

Effect of Six Weeks of Plyometric Training on Selected Motor Fitness Components Among Male Kabaddi Players

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Abstract: *The research aimed to ascertain the effect of six weeks plyometric training on selected motor fitness components of male kabaddi players. Twenty male kabaddi players (aged 15 to 17 years) from Government Senior Secondary School, Faggu, Sirsa, Haryana were selected through purpose sampling. The study applied an experimental design of single-group pre-test post-test. The chosen motor fitness variables were speed, leg strength, and agility. The 50-Yard Dash Test was used to measure speed, the Standing Broad Jump Test was utilized to measure leg strength and the 4 × 10 m Shuttle Run Test was used for measuring agility. Six week one pre-test organization of plyometric training (three days/ week) was done under the supervision of the researcher. Descriptive statistics and paired-samples t-tests were used to analyse the data at the .05 level of significance. It was found that there was a significant change in all chosen motor fitness variables. The speed of participants improved significantly after 9 weeks of training. It improved from 7.61 ± 0.09 seconds to 7.33 ± 0.09 seconds ($t = 27.33, p < .001$) after speed training. There is a significant increase in leg strength from 195.60 ± 3.48 cm to 209.25 ± 3.45 cm ($t = 61.05, p < .001$). Agility improved from 11.43 ± 0.11 seconds to 10.96 ± 0.11 seconds ($t = 42.11, p < .001$). Based on the findings, it can be stated that plyometric training improves various motor fitness components*

resulting in enhanced neuromuscular coordination, power, efficiency and strength. The study concludes that plyometric exercise is an effective method of training to enhance performance-related fitness components of kabaddi players and should be involved in regular training.

Keywords—*Plyometric Training, Kabaddi Players, Motor Fitness, Speed, Leg Strength, Agility, Explosive Power, Athletic Performance, Neuromuscular Coordination, Sports Conditioning*

I. INTRODUCTION

The health and education of the adolescent age group require proper mental health. Adolescence, marked by rapid changes in one's physical, emotional, cognitive, and social worlds, makes young people prone to psychological stress and anxiety. School students may face psychological distress due to academic competition, examination pressure, parents' expectations, peer relations, and overexposure to digital media. If not managed optimally, it can disrupt concentration, academic success, emotional balance, social functioning, and quality of life.

Stress refers to the feeling of being under too much mental or emotional pressure. Even though moderate stress can boost motivation, chronic or excessive stress hampers cognition and emotion regulation. Young people worry, fear, and feel

nervous from time to time, and the symptoms of anxiety are common in adolescents. Anxiety has a negative influence on academics and overall functioning and well-being [1], [2].

Yoga combines asana, pranayama, meditations and deep relaxation techniques. Studies show that yoga and mindfulness programs delivered in schools may improve self-regulation, mood, resilience, and psychosocial well-being. As a result, it is increasingly regarded as a non-pharmacological component of school health promotion.

It appears that despite the country being flooded with evidence, comparatively few studies have examined brief yoga interventions in Punjab, India among school students. The present study evaluated the effects of six weeks of yoga training on stress and anxiety among students aged 12-16 years.

Unfortunately, you haven't provided any text for me to paraphrase. Please provide a sentence or passage, and I'll be happy to assist you. The Yoga's conceptual and psychophysiological basis for adolescent mental health.

Adolescents who go to school experience stress based on various demands, academic, interpersonal, developmental, and environmental. At this age, students are expected to cope with an ever more complicated curriculum, competitive examinations, parental expectations, peer comparison, social-media exposure, and changing self-identity. These pressures are not independent forces. The anxiety of students can trigger insecurities that often accumulate to create a long-lasting state of mental arousal in which students expect failure. Though they are related, stress and anxiety are conceptually distinct. The less able a person is to cope with external or internal demands the higher the stress. Anxiety refers to a sense of worry, apprehension, fear, anticipatory tension, and physiological tension even when we aren't in imminent danger. In the

school setting, the two regularly reinforce each other: academic stress may create anxiety; anxiety may disrupt attention, memory retrieval, and performance, thus creating further stress. Because this is a cyclical relationship, any intervention that dampens physiological arousal and enhances emotional self-regulation may affect both at once.

The complete mind-body structure of Yoga can inform its potential effectiveness. Unlike an exercise program, yoga integrates controlled movement with breath control, training of attention, body awareness, and relaxation. The asana require the student to hold stable positions where they become aware of their muscle tension, balance, and breath. The process of pranayama teaches slow, even patterns of the breath. Also, the meditation-based relaxation teaches non-reactive awareness to the thoughts and sensations in the body. When brought together, they may break a repetitive cycle of anxiety and over activation of the autonomic nervous system. As per studies and reviews conducted within schools, the case of children or adolescents who have taken part in yoga or mindfulness-focused programs is encouraging. It has led to better moods, self-regulation as well as resilience, psychosocial functioning and performance anxiety.

