ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 12, pp.43943-43947, December, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

THE EFFECT OF FARADARMANI AND LAVENDER SUPPLEMENTATION ON THE MARKERS OF DOMS IN YOUNG GIRLS

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ARTICLE INFO

Article History:
Received 15th September, 2016
Received in revised form
22nd October, 2016
Accepted 18th November, 2016
Published online 30th December, 2016

Key words:
Ultra-Therapy,
Lavender,
Pain Feeling and Creatine Kinase.

ABSTRACT

The present study aimed at investigating the impact of ultra-therapy [Faradarmani] and lavender supplementation on the markers of DOMS in young girls. The statistical population of the study incorporated healthy young girls who have not done regular physical activities during the last year. 48 girls were selected among volunteers as the samples of the study. They were randomly divided into four groups: ultra-therapy group (12 participants), lavender supplementation group (12 participants), ultra-therapy and lavender supplementation group (12 participants), and control group. As the first phase of the study, the whole procedure of the research was fully explained to the participants. Then, the first experimental group performed ultra-therapy exercises for four weeks (one 30-min session per day); the second experimental group consumed 60 drops of lavender tincture per day; the third experimental group both performed ultra-therapy exercises and consumed 60 drops of lavender tincture as well. However, the control group neither performed ultra-therapy exercises nor consumed any supplementation. After a month, the participants' pain feeling and creatine kinase levels were all measured in pre-test using visual analogue scale (VAS) and blood sampling, respectively. Afterwards, all the participants underwent a training program including a 5-min warm-up and 30-min running on a treadmill with a slope of -10% and at a rate equivalent to 65% of the participants' VO2 max. 24 hours and 48 hours after the training, the above-mentioned tests were administered again. Finally, the process of data analysis was done using descriptive statistics, Kolmogorov-Smirnov Test, one way ANOVA with repeated measurements, as well as Tukey's post hoc test via SPSS/21at the significance level a≤0 / 05. The study yielded the results that ultra-therapy and lavender supplementation have a significant effect on the young girls' muscle pain feeling and creatine kinase levels.

Citation: Somayeh Sangsefidi, Hasan Matinhomaee, Sepideh Sangsefidi and Mohammad Mahdi Sangsefidi, 2016. "The effect of faradarmani and lavender supplementation on the markers of doms in young girls", *International Journal of Current Research*, 8, (12), 43943-43947.

INTRODUCTION

One of the unpleasant consequences of exercise is Delayed Onset Muscle Soreness (DOMS). It is a kind of disorder that is different in different people regarding their fitness level. The disorder is thought to be caused by eccentric exercises such as downhill running, stair climbing, weightlifting, etc. and hampers physical activities (Rahmaninia *et al*, 2003). "Soreness is usually said to follow an inverted U-shaped curve over time, peaking 24 – 48 hours after exercise" (Vickers, 2011).

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It takes 5 to 7 days for the soreness to reduce gradually. The symptoms of DOMS include pain, soreness, stiffness, abnormal sensitivity, and muscle weakness (Karbalaei Far *et al*, 2011). There are numerous hypotheses as to why muscle soreness is accompanied with the onset of some symptoms such as pain. Some researchers believe that the pain is due to the inflammation appeared after the release of proteins, ions, and extracellular fluid in myofibers. Some others attribute the pain to the biochemicals released from damaged cells. Some researchers refer to muscle soreness as a result of inflammatory reactions in muscles (Karbalaei Far *et al*, 2011).
In general, Delayed Onset Muscle Soreness impairs athletes' performance and decreases their efficiency in the future competitions as well. The disorder-induced stress is also likely to affect the other members of team as well as coach, which

