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Immediate and Acute Effect of Self Myofascial Release vs. Instrument Assisted Soft Tissue Mobilization on Flexibility and Strength Performance in Young Male Soccer Players

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Abstract

Background: Regular exercise and performance can result in microtrauma, which is a small amount of damage to the muscle. The resulting inflammatory response may lead to fascia scar tissue over time, which in turn may lead to muscular dysfunction. Self-myofascial release (SMR) and instrument assisted soft-tissue mobilization (IASTM) are 2 popular, manual therapy interventions used by rehabilitation and exercise science specialists.

Purpose: The purpose of our study was to compare immediate and acute effect of SMR and IASTM on flexibility and strength performance in young male soccer players. Method: 27 young male soccer players were randomly assigned to receive either SMR via plain foam roller or IASTM via M2T blade. To compare the effect of interventions, subjects were assessed on measures of flexibility via sit and reach test and strength test by dynamometer. Results: An one way ANOVA was used to analyze differences. To test for the difference between interventions and across 3 assessments, a 3X3 split plot ANOVA with group (control, SMR, IASTM), time (0 min, 10 mins, 20 mins) and interaction effect (Group X Time) was employed. There was a significant for strength during performance without intervention vs. immediately after SMR and IASTM (p=0.03). however, There were no significant differences between interventions for all variables.

Conclusion: findings of our study suggest that SMR and IASTM did not improve physical performance in young male soccer players, but it also did not hinder performance. Even if performance is not improved, there does not seem to be any adverse effects to use either SMR and IASTM before physical activity, and we do not need to discourage athletes from using these tools.

Keywords: soccer; self-myofascial release; Instrument assisted soft-tissue mobilization; physical performance

Introduction

Regular exercise and performance can result in microtrauma, which is a small amount of damage to the muscle (1). The resulting inflammatory response may lead to fascia scar tissue over time(1). When injured, fascia can adhere to the muscles and other body structures to produce restrictions, which can lead to decreased flexibility, muscle spasms, neuromuscular changes, and pain(2). Manual therapy interventions are being increasingly used recently to prevent these dysfunctions and enhance muscle relaxation, reduce muscle tension and soreness and to improve athletic performance(3,4). Soccer is one of the most widely played sports in the world (5). These game-related demanding activities such as change of direction, sprint, dribbling, tackling, kicking ball and heading require high rates of force production by the muscles of the lower limbs (6). Thus, a soccer player must not only manage technical and tactical tasks, but also must have well-developed physical conditioning in terms of strength, power and speed to yield high performance during a match (7,8). Self-myofascial release (SMR) and instrument assisted soft-tissue mobilization (IASTM) are two popular, manual therapy interventions used by rehabilitation and exercise science specialists. Both interventions are believed to work directly on fascial restrictions and adhesions that occur as a result of, or in response to, tissue injury(9). Some research indicates that SMR and IASTM treatment are used to improve range of motion (ROM), decrease the incidence of injury before exercise, and aid in post exercise recovery (10). Foam rolling is a type of SMR that requires the person to use a dense foam cylinder to roll back and forth over the muscle and fascia. The use of foam rolling (FR) has gained popularity in recent years within the general population. Although, its precise mechanism of action is unknown, the conventional theory states that the friction created during FR breaks apart fascia adhesion. By removing these mechanical restrictions from the myofascial tissue, ROM can be restored. IASTM is typically used for myofascial relaxation and, as a new form of treatment for myofascial pain syndrome, to detect and eliminate adhesion within scar tissues and myofascial limitations. In addition, IASTM is also used as a method for stimulating nerves in muscles, which can affect muscle strength through the activation of the muscular and nervous systems. IASTM not only improves flexibility but may also affect muscle strength, endurance, and recovery from muscle fatigue and fitness. SMR is marketed to enhance flexibility and boost performance. Current research has suggested that SMR has effect on flexibility, strength. However, janot, et al reported a detrimental effect to maximal anaerobic performance. Despite variability in the type, intensity, duration, and area of the body to which SMR was applied, most studies which evaluated acute effect of SMR found an improvement in joint ROM.

