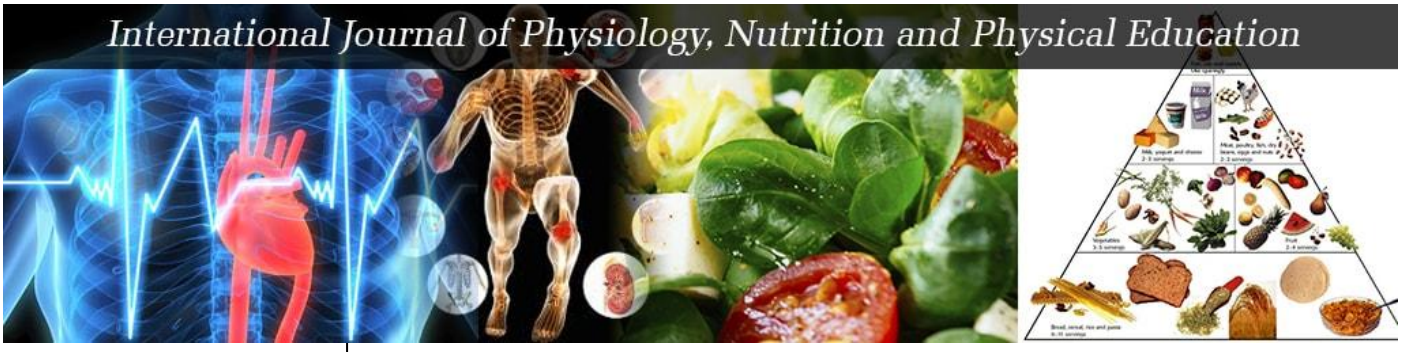

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The difference effect between ice massage and myofascial trigger point dry needling to reduce lactic acid in delay onset muscle soreness (Doms)

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Abstract
Delay onset muscle soreness (DOMS) is associated with excessive muscle work due to the eccentric muscle contraction, that cause the accumulation metabolic residue called lactic acid. This study aimed to know the difference effect among ice massage and dry needling to reduce the levels of lactic acid. This research is an experimental study with pretest-posttest design. Twenty subjects that consist of physical therapystudents were divided into two experiment groups. All respondents were given an interval training in first session to trigger accumulation of lactic acid. The data of lactic acid levels was taken on the second day of the experiment while the DOMS appeared. The respondent lactic acid were checked before and after, they were given the treatment based on the experiment groups. The technique of analysis data used independen t-test. There is difference effect between ice massage and myofascial trigger point dry needling to reduce lactic acid in delay onset muscle sorenees. myofascial trigger point dry needling interfere mechanical, neurophysiologic and chemical in soft tissue. It also has gate control theory mechanism that inhibit pain related to delay onset muscle soreness. Myofascial trigger point dry needling has different effect to reduce lactic acid than ice massage was proved by p 0,046< 0,05.

Keywords: ice massage, dry needling, lactic acid, DOMS

Introduction
Delay Onset Muscle Soreness (DOMS) is associated with excessive muscle activity due to eccentric muscle contraction, which causes the accumulation of metabolic residues called lactic acid. DOMS is characterized by the appearance of pain that often leads to a decrease in desire for exercise. Exercise that usually has the potential to cause tissue damage or DOMS is an eccentric exercise such as downhill running. Eccentric exercise will stimulate the synthesis of prostaglandins and leukocytes. Prostaglandins stimulate pain by affecting type II and III receptors through chemical stimulation. Leukocytes increase permeability of blood vessels and attack neutrophils so damage occurs. There a respiratory burst where neutrophils produce free radicals that harm cell membrane. Swollen is caused by the accumulation of fluid which flow from blood vessel into the interstitial spacewhileswelling distribute the pain sensation through certain area. The damage in delay muscle soreness has sporadic charactheristic that can spread surrounding tissues. The symptoms occur within 24-48 hours after exercise and disappear in 98 hours[123]

