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Effect of 6 Weeks Plyometric Training on Speed and Agility of Football Players

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Abstract: ***The study aimed to examine the impact of a 6-week plyometric training program on the speed and agility of football players. Twenty players from the Zeal football academy, aged 16 to 19, participated in the study. Speed was assessed through a 50-meter dash, while agility was measured using the T-test. The experimental group incorporated plyometric exercises into their regular training sessions, while the control group followed their usual training routine. Pre-training tests were conducted for both groups, and post-training tests were administered to evaluate the effects of plyometric training. The results showed a significant increase in speed among the experimental group compared to the control group, indicating that plyometric exercises positively affected the acceleration of football players. However, neither group showed significant improvements in agility, suggesting that plyometric training may not be effective in developing agility specifically. The study partially supported the hypothesis that plyometric training paired with football practice would improve both speed and agility. The study underscores the potential benefits of plyometric exercises for enhancing athletes' quickness and speed, but further research is needed to explore effective approaches for improving agility in football players.***

Keywords: Plyometric, Speed, Agility, T – Test, Pre Test, Post Test, Football, 50m sprint

1. Introduction

In spite of the way that there are numerous different games, football is the most prestigious in the globe. They appear to have a fan following that is unaffected by contrasts in race, language, age, and orientation. Alluding to it as the overall sport is in this way fitting.

B-ball and football are the main games that are well known with nearly everybody on the earth. In this large, wide planet, football is the game that is most preferred in our country. Regardless of not being one of the top footballing countries in Africa, Ethiopia has created various exceptional groups at the athletic association and global levels notwithstanding a few splendid individual players. Because of football's hazardous development in prominence, world class execution has become vital. Football is the most well-known sport on the planet, regardless of there being numerous others. They seem to have a fan base that rises above differentiations in variety, language, age, and orientation. Bearing the moniker "all-inclusive games." The main games that move almost everybody in the world are b-ball and football is hence genuinely capable. Football is the most well-known sport in our country as a piece of this huge world. Ethiopia has delivered a few excellent groups at the club and worldwide levels notwithstanding a few capable individual players, regardless of not being one of the top footballing countries in Africa. Football's quickly rising ubiquity actually wants first rate execution. For football trainers to prevail as players, they need different characteristics. These incorporate perseverance, muscle strength, adaptability, deftness, coordination, and strategic comprehension.

Football preparing requires expanding a player's speed of response, state of being, and consciousness of the basics of play and preparing. Football for men can work on its abilities by utilizing logical preparation strategies and deliberate arrangement procedures. Football is a truly requesting sport that is exemplified by unstable developments like handling, winding, and bouncing notwithstanding extreme focus running and runs over moderately brief distances.

Plyometric exercises, frequently known as "bounce preparing" or "plyos," are those wherein the muscles 2 agreement as fast as conceivable with their most prominent power to upgrade their power (speed-strength). With rehashed particular jumping, this preparing centers around consummating the speedy or "unstable" change from a muscle expansion to a constriction. Increment your solidarity and touchiness through plyometric preparing (PT). It includes performing actual activities that require the muscles to contract with their most prominent power for just a brief time frame to work on unique exhibitions. Many creators, sport science experts, and scholastics have talked about the advantages of plyometric work out. Enhancements in touchy power, speed, dexterity, snappiness (response time), strength, and coordination are among these benefits, as well as an expansion in sensory system awareness and reactivity. Since there hasn't been sufficient exploration on the subject, explicitly about what it means for these properties, the scientist really tried to figure out how plyometric preparing influences the speed, deftness, and response season of male football players.

1.1 Statement of the Problem

The problem statement highlights the underutilization of plyometric training by coaches in improving explosive moments in male football players, particularly in terms of speed, agility, and reaction time. Coaches often prioritize activities like ball work, team drills, and distance running, neglecting the importance of plyometric training. The researcher aims to explore how plyometric training specifically affects the speed, agility, and reaction time of male football players, as there is limited research on the subject.

1.2 The Purpose of the Study

Because it is challenging and impractical to perform research on all facets of football and fitness, the study's goal is to ascertain the effect of plyometric in training on speed, agility, and reaction time. The research was restricted to examining how plyometric exercise affected speed and agility due to the aforementioned considerations.

1.3 Objective of the Study

1) General objectives: To examine the effect of plyometric training on speed, agility of male football project players.
2) To investigate the effect of the plyometric training on speed of male football project players.
3) To test the effect of plyometric in training on agility of male football project players.