has a negative mental impact on team performance (Karbalaei Far *et al*., 2011). Although DOMS is a universal phenomenon, no practical and effective treatment has been so far introduced (Bakhtiary *et al*., 2007). The researchers have been always seeking the best method to treat the disorder. On the basis of the previous researches on the use of nonsteroidal anti-inflammatory drugs for treating DOMS, the frequent use of such drugs is said to cause gastrointestinal wall damage and an increased risk of cardiovascular diseases; that is why researches turned to dietary supplements since it is believed that using such supplements prior to exercise or after that might have preventative effects or prove effective in treating DOMS (Davis *et al*., 2007). One of the supplements is lavender, a flowering plant in the mint family, Lamiaceae, and with the scientific name Lavandula Officinalis which is a medicinal plant with beneficial effects (Akhondzadeh *et al*, 2003). Lavender has proved effective in treating stomach diseases, headaches, especially, tension headaches. The plant is of analgesic, anti-spasmodic and soothing properties (Akhondzadeh *et al*., 2003). Moreover, researches have reported several other properties of this plant which are as follows: anti-anxiety, antidepressant, anti-inflammatory, antispasmodic, antibacterial, antiparasitic, antiviral and antioxidant properties (Buchbauer *et al*., 1991). A great deal of studies has been conducted on the impact of dietary supplements on DOMS. Daryanoush *et al* (2012) investigated the effects of short-term consumption (after one training session) of ginger extract on DOMS in girls. They came to the conclusion that consuming ginger prior to exercise or after that has no significant effects on feeling muscle soreness. Examining the consumption of a high dose of fish oil, Stanley *et al*. (2010) found out that in the case of knee flexors contractions, fish oil consumption brings about significant changes in interleukin 6 levels as a DOMS marker. Some other methods which have drawn researchers' attention include non-pharmacological treatments known as complementary therapies. Fradarmani (ultratherapy), a subset of the complementary therapies, is mystical by nature. Taheri (2009) elaborated on Faradarmani as follows:

Faradarmani is based on the theory of "Unity of Consciousness" or "The consciousness bond of the parts". According to this theory, whenever a link is formed between the whole consciousness and the parts, the mental consciousness will automatically self-recover and subsequently mental or physical healing will take place. Faradarmani is so important that a great bulk of studies have been so far carried out in this field. Some of the studies are as follows:

Sang Sefidi (2014) investigated the effect Faradarmani on the level of the anxiety in female swimming coaches in Tehran. she came to the conclusion that Faradarmani decreases female swimming coaches' anxiety which has a negative effect on their performance; thus, ultra therapy can be regarded as a complementary therapy. Sang Sefidi (2015) studied the effect of Faradamani on students' sleep quality. Using Petersburg sleep quality questionnaire, she conducted his study on 30 students of Islamic Azad University, Islamshahr Branch. she came to the conclusion that 2-month Faradarmani program has a significant effect on participants' subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Despite the negative impacts of DOMS on performance and the positive effects of both ultra-therapy and lavender, no studies have been so far carried out in Iran or overseas exploring the effects of these two complementary therapies, either separately or together, on DOMS. However, given the negative impacts of pain and muscle soreness on exercise, DOMS prevention and treatment have been all coaches, athletes, and therapists' concern, which proves the significant of the present study. Therefore, this study is hoped to provide researchers, physicians, coaches, and athletes with comprehensive insights into the effects of ultra-therapy and lavender supplementation so that they can select the best techniques for the prevention and treatment of DOMS and devise the best-laid plans for reaching their goals.

METHODS AND MATERIALS

The present study is a quasi-experimental and applied research which was carried out on the basis of pre-test, post-test, and repeated measurements as well. The statistical population of the study incorporated healthy young girls who have not done regular physical activities during the last year. 48 girls were selected among volunteers as the samples of the study. They were randomly divided into four groups: ultra-therapy group (12 participants), lavender supplementation group (12 participants), ultra-therapy and lavender supplementation group (12 participants), and control group. As the first phase of the study, the whole procedure of the research was fully explained to the participants. Then, the first experimental group performed ultra-therapy exercises for four weeks (a 30-min session per day); the second experimental group consumed 60 drops of lavender tincture per day; the third experimental group both performed ultra-therapy exercises and consumed 60 drops of lavender tincture as well. However, the control group neither performed ultra-therapy exercises nor consumed any supplementation. After a month, the participants' muscle strength, knee and hip flexibility, aching sensation, thigh girth, and creatine kinase levels were all measured in pre-test using dynamometer, goniometer, visual analogue scale (VAS), tape measure, and blood sampling, respectively. Afterwards, all the participants underwent a training program including a 5-min warm-up and 30-min running on a treadmill with a slope of -10% and at a rate equivalent to 65% of the participants' VO2 max. 24 hours and 48 hours after the training, the above-mentioned tests were administered again. Finally, the process of data analysis was done using descriptive statistics, Kolmogorov-Smirnov Test, one way ANOVA with repeated measurements, as well as Tukey's post hoc test via SPSS/21at the significance level $a \leq 0 / 05$.