IASTM is a popular tool used by physiotherapist, which is purported to increase ROM and enhance performance. recent research has suggested that IASTM has effect on flexibility, strength. A systematic review of IASTM showed only two studies that reviewed IASTM treatment on joint ROM. Both studies found that ROM outcomes were increased after the intervention. The reviewers suggested that there was a lack of IASTM standardized protocols that

were followed by the initial researchers.However Stroiney reported a standardized protocol of IASTM technique procedure. Previously, Goran Markovic (2015) compared the effect of SMR and IASTM on joint ROM and found that IASTM has more effect on joint ROM than SMR, while Stroiney(2018) compared their effects on vertical and horizontal power on recreational athlete and found that SMR has more effect on VJ performance, however IASTM do not improve VJ performance and also found SMR and IASTM do not improve sprint performance. However, to the best of our knowledge, no study has compared the efficacy of SMR and IASTM techniques on athletic performance. Therefore, the purpose of this research study is to determine whether there is a difference between SMR and IASTM techniques on physical performance in young male soccer players.

Methods

27 young male soccer players ranging in ages from 14 to 18 years, without any known neuromuscular, orthopedic or cardivascular conditions, volunteered to participate in the study. Subjects were recruited from those who voluntarily reported. This study consisted of randomized crossover design in which subjects participated in both manual therapy treatments. In which, at the very first day the baseline measurement was taken of one subject, after 24 hours he took one manual therapy treatment, then after 5days of that treatment he took another manual therapy treatment.

Variables

In our study, two independent variables and two dependent variable were taken. For SMR treatment we used VPK plain foam roller, for IASTM M2T blade was taken. In dependent variables, felxibility was measured by sit and reach test and strength by dynamometer.

Procedures

The potential volunteered candidates were explained nature and purpose of the study. Eligible candidates underwent assent taking and received familiarization trials specific for the each subject. Desciptive variables of all subjects, such as age, height, weight, BMI were recorded. After familiarization trial the base line measurement of dependent variables was taken.

Interventions

On the very first day baseline data was taken, after 24 hours any one of two intervention was given that may be SMR or IASTM. For SMR, we used VPK plain foam roller and muscles were taken quadriceps, hamstring, tricep surae.

Data analysis

The data was SPSS 21 version software. The descriptive analysis was used to determine the mean and standard deviation of the variables. Physical characteristics data of subjects including age, height and weight were descriptively summarized.

