International Journal of Health, Physical Education & Computer Science in Sports

A Peer Reviewed (Refereed) International Research Journal

Published by :
Indian Federation of Computer Science in Sports
www.ijhpecss.org & www.ifcss.in

ISSN 2231-3265
(Online and Print)

Volume - 23 No. 2
QUARTERLY
July 2016 to September 2016

Publication Impact Factor I2OR 3.565
ISRA Journal Impact Factor 3.579
Index Journal of

Publisher:
Indian Federation of Computer Science in sports
www.ijhpecss.org and www.ifcss.in
under the auspices of
International Association of Computer Science in sports
Email:rajesh2sports@gmail.com

International Journal of Health, Physical Education and Computer Science in sports ISSN 2231-3265 (On-line and Print) Journal Impact factor is 3.565.Journal published Quarterly for the months of March, June, September and December. IJHPECSS is refereed Journal.Index Journal of Directory of Research Journal Indexing, J-Gate, 120R etc

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CONTENTS

ISSN 2231-3265
International Journal of Health, Physical Education and Computer Science in Sports
Volume No.23, No.2 pp1-7
Journal Impact Factor 3.565
A Peer Reviewed (Refereed) International Research Journal

Effect Of Traditional Sprint Training and Resistance Training On Leg Strength Among Hurdlers

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ABSTRACT:

The purpose of this study was to examine the effect of traditional sprint training (TST) and resistance training (RT) on leg strength among intercollegiate male hurdlers. Forty-five (N=45) hurdlers from Kadapa district, aged 17–23 years, were randomly assigned into three groups of fifteen: Group I (TST), Group II (RT), and Group III (Control). The training intervention lasted for 12 weeks, after which pre-test and post-test scores on leg strength were compared using analysis of covariance (ANCOVA).The pre-test means for leg strength were 26.10 (TST), 27.43 (RT), and 25.87 (Control), with an F-value of 2.61, indicating no significant difference at baseline. Post-test means increased to 28.97 (TST), 29.57 (RT), and 25.87 (Control), yielding a significant F-value of 12.23 ($p < 0.05$). Adjusted post-test means further confirmed significant differences, with values of 28.60 (TST), 29.33 (RT), and 26.47 (Control), and an obtained F-value of 46.81 exceeding the critical value of 3.10. Post hoc analysis revealed that both TST (MD = 2.87) and RT (MD = 2.13) were significantly more effective than the control, with RT showing a slight edge over TST (MD = 0.74).The findings indicate that both sprint-specific and resistance-based training methods significantly improve leg strength in hurdlers, with RT demonstrating superior effects. These results suggest that incorporating resistance training alongside sprint practice can optimize neuromuscular adaptations and enhance athletic performance in hurdle events.**Keywords:** Sprint training, Resistance training, Leg strength and Hurdlers.

INTRODUCTION

Hurdling combines maximal sprint speed with repeated explosive actions and a technical clearance component, which together place high demands on lower-limb strength and power. Leg strength underpins the ability to produce large horizontal and vertical forces during the approach, take-off and re-acceleration phases between hurdles; therefore, strength development is widely considered a foundational element of hurdlers' training programs. Empirical work on high-level hurdlers has shown that targeted power/strength cycles (for example, jump-squat based maximal-power programs) produce meaningful increases in maximal strength, jump performance and short-sprint acceleration, indicating good transfer from strength/power interventions to sprint capacity in this event group.

Traditional sprint training (repeated maximal sprints, technical drills, and interval sprinting) clearly improves neural and mechanical determinants of sprinting (rate of force development, stride mechanics, sprint-specific endurance), but may have limited hypertrophic or maximal-force effects if used alone. Conversely, resistance-based interventions — including heavy strength training, optimum-power loading and complex/contrast models (weights combined with plyometrics) — are effective at increasing maximal strength and jump power and have been shown to either match or augment sprint improvements when properly periodized with sprint work. Meta-analytic and controlled-trial evidence indicates that plyometric, complex and resistance methods all enhance short-sprint and jump outcomes, though the magnitude and time course of improvements depend on program dose, load orientation and athlete training status.

Hurdle events present a specificity question: are hurdle-specific plyometrics (hurdle hops, unilateral hurdles) and sprint repetitions more effective at transferring to hurdle performance than generic resistance programs? Biomechanical comparisons show that certain hurdle-jump drills provide ground-contact times and force profiles closer to sprint and hurdle actions than standard CMJs, suggesting that training drills chosen for their task specificity may produce superior functional transfer for hurdlers. At the same time, short controlled studies comparing resistance, plyometric and combined protocols report that combined or power-oriented loading often yields similar or better gains in both strength and short-sprint outputs than isolated methods in short interventions.

When evaluating leg-strength outcomes in hurdlers, researchers typically measure one-repetition maximum (half-squat or squat 1-RM), jump tests (CMJ, squat jump), and short sprint times (30 m or 20 m), plus power output in loaded jump-squat tests. These measures capture both maximal force capacity and explosive force application — the two physiological domains most relevant to hurdle acceleration and re-acceleration phases. Monitoring tools such as the countermovement jump (CMJ) have also been validated to monitor training load and neuromuscular fatigue during sprint sessions, which is important when combining heavy resistance work with high-intensity sprinting.

Taken together, the literature from 2010–2013 suggests that (a) resistance/power training reliably increases leg strength and power in sprint-type athletes, (b) plyometric and complex models are effective for explosive qualities, and (c) event-specific plyometrics (hurdle jumps/hurdle hops) provide useful task specificity for hurdlers. For an experimental study comparing **traditional sprint training alone** versus **resistance/power training (or combined models)** in hurdlers, the expected outcome—based on this period's evidence—is superior gains in measured leg strength (1-RM, loaded jump power) for resistance/power interventions, with comparable or slightly improved sprint acceleration when sprint training is preserved in both groups.

EXPERMENTAL DESIGN

Find out the study effect of traditional sprint training and resistance on leg strength among Hurdlers .The study was formulated as a true random group design consisting of a pre-test and post test. The subjects men hurdlers who are participated inter collegiate tournaments in kadapa district (N=45) were randomly assigned to three equal groups of fifteen and their age ranged between 17-23 years . The selected subjects were divided into three groups randomly. Experimental Group I was considered traditional sprint training group, experimental group II was RT group and control group was not involved in any special treatment. Pre test was conducted for experimental Groups I and II and the control group on leg strength. Experimental groups underwent the respective training for 12 weeks. Immediately after the completion of 12 weeks training, all the subjects were measured of their post test scores on the selected criterion variable. The difference between the initial and final scores was considered the effect of respective treatments. To find out statistical significance of the results obtained, the data were subjected to statistical treatment using ANCOVA. In all cases 0.05 level was fixed to test the significance of the study.

RESULTS ON LEG STRENGTH

The statistical analysis comparing the initial and final means of Leg strength due to traditional sprint training and RT compared with control group among intercollegiate Hurdlers presented in Table I

Table I :COMPUTATION OF ANALYSIS OF COVARIANCE OF LEG STRENGTH

	traditional sprint training group	RT group	Control GROUP	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	26.10	27.43	25.87	Between	42.87	2	21.43	2.61
				Within	715.53	87	8.22	
Post Test Mean	28.97	29.57	25.87	Between	236.60	2	118.30	12.23*
				Within	841.80	87	9.68	
Adjusted Post Test Mean	28.60	29.33	26.47	Between	131.64	2	65.82	46.81*
				Within	120.92	86	1.41	
Mean Diff	2.13	2.87	0.00					

Table F-ratio at 0.05 level of confidence for 2 and 87 (df) =3.10, 2 and 86 (df) =3.10.

*Significant

As shown in Table I, the obtained pre test means on Leg strength on TST group was 26.10, RT group was 27.43 was and control group was 25.87. The obtained pre test F value was 2.61 and the required table F value was 3.10, which proved that there was no significant difference among initial scores of the subjects.The obtained post test means on Leg strength on TST group was 28.97, RT group was 29.57 was and control group was 25.87. The obtained post test F value was 12.23 and the required table F value was 3.10, which proved that there was significant difference among post test scores of the subjects. Taking into consideration of the pre test means and post test means adjusted post test means were determined and analysis of covariance was done and the obtained F value 46.81 was greater than the required value of 3.10 and hence it was accepted that there was significant differences among the treated groups. Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe’s Confidence Interval test. The results were presented in Table II.

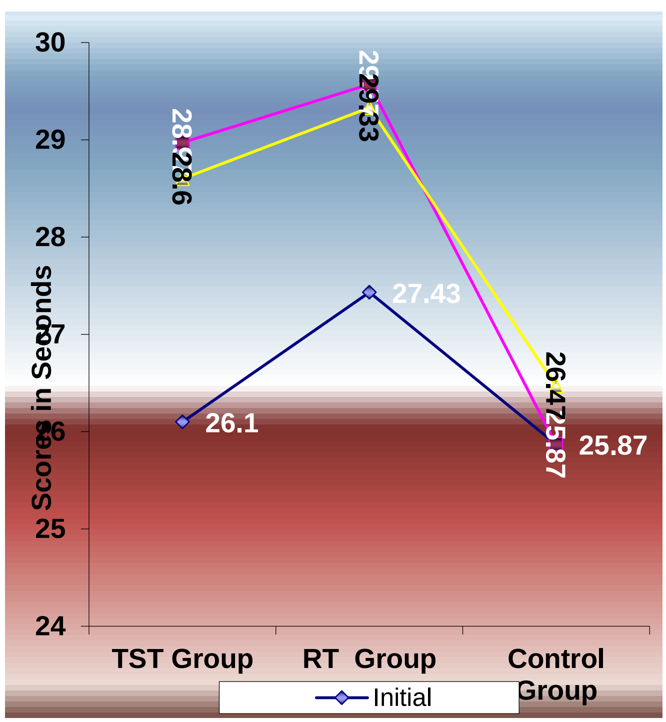
Table II :Scheffe's Confidence Interval Test Scores on Leg strength

MEANS				Required . C I
Traditional sprint training Group	Resistance training Group	Control Group	Mean Difference	
28.60	29.33		0.74	0.73
28.60		26.47	2.87	0.73
	29.33	26.47	2.13	0.73

***** Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between TST group and control group (MD: 2.87). There was significant difference between RT group and control group (MD: 2.13). There was significant difference between treatment groups, namely, TST group and RT group. (MD: 0.74). The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure I.