RESUALTS

The results of the study showed that the participants of the study are in the same range in terms of age, height, and weight. The results also confirmed that ultra-therapy and lavender supplementation have significant effects on the young girls' aching sensation and creatine kinase levels. Regarding the change in aching sensation, it was revealed that there is a significant difference between different groups of participants and various time courses as well. Furthermore, the results demonstrated that there is no significant difference between the ultra-therapy group and lavender supplementation group although this is not true for the other groups, i.e. there is a significant difference between them. On the other hand, the results of Tukey's post hoc test suggested that there is a significant difference between all the phases of measurements. All the participants' aching sensation increased in the post-test in comparison to the pre-test.

The sensation increased 24 hours after the exercise but decreased after 48 hours. However, the level of aching sensation 48 hours after the exercise was still higher than this level in the pre-test and post-test. It was also revealed that the hierarchy of the four groups based on the most effective independent variable to the least effective one is as follows: ultra-therapy and lavender supplementation group, ultra-therapy group, lavender supplementation group, and control group. In other words, ultra-therapy and lavender supplementation group had the most effective independent variables.

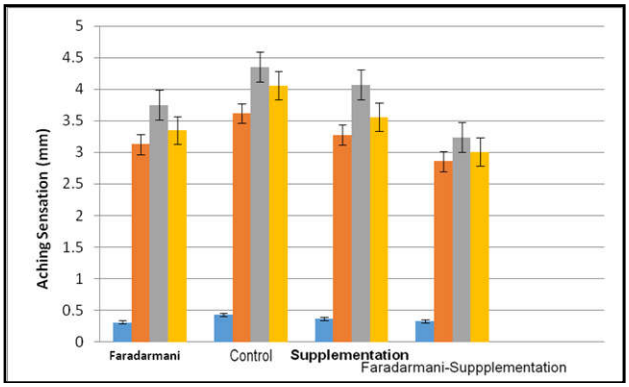

Chart 1. Aching Sensation

Data analysis showed that there is a significant difference between different groups of participants and various time courses in terms of creatine kinase levels. The results of Bonferroni test confirmed that there is a significant difference between all the groups. On the other hand, Tukey's post hoc test indicated that there is a significant difference between all the phases of measurement. All the participants' creatine kinase levels increased in the post-test in comparison to the pre-test. The creatine kinase levels increased 24 hours after the exercise but decreased after 48 hours. Moreover, it was confirmed that the hierarchy of the four groups based on the most effective independent variable to the least effective one is as follows: ultra-therapy and lavender supplementation group, ultra-therapy group, lavender supplementation group, and control group. That is to say, ultra-therapy and lavender supplementation group had the most effective independent variables.

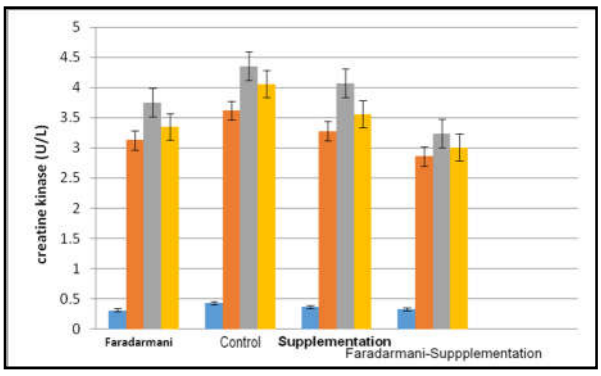

Chart 2. Creatine Kinase Levels

DISCUSSION

The present study yielded the result that ultra-therapy and lavender supplementation have significant effects on the young girls' aching sensation.

This finding is in line with the findings of the studies carried out by Farokhshahi Nia *et al* (2013), Me'marbashi and Abassian (2013), Tartibian *et al* (2009), and Kawakita *et al* (2002). However, it is not consistent with the findings of the studies conducted by Daryanoush *et al* (2012) and Black *et al* (2008). The type of training protocol and supplements consumed, exercise intensity, the duration of exercise, participants' age, gender, and fitness level are some of the factors affecting the results of the study. The fact that these factors might be different in different studies can be the probable reason of the inconsistency between the results of the studies.