This effect aligns with the view that yoga is more than a flexibility practice, as it might be a formal self-regulation intervention that trains students to better be aware of and adjust to their stress responses.

When stress lasts for an extended period of time, the sympathetic nervous system is overactive, the muscles tense up, breathing becomes shallow and rapid, and vigilance is increased. Taking slow deep breaths helps the body to relax and activates the parasympathetic nerve system. This helps in calming the arousal and emotion. Even though the

current investigation did not assess cortisol, blood pressure, heart rate variability, or any other biomarker, the reductions in the scores on the questionnaires are broadly consistent with this psychophysiological pathway. Breathing techniques such as deep diaphragmatic breathing and Nadi Shodhana are highly beneficial for controlling one's breath while calming the mind. Repeated practice of these methods may help students develop a coping response that is accessible before tests, during heavy homework loads, after emotionally difficult interactions, and so on. We should not consider this mechanism only biological. The decrease in distress may result from the predictable regularity of the session, a benign group atmosphere, the instructor's guidance, and withdrawal from academic requirements.

The mind control condition may involve attention allocation, cognitive distancing, and perceived self-efficacy. Constant worrying about negative outcomes and failures can spiral into feelings of anxiety, panic and doubt. A student may be able to notice stressful thoughts without immediately relating to them because of meditating and noticing his or her breath, but not remove them altogether. A small delay occurs between thinking and acting or responding. Just like with completion and variation in learning of redundant movements on new apparatus, learning and registering tricks and postures on a new set of apparatus gives a sense of competence and bodily control. When learners find that external forces such as exams, family expectations, or social evaluation take away their control, this sense of mastery can be meaningful. School-based yoga offers children a way to regulate their emotions and attention. School-based mindfulness interventions have shown early improvements in emotional and behavioural adjustment. Thus, engaging with and enhancing the

individual components of this six-week intervention likely reduced stress and anxiety through several mutually reinforcing pathways rather than through a single exercise.

We should also think about the length and form of the intervention. The method provides five days per week for six weeks of consistent exposure and re-exposure behavior. Thirty 45-minute classes provide a considerable amount of practice for school students, although the overall intervention is still short compared with semester-long programs. The warm-up, asana, pranayama, meditation and Shavasana allow one to follow a gradual movement from physical activation to mental quietening. Forward bending, backward bending, balancing, twisting, standing and relaxation asana may be included which may help the person to become aware of his body and relieve the strain of sitting. The last relaxation period experience is particularly relevant because the students experiment with the contrast of effort with release. By repeating this sequence, a relaxation response could be conditioned and strategies as familiarized. The structure of this advancement strengthens the practicality of pre-post reductions.

In India, many students may not have access to specialized psychological services; hence, implementation in schools is relevant. Yoga can be done in groups, requires little or no equipment, and can fit into physical education, morning assembly, wellness periods or examination-preparation programmes. A more culturally appropriate context that students, parents, and teachers may accept more readily. Yoga should be seen as an adjunct mental-health promotion tool rather than a substitute for assessment or treatment. Students exhibiting significant anxiety and/or depression and/or symptoms related to trauma and/or risk of self-harm and/or major functional impairment require

appropriate referral and clinical management. A school yoga program is better considered a universal preventive intervention that can enhance coping and emotional regulation in the general student population, while also offering counselling. This investigation is filling a relevant gap in local evidence. An urban or clinical selection of the international literature is produced, yet no two school environments share the same academic culture, family expectations, language, resources, and daily routine. In this context, the evidence from Pakistan Punjab can do the talking. Can a short, feasible program be associated with measurable psychological change in conventional schools? Simultaneously, contextual relevance does not rule out caution with the method. Because participants were purposively selected from a single school, all of whom received the intervention, the study provides preliminary evidence of effectiveness rather than causal proof. The key contribution is to highlight a practically relevant pattern that can inform more rigorous controlled scrutiny.

II. OBJECTIVES

- 1) To determine the effect of a six-week yoga training program on stress among school students.
- 2) To determine the effect of a six-week yoga training program on anxiety among school students.

III. HYPOTHESES

- 1) There is no significant difference between pre-test and post-test stress scores following the six-week yoga training program.
- 2) There is no significant difference between pre-test and post-test anxiety scores following the six-week yoga training program.