Figure I :LINE DIAGRAM ON ORDERED ADJUSTED MEANS ON Leg strength



DISCUSSIONS ON FINDINGS ON LEG STRENGTH

The effect of TST and RT on Leg strength is presented in Table I . The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 46.81 was greater than the required table F value to be significant at 0.05 level.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table II proved that there was significant difference between TST group and control group (MD: 2.87) and RT group and control group (MD: 2.13). Comparing between the treatments groups, it was found that there was significant difference between TST group and RT group group among intercollegiate Hurdlers.

Thus, it was found that TST with skill training group was significantly better than traditional sprint training group and control group in improving Leg strength ability of the intercollegiate male Hurdlers

CONCLUSION

The findings of this study clearly demonstrate that both traditional sprint training (TST) and resistance training (RT) significantly improved leg strength among intercollegiate hurdlers compared to the control group. The post-test and adjusted mean scores confirmed that the experimental groups produced meaningful gains, with RT showing slightly greater improvements than TST. The analysis of covariance and subsequent post hoc comparisons revealed that while both training methods were effective, RT was superior in enhancing leg strength, highlighting the importance of structured resistance-based interventions in hurdler preparation. These results support the inclusion of resistance training, alongside sprint-specific drills, in systematic training programs to optimize performance. Coaches and athletes can therefore benefit from a combined approach, where sprint training develops speed and technical proficiency, while resistance training strengthens the neuromuscular system to meet the explosive demands of hurdling.

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ISSN 2231-3265
International Journal of Health, Physical Education and Computer Science in Sports
Volume No.23, No.2 pp8-11
Journal Impact Factor 3.565
A Peer Reviewed (Refereed) International Research Journal

The Effect of Psychological Skills Training on Mental Health among Athletes

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Abstract:

Psychological Skills Training (PST) — which includes goal-setting, imagery, relaxation, self-talk, and attention control — is widely used to improve sport performance. Emerging evidence suggests PST may also benefit athletes' psychological health (reduced anxiety, improved coping, and greater well-being). This paper reviews recent empirical and review evidence on PST's effect on athlete mental health, synthesizes findings from randomized and quasi-experimental studies and systematic reviews, discusses mechanisms and limitations, and gives recommendations for practice and future research. Overall, PST and PST-combined interventions show small-to-moderate positive effects on anxiety, coping skills, and psychological well-being, but heterogeneity in methods and outcomes limits strong causal claims. Keywords: psychological skills training, athletes, mental health, anxiety, depression, well-being, mindfulness

Introduction

Athletes face unique stressors (competition stress, injury, selection pressure) that place them at risk for anxiety, depression, burnout, and reduced well-being. Interventions that build psychological resilience and coping — including Psychological Skills Training (PST) — are commonly implemented with the goal of enhancing performance, and increasingly are promoted for mental health benefits as well. The present paper examines empirical evidence for PST's impact on athlete mental health, asking: Does PST improve mental-health outcomes in athletes, Which PST components are associated most strongly with mental-health benefits What are the methodological strengths, gaps, and practical implications,Recent systematic reviews and RCTs provide the primary evidence base for this synthesis.

Definitions and theoretical rationale

Psychological Skills Training (PST): spatially structured training to teach athletes cognitive and behavioral skills such as goal-setting, relaxation/controlled breathing, imagery/visualization, self-talk, concentration/attention control, and pre-performance routines. PST is typically delivered over multiple sessions and is goal-directed performance and/or psychological health. Mental health outcomes of interest: symptoms of anxiety and depression, competitive anxiety, psychological well-being, coping skills, stress reactivity, and mental toughness. Mechanistically, PST may reduce maladaptive arousal and worry (via relaxation and cognitive restructuring), improve perceived control and self-efficacy (via goal-setting and mastery experiences), and increase adaptive attention regulation and emotional regulation (via attentional training and imagery), all of which are protective for mental health.

Methodology

This is a focused narrative synthesis drawing on recent randomized controlled trials, and systematic reviews/meta-analyses of psychological interventions in sport published in the last ~10 years. Key sources informing this paper include: randomized and controlled trials comparing PST ,or combined PST/mindfulness,with control/waitlist; systematic reviews/meta-analyses evaluating psychological interventions for athlete mental health. Representative high-quality and recent sources are cited in the reference list.

Findings

Randomized and controlled trials

A randomized controlled trial comparing PST and mindfulness versus waitlist in competitive athletes reported differential improvements in emotion regulation, attention, and coping capacities in the PST groups, indicating transfer from skill learning to psychological outcomes. While performance outcomes are often central in PST trials, several RCTs included measures of anxiety, coping, or well-being and found modest improvements.

A longitudinal mixed-methods study of a 10-session PST + mindfulness program in futsal players found reduced competitive anxiety and improved coping and mental toughness across time, suggesting combined PST/mindfulness delivery can benefit both performance and psychological health.

Systematic reviews and meta-analyses

Recent systematic reviews and meta-analyses of psychological interventions for athletes reported that PST, mindfulness, and other cognitive-behavioral approaches show small-to-moderate positive effects on psychological outcomes well-being, anxiety, and coping. However, effect sizes vary and many primary studies have methodological limitations (small samples, heterogeneous outcomes, short follow-ups). A 2023–2025 body of review work highlights that PST and mindfulness-based programs are among the more promising approaches, but cautions that many trials are low-to-moderate quality.

Comparative and component findings

Interventions emphasizing attentional control, relaxation, and cognitive restructuring/self-talk appear especially relevant to anxiety reduction. Mindfulness components often produce larger effects for general well-being, while classic PST components (goal-setting, imagery, self-talk) appear to strengthen coping and perceived control. However, direct head-to-head comparisons are limited.

athlete levels (youth, collegiate, elite).

Investigate implementation factors (coach buy-in, delivery format: group vs individual, digital delivery) that influence real-world scalability.

Conclusion

Psychological Skills Training offers a theoretically plausible and empirically supported pathway to improve certain mental-health outcomes among athletes — especially anxiety, coping, and aspects of well-being. The best evidence currently points to small-to-moderate benefits, with stronger effects when PST is combined with mindfulness or acceptance strategies. To streng**Discussion**

Interpretation

The accumulated evidence suggests PST can produce mental-health benefits for athletes, particularly for lowering competitive anxiety and improving coping and psychological well-being. Combined interventions (PST + mindfulness/acceptance) often show broader effects, likely because they target both cognitive control and acceptance/regulation processes. Nevertheless, effect sizes are often modest and study heterogeneity complicates generalization.

Methodological limitations in the literature

Many PST studies prioritize performance metrics and include mental-health measures secondarily; thus, power and measurement choices for psychological outcomes can be suboptimal. Samples are frequently small, use convenience sampling, or consist of single sport groups, restricting external validity. Intervention components, duration, and facilitator qualifications vary, making it difficult to isolate which PST elements drive mental-health change.

Few studies include long-term follow-up to assess sustained mental-health benefits.

Practical implications for practitioners

Implement PST with explicit mental-health aims (not just performance): include validated measures of anxiety, depression, and well-being pre/post and at follow-up.

Combine PST skills (e.g., relaxation, self-talk, attentional strategies) with mindfulness/acceptance elements to maximize broad psychological benefits.

Ensure qualified providers (clinical/sport psychologists) deliver interventions or supervise practitioners to address clinical symptoms that exceed brief preventive approaches.

Recommendations for future research

1. Conduct adequately powered RCTs that set mental-health outcomes as primary endpoints, not secondary.

2. Standardize outcome measures (common anxiety, depression, and well-being scales) to enable meta-analysis.

3. Compare PST components (e.g., relaxation vs. imagery vs. self-talk) in dismantling designs to identify active ingredients.

4. Examine long-term maintenance, dose-response relations, and effectiveness acrosthen practice recommendations, future research should prioritize robust randomized designs, standardized mental-health outcomes, and long-term follow-up. Practitioners should deliver PST with clear mental-health goals and appropriate clinical oversight where needed.

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ISSN 2231-3265
International Journal of Health, Physical Education and Computer Science in Sports
Volume No.23, No.2 pp12-15
Journal Impact Factor 3.565
A Peer Reviewed (Refereed) International Research Journal

Effects of High-Intensity Progressive Resistance Training on Performance in Male Softball Players

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Abstract: The High-intensity progressive resistance of training (HIPRT) is widely promoted to improve muscular strength, power, and sport-specific performance. Softball players require a balance of explosive lower-body drive, rotational power, upper-body throwing velocity, and repeated sprint capacity. This review synthesizes physical and physiological mechanisms and practical evidence on HIPRT for male softball players of Rayalseema college of Physical Education aged 18–25 years examines expected effects on key performance outcomes (strength, countermovement jump, sprint, throwing velocity, batting exit velocity), and provides practical programming recommendations. Overall, HIPRT delivered 2–4 times per week over 6–12 weeks is expected to produce important improvements in maximal strength (large effect), meaningful gains in power and explosive performance (moderate to large), and smaller but sport-relevant improvements in throwing and batting metrics when combined with sport-specific drills. Individualization, progressive overload, and inclusion of both multi-joint heavy lifts and power exercises are critical. Future controlled trials in male collegiate-age softball players should quantify transfer to game performance and injury risk reduction.**Keywords**: high-intensity resistance, progressive overload, softball, power, strength, youth adult athletes.

Introduction

Softball performance depends on a mixture of maximal and explosive strength, rotational power, and repeat high-intensity efforts. Although much resistance-training research has focused on baseball or general team-sports, softball players, particularly male athletes aged 18–25 years (late adolescents to young adults), Share similar physical and physiological demands: rapid sprint acceleration, explosive lower-body vertical and horizontal force production, forceful rotational swings, and strong overhead throws. Progressive resistance training, where load, volume, or velocity is systematically increased, optimizes neuromuscular adaptations. High-intensity variants (≥80% of 1-repetition maximum [1RM], low to moderate volumes, emphasis on force production) preferentially produce maximal strength and neural versions that underpin power development. The article reviews mechanisms and practical outcomes of HIPRT, discusses how it can be implemented for male softball players, and highlights gaps in the literature.

