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Effectiveness of Core Stability Training versus Balance Training on Dynamic Balance and Agility in Cricket Pace Bowlers

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Abstract

Background: Cricket pace bowling requires optimal core stability, dynamic balance, and agility to achieve efficient force transfer and maintain performance during high-intensity bowling actions. Both core stability training and balance training are commonly used to improve neuromuscular control and athletic performance; however, evidence comparing their effectiveness in cricket pace bowlers is limited (1–3).

Objective: To compare the effectiveness of core stability training and balance training on dynamic balance and agility in cricket pace bowlers.

Methods: A pre-test and post-test experimental study was conducted among 40 male cricket pace bowlers aged 18–25 years. Participants were allocated into two groups: Group A received core stability training, and Group B received balance training, three sessions per week for six weeks. Dynamic balance was assessed using the Star Excursion Balance Test (SEBT), and agility was assessed using the T-Agility Test (TAT) before and after the intervention (4,5).

Results: Both groups demonstrated statistically significant improvements in SEBT and TAT scores after six weeks ($p \leq 0.05$). However, Group A showed significantly greater improvements than Group B in both dynamic balance and agility ($p \leq 0.05$).

Conclusion: Both core stability training and balance training effectively improved dynamic balance and agility in cricket pace bowlers. However, core stability training was more effective than balance training in enhancing performance outcomes.

Keywords: Core stability training, Balance training, Cricket pace bowlers, Dynamic balance, SEBT, Agility, T-Agility Test, Sports physiotherapy.

Introduction

Cricket pace bowling is a physically demanding activity that requires an optimal combination of core stability, dynamic balance, agility, and neuromuscular coordination to produce efficient bowling performance. Effective force transfer through the kinetic chain, from the lower limbs to the upper extremities, is essential for generating bowling speed while maintaining postural control and reducing injury risk.

Dynamic balance is the ability to maintain postural stability while performing functional movements. In pace bowlers, it is essential during the run-up, delivery stride, and follow-through, where

precise body control and stability are required for effective performance. Deficits in dynamic balance may impair bowling mechanics and increase the likelihood of lower-limb and lumbar injuries.

Agility refers to the ability to accelerate, decelerate, and rapidly change direction while maintaining balance and movement control. It is a key physical component for pace bowlers, enabling efficient directional changes during bowling and fielding activities. Improved agility contributes to enhanced athletic performance and reduced injury risk.

Core stability training enhances trunk muscle strength, lumbopelvic stability, and neuromuscular control, thereby improving force transmission and movement efficiency. Similarly, balance training improves proprioception, postural control, and sensorimotor coordination. Although both interventions are widely used in sports conditioning, limited evidence directly compares their effectiveness in improving dynamic balance and agility among cricket pace bowlers.

Therefore, this study aimed to compare the effectiveness of core stability training and balance training on dynamic balance and agility in cricket pace bowlers.

Methods

Study Design and Participants

The study was approved by the institute ethics committee, IEC- RIPT/DT/21/4531. This pre-test and post-test experimental study was conducted over six months at Tiruppur School of Cricket, Murugampalayam. A total of 40 male cricket pace bowlers were recruited using purposive sampling and randomly allocated into two groups (n = 20 each). Group A received core stability training, while Group B received balance training. All participants provided written informed consent before enrolment.

Inclusion and Exclusion Criteria

Male cricket pace bowlers aged 18–25 years with a minimum of two years of bowling experience and regular training of at least three sessions per week were included in the study. Participants with any musculoskeletal injury within the previous six months, neurological or vestibular disorders affecting balance, recent orthopaedic surgery, or those outside the specified age range were excluded.

Intervention

Participants in Group A underwent a structured core stability training program, while Group B received a structured balance training program. Both groups trained for 45–60 minutes per session, three sessions per week, for six weeks (18 sessions). The exercise programs were progressively advanced under supervision to ensure correct technique and participant adherence.

Outcome Measures

Dynamic balance was assessed using the SEBT, and agility was assessed using the TAT. Outcome measures were recorded before and after the six-week intervention period.

Statistical Analysis

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 24. Data normality was assessed using the Shapiro–Wilk test. Since the data were normally distributed ($p > 0.05$), parametric tests were applied. Paired t-tests were used to compare pre- and post-intervention values within each group, while independent t-tests were used to compare post-intervention outcomes between groups. Statistical significance was set at $p \leq 0.05$ with a 95% confidence interval.

Demographic Variables

The demographic variables collected for the present study included age and playing experience of the participants. A total of 40 male cricket pace bowlers aged 18–25 years participated in the study and were equally allocated into Group A (Core Stability Training) and Group B (Balance Training), with 20 participants in each group. The demographic characteristics of both groups are summarized in Table 1.

