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EFFECT OF RESISTANCE AND PLYOMETRIC TRAINING ON ANAEROBIC POWER OF WOMEN'S SOCCER PLAYERS

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ABSTRACT

Soccer requires a certain combination of physical skills, particularly at the women's level [1]. Players must have tremendous bursts of speed, agility and strength for acts like running, jumping, tackling and kicking the ball in addition to extraordinary endurance to cover long distances [2]. These physical attributes, collectively known as motor fitness, are crucial determinants of on-field performance and can significantly influence a team's success [3]. While physical fitness may improve in young soccer players as a result of involvement in soccer-specific training, resistance training has the potential to provide an additional stimulus that can aid long-term athletic development [4].

Keywords: Resistance and Plyometric Training, Women's, Soccer

1. INTRODUCTION

Soccer requires a certain combination of physical skills, particularly at the women's level [1]. Players must have tremendous bursts of speed, agility and strength for acts like running, jumping, tackling and kicking the ball in addition to extraordinary endurance to cover long distances [2]. These physical attributes, collectively known as motor fitness, are crucial determinants of on-field performance and can significantly influence a team's success [3]. While physical fitness may improve in young soccer players as a result of involvement in soccer-specific training, resistance training has the potential to provide an additional stimulus that can aid long-term athletic development [4].

PT is an extremely important training method for improving player motor fitness and skills. Finding out how the PT exercise enhances the physical fitness traits of intercollegiate football players at Haramaya University was one of the study's goals [5]. Strength and explosive power are increased using the PT approach [6]. Plyometric training is a type of exercise that increases power and speed by using the body's stretch response and eccentric muscle contractions. Plyometric training aids in the development of overall athletic ability, ballistic abilities, kinaesthetic awareness, rhythm,

and coordination, even though explosive power makes up a small portion of aerobic performance. Plyometric exercises are particularly beneficial for football players as they help them increase their strength and general athleticism. Football players must be able to react swiftly and forcefully in both offensive and defensive situations [7]

RT has been shown to increase muscle power, strength, and neuromuscular coordination, all of which can lead to better sports performance. (Christou et al., 2006) [8]. The RT program focused on dynamic resistance exercises designed to enhance muscular strength, power, and isokinetic movement [8].

This study aimed to examine the strength and power characteristics of female soccer players both before and after an 8-week intervention that included plyometric, resistance, and soccer training. We anticipated that an eight-week training regimen would enhance neuromuscular fitness, or the explosive power of the lower extremities. Training consisted of bilateral exercises that improved neuromuscular variables and workouts that used movement patterns, muscular power, and body stability to build muscle strength.

2. OBJECTIVES

1) The study was to find the effect of resistance training on women's soccer players.
2) The study was to find the effect of plyometric training on women's soccer players.

3. METHODOLOGY

A total of thirty (30) women's soccer players, Plyometric group or experimental group 1 (n=10), Resistance training group or experimental group 2 (n=10), and control group (n=10) were randomly selected to participate in this study. The subjects were selected from two renowned clubs from Manipur, KRYPHSA and YWC Langthabal. The subject then participated in the pretest. Following the completion of the six-week training program, they participated in the post-test. The data were collected before and immediately after the 6 weeks of resistance training. The plyometric and resistance training group participated in a supervised plyometric and resistance training program for 6 weeks in alternate four (4) days per week under the supervision of a certified strength and conditioning coach, and no additional training was provided to the control group except regular practices. Anaerobic power was measured by the Sergeant jump Lewis Nomogram Test (explosive power). The analysis of covariance (ANCOVA) statistical technique was employed to determine the significant mean differences between the variables in the Resistance Training Group (RTG), Plyometric Training Group (PTG), and control groups (CG).

4. RESULTS AND INTERPRETATION

The descriptive and ANCOVA analyses to evaluate the significant changes (if any) and differences in the Sergent Jump Lewis Nomogram between the RGT, PGT, and Control Groups, respectively, are shown in Table 1.

Table 1 Mean comparison of pre and post test Data

Group	Variable	Test	N	Mean	SD	F	Sig. (P)
RGT		Pre	10	71.21	6.99		
		Post	10	73.56	8.62		
PGT	Anaerobic power	Pre	10	69.22	4.92		
		Post	10	75.11	3.84	4.48*	0.02
CG		Pre	10	68.98	5.42		
		Post	10	70.83	4.87		

Significant at 0.05 level. $F(2,30) = 3.32$

Table 1 shows the means and standard deviations (M±SD) of the Anaerobic power for the RGT, PGT, and Control Group in the pre-test were 71.21±6.99, 69.22±4.92, and 68.98±5.41, respectively, and in the case of the post-test were 73.56±8.62, 75.11±3.84, and 70.83±4.87, respectively. And, it shows significant differences among the groups as the calculated F value 4.48 ($p>0.02$) was greater than the tabulated value F=3.32. The graphical representation of pre and post-test means of the RGT, PGT, and Control groups is shown in Figure 1.

