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Development Of Strength And Power Through Plyometric And Resistance Training In Rugby Players

Sumaira Hanif [1], Aqsa Shamim Ahmed[1], Shahzaman Khan[2], Aqsa Ijaz[1], Mufeez Alam[1], Muhammad Farhan Tabassum[1*]

[1]Department of Sports Sciences & Physical Education, Faculty of Allied Health Sciences, University of Lahore, Lahore, 54000, Pakistan.
[2]Department of Physical Education, Sukkur IBA University, Sukkur, Pakistan.
[*]Corresponding Author: Muhammad Farhan Tabassum, farhanuet12@gmail.com

Abstract: The goal of this research was providing a technique for enhancing female rugby players' strength and power by employing the plyometric and resistance training. The training by these two methods enhanced the performance of the rugby athletes. Resistance training and plyometrics training combined improves the athlete's higher rate of force and endurance development and rapid speed movements also improved long contractions. This experimental research was conducted to examine the effects of plyometric and resistance training on muscular strength and power development of Rugby players. Female Rugby players (n=40) participated in the study. Simple random sampling was used. Data was analyzed using SPSS version 23. Paired Sample T-Test was applied to examine the pre-test and post-test height of vertical jumps of female rugby players before and after training. Paired sample T-test analysis was also conducted to examine the difference in weightlifting of female rugby players before and after intervention. The results indicated that after the intervention a noticeable difference was observed in the height of vertical jumps significant difference before training (M=9.13; SD=1.24) after training (M=12.93; SD= 1.36) significant difference between weightlifting before training (M=22.35; SD=3.64) after training (M=26.90; SD= 4.16). This approach was thought to be beneficial in assessing rugby players' strength and power. Consequently, it is recommended that plyometric training and resistance training are significant and beneficial for improving the athlete's muscular strength and his muscular power development.

Keywords: Rugby players, Plyometric Training, Resistance Training, Strength, Power.

Introduction

Rugby is played in 37 nations worldwide. Rugby players must self-register (ChartsBin, 2022). Rugby is a multifaceted sport. It is designed as an intrusive game, as well as a rare ender game. Many high-intensity actions are also incorporated into the Rugby merger. (Trajkovi and colleagues 2020). Rugby requires both quick and strong movements, and players are increasingly expected to execute with both (Blazevich, 2020). Each players unique ability can be frequently expanded and improved through Traditional rugby training (Pearson, 2021). Developing speed, agility, and power all at the same time is the aim of traditional rugby training. Backs who tackle with the force of forwards and forwards who run like backs are common in modern rugby. A rugby pitch is 100 meters long and 70 meters wide between the try-lines. The typical length for this game is 80 minutes, which is divided into 40-minute segments. The incorporation of plyometric exercise into running training programs seemed unavoidable because of its emphasis on speed and power (Chu, 1992). The cutting edge for explosive power athletes had remained throughout the almost 50-year history

of plyometric training (or "stretch-shortening" training, as it was originally named) (Young, 2022). Throwers, sprinters, and jumpers (the original goal for plyometrics) have benefited greatly from the practice (Siff & Verkhoshansky, 2018: 290-306).

Other sports are destined to reap the advantages of plyometrics' as its application to other sports is well progressed and has surpassed its initial sphere. When it comes to national monitoring of this game, 30 minutes is the maximum amount of time that may be played during the entire game session. The overall number of participants in this game is 15, with eight attackers and seven surviving players. For example, we observe the offensive side occasionally taking control of the crowd, while the opposition team may take advantage of a ball-tossing chance if an error occurs throughout the game. The main purpose of the game is to score more points than your opponent. As a result, players must be able to defend successfully when moving beyond the advantage line (Ungureanu et al., 2019). In a professional match, the various exchanges between team members and their opponents might be fairly surprising. As a result, players must constantly adjust to shifting environments, and their responses must be quick and efficient. If the orientation of the rugby union modifications, if they try to attack the opponent behind the line, if the opposing team tries to put pressure on the front players, or if they try to move the ball forcefully, the scene of the game may change. These reactions to various stimuli have been hypothesized to be a component of reactive agility (Sheppard et al., 2006).

High levels of strength and power are required for good performance in Rugby Union (Argus, 2020). Athletes that are bigger, stronger, quicker, and further powerful are probable to be greater effective withinside the bodily factors of the game, alongside dominating the breakdown, prevailing collisions, and making the gain-line. In addition, stronger, greater powerful athletes are more likely to be effective in sections of the game in which physical dominance boosts the chances of retaining possession, recovering (or turning over) the ball, and breaching the protecting line (Adams et al., 1992).

