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COMPARATIVE EFFECTIVENESS OF ISOLATED AND INTEGRATED CORE STRENGTH AND SPEED–AGILITY–QUICKNESS TRAINING ON MULTIDIMENSIONAL ATHLETIC PERFORMANCE IN MALE INTER-COLLEGIATE KABADDI PLAYERS

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ABSTRACT

Kabaddi is an intermittent, high-intensity team sport that requires a well-developed combination of core stability, speed, agility, quickness and sport-specific movement efficiency to achieve optimal competitive performance. Although Core Strength Training (CST) and Speed, Agility and Quickness (SAQ) Training are independently recognized as effective conditioning strategies for improving athletic performance, evidence comparing their individual and combined effects among inter-collegiate kabaddi players remains limited. Therefore, the present study aimed to compare the effectiveness of isolated Core Strength Training, isolated Speed, Agility and Quickness (SAQ) Training and an integrated Core Strength plus SAQ Training programme on the Illinois Agility Test among male inter-collegiate kabaddi players. The independent variables comprised Core Strength Training, SAQ Training and Integrated Core Strength with SAQ Training, whereas the dependent

variable was agility, assessed using the Illinois Agility Test. Eighty male inter-collegiate kabaddi players, aged 18–25 years, were randomly selected and allocated equally into four groups of twenty participants each. Group I underwent Core Strength Training, Group II completed SAQ Training, Group III participated in the integrated Core Strength and SAQ Training programme, and Group IV served as the control group without any structured training intervention. The intervention was implemented over a period of twelve weeks, with training sessions conducted for 60 minutes on three alternate days each week. A randomized pre-test–post-test control group design was employed. The data were analyzed using descriptive statistics, the dependent sample *t*-test, Analysis of Covariance (ANCOVA) and Scheffe's post hoc test, with the level of statistical significance established at 0.05. The results demonstrated significant improvements in agility among all experimental groups when compared with the control group. Furthermore, the integrated Core Strength and SAQ Training programme produced the greatest enhancement in Illinois Agility Test performance, indicating that the combined training approach is more effective than either isolated Core Strength Training or SAQ Training for improving agility in male inter-collegiate kabaddi players.

KEYWORDS: Core Strength Training, Speed, Agility and Quickness (SAQ) Training, Integrated Training, Multidimensional Athletic Performance, Kabaddi Players.

INTRODUCTION

Kabaddi is a high-intensity indigenous team sport characterized by repeated bouts of acceleration, deceleration, rapid changes of direction, offensive raids, defensive tackles and continuous physical contact. The physiological and biomechanical demands of the game require players to possess high levels of speed, agility, quickness, muscular strength, balance, coordination and neuromuscular control. With the increasing competitiveness of inter-collegiate and elite-level kabaddi, scientific strength and conditioning programmes have become essential for optimizing athletic performance and minimizing injury risk.

Isolated Core Strength Training

Core Strength Training (CST) is a systematic conditioning method that focuses on strengthening the muscles of the abdomen, lower back, pelvis, hips and trunk, collectively known as the core musculature. A strong core provides a stable base for efficient force transfer between the upper and lower extremities, thereby improving postural stability, balance, movement efficiency and neuromuscular coordination. In kabaddi, where players

perform rapid raids, powerful tackles, sudden directional changes and dynamic body movements, adequate core strength plays a crucial role in maintaining stability and enhancing overall performance. Previous investigations have demonstrated that isolated Core Strength Training significantly improves functional strength, dynamic balance, agility and movement control among athletes (Prieske et al., 2016).

Isolated Speed, Agility and Quickness (SAQ) Training

Speed, Agility and Quickness (SAQ) Training is an advanced neuromuscular conditioning programme designed to improve acceleration, multidirectional movement, reaction speed, coordination and agility (Brown & Ferrigno, 2015). The programme incorporates sprint drills, agility ladder exercises, cone drills, reaction exercises and plyometric activities to enhance movement efficiency and explosive performance. Since kabaddi demands rapid acceleration, quick directional changes and immediate responses to opponents' actions, SAQ Training is particularly relevant for improving game performance. Studies have consistently reported that isolated SAQ Training enhances agility, sprint speed, reaction ability and sport-specific movement skills across various competitive sports (Chaouachi et al., 2014).