High intensity exercise for 30-120 seconds, get the level of lactic acid up to 15-25 Mm that measured after 3-8 minutes exercise. Enormous of increasing lactic acid levels lead to ischemic and hypoxia. Lactic acid arises from ATP-PC process which belong to anaerobic metabolism. In anaerobic physical exercise, oxygen insufficiency in mitochondria of muscle fibers occurs, due to the rate of energy demand exceeds oxygen supply to the mitochondria which deliver by the oxygen transport system. This cause mitochondria get oxygen insufficiency in anaerobic glycolysis process that produces lactic acid from pyruvic acid in the cytoplasm of muscle cells. If anaerobic glycolysis occurs continuously there is accumulation of lactic acid in the blood. In this study the exercise used to trigger lactic acid encapsulation is the interval training. Interval training is an exercise that uses a period of change between work period and rest period of exercise with 2: 1 ratio. Interval training uses a high-intensity work phase and fast of rest phase allow anaerobic metabolism. After given interval training, subjects

given the treatment of ice massage and dry needling on the next day. Ice massage is a direct method of massage on the skin using ice for 5-10 minutes which affect the speed of pain conduction in A delta and C delta nerve fibers and result in vasoconstriction of blood vessels to inhibit inflammation[4]. Dry needling is a needle insertion into the tissue by rotating a needle that allows for local mechanical motion. Dry needling has mechanical influences, neurophysiological influences and chemical influences. This study aims to know and determine the difference effect among ice massage and dry needling to reduce the levels of lactic acid

Method

This research used experimental study with pretest-posttest design. The subjects of research were physiotherapy students of Universitas Muhammadiyah Surakarta and consist of 10 female students and 10 male students which were obtained by purposive random sampling technique with criteria: [1] no history of neurological or orthopedic disorders, [2] Were not undergoing a structured exercise program, [3] not athletes, [4] had no sensibility disorder or skin infection. Respondes were divided into three groups randomly based on given treatment methods (ice massage and dry needling). The independent variables in this research are: [1] ice massage, [2] dry needling. And dependent variable in this research is lactic acid. Materials and equipments used in this study include: [1] stopwatch: used to count and measure duration in work period and rest period of training interval, [2] VAS: used to measure pain as an indicator of DOMS [3] Accutrend Lactate: to measure lactic acid blood sample [5] ice massage equipment such as ice cubes and towels [7] acupuncture needles, [8] alcohol and cotton to clean the area to be treated. This study was conducted in 2 sessions. On the first day the subjects did an interval training exercise were running with a doses of 3 sets (4 x 50 meters) and 2 sets (3 x 100 meters) with a half-break phase of the working period. On the second day, before given ice massage and dry needling, measured lactic acid levels which then called pre-lactic acid. Ice massage was given in both calf of the subject for 10 minutes longitudinal method applied. Dry needling is applied to trigger point in both gastrocnemius muscles for 2 minutes with circular movement of stimulation while insert the needle. After treatment, subjects re-examined of lactic acid levels which were referred to post-lactic acid. The technique of analysis data used independent t-test with normality test and test of homogeneity of variances as prerequisite test and used SPSS 15.0 to analize.

Result and Discussion

Based on Levene's test found that the value of sig = 0,309 > 0.05 (P> 0.05) means data has homogeneous variance. From the results of the study showed that the results of decreased lactic acid by giving ice massage and dry needling have different effects on lactic acid levels. It is proved by significance value was 0.046<0.05 (p <0.05). From the follow-up analysis, it was found that application of dry needling in DOMS that occurred after interval training had a better effect than ice massage. The average yield of lactic acid decrease in ice massage and dry needling group were 0.63 m / Dl and 3.29 m / dL, respectively (Tabel 1).

Tabel 1: data of lactic acid

	Lactic Acid					
	Ice Massage			Dry Needling		
	pre	post	difference	pre	post	difference
	4,6	4,4	0,2	5,2	4,4	0,8
	4	5,6	-1,6	7,2	4,4	2,8
	4,3	4,1	0,2	17,2	13	4,2
	4,8	3,9	0,9	7,6	2,8	4,8
	5,9	5,6	0,3	9,6	6,7	2,9
	16,4	11,2	5,2	11,6	11,6	-2,8
	5,6	8	-2,4	7,2	7,2	4,4
	9,6	8,8	0,8	2,4	2,4	10,3
	8,4	7,8	0,6	5,6	5,6	1,6
	7,9	5,8	2,1	4,8	4,8	3,9
Total	71,5	65,2	6,3	80,4	62,9	32,9
Everage	71,5	6,52	0,63	8,04	6,29	3,29

