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RESEARCH ARTICLE

The Effects of Pre-Event Warm Up Protocols on Some Selected Physical Fitness Components of Junior Soccer Players of Ambo FIFA Goal Project Academy

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Abstract

Objectives: To investigate the effects of pre-event lower limb massage, traditional warm-up and the combination of massage with a traditional warm-up on some selected physical fitness components.

Design: Experimental study design was employed with six weeks intervention for each protocol.

Methods: Thirty five (35) junior soccer players (19 male and 16 female) were included as a subject using purposive and availability sampling technique. Descriptive statistics were produced for each of the parameters. The results presented as mean ± SD. Paired T-test was used to compare the pre-test values with the three conditions. The significance level was set at $P< 0.05$ for each of the statistical tests. The SPSS 20 software was used for the statistical analysis.

Result: The mean age of male and female soccer trainees was 17.89 and 16.81 years old respectively. BMI in kg/m2 of male and female soccer trainees was 19.9 and 20.4 kg/m^2 respectively. Traditional warm up intervention showed significantly increases the performance in female on speed and agility and sit & reach test in both male and female trainees. Pre-event lower limb massage intervention can show significant increases of performance in standing broad jump and sit & reach test in both male and female trainees. In contrast, the combined warm-up protocol can show significant increases of performance in standing broad jump in female, while in speed, agility and sit & reach test in both male and female trainees.

Conclusion: Massage should not be recommended for warm-ups separately. Further studies should examine the effectiveness of shorter duration and various types and frequencies of massage manipulations for their utility immediately prior to activities

INTRODUCTION

Massage has been utilized in the treatment of illness and injury for thousands of years by health care practitioners [1]. Chinese writings dating back to 2500 BC describe the use of this modality or a variety of medical purposes [1,2]. Massage has been promoted as a treatment of choice for numerous conditions such as musculoskeletal injuries, cancer, stress, relaxation, and pregnancy [2,3].

Physical therapists who specialize in sports medicine often utilize massage techniques to aid an athlete's recovery from intense exercise or as a treatment option when performing clinical rehabilitation [4]. Sports massage has been suggested as a means to prepare an athlete for competition, as a tool to enhance athletic performance, as a treatment approach to help the athlete recover after exercise or competition, and as a manual therapy intervention for sports-related

musculoskeletal injuries [2,4]. While massage is frequently performed by physical therapists (and other healthcare or alternative medicine practitioners) and is popular with athletes and coaches, its actual effectiveness is questionable [4,5].

Pre-event massage can be used as an assistant to physical warm-up [6]. Warm-up is practiced by athletes to increase their physiological and psychological capacities prior to training or competition, despite limited scientific evidence supporting one protocol over another [7,8]. Different types, intensity and duration of warm-up ensure different physiological, biochemical and psychological changes in the body [9,10].

Traditionally, athletes perform static stretching after initial jogging during warm-up because it is easy, safe, and believed to be less likely to strain the muscles than other types of stretching [11,12]. However, recent research has shown that static stretching decreases acute explosive and high speed motor capacities such as power, strength, vertical jump, velocity and reaction time [13,14,15].

Apart from stretching, pre-event massage can be used as an assistant to physical warm-up [6]. Many claims are made about massage, but few are backed by any empirical data regarding either mechanisms or effects. Possible mechanisms of massage have been categorized into biomechanical, physiological, neurological and psychological [16]. Some data have indicated that both massage and stretching causes a decline in motor unit activation [17,18] and reduces muscle stiffness as evidenced by a lengthening of massaged muscle [19].

There are controversial claims in the sports literature that pre-event massage can increase or decrease performance [16]. Goodwin and a group of authors [20] found that a controlled 15 minute lower limb massage administered prior to warm-up had no significant effect on sprint performance. Research conducted by Hunter and his friends [21] showed that lower limb massage appears to produce a reduction in force during the first contraction of muscles. Studies showed that massage of the hamstring muscle group increased the passive range of motion in hip and lower limb joints [22,23]. Moreover, there is no consensus on the type, style, application, duration, intensity, number of strokes applied, or the time of application prior to training or competition [24,25].

