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APPLICATION OF PRE-EXERCISE SELF MYOFASCIAL RELEASE AND POST-ACTIVATION POTENTIATION ON DEVELOPMENT OF SPEED AND EXPLOSIVE POWER IN MEN FOOTBALL PLAYERS

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ABSTRACT

Speed and explosive Power are key elements in the physical fitness preparation of football players training to generate high-level performance. To determine the application of Self-myofascial release (SMFR) before complex training (CT) on the development of Speed and Explosive power of footballers, Forty-five male (EX-1) SMFR+PAP=15, (EX-2) PAP=15, and CON group=15, The EX-1 and EX-2 underwent a 12-week training program, The EX-1 received foam rolling, dynamic stretching and complex training while EX-2 dynamic stretching and complex training, and the CON group followed regular exercise practices. The findings show the importance of MFR as a tool for optimal warm-up strategies during sports conditioning and before intensive activities and the combined intervention of Pre-exercise MFR before Complex training improves the performance of football players. Compared to the CON group the EX-1 and EX-2 groups showed significant improvements in both speed and Explosive power and the MFR+PAP group displayed the most significant improvement. Further, long-term investigations recommend exploring the durability and long-term benefits of SMFR and PAP interventions in different sports fields and elements that result in optimal performance.

KEYWORDS: *Complex training; Self-mayo facial release; Myofascial release; Post-activation potentiation;*

INTRODUCTION

Modern sports to a great extent demanding and determined by the level of Explosiveness and speed. Apart from mental and tactical preparations, speed and strength exercises are the crucial part of soccer training. Soccer players accelerate and decelerate repeatedly throughout a single football game (Dalen et al., 2016). Hence, Speed and strength training, including Explosive power are key aspects of soccer players' physical fitness preparation. In modern team games, the ability to generate high values of muscular power has a substantial effect on performance. Using PAP in training allows for significant gains in speed (Pajerska et al., 2021). Speed movement and explosiveness in Soccer games are defined as perception, prediction, anticipation, reaction, decision-making, and combination of movements (Teoldo et al., 2023). Regardless of the playing position Speed and Explosiveness are essential qualities for the player in the tactical situations in which sprints and explosive movements occur (Lobo-Triviño et al., 2024). The speed gives an advantage to the player during the game in reaching the ball faster to beat the opponents. Depending on the speed and explosive moves help the forwards and defenders to score goals or stop their opponents' attacks (Pajerska et al., 2021). Scientifically opted optimal warm-up is highly necessary to prevent injury and achieve top speed and maximum strength during the competition (Read et al., 2020). The Muscle needs to train in specific conditions to perform the intensive actions and sequence of the movements (Schoenfeld, 2010).

MFR was developed by John F. Barnes, to help reduce the dysfunction caused by restrictive fascia. MFR is a manual therapy technique that involves the use of hands and types of equipment. Specifically, MFR has been used to reduce stiffness and tightness and increase the circulation of blood. The MFR improves compliance of fascia and connective tissue surrounding the muscle and neuromuscular, designed to reduce injury risk and ROM (Cheatham et al., 2015). The MFR categorised into two methods: The MFR technique applied by a professional, and the MFR technique performed by the individual (Hansen et al., 2015). SMR is a technique that uses FR or MR to provide soft tissue massage and enhance mobility in the muscle fascia. In addition, including SMR in warm-ups and cool-downs greatly impacts the physical performance qualities of both professional and amateur athletes, including the development of ROM and abilities. (Martínez-Aranda et al., 2024). Foam rolling has been used in sporting situations to enhance flexibility and reduce stiffness in the muscles while maintaining the strength of the muscles and athletic performance (Nakamura et al., 2021). However, no research has been conducted to examine the long-term impact of SMFR with FR during a warmup intervention before PAP. The CT regulates the PAP, which occurs due to the contractile history of the muscle and develops the force output of the muscle