Rugby overall performance, like many different sports, is multidimensional, now no longer simply physical but additionally tactical and technological components. As a result, the dependability of a test that tries to encompass several dimensions of usual overall performance isn't always possible to be good. As a result, coaches and researchers regularly rent surrogate measures and gym-based strength and energy physical games to evaluate the bodily additives in isolation (Ahtiainen et al., 2019). For example, a three-repetition maximum (RM) has often been decided on in research evaluating Rugby Union athletes to determine maximal strength levels with the aid of using the usage of versions of the bench press and squat physical games (Allerheiligen et al., 2018). Likewise, researchers have considerably applied peak or mean energy generated at some stage in jumping or throwing sports activities to determine muscle strength levels. Although maximal strength and energy assessments are not direct measurements of athletic ability, they are ideas to reflect bodily usual overall performance attributes indicative of playing potential (Anderson et al., 2018).

Rugby Union individuals have become out to be heavier, and their backs have grown higher for a motive that sport's professionalization in August 2018. (Hanson et al., 2018). Furthermore, among 2020 and 2018, professionals (e.g., provincial and worldwide representatives) had a median improvement in strength (anticipated 1RM) of 3-five percentage for the better frame and 5-15 percentage for the reduced frame (Harris et al., 2022). It has been proposed that the size and strength inequalities located recommend the charge at which the muscularity of Rugby gamers four is rising (Harris et al., 2018). These changes might be attributed to increased training loads

and improved dietary and recuperation practices that have come with professionalism (Harris et al., 2018).

Characteristics of strength and strength in rugby union are indexed as (i) examining variations in strength and strength in rugby union athletes at specific stages of opposition and (ii) figuring out the hyperlink among metrics of strength and strength in rugby union athletes at specific stages of opposition (iii) describe the outcomes of quick pre-season training on the strength and strength of rugby union athletes describe the outcomes of an in-season training software on the strength and strength of rugby union players and (iv) Determining the correlates of strength and strength extrude in expert rugby union athletes for the duration of a training period (Newton and Kraemer, 2018). However, to physically prepare younger athletes for opposition or development to a better stage of resistance, the present stages of energy and strength in every opposition stage need to be quantified first. To strengthen young athletes, the essential exercise observed is plyometric and resistance training (Vervoorn et al., 2022).

Plyometric training is a fast, powerful movement that consists of a series of reactive exercises and an eccentric contraction followed by an explosive concentric contraction. Plyometrics is a shape of exercise training that builds muscular electricity with the aid of using numerous the tempo and stress of numerous exercises. Plyometrics exercise can beautify your typical physical overall performance and ability to do masses of tasks. Push-ups, throwing, sprinting, leaping, and kicking are all examples of plyometric exercises. Plyometrics are often used by athletes in their education, despite the fact that one's exercises may be done with the resource of the usage of anybody. After a twist of destiny or injury, human beings in bodily rehabilitation make use of plyometrics to get once more into form and function (Robinson, 2020).

Plyometrics is a type of exercise training that increases muscle strength by altering the rate and force of various activities. Plyometrics training can improve your physical performance and ability to do various jobs. Plyometric workouts include push-ups, throws, runs, jumps, and kicks. Athletes commonly use plyometric exercises in their training, although anyone can perform these routines. Plyometrics is used in physical rehabilitation after an accident or injury to help people regain form and performance. Some latest studies in the field of physical educations have been reported in (Aamina et al., 2020; Aqsa et al., 2020; Aqsa et al., 2021; Farwa et al., 2021; Hira et al., 2021; Iqbal et al., 2019; Rabia et al., 2021; Saadia et al., 2021; Salma et al., 2020; Sana et al., 2021; Threem et al., 2020)

Objectives of study: 1) To examine the effects of plyometric resistance training on Rugby players muscular strength. 2) To study the plyometric resistance training effects on power development of Rugby players.

Hypotheses of study: H_1: There were significant effect of plyometric resistance training on muscular strength of rugby players. H_2: There were significant effect of plyometric resistance training on power development of rugby players

Research Methodology

The study was based on a pre and post-test nature of the experimental research design with an experimental group. The training program lasted for 6 weeks, in which all subjects exercised 3 days per week. A simple Random Sampling Technique was employed. 40 rugby national female volunteer athletes of Lahore Hawks Rugby Club, Defense rugby club and falcon rugby club were selected for the study. Pre and post-test were taken through One-repetition maximum(1RM) and Vertical jump test. Through pre and post testing determined the strength and power development of young female rugby players.

