Classic sports massage vs. Chinese self-massage. Which one is more effective in warm-up?

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Abstract

Study aim: Warm-up is an indispensable element of sports training. The aim of the study was to determine the effect of warm-up exercises with Swedish, classic sports massage and Chinese self-massage on functional limitations of the locomotive system.

Materials and methods: The study included 42 women and 13 men aged 19 to 22. They all performed the Functional Movement Screen (FMS) test, without a warm-up, and then (after a week) performed it again after either a standard warm-up with sports massage (Group 1) or a warm-up with Chinese self-massage (Group 2).

Results: Both groups obtained significantly higher results in the second measurement (FMS test), preceded by a standard warm-up with sports massage (Group 1, $p = 0.003$) and warm-up with Chinese self-massage (Group 2, $p = 0.000$). In Group 1, statistically significant differences were observed in the results of the exercises: hurdle step and push-ups. In Group 2, the difference was significant in the attempts to sit down deep, walk over the fence and pump.

Conclusion: There were no significant differences between the groups that used massage and self-massage. Both methods can improve movement functionality.

Keywords: Self-massage – Sports massage – Warm-up – Functional Movement Screen

Introduction

Correctly conducted sports training consists of three parts: the initial one – warm-up; the main one – proper exercises; and the final part – cool down. The purpose of the warm-up is to properly prepare the practitioners physically and psychophysically for the movement tasks performed in the main part and to adapt the body to the effort. The warm-up should include: aerobic exercises (increasing the body temperature), stretching exercises (stretching the muscles to be used for a specific task) and exercises consisting of movements to be used in the actual training [3, 29, 38]. An important function of warm-up is to minimise the risk of overload and injuries [34, 37]. Therefore, more and more often in the initial part of physical activity, procedures and actions characteristic for post-workout regeneration, such as stretching or self-massage, are used [5, 13, 14]. Some of the physiotherapeutic procedures are

also applied before one takes up the activity; this is the case with massage or taping, for example. They can improve the quality of movement, gradually adapt to one's workout or reduce any adverse effects that may be experienced [7, 10, 15, 39].

Functional assessment can also be an additional element of injury prevention. Information on traffic quality and functional limitations is necessary to introduce a possible intervention. The tool for physiotherapist's screening can be the Functional Movement Screen (FMS) but also other tests and studies such as the Thomas Test, Core Muscle Strength and Stability Test, Thomayer's Test or Rotation Test [12, 26, 30].

The main cognitive objective of the research was to determine the impact of two forms of preparation for physical exercise (warm-up exercises preceded by an invigorating sports massage and warm-up exercises with Chinese self-massage) on the quality of movement and the degree of functional limitations in the locomotive system.

Material and methods

Fifty-five students aged 19 to 22, who were not engaged in competitive sports, participated in the survey (Table 1). There were 42 women and 13 men. All participants were interviewed before the research was conducted to determine existing cardiovascular and respiratory diseases, as well as past damage to the locomotor system, which might hinder the test. Healthy women without the diseases and injuries mentioned above qualified for the study.

The subjects performed the Functional Movement Screen twice. The first time the test was carried out, according to the recommendations in the literature, without a warm-up. Then, after a week, the subjects were randomly divided into two groups and the test was repeated. Before re-examination, persons from Group 1 performed a warm-up preceded by a pre-workout, stimulating sports massage. Strokes, intensive rubbing and kneading were performed on the muscles of the lower, upper and dorsal extremities, along with the development of the joint area. Procedure time: 10 minutes [9]. Persons qualified for Group 2 performed a warm-up with Chinese self-massage, performing stroke and rubbing movements, longitudinal and circular, 16 repetitions each. It started with hand rubbing, followed by energetic stroking and rubbing the arms and whole upper limbs. Then the chest and abdomen were stroked. Finally, the lower limbs were worked on longitudinally (whole limbs) and circularly (knee joints) [25]. Warm-up exercises in both groups were the same. Aerobic exercises were used – running (running exercises – skips, reverse gear, crossings, etc.), and dynamic stretching exercises (circulations, bends, turns) [2]. The warm-up took about 10 minutes.

The main research tool was the Functional Movement Screen test by Gray Cook and Lee Burton [20, 21]. It was developed to provide an objective analysis of the human motor patterns in relation to functional performance and to predict and prevent injuries. Thanks to a tri-dimensional movement analysis, it is possible to detect anomalies in kinetic chains, as well as to have a comprehensive assessment identifying the asymmetry and important functional limitations, which are a result of incorrect mobility and

motor system stability. FMS consists of seven exercises assessing basic movement patterns: 1. Deep squat, 2. Hurdle step, 3. In-line lunge, 4. Shoulder mobility, 5. ASLR – active straight leg raise, 6. Trunk stability push up, 7. Rotation stability [20, 21].