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(Robbins, 2005). Pre-exercise-MFR and PAP are two distinct yet complementary interventions investigated here. Considering the PAP initial exercise is related to a reduction in maximum force output that occurs while performing back-to-back efforts. Several studies suggest that PAP can be manipulated to enhance both acute and chronic performance. CT involves performing the HRE before an explosive exercise with similar biomechanical properties, sometimes called a complex pair. Several sets of the complex pair are repeated, each one bringing about a long-term change in a muscle's tendency to generate power. CT has been used to achieve PAP, which consists of a highly loaded resistance activity followed by an explosive activity specific to the particular sports discipline and PAP occurs in muscles when muscle fibers are activated by strength training (Tillin & Bishop, 2009). Post-activation of muscle fibers has a direct impact on the rate of force development in a short period and the training conditions and protocols adapt with the muscle groups to actions and sequence of the movements. While both interventions have demonstrated individual efficacy, the combined impact on speed and Explosive power deserves further investigation. The foam rolling intervention reduces muscular stiffness and increases the pliability of muscles to achieve better outcomes through complex exercises. Therefore, the objective of this research was to examine the influence of SMFR during the warmup and the effect of CT on the speed and Explosive power performance of footballers.

Abbreviations and Acronyms

Complex training (CT), Self-mayo facial release(SMFR), Myofascial release (MFR), Foam roll (FR), Post activation potentiation (PAP), Massage roll (MR), Range of motion (ROM), Delayed-onset muscle soreness (DOMS), Heavy resistance exercise (HRE), Experiment group (EX), Control group (CON).

METHODS

Subjects and Ethical Consideration

A total of 45 football players were selected for the study from various colleges at Calicut University. In the SMFR+PAP group, age, body mass, height, and BMI were 22.1 ± 1.05 years, 62.4 ± 8.9 kg, 168.9 ± 6.6 m, and 22.1 ± 2.8. In the PAP group22.7± 1.2 years, 63.6 ± 7.5 kg, 169.8 ± 5.9 m, and 23.3 ± 2.1. In the CON group 23.4 ± 1.01 years, 63.1 ± 8.9 kg, 169.1 ± 5.5 m, and 23.7 ± 2.4. The average age of the players was 22.1 ± 105 years, body mass 62.4 ± 8.9 kg-, the height was 168.9 ± 6.6 m, and the BMI was 22.1 ± 2.8. The study included male participants aged 19 to 24 who had played at the university level for one to five years. Participants were precluded from the study if they had been injured and were currently undergoing rehabilitation within the past six months. Ethical clearance was obtained from the institutional the institutional ethical committee of Pondicherry University, Puducherry, India.

Experimental Procedure

Purposive sampling was implemented in this investigation, The experimental interventions and the subjects were randomly assigned to two Experimental Groups and one CON Group, each of which contained 15 subjects. The EX-1=15 (MFR+ PAP) and EX-2=15 (DS+PAP) underwent a 12-week training program. The EX-1 Group received Foam Rolling, DS, and CT while the EX-2 Group received DT and CT three days per week. The pre-tests and post-tests were administered to all groups. The CON group (=15) members engaged in routine practice without being enlisted in any particular training program, and the workout series lasted from 75 to 85 minutes. The training schedule, for both EX groups, starts with 10 minutes of static stretching EX-1 alone will undergo 15-20 minutes of SMFR and join EX-2 10 min cardio warmup session and 10 min DS movements with emphasis on CT excises, then both groups will undergo CT.

Statistical analysis

All statistical procedures were conducted using Statistical Package for the Social Sciences (SPSS 11.0 for Windows, SPSS Inc., Chicago, IL). The data was subjected to a Paired t-test to identify the significant difference between the pre-test and post-test of both experimental groups and the control group respectively. Analysis of covariance (ANCOVA) was used to find out the significant difference between the control group and experimental groups. Scheffe's Post hoc test was employed to the significance of the mean difference among the groups. A 0.05 level of confidence was fixed to test the hypothesis.

