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Evaluation of Plyometric Training on Skill Abilities of Women Soccer Players

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ABSTRACT

Background: High-intensity intermittent sport that requires high physical demand and explosive movements is mainly required in soccer. Players are required to perform different movements, including jumping, sprinting, running, and walking, with sudden movements in different directions. Plyometric training (PT) is a rapid stretching and eccentric muscle action with concentric action of the muscles and connective tissues.

Objective: The objective of the study was to find the effect of plyometric training on the skill abilities of women soccer players.

Method: Twenty (20) national-level women soccer players of KRYPHSA, Manipur, between 17-26 years of age were randomly selected and further divided into experimental and control groups of ten (10) subjects each. The Mor-Christian general soccer ability test assessed the dribbling, passing, and shooting abilities before and after the eight (8) weeks PT. The analysis of covariance (ANCOVA) was used to determine the significant mean differences.

Results: Significant means differences were found in dribbling, passing, and shooting abilities between experimental and control groups as the obtained $F = 15.18$, $F = 10.13$, and $F = 23.08$, respectively, at 0.05 level of significance ($p < 0.05$).

Conclusion: Reasonably, the PT was an effective training for improving skill abilities in addition to improving muscular power and reaction quality of the lower limbs.

Keywords: Soccer, Skill, Dribbling, Passing, Shooting and Plyometric training (PT).

I. INTRODUCTION

Women's soccer all over the world has increased the popularity and participation in the last decade [1]. Soccer is also known as football and is the world's most popular sport. Soccer is a high-intensity, intermittent sport that requires high physical demand and explosive movements. Players are required to perform different movements, including jumping, sprinting, running, and walking with sudden changes in direction. Modern professional football (soccer) is a highly demanding team sport characterized by a succession of high-intensity actions performed intermittently [2]. PT type of exercise is a dynamic movement and eccentric action which is immediately followed by a concentric action of the muscles and connective tissues [3]. The maximum force that can be produced by a concentric movement alone is produced with the help of the muscle's stored elastic energy. It is distinguished by the quick mass deceleration followed by a quick acceleration towards the opposite vertical directions. PT exercises include lower limb exercises, including jumping, hopping, box jumping and vertically jumping right away following a ground contact amortization phase[4]. PT is a very crucial training for enhancing player skills and motor fitness. The objectives of the study were to determine how the PT exercise helps to improve soccer-related physical fitness characteristics of intercollegiate soccer players at Haramaya University [5].

Plyometric exercise involves an eccentric action of a particular muscle, which immediately concentric action of the particular muscle and connective tissue [6]. The PT method is used to increase explosive power and strength [7], and it also involves a diverse range of bilateral and unilateral jumps, single-leg jumps, hops, and bounds [6]. Plyometric exercise, women soccer players improve small muscles, single and repeated sprinting, jumping, agility movement, shooting power, and endurance [8]. Related to plyometric training (PT), several reviews and meta-analyses have been published in Soccer [9][10].

II. OBJECTIVES

The objective of the study was to find the effect of plyometric training on the skill abilities of women soccer players.

III. METHODOLOGY

Twenty (N=20) women soccer players were randomly selected among the players of KRYPHSA, between 17 and 26 years of age, who represented Manipur at National level tournaments were chosen randomly. The subjects were divided into two groups: plyometric training (PT) or experimental group (n=10) and control group (CG) (n=10). The PT group was subjected to the 8-week plyometric training intervention, and no additional training was provided to the control group except regular practices. The training was administered in alternate four (4) days of a week, which were composed of different exercises viz. ladder jumps, hurdle jumps (single & double leg), squat jumps, box jumps (single & double leg), ankle jumps, jumping lunges, tuck jumps, progressive skater jumps, single RDL jumps, single leg side to side hops, forward-backward hops, scissor hops, bounds, turning jump squats, forward jumps (single & double leg), knee to feet jumps, explosive step-ups, seated explosive jumps, ball feeling with jumps and along with other conditioning drills. The PT group participated in an 8-

week plyometric training program with exercises four days a week. The training load was increased, followed by systematic scientific sports training principles. The data were collected before and immediately after the eight weeks of plyometric training. The Mor-Christian General Soccer Ability Test was adopted to assess dribbling, passing, and shooting skill abilities. The pertaining data were collected before (pre-data) and after (post-data) the eight (8) weeks PT programme. The analysis of covariance (ANCOVA) statistical technique was employed to determine the significant mean differences between the variables in the experimental and control groups.

