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The comparison of surface heat and cold effects on the some signs of delayed onset muscle soreness

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ABSTRACT

Delayed muscle soreness is the most common sports injuries that has weakened The athletes' performance This is called delayed, due to contusion that Immediately after exercise does not appear, And a few days after an eccentric contraction session will be felt. Many people who engage in physical activity and exercise, so they experience delayed muscle soreness. This damage has been extensive research to identify mechanisms And explore effective ways and methods of treatment And improvements have been made to reduce the effects of, But the evidence for each of the theories and methods to control the stability and credibility of contusion is not enough And there are many unclear points The purpose of this study and comparison Between two treatments, superficial heat and cold By immersion in hot water ($40-45^{\circ}$ c) and cold water (5° c) After a delayed muscle soreness By doing 50 jumps from a one_meter_high platform, in Young basketball players in women with a mean age of 22.5 years To find a more appropriate way to reduce the complications of this injury is rapid. In this study, Creatine kinase blood enzyme changes, Pain perception after injury And maximum isometric strength of subjects dominant leg, As some of the symptoms of delayed muscle soreness has been considered.

Keyword: eccentric contractions, maximum isometric strength, creatin kinaz enzyme.

INTRODUCTION

Whatever the quality and quantity of physical activity and sport development and increased, The training also stresses that cause lesions and injuries, especially in the musculoskeletal system, Investigate the causes and prevention of sports injuries is very important And a considerable amount of effort allocated to the experts and scientists in this field [1, 2, 3]. One of the things that has interested many researchers, is, delayed muscle soreness. This is called delayed due to contusion that Immediately after exercise does not appear and A few days after an eccentric contraction session will be felt [4, 5, 6]. Many people who engage in physical activity and exercise, so they experience delayed muscle soreness. This damage has been extensive research to understand mechanisms and to find effective ways and methods of treatment And improvements have been made to reduce the effects of But the evidence for each of the theories and methods to control the stability and credibility of contusion is not enough .Methods for rapid reduction in symptoms of fatigue, there is no comprehensive agreement,For example Saymvnd Brook and colleagues (2004), showed that there is not significant temperature effect on delayed muscle soreness e[7]. Also Hvvatsvn (2005) and Stewart (2007) showed that Muscle immersed in cold water to reduce symptoms after eccentric contraction-induced muscle soreness is delayed [8, 9]. But in so doing, Stone and Peters (1999) and Algafly (2007) in their papers to the lack of significant effect in reducing cold symptoms that are delayed muscle soreness[10, 11]. The methods used in the recovery period The signs of delayed muscle soreness that in some papers (with diffrent results) are referred to, And to compare these methods in the country has seldom been studied. In this study, methods to reduce adverse selection, with emphasis on the ways in which direct That each person can do alone and without help And require expertise and not of principles. The effect of immersion in warm water (40-45° c) and cold water (5°c) on enzyme changes in serum creatine kinase, Organs involved in pain perception and maximal isometric strength And comparing the two methods in these variables to 24 hours after injury, In this study we have examined.

MATERIALS AND METHODS

In this experimental study 24 girls basketball players young volunteers with a mean age of 22.5 years After completing the health questionnaire form ,and Consent form Randomally 3 groups (heat , cold and control group) were divided into eight Individuals selected for this study were without heart disease, respiratory, muscular, skeletal. Talag pain perception questionnaire was completed by subjects before The jump test, Immediately after the delivery of treatment and 24 hours after it And their maximum isometric strength was determined and Creatine kinase enzymes in the blood were measured before exercise too. In the second stage.Participants were asked To do 50 jumping from a height of 1 meter . after a practice jump, In the measured variables were measured before testing again . Immediately after the thermotherapyof the subjects were asked , Put your feet in warm water containing a small pool (40-45 c) for 15 minutes. Water temperature was kept constant during 15 minutes .Cryotherapy group of subjects put your feet for 15 minutes in cold water(5 c) too . The dependent variables were measured again in the dependent variables were measured immediately. 24 hours after the above mentioned factors were measured. The study of statistical tests and Tukey analysis of variance (ANOVA), has been used to examine differences.