Physiological Basis and Mechanisms

HIPRT drives adaptations through two principal mechanisms:Neural adaptations: Early strength gains (first 2–6 weeks) largely reflect improved motor unit recruitment, firing rates, intermuscular coordination, and reduced antagonist co-activation. These neural changes translate to higher rate of force development (RFD), which is critical for explosive actions (sprinting, jumping, throwing).Muscular hypertrophy and architectural changes: With sustained HIPRT (≥6–8 weeks), increases in muscle cross-sectional area (CSA), pennation angle adjustments, and favorable fiber-type shifts (increased type IIa expression from type IIx) occur. The structure of changes contributes to sustained improvements in maximal force and power when combined with velocity-oriented training.In the context of softball, HIPRT enhances the force base required for rapid ground reaction during sprint starts and for generating torque during bat swings and throws. When compared with the ballistic and rotational exercises, transfer to sport-specific power improves.

Effects on Performance Outcomes

Maximal Strength

HIPRT protocols emphasizing heavy compound lifts (squat, deadlift, Romanian deadlift, bench press, bent-over row). With loads ≥80% 1RM and 3–6 sets of 3–6 reps reliably produce large increases in 1RM strength in young adults. For male softball players, gains in lower-body and trunk strength provide the basis for improved sprint acceleration and swing force.

Power and Explosive Performance

Power (force × velocity) benefits when HIPRT is combined with velocity-oriented work (contrast training, plyometrics, Olympic-style lifts). Isolated HIPRT improves the maximal force component, which often raises RFD when neural adaptations occur; however, maximal transfer to explosive measures (countermovement jump height, standing long jump, sprint 0–10 m) is greatest when heavy lifting is paired with explosive exercises.

Sprint and Change-of-Direction (COD)

The Improvements in 10-m sprint and short COD tests are typically moderate following 6–12 weeks of HIPRT due to improved strength production and improved RFD. Transfer is improved when heavy training includes unilateral and horizontal strength exercises (split squats, hip thrusts, sled pushes) that mimic sprinting mechanics.

Throwing Velocity and Leave-taking Bat Speed

Upper-body strength exercises (rotational core strength and shoulder girdle force) from HIPRT contribute to increased throwing velocity and bat exit speed. However, the carryover is often smaller than for strength/power tests because of the technical and timing complexity of throwing and batting. Combining HIPRT with sport-specific throwing and swing drills accelerates neuromuscular coordination needed for transfer.

Injury Risks

Resistances of training increases tendon stiffness, muscle strength imbalances correction, and neuromuscular control, all of which can reduce soft-tissue injury risk when appropriately dosed. Progressive loading with attention to technique minimizes overload and acute injury risk.

Practical Programming Recommendations for Male Softball Players (18–25 yrs)

Frequency & Duration

2–4 sessions per week, program duration 6–12 weeks for measurable adaptations.

Off-season: 3–4 sessions/week emphasizing hypertrophy and strength.

Pre-season: 2–3 sessions/week with higher power content and sport practice.

Session Structure

Warm-up: dynamic mobility, movement preparation and activation (10–15 min).

Main strength block (20–35 min): heavy compound lifts (e.g., back squat, deadlift, bench press) 3–5 sets × 3–6 reps at 80–95% 1RM; progressive increase in load 2.5–5% per week when technique conserved.

Power/ballistic block (10–20 min): after heavy lifts or on alternate days—power cleans, kettlebell swings, jump squats, medicine-ball rotational throws, plyometrics, 3–6 sets × 3–6 reps (maximal intent, full recovery).

Accessory & core (10–15 min): unilateral leg work, posterior chain, rotator cuff, anti-rotation core (Pallof presses), to address imbalances.

Conditioning: short sprints, prowler pushes, and sport drills as appropriate.

Progressive Overload & Periodization

Linear or undulating periodization is effective, start with heavier loads and moderate volume, then introduce higher velocity/power sessions while maintaining strength.

Include deload weeks every 4–6 weeks or prior to competition periods.

Individualization & Monitoring

Baseline testing: 1RM or estimated 1RM for key lifts, countermovement jump, 10-m sprint, throwing/ leave taking bat speed and velocity, and screening for asymmetry.Monitor session RPE, jump performance, and soreness to adjust volume.Emphasize technique coaching, proper hip hinge, trunk stability, and scapular control to preserve shoulder health.

Limitations and Gaps in Evidence

Direct randomized controlled trials targeting male softball players aged 18–25 are scarce. Much evidence is extrapolated from baseball, soccer, or general male athlete populations. The specific demands of different field positions (pitcher vs. position player) also require position-specific prescriptions. Additionally, long-term effects on in-game performance, pitcher arm health, and career-long injury incidence need prospective cohort or randomized research.

Conclusion

High-intensity progressive resistances of training, when properly programmed and collective with power and sport-specific practice, is well suited to improving the strength, power, and several sport-relevant performance metrics in male softball players aged 18–25 years. Coaches should emphasize a foundation of heavy multi-joint lifts for maximal strength, integrate ballistic and rotational power work for transfer, individualize loads, and monitor recovery.

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Volume No.23, No.2 pp16-18
Journal Impact Factor 3.565
A Peer Reviewed (Refereed) International Research Journal

The Role of Physical Training in Academic Excellence

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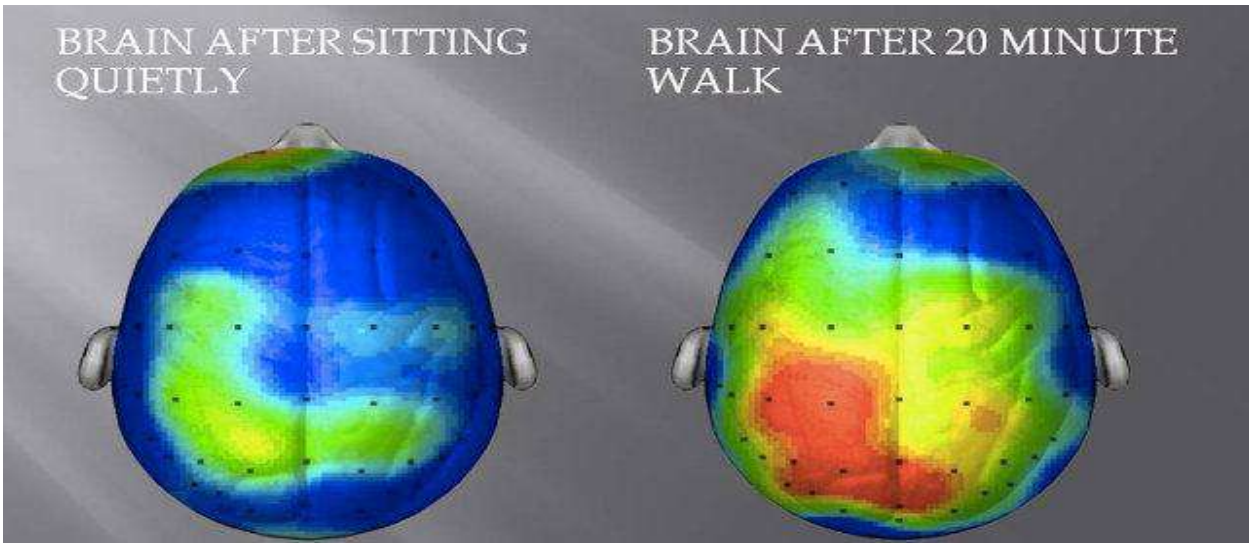
Introduction

Now we are witnessing the highest competitive academic curriculum among educational institutions, completely excluding or avoiding the physical activity in the planning of educational curriculum. Is this beneficial to growing children in long term development? Or even in short term excellence?

There are many studies worldwide proving against this thinking, reemphasizing the importance of essential hours of physical training as a part of academic curriculum at all levels of education.

Children who are physically fit absorb and retain new information more effectively than children who are out of shape, a new study finds, raising timely questions about the wisdom of slashing physical education programs at schools.

Parents and exercise scientists (who, not infrequently, and the similar people) have known for a long time that physical activity helps young people to adjust and pay attention in school or at home, with beneficial effects on academic performance. A representative study, presented at the American College of Sports Medicine, found that fourth- and fifth-grade students who ran around and otherwise exercised vigorously for at least 10 minutes before a mathematics test scored higher than children who had sat quietly before the exam.



If we start exercising, our brain recognizes this as a moment of stress. As our heart pressure increases, the brain thinks like we are either fighting the enemy or fleeing from it. To protect our self

and our brain from stress, our body releases a protein called BDNF (Brain-Derived Neurotropic Factor). This BDNF has a protective and also reparative element to the memory neurons and acts as a reset switch. That's why we often feel so at ease and things are clear after exercising and eventually happy.
At the same time, endorphins, another chemical to fight stress, is released in our brain. The endorphin's main purpose is these endorphins tend to minimize the discomfort of exercise, block the feeling of pain and are even associated with a feeling of euphoria.

Overall, there is a lot positive changes going on inside our brain and it is in fact brain is a lot more active than when we are just sitting down or actually concentrating only mentally.

More generally, in a large-scale study of almost 12,000 schoolchildren published in The Journal of Pediatrics, researchers compiled each child's physical fitness, as measured by a timed run, body mass index and academic achievement in English and math, based on the state's standardized test scores. The findings were interesting! Better fitness proved to be linked to significantly higher achievement scores, while, surprisingly, body size had almost no role. Students who were overweight but relatively fit had higher test scores than lighter, less-fit children.

To date, however, no study specifically had examined whether and in what ways of physical fitness might affect how children learn. Researchers recently stepped into that breach, recruiting a group of local 9- and 10-year-old boys and girls, testing their aerobic fitness on a treadmill, and then asking 24 of the most fit and 24 of the least fit to come into the exercise physiology lab and work on some difficult memorization tasks.