Previous studies did not examine the acute effects of pre-event anterior and posterior lower limb massage on the vertical jump, speed and flexibility, and they did not compare their results with traditional warm-up and the combination of massage with traditional warm-up. Furthermore, studies have not been conducted so far on the subject in Ethiopia. Therefore, this study was investigate the effects of pre-event lower limb massage, traditional warm-up and the combination of massage with a traditional warm-up on some selected physical fitness components such as explosive power, speed, agility and flexibility and this study may be served as baseline information for future intervention program.

Having the aforementioned problem in mind, this research was deeply aimed to answer the following basic questions.

- Does a pre-event warm-up protocol have an effect on the explosive power, speed, agility and flexibility?
- Which is the best warm-up protocol among pre-event lower limb massage, traditional warm-up and the combination of massage with traditional warm-up?
- Do pre-event lower limb massage and the combination of massage with traditional warm-up replace the traditional warm-up protocol?

2. Methods

For this study experimental design was used, because the participants were tested than one test. Junior soccer players, with a minimum training/playing background of 3 sessions per week, have been assigned. The study takes place in the FIFA goal project of Ambo, Ethiopia from January to May, 2015.

For this research availability and purposive sampling techniques were used because of the small number of the subjects in both sexes at Ambo FIFA goal project. Thirty-five junior soccer players (19 male and 16 female) were included as a subject according to the inclusion and exclusion criteria. The participants were used the anthropometric measurements includes Age, sex, weight, height, body mass index (BMI) and performance tests includes explosive power, speed, agility and flexibility performance measurements before and after intervention pre-event lower limb massage, traditional warm-up and pre-event lower limb massage with traditional warm-up.

Alloftheselectedparticipantswereincludedassubjects who are junior soccer players and who, having football training in Ambo FIFA goal project academy.Inadditionto thishave sunburn, skin rashes or conditions, open sores, fractures, contusions, hematomas, thrombophlebitis, acute pain or injury and fever or infections werenotincludedasparticipantsinthis research study.

Permission was obtained from the director of the FIFA goal project academy of the Ambo. The purpose of the study was explained to the study participants in order to get informed verbal consent. The privacy of the participants was guaranteed in risk of any harm. A written consent was read to each participant to obtain their agreement. Then verbal consent was received from each study subjects and anyone who was not willing to take part in the study has full right to do so.

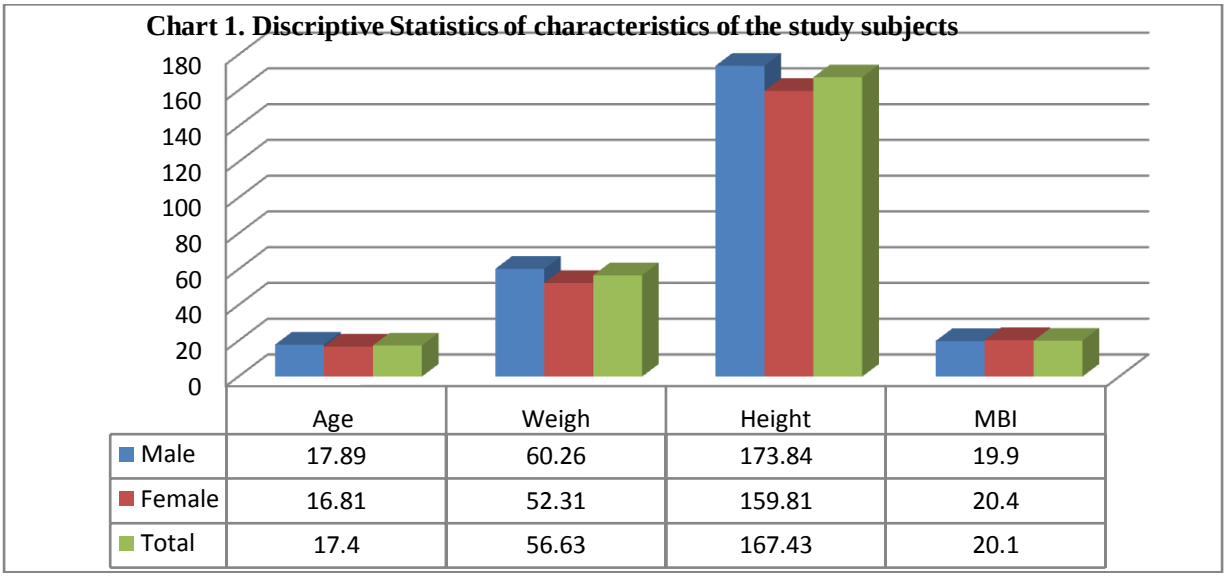
Quantitative data was used through the appropriate anthropometric test includes age, sex, weight, height, body mass index (BMI) to know the characteristics of the study participants and performance tests includes explosive power [26], speed, agility and flexibility [27,28] performance measurements following the three discrete warm-up modalities, consisting of pre-event lower limb massage, traditional warm-up, and pre-event lower limb massage combined with traditional warm-up from Ambo FIFA goal project academy.