2. Literature Review

The literature review discusses the concept of plyometric training and its effects on athletic performance, specifically focusing on speed and agility. Plyometric training involves combining strength and speed of movement to enhance power in activities such as jumping, throwing, and running. Yuri Verkhoshansky, a Russian Olympic coach, played a significant role in the development of plyometric training by introducing the "shock" method and exploring deep jumping.

There are two variations of plyometric training: the shock method and the American approach. The shock method involves a rapid eccentric contraction followed by a concentric contraction, resulting in quick and explosive movements. The American approach focuses on any type of jump, regardless of the speed at which it is achieved. Although the transition from eccentric to concentric contraction takes longer in the American approach, it requires less intensity and precision.

Plyometric training combines the myotatic "stretch-reflex" with rapid voluntary muscle contractions. The term "plyometric" originates from the Greek words "plio" meaning "more" and "metric" meaning "to measure, " highlighting the goal of increasing power. Plyometric exercises, such as jumping, hopping, and skipping, are performed to improve dynamic muscle performance.

The training program of plyometrics involves rapid and repetitive stretching and shortening of muscles and connective tissues. The stretch-shortening cycle, which involves transitioning from muscle extension to compression, is the main focus of plyometric training. This cycle is characterized by three phases: the eccentric phase, the amortization phase, and the concentric phase. The eccentric phase involves stretching the muscles, followed by the amortization phase, which is a transitional period between eccentric and concentric contractions. Finally, the concentric phase involves the rapid concentric contraction that enhances muscle function.

Plyometric training aims to improve neuromuscular efficiency and motor learning. It enhances the reflexive properties of the neuromuscular system and increases power output, motor unit recruitment, firing frequency, and synchronization. Plyometric exercises optimize the body's ability to generate force in a short amount of time, making them beneficial for sports that require quick movements and reactions. The review emphasizes the impact of plyometric training on speed and agility. Plyometrics have been shown to improve sprinting speed and agility in team sports such as soccer, rugby, basketball, handball, and hockey. The elastic properties of muscle fibres and connective tissues are enhanced through plyometric exercises, allowing for the storage and release of energy during acceleration and deceleration phases. This leads to increased force production and speed.

Furthermore, plyometric exercises contribute to the development of agility by improving leg strength, muscle power, joint awareness, and overall proprioception. Agility is crucial in sports as it allows athletes to change direction quickly and maintain proper body alignment. Plyometric training can also prevent injuries by promoting optimal muscle activation and control. In conclusion, plyometric training is a valuable tool for athletes aiming to enhance their speed, power, and agility. It involves rapid transitions between eccentric and concentric contractions, optimizing neuromuscular efficiency and motor learning. Plyometrics have been shown to improve sprinting speed and agility, making them beneficial for various sports. By incorporating plyometric exercises into a training program, athletes can improve their overall performance and reduce the time spent on the ground during movements.

3. Methodology

The study focused on male football players between the ages of 16 and 19. The trial materials included cones, boxes of various sizes, measuring meters, chalk, stopwatch, whistle, pen, and paper. The researcher used primary data sources for this study. The researcher conducted a plyometric training program for a period of six weeks, three days per week. The training routine progressively increased in duration and complexity. The population consisted of 20 male football players. The exploratory group (EG) consisted of 10 players, while the control group (CG) also had 10 players. Individuals with significant illnesses or injuries were excluded from the study. Fitness assessments were conducted on both groups before and after the treatment to gather initial data. The 50-meter run test was used to measure speed, and the T-Agility test was used to measure agility. The researcher used quantitative data analysis and compared the results of the pre-and post-tests for each group. Group mean values and standard deviations were presented, and a paired-sample T-test was used to assess the variation between each experimental outcome. Protocols and measurements were followed to ensure data accuracy. Pre-test procedures were explained to participants, and tests were conducted before, during, and after the treatment to enhance the validity and reliability of the results. The researcher informed participants about the study and its goals. The control group was not subjected to any special training or treatments apart from their normal routine.

Overall, the methodology involved selecting and dividing participants into two groups, conducting a plyometric training program for the experimental group, measuring speed and agility using specific tests, collecting data before and after the treatment, and analysing the results using statistical methods. Data quality control measures were implemented, and ethical considerations were taken into account throughout the study.