RESULTS

As the results show The eccentric contractions in the thermotherapy, Enzyme creatine kinase was significantly increased only at 24 h after exercise (81.026%). This view may reflect the nature and occurrence of symptoms is delayed contusion. By comparing the results with control groups (Tables 1 and 2). Although not at pre-test and 24 hours after the exercise of independent variables, Creatine kinase levels between the two groups, Thermotherapy and control, there was no significant difference (respectively P=0.653 and P=0.169) But for a more thorough evaluation of this treatment Enzymatic changes of up to 24 hours after the exercise of independent variables, the two groups were compared, And it was observed that there is no significant difference between the two groups (p =0.144). (Tables 3 and 4). the enzyme creatine kinase in just 24 hours after exercise in Cryotherapy group was significantly increased (36.19 percent) has, And at other times is not significantly different. Although not at pre-test and 24 hours after the exercise of independent variables,CK levels between the two groups, Cryotherapy dnd control, and there was no significant difference (respectively P=0.781 and P=0.995). And this can also indicate whether cryotherapy ineffective in preventing the increase ofcreatine kinase is due to contusion. The enzymatic changes of up to 24 hours after the exercise of independent variables, thetwo groups were compared. And observed a significant difference exists between the two groups (P =0.027). This means that cryotherapy could prevent a further increase in enzyme in the next 24 hours. (36.19 percent increase compared with the control group increased by 69.82 percent and 81 percent of the thermotherapy)

Therefore, the sum can be concluded that the effect of cryotherapy in significant changes in serum creatine kinase enzyme, the contractions are extroverts. (Tables 5 and 6).

Thermotherapyin the perception of pain by up to 24 hours after exercise has consistently increased significantly. (125.83% of the exercise to 24 hours after the thermotherapy) By comparing he results with control groups (Tables 7 and 8), It seems that the thermotherapyis not effective and could increase the perception of pain, prevent.

Given that 24 hours after the exercise of independent variables, The amount of pain control and thermotherapythere is a significant difference (p=0.003) And this could indicate the effect of thermotherapyin the prevention of pain from the contusion, But for a more thorough evaluation of this treatment, Changes in pain from before training to 24 hours after the exercise of independent variables, The two groups were compared And it was observed that there is a significant difference between the two groups (p=0.003). Therefore, the sum can be concluded that the significant effect of thermotherapy on changes in perceived pain of contractions are extroverts. (Tables 9 and 10). As a control, Perceived pain in the cryotherapy group and 24 hours after exercise has consistently had a significant increase (5.15 percent after 24 hours of training to the independent variable). But only a third of the average pain is pain control. By comparing the results with control groups (Tables 7 and 8), At first glance it seems that the cold treatment had a significant effect and is able to prevent increase in perceived pain So although in practice, and time after time Cryotherapy and 24 hours thereafter, The amount of perceived pain control, and there is no significant difference in

the the two groups (In all cases, 0001 / 0 = P), Changes in pain from before training to 24 hours after the exercise of independent variables, the two groups were compared And observed a significant difference exists between the two groups (p=0.0001) This means that cryotherapy has been able to increase further in the next 24 hours to prevent pain perception (Increase of 15% compared with the control group increased 116 percent and 125 percentof the thermotherapy). Therefore, the sum can be concluded that, the effect of cryotherapy in significant changes inperceived pain of contractions are extroverts. (Tables 11 and 12)

It should be noted that There was no change in strength as a sign of a contusion to the effects of changes in heat and cold, it will be investigated. (Tables 13 and 14 and 15)

Citing the results table can be concluded that There are significant differences between treatment effects And cryotherapy, in comparison with thermotherapy, has been able to significantly inhibitthe enzyme creatine kinase (Figure 1, Figure A). and The significant difference in pain between the effects of treatment there, And methods of heat therapy and cryotherapy in comparison with control groups, could significantly prevent the increase in perceived pain (Figure 1, Figure B).

Table 1. Analysis of variance results in creatine kinaz enzyme's control group

Variance	SS	Sum of Squares	F	Significant Level
SSb SSw Total	10562.58 10937.25 21499.83	5281.292 520.821	10.14	0.001

Table 2. Tukey test results in creatine kinaz enzyme's control group

	24h after independent variable	Exactly after independent variable	Exactly after exercise
Poforo ovoroiso	-51.25	-14.63	-12.31
Before exercise	0.001	.097	.147
Exactly often exercise	-28.875	-11.18	
Exactly after exercise	.049	.178	
Exactly ofter independent veriable	-17.24		
Exactly after independent variable	.073		

Table 3) analysis of variance data for the thermotherapyof creatine kinase

Variance	SS	Sum of Squares	F	Significant Level
SSb SSw Total	19550.08 20372/96 39992/96	9775.042 970.137	10.076	0.001

