THE EFFECT OF COLD -WATER IMMERSION AND PASSIVE REST ON RECOVERY AMONG SPRINT ATHLETES

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Abstract

Recovery technique could help lessen the fatigue, increased the level of athletes' fitness and performance. The main purpose of this research was to study the effect of cold - water immersion and passive rest on recovery of performance among sprint athletes. 14 young athletes were selected and have been divided into two groups that was cold- water immersion group (n = 7) and passive rest group (n = 7). Subjects performed three tests; (i) 35meter sprint, (ii) standing broad jump and (iii) sit and reach. Before the athletes did the test, they warm up themselves for 10 minutes. After that, subjects did the recovery techniques which was for 15 minutes and then repeated the tests. Data analysis was analysed using paired samples test which was pre-test and post-test. The results showed that there was significant effect of cold - water immersion on performance, there was significant effect of passive rest on performance and there were significant different on cold - water immersion and passive rest on performance. Cold - water immersion result for 35 meter sprint (p = 0.001), standing broad jump (p = 0.030) and sit and reach (p = 0.002) which was showed the decreased of performance and then for passive rest the result in 35 meter sprint (p = 0.040), standing broad jump (p = 0.042) and sit and reach (p = 0.000) which showed the improvement through cold – water immersion. Implication of this study found that passive rest was good recovery technique for short period of time and cold - water immersion was good for longer period of time.

Keywords *Cold water immersion, passive rest, skill related fitness, sprinter,*

Introduction

It was commonly recognized that good recovery allowed better performance and reduced the number of injuries in athletes. Recovery was an important component of any physical activities (Strejcová & Konopková, 2011). Recovery could be defined as muscle in our body return to normal state after the doing exercises (Tomlin and Wenger, 2001). By speeding up the recovery process in such situations could deliver a competitive improvement to the athletes. Athletes, trainers, and coaches may use many different approaches to increase recovery and subsequent performance after exercise. It was including rest and sleep to nutritional strategies such as supplementation, to physical modalities such as massage, active recovery, and stretching (Calder, 2004). Every type of recovery had a different method and different situation hence it must be done in the right time and right procedures. Balance between competition or training and recovery was needed to increase performance and to avoid injury due to overtraining (Garcia et al., 2016).

Sprinting competitions put a sprinter's body under stress in the short- term tournament-style events, or over a longer term in competitions where athletes compete weekly (or more) over numerous weeks. Sprint athlete trains on explosive movement to explode the speed until the end point. The nature of sprint training requires the athlete to use power of explosive, power on lower body, the quickness, endurance and an agility to show their performance at maximum level (Chamari & Padulo, 2015). All these components in sprinting event cause the sprinters under stress. In these types of circumstances there might be insufficient time for athletes to recover to their optimal physiological and psychological status before the next bout of exercise (Wilcock, Cronin & Hing, 2006). Some of the sprint athletes that compete in various events on the same day can lead to fatigue. Due to that, the effective recovery was important to make sure the best performance in the next tournament or event (Crowe, O'Connor, & Rudd, 2007).

Recently, cold-water immersion recovery had emerged as one of the most popular interventions to speed up recovery (Strejcová & Konopková, 2011). Cold water immersion (CWI) wass one of the cryotherapy recovery techniques that use cold method. Anecdotally, various sporting bodies, coaches, and athlete-support services suggested the use of water immersion to improve recovery (Wilcock, Cronin & Hing, 2006). Four basic types of water immersion could be achieved: cold immersion, hot immersion, alternating-temperature immersion (contrast therapy), immersion in which the water temperature was neutral in relation to body temperature (Wilcock, Cronin & Hing, 2006).

Cold water immersion had many proposed physiological effect that can help in recovery from fatigue, as well as the ability to decrease cellular need for oxygen by reducing cellular metabolism, reduced heart rate, decreased inflammation and reduced core, intramuscular and cutaneous temperatures (Eltman & Aliba, 2012). The benefit of cold-water immersion was changing blood flow (Vaileetal. 2008), thermoregulation (Peiffer et. al. 2009; Vaile et al. 2010), and option of recovery (Stanley et al. 2012) which can reflect by modified the cardiac autonomic activity (Buchheit et al. 2009b; Stanley et al. 2012). Application of cold - water immersion that have been suggested by a growing body of evidence following strength exercise can speed recovery to improve the symptoms of delayed onset muscle and muscle damage (Leeder et al., 2012). Some of the readings that have been examined cold water immersion effect after strength exercise, the comparator groups have naturally included active recovery (Roberts et al., 2014), contrast therapy (i.e. alternating between warm and cold water) (Vaile et al., 2008) and warm water immersion (Vaile et al., 2008).