Performing the tasks is subject to evaluation on a four-point scale (0 to 3 points); 3 points are granted to a person who performed the movement pattern correctly, 2 points to a person who performed the movement pattern with compensation, 1 point to a person who is not able to perform a movement pattern in its entirety, while 0 is assigned to persons who experience pain while performing the exercise or during a provocation test. The maximal score a person can achieve is 21 points [20, 21].

The first FMS test was performed without any warm-up, the second after a warm-up (with sports massage and Chinese self-massage). The evaluation was done in two planes, sagittal and frontal. The test person performed a given movement task three times, and the investigator recorded the best of the trials. If there were doubts as to the correctness of the pattern, a lower grade was obtained. Each side was assessed separately [20, 21].

An additional research tool was an original survey containing biometric data.

The differences between the first and second FMS measurements were calculated using the paired samples Wilcoxon test. The differences between the groups were established by the Mann-Whitney U test. The minimal significant level was adopted at $p \leq 0.05$.

Results

The total measurement score of the first FMS test was similar in both groups. The results were 14.9 (Group 1) and 15.2 (Group 2), indicating mean average susceptibility to injury. In the second FMS assessment (Group 1 preceded by warm-up with sports massage and Group 2 preceded by Chinese self-massage), both groups scored significantly higher (Fig. 1).

For Group 1, statistically significant differences were observed in the results of the following tasks: hurdle step ($p = 0.008$) and trunk stability push-up ($p = 0.013$). In Group 2, significant differences were noted in the

Table 1. Characteristics of examined persons

Group	Gender	Number of people	Age [years]	Body mass [kg]	Body height [cm]	BMI [kg/m ²]
1 (massage)	women	23	21.0 ± 1.1	65.5 ± 11.8	167.7 ± 7.1	22.7 ± 3.0
	men	5	20.6 ± 0.9	79.6 ± 8.2	181.4 ± 4.0	24.2 ± 3.1
2 (self-massage)	women	19	20.4 ± 0.8	61.5 ± 8.9	166.5 ± 4.6	22.1 ± 2.5
	men	8	20.1 ± 0.4	76.2 ± 9.3	180.3 ± 3.8	23.4 ± 2.9

Fig. 1. Overall results of FMS

following tests: deep squat ($p = 0.013$), hurdle step ($p = 0.016$), and trunk stability push-up ($p = 0.048$). Only in the rotary trunk stability exercise was a slightly lower result obtained in the second test (Table 2).

Among Group 1 women, the greatest differences between the results of both measurements were observed in the following tasks: hurdle step ($p = 0.002$) and trunk stability push-up ($p = 0.021$). Group 2 women achieved a significant improvement in three attempts: deep squat ($p = 0.002$), hurdle step ($p = 0.009$) and push-up ($p = 0.048$). Men from both groups had a lower total FMS score than women. The highest progression of the results (close to statistical significance) after the intervention was recorded in deep squat and active straight leg lift in Group 1 and active straight leg lift in Group 2 (Table 3).

Discussion

Physical activity is one of the main elements of a healthy lifestyle. However, it is important that the movement is safe and the training does not impair the functional capabilities of the body. Therefore, a proper warm-up is

necessary, which can be supported by physiotherapy techniques. Methods that help to minimise the adverse effects of fatigue and reduce the risk of injury, i.e. supplementary exercises (stretching) and treatments (massage, self-massage), should be an important element of training both among professional and recreational athletes [14, 32]. Our own research has demonstrated that warm-up exercises with both sports massage and self-massage have a positive effect on minimizing the locomotive system's functional limitations. This confirms that warm-up before training is a very important aspect of anti-injury prevention [34, 37].

The positive effect of warm-up in anti-injury prophylaxis is confirmed by studies conducted by Subasi et al., Maiiou et al. and Obalkowska whereby warm-up exercises significantly affected proprioception, sense of balance and muscle function [28, 31, 36].

Massage is considered as one of the most effective methods positively affecting muscle regeneration and symptoms of post-workout muscle soreness. The potential benefits of massage include increased blood flow and venous return and reduced soreness [9, 40]. However, the results of studies concerning the effects of massage as an element of preparation for physical effort are not convergent

Table 2. Results of all tasks of the FMS

Groups	Measurement	Deep squat	Hurdle step	In-line lunge	Shoulder mobility	Active straight leg raise	Trunk stability push-up	Rotary stability
1	pre-test	2.18 ± 0.61	2.00 ± 0.54	2.36 ± 0.73	2.54 ± 0.88	2.43 ± 0.84	1.39 ± 1.13	2.07 ± 0.38
	post-test	2.29 ± 0.66	2.29** ± 0.60	2.43 ± 0.69	2.61 ± 0.63	2.54 ± 0.69	1.86* ± 0.97	2.11 ± 0.31
2	pre-test	1.85 ± 0.53	2.15 ± 0.36	2.30 ± 0.72	2.70 ± 0.67	2.30 ± 0.72	1.93 ± 0.87	2.04 ± 0.34
	post-test	2.19** ± 0.56	2.41* ± 0.51	2.56 ± 0.51	2.74 ± 0.53	2.44 ± 0.70	2.15* ± 0.91	2.00 ± 0.48

Differences between first and second measurements: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (Wilcoxon test).