Table 1. Descriptive analysis of demographic variables of Group A and Group B

Variables	Group A (Mean ± SD)	Group B (Mean ± SD)
Age(years)	21.45±1.72	21.20±1.58
Playing experience (years)	4.30±1.10	4.15±1.05
Height(cm)	174.60±5.21	175.10±4.96

Weight (kg)	68.85±6.32	69.20±5.98
Body Mass Index (kg/m²)	22.60±1.84	22.55±1.72

Result

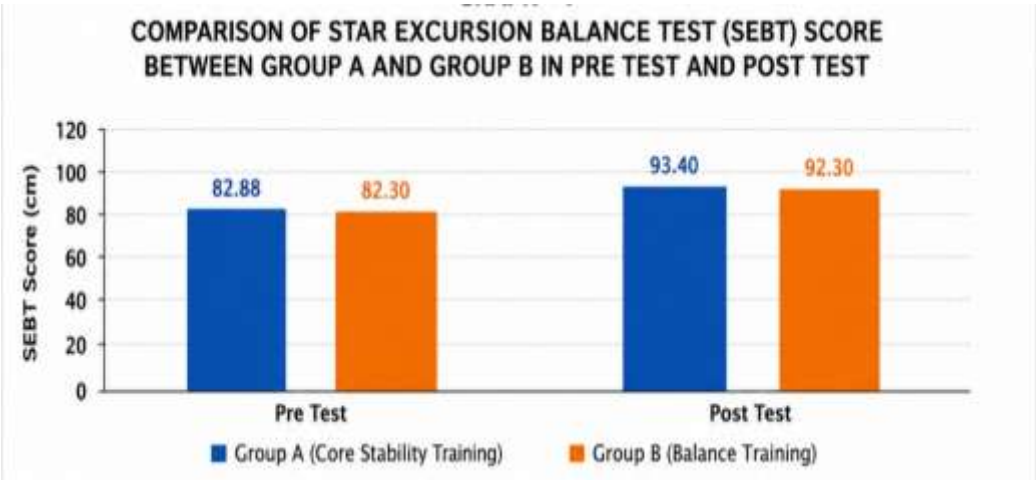
A total of 40 cricket pace bowlers completed the study and were equally allocated into Group A (Core Stability Training) and Group B (Balance Training), with 20 participants in each group. Baseline analysis showed no statistically significant differences between the groups in Star Excursion Balance Test (SEBT) and T-Agility Test scores ($p > 0.05$). Within-group analysis demonstrated significant improvements in both dynamic balance and agility following the 6-week intervention.

Table 2. Comparison of Post-test Dynamic Balance and Agility between Group A and Group B

Variables	Group A (Core Stability Training) Mean ±SD	Group A (Balance Training) Mean ± SD	t-value	p-value
Star Excursion Balance Test (SEBT) (cm)	93.40 ± 1.40	92.30 ± 1.09	2.76	0.001*
T-Agility Test (seconds)	10.07 ± 0.287	10.60 ± 0.272	−5.98	0.001*

Between-Group Comparison

Post-test analysis demonstrated statistically significant differences between the two groups. Group A showed significantly greater improvement in dynamic balance, with a higher SEBT score (93.40 ± 1.40 cm) compared with Group B (92.30 ± 1.09 cm; $p = 0.001$). Likewise, Group A demonstrated significantly better agility performance, recording a lower T-Agility Test time (10.07 ± 0.287 s) than Group B (10.60 ± 0.272 s; $p = 0.001$). These findings indicate that core stability training was more effective than balance training in improving dynamic balance and agility among cricket pace bowlers.



Graph 1: Comparison of Star Excursion Balance Test (SEBT) scores between Group A (Core Stability Training) and Group B (Balance Training) in the pre-test and post-test.

Within -group comparison

Within-group analysis revealed statistically significant improvements in both Group A and Group B following the intervention. In Group A, the mean SEBT score improved from 82.88 ±1.40 cm to 93.40 ± 1.40 cm, while the T-Agility Test time improved from 10.75 ± 0.291 s to 10.07 ± 0.287 s. Similarly, Group B demonstrated improvements in SEBT score from 82.30 ± 1.43 cm to 92.30 ± 1.09 cm, and T-Agility Test time from 10.87 ± 0.272 s to 10.60 ± 0.272 s.

Paired t-test analysis showed statistically significant differences between pre-test and post-test values in both groups ($p = 0.001$), indicating that both interventions were effective. However, the magnitude of improvement was greater in Group A than in Group B.