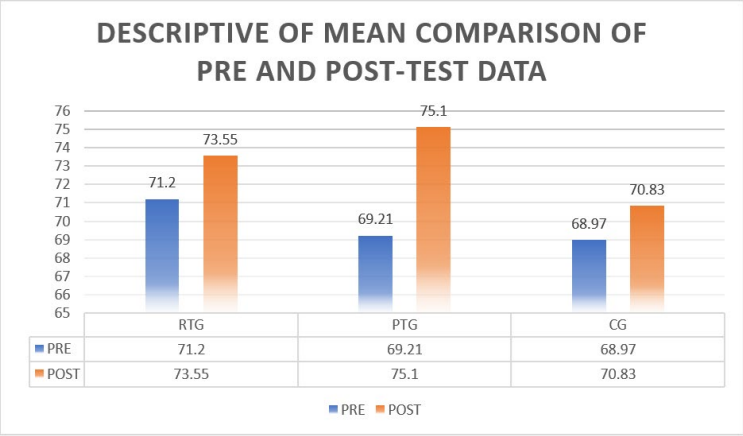

Figure1 Pre and Post-Test Mean comparison

Further, the post hoc test was employed to find out which groups differ significantly from each other and is shown in Table 2.

Table 2 Comparison of Pair-wise mean differences (Tukey's HSD).

Comparison	Mean Difference	Significance (p)
PGT vs CG	5.89 – 1.86 = 4.03	p <0.05
PGT vs RGT	5.89 – 2.35 = 3.54	p <0.05
RGT vs CG	2.35 – 1.86 = 0.49	p <0.05

Table 2 shows that the PGT group (Mean = 5.89) showed a significantly greater improvement in anaerobic power compared to both the control group (CG, Mean = 1.86) and the RGT group (Mean = 2.35). The mean difference between PGT and CG was 4.03 units (5.89 – 1.86), with a p-value less than 0.05, indicating a statistically significant improvement in anaerobic power for the PGT group compared to the control. Similarly, the mean difference between PGT and RGT was 3.54 units (5.89 – 2.35), also with $p < 0.05$, confirming that PGT significantly outperformed RGT in enhancing anaerobic performance.

However, the difference between RGT and CG was only 0.49 units (2.35 – 1.86), and this difference was not statistically significant ($p > 0.05$). This indicates that RGT did not produce a meaningful improvement in anaerobic power compared to the control group.

5. DISCUSSION

The investigation results through the pertaining data showed significant differences among the pre and post- test means of anaerobic power between RTG, PTG and CG as the obtained F = 4.48 at 0.05 level of significance ($p<0.05$) respectively, were greater than the tabulated F = 3.32 at 0.05 level of significance ($p<0.05$). whereas it shows that the PGT group (Mean = 5.89) showed a significantly greater improvement in anaerobic power compared to both the control group (CG, Mean = 1.86) and the RGT group (Mean = 2.35).

The effects of resistance and plyometric training on the motor fitness of women's soccer players have been extensively studied, revealing significant benefits from both training modalities. Plyometric training (PT) has been shown to enhance vertical jump, linear sprint, and change of direction (COD) performance more effectively than strength training (ST) alone [9]. Additionally, a combined resistance-plyometric training program has demonstrated improvements in running economy and peak oxygen consumption, indicating enhanced aerobic capacity [10]. Resistance training contributes to maximal strength improvements, although its effects on agility and speed are less pronounced compared to PT (Sánchez-Sánchez et al., 2024). The 1-repetition maximum (1RM) test and jump performance measurements like the squat jump (SJ) and countermovement jump (CMJ) show that resistance training significantly increases strength and power [11].

6. CONCLUSION

The results of this study showed that women soccer players' anaerobic power increased after eight weeks of RT and PT. Whereas the PT group has shown statistically significant improvement in anaerobic power by increasing their muscle strength, power, and coordination compared to RT and CG. It may be recommended that PT intervention be included as a vital training component in soccer training plans.

CONFLICT OF INTERESTS

None.

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