Learning is, of course, a complex process, involving not only the taking in and storing of new information in the form of memories, a process known as encoding, but also recalling that information later. Information that cannot be recalled has not really been learned practically.

Earlier studies of children's learning styles have shown that most learn more readily if they are tested while they are in the process of learning it. In effect, if they are quizzed while memorizing, they remember more easily. Straight memorization, without intermittent reinforcement during the process, is tougher, which fact reemphasizing the compulsory hours of physical activity in between the academic curriculum, although it is how, most children tries to study when given them a choice.In one research setting, the researchers opted to use both approaches to learning. In one learning session,they provided their young volunteers with which several maps of imaginary lands had been loaded. The maps were demarcated into regions, each with a four-letter name. During one session, the children were shown these names in place for six seconds. The names then appeared on the map in their correct position six more additional times while children stared at and tried to memorize them, akin to repetition method.

In a separate learning session, region names appeared on a different map in their proper location, and then moved to the margins of the map. The children were asked to tap on a name and match it with the correct region, providing in-session testing exercise as they memorized. A day later, all of the children returned to the lab and were asked to correctly label the various maps' regions. The results, show that, over all, the children performed similarly when they were asked to recall names for the map, But when the recall involved the more difficult type of learning and memorizing without intermittent testing, the children who were in better aerobic condition significantly outperformed the less-fit group, remembering about 40 percent of the regions' names accurately, compared with barely 25 percent accuracy for the out-of-shape kids. This finding suggests that "higher levels of fitness have their greatest impact in the most challenging situations" that children face intellectually.The study's outcomes also confirm that the more difficult something is to learn, the more physical fitness may aid children in learning it. Of course, this study did not focus specifically on the kind of active exercise typical of recess, but on longer-term, the overall physical fitness in young children matters most. This, subtly reinforces the importance of physical training and similar physical activity programs in schools, we believe. If children are to develop and maintain the kind of aerobic fitness, that definitely amplifies their ability to learn, said Charles Hillman, a professor of kinesiology at the Institute for Advanced Science and Technology, University of Illinois and suggest they should engage in "*at least an hour a day of vigorous physical activity*". The Schools, where children spend so many of their waking hours, provide the most logical and logistically plausible place for them to get such exercise.Reducing or eliminating physical education in schools, as is often done in tight financial or space restraints, may not be the best way to ensure educational success among our young people.

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Journal.pone.0072666, DOI: 10.1371 Published: September 11, 2013

The Influence of Childhood Aerobic Fitness on Learning and Memory

Lauren B. Raine, Hyun Kyu Lee, Brian J. Saliba,LauraChaddock-Heyman,Charles H. Hillman mail, Arthur F. Krame r.

ISSN 2231-3265
International Journal of Health, Physical Education and Computer Science in Sports
Volume No.23, No.2 pp19-23
Journal Impact Factor 3.565
A Peer Reviewed (Refereed) International Research Journal

Convenient Managing of Sudden Cardiac Arrest on the Football Field

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Abstract

Sudden cardiac arrest (SCA) remains a tragic occurrence on the football field. The limits of pre-participation cardiovascular screening make it compulsory that prearranged emergency medical services be available at all football matches to immediately respond to any collapsed player. Management of SCA involves prompt recognition, immediate cardiopulmonary resuscitation (CPR) and early defibrillation. Any football player who collapses without contact with another player or obstacle should be regarded as being in SCA until proven otherwise. An automated external defibrillator (AED), or manual defibrillator if an AED is not available, should be immediately accessible on the field during competitions. This study presents guidelines for a practical and systematic approach to the management of SCA on the football field.

Introduction

Sudden cardiac arrest (SCA) is the leading cause of death in athletes during exercise and sport, and a tragic occurrence on the football field. Although the pre competition medical assessment (PCMA) was developed by F-MARC to provide a standard evaluation to identify athletes at risk for SCA, it is not yet a mandatory requirement for all amateur or professional football players internationally. The variable compliance with PCMAs for all footballers combined with the limits of pre participation cardiovascular screening in athletes makes it compulsory that prearranged emergency medical services be available at all football matches to immediately respond to any collapsed football player on the field who may be in cardiac arrest.

Management of SCA involves prompt recognition, immediate cardiopulmonary resuscitation (CPR) and early defibrillation where appropriate. Although the literature makes reference to various aspects of SCA and its immediate management on the football field, proper emergency planning for this life-threatening incident is not universally practised, thereby leaving it up to each field-side medical team, physician or attending rescuer to enact a practical plan *ab initio*. The aim of this paper is to recommend a practical and systematic approach to the management of SCA on the football field, and to emphasise the critical importance of local adaptation of these guidelines at all football venues.

Recognition

Any football player who collapses without contact with another player or obstacle should be regarded as being in SCA until it is proved otherwise. Delayed recognition of SCA by first responders can lead to critical delays or even failure to initiate resuscitative measures. Brief seizure-like activity or involuntary myoclonic movements have been reported in over 50% of athletes with SCA. Thus, SCA should not be mistaken for a seizure. Inaccurate rescuer assessment of pulse or respirations is another cause of delayed resuscitation. Agonal or occasional gasping can occur in the first minutes after SCA and be misinterpreted as normal breathing. Therefore, to avoid potentially fatal delays in resuscitation, any collapsed and unresponsive athlete should be managed as SCA including immediate CPR and application of an automated external defibrillator (AED), or manual defibrillator if an AED is not available, as soon as possible for rhythm analysis and shock as indicated.

On the field, once SCA has been recognised by the field medical team, players, or the referee, addi-tional medical personnel and the defibrillator should enter the field of play simultaneously. Each football venue for training or competition must have access to an AED, or manual defibrillator if an AED is not available, with a goal of a less than 3 min time delay from player collapse to first defibrillation shock. For competitions, the home team and stadium management should be responsible for ensuring that a defibrillator is present and located preferably with the fourth referee official. However, it should be a matter of routine that the location of the AED must be reviewed by both teams prior to the match, including a brief readiness check of the device by the team physician.

Time taken to initiate CPR and defibrillation are important determinants of successful cardiac arrest resuscitation, hence delay in entering the field of play in a potential SCA must be minimised, even if the FIFA (Fédération Internationale de Football Association) Rules of the Game are to be amended to accommodate management of this life-threatening event, including education of referees.

Emergency action plan

Once it has been established that the collapsed player is in cardiac arrest, a preplanned, prerehearsed emergency action plan should be initiated. CPR should be effectively established and the AED immediately retrieved. Concerned football players should be directed away from the collapsed player to provide sufficient space for the resuscitating medical team. The referees may be helpful to organise the players on the field in this regard. Other field staff should be responsible for directing an ambulance onto the pitch as soon as possible (if feasible).

Cardiopulmonary resuscitation

SCA in an active footballer on the field usually means that the blood oxygen saturation level is sufficient for hands-only chest compression to be undertaken for the first few minutes of CPR. After that an effective form of rescue ventilation should be initiated via mouth-to-mask or manual resuscitator ventilation, with or without supplemental oxygen and with or without use of an appropriate supraglottic airway.

On-field defibrillation

The single greatest factor affecting survival from SCA is the time interval from cardiac arrest to defibrillation, with survival decreasing to 10% per minute defibrillation is delayed in the absence of CPR but 3% to 4% with CPR. Survival following SCA has been greatly improved by rescuer and public access defibrillation programmes designed to shorten the time interval from SCA to shock delivery, with survival rates >60% in young athletes if prompt CPR and defibrillation can be achieved.

Immediately after SCA recognition, the defibrillator should be retrieved and positioned next to the collapsed player and applied as soon as possible. AEDs will determine whether a shockable rhythm is present and charge the AED accordingly, whereas manual defibrillators require healthcare rescuer rhythm recognition and manual defibrillation. Wet sweaty and/or excessively hairy chests may make it problematic for adequate defibrillation pads attachment or paddle placement, necessitating the use of a towel and/or disposable razor. For these situations, it is recommended that each defibrillator meant for the football field has an accessory kit that contains a rescue-type scissors, a cloth towel, two disposable razors and spare AED pads or extra defibrillation gel as minimum. These items are likewise useful when SCA and defibrillation are undertaken in the rain, which is a safe practice.

Immobilisation and transfer

Players who experience SCA may collapse in an uncontrolled and unprotected manner with the potential for a cervical spinal injury. Therefore, cervical spine precautions should be taken when transferring the player from the ground onto an appropriate rigid immobilisation device (eg, basket stretcher or spine board), and to immobilise the neck with head blocks accordingly.

Initial sequences of CPR and defibrillation should occur on the field at the location of collapse to avoid unnecessary delays in resuscitation by attempting to move the player. The decision to transfer the player from one's initial position of collapse and CPR is critical, because external chest compression in transit, with a player strapped to a rigid immobilisation device, may not be as effective as when stationary on the ground and may compromise the success of the resuscitation. Therefore, at least three cycles of external chest compression and intermittent defibrillation (as per international guidelines, should be undertaken as a minimum before transfer is considered. Interruptions in CPR should be minimised with chest compressions re-initiated immediately after shock delivery.

If on-field measures do not return the player to a spontaneous rhythm, or if ventricular fibrillation appears to persist, the player should be loaded into an ambulance, preferably that has been brought onto the field, where more advanced cardiac care can be provided during transport to a hospital facility. It is imperative to continue, without delays or interruptions, effective, efficient CPR and intermittent appropriate defibrillation, until a spontaneous cardiac rhythm is obtained with signs of life.

Post-SCA procedures and reporting

After a major medical event of this nature on the football field, protocols should be instituted which address issues related to psychological team debriefing and event review. Comprehensive documentation is likewise mandatory for not only medical and legal purposes, but to assist in research of SCA, its aetiology and successful treatment.

EDUCATION AND TRAINING

It is strongly recommended that all players, officials, referees and associated staff at stadiums and training grounds be trained in basic CPR and AED use because of the potential life saving benefits that may result on and off the football field of play.