50 M Speed Test

Pre-test 50m dash (experimental group)	Post test 50m dash (experimental group)
6.33	6.03
6.19	5.93
5.93	5.47
6.1	5.8
6.87	6.21
5.91	5.47
6.55	6.21
6.33	6
6.47	6.01
6.89	6.45

These are the timings of the 50m dash, which include both pre-test and post test of the experimental group. This data consists of 10 football subjects (experimental group)

Pre-test 50m dash (Control group)	Post test 50m dash (Control group)
6.33	6.31
6.19	6.17
5.93	5.85
6.1	6.01
6.87	6.55
5.91	5.88
6.55	6.45
6.33	6.27
6.47	6.4
6.89	6.8

These are the timings of the 50m dash, which include both pre-test and post-test of the control group. This data consists of 10 football subjects (control group)

T Test Agility

pre-test T test (experimental group)	post-test T Test (experimental group)
11.33	11.28
11.1	11.02
10.88	10.92
11.27	11.17
12.34	12.24
12.03	11.99
10.98	10.82
11.09	11.11
10.98	10.93
11.77	11.71

These are the timings of the T-Test, which includes both pre-test and post-test of the experimental group. This data consists of 10 football subjects (experiment group)

Pre-Test T test (Control group)	Post Test T test (Control group)
11.44	11.4
11.96	11.89
11.75	11.69
11.54	11.44
11.47	11.29
11.33	11.1
12.97	12.1
10.98	11.03
10.88	11.06
12.06	11.93

These are the timings of the T-Test, which includes both pre-test and pro test of the control group. This data consists of 10 football subjects (control group)

4. Results and Analysis

The analysis provided discusses the results and findings of a study on the impact of plyometric training on the speed and agility of football players. The study included 20 football players who volunteered to participate in the research. The participants were divided into two groups: the experimental group (EG) and the control group (CG), with each group consisting of 10 members.

The experimental group underwent plyometric training three days a week for six weeks in addition to their regular soccer-related activities. The control group did not receive any plyometric training. Both groups underwent a 50-meter run speed test and a T-test before and after the training program, and the results were recorded.

The analysis focuses on the results of the experimental group and the control group separately.

1) Analysis of the Experimental Group (EG):
Speed Test: The average pre-test time for the experimental group was 6.357 seconds, and the average post-test time was 5.958 seconds. This suggests that the participants in the experimental group improved their 50-meter run speed after the intervention.

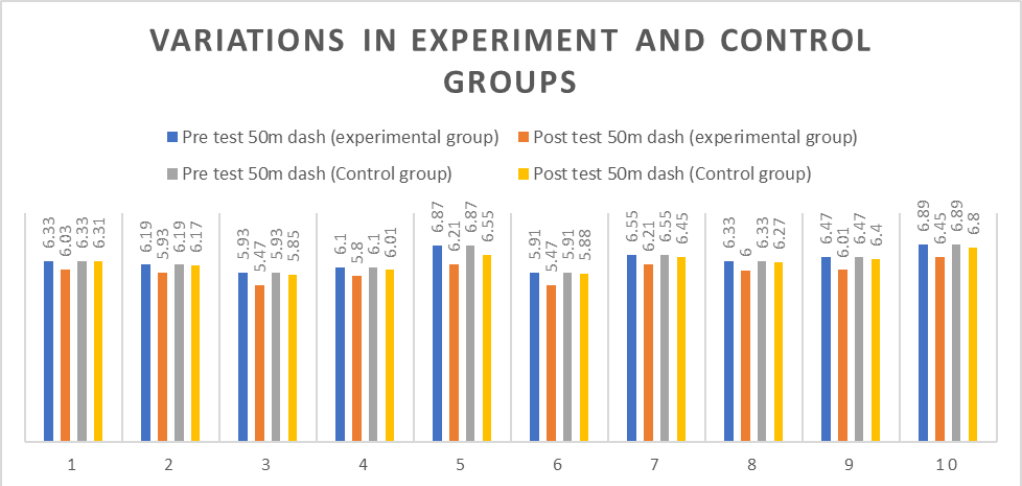
	Pre-test 50m dash (experimental group)	*Post test 50m dash (experimental group)*
Mean	6.357	5.958
Variance	0.119423333	0.097862222
Observations	10	10
Pooled Variance	0.108642778	
Hypothesized Mean Difference	0	
df	18	
t Stat	2.706808099	
P(T<=t) one-tail	0.007220639	
t Critical one-tail	1.734063607	
P(T<=t) two-tail	0.014441279	
t Critical two-tail	2.10092204	

T-Test Analysis: The analysis conducted a paired sample T-test to determine the significance of the difference between the pre-test and post-test means. The calculated t-value was 2.706808099, and the p-value was 0.007220639. The p-value being below the significance level (usually 0.05) indicates high evidence against the null hypothesis, suggesting that the observed difference is statistically significant. The conclusion is that the intervention had a significant impact on improving the post-test performance compared to the pre-test.