RESULTS

Speed

Table 1. Descriptive Statistics of Speed

Groups	Pre-Test		Post-Test		df	T-Ratio
	Mean	SD	Mean	SD		
MFR+PAP	7.47	.304	6.76	.246	14	8.809*
PAP	7.50	.302	6.97	.203	14	5.649*
CON	7.48	.308	7.34	.231	14	1.941

*Significant at 0.05

The T-Ratio for the MFR+PAP group is 8.809 > 2.145 and the PAP group 5.649 > 2.145 table value shows significant improvement in speed after the intervention. Similarly, the. The CON group 1.941< 2.145 indicates no significant improvement.

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Table 2. ANACOVA of Speed

TEST	MFR+PAP	PAP	CON	SoV	Sum of Square	Df	Mean Squares	F
Pre-test								
Mean	7.47	7.50	7.48	B	.005	2	.002	.026
SD	.304	.302	.308	W	3.90	42	.093	
Post-test								
Mean	6.76	6.97	7.34	B	2.61	2	1.30	25.239*
SD	.246	.203	.231	W	2.17	42	.052	
Adjusted post-test								
Mean	6.76	6.97	7.34	B	2.59	2	1.30	27.053*
				W	1.97	41	.048	

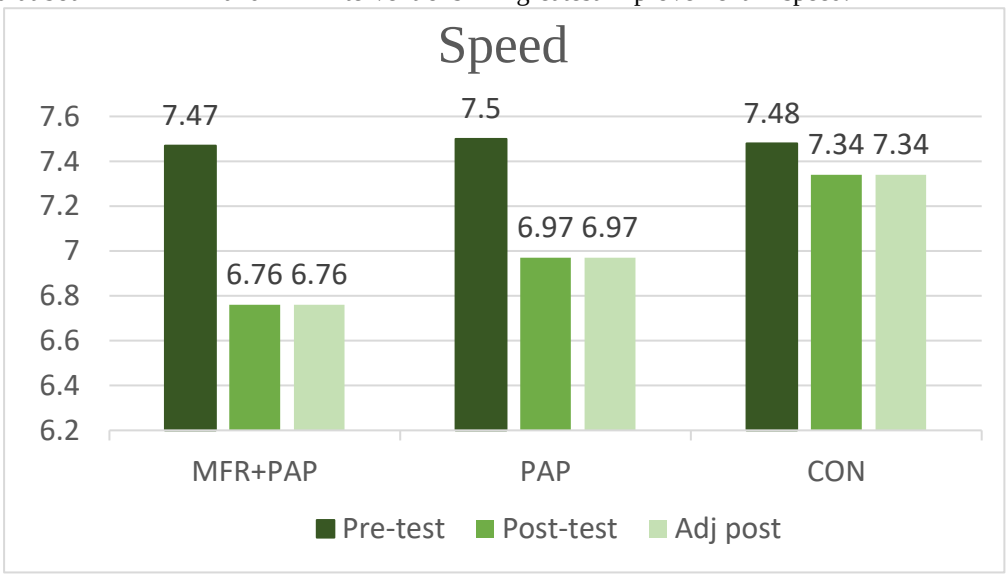
*Significant at 0.05

The F value for the pre-test is 0.026<3.23 no significant differences in speed means among the groups before the intervention. The F value for the post-test is 25.239>3.23 significant differences in post-test speed means among the groups. The F value for the adjusted post-test is 27.053>3.22, confirming significant differences in speed means among the groups.

Table 3. Post hoc test of Speed

MFR+PAP	PAP	CON	Mean Difference	Confidence Level Value
6.76	6.97	-	0.21*	0.203
6.76	-	7.34	0.58*	
-	6.97	7.34	0.37*	

MFR+PAP vs. PAP= MD 0.21>0.203 CV, MFR+PAP vs. CON= MD 0.58>0.203 CV, PAP vs. CON= MD 0.37>0.203 CV. This indicates that both MFR+PAP and PAP interventions were significantly more effective than the control condition, with the combined MFR+PAP intervention showing the greatest improvement in speed.