There were few factors that affect athlete performance such as equipment, the skills, experience and the recovery process. The entire athletes around the world seek for the best recovery method to help them recover faster after the game or training to recovery. Performance of the athlete and recovery were said that could be directly linked. Some of the game competitions had not enough time for the athlete to recover effectively between training and competitive session, that could make performance decreased (Nepocatych et al., 2015). Different types of recovery modalities, individual or combination were most used

by competitive athlete to improve recovery, decrease muscle soreness, and increase performance (Barnett, 2006). For the athlete, the balance between recovery and training / competition pressure was significant to maximize sports performance and to avoid possible disturbance leading to overtraining and a few of recovery strategy have been studied to increase the reestablishment of physiological capability to pre-exercise level and to improve performance (Garcia et al., 2016).

Furthermore, every athlete in sports competes frequently and recovery was needed to maximize the potential between competition restoration and decrease fatigue. Hence, better recovery after strong and extensive activities could help improve post-exercise physical performance and it could help following training and performance of athlete (Elias et al., 2013). Most problems for the athlete in the tournament as the period for full recovery is restricted and thus performance may decrease. Current studies had verified that residual fatigue accumulated over following matches could poorly affect team-sport performance (Ronglan et al., 2006; Spencer et al., 2005). The athletes that want to increase training and competition performance, fatigue should be decreased by recovering as fast as possible (Versey et al., 2013). The improvement of recovery from training and competition has become important aspect of increase athletic performance. The better recovery strategies after physical activity was believed to improve subsequent performance and may minimize the potential of injury (Argus et al., 2013). The purpose of this study was to study the effect of cold -water immersion and passive rest on recovery of performance among sprinter athlete.

Materials and Method

This study compared two groups of recovery technique that were cold water immersion (CWI) and passive rest (PR) on skill related fitness that related to sprint athlete. The sprint athletes were from Sekolah Sukan Malaysia Terengganu and the total of them were 14 athletes which is 8 males and 7 females. The athlete's ages were ranged 13 years old until 17 years old.

The athlete undergoes 35meter sprint, standing broad jump and sit and reach. These skills were being tested before (pre-test) and after (post-test) recovery technique. All the athletes have been immersed in cold water for 15 minutes.

Statistical Analysis

Paired Sample t-Test was used to identify the significant of the three tests. Mean and standard deviation were analyses as a descriptive statistic.

Result

Table 1: Descriptive Statistic

		Minimum		Maximum		Mean		Std. Deviation	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
Speed (s)	CWI	4.47	5.16	7.27	7.38	5.00	5.83	0.63	0.73
	PR	4.66	4.38	4.93	4.90	4.80	4.72	0.12	0.178
Power (m)	CWI	116	119	263	250	197.86	174.71	50.14	52.46
	PR	186	198	264	270	212.00	217.57	26.29	24.5
Flexibility (cm)	CWI	23.5	22.0	43.6	42.0	32.07	30.64	7.25	7.54
	PR	23.5	25.0	34.0	35.5	28.93	30.93	4.96	4.95

Descriptive Statistic

The result showed the improvement and decreases of performance among sprint athlete. Based on result, the cold - water immersion indicated decrease of performance in comparison to passive rest performance.

Speed of cold - water immersion showed decreasing of performance, pre 5.00±.63 and post was 5.83±.73. Meanwhile, speed of passive rest showed that the improvement of performance, which was speed pre 4.80±.12 and speed post 4.72±.178.

Power of cold - water immersion showed the decreasing of performance, which was power pre 197.86±50.14 and power post 174.71±52.46. Meanwhile power of passive rest shows the improvement of performance, which was power pre 212.00±26.29 and power post 217.57±24.5. Flexibility of cold - water immersion showed the decreased of performance, which was flexibility pre 32.07±7.25 and flexibility post 30.64±7.54. Flexibility of passive rest shows the improvement of performance, which was flexibility pre 28.93±4.96 and flexibility post 30.93±4.95.

Paired Sample Test

Speed of cold water immersion and passive showed the significant different for both groups, which was for cold water immersion the result, t (6) = -5.99, p value: 0.001 which was p > 0.05 and the result for passive rest is t (6) = 2.61, p value: 0.040 which was p > 0.05.

Power of cold water immersion and passive showed the significant different for both groups, which was for cold water immersion the result, was t (6) = 2.84, p value: 0.030 p > 0.05 and the result for passive rest was t (6) = -2.58, p value: 0.042 p > 0.05.

Flexibility of cold water immersion and passive showed the significant different for both groups, which is for cold water immersion the result was t (6) = 5.14, p value: 0.002 p > 0.05 and the result for passive rest was t (6) = -9.17, p value: 0.000 p > 0.05.