Descriptive statistics was produced for each of the parameters. The results presented as mean ± SD. Paired T-test was used to compare the pre-test values with the three conditions (pre-event massage, traditional warming up, and massage with traditional warming up). All tests will be matched pairwise (before and after intervention), to find out the significant difference in selected explosive, speed and flexibility performance. The significance level was set at $P< 0.05$ for each of the statistical tests. The SPSS 20 software was used for the statistical analysis.

3. Results

Descriptive statistics of Male and Female Soccer Trainees variables

Chart 1. Discriptive Statistics of characteristics of the study subjects



The mean age of male and female soccer trainees was 17.89 and 16.81 years old respectively. BMI in kg/m^2 of male and female soccer trainees was 19.9 and 20.4 kg/m2 respectively.

The results of male trainees in traditional warm up intervention showed significantly degraded performance on standing broad jump test, speed test, and agility test. In contrast, traditional warm up intervention showed significant increases the performance on sit & reach test at $p<0.05$. The results of the current study (pre-event lower limb massage) can show significant increases of performance in standing broad jump test and sit & reach test. And also the results of pre-event lower limb massage can show significant degraded of performance in speed test and agility test at $p<0.05$. In an attempt to further elucidate the optimal pre-participation protocols for activities, the new approach in this study was to examine the effects of the combination of pre-performance lower limb massage and traditional warm up warm-up on explosive, speed, agility and flexibility. The findings of the present study showed that significant increases of performance in speed test, agility test and sit & reach test. And also the finding can showed significantly degraded performance on standing broad jump test at $p<0.05$.

Table 1. The Acute Effect of Warm up Modalities on Male Soccer Trainees

Variables	Treatments	Paired Differences					t	Df	Sig. (2-tailed)
		Mean ± Std. Deviation	Mean Diff.	Std. Error Mean	95% Confidence Interval of the Diff.				
					Lower	Upper			
Explosive Power (Broad Jump Test (m))	Pre-Test	2.1053±0.08	0.0358	0.0229	-0.0123	0.0839	1.563	18	0.135
	Traditional Warm Up	2.0695±0.09							
	Pre-Test	2.1053±0.08	0.0348	0.0166	-0.0001	0.0696	2.094	18	0.051
	Lower Limb Massage	2.0705±0.08							
	Pre-Test	2.1053±0.08	0.0027	0.0222	-0.0441	0.0493	0.118	18	0.907

	Lower Limb Massage with Trad. Warm Up	2.1026±0.11							
Speed (30m Speed Test (s))	Pre-Test	4.5326±0.23	-0.069	0.069	-0.2139	0.076	-0.999	18	0.331
	Traditional Warm Up	4.6016±0.17							
	Pre-Test	4.5326±0.23	-0.5958	0.5003	-1.6469	0.4554	-1.191	18	0.249
	Lower Limb Massage	5.1284±2.25							
	Pre-Test	4.5326±0.23	0.5031	0.0638	0.3689	0.6373	7.878	18	0.000
	Lower Limb Massage with Trad. Warm Up	4.0295±0.19							
Agility (Illinois Agility Test (s))	Pre-Test	16.2674±0.65	-0.5931	0.1543	-0.9173	-0.2691	-3.845	18	0.001
	Traditional Warm Up	16.8605±0.38							
	Pre-Test	16.2674±0.65	-0.2573	0.1758	-0.6267	0.1119	-1.464	18	0.160
	Lower Limb Massage	16.5247±0.41							
	Pre-Test	16.2674±0.65	1.72	0.6049	0.4493	2.9908	2.844	18	0.011
	Lower Limb Massage with Trad. Warm Up	14.5474±2.57							
Flexibility (Sit and Reach Test (cm))	Pre-Test	10.1421±1.87	-3.879	0.543	-5.019	-2.738	-7.143	18	0.000
	Traditional Warm Up	14.0211±2.27							
	Pre-Test	10.1421±1.87	-5.279	0.438	-6.199	-4.358	-12.05	18	0.000
	Lower Limb Massage	15.4211±1.98							
	Pre-Test	10.1421±1.87	-5.521	0.7568	-7.111	-3.931	-7.295	18	0.000
	Lower Limb Massage with Trad. Warm Up	15.6632±2.95							