Key recommendations for emergency planning for sudden cardiac arrest on the football field

- Every team and venue hosting football training or competition should have a written emergency response plan for SCA.
- Potential responders to SCA on the field (ie, coaches, referees, physiotherapists, athletic trainers, and other medical staff) should be regularly trained in CPR and AED use, and demonstrate skills proficiency in this regard.
- An AED should be immediately available on the pitch during competitions.
- Both teams should review prior to the match the location of the AED and details of the emergency response plan.
- AED, automated external defibrillator; CPR, cardiopulmonary resuscitation; SCA, sudden cardiac arrest.

Practical management of sudden cardiac arrest on the football field

- Prompt recognition of SCA
- SCA should be assumed in any collapsed and unresponsive athlete
- Seizure-like activity, and abnormal breathing or gasping must be accepted as SCA until proven otherwise
- Early activation of the emergency medical response system and call for additional rescuer assistance
- Early CPR
- If unresponsive and not breathing normally, begin Hands-Only (compression only) CPR—push hard, push fast
- C−A−B (chest compressions−airway−breathing).
- Immediate retrieval of the AED or manual defibrillator.
- Application of the AED or manual defibrillator as soon as possible—while CPR continues. Stop CPR only for rhythm analysis and shock delivery if indicated
- If no shock is delivered, CPR and life support measures should be continued until the player becomes responsive or a non-cardiac aetiology can be clearly established.
- If a shock is delivered, immediately continue CPR for 2 minutes, then allow AED to reanalyse the rhythm.
- On the discretion of the senior clinician on scene, transport of the SCA victim to a hospital facility capable of advanced cardiac life support, realising that effective CPR should be continued en route.
- Upon return of spontaneous circulation, while still in coma, rapid cooling (induced hypothermia) for SCA victims with VF arrest has been shown to improve survival and decrease neurological complications.
- AED, automated external defibrillator; CPR, cardiopulmonary resuscitation; SCA, sudden cardiac arrest; VF, ventricular fibrillation.

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ISSN 2231-3265
International Journal of Health, Physical Education and Computer Science in Sports
Volume No.23, No.2 pp24-29
Journal Impact Factor 3.565
A Peer Reviewed (Refereed) International Research Journal

Effect Of Plyometric Training And Own Body Resistance Exercises On Leg Explosive Strength Among Ball Badminton Players

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ABSTRACTThe present study investigated the effect of plyometric training and own body resistance exercises (OBRE) on leg explosive strength among Ball badminton players. Forty-five male inter-collegiate ball badminton players (aged 17–23 years) from Kadapa District were randomly assigned into three groups: Plyometric Training Group (PLTG, n=15), Own Body Resistance Exercises Group (OBRE, n=15), and Control Group (CON, n=15). The training interventions were conducted for 12 weeks, while the control group did not undergo any special training. Leg explosive strength was assessed using the standing broad jump test, and the data were statistically analyzed using ANCOVA at the 0.05 level of significance.The results indicated that the pre-test mean values for PLTG (1.58 m), OBRE (1.55 m), and CON (1.55 m) showed no significant difference (F=0.44, p>0.05). However, the post-test mean values improved significantly for PLTG (1.83 m) and OBRE (1.77 m) compared to CON (1.56 m), with an obtained F-ratio of 34.60 (p<0.05). Further, the adjusted post-test means (PLTG=1.82 m, OBRE=1.77 m, CON=1.57 m) confirmed significant differences with an F-ratio of 52.93 (p<0.05). Scheffé's test revealed no significant difference between PLTG and OBRE (mean diff.=0.05, < CI 0.06), but both experimental groups significantly outperformed the control group (PLTG vs CON=0.25; OBRE vs CON=0.20).The study concluded that both plyometric training and OBRE significantly enhanced leg explosive strength, with plyometric training showing slightly superior results. The findings suggest that integrating these training methods into conditioning programs can effectively improve explosiveness, agility, and performance in Ball badminton players.**Keywords:** Ball badminton, Plyometric Training and Own Body Resistance

INTRODUCTION

Ball badminton is a traditional Indian sport that demands high levels of speed, agility, and explosive movements. The game is played on a rectangular court where players rely on quick directional changes, rapid footwork, and powerful strokes to maintain effective performance. Among the various physical qualities required, leg explosive strength plays a vital role as it contributes to jumping ability, sprinting, and quick reaction during rallies. Developing leg power is, therefore, crucial for enhancing overall playing ability in ball badminton.

Explosive strength, often referred to as power, is the ability to exert maximal force in the shortest time possible. In sports such as ball badminton, where sudden bursts of speed and rapid movements are common, leg power enables players to reach the shuttle quickly, perform lunges effectively, and recover efficiently during rallies. Without adequate explosive strength, players may struggle to maintain high performance under the fast-paced conditions of the game.Plyometric training is widely recognized as an effective method to develop explosive leg strength. It involves exercises that utilize the stretch–shortening cycle of muscles, such as jump squats, bounding, and box jumps, to enhance neuromuscular efficiency. By repeatedly training the muscles to contract forcefully after rapid stretching, plyometric drills improve muscle power, sprinting ability, and agility, all of which are essential in Ball badminton.In addition to plyometric training, own body resistance exercises (OBRE) such as squats, lunges, push-ups, and calf raises also contribute significantly to strength development. These exercises use body weight as resistance, making them highly accessible and safe for athletes. Incorporating OBRE into training improves muscular endurance, balance, and functional strength, thereby complementing plyometric training in developing leg explosive strength.

Combining plyometric training with own body resistance exercises may provide a comprehensive approach to improving leg explosive power among Ball badminton players. While plyometrics focus on power generation and speed, OBRE builds foundational strength and stability. Investigating the effects of these training methods will help coaches and trainers design more effective conditioning programs tailored to the demands of ball badminton, ultimately enhancing athletic performance.

EXPERMENTAL DESIGN

Find out the study effect of plyometric training and own body resistance exercises on leg explosive strength among ball badminton players.The study was formulated as a true random group design consisting of a pre-test and post test. The subjects men Ball badminton players who are participated inter collegiate tournaments in kadapa district (N=45) were randomly assigned to three equal groups of fifteen and their age ranged between 17-23 years . The selected subjects were divided into three groups randomly. Experimental Group I was considered plyometric training group, experimental group II was own body resistance training group and control group was not involved in any special treatment. Pre test was conducted for experimental Groups I and II and the control group on leg explosive strength. Experimental groups underwent the respective training for 12 weeks. Immediately after the completion of 12 weeks training, all the subjects were measured of their post test scores on the selected criterion variable. The difference between the initial and final scores was considered the effect of respective treatments. To find out statistical significance of the results obtained, the data were subjected to statistical treatment using ANCOVA. In all cases 0.05 level was fixed to test the significance of the study.

RESULT ON LEG EXPLOSIVE STRENGTH

Table-I ANALYSIS OF COVARIANCE FOR LEG EXPLOSIVE STRENGTH PRE-TEST AND POST-TEST SCORES OF PLYOMETRIC AND OWN BODY EXERCISES TRAINING [OBRE] AND CONTROL [CON] GROUPS

TESTS	PLTG	OBRE	CON	Source of variance	Sum of squares	df	Mean squares	'f' ratio
Pre-Test Mean	**1.58**	**1.55**	**1.55**	Between	0.01	2	0.01	**0.44**
				Within	1.31	87	0.02	
Post-test Mean	**1.83**	**1.77**	**1.56**	Between	1.14	2	0.5687	**34.60***
				Within	1.43	87	0.02	
Adjusted Post-test Mean	**1.82**	**1.77**	**1.57**	Between	1.02	2	0.51	**52.93***
				Within	0.83	86	0.01	

Significant level constant at 0.05

[The table value for 0.05 level of significant with 2 and 87 (df) =3.10, 2 and 86 (df) =3.10]

The above table -I display the plyometric exercises training group [PLTG], own body exercises treatment group [OBRE] and control group [CON]. The pre test mean value of leg explosive strength are 1.58, 1.55 and 1.55 respectively. The obtain 'F' ratio value for pre test mean of leg explosive strength is 0.44 lower than the tabular value 2 and 87 (df) =3.10 at 0.05 level of confidence. Therefore there is no significant differences exist in pretest mean values between PLTG, OBRE and CON groups Ball badminton players on leg explosive strength.

The plyometric exercises training group [PLTG], [OBRE] and control group [CON] post test score mean values of leg explosive power are 1.83, 1.77 and 1.56 respectively. The obtain 'F' ratio value for post test mean of leg explosive strength is 34.60 greater than the tabular value 2 and 87 (df) =3.10 at 0.05 level of confidence. It discovered that there is significant differences exist in post test mean values between PLTG, OBRE and CON group's Ball badminton players on leg explosive strength.

The plyometric training group [PLTG], [OBRE] and control group [CON] adjusted post test mean value of leg explosive strength are 1.82, 1.77 and 1.57 respectively. The obtain 'F' ratio value for adjusted post test mean value of leg explosive strength is 52.93 higher than the tabular value 2 and 86 (df) =3.10 at 0.05 level of confidence. Hence statistical analysis shows that there is significant differences exist in adjusted post test mean values between PLTG, OBRE and CON group's Ball badminton players on leg explosive strength.

The above analysis indicated that there is significant improvement in leg explosive strength performance of Ball badminton players due to impact of plyometric training and OBRE treatment. To find the significant changes between the groups of PLTG, OBRE and CON Scheffe's test applied and presented in the table – II.