Table 2: Paired Sample Test

Testing	CWI group		P value	PR		P value
	Pre	Post		Pre	Post	
35meter sprint	5.00±0.62	5.83±0.73	0.001	4.80±0.11	4.72±0.18	0.040
Standing board jump	197.86±50.14	174.71±52.46	0.030	212.00±26.29	217.57±24.5	0.042
Sit and reach	32.07±7.25	30.64±7.54	0.002	28.93±4.96	30.93±4.95	0.000

Discussion

Cold - Water Immersion on Athletes

The current finding showed that there was significant different of cold - water immersion on recovery of performance. According to past study conducted by Crowe et al., 2007 the result of cold - water immersion performance was negative when performing the test compared to passive rest. Cold water immersion had many proposed physiological effect that could help in recovery from fatigue, as well as the ability to decrease cellular need for oxygen by reduce cellular metabolism, reduce heart rate, decrease inflammation and reduce core, intramuscular and cutaneous temperatures (Eltman & Aliba, 2012). The benefit of cold - water immersion was to help the body reduce from fatigue and make the body relax for a long period of time.

The current study was in line with the previous results that revealed control group was faster in recovery than cold water immersion it because cold water immersion could reduce sprint performance that

associated with parasympathetic exercise that could reduce heart rate and performance (Parouty et al., 2010). From this journal the cold - water immersion was good use for short-term recovery between training and competition that was not provides good performance for sprint athlete and was not recommended for the anaerobic athlete user such as sprinter.

The current finding showed the performance of sprint athletes after cold water immersion was decreased. The data indicated that pre-test and post-test for cold water immersion mostly decreased due to the muscle of the athlete totally relaxes compare to passive rest. Cold water immersion makes the body relax, which means the body of the athlete return to normal before do the test. After competition the tool of recovery most used was cold water immersion and frequently recommend for coach and medical staff to decrease the believe performance decrements in repetitive exercise stress (Eltman & Aliba, 2012). Most of the coach and athlete believed that the cold water immersion could use long period of time rest which means the repetitive event that had gap for long period of time and that was be recommended that the best time use of cold water immersion.

Passive Rest on Athletes

The current study showed there was significant different of passive rest on recovery of performance among sprinter athlete. Based on the previous study, the finding said there was significant on passive rest in increasing the performance such as peak power, total work and blood lactate concentration compare to cold water immersion (Crowe et al., 2007).

The past study showed that passive rest was the best recovery method for short duration of rest durations between events. Passive rest also could reduce heart and decrease fatigue, This technique make the body relax for next game in short duration which means it could be practiced for multiple event in one day (Eltman & Aliba, 2012).

In regard of past study passive rest appeared in much better improvement in time trail from one to three in the trial compare to cold water (Stanley et al., 2013). The rest time between three trials for passive rest was in short duration which means better for passive rest compare to cold water immersion. The recovery technique of passive rest showed the positive effect on performance (Garcia et al., 2016).This due to athlete's body in preparing the muscle for physical activity.

Different Between Cold - Water Immersion and Passive Rest on Athletes

There was significant different between cold water immersion and passive rest. In previous study, it was stated that the use of cold water immersion for recovery in anaerobic exercise was more on decrease the performance when compared to passive rest (Crowe et al., 2007). The idleness post-exercise technique that makes the body returns to homeostasis which was the body is doing nothing (rest). Basic form of passive rest is sleep or bed rest. However, the current of the study, sleep will be replaced with lie down on the surface.

Based on the previous study, the finding said there was significant that passive rest increase in performance such as peak power, total work and blood lactate concentration compare to cold water immersion (Crowe et al., 2007). The result from previous study consistent with present study revealed that there was significant different between cold water immersion and passive rest on athlete performance, where cold water immersion showed the decrease of performance compared to passive rest that showed the

improvement of performance. Passive rest appeared to be the best recovery method in a short period of time compared to cold water immersion.

Conclusion

In conclusion, there was significant effect of cold - water immersion on recovery of performance among sprinter athlete. The cold - water immersion technique gives the muscle of the athletes were totally relaxed and when the athlete undergoes a test, their muscle shown that they were totally not ready although the athlete warms up before do the test.

Furthermore, there was significant effect of passive rest on recovery of performance among sprinter athlete. The current study revealed that passive rest was the best for a short duration of rest between events in one-day compare to cold water immersion. For this recovery technique the athletes physiologically prepared and ready comparing to the athlete's condition after cold water immersion treatment. This could explain as the athletes' body is totally rest and restored to normal condition.

Recommendation

Future scientific research should be conducted to further investigate on duration of recovery technique. Hence, the result of studying may show the effect of recovery technique in that duration. The present study suggests CWI and CWT to be promising recovery intervention. However, future studies must be conducted to enhance the body of knowledge and understanding of hydrotherapy and its' associated mechanisms.

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