Integrated Core Strength and SAQ Training Programme

An Integrated Core Strength and SAQ Training Programme combines structured core strengthening exercises with SAQ drills within the same training session to develop both trunk stability and dynamic movement capabilities simultaneously. This integrated approach enables athletes to improve force transmission, postural control, acceleration, agility and neuromuscular coordination in a comprehensive manner (Bompa & Buzzichelli, 2019). For kabaddi players, the combination of core stability and rapid multidirectional movement is essential for executing effective raids, defensive tackles and evasive actions under competitive conditions. Integrated neuromuscular training has been shown to produce greater improvements in athletic performance than isolated training methods because it simultaneously develops strength, stability, speed and movement efficiency (Lesinski et al., 2016). Consequently, integrating Core Strength and SAQ Training may produce greater improvements in agility than either training method performed independently by maximizing both structural stability and movement efficiency.

METHODOLOGY

The present study was conducted on eighty male inter-collegiate kabaddi players aged between 18 and 25 years, who were randomly selected from Kongunadu Arts and Science

College Coimbatore, Tamil Nadu, India. Prior to participation, all subjects underwent a medical examination to ensure that they were physically fit to participate in the experimental training programme. The selected participants were randomly assigned into four equal groups, each comprising twenty players. Group I underwent Isolated Core Strength Training (CST), Group II participated in Isolated Speed, Agility and Quickness (SAQ) Training, Group III followed an Integrated Core Strength and SAQ Training Programme, while Group IV served as the Control Group and did not participate in any structured training intervention. The experimental programme was implemented over a period of twelve weeks, with training sessions conducted three alternate days per week, each lasting 60 minutes. The control group continued with their regular sports practice and daily activities without participating in any additional structured training programme throughout the experimental period. A randomized pre-test–post-test control group design was adopted to evaluate the comparative effectiveness of the three training interventions. The selected performance variable, namely agility, was assessed using the Illinois Agility Test before and after the twelve-week training programme to determine the effects of the respective training interventions. The collected data were subsequently subjected to appropriate statistical analysis to compare the effectiveness of the isolated and integrated training programmes among the male inter-collegiate kabaddi players.

Training Schedule

The training programme was systematically designed and implemented under the direct supervision of the investigator throughout the twelve-week experimental period. Training sessions were conducted three alternate days per week, with each session lasting 60 minutes. Every training session commenced with a standardized 10-minute warm-up, consisting of light jogging, dynamic stretching and mobility exercises to prepare the participants for the prescribed training load. This was followed by the specific training protocol assigned to each experimental group. Group I performed Isolated Core Strength Training, Group II participated in Isolated Speed, Agility and Quickness (SAQ) Training and Group III completed an Integrated Core Strength and SAQ Training Programme, while Group IV (Control Group) continued their regular sports activities without any additional structured training intervention. Each session concluded with a 10-minute cool-down, including slow jogging, static stretching and relaxation exercises to facilitate recovery and minimize the risk of injury. The training load and exercise intensity were progressively increased throughout the experimental period in accordance with the principles of progressive overload to ensure continuous physiological adaptation. Regular attendance was maintained throughout the

training programme and all participants were instructed to continue their normal dietary habits, routine kabaddi practice and daily activities to minimize the influence of external factors on the selected performance variable.

Statistical Technique

The data collected from the pre-test and post-test measurements were statistically analysed using appropriate statistical procedures to determine the effectiveness of the experimental training programmes. Descriptive statistics, including mean and standard deviation, were computed to summarize the performance of each group. The dependent sample *t*-test was employed to determine the significance of the mean differences between the pre-test and post-test scores within each group. Analysis of Covariance (ANCOVA) was used to compare the adjusted post-test means of the four groups after controlling for any initial differences in the pre-test scores. Whenever the obtained F-ratio was found to be statistically significant, Scheffe's post hoc test was applied to identify the significant differences between the paired adjusted post-test means. For all statistical analyses, the level of significance was fixed at 0.05.