Table-II

THE SCHEFFE'S TEST FOR THE ADJUSTED POST MEAN DIFFRENCES BETWEEN PLYOMETRIC EXERCISES TRAINING [PLTG], OWN BODY RESISTANCE EXERCISES [OBRE] AND CONTROL [CON] GROUPS ON LEG EXPLOSIVE STRENGTH

MEANS				**Required CI**
PLTG	**OBRE**	**CON**	**Mean differences**	
1.82	1.77	-	0.05	0.06
1.82	-	1.57	0.25*	0.06
	1.77	1.57	0.20*	0.06

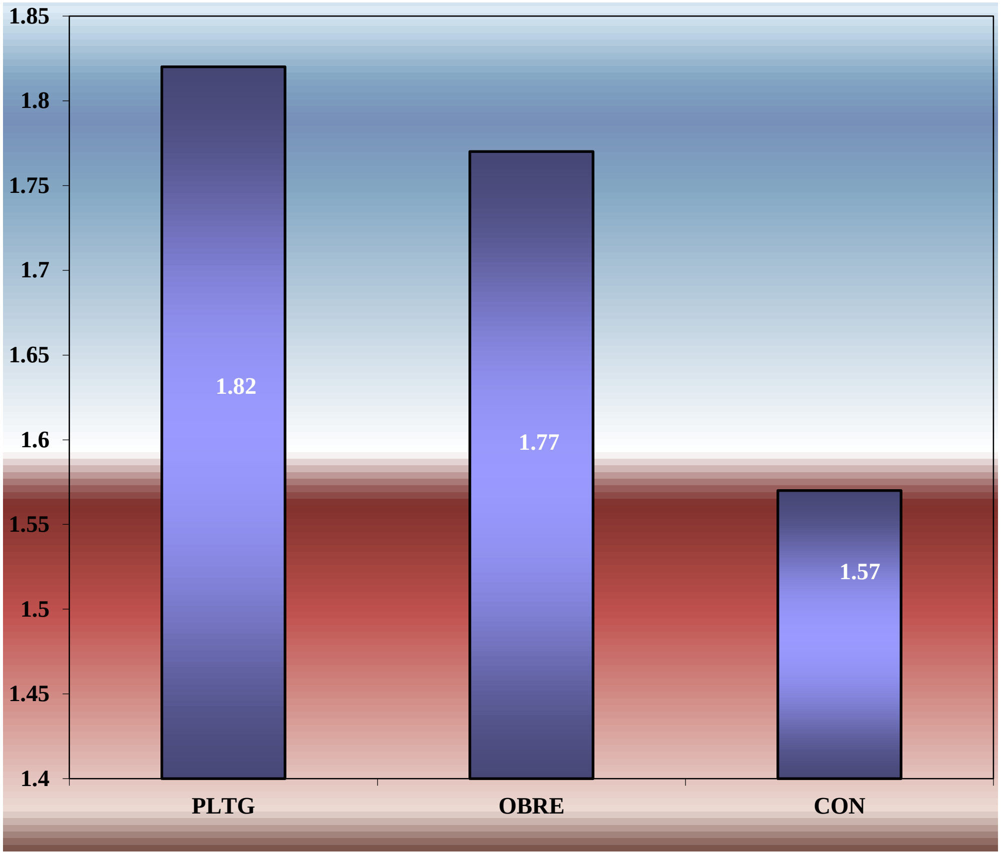
Significant level constant at 0.05 level of confidence

The above table –II indicate the paired mean differences between plyometirc exercises training group [PLTG], own body exercises group [OBRE] and control group [CON] for leg explosive strength of Ball badminton players.The adjusted post test mean differences between plyometric training group [PLTG] and [OBRE] is 0.05 lower than the required CI value 0.06. Therefore it is proved that there is no significant changes exist between plyometric training group [PLTG] and [OBRE] for leg explosive strength performance of Ball badminton players.The adjusted post test mean difference between plyometric training group [PLTG] and control group [CON] is 0.25 greater than the required CI value 0.06. Therefore it is confirmed that there is changes exist between plyometric exercises treatment group [PLTG] and control group [CON] for leg explosive strength performance of Ball badminton players

The adjusted post test mean difference between resistance training group [OBRE] and control group [CON] is 0.20 greater than the required CI value 0.06. Therefore it is noted that there is significant changes exist between [OBRE] and control group [CON] for leg explosive strength performance of Ball badminton players.

The pre test, post test and adjusted post mean values of three groups PLTG, OBRE and CON of leg explosive strength are displayed in graph figure-I

Figure-I: GRAPICAL ILLUSTRATION OF ADJUSTED POST MEAN VALUES OF PLYOMETRIC EXERCISES TRAINING [PLTG} AND {OBRE] AND CONTROL [CON] GROUPS ON LEG EXPLOSIVE STRENGTH (In centimeters)



CONCLUSION

The findings of the study revealed that both plyometric training and own body resistance exercises (OBRE) significantly improved the leg explosive strength of Ball badminton players compared to the control group. The statistical analysis confirmed that while both experimental groups demonstrated notable gains, plyometric training produced slightly greater improvements than OBRE. However, no significant difference was observed between the plyometric and OBRE groups, indicating that both methods are effective in enhancing explosive leg power. These results suggest that integrating plyometric and own body resistance exercises into regular training programs can be a practical and efficient approach to improving performance-related fitness components in ball badminton players. Coaches and trainers are therefore encouraged to adopt these training strategies to optimize athletes' explosive movements, agility, and overall playing ability.

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ISSN 2231-3265
International Journal of Health, Physical Education and Computer Science in Sports
Volume No.23, No.2 pp30-34
Journal Impact Factor 3.565
A Peer Reviewed (Refereed) International Research Journal

Importance of Hill Running for Long Distance Races

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Abstract:

Hill running has a strengthening effect as well as boosting your athlete's power and is ideal for those athletes who depend on high running speeds - football, rugby, basketball, cricket players and even runners. To reduce the possibility of injury hill training should be conducted once the athlete has a good solid base of strength and endurance. In hill running, the athlete is using their body weight as a resistance to push against, so the driving muscles from which their leg power is derived have to work harder. The technique to aim for is a "bouncy" style where the athlete has a good knee lift and maximum range of movement in the ankle. They should aim to drive hard, pushing upwards with their toes, flexing their ankle as much as possible, landing on the front part of the foot and then letting the heel come down below the level of the toes as the weight is taken. This stretches the calf muscles upwards and downwards as much as possible and applies resistance which overtime will improve their power and elasticity. The athlete should look straight ahead, as they run (not at their feet) and ensure their neck, shoulders and arms are free of tension. Many experts believe that the "bouncy" action is more important than the speed at which the athlete runs up the hills. Key words: Hill running, speed, calf muscles etc.

Introduction:

Hill work results in the calf muscles learning to contract more quickly and thereby generating work at a higher rate, they become more powerful. The calf muscle achieves this by recruiting more muscle fibres, around two or three times as many when compared to running on the flat. The "bouncy" action also improves the power of the quads in the front of the thigh as they provide the high knee lift that is required. For the athlete, when competing in their sport/event, it can mean higher running speeds and shorter foot strike times.

Hill training offers the following benefits:

- helps develop power and muscle elasticity
- improves stride frequency and length
- develops co-ordination, encouraging the proper use of arm action during the driving phase and feet in the support phase
- develops control and stabilisation as well as improved speed (downhill running)
- promotes strength endurance
- develops maximum speed and strength (short hills)
- improves lactate tolerance (mixed hills)

The benefits of short, medium and long hills are quite different, and can be used at different times of the year.

Discussion

Short hills

A short hill is one which takes no more than 30 seconds to run up and has an inclination between 5 and 15 degrees gradient. The athlete's energy source on short hills is entirely anaerobic. The athlete should focus on a running technique which has vigorous arm drive and high knee lift, with the hips kept high, so that they are 'running tall', not leaning forwards.

The session is anaerobic so the recovery time can be long, a walk back down the hill, or a slow jog of 60 to 90 seconds. The total volume will depend on the fitness of the athlete and the reason for doing it. A sprinter looking for strength might do 10 repetitions of 15 second duration up a steep slope with a long recovery where as a distance runner who is trying to improve sprinting speed might do 30 repetitions of 15 seconds duration.Short hills of 5 to 10 second duration will help improve the Adenosine Triphosphate and Phosphate-creatine (ATP+PC) energy system and hills of 15 to 30 second duration will help develop the ATP+PC+muscle glycogen energy system. Example of short hill sessions:

- 8 to 10 repetitions over 50 meters (sprinters and hurdlers)

- 8 to 10 repetitions over 40 meters (jumpers and throwers)
- 8 to 10 repetitions over 150 meters (middle distance athletes)
- 8 to 10 repetitions over 200 meters (long distance athletes)

Medium hills

A medium hill is one that takes between 30 to 90 seconds to run up. This is the length of hill is a good distance for the middle-distance runner, because it combines the benefits of the short hills with the stresses on local muscular endurance and tolerance of lactic. Use a hill as steep of one in six to one in ten, so that you can run at something near race pace. The energy source is both aerobic and anaerobic and the athlete will experience the buildup in blood lactate as they go further up the hill.

Although the session will usually be quite fast and competitive, it is important that style is emphasized. Scuttling up the hill with a short stride and forward lean may be the best way to get up in a race, but in training, we are trying to develop particular qualities. It is better, therefore, to go for a longer stride and higher knee lift: running tall with the hips pushed forwards, keeping the back upright. Again, the volume of the session depends on the individual.

With a group of youngsters, you can do six to eight runs of 45 seconds, followed by some 10 second sprints on a steeper hill. With top class senior runners, you can do 12 to 15 runs of about 70 seconds, so that it is the equivalent of an interval training session on the track. A good practice is to increase the number by one or two each time the session comes around, while trying to run them at about the same pace. The recovery is a slow jog back to the bottom, and when the times start falling much below those of the first few runs, it is time to stop.

Long hills

A long hill is one which takes from 90 seconds to three minutes plus. Here most of the energy comes from aerobic sources, but if parts of the hill are steep and they are running them hard, there will still be an accumulation of blood lactate. There will be local muscular fatigue in the leg muscles, and possibly in the abdominal muscles too, but the main limiting factor will be the athlete'scardiovascular system.

These hills can be used in two ways:

- as a hard aerobic training session during the pre-competition season
- as a hard time-trial session in the early part of the competition period

As these hill sessions are aerobic, the athlete will not use as much power per stride as the shorter hills, and so perhaps would not be used by middle-distance runners, except for one or two time-trial runs. They are particularly good for the cross country or road runner who is running distances of 10,000m and upwards. A session of, say eight three minutes, with a run back of four or five minutes will make a good hard work out.

