

# Effects of Plyometrics, Agility, and Resistance Training on A Football Athlete's Fitness Assessment: A Case Study Report

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**ABSTRACT** The purpose of this training programme was to enhance the performance and skills of the participating players through a structured training programme. The training programme consisted of a combination of physical exercises: plyometric, agility, and resistance training. The training sessions focused on improving key aspects such as agility, strength, and to improve stamina. This is a prospective study which is our case followed over time and data about his training. This training programme resulted in an increase in cardiovascular, muscular endurance and agility based on pre-fitness tests and post-fitness tests. In conclusion, our subject gained strength and increased his agility after following this training programme. However, some fitness tests that were measured decreased after our subject followed this training programme such as power. This training programme appears to be an effective method to increase footballers' performance on the field.

**Keywords:** Plyometrics, Agility training, Resistance training

## 1. INTRODUCTION

Any athlete should put in extra effort if they want to succeed at the highest levels in their sport. One of the components of it to attain tremendous success is physical fitness. There are four major components that make players stronger and more equipped to reach high levels of achievement in sports: preparation for physical health, preparation for technical events, preparation for tactics, and psychological preparation. Physical training increases an athlete's functional potential and helps in the development of their motor skills, which increases their velocity.

The authors focused on plyometric, agility, and resistance training to help an athlete improve his abilities in football. Plyometrics is a kind of training to ensure fast, powerful movements and improve the nervous system's functions, as in general to improve sports performance. Plyometrics are conditioning methods used to improve intensity and explosivity for athletes. Agility is the capability to hold or monitor the location of the physique by moving rapidly in a variety of movements. Agility is the ability to start quickly, slow down, change directions, then speed up again while maintaining body control and slowing down velocity. Resistance training builds muscle strength by challenging your muscles to work against a weight or force. Resistance training could be done using free weights, weight machines, resistance bands, or your own body weight.

The aim of this case study was to improve football player fitness by a duration of only 4 weeks of training, divided into plyometrics, agility, and resistance training each day, which was 3 days of training in a week. The primary purpose of conducting this study was to assist the

development of a football athlete in improving his pre-test and post-test results of fitness. The second outcome was to observe the effects of integrating in divided 3 types of training each 3 days in every week.

## **2. METHOD**

In this case study, we use fitness form assessment to help collect the data from the pre-test, during the training session, and post-test of an athlete's fitness result.

The intervention of plyometrics, agility, and resistance training were applied in this study to help a football athlete improve his fitness, skills, and tactics for the next competition. The training programme had been made into 4 weeks of training, each day with different types of training that had been listed. It started with plyometrics training on Sunday 6 exercises which were skater jumps, tuck jumps, squat jumps, plyometric clap push-ups, lunge jumps, and triple broad jumps. Then proceed to Wednesday, agility training with 5 exercises which contain acceleration and deceleration run, shuttle run, lateral run, crosshairs, and diagonal square. Resistance training was done every Friday, it consisted of 7 exercises which were barbell squat, dumbbell lunges, leg press, leg extension, leg curl, calf raise, and plank. All these exercises were done on the listed days and ongoing for 4 weeks of training sessions for this case study. Before this training programme was specified, the intensity and frequency of this training had been calculated using the Karvonen Formula, this is so the athlete could suit himself in the training session easily and to avoid any major accidents or injuries happening while doing them. The athlete was required to fill a fitness test form for the pre-test and post-test.