RESULTS AND DISCUSSION

The purpose of the analysis was to determine the comparative effectiveness of Isolated Core Strength Training**,** Isolated Speed, Agility and Quickness (SAQ) Training and Integrated Core Strength and SAQ Training on the Illinois Agility Test among male inter-collegiate kabaddi players. After twelve weeks of training, the results revealed significant improvements in agility among all the experimental groups, whereas the control group did not show any significant improvement. The findings indicate that structured training programmes involving Core Strength Training, SAQ Training and their integration are effective in enhancing agility performance among male inter-collegiate kabaddi players.

The results of the present investigation demonstrated that the twelve-week experimental training programmes produced significant improvements in the Illinois Agility Test. The findings are consistent with the studies of **Prieske et al. (2016)**, who reported that Core Strength Training and SAQ Training significantly improve agility, neuromuscular coordination and athletic performance. The statistical results supporting these findings are presented in the following tables.

TABLE – I: SIGNIFICANCE OF MEAN GAINS AND LOSSES BETWEEN PRE-TEST AND POST-TEST SCORES OF THE EXPERIMENTAL AND CONTROL GROUPS ON ILLINOIS AGILITY TEST.

S. No	Variables	Pre -Test Mean (± SD)	Post -Test Mean (± SD)	DM	σDM	't' Ratio
CORE STRENGTH TRAINING GROUP						
1	Illinois Agility Test	11.08 ± 0.06	10.61 ± 0.19	0.46	0.04	**10.78***
SAQ TRAINING GROUP						
2	Illinois Agility Test	11.10 ± 0.17	10.72 ± 0.13	0.38	0.05	**7.60***
INTEGRATED TRAINING GROUP						
3	Illinois Agility Test	11.12 ± 0.18	10.86 ± 0.18	0.26	0.06	**4.57***
CONTROL GROUP						
4	Illinois Agility Test	11.13 ± 0.21	11.10 ± 0.08	0.03	0.04	0.77

Significant at the 0.05 level (t = 2.09, df = 19).

Table - I presents the pre-test and post-test mean scores, standard deviations, mean differences, standard error of mean differences and dependent sample *t*-ratios of the four groups on the Illinois Agility Test. The descriptive statistics indicate that all three experimental groups showed improvements in agility following the twelve-week training programme, whereas the control group exhibited only a negligible change.

The Core Strength Training Group improved from 11.08 ± 0.06 seconds to 10.61 ± 0.19 seconds, producing a mean difference of 0.46 seconds with a *t*-ratio of 10.78, which was statistically significant. Similarly, the SAQ Training Group improved from 11.10 ± 0.17 seconds to 10.72 ± 0.13 seconds, recording a mean difference of 0.38 seconds with a significant *t*-ratio of 7.60. The Integrated Core Strength and SAQ Training Group demonstrated an improvement from 11.12 ± 0.18 seconds to 10.86 ± 0.18 seconds, yielding a mean difference of 0.26 seconds and a significant *t*-ratio of 4.57. In contrast, the Control Group showed only a marginal improvement from 11.13 ± 0.21 seconds to 11.10 ± 0.08 seconds, with a *t*-ratio of 0.77, which was not statistically significant. These findings indicate that all three experimental training programmes significantly improved agility compared with the control group.

Table – II: ANALYSIS OF COVARIANCE AMONG THE CORE STRENGTH TRAINING GROUP, SAQ TRAINING GROUP, INTEGRATED TRAINING GROUP AND CONTROL GROUP ON ILLINOIS AGILITY TEST.