Mixed hill running

The attraction of mixed hill training is that it can be fitted in with the terrain the athlete is running on and can, therefore, be interesting and full of variety. If they do a fartlek session round a hilly course, they will be able to fit in a number of different runs. Two advantages can come from this type of hill training:

- **Race simulation**. It is a good principle to rehearse in training the situations they are likely to meet in a race, such as trying to break open a gap by running hard over the top of a hill and keeping the pace going instead of easing up, as many runners do.
- **Downhill running**. This is something that often causes jarring and strains. I do not advise doing repeated fast downhill runs, but I would suggest that they practice to find the most relaxed way of running downhill without strain.

Mixed hill running can also be used to improve running economy and boost an athlete's VO_2 max. To do this identify a six or seven mile undulating hilly course, commence the session jogging at a modest pace and gradually pick up the intensity as they move through the hills. The key is not just to run up and down a few hills in their workout but to find a place where they can run up and down hills nearly constantly. If they cannot find a six or seven mile course with constant undulations, use a shorter course and run back and forth on it. The key is not to let the flat ground running total more than 25% of the workout.

During most of the run, the athlete's heart rate should be close to 85% of maximum (85% of maximum heart rate matches up with 76% VO_2 max). Do not let them blast up hills in the early part of the workout, this can stop them working though subsequent miles. The idea is to run constantly at a hard but not super fast speed. They should not feel like they are racing but as though they are running just slightly slower than lactate threshold, even if the actual pace is even slower than that. Alternatively, they can use heart rate, which should be at around 85% of maximum during at least the last two-thirds of their run. A run of six to seven miles in this manner is enough for a great workout, but you can expand the session as much as you want with some additional hilly, but easier miles. If you plan in a mixed hill session once a week over 10 to 12 mile course, you will be amazed at how their running takes off.

Conclusions

There are many advantages of combining hills and hard going e.g. sand. When the sand is soft, the athlete has to work a lot harder, and increase their leg speed to keep themselves going. At the same time, there is a reduced risk of damaging their legs through impact injuries. In general, it has the same effect as hill running, but the distances can be reduced because of the difficulty. Other methods of building leg strength are running in boots, running through snow or running with a pack on your back. As the coach remember, the tougher the session the more carefully it must be integrated into the overall training plan

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ISSN 2231-3265
International Journal of Health, Physical Education and Computer Science in Sports
Volume No.23, No.2 pp35-37
Journal Impact Factor 3.565
A Peer Reviewed (Refereed) International Research Journal

Comparison of Agility among Soft Ball Players and Cricketers of Rayalseema College of Physical Education

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Abstract:
Soft Ball Players and Cricketers need to perform in multiple busts of speed. Agility being the key component of cricket is a collective coordinative ability that includes speed, balance and coordination and plays an important role in determining a player's performance. The purpose of the present study to find out the Agility among Soft ball Players and Cricketers of Rayalseema College of Physical Education, Prodattur, A.P. The sample for the present study consists of 20 Male Soft Ball Players and 20 Male Cricketers of Rayalseema college of Physical Education. The 4 x 10 Agility Shuttle Run Test is used to assess the agility among Male Soft Ball Players and Cricketers..The descriptive Statistics is used to analyze the results of the study. The Mean Values of of Cricketers in Shuttle Run Test is 15.59 and Soft Ball Players is 14.31. Hence the Soft Ball Players are having good agility compare to Cricketers. Key Words: Agility, Cricket, Soft Ball etc.

Introduction:

Soft Ball Players and Cricketers need to perform in multiple busts of speed. Agility being the key component of cricket is a collective coordinative ability that includes speed, balance and coordination and plays an important role in determining a player's performance.Athletes who work to improve their agility also see improvements in their overall athletic abilities, including in critical areas such as balance and stability, coordination, body control, cognition, and recovery time

Cricket is a bat-and-ball game played between two teams of 11 players each on a field at the centre of which is a rectangular 22-yard long pitch. The game is played by 120 million players in many countries, making it the world's second most popular sport. Each team takes its turn to bat, attempting to score runs, while the other team fields. Each turn is known as an innings. The bowler delivers the ball to the batsman who attempts to hit the ball with his bat away from the fielders so he can run to the other end of the pitch and score a run. Each batsman continues batting until he is out. The batting team continues batting until ten batsmen are out, or a specified number of over's of six balls have been bowled, at which point the teams switch roles and the fielding team comes in to bat

Softball is a sport that requires both muscular strength and endurance, and for this reason when training with weights you need to concentrate on developing strong muscles with high endurance capabilities.**Speed** is a key component of Physical fitness which is very important for **Softball** Players for giving the high level of performance in competition. Speed is the performance pre requisite to do motor actions under given conditions in minimum of time. Speed is the ability to move all or part of the body quickly i.e. Speed is the quickness of movement of a limb, whether this is the legs of a runner or the arm of the shot putter. Speed means Relative rapidity in moving, going, etc.; rate of motion or progress: Speed is an integral part of every sport and can be expressed as any one of, or combination of, the following: maximum speed, elastic strength and speed endurance, combination of reflexes and stamina. Speed training is something that should be done throughout the year- unless there are some points of the season where you don't have to move fast- so little and often is better. Constantly reinforce the quality of execution of your speed.

Dr. Rajesh Bohra (2016) The present study was an attempt to investigate the significant mean difference between Batsmen and Bowlers on physical fitness variable agility which are participating at District level. The sample of the study comprised of 20 batsmen and 20 bowlers of Jind district of Haryana state. All the players are male participants and their age ranges from 16 to 19 years. In order to test the significance of mean difference between the variables descriptive statistics was employed. The result indicates that there exists a significance difference between Batsmen and Bowlers on physical fitness variable agility. Batsmen were found to be better than Bowlers on this physical fitness variable.

Purpose of the study:

The purpose of the present study to find out the Agility among Soft ball Players and Cricketers of Rayalseema College of Physical Education, Prodattur, A.P.

Methodology:

The 4 x 10 Agility Shuttle Run Test is used to assess the agility among Male Soft Ball Players and Cricketers.

Results and Discussion:

Table 1 :showing the Mean values and Independent Samples Test of shuttle run test for agility between Cricketers and Soft ball Players

Variables	Group	Mean	SD	t	P - Value
Shuttle Run Test	Cricketers	15.59	0.21	2.54	0.000
	Soft Ball Players	14.31	0.57		

*Significant at 0.05 level

In Table –I the Mean Values of Cricketers in Shuttle Run Test is 15.59 and Soft Ball Players is 14.31. Hence the Soft Ball Players are having good agility compare to Cricketers.

There is a range of physical and mental components that contribute to successful performance in sports. Each sport and activity requires a specific set of these skills. Being successful in one sport does not necessarily make you successful in another, as success requires a whole range of factors to come together and interact in the right way.Fitness is just one of the factors, and for many sports plays a major role in success.

Conclusions:

.It is concluded that Soft Ball Players are having better agility than Cricketers.. Softball players, just like athletes in many other sports, do not simply move in on direction (forward and backward). Instead athletes are most often required to move in multiple directions or required to quickly change directions. Where an effective sprint training program will help a softball player develop great linear speed, agility training must also be implemented to translate that great speed into quick and effective movements in all directions.

Recommendations:

1. Similar studies can be conducted on other Events and among females.

2.This study also helps the physical educators and coaches to improve their training regime to excel in Soft Ball and Cricketers.

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Dr. Rajesh Bohra (2016) Comparison of batsmen and bowler on physical fitness variable agility-International Journal of Physical Education, Sports and Health2016; 3(3): 01-02

ISSN 2231-3265
International Journal of Health, Physical Education and Computer Science in Sports
Volume No.23, No.2 pp38-44
Journal Impact Factor 3.565
A Peer Reviewed (Refereed) International Research Journal

Effect Of Plyometric Training And Sprint Assisted Training On Explosive Strength Among School Level Long Jumpers

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ABSTRACT

The purpose of this study was to investigate the Effect of Plyometric Training and Sprint-Assisted Training on Explosive Strength among school level Long Jumpers. A total of 60 male high school long jumpers from Proddatur region, aged 12–16 years, were randomly assigned into three groups (n = 20 each): **Plyometric Training Group (PTG)**, **Sprint-Assisted Training Group (SATG)**, and a **Control Group (CG)**. The experimental groups underwent 12 weeks of specific training, while the control group received no intervention. Explosive strength was measured using standardized field tests before and after the training period.The pre-test mean scores were 8.75 (PTG), 8.70 (SATG), and 9.05 (CG). After 12 weeks, post-test means improved to 10.35 (PTG), 9.85 (SATG), and 9.00 (CG). ANCOVA results revealed significant differences among the groups ($F = 32.38$, $p < 0.05$). Post-hoc analysis showed that both PTG (MD = 1.58) and SATG (MD = 1.12) significantly outperformed the control group, while no significant difference was observed between PTG and SATG (MD = 0.46).These findings indicate that both plyometric and sprint-assisted training significantly improve explosive strength in school-level long jumpers, with plyometric training showing slightly greater effects. The study concludes that structured, age-appropriate plyometric and sprint-assisted drills can be effectively integrated into training programs to enhance explosive power, which is essential for long jump performance.**Keywords:** Plyometric training, Sprint assisted training, Explosive strength and Long jump School athletes etc.

INTRODUCTION

Plyometric training (PT) and sprint-assisted/over speed training (AST) are commonly used in athletics to develop explosive lower-limb power and sprinting mechanics qualities that are crucial for long jump performance. Plyometrics target the stretch–shortening cycle (SSC), improving rapid force production and reducing ground contact time, while assisted sprint methods aim to expose athletes to supra maximal limb-speed and altered gait patterns that may transfer to higher maximal velocity and improved take-off approach speed.

Empirical evidence shows that plyometric programs can produce meaningful gains in jump and sprint performance across age groups when properly dosed (volume, intensity, frequency) and periodized meta-analytic and experimental studies report improvements in vertical and horizontal jump measures and short-sprint times after PT interventions. These adaptations are frequently linked to intramuscular changes (improved motor unit recruitment and rate of force development) and mechanical changes (increased tendon stiffness and improved reactive strength).

Research on assisted and resisted sprinting indicates that each sprint modality elicits distinct adaptations: resisted sprinting (e.g., sleds, vests) often enhances acceleration capabilities, whereas assisted or overs peed methods (e.g., towing, downhill running, motorized assistance) acutely increase stride frequency/flight time and, with appropriate programming, can produce longitudinal improvements in maximal sprint velocity. However, effects vary with participant training status, overload magnitude, and intervention length.