IV. RESULT AND INTERPRETATION

The descriptive and ANCOVA analyses to evaluate the significant changes (if any) and differences in dribbling, passing, and shooting skill abilities between the experimental and control groups, respectively, are shown in Tables 1 and 2.

Table 1: Descriptive Analysis of the Experimental Group

Group	Variable	Test	N	Min	Max	Mean	SD
Expt. Group (PT)	Dribbling	Pre	20	16.34	24.52	18.59	2.23
		Post	20	15.22	20.16	17.27	1.37
	Passing	Pre	20	2.00	10.00	6.60	2.06
		Post	20	4.00	12.00	8.60	1.84
	Shooting	Pre	20	0.00	50.00	14.50	13.56
		Post	20	10.00	54.00	23.70	13.22
Cont. Group (CG)	Dribbling	Pre	20	16.46	24.52	18.62	2.21
		Post	20	16.00	23.90	18.28	1.87
	Passing	Pre	20	4.00	8.00	6.60	1.84
		Post	20	6.00	10.00	7.30	1.49
	Shooting	Pre	20	4.00	12.00	8.60	1.85
		Post	20	4.00	40.00	16.60	10.20

Table 1 shows the mean and standard deviations ($M \pm SD$) of dribbling, passing, and shooting for the experimental group in the pre-test were 18.59 ± 2.23 , 6.60 ± 2.06 and 14.50 ± 13.56 , respectively, and in the case of the post-test were 17.27 ± 1.37 , 8.60 ± 1.84 , and 23.70 ± 13.22 , respectively. The graphical representation of pre and post-test means of the PT group is shown in Figure 1.

Further, table 1 shows the mean and standard deviations ($M \pm SD$) of dribbling, passing, and shooting for the control group in the pre-test were 18.62 ± 2.21 , 6.60 ± 1.84 , and 8.60 ± 1.85 , respectively, and for the post-test, were 18.28 ± 1.87 , 7.30 ± 1.49 , and 16.60 ± 10.20 , respectively. The graphical representation of the pre and post-means of the control group is shown in Figure 2.

