	One time a day	Dynamic
		DAY - 4 (REST)		
		DAY-5		
Plank	3 sets Hold for 1.3 min	Light to moderate	One time a day	Isometric

Lying Zipup	3 sets 12-15 sec	Light to moderate	One time a day	Dynamic
Glute medius	3 sets 15-20 reps	Light to moderate	One time a day	Dynamic
Bridging onback	3 sets 15-20 sec	Light to moderate	One time a day	Dynamic
Superman	3 sets Hold 10-15 sec	Light to moderate	One time a day	Dynamic
DAY -5				
Plank	3 sets Hold for 2 min	Light to moderate	One time a day	Isometric
Bridging onback	3 sets 15-20 sec	Light to moderate	One time a day	Dynamic
Side Plank	3 sets Hold for 1 min	Light to moderate	One time a day	Isometric
Glute medius	3 sets 20-25 reps	Light to moderate	One time a day	Dynamic
DAY– 7 (REST)				

Note: there should be 30 sec rest at the end of every exercise of the session

The Researchers will personally monitor the whole exercise session. The independent variable in this study was the core stability exercise program, specifically designed to improve the strength and stability of the participants' core muscles. The dependent variable was the participants' dynamic balance, which was measured using the "Johnson Modification of the Bass test of Dynamic Balance". Additionally, the demographic variables (i.e age, weight and height) were also taken. After the core stability exercise program, To compare the dynamic balance performance between the experimental group (those undergoing the core stability exercise program) and the control group (those not undergoing the program).

Data Analysis

The given data in the table 2 represents paired samples statistics for two groups: Control group (N=14) & experimental group (N=30). The statistics provide information about the pre-test and post-test scores for both groups.

Table 2: *Paired Sample Statistics*

Table 2: Showed the pre and post test values Mean ± S.D. with difference in values along with percentage, the table also showed t-value and significant value of control (N=14) and experimental group (N=30). The data was collected from 168 cricket clubs of Lahore having proper cricket facilities.

Groups											
	Control Group						**Experimental Group**				
Subjects N = 14	Pre	Post	diff (%)	t-value	P-value	N=30	Pre	Post	diff (%)	t-value	P-value
Pair 1	59 ± 2.1	59.1 ± 2.2	0.1 (0)	t= -10.7	NS	**Pair 2**	59.3 ± 2.9	68.2 ± 7.1	7.5 (12.6)	t=-6-7	.0000***

The control group pre-test score is 59 and standard deviation of 2.1. The mean post-test score for the control group is 59.1, with a standard deviation of 2.2. the t-value is -10.7 and its value showed non-significant results. The difference between pre and post showed 0.1 differences and its percentage is 0. In the experimental group, the mean pre-test score is 59.3, with a standard deviation of 2.9. The standard error of the mean is calculated to be 1.1. The experimental group showed mean value 68.2 and standard deviation of 2.2, the difference of mean value is 7.5 and its percentage improvement is 12.6.These statistics provide insights into the performance of the two groups before and after 6-week core stability training program. By comparing the pre and post-test scores, it is possible to assess the impact of the intervention on each group. The mean scores can be used to determine the average performance of each group, while the standard deviations provide information about the variability of the scores within each group. The standard error of the mean indicates the precision of the sample mean estimates. The percentage improvement showed the better results in the experimental group. The significant value also indicated that there is an increase in dynamic balance through core stability exercise.

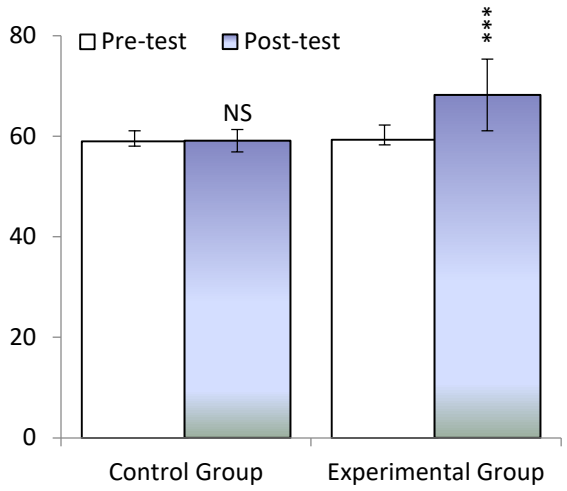

Figure 2

Figure 2: Showed the pre and post test results evaluated through paired sample t-test showed non-significant (NS) and significant results ($p<0.001$) of control and experimental group

Discussion

The results of this study revealed a significant improvement in the dynamic balance of novice cricket players after the implementation of core stability exercises. The experimental group, which underwent a six-week core stability exercise program, exhibited enhanced balance control and stability compared to the control group. The improvement in dynamic balance can be attributed to the specific nature of the exercises targeting the core muscles, which play a crucial role in maintaining balance during cricket activities. The present study investigated the impact of core stability exercises on the dynamic balance of novice male cricket players. The improvement in dynamic balance observed in this study can be attributed to the specific nature of the core stability exercises employed.