The results female of trainees in traditional warm up intervention showed significantly degraded performance on standing broad jump test. In contrast, traditional warm up intervention showed significant increases the performance on speed test, agility test and sit & reach test at $p<0.05$. The results of the current study (pre-event lower limb massage) can show significant increases of performance in standing broad jump and sit & reach test. And also the results of pre-event lower limb massage can show significant degraded of performance in speed test and agility test at $p<0.05$.

In an attempt to further elucidate the optimal pre-participation protocols for activities, the new approach in this study was to examine the effects of the combination of pre-performance lower limb massage and traditional warm up warm-up on explosive, speed, agility and flexibility. The findings of the present study showed that significant increases of performance in standing broad jump test, speed test, agility test and sit & reach test at $p<0.05$.

Table 2. The Acute Effect of Warm up Modalities on Female Soccer Trainees

Variables	Treatments	Paired Differences					t	Df	Sig. (2-tailed)
		Mean ± Std. Deviation	Mean Diff.	Std. Error Mean	95% Confidence Interval of the Diff.				
					Lower	Upper			
Explosive Power (Broad Jump Test (m))	Pre-Test	1.7156±0.09	0.0468	0.0376	-0.0334	0.1271	1.244	15	0.233
	Traditional Warm Up	1.6688±0.14							
	Pre-Test	1.7156±0.09	0.0137	0.0378	-0.067	0.0945	0.363	15	0.722
	Lower Limb Massage	1.7019±0.14							
	Pre-Test	1.7156±0.09	-0.0788	0.0727	-0.2338	0.0763	-1.082	15	0.296
	Lower Limb Massage with Trad. Warm Up	1.7944±0.29							
Speed (30m Speed Test (s))	Pre-Test	5.5206±0.19	0.01	0.0828	-0.1666	0.1866	0.121	15	0.906
	Traditional Warm Up	5.5106±0.23							
	Pre-Test	5.5206±0.19	-0.5869	0.1007	-0.8016	-0.3721	-5.826	15	0.000
	Lower Limb Massage	6.1075±0.31							
	Pre-Test	5.5206±0.19	0.55	0.0648	0.4119	0.6881	8.490	15	0.000
	Lower Limb Massage with Trad. Warm Up	4.9706±0.15							
Agility (Illinois Agility Test	Pre-Test	18.7281±0.59	0.3875	0.2096	-0.0593	0.8343	1.848	15	0.084
	Traditional Warm Up	18.3406±0.57							
	Pre-Test	18.7281±0.59	-0.0413	0.2378	-0.5482	0.4657	-0.173	15	0.865

(s))	Lower Limb Massage	18.7694±0.61							
	Pre-Test	18.7281±0.59	1.6437	0.6364	0.2872	3.0003	2.583	15	0.021
	Lower Limb Massage with Trad. Warm Up	17.0844±2.47							
Flexibility (Sit and Reach Test (cm))	Pre-Test	18.3188±1.34	-0.5937	0.4664	-1.5879	0.4004	-1.273	15	0.222
	Traditional Warm Up	18.9125±1.5							
	Pre-Test	18.3188±1.34	-1.7	0.6454	-3.0757	-0.3243	-2.634	15	0.019
	Lower Limb Massage	20.0188±2.33							
	Pre-Test	18.3188±1.34	-1.0562	0.5279	-2.1814	0.0689	-2.001	15	0.064
	Lower Limb Massage with Trad. Warm Up	19.3750±2.06							