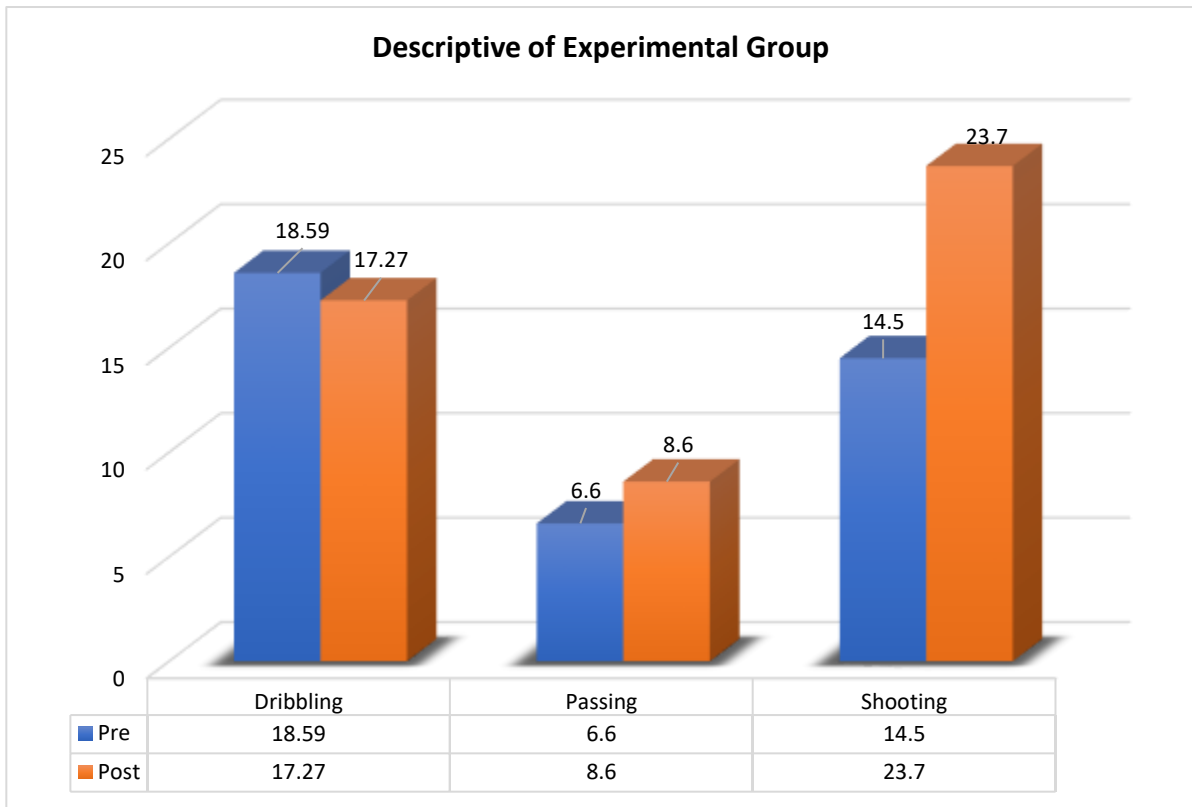


Fig. 1. Pre and Post-Test Means of Experimental (PT) Group.