There are various theories as to why muscle soreness is accompanied by pain and stiffness. Some researchers believe that the pain is due to the inflammation appeared after the release of proteins, ions, and extracellular fluid in myofibers. Some others attribute the pain to the biochemicals released from damaged cells and stimulation of chemoreceptors. Some researchers refer to muscle soreness as a result of inflammatory reactions in muscles (Karbalaei Far *et al*, 2011). In general, pain may occur as a result of harmful body temperature, injury, tear, elongation, electric current, necrosis, inflammation, and spasm (Saarto, 2010). Therefore, anything influencing these factors would be effective in relieving pain. In this line, lavender extract is known as an anti-inflammatory element acting as an acetylcholinesterase inhibitor (Ferreira *et al*, 2006). Moreover, lavender has proved effective in treating stomach diseases, headaches, especially, tension headaches. The plant is of analgesic, anti-spasmodic and soothing properties (Akhondzadeh *et al*, 2003). On the other hand, one of the main issues in ultra-therapy is the meta-holistic view called “Interuniversalism”. This approach is a totally holistic way of viewing human being and considers the entire human being in relation to the whole universe.

In holistic view, each cell is considered in relation to the other cells; humans' body, psyche, mind, and the other aspects of human existence are related to each other, and if one member suffers, all the other members will suffer, too (Taheri, 2009). In many cases, the elderly people who have been suffering from weakness, chronic fatigue, and pain received ultra-therapy treatment, and consequently, restored strength and vitality (Taheri, 2009). Hence, affecting all aspects of human existence, ultra-therapy may be effective in reducing pain sensation. All the factors mentioned earlier might be the possible reason of the results of the present study. The results of data analysis confirmed that ultra-therapy and lavender extract have significant effects on the young girls' creatine kinase levels. This finding expands upon the findings of the studies carried out by Me'marbashi and Abassian (2013), Daryanoush *et al* (2012), and Elahi *et al* (2011); however, it is not in line with the results of the studies done by Farokhshahi Nia *et al* (2013) and Ravassi *et al* (2011). The type of training protocol and supplements consumed, exercise intensity, the duration of exercise, participants' age, gender, and fitness level are some of the factors affecting the results of the study. The fact that these factors might be different in different studies can be the probable reason of the inconsistency between the results of the present study and those of the other studies mentioned above. In other words, the present study focused on the probable effect of lavender while the other studies scrutinized that of some other plants such as ginger and cinnamon; besides, the types of the exercises were also different.

DOMS causes many changes in biochemical variables such as increasing creatine kinase and Lactate dehydrogenase in blood as well as hemoglobin, hydroxyproline, and creatinine in urine (Taheri *et al*, 2010). Creatine kinase is an enzyme level of which elevates along with IL-6 in certain conditions such as acute exercise and inflammation. In inflammatory diseases, antibodies target the body's own healthy cells. As a result, cells become inflamed and destroyed. One of the ways through which body's immune system discriminates between invading *pathogens* and the *body's own cells is* cellular consciousness**.** *When* cellular consciousness is impaired, it will be attacked by the immune system (Taheri, 2009). Ultra-therapy positively affects this type of disease in several ways: it affects the immune system positively in cases where there is infection and boosts the immune system through reforming the arrangement of patients' mental and psychic systems. Ultra-therapy improves body's immune system, that is to say, it responses to infectious diseases positively. Therefore such diseases can be treated in a shorter time (Taheri, 2009).

On the other hand, the anti-inflammatory property of lavender was used in traditional medicine; the anti-inflammatory property is attributed to its ethanol and aqueous extract. However, it was revealed that this property is related to 2 monoterpenes, 5 diterpene, and 4 triterpene in the ethanol extract of the plant (Messaoud *et al*, 2012). Lavender extract is mainly extracted from the aerial part of the plant. Its main compositions entail Perillyl Alcohol, Ghrelin Acetate, Lavender Lynalyl, Alpha-terpineol, Acetate and Linalool. A small amount of Perillyl Alcohol is found in lavender. The previous studies show that Perillyl Alcohol has inhibitory effects on some cancers including breast cancer, skin cancer, lung cancer, and pancreatic cancer (Zargari, 2011). Furthermore, the other compositions of lavender include butyric acid, propionic acid, and valeric acid, But only the linalool in the essential oil is of anticancer and anti-inflammatory properties (Woronuk *et al*., 2011). Therefore, it seems quite rational to claim that ultra-therapy and lavender have positive effects on the creatine kinase level.

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