2) Analysis of the Control Group (CG):
Speed Test: The analysis states that there is no statistically significant difference between the pre-test and post-test averages for the control group. The average pre-test time was 6.357 seconds, and the average post-test time was 6.269 seconds.

	Pre-test 50m dash (Control group)	*Post test 50m dash (Control group)*
Mean	6.357	6.269
Variance	0.119423333	0.090698889
Observations	10	10
Pooled Variance	0.105061111	
Hypothesized Mean Difference	0	
df	18	
t Stat	0.607081054	
P(T<=t) one-tail	0.275689448	
t Critical one-tail	1.734063607	
P(T<=t) two-tail	0.551378895	
t Critical two-tail	2.10092204	

T-Test Analysis: A paired sample T-test was conducted to assess the significance of the difference between the pre-test and post-test means. The calculated t-value was 0.607081054, and the p-value was 0.275689448. Since the p-value is greater than the significance level, there is no evidence to reject the null hypothesis, indicating that there is no significant difference in the mean performance of the control group.



The analysis presents the results of a t-test performed on two independent samples to examine the effect of plyometric training on agility. The first part of the analysis focuses on the experimental group, while the second part examines the control group.

3) Experimental Group Analysis

- The pre-test mean score for the experimental group was 11.377, and the post-test mean score was 11.319, suggesting a small average decrease in scores between the two tests.
- The variation in scores is measured by the pre-test and post-test differences, which were 0.240854444 and 0.249245556, respectively. The smaller post-test difference indicates less change compared to the pre-test.
- There were ten participants in both the pre-test and post-test groups, indicating a random selection of ten members from each group.
- Assuming equal variances between the two groups, the pooled variance is estimated to be 0.24505, which represents the average variability in the data.
- The hypothesized mean difference is 0, indicating that no difference was expected between the pre-test and post-test means.
- The degrees of freedom, which represent the number of independent pieces of information available for estimating statistical parameters, is calculated to be 18.
- The estimated t-statistic, measuring the variability within the groups relative to the difference between the means, is 0.261990559.
- The one-tail probability associated with the t-statistic is 0.398151688, representing the likelihood of encountering a t-value as extreme as the observed t-statistic assuming no difference in means.
- The one-tail critical value for the t-test, determined based on the degrees of freedom and chosen significance level (usually 0.05 or 0.01), is 1.734063607.
- The two-tail probability associated with the t-statistic is 0.796303376, indicating the probability of encountering a t-value in either tail as extreme as the observed t-statistic.
- The two-tail critical value for the t-test, used in a two-tailed test where significance is not predetermined, is 2.10092204.

Based on the t-test results, there is no statistically significant difference between the pre-test and post-test means in the experimental group. The observed t-statistic (0.261990559) is lower than both the one-tail critical value (1.734063607) and the two-tail critical value (2.10092204), indicating that the observed difference is not statistically significant. It is important to note that additional information, such as the specific study subject, significance level, and effect size, would be needed for a more comprehensive interpretation of the results.

Control Group Analysis:

- The control group analysis also involves a two-sample assumption of equal variances t-test, comparing the means of the pre-test and post-test scores.
- The pre-test mean score for the control group was 11.638, and the post-test mean score was 11.493, suggesting a decrease in scores from the pre-test to the post-test.
- The pre-test variation (control group) was 0.360884444, while the post-test variation (control group) was 0.151645556. These values indicate some variability in scores within both groups, with slightly higher variation in the pre-test group.
- There were ten observations in each group (pre-test and post-test) for the control group.
- The pooled variance, representing the common variation between the two groups, is estimated to be 0.256265.
- The hypothesized mean difference for the control group is 0, implying no expected difference between the pre-test and post-test means.
- The degrees of freedom for this analysis are 18.
- The t statistic for the analysis is 0.640484106, representing how much the sample mean differs from the sample variation.
- The one-tail probability associated with the t-statistic is 0.26496391, indicating the likelihood of obtaining a t-value as extreme as the observed t-statistic assuming the null hypothesis is true.
- The one-tail critical value for the one-tailed test is 1.734063607.
- The two-tail probability associated with the t-statistic is 0.52992782, representing the probability of obtaining a t-value as extreme as the observed t-statistic assuming the null hypothesis.

- The two-tail critical value for the two-tailed test is 2.10092204.