Most intervention studies have focused on adult or elite adolescent athletes; fewer have addressed *school-level* (young adolescent) long jumpers specifically. Yet school-age athletes present unique training-responsiveness and safety considerations (growth, maturation, technical skill acquisition), so results from adult cohorts cannot be automatically generalized. There is therefore a practical need to test how PT and AST alone or combined affect explosive strength and long jump-specific outcomes in school populations. Additionally, combined or mixed training approaches (e.g., PT + sprint-specific work, or periodized PT integrated with speed work) may yield superior transfer to event-specific tasks (approach velocity, take-off kinetics) compared with isolated modalities. Reviews of sprint-training methods emphasize matching the training modality to the targeted sprint distance/phase (acceleration vs. maximal velocity), which is relevant for long jump where the approach and take-off phases require both acceleration and maintained high velocity. These principles support investigating PT and AST in a long jump context.

EXPERMENTAL DESIGN

Find out the study Effect of Plyometric Training and Sprint-Assisted Training on Explosive Strength among school level Long Jumpers .The study was formulated as a true random group design consisting of a pre-test and post test. The subjects high school (Boys) long jumpers in proddatur region (N=60) were randomly assigned to three equal groups of twenty and their age ranged between 12-16 years . The selected subjects were divided into three groups randomly. Experimental Group I was considered plyometric training group, experimental group II was sprint assisted training group and control group was not involved in any special treatment. Pre test was conducted for experimental Groups I and II and the control group on explosive strength. Experimental groups underwent the respective training for 12 weeks. Immediately after the completion of 12 weeks training, all the subjects were measured of their post test scores on the selected criterion variable. The difference between the initial and final scores was considered the effect of respective treatments. To find out statistical significance of the results obtained, the data were subjected to statistical treatment using ANCOVA. In all cases 0.05 level was fixed to test the significance of the study.

RESULTS ON EXPLOSIVE STRENGTH

The statistical analysis comparing the initial and final means of explosive strength due to plyometric training and Sprint Assisted training among school level Long jumpers is presented in Table-I.

Table-I :ANCOVA RESULTS ON EFFECT OF PLYOMETRIC TRAINING AND SPRINT ASSISTED TRAINING COMPARED WITH CONTROLS ON EXPLOSIVE STRENGTH

	Plyometric Training	**Sprint Assisted Training**	**Control Group**	**Source of Variance**	**Sum of Squares**	**Df**	**Mean Squares**	**Obtained F**
Pre-test Mean	8.75	8.70	9.05	Between	1.43	2	0.72	1.00
				Within	40.90	57	0.72	
Post-test Mean	10.35	9.85	9.00	Between	18.63	2	9.32	11.27*
				Within	47.10	57	0.83	
Adjusted Post-test Mean	10.41	9.95	8.83	Between	25.79	2	12.894	32.38*
				Within	22.297	56	0.398	
Mean Diff	1.60	1.15	-0.05					

Table F-ratio at 0.05 level of confidence for 2 and 57 (df) =3.16, 2 and 56 (df) =3.16.

*Significant

As shown in Table-I, the obtained pre-test means on explosive strength on plyometric training group was 8.75, Sprint Assisted training group was 8.70 was and control group was 9.05. The obtained pre-test F-value was 1.00 and the required table F-value was 3.16, which proved that there was no significant difference among initial scores of the subjects.

The obtained post-test means on explosive strength on plyometric training group was 10.35, Sprint Assisted training group was 9.85 was and control group was 9.00. The obtained post-test F-value was 11.27 and the required table F-value was 3.16, which proved that there was significant difference among post-test scores of the subjects.

Taking into consideration of the pre-test means and post-test means adjusted post-test means were determined and analysis of covariance was done and the obtained F-value 32.38 was greater than the required value of 3.16, and hence it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post-hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table-II

Table-II

Multiple Comparisons of Paired Adjusted Means and Scheffe's Confidence Interval Test Results on Explosive Strength

MEANS				Required C.I.
plyometric training Group	**Sprint Assisted training Group**	**Control Group**	**Mean Difference**	
10.41	9.95		0.46	0.50
10.41		8.83	1.58*	0.50
	9.95	8.83	1.12*	0.50

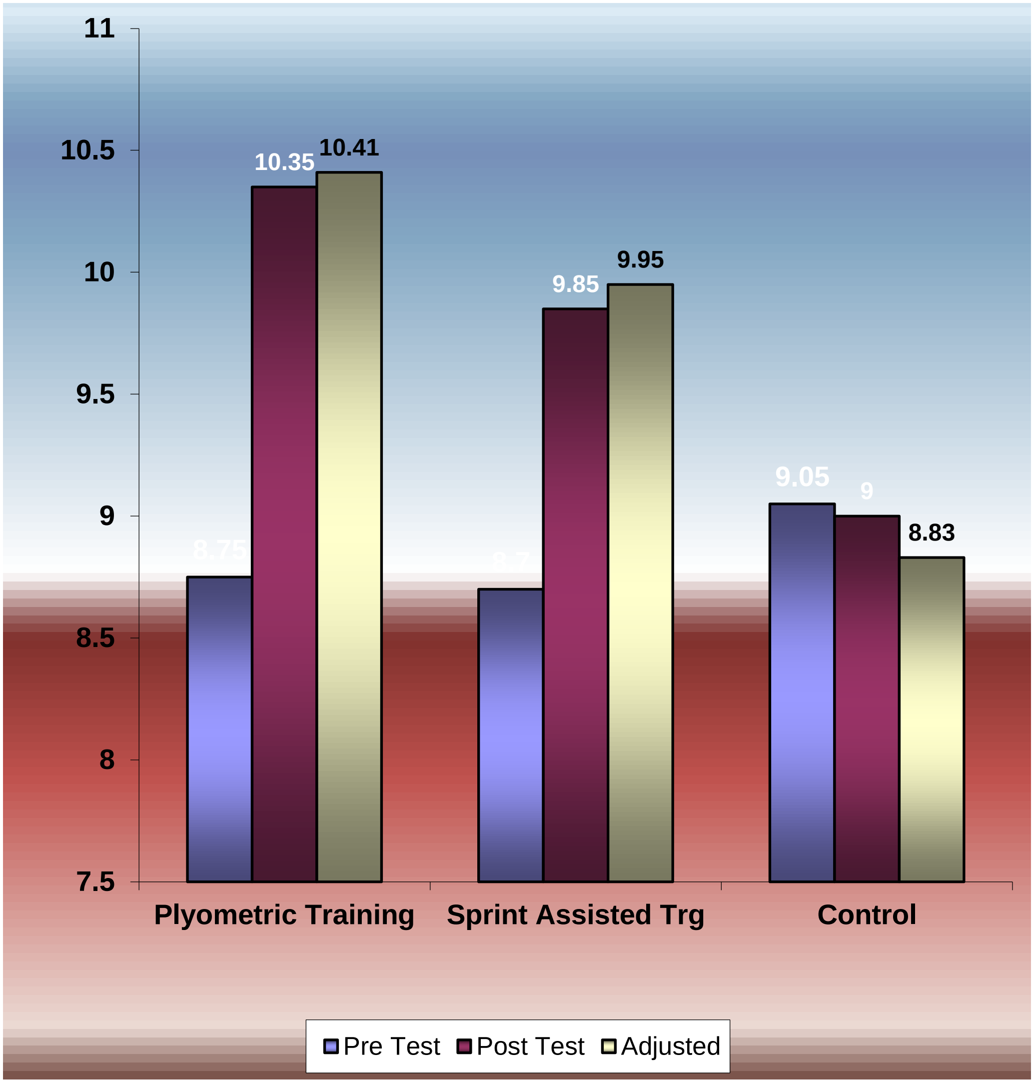
***** Significant

The post-hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between plyometric training group and control group (MD: 1.58). There was significant difference between Sprint Assisted training group and control group (MD: 1.12). There was no significant difference between treatment groups, namely, plyometric training group and Sprint Assisted training group. (MD: 0.46).

The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure-I

Figure-I

BAR DIAGRAM SHOWING PRE-TEST, POST-TEST AND ORDERED ADJUSTED MEANS ON EXPLOSIVE STRENGTH



DISCUSSIONS ON FINDINGS ON EXPLOSIVE STRENGTH

In order to find out the effect of plyometric training and Sprint Assisted training on explosive strength the obtained pre- and post-test means were subjected to ANCOVA and post-hoc analysis through Scheffe's confidence interval test.

The effect of plyometric training and Sprint Assisted training on explosive strength is presented in Table-I. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F-value 32.38 was greater than the required table F-value to be significant at 0.05 level.

Since significant F-value was obtained, the results were further subjected to post-hoc analysis and the results presented in Table-II proved that there was significant difference between plyometric training group and control group (MD: 1.58) and Sprint Assisted training group and control group (MD: 1.12). Comparing between the treatment groups, it was found that plyometric training was better than Sprint Assisted training in improving passing performance, however this difference was not significant among school level Long jumpers.

Thus, it was found that plyometric training and Sprint Assisted training were significantly better than control group in improving explosive strength performance of the school level Long jumpers.

CONCLUSIONS

The findings of the present study demonstrated that both plyometric training and sprint-assisted training produced significant improvements in explosive strength among school-level long jumpers when compared to the control group. The ANCOVA results indicated that the experimental groups outperformed the control group, confirming the efficacy of structured training interventions in developing explosive lower-limb power in adolescent athletes. Post-hoc analysis further revealed that while both training methods were effective, plyometric training elicited slightly greater improvements than sprint-assisted training, although the difference between the two experimental groups was not statistically significant.

These results suggest that incorporating plyometric and sprint-assisted drills into the regular training routines of school-level long jumpers can enhance their explosive strength, which is a key determinant of take-off power and jump distance. The study also highlights the importance of age-appropriate training protocols, as school-aged athletes are highly responsive to progressive overload and neuromuscular stimuli when carefully supervised.

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