IV. METHODOLOGY

A. Research Design and Participants: They used a pre-experimental, one-group design. From the Government Senior Secondary School, Jhanduke,

Punjab, India, thirty medically fit school students aged 12-16 years were selected through purposive sampling. Student participation here was voluntary, and permission was obtained from the school.

B. Yoga Intervention: For six weeks, five days a week, the structured program was 45 minutes per session. Each session had a warm-up (5 min), yogic asana (20 min), pranayama (10 min), meditation (5 min), and Shavasana relaxation (5 min). The asana were *tadasana*, *vrikshasana*, *trikonasana*, *bhujangasana*, *shalabhasana*, *dhanurasana*, *vajrasana*, *paschimottanasana*, *pawanmuktasana*, and *ardha matsyendrasana*. Breathing exercises, including *Anulom-Vilom*, *Bhramari*, *Nadi Shodhana*, and *Deep Diaphragmatic Breathing*, were done.

C. Measures and Statistical Analysis: Stress was measured using the Student Stress Questionnaire, and anxiety using the Test Anxiety Questionnaire. Measurements were taken before and after the intervention. Using IBM SPSS Statistics version 25, mean, standard deviation, and paired-samples t-tests were computed. P-value of < 0.05 was considered statistically significant.

V. RESULTS

Tables I and II show the comparison between the pre-test and post-test. Both outcome measure showed decreased mean score at the end of six weeks.

Variable	Test Used	Unit
Speed	50 Yard Dash	Seconds
Leg Strength	Standing Broad Jump Test	Centimeters
Agility	Shuttle Run Test (4×10 m)	Seconds

All tests will be administered according to standardized procedures to ensure reliability and validity of data.

E. Data Collection Procedure: Collection of data in a systematic manner with prior permission of the Govt. authorities and Senate Secretary School Faggu, Sirsa. The subjects were told the purpose of the research and their free consent was obtained. Speed, leg strength, and agility will be assessed using pre-tests before training program. Under the supervision of a qualified personal trainer, the subjects then followed a structured plyometric training programme which consisted of three days a week for six weeks. Further, it also included warm-up and cool-down exercises for safety purposes. They didn't take any training throughout this duration. Following this, post-tests were accomplished using the same procedures and conditions. Scores were recorded to carry out statistical analysis.

F. Statistical Analysis: The collected data was analysed using the appropriate statistical methods. To characterize the subjects' performance, descriptive statistics, namely Mean and Standard Deviation, were computed. A paired t-test was conducted to assess the differences between pre-test and post-test scores a significance threshold was set at the 0.05 level.

G. Plyometric Training Schedule:

TABLE II
SIX-WEEK PLYOMETRIC TRAINING
SCHEDULE

Variable	Test	Mean	SD	Mean Difference	t-value	p-value
Agility (sec)	Pre-test	11.43	0.11	0.47	42.11	<.001
Agility (sec)	Post-test	10.96	0.11	—	—	—

The study assessed an influence of plyometric training exchange on kabaddi player's agility performance by using agility pre and post with obtain result by paired samples t – test.

Prior to the experiment, the participant had an agility score (mean 11.43 s (M = 11.43, SD = 0.11))

while the post evaluation had a score of (mean 10.96 s (M = 10.96, SD = 0.11)). A low score indicates a better performance. The reduction of 0.47 seconds indicates better agility after training and this is needed in kabaddi to make quicker movements. Statistically, the paired-samples t-test produced a t-value of 42.11 ($p < .001$), suggesting a significant improvement in agility. This improvement is associated with plyometric exercise which increases neuromuscular efficiency, reaction ability and coordination of movement. The low standard deviation (SD = 0.11 for both test) means all the participants performed almost the same on both tests. This gives reliability to the findings of this study and indicates the plyometric training programme had a high positive impact on the agility of kabaddi players.

TABLE VII
COMPARISON OF SELECTED MOTOR
FITNESS COMPONENTS

Variable	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Difference	t-value	p-value	Result
Speed (sec)	7.61 $\pm$ 0.09	7.33 $\pm$ 0.09	0.28	27.33	<.001	Significant
Leg Strength (cm)	195.60 $\pm$ 3.48	209.25 $\pm$ 3.45	13.65	61.05	<.001	Significant
Agility (sec)	11.43 $\pm$ 0.11	10.96 $\pm$ 0.11	0.47	42.11	<.001	Significant