Explosive Power

Table 4. Descriptive Statistics of Vertical jump

Groups	Pre-Test		Post-Test		df	T-Ratio
	Mean	SD	Mean	SD		
MFR+PAP	47.20	2.18	50.60	2.29	14	6.608*
PAP	46.60	1.72	48.60	1.88	14	3.568*
CON	46.47	2.61	46.87	2.20	14	1.309

*Significant at 0.05

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The T-Ratio for the MFR+PAP group is 6.608 >2.145 and the PAP group 3.568>2.145 table value, showing a statistically significant improvement in Explosive power after the intervention. The CON group 1.309< 2.145 indicates no significant improvement.

Table 5. ANACOVA of Explosive Power

TEST	MFR+PAP	PAP	CON	SoV	Sum of Square	Df	Mean Squares	F
Pre-test								
Mean	47.20	46.60	46.47	B	4.58	2	2.29	.472
SD	2.18	1.72	2.61	W	203.73	42	4.85	
Post-test								
Mean	50.60	48.60	46.87	B	104.71	2	52.36	11.517*
SD	2.29	1.88	2.20	W	190.93	42	4.55	
Adjusted post-test								
Mean	50.32	48.67	47.05	B	78.99	2	39.50	14.446*
				W	112.10	41	2.734	

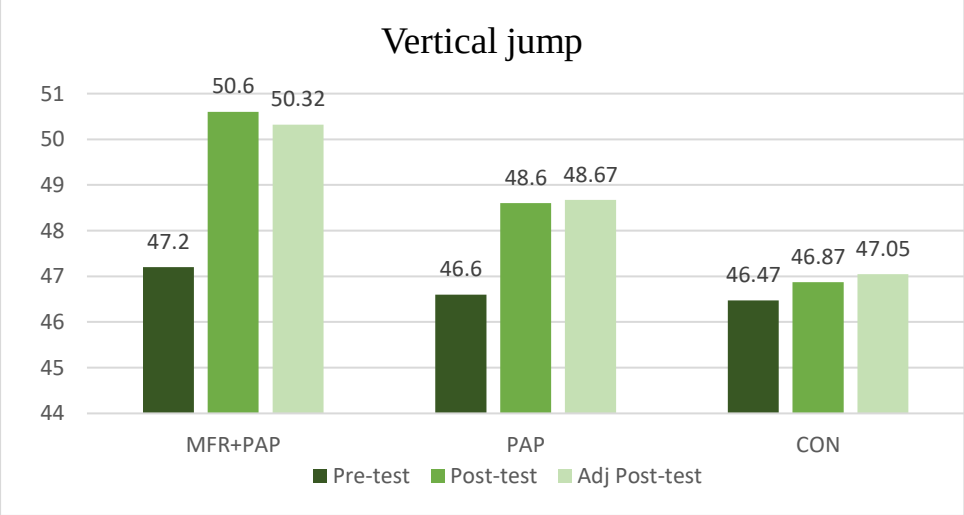
*Significant at 0.05

The F value for the pre-test 0.472<3.23 no significant differences in explosive power means among the groups before the intervention. The F value for the post-test 11.517>3.23 significant differences in post-test speed means among the groups. The F value for the adjusted post-test 14.446>3.22, confirming significant differences in Explosive power means among the groups.

Table 6. Post hoc test of Explosive power

MFR+PAP	PAP	CON	Mean Difference	Confidence Level Value
50.32	48.67	-	1.65*	1.532
50.32	-	47.05	3.27*	
-	48.67	47.05	1.62*	

MFR+PAP vs. PAP= MD 1.65>1.532 CV, MFR+PAP vs. CON= MD 3.27>1.532 CV, PAP vs. CON= MD 1.62>1.532 CV. This indicates that both MFR+PAP and PAP interventions were significantly more effective than the control condition, with the combined MFR+PAP intervention showing the greatest improvement in Explosive power.