The exercises targeted the deep stabilizing muscles of the core, which are essential for maintaining balance and stability during dynamic movements in cricket. By strengthening these muscles, the players were able to enhance their ability to maintain postural control and make rapid adjustments during batting, fielding, and throwing actions. Several mechanisms may contribute to the positive effects of core stability exercises on dynamic balance. First, these exercises target the deep stabilizing core muscles e.g. the transverse abdominus and multifidus, which play a crucial role in maintaining postural control. Second, core stability exercises promote proprioception and kinesthetic awareness, which are essential for balance control. Third, the increased core strength resulting from these exercises may enhance overall muscular stability and coordination, leading to improved balance during dynamic movements. Moreover, the findings of this study support the theoretical framework that highlights the importance of core stability in enhancing overall athletic performance. The core acts as a link between the lower and upper extremities, and a strong and stable core is crucial for generating efficient and coordinated movements. The improved dynamic balance observed in this study suggests that core stability exercises can contribute to the development of a solid foundation for cricket players, enabling them to perform optimally on the field. These findings are consistent with previous research that has highlighted the positive effects of core stability exercises on balance control in various athletic populations (Cortell-Tormo et al., 2019; Hrysomallis, 2011). While the findings are promising, it is important to acknowledge some limitations of the study. Firstly, the sample size was relatively small, which may limit the generalizability of the results. Future research with a larger and more diverse sample would provide a more comprehensive understanding of core stability exercises on dynamic balance in novice cricket players. Secondly, the study focused exclusively on male participants, and the results may not be directly applicable to female

cricket players. Future studies should explore the effects of core stability exercises on dynamic balance in female cricket players to determine any potential gender differences.

Conclusion

In conclusion, this study demonstrated that core stability exercises have a significant positive effect on the dynamic balance of novice male cricket players. The findings indicate that incorporating a structured core stability exercise program into training regimens can enhance postural control, stability, and balance during cricket-specific movements. These findings provide empirical support for the integration of core stability training into the training programs of novice cricket players. By enhancing core strength, neuromuscular coordination, and postural control, players can optimize their balance during dynamic cricket-specific movements. Coaches, trainers, and cricket players should consider integrating core stability exercises into their training routines for improved overall athletic performance. These improvements can contribute to better performance outcomes and injury prevention in cricket.

Recommendations

Based on the findings and limitations of this study, several recommendations are provided for future research and practical applications: Conduct longitudinal studies to investigate the long-term effects of core stability exercises on dynamic balance and other performance variables in cricket players. This will provide a better understanding of the sustainability of the improvements observed in this study, Extend the research to include diverse populations, such as experienced cricket players and female athletes. This will help determine the generalizability of the findings and identify any potential gender or skill-level differences in the effectiveness of core stability exercises, Expand the scope of future research to encompass a broader range of performance variables, such as agility, batting, and bowling performance. This will provide a more comprehensive evaluation of the impact of core stability exercises on cricket-specific skills, Coaches and trainers should integrate core stability exercises into the training programs of novice cricket players to enhance their dynamic balance. Emphasize proper technique and gradual progression of exercises to ensure safe and effective implementation & Collaboration between researchers, coaches, and sports scientists is encouraged to implement evidence-based training programs that incorporate core stability exercises effectively.

Moreover, coach explain and identifying the potential benefits of core stability exercises, coaches and trainers can design more effective training programs to enhance the performance of their players. Meanwhile, this study can contribute to the existing body of knowledge on the role of core stability exercises in improving dynamic balance, as most previous research has focused on other sports or general populations. Lastly, by improving the dynamic balance of novice cricket players, this study may help reduce the risk of injuries associated with imbalances or instability, thereby promoting the long-term participation and well-being of cricket players. The main objectives of this study are as follows: To examine the effect of a core stability exercise program on the dynamic balance of novice male cricket students, To assess the changes in performance on the modified BASS test, a tool for dynamic balance testing,

Acknowledgements

None.

Conflict of Interest

Authors declared NO conflict of interest.

Funding Source

The authors received NO funding to conduct this study.

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