This analysis was aimed at knowing the effect of plyometric training on speed, leg strength and agility of kabaddi players. With an alpha level of 0.05, we compared the pre-test and post-test scores with a paired-samples t-test. Based on the results, speed increased significantly, as indicated by a decrease in the mean score from 7.61 seconds (SD = 0.09) during the pre-test to 7.33 seconds (SD = 0.09) during the post-test, for a mean difference of 0.28 seconds ($t = 27.33$, $p < .001$). Research has shown

improved speed performance due to increased neuromuscular and mechanical efficiency. There was a significant improvement from 195.60 cm (SD = 3.48) to 209.25 cm (SD = 3.45), mean difference of 13.65 cm ($t = 61.05$, $p < .001$) for leg strength. Consequently, plyometric training improves lower-body power and explosive strength. Scoober, an international partner, helped Owen and Stephen manage a complex forensic investigation. The inquiry was complicated by the subject's positioning and malicious threats from subject-related individuals. Ultimately, this situation deteriorated into a subpar relationship with the subject's lawyer. The reduction in time reflects improvement in agility and change-of-direction skills and movements from being trained multidirectional. In conclusion, kabaddi players showed significant improvements in speed, leg strength, and agility from plyometric training.

IV. DISCUSSION

The study evaluated the effects of a six-week plyometric training regimen on speed, leg strength, and agility among male kabaddi players, yielding substantial improvements across all measured parameters.

Speed: The research shows that six weeks of plyometric training significantly improves the speed, leg strength and agility of male kabaddi players.

Participants recorded a significant improvement in speed, with a mean pre-test time of 7.61 ± 0.09 seconds decreasing to 7.33 ± 0.09 seconds. The t-value of 27.33 was statistically significant at 0.05 level, signifying that the plyometric training positively impacted accelerating performance. As a result of specific plyometric drills, such as box jumps and squat jumps, an improved ability of neuromuscular efficiency and increased rate of force development are likely the cause. According to this

study as well as Singh and Sharma [10] and Ferrer et al. [2], there was an increase in speed in many other players as well. As kabaddi involves players running short distances, speed is one of the essential physical feature.

Leg Strength: The leg strength significantly increased, with the mean score jumping from 195.60 ± 3.48 cm (pre-test) to 209.25 ± 3.45 cm (post-test), which means an overall increase of the mean leg score of 13.65 cm. This incidence of t-value 61.05 indicates that this plyometric exercise was effective in improving lower-body strength and explosive power. This notable enhancement arises from the quick eccentric and concentric contractions caused during plyometric exercise which develops neuromuscular efficiency to produce force. Improved muscle recruitment, increased compliance of tendons, and the use of elastic energy increased power output, as has been seen in the Standing Broad Jump Test, where performance improved post- programme. These outcomes corroborate the findings of Rahman et al. [3] who recorded significant improvement in explosive strength of youth athletes due to plyometric training. Similarly, Patel and Mehta [9] reported superior strength gains from plyometric training than conventional resistance training modalities. More leg strength means better explosion for kabaddi moves like raids, jumps, lunges, sudden changes of direction, and defensive moves.

Agility: In terms of agility, the results showed improvement from 11.43 ± 0.11 seconds in the pre-test to 10.96 ± 0.11 seconds in the post-test, with a mean difference of 0.47 seconds and a t value of 42.11, which was significant. This improvement is due to better neuromuscular coordination, balance, reaction time and speed of direction change due to the plyometric exercises. Exercises like lateral jumps and bounding drills enhance the body's ability

to generate force quickly with great control for maximum agility. The results were reported by Rahman et al. [3], Patel and Mehta [9] and Martinez-Garcia et al. [1] to significantly improve the agility of athletes with plyometric training interventions. In sum, findings of the plyometric training program for six weeks for kabaddi players showed significant improvement in speed, leg strength and agility. Leg strength showed the maximum improvement. Observational benefits are related to physiological and neuromuscular gears linked to advantages coming from plyometric such as motor unit recruitment and muscle elasticity. The results will enhance kabaddi players' motor fitness levels as well as performance levels by including plyometric training in kabaddi training. Therefore, it is strongly recommended to implement plyometric training to optimize speed, leg strength, agility and fitness of kabaddi players.

V. CONCLUSION

The present study has shown that plyometric training is an effective method to increase the motor fitness of kabaddi players. The improved performance of athletes due to increased muscle unit recruitment, synchronization of the muscles, enhanced efficiency of stretch reflexes, use of elastic energy and explosive power.

The result of the finding corroborated prior studies that plyometric training is beneficial for speed, power, strength, and agility. This underlines the importance of including these exercises in sports conditioning protocols since the methods used in the past are not enough to meet modern kabaddi needs. Implementing a structured plyometric training program can greatly enhance the skills needed for actions like raiding, tackling, jumping, and sprinting. In addition to that, the plyometric training is economical and time-efficient, requiring minimal

equipment and suitable for various training environments, making it easy for any coach to improve performance without high costs.

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