Table 3. Results of women and men of all tasks of the FMS

Groups (gender)	Measurement	Deep squat	Hurdle step	In-line lunge	Shoulder mobility	Active straight leg raise	Trunk stability push-up	Rotary stability	Sum
1 (women)	pre-test	2.26 ± 0.62	1.96 ±0.46	2.39 ±0.76	2.65 ±0.73	2.70 ± 0.72	1.13 ± 1.02	2.09 ±0.36	15.17 ± 2.42
	post-test	2.30 ± 0.61	2.30** ±0.56	2.52 ±0.62	2.74 ±0.54	2.70 ± 0.64	1.57* ± 1.02	2.09 ±0.41	16.22** ± 2.28
1 (men)	pre-test	1.80 ± 0.45	2.20 ±0.45	2.20 ±0.45	2.00 ±1.22	1.20 ± 0.45	2.60 ± 0.55	2.00 ±0.71	14.00 ± 1.87
	post-test	2.20 ± 0.84	2.20 ±0.45	2.00 ±0.71	2.00 ±0.71	1.80 ± 0.45	2.80 ± 0.45	2.20 ±0.45	15.20 ± 1.30
2 (women)	pre-test	1.84 ± 0.61	2.11 ±0.32	2.37 ±0.83	2.84 ±0.37	2.63 ± 0.50	1.63 ± 0.83	2.00 ±0.33	15.42 ± 2.61
	post-test	2.26** ± 0.56	2.42** ±0.51	2.63 ±0.50	2.89 ±0.32	2.74 ± 0.56	1.95* ± 0.97	1.95 ±0.52	16.84*** ± 2.39
2 (men)	pre-test	1.88 ± 0.35	2.25 ±0.46	2.13 ±0.35	2.38 ±1.06	1.50 ± 0.53	2.63 ± 0.52	2.13 ±0.35	14.88 ± 1.13
	post-test	2.00 ± 0.53	2.38 ±0.51	2.38 ±0.52	2.38 ±0.74	1.75 ± 0.46	2.63 ± 0.52	2.13 ±0.35	15.63* ± 1.06

Differences between first and second measurements: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (Wilcoxon test).

[4, 17]. Sports massage used before warm-up influenced the range of motion in joints as well as the results of motor tests, especially short-term ones (speed, power) [6, 13, 37]. It also had a positive impact on the starting efficiency of players participating in the boxing tournament. However, some researchers come to different conclusions. Arabaci et al. [4] determined the effect of lower limb massage before exercise on selected motor skills through the use of Swedish massage. Their results indicated that massage adversely affected the examined motor features. It was concluded that the massage time was too long and too burdensome for the contestant [4].

However, there are very few studies on manual massage in warm-up. The most frequently indicated positive effects are in preparation for effort [13]. More often, foam rolling was used as a supporting treatment. Here, its effectiveness was also emphasized, particularly in the context of improved muscle flexibility [24, 33, 35].

The Functional Movement Screen test used in this study provides an opportunity to assess the likelihood of injury and existing dysfunctions of the locomotive apparatus. It is a screening test, making it possible to reveal weaknesses in the kinematic chains. It is used to assess movement patterns and functional fitness of athletes [1, 18, 23]. Each of the tests that make up the test provides relevant information. For example, a strong correlation between deep squatting and injury was revealed. Thus, the very attempt at deep squatting may be a prognostic test [19]. The effectiveness of the FMS test

is evidenced by the large number of scientific publications in which it is a research tool. This makes it possible to easily and reliably compare the results obtained with those of other authors. Susceptibility tests, using FMS, concerned, among others, athletes, team game players and martial arts adepts [8, 11, 16].

Looking for alternative forms of preparation for physical activity can not only increase the training effect, but also make the training more attractive. The primary goal of sports or recreational training is to increase the exercise capacity of the system. For this process to be effective, exercises must be performed regularly. It is therefore necessary to prepare the body for every workout.

In view of further research, therefore, it seems justified to investigate a larger group, more diverse in terms of age, health, growth and weight parameters, physical activity or even lifestyle. Additionally, the warm-up can be supplemented with further physiotherapeutic procedures or various forms of exercise and their effect on the body assessed [22, 27].

Conclusions

1. A proper warm-up can have a beneficial effect on minimizing the motion apparatus' functional limitations. It is advisable to perform preparatory exercises before each training session in order to improve the quality of movement and minimize the risk of injury.

2. There are no significant differences between the group using sports massage and the group using Chinese self-massage. Both methods can improve movement functionality.
3. The Functional Movement Screen test provides information about functional limitations of the motion apparatus and its dysfunctions that can lead to damage. It can be a diagnostic tool used in the prevention of injuries.
4. Research on the effectiveness of prevention programmes should be continued in different groups, especially among athletes, for whom the risk of injury is highest.

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