4. Discussion

Traditionally, athletes perform a warm-up session prior to physical activity or competition. The aim of the warm-up is to improve the physiological, biomechanical and psychological performance of the athlete. However, coaches, athletic trainers, athletes, and sport scientists have not yet determined which warm-up protocol is the best. Generally, coaches and athletes apply jogging and static stretching during the warm-up session. The current study results in traditional warm up intervention showed significantly degraded performance on standing broad jump in both male and female, speed test in male, and agility test in male trainees. Similar with this, studies have shown that pre-event traditional warm up (static stretching) (particularly increasing the stretching duration) decreases the performance of acute explosive, speed and power exercises [12,14,29]. In contrast, traditional warm up intervention showed significant increases the performance onspeed test in female, agility test in female and sit & reach test in both male and female trainees.

Apart from traditional warm up (stretching), pre-event massage can be used as an adjunct to physical warm-up [6]. To date, very few studies have examined the effects of pre-event massage on performance. There are controversial claims in the sports literature that pre-event massage can increase or decrease performance [16]. However, the results of the current study (pre-event lower limb massage) can show significant increases of performance in standing broad jump both in male and female and sit & reach test in both male and female trainees. Similar with these, studies found that massage of the hamstring muscle group increased the passive range of motion in hip and lower limb joints [21,22]. And also the results of pre-event lower limb massage can show significant degraded of performance in speed test in both male and female, and agility test in both male and female trainees. Similarly, Goodwin and his friends [20] found that a controlled 15 minute lower limb massage administered prior to warm-up had no significant effect on sprint performance. And research conducted by Hunter and a group of authors [21] showed that lower limb massage appears to produce a reduction in force during the first contraction of muscles.

In an attempt to further elucidate the optimal pre-participation protocols for activities, the new approach in this study was to examine the effects of the combination of pre-performance lower limb massage and traditional warm up warm-up on explosive, speed, agility and flexibility. The findings of the present study showed that significant increases of performance in standing broad jump in female, speed test in both male and female, agility test in both male and female and sit & reach test in both male and female trainees. And also the finding can showed significantly degraded performance on standing broad jump in male trainees. The result of the present study is in contrast, with the previous study which examined the use of massage in pre-event after warm-up [30]. Arabaci[30] also found that 10 min posterior and 5 min anterior lower limb Swedish massage after a warm-up session significantly degrades the performance of explosive, speed, and agility tests and significantly increased flexibility of the hip joint (sit & reach test).

5. Conclusion

Traditional warm up protocol has an adverse effect on standing broad jump in both male and female, speed test in male, and agility test in male trainees performance and a positive effect on speed test in female, agility test in female and sit & reach test in both male and female trainees performance. Pre-event lower limb massage warm-up protocols has a positive effect on standing broad jump both in male and female and sit & reach test in both male and female trainees performance and an adverse effect on speed test in both male and female, and agility test in both male and female trainees. The combined warm-up protocols (pre-event lower limb massage with traditional warm-up) has a positive effect on standing broad jump in female, speed test in both male and female, agility test in both male and female and sit & reach test in both male and female trainees and an adverse effect on standing broad jump in male trainees performance. Massage should not be recommended for warm-ups separately. It is recommended that, coaches and athletes to use the combined warm up protocol which pre-event lower limb massage then traditional warm-up. It is highly expected from

sport professionals, coaches and related fields professionals to guide and educate on the importance and the effects of warm-up protocols for performance efficiency. Further studies should examine the effectiveness of shorter duration and various types and frequencies of massage manipulations for their utility immediately prior to activities.

6. Practical implications

- The pre-test was taken through performance tests which includes; explosive power, speed, agility and flexibility.
- The players were treated with the first warm-up modality which is traditional warm-up (walking, jogging, running and static stretching) for six (6) weeks intervention and the players takes performance tests which includes; explosive power, speed, agility and flexibility.
- The players were treated with the second warm-up modality which is pre-event lower limb massage for six (6) weeks intervention and the players takes performance tests which includes; explosive power, speed, agility and flexibility.
- The third warm-up modality was applied on the players which is the combination of pre-event lower limb massage with traditional warm-up for another six (6) weeks, and then the players takes performance tests again which includes; explosive power, speed, agility and flexibility.

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