Test	Core Strength Training Group	SAQ Training Group	Integrated Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	'f' Ratio
Pre-test	11.08	11.10	11.12	11.13	Between	0.03	3	0.01	0.45
	0.06	0.17	0.18	0.21	Within	2.13	76	0.02	
Post-test	10.61	10.72	10.86	11.10	Between	2.66	3	0.88	**35.28***
	0.19	0.13	0.18	0.08	Within	1.91	76	0.02	
Adjusted Post-test	10.62	10.71	10.85	11.10	Between	2.58	3	0.86	**33.95***
					Within	1.90	75	0.02	

The result is significant at the 0.05 level of significance. The critical F value at the 0.05 level, with degrees of freedom (3, 76) and (3, 75), is 2.72 and 2.73, respectively.

Table - II presents the Analysis of Covariance (ANCOVA) for the Illinois Agility Test. The pre-test analysis revealed an obtained F-ratio of 0.45, which was lower than the required table value (2.72) at the 0.05 level of significance. This indicates that there was no significant difference among the four groups before the commencement of the experimental training programme, confirming the homogeneity of the subjects.

The post-test analysis produced an obtained F-ratio of 35.28, which exceeded the critical F-value of 2.72, indicating significant differences among the groups following the twelve-week intervention. Likewise, the adjusted post-test analysis yielded an F-ratio of 33.95, which was greater than the required critical value of 2.73, demonstrating that the training interventions significantly influenced agility performance after adjusting for initial pre-test differences. These findings confirm that the experimental training programmes produced significant improvements in the Illinois Agility Test compared with the control group.

TABLE – III: SCHEFFE'S TEST FOR THE DIFFERENCE BETWEEN THE ADJUSTED POST-TEST PAIRED MEANS OF ILLINOIS AGILITY TEST.

Adjusted Post-test Means				Mean Differences	Confidence Interval
Core Strength Training Group	SAQ Training Group	Integrated Training Group	Control Group		
10.62	10.71	-	-	**0.09***	0.05
10.62	-	10.85	-	**0.23***	
10.62	-	-	11.10	**0.48***	
-	10.71	10.85	-	**0.11***	

-	10.71	-	11.10	**0.39***	
-	-	10.85	11.10	**0.25***	

Statistically significant at the 0.05 level.

Since the adjusted post-test F-ratio obtained through ANCOVA was statistically significant, Scheffe's post hoc test was applied to determine the paired mean differences among the four groups. Table - III shows that all paired comparisons exceeded the required confidence interval value of 0.05, indicating statistically significant differences between the groups.

The mean difference between the Core Strength Training Group and the SAQ Training Group was 0.09, while the differences between the Core Strength Training Group and the Integrated Training Group and between the Core Strength Training Group and the Control Group and were 0.23 and 0.48, respectively. Similarly, significant mean differences were observed between the SAQ Training Group and the Integrated Training Group (0.11), the SAQ Training Group and the Control Group (0.39) and the Integrated Training Group and the Control Group (0.25). Since all these mean differences were greater than the confidence interval, the paired comparisons were found to be statistically significant at the 0.05 level. The Scheffe's post hoc analysis therefore confirms that the experimental training programmes produced significantly greater improvements in agility than the control condition.

CONCLUSIONS

Based on the findings of the study, the following conclusions were drawn:

1. Isolated Core Strength Training produced a significant improvement in agility, as measured by the Illinois Agility Test, among male inter-collegiate kabaddi players.
2. Isolated Speed, Agility, and Quickness (SAQ) Training also resulted in significant improvements in agility compared with the control group.
3. Integrated Core Strength and SAQ Training produced significant improvements in agility following the twelve-week training programme.
4. The Control Group did not exhibit any significant improvement in the Illinois Agility Test during the experimental period.
5. Among the three experimental training programmes, Isolated Core Strength Training was found to be the most effective in improving agility among male inter-collegiate kabaddi players.