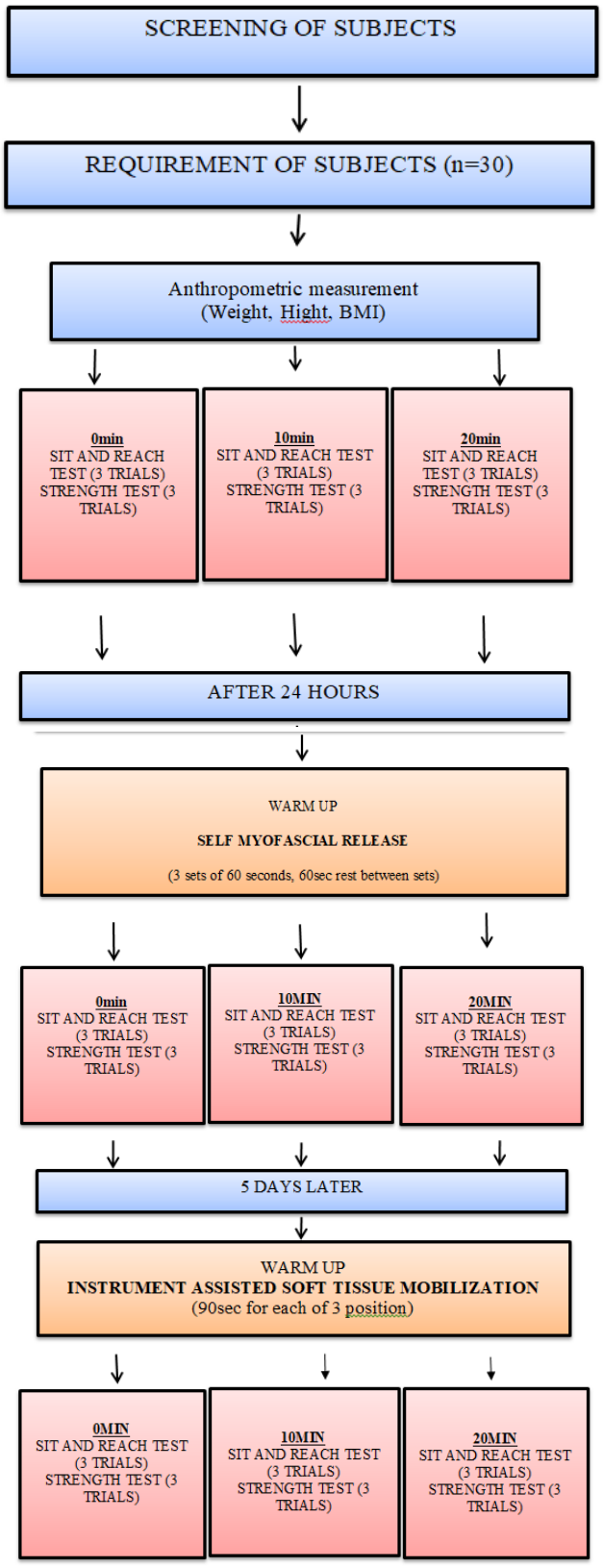

Figure 1: Flow chart of procedure

Twenty-seven participants (n=27) were assessed during the experiment for performance measures, under 3 test conditions (Control, SMR, IASTM), in a random order. The criterion measures immediately after SMR vs. IASTM vs. no intervention were compared by one-way ANOVA. To test for the difference between interventions and across 3 assessments, a 3X3 split plot ANOVA with group (control, SMR, IASTM), time (0 min, 10 mins, 20 mins) and interaction effect (Group X Time) was employed. When the main effect was found to be significant, a Bonferroni test was employed as post hoc analysis to locate the pairs having significant difference. Significance level was set at $p< 0.05$.

Results

Physical characteristics of participants

The mean (SD) of age, height, weight and BMI of the participants was 16.63 (1.445) yrs, 169.33 (5.6) cm, 57.19 (4.4) kg and 19.96 (1.6) kg/m2 respectively (table 1). Using ANOVA, a statistically significant difference was found only in strength test among the interventions and without intervention, where the strength was increased more after SMR and IASTM interventions than control group and no such significant difference was seen in other dependent variables.(table 2).

Subjects	Age (years)	Height (cm)	Weight (kg)	BMI (kg/m2)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Total (n=27)	16.63 (1.445)	169.33 (5.6)	57.19 (4.4)	19.96 (1.6)
BMI: body mass index; W: weight; H: height; data are presented as Mean (SD).				

Table 1: Descriptive statistics of physical characteristics of whole sample

Discussion

The goal of the present investigation was to determine (a) wheather there was any difference present between SMR and IASTM on various performance in terms of flexibility, strength of young male soccer players, and (b) the time course of these effects. The research that has been conducted is inconclusive. To our knowledge, this is the first study to compare the differences in these various performance between SMR and IASTM. Previuosly Stroiney at al. 2018,(18) examined in the study of "Examination of Self-myofascial release vs Instrument assisted soft tissue mobilization techniques on vertical and horizontal power in recreational athletes" only on vertical jump and 40-yd sprint along with pain percieve. It was hypothesized that there would be no difference when comparing SMR and IASTM on flexibility, strength and sport-specific performance. Flexibility performance in the present study showed similar trends in both SMR amd IASTM groups from control group. Both groups demonstrated significant time effects. however, main effects for group and interaction were non significant. Skarabot et al. 2015,(19) evaluated the time course of the effect of FR, static stretching, and the combination of FR and static stretching. They reported no change in passive ankle-dorsiflexion ROM after performing 3 sets of 30 seconds of FR using the GRID Foam Roller. Our study result follows this.

Strength performance: The present study showed that both groups demonstrated significant time effects ($p=0.001$), however, the main effects of group ($p =0.154$) and interaction ($p =0.335$) were non significant. Pincivero et al.2006,(22) reported that increasing flexibility and range of motion improves strength and interactions among muscle groups. IASTM activates more lower limb muscle fibers but not through the switching muscle fiber theory.(23) Our results are consistent with previous studies reporting that IASTM increases immediate strength. healey et al. 2014,(24) reported that strength performance was maitained throughout the study.

Conclusion

The use of SMR and IASTM before exercise immediately improved strength performance in young male soccer players. However, it was dessipated after 10 minutes. This findings of our study suggest that SMR and IASTM did not improve physical performance in young male soccer players, but it also did not hinder performance. Even if performance is not improved, there does not seem to be any adverse effects to use either SMR and IASTM before physical activity, and we do not need to discourage athletes from using these tools.

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