Table 4) Tukey test data related to the thermotherapyof creatine kinase

	24h after independent variable	Exactly after independent variable	Exactly after exercise
Pofora avaraisa	-69.88	-41.37	-33.0
Before exercise	0.001	.09	.11
Exactly offer exercise	-36.875	-13.76	
Exactly after exercise	.068	.541	
Exactly ofter independent veriable	-34.65		
Exactly after independent variable	.071		

Table 5) analysis of variance data cryotherapy group CK

Variance	SS	Sum of Squares	F	Significant Level
SSb SSw	3829.00 6631.625	1914.5	6.063	0.008
Total	10460.63	315.792	0.000	01000

Table 6) Tukey test data relating to CK cryotherapy group

	24h after independent variable Exactly after independent variable		Exactly after exercise
Pafara avaraisa	-30.25	-13.21	-9.5
Before exercise	.007	.117	.543
Exactly often exercise	-20.75	-16.43	
Exactly after exercise	.073	.334	
Evently often independent verichle	-14.12		
Exactly after independent variable	.186		

Table 7) analysis of variance of perceived pain control

Variance	SS	Sum of Squares	F	Significant Level
SSb SSw Total	465.924 3.478 469.402	232.962 .166	1406.72	0.0001

Table 8), Tukey test data related to pain control

	24h after independent variable	Exactly after independent variable	Exactly after exercise
Pafora avaraisa	-10.782	-8.542	-4.986
Before exercise	.0001	.0001	.0001
Exectly often evening	-5.796	-7.342	
Exactly after exercise	.0001	.0001	
Exectly often independent verichle	-3.763		
Exactly after independent variable	.0001		

Table 9) analysis of variance data for the thermotherapyof pain

Variance	SS	Sum of Squares	F	Significant Level
SSb SSw Total	364.762 7.739 372.5	182.381 .369	494.923	0.0001

Table 10) Tukey test data related to the thermotherapyof pain

	24h after independent variable	Exactly after independent variable	Exactly after exercise
Pofora avaraisa	9.529	-7.18	-4.22
Before exercise	.0001	.0001	.0001
Exactly ofter exercise	-5.301	-4.71	
Exactly after exercise	.0001	.0001	
Evently often independent yerichle	-3.76		
Exactly after independent variable	.0001		

Table 11) ANOVA results of the pain of cryotherapy

Variance	SS	Sum of Squares	F	Significant Level
SSb SSw Total	63.733 6.904 70.636	31.866 .329	96.933	0.0001

Table 12) Tukey test data related to the pain of cryotherapy

	24h after independent variable	Exactly after independent variable	Exactly after exercise
Pofora avaraisa	-3.674	-3.276	-3.189
Before exercise	.0001	.0001	.0001
Exactly often exercise	485	356	
Exactly after exercise	.232	.564	
Exectly often independent you'ship	342		
Exactly after independent variable	.653		

Table No. 13), analysis of variance data for maximal isometric force control

Variance	SS	Sum of Squares	F	Significant Level
SSb SSw Total	60.25 179.75 220.00	30.125 9.56	3.519	.112

Table No. 14), analysis of variance data for maximal isometric strength of the heattreatment

Variance	SS	Sum of Squares	F	Significant Level
SSb SSw Total	50.021 354.813 404.833	25.01 16.896	1.48	.25

Table 15) analysis of variance data for maximal isometric strength of cryotherapy

Variance	SS	Sum of Squares	F	Significant Level
SSb SSw Total	17.438 271.063 288.5	8.719 12.908	1.892	.176



Figure 1. CK(A) and pain(B) for the heat; cold and control groups

DISCUSSION

Therefore in order to reduce pain, it is suggested that physiologists sports coachs and athletes use 15 minutes cold immersion for pain reduction. This method could be prevent non_athlete popel of becoming discouraged After acute exercises

CONCLUSION

it's seem that cold water with it's ability in reduction of blood circulation and reduction of membrane permeability ,causes reducing CK effluxand alters nerve conduction velocity and hence pain tolerance. This results was different with Eston(1999) and Algafly(2007) researchs but it confirmed with isabell (1992) Howatson(2005) Stuart(2007). may be the difference in results was due to the different ways in kind, number of stage and time applays. So it's seems that heat water with it's ability in muscles warming and opening in vasculars and altering them and improving metabolism could get rid of waste material and P substaces of muscles. since the best time for applying heat is 48 hours after the damage 15minutes heat immersion after eccentric contraction was not effective in reducing CK. This results confirmed Symons researchs (2004) .Ineffectiveness of eccentric exercises in isometric strength, probably is due to examinees high level fitness , few repetitive jumping , and examinnees being to repetitive jumping.

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