## **3. RESULTS**

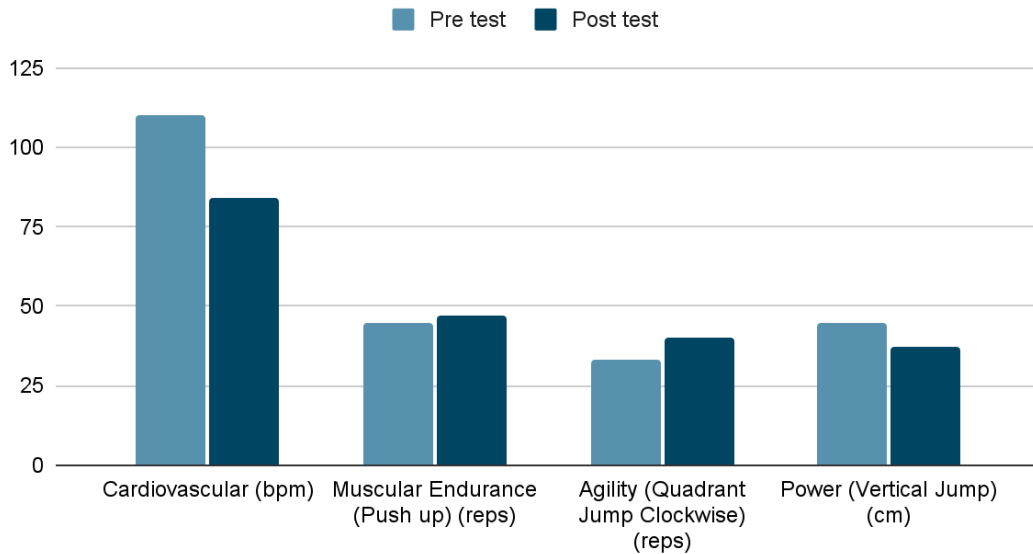
### ***Client Descriptions***

In order to carry out this case study, we have chosen a male student to be used as a sample to ensure whether this study is successful or not. His name is Sufi Azfar who is 21 years old. His weight is 72 kg, and his height is 166m. The waist circumference is 77 cm and hip circumference are 97. He is a sports science student at UPSI. The cost taken is a sports rehabilitation. He is an athlete in various sports, but his main sport is football. In football, he plays in the right back position. He also has a medical history that happened recently, his finger was broken during playing football. However, his health during this exercise has been at a very good level. We chose him as a subject to this case study because the training we conducted was very suitable for improving his performance in the football game.

### ***Client Needs Analysis***

In this study case, we aim to improve the athlete's skills in terms of agility, muscle strength, and muscle endurance. This is because all these aspects are very necessary to be a good football player. So, in this study, we have provided training that will improve all aspects that are important for a football player. Whether this study was successful or not, we did a test before and after the training. We use the fitness assessment which consists of pre-test and post-test fitness results. Before doing the pro test, the athlete was assigned to follow the training schedule that we have prepared for 4 weeks. In this study, the study is in the form of resistance band training, plyometric training, and agility training. It is because both of the training can improve muscle endurance, power, cardiovascular, and agility

***Fitness Test Results***



**Chart 1.** Fitness pre and post-test results

***Exercise Programme Intervention Plan***

**Table 1** Exercise programme intervention plan for the chosen day in 4 weeks

<b>DAY 1: PLYOMETRICS TRAINING</b>	<b>DAY 2: AGILITY TRAINING</b>	<b>DAY 3: RESISTANCE TRAINING</b>
<ul style="list-style-type: none"> <li>● Skater Jumps</li> <li>● Tuck Jumps</li> <li>● Squat Jumps</li> <li>● Plyometric Clap Push-Up</li> <li>● Lunge Jumps</li> <li>● Triple Broad Jumps</li> </ul> <p><b>Intensity:</b> 70%  <b>Reps:</b> 10  <b>Sets:</b> 3  <b>Rest:</b> 90 seconds between sets</p>	<ul style="list-style-type: none"> <li>● Acceleration and Deceleration Run</li> <li>● Shuttle Run</li> <li>● Lateral Shuffle</li> <li>● Crosshairs</li> <li>● Diagonal Square</li> </ul> <p><b>Intensity:</b> 70%  <b>Reps:</b> 5  <b>Sets:</b> 1  <b>Rest:</b> 90 seconds between sets</p>	<ul style="list-style-type: none"> <li>● Barbell Squat</li> <li>● Dumbbell Lunges</li> <li>● Leg Press</li> <li>● Leg Extension</li> <li>● Leg Curl</li> <li>● Calf Raises</li> <li>● Plank</li> </ul> <p><b>Intensity:</b> 80%  <b>Reps:</b> 10  <b>Sets:</b> 3  <b>Rest:</b> 90 seconds between sets</p>

*\*Follow the intervention plan until the 4th week*

### ***Expected Outcome of The Intervention Plan***

By planning a training programme for our athletes, we are expecting the athlete to get a better increase during the post-test since we already specified the training programme based on the positions of athletes in football. As you can see the result for the fitness test during the pre-test is not good, so we do a training programme such as resistance band, plyometrics, and agility to help the athletes to get a better result for the fitness test on post-test. This programme training basically focuses on improving cardiovascular, muscular endurance, power, and agility. A better result for a fitness test will help the athletes to get a better performance when he plays football during tournaments. Other than that, we also expect our athletes to increase by around 8 to 10 points for each fitness test post-test since the training programme that we already do is based on football training.

### ***Actual Outcome***

A central tenet in judgement and choice research is that a good outcome does not necessarily imply a good decision process (Baron, 1985; Hastle & Dawes, 2009). It follows that it is unwise to assess decisions based safely on outcomes. We administer pre and post-tests to athletes. We use fitness assessments that have an emphasis on strength, power, agility, and muscular endurance. We discovered that not all fitness tests were improved by athletes based on the results. Due to the athlete's decreased energy and stamina caused by injury during the training session, the outcome of the power (vertical jump) test is decreased. However, there was an improvement in the agility metrics. The element that improved a lot in this assessment is the cardiovascular test, the athlete's heart bpm gets better than the pre-test. The post-test results for muscular endurance (push-ups) are a little bit higher than pre-test. Athletes' fitness assessments are based on the exercise programme intervention strategy. This fitness test helps athletes become more disciplined in their everyday training and can advance them later on match day.