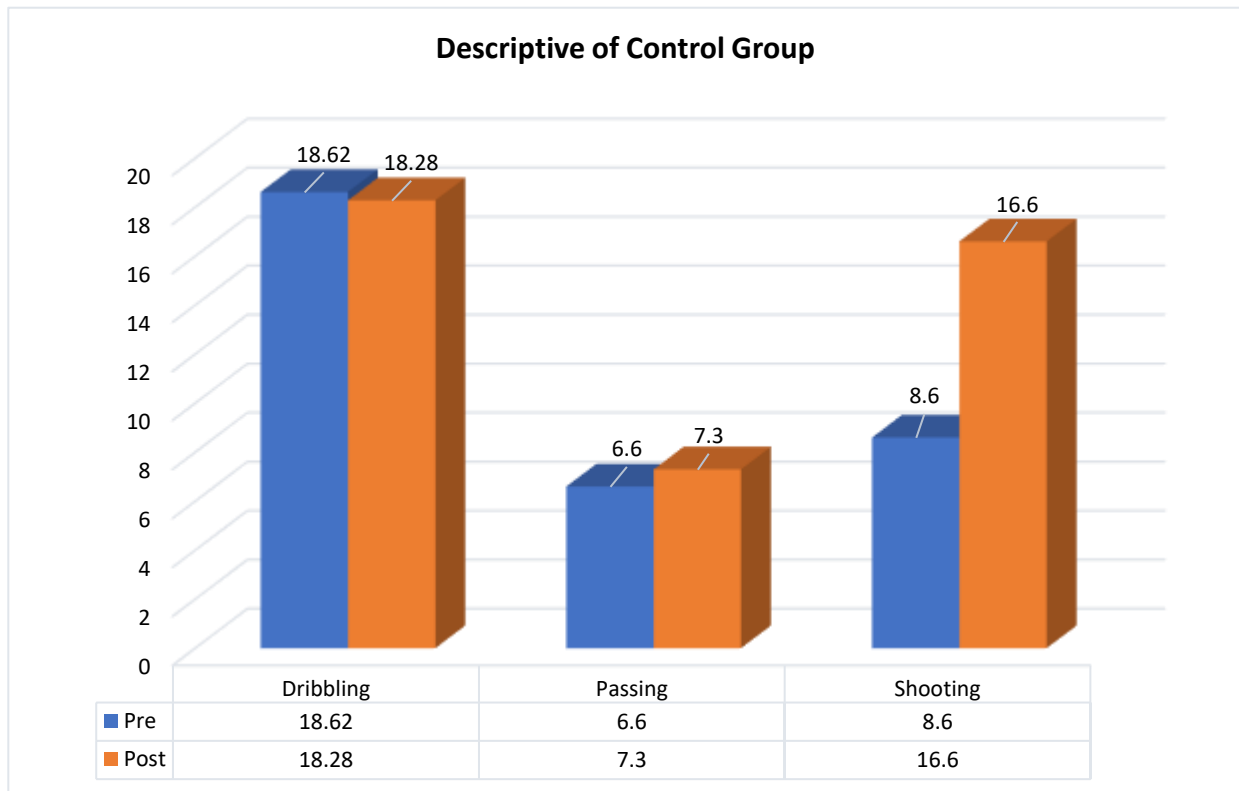


Fig. 1. Pre and Post-Test Means of Control Group.

Table 2: Mean Comparison of Pre and Post-test Data.

Variables	Sources	Types III sum of Squares	df	Mean square	F	Sig. (P)
Dribbling	Group	10.80	1	9.72	15.18*	0.00
	Error	13.28	37	0.64		
	Total	12753.79	40			
Passing	Group	16.90	1	16.90	10.13*	0.00
	Error	61.715	37	1.66		
	Total	2652.00	40			
Shooting	Group	491.62	1	491.62	23.08*	0.00
	Error	787.89	37	21.29		
	Total	22044.00	40			

***Significant at 0.05 Level of Confidence, where tabulated $F_{0.05(1, 37)} = 4.08$ (P<0.05)**

Table 2 reveals significant differences in dribbling, passing, and shooting in comparison among the pre and post-test means between the experimental and control groups as the calculated F values of 15.18, 10.13, and 23.08, respectively, are greater than the tabulated $F = 4.08$ at 0.05 level of confidence ($P < 0.05$). Therefore, the result of the study evidenced that the eight (8) weeks of PT could improve the primary skill abilities of dribbling, passing, and shooting in soccer.

V. DISCUSSION

The investigation results through the pertaining data showed significant differences among the pre and post-test means of dribbling, passing, and shooting between experimental and control groups as the obtained $F = 15.18$, $F = 10.13$, and $F = 23.08$, respectively, were greater than the tabulated $F = 4.08$ at 0.05 level of significance ($p < 0.05$). The players of the control group actively participated in regular football practices. Therefore, there might be the chances of improving the skill abilities conditionally.

Other relevant study such as Life Kinetic exercises for football players, tactical approach for soccer players, and dribble training with playing method for young soccer players have a beneficial influence on technical skills and motor skill performances, particularly in dribbling, pass accuracy, and shooting abilities [11][12]. Research has shown that PT exercise improves the skills abilities of women soccer players. Studies have shown that short-term PT can significantly improve jump performance, agility, and explosive power [13]. In addition, an extensive review and meta-analysis highlighted the effectiveness of plyometric training in enhancing kicking performance, which is crucial for passing and shooting actions during games [14]. Studies have demonstrated that even one day of PT per week can enhance sport-specific fitness parameters in soccer players, specifically at the professional level during the season, particularly affecting variables like triple jump distance and sprint times [15]. Furthermore, plyometric training has been shown to significantly enhance motor fitness variables among speed, agility, and explosive power, additionally soccer skills like dribbling and kicking accuracy in women soccer players [16]. The current investigation has shown a significant relationship of the selected plyometric exercises to the skill ability such as dribbling, passing and shooting of women soccer players under a specific training schedule.

VI. CONCLUSION

The present study found that 8(eight) weeks of PT helped to improve soccer players' skill abilities. PT can increase coordination abilities, reflex actions and muscular power, which allows players to perform precisely in soccer skills such as dribbling, passing, and shooting. PT intervention could be recommended as an indispensable training component to be added in the soccer training programs.

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