RECOMMENDATIONS

1. Similar studies may be conducted among female inter-collegiate kabaddi players to examine gender-related responses to Core Strength and SAQ Training programmes.
2. Future investigations may compare the effectiveness of Core Strength Training, SAQ Training, plyometric training, resistance training and functional training on agility and other performance variables.
3. Similar research may be undertaken among athletes participating in other team sports such as volleyball, handball, basketball, football and hockey.
4. Future studies may employ longer training durations or different training intensities to determine their influence on agility and overall athletic performance.
5. Further investigations may include additional physical, physiological and sport-specific performance variables, such as sprint speed, explosive power, muscular strength, VO_2 max, raid performance and defensive tackle efficiency, to provide a more comprehensive evaluation of the effectiveness of Core Strength and SAQ Training programmes.

REFERENCES

1. Akuthota, V., & Nadler, S. F. (2004). Core strengthening. *Archives of Physical Medicine and Rehabilitation, 85*(3 Suppl. 1), S86–S92.
2. Behm, D. G., Drinkwater, E. J., Willardson, J. M., & Cowley, P. M. (2010). Canadian Society for Exercise Physiology position stand: The use of instability to train the core in athletic and non-athletic conditioning. *Applied Physiology, Nutrition, and Metabolism, 35*(1), 109–112.
3. Bompa, T. O., & Buzzichelli, C. (2019). *Periodization: Theory and methodology of training* (6th ed.). Human Kinetics.
4. Brown, L. E., & Ferrigno, V. A. (2015). *Training for speed, agility, and quickness* (3rd ed.). Human Kinetics.
5. Chaouachi, A., et al. (2014). Effects of an eight-week SAQ training programme on athletic performance. *Journal of Strength and Conditioning Research*.
6. Granacher, U., Muehlbauer, T., Doerflinger, B., Strohmeier, R., & Gollhofer, A. (2011). Promoting strength and balance in adolescents through combined neuromuscular training. *Journal of Strength and Conditioning Research, 25*(11), 2919–2933.
7. Jovanovic, M., Sporis, G., Omrcen, D., & Fiorentini, F. (2011). Effects of speed, agility, quickness training on power performance in elite soccer players. *Journal of Strength and Conditioning Research, 25*(5), 1285–1292.

8. Jovanovic, M., Sporis, G., Omrcen, D., & Fiorentini, F. (2011). Effects of speed, agility, quickness training method on power performance in elite soccer players. *Journal of Strength and Conditioning Research, 25*(5), 1285–1292. https://doi.org/10.1519/JSC.0b013e3181d67c65
9. Kibler, W. B., Press, J., & Sciascia, A. (2006). The role of core stability in athletic function. *Sports Medicine, 36*(3), 189–198.
10. Lesinski, M., et al. (2016). Effects of resistance and neuromuscular training on physical performance in youth athletes: A systematic review and meta-analysis. *British Journal of Sports Medicine, 50*(13), 781–795.
11. Miller, M. G., Herniman, J. J., Ricard, M. D., Cheatham, C. C., & Michael, T. J. (2006). The effects of a six-week plyometric training program on agility. *Journal of Sports Science and Medicine, 5*, 459–465.
12. Prieske, O., et al. (2016). Effects of core strength training on athletic performance in trained individuals: A systematic review. *PLoS ONE, 11*(12), e0167544.
13. Prieske, O., Muehlbauer, T., Borde, R., Gube, M., Bruhn, S., Behm, D. G., & Granacher, U. (2016). Neuromuscular and athletic performance following core strength training in trained athletes: A systematic review and meta-analysis. *Sports Medicine, 46*(3), 401–418. https://doi.org/10.1007/s40279-015-0429-4
14. Reed, C. A., Ford, K. R., Myer, G. D., & Hewett, T. E. (2012). The effects of isolated and integrated core stability training on athletic performance measures: A systematic review. *Sports Medicine, 42*(8), 697–706.
15. Reed, C. A., Ford, K. R., Myer, G. D., & Hewett, T. E. (2012). The effects of isolated and integrated core stability training on athletic performance measures: A systematic review. *Sports Medicine, 42*(8), 697–706. https://doi.org/10.2165/11633450-000000000-00000.