Table 2: Group Statistic

Treatment		N	Mean	Std. Deviation	Std. Error Mean
Lactic Acid	Ice massage	10	3,2900	3,33981	1,05614
	Dry needling	10	,6300	2,04888	,64791

Table 3: Independent Samples Test

		Levene's Test for Equality of Variance		t-test for Equality of Means					
		F	Sig.	t	df	Sig.(2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Lactic Acid	Equal variances assumed		,309	2,147	18	,046	2,66000	1,23904	,05687
	Equal variances not assumed			2,147	14,934	,049	2,66000	1,23904	,01803

Dry needling technique has several models of technique are MTrP (myofascial trigger point) model and segmental sensation model. This research used myofascial trigger point dry needling technique. Myofascial trigger points will result in multiple contractions of the myofascial muscles in which trigger points occur, which in turn lead to acethylcholin (ACh) expulsion on endplate motors present in active or latent MTrPs [5–7]. The effects of myofascial trigger point dry needling are divided into three mechanisms: mechanical effects, neurophysiological effects and chemical effects. Myofascial trigger point dry needling can mechanically disrupt the functional integrity of the end plate motor. From a mechanical point of view, MTrP dry needling can affect the shortening of muscle sarcomas. It is believed that proper needle insertion can stretch the muscles locally causing a structural contraction of the sytoskeletal, which can separate the myosin filaments from the titin gel in the Z-band muscle fibers. This may affect the sarcoma to rest the length of the muscle at rest (length) by decreasing the degree of overlap between actin filaments and myosin fibers.

Needle insertion on the tissue by turning the needle allows for local mechanical motion that will stretch the muscle fibers in the area. The shift of surrounding tissue resulting from needle rotation will result in a "needle grasp" movement. Entering

the needle in a rotating way will lead to better collagen tissue preparation than needle injection without rotation. Mechanical stimulation produced by MTrP dry needling stimulate the reactivation of cytoskeletal actin and increase the production of proto-oncogenes, including cFos, tumor necrosing factor and interleukin. Movement of the needle up and down result a "needle graps" and the resultant LTR. As a result of mechanical stimulation, group II muscle fibers change the length of the overall muscle fibers that can activate the gate control system which block the input of the nociceptors from MTrP which followed by a decrease in pain.

The neurophysiological effects caused by dry needling are stimulation of the A-delta (group III) fibers that be stimulated for 72 hours after the dry needling application. During this stimulation period, the afferent sensory fibers of the A-delta activate the enkephalinergic inhibitory of the dorsal horn interneurons, which will be the medium / link in pain relief. In addition superficial dry needling energize the serotonergic and noradrenergic descending inhibitor system, which block the entry of harmful stimuli into the dorsal horn. Activation of the enkephalicenergic, serotonergic and noradrenergic of the inhibitory descending system occurs through the stimulation of A-delta nerve fibers caused by the application of dry needling. Stimulation of afferent A-delta and C- (group IV) fibers may produce increased blood flow in the cortical cerebral, which result in a reflex reaction of the afferent pathway, including the II group nerve fibers and group IV that afferent nerves and efferent pathway. There will be cholinergic vasodilatation. In addition to the described mechanical and neurological effects, there are several sources that suggest that dry needling applications can cause chemical effects. Dry needling can trigger an increase of various chemical substances such as bradykinin, CGRP, P substance and so forth. The recovery of MTrP occur due to the emergence of LTR by needle dry needling. Although it is not known what happens to these chemicals when the needle is inserted into the MTrP, it is believed that LTR spending is important [6, 8].

Ice massage can reduce pain sensitivity. Ice massage causes analgesic phenomenon in the superficial region since 2 minutes after treatment. Ice massage leads to vasoconstriction in the blood vessels and inhibit inflammation. There are some sources stated that ice massage reduce the local temperature and will be followed by numbness and vasoconstriction. After the vasoconstriction of the blood vessels, it will be widened again and affect the permeability of blood vessels which accelerate blood vessels and local metabolism [4]

Conclusion and Suggestion

There is differences effect between ice massage and dry needling on decreased lactic acid levels. It was found that application of dry needling in DOMS that occurred after interval training had a better effect than ice massage. More research needed to confirm the mechanism of ice massage, and dry needling mechanism in lactic acid recovery.

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