## **4. DISCUSSIONS**

This will be, to our knowledge, the first research to assess the effects of plyometrics, agility, and resistance training on a football athlete's fitness assessment who played multiple sports at a young age. This is categorised as good reporting about how these 3 types of intervention training can influence the particular outcomes of an athlete's fitness assessment. In our case study, we observed that the athlete's improvement from pre-test to post-test was up by only 85%. This result takes place in mostly increasing but unfortunately there was a test that faced decreased, it was caused by injuries that happened to the athlete during these training sessions which involved his lower limbs. His injuries were knee abrasion and groyne injury. As mentioned earlier in this study, the athlete is involved in multiple sports other than his main sport, which is football, he got injured during his 400 metres hurdles match in the third weeks of his training session. Due to that reason, it resulted in low progress in his improvement training session.

By observing the fitness assessment done by the athlete considering his injuries, the results of his cardiovascular test were even better than the pre-test, which was 110 bpm, then it improved to 84 bpm. This training proved that his cardiac output (Q) has increased resulting in good in his normative data for cardiovascular test. Next, the athlete's muscular endurance has also improved a little better than the pre-test, it went from 45 repetitions of 1-minute push-ups to 47 repetitions after 4 weeks of training session. It is clear that high-intensity resistance training over a period of time causes increases in skeletal muscle mass in humans (McDonagh and Davies, 1984; Jones and

Rutherford, 1987). The athlete also has improved in the agility test despite his injuries, resulting in 33 repetitions for the quadrant jump test in the pre-test, then it went up to 40 repetitions for post-test. The plyometrics exercises must have helped a lot even though he experienced injuries during this post-test. The last element tested in this fitness assessment is power, which results in lower than the pre-test. It went from 45 cm in vertical jump test to 37 cm in the post-test. The athlete may have experienced fatigue and pain during this assessment because the power test was the last test, he did on the post-test fitness assessment day. Injuries on the lower limbs of the athletes resulted in decreases in his power fitness assessment.

## 5. CONCLUSIONS

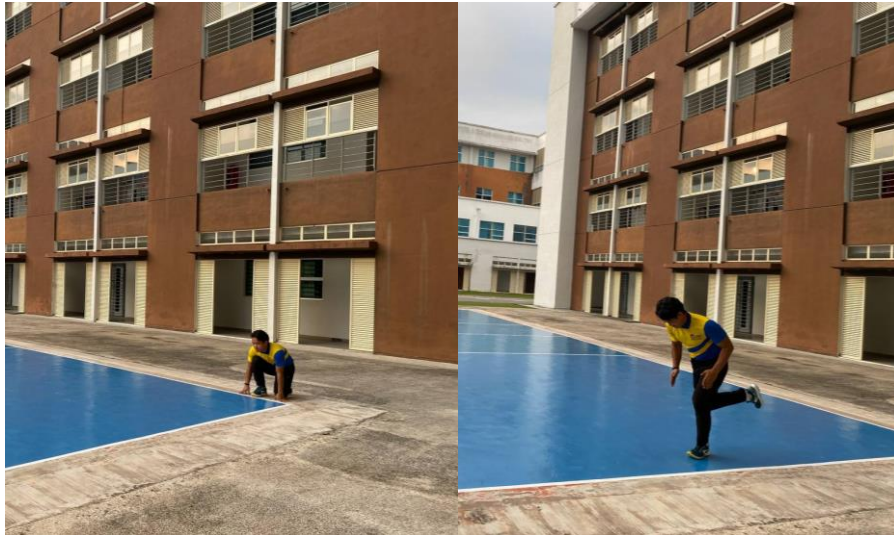
This training program represents a positive impact on cardiovascular, muscular endurance and agility after 4 weeks of the programme. The above case study report concluded the training programme is beneficial to increase muscular endurance and speed and agility and make the subject performance increase in his sport respectively. Other athletes or coaches can use this training program to increase their performance level. Furthermore, for future studies, athletes or subjects should be more careful and cautious in their training and match days. Any incidents that involve getting injuries could affect the results of the case study. The training programme may become less reliable for people to use in their training.

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## APPENDIX

### *Pictures of Subject*



**Picture 1.** Athlete during pre-test of fitness assessment



**Picture 2.** Athlete doing post-test of fitness assessment



**Picture 3.** Athlete implementing his training programme session