Research Design: The study was based on a pre and post-test nature of the experimental research design with an experimental group. The training program lasted for 6 weeks, in which all subjects exercised 3 days per week.

Sample Size: A total number of 40 Rugby National female athletes were recruited.

Population: All rugby female athletes were recruited from Lahore's rugby club (Lahore Hawks Rugby club, Defense rugby club and falcon rugby club)

Data Collection Tools: The tools for this study for collecting the data were 1RM bench press and vertical jump.

Results

The following chapter contains the study's descriptive information, the findings of the paired sample T-test. The tests were carried out to investigate the current study's hypothesis.

The mean and standard deviation of continuous variables, as well as frequency and percentage for categorical variables, are provided in the study. The descriptive information is presented in table 1.

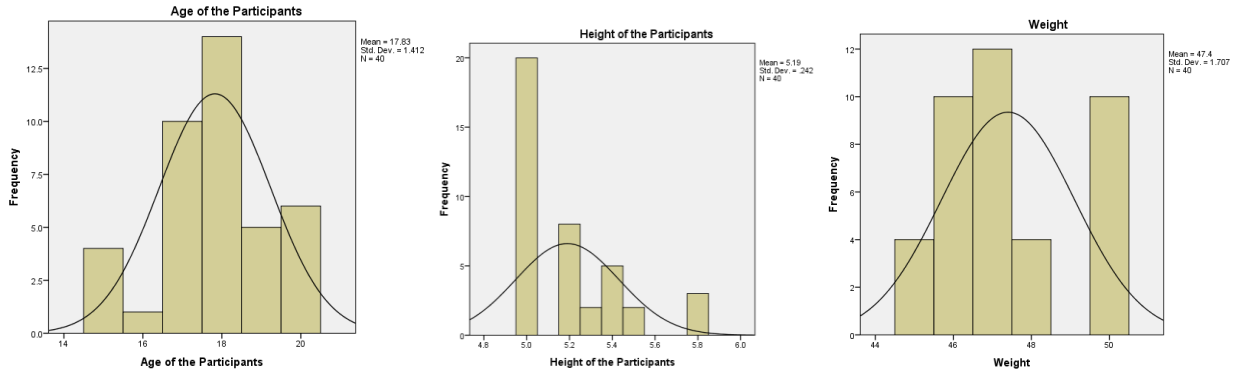
Table 1 Descriptive Information

Demographics	M	SD
Age	17.83	1.41
Height	5.19	.24
Weight	47.40	1.70

M= Mean, SD= Standard deviation

Table 1 reveals that females (n=40) participated in the study from different institute backgrounds i-e national and international.

Figure 1 Histogram of the age, height and weight of participants



Paired sample T-test was conducted to examine if plyometric and resistance exercise enhances strength and power in rugby females' players in vertical jumps and upper body. Paired Sample T-Test for vertical jumps. The paired sample t-test is conducted on height before the intervention and after the intervention in vertical jumps. Table 5.2 displays the overall results of all participants.

Table 2 Mean differences of paired sample T-test (n=40)

	M	SD	95% CI		p	T
			LL	UL		
Pre-Test - Post Test	3.75	.98	4.06	3.4	.000	24.18

M= mean, SD= Standard deviation, CI= Confidence Interval

A paired-samples t-test was used to determine the effect of training on the strength and power of rugby players. The results indicate a significant difference between height before training (M=9.13; SD=1.24) and height after training (M=12.88; SD= 1.36) in vertical jumps The 95% confidence interval of the difference between the means indicates a difference between the means of the height in jumps. Furthermore, it can be concluded that plyometric and resistance intervention/ training enhances vertical jumps of female rugby players. Paired Sample T-Test for 1RM Upper Body Strength

The paired sample t-test is conducted on carrying wight before the intervention and after the intervention in weightlifting. Table 5.3 displays the results.

Table 3 Mean differences of paired sample T-test (n=40)

	M	SD	95% CI		P	T
			LL	UL		
BPre-Test - BPost Test	4.50	.67	4.7	4.3	.000	42.47

M= mean, SD= Standard deviation, CI= Confidence Interval

A paired-samples t-test was used to determine the effect of training on the strength and power of rugby players. The results indicate a significant difference between weightlifting before training (M=22.35; SD=3.64) and weightlifting after training (M=26.90; SD= 4.16) in bench weightlifting the 95% confidence interval of the difference between the means indicates a difference between the means of the weightlifting i-e participant was able to carry more weight after training. Furthermore, it can be concluded that plyometric and resistance intervention/ training enhances strength and power in upper bodies of female rugby players.