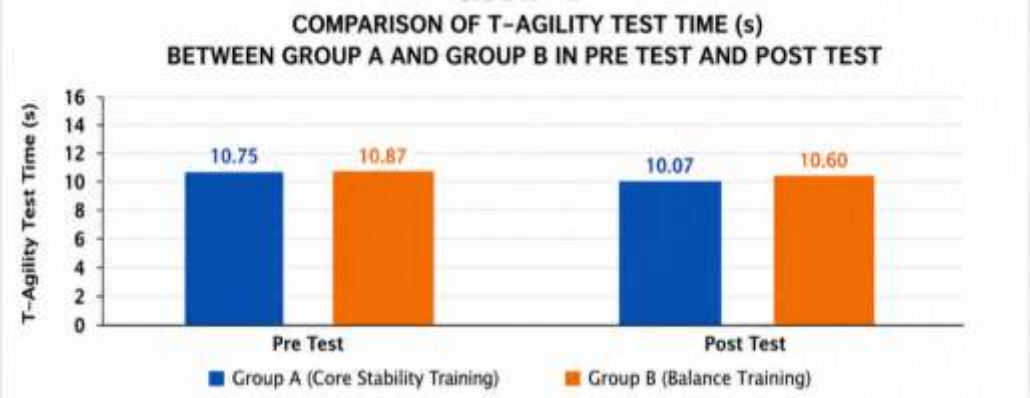


Fig 2. Comparison of T-Agility Test times (seconds) between Group A (Core Stability Training) and Group B (Balance Training) in the pre-test and post-test.

Discussion

The present study compared the effectiveness of Core Stability Training (CST) and Balance Training (BT) on dynamic balance and agility in cricket pace bowlers. Both interventions produced statistically significant improvements in Star Excursion Balance Test (SEBT) and T-Agility Test scores following the 6-week training program. However, participants who received CST demonstrated significantly greater improvements than those who underwent BT, indicating that proximal trunk stabilization plays a vital role in enhancing functional performance in pace bowlers.

The superior outcomes observed in the CST group may be attributed to improved lumbopelvic stability, enhanced neuromuscular control, and more efficient force transfer through the kinetic chain during the bowling action. A stable core provides a strong foundation for lower- and upper-limb movements, thereby improving postural control, dynamic balance, and rapid changes in direction required during pace bowling. These findings are consistent with previous studies by Kibler et al., Reed et al., and Granacher et al., which reported that CST improves balance, agility, and overall athletic performance more effectively than balance-focused exercises alone.

Although BT also resulted in significant improvements, its effects were comparatively smaller than those of CST. Balance exercises primarily enhance proprioception, postural control, and sensory-motor integration, contributing to better dynamic balance and agility. However, because pace bowling requires efficient trunk stability and force transmission, CST appears to provide greater sport-specific benefits. Overall, the findings suggest that while both training approaches are effective, CST should be prioritized in conditioning programs aimed at improving dynamic balance and agility in cricket pace bowlers.

Conclusion

The present study compared the effectiveness of core stability training and balance training on dynamic balance and agility in cricket pace bowlers. Both interventions produced significant improvements following the six-week training program. However, participants who received core stability training demonstrated greater improvements in SEBT and TAT performance than those who received balance training. Therefore, core stability training appears to be a more effective intervention for enhancing dynamic balance and agility in cricket pace bowlers and may be incorporated into sports-specific conditioning programs to optimize performance and reduce injury risk.

Limitations

The study had several limitations, including a relatively small sample size and inclusion of only male pace bowlers aged 18–25 years, which limits the generalizability of the findings. In addition, only dynamic balance and agility were evaluated, while other performance variables such as bowling speed, accuracy, muscle strength, and endurance were not assessed.

Recommendations

Future studies should include a larger and more diverse sample, extend the duration of the intervention, and incorporate additional outcome measures such as bowling speed, accuracy, muscular strength, endurance, and injury incidence to better understand the long-term effects of core stability and balance training in cricket pace bowlers.

Informed consent

Written informed consent was obtained from all participants before enrolment in the study. Participants were informed about the study objectives, procedures, potential benefits, and their right to withdraw from the study at any time without any consequences.

Conflict of interest

The authors declare that they have no conflict of interest regarding the publication of this study.

Author contributions

Santhosh Matthew E: Conceptualization, methodology, participant recruitment, data collection, manuscript preparation.

Dr. B.J.A.C Darrius: Study conception and design, supervision, methodology validation, interpretation of results, critical revision of the manuscript, and final approval of the manuscript.

Dr. P. Bright Alwin Victor: Administrative support, overall academic guidance, and final approval of the manuscript.

Data availability statement

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

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