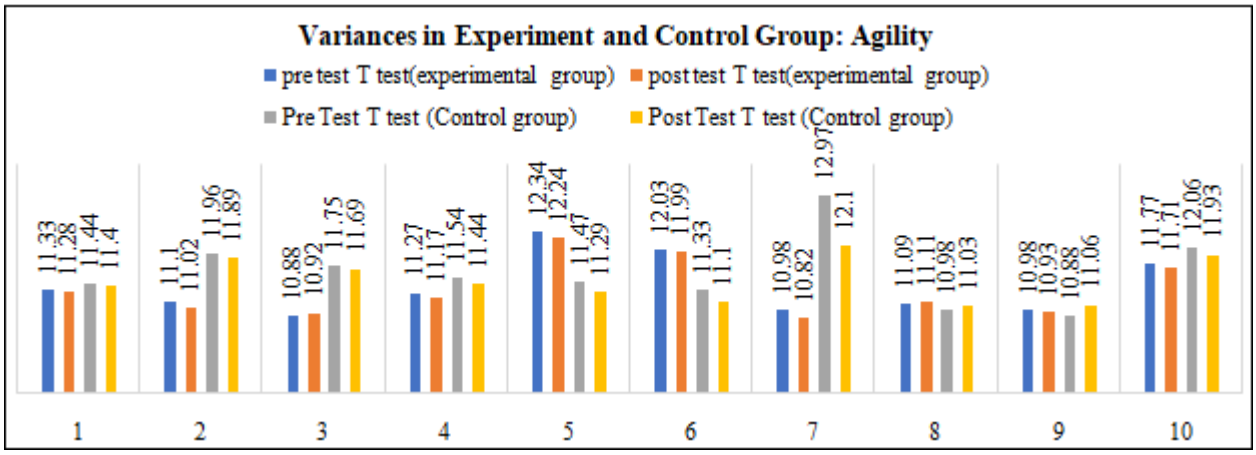
Based on the t-test results, there is no statistically significant difference between the pre-test and post-test means in the control group. The observed t-statistic (0.640484106) is lower than both the one-tail critical value (1.734063607) and the two-tail critical value (2.10092204), indicating that the observed difference is not statistically significant. The p-values (0.26496391 for one-tail and 0.52992782 for two-tail) further support the conclusion that there is no significant difference between the pre-test and post-test scores for the control group.

Analysis of Control Group

T-Test: Two-Sample Assuming Equal Variances

	Pre Test T test (Control group)	*Post Test T test (Control group)*
Mean	11.638	11.493
Variance	0.360884444	0.151645556
Observations	10	10
Pooled Variance	0.256265	
Hypothesized Mean Difference	0	
df	18	
t Stat	0.640484106	
P(T<=t) one-tail	0.26496391	
t Critical one-tail	1.734063607	
P(T<=t) two-tail	0.52992782	
t Critical two-tail	2.10092204	

In summary, the analysis suggests that the plyometric training did not have a statistically significant effect on agility in both the experimental and control groups. The observed differences between the pre-test and post-test scores were not large enough to be considered significant based on the t-test results. However, it is important to consider additional contextual information and further research to gain a comprehensive understanding of the findings.



5. Summary

The current study set out to determine how plyometric exercise affected the speed and agility of football players. Twenty football players from the Zeal football academy, ranging in age from 16 to 19, took part in the current study, which employed a multi-stage sample methodology. Results from the 50-meter dash for speed and the T-test for agility were recorded prior to the training. They added 50 minutes of plyometric exercise to their three weekly sessions of conventional football project training over the course of six weeks on the experimental gym. For the football project, participants in the control group just followed their normal training schedule.

The tests were also recorded before the training programme, and the researcher documented the post-test findings for both groups after the training in accordance with the procedure. The effects of a 6-week plyometric training programme on the growth of football players' speed and agility were evaluated using a paired T test for both between-groups and within-group comparison. In comparison to the CG group, there was a considerable increase in speed in the EG group. It indicates that plyometric exercise had a beneficial effect on accelerating football initiatives. However, neither the EG nor the CG groups significantly improved in terms of agility. This suggests that developing agility in football projects through plyometric training was ineffective. In the present study, the researcher proposed the hypothesis that players' speed and agility would improve after six weeks of plyometric training paired with football practise. Based on the main finding and the study's probable limitations, the following statement was made as a conclusion: It was demonstrated that six weeks of plyometric training increased the speed of football players based on the outcomes of the 50-meter dash speed test and

the most recent research. According to the results of the current study, plyometric exercise did not significantly increase football players' agility when compared to only practising their sport. The study's results generally demonstrated how plyometric exercise might improve athletes' quickness and agility.

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