Discussion

In the current study, the impact of plyometric and resistance training on vertical jumps and the strength of the body are investigated. The study highlights that plyometric and resistance theory increases strength and power of adolescent female rugby players in short period of time. As plyometrics are hard workouts that promote muscular growth and a reduction in body fat percentage. Combined resistance and plyometric training enhance the muscular endurance, increase muscular strength and also increase and enhance the power development of muscle, which helps the athletes to exert extreme power and endure the resistance in the team sport. The ratio of fats to lean body weight is essential for rugby players.

Lean body weight refers to all nonfat physical tissue, while body fats symbolize "useless weight. “However, a certain amount of body fat is required to maintain normal physiological processes. Because of their genetic make- up, forwards carry more body fat than backs on average, which may also aid in protecting them during hard contact (Turnbull et al., 2018). Although the faculty rugby exercise program can also additionally have additionally contributed to the decreased frame fats percentage, the six-week plyometric-resistance training program resulted withinside the experimental organization having a significantly decrease in-body fats percentage. Plyometric leaps and resistance training need the projection of the entire body's bulk.

Maximum impact plyometrics and resistance training often raise muscular tension significantly. Sub-maximum impact plyometric

and resistance can be used to prepare for maximal impact plyometric and resistance or to improve various functional and structural features. Strength, muscle hypertrophy, muscular endurance, and speed-strength endurance are examples of these
characteristics (Siff & Verkhoskansky, 2018). According to the literature, calf muscles are used during plyometric exercise and resistance training (Siff & Verkhoskansky, 2018). Plyometric and resistance activity is split into phases, and its miles clean that the calf muscle contracts concentrically at some point of the push-off phase, isometrically at some point of the air phase, and eccentrically at some point of the landing phase; thus, this workout meets the requirements for muscle hypertrophy (i.e., concentric and whimsical contractions) (McArdle et al., 2018; Siff & Verkhoshansky, 2018). One reason for the considerable variations in calf circumferences between that the group's average calf circumference improved during the six-week period.

Although the calf muscle tissues operated concentrically and eccentrically, there was a decrease in frame fat percentage similarly to growth in calf muscle circumference, indicating hypertrophy of the calf muscle.

Jothi, Vinu, and Eleckuvan (2010) have observed the effects of a 7-week-combined plyometric and resistance training program on the development of selected bio motor abilities. Their findings discovered that feet's strength (%4.13), resistance power (%11.81), speed (%4) and in anaerobic strength (%7.53) enhanced after the training program. Hence, combined plyometric and resistance and training programs had statistically substantial effects on the improvement of said variables.

Youthful rugby players profit after the application of resistance training. Though resistance training follows and how they have impact on the short-term physical change is unidentified. Because of the physical qualities that strengthen the match demands, higher levels of muscular strength, power, and speed are advantageous, while increase in the mass can be favorable for better sporting performance. Sedentary adults experience a 3% to 8% loss of muscle in their mass in every decade, which lead to their resting metabolic rate reduction and fat accumulation. Ten weeks of resistance training can increase their lean weight by 1.4 kg, increase in their resting metabolic rate by 7%, and reduce fat weight by 1.8 kg. Aids of resistance training include improved physical performance, movement control, walking speed, functional independence, cognitive abilities, and self-esteem (Current Sports Medicine Reports: (Current Sports Medicine Reports, 2012).

Conclusion

The goal of this study was to provide a technique for increasing the rugby players' strength and power by employing plyometric and resistance training. There became a huge variant in vertical jumps and bench weightlifting. Combined plyometric and resistance training increases our muscular power and strength, which help the athlete to run faster, jump higher, and change the direction quickly. Plyometric exercises improve your performance in any sport that involves running, jumping, or kicking. Strength, endurance and power are our main fitness components, which is the key for success in many individual and team sports. Many sports, like weight lifting, wrestling and weight throwing, it is the vital physical attributes. In other sports, which includes team sports like rugby, higher strength muscle endurance and power is also very vital as it is very important part of our overall fitness profile. Young adolescent athletes who are already in growing age can benefits from combined plyometric resistance training the study shows that short period of training have great impact on athletes' muscular strength and endurance and also have significant effect on muscular power which can help in their

performance. However, further research and comparisons with other tests are needed to confirm the method's stability as a measure of rugby player's strength and power. We'll need to expand the number of participants and construct score records to do so.

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