DISCUSSION

The purpose of the study was to investigate the influence of pre-exercise SMFR during the warmup and the combined effect with PAP on the development of speed and explosive power in football players. After the 12-week intervention both the experimental group confirmed the development of speed and explosive power. The MFR+PAP group shows significant improvement compared to the PAP group. (Hendricks et al.,

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2020) Investigated the impact of dynamic flexion with foam roller application on the efficacy of vertical jumps, knee strength, and hip flexibility. The application of SMR techniques before the intensive exercises aimed and designed to improve flexibility and reduce skeletal muscle injuries and as a result the movement patterns develop, enhancing strength, power, and overall speed and performance (Lim & Park, 2019). SMFR with FR increases ROM and neuromuscular efficiency and reduces muscle stiffness, and the players become able to execute high-velocity and explosive motions to a greater extent and optimally potentiated warm-up is a greater concern in achieving muscle activation. The MFR combined with dynamic exercises may provide a viable option before intensive exercise (Martínez-Aranda et al., 2024). the present study suggests that SMFR before the CT session reduces the recovery time and enhances the quality of recovery pain perception, and fatigue, and reduces the DOMS. The combination of SMFR before PAP activates and stimulates the muscle force output. The recruitment of higher-order motor neurons may be increased by the heavy-loaded exercise and also improve the performance of subsequent explosive activities and increase the contribution of rapid twitch fibers (Tillin & Bishop, 2009). The current findings suggest that foam rolling as an SMFR tool used for high-resolution activation before CT. The MFR causes the soft tissues of the muscle due to repetitive activation of neuro receptors and stimulates the fascia. MFR specifically targets the fascia and significant effect on anaerobic power production after 30, 60, and 90 seconds (Hansen et al., 2015). PAP principles have been applied to short-term motor performance as well as being used as a rationale for long-term neuromuscular changes through CT (Pajerska et al., 2021), and PAP uses a conditioning exercise to stimulate greater recruitment of motor units and activation of muscles and results in the enhancement of performance on explosive movements. Both Experimental groups show a significant increase in explosive power and speed. studies suggested that heavy resistance training and high-intensity loaded exercises increase explosive movements that enhance the explosive ability of the muscles. (Ampillo et al., 2015) confirming that lower body CT exercises improve the speed and related movements. Explosiveness and power movements are critical factors for skill execution and gaining an advantage over opponents during the game. The application of the PAP develops muscle strength and power improving speed and explosiveness and the substantial quantities of force and quick reactions influence the striking, jumping, heading ball, and quick runs and turns of the football players. PAP principles have been applied to short-term motor performance as well as being used as a rationale for long-term neuromuscular changes through CT(Pajerska et al., 2021).

This may be beneficial to improve the performance of various skills, such as sprinting, and jumping. The fatigue co-exists in skeletal muscle, and the muscle performance following intensive resistance training depends upon the equilibrium between muscle fatigue and muscle potentiation. In comparison to the intervention groups, the MFR+PAP group shown had a distinct benefit for the players before participating in the main sessions. Since the variation in speed and explosive power performance after 12 weeks of intervention this method has been suggested to the professionals to determine the practical significance.

CONCLUSION

In conclusion, the study findings indicate the importance of MFR during the warmup session and the importance of PAP to enhance speed and explosive power. The 12-week structured intervention builds a dimension to the warmup regulations and the combined effect with PAP on Speed and explosive power are essential abilities for players' movement function and performance. The findings provide key steps and ideas about the Pre-exercise SMFR with FR Before intensive exercise sessions and the contribution to the performance of the players.

Further research is warranted to Conduct longitudinal studies and follow-up assessments to assess the long-term effects of Pre-exercise SMFR and PAP interventions on athletes' performance, and durability.

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