The Effect of Massage Therapy Method, Inventory Levels and Stress Levels on Kinase Creatine Levels

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Abstract

The aim of this research is to explain the effect of massage effriction therapy and frirage therapy in helping creatine kinase levels in patients who have experienced injuries I and II with high and low stress levels. The method in this research is quasi-experimental with factorials. The treatments are effriction massage therapy and frirage massage. The two types of therapy that are used are a combination of the two massage method. Effriction massage is massage therapy that is dominated by efflurage and there is pressure to deep tissue. Frirage massage is a massage therapy that is dominated by the thumb and moves to grind but not deep due to scouring combined with efflurage. Both types of therapy are used in this study to obtain maximum results in lowering creatine kinase levels. Effriction therapy and frirage therapy were intervened with a duration of 15 minutes with the criteria for the sample who had level I and grade II injuries, and high and low stress levels. physical assessment test instruments for grade I and grade II injuries by looking at the results of the MRI lab, CT scan or by using a drower test. For the stress level, the instrument used is DASS to determine the level of stress. To measure creatine kinase levels by laboratory tests in collaboration with the pharmaceutical chemistry laboratory in Semarang. The conclusion of this study is that effriction massage therapy and frirage massage therapy can reduce creatine kinase so that it can be used for the therapy of grade I and grade II injuries, high and low stress levels, especially effriction massage therapy as a therapy that has better effectiveness than frirage in reducing creatine levels kinase for cases of knee injury, because one group in the effriction group experienced a significant reduction Keywords: Massage Therapy, Injury Level, Stress Level, Creatine Kinase Levels.

Keywords: ..... .

Introduction

Along with the development of this sport it has become a lifestyle that is not only practiced by professional athletes, but also by the general public. One of the sports is used as a means to improve and maintain body fitness. There are many types and alternative choices of sports that can be done by sports players, usually people exercise according to their hobbies and preferences for certain sports. By doing regular exercise, it can indeed nourish the brain[1]. This is due to the smooth circulation of oxygen flowing to the brain. The brain always produces new cells every time humans enter the growth and development phase. Since humans were born, their brains have never been the same and are always changing. When the brain is assigned different tasks, it will form new connections between brain cells. Synapses or junctions between two nerve cells will reconnect. Physical exercise involves the five human senses. That is why it can provide the brain with more information to integrate [2]. In addition, regular and controlled exercise can improve blood circulation, stimulate the dopamine hormone to increase its secretion so that the brain will get a signal to always feel good. Exercise is good for cardiovascular function which is good for the heart. A good heart will keep

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the brain in good shape, because it reduces the risk of blockage so you avoid strokes, and increases energy use. A large increase in energy use with varying exercise doses will lead to physiological adaptations for the body with exercise records starting with low intensity to high intensity which are systematically programmed [3]. Physical exercise performed with high intensity and long enough duration can cause changes to occur at the cellular level[4]. Changes in the body in carrying out various kinds of metabolism will also produce various kinds of waste products, one of which is creatinine and is followed by an increase in the enzyme creatine kinase[5]. Creatine kinase is a molecular chemical enzyme produced from muscle metabolism, for creatine kinase tips. CK-M.Creatine kinase is transported through the bloodstream to the kidneys. Creatine kinase levels are determined by the amount of muscle mass (protein catabolism rate), in addition to how our body's metabolic activity, for example, increases when we are sick (heat/ infection) and triggers an increase in stress in the body, the increase in stress is in the form of metabolic stress or stress. mechanics. The stress that occurs in the body will trigger damage to muscle tissue structures and an inflammatory reaction. Damage to muscle tissue that occurs can cause an increase in serum creatine kinase (CK) levels and pain due to inflammatory reactions. The mechanism of increased creatine kinase is due to creatine produced during skeletal muscle contraction through the breakdown of creatinine phosphate [6]

Creatine kinase levels are predictors of biomarkers that are often studied to determine the degree of structural damage to muscle tissue. A person's creatine kinase activity can be influenced by age, gender, muscle mass, physical activity and weather or climate conditions[7].Total serum creatine kinase activity was recorded to have increased 24 hours after physical exercise and would decrease when athletes rest [8]. One of the important things that need attention in sports injuries is recovery for muscles that have damaged tissue or inflammation in the muscles[9]. The mechanisms that occur in the body after injury are the initial critical events in the inflammatory process that occur within hours of injury. The initial critical event in the inflammatory process is the accumulation of white blood cells, namely neutrophils, at the site of injury. Practical injuries based on their lightness can be divided into three parts, namely: (1) Level I injuries are injuries that are not followed by significant damage to body tissues, causing movement disorders in the recovery process, and The pain caused is negligible during activities and will heal on its own after a period of rest. (2) Level II injury is the level of tissue damage that is more significant, affects the athlete's performance, complaints can be in the form of pain, swelling, impaired function of signs of inflammation, for example muscle width, grade II muscle strain, sprain, tendons, torn ligaments (sprain grade). (3) Grade III (serious injury) is a serious injury, which is characterized by tissue damage in the body, for example torn muscles, ligaments or tendon breaks or fractures or fractures. Recovery is useful for giving the body the opportunity to adapt after an injury.Several method are used in an effort to speed up recovery in an injury, one of which is the first by stopping this exercise which is passive recovery, ice compresses are the first treatment when a new injury occurs. So it can be said that passive recovery is carried out at the beginning of an injury with the aim of maintaining performance, stabilizing acid-base balance, and reducing fatigue [10]. The next method is massage therapy which aims to be restorative for the injured. Before being treated by a professional when an acute inflammatory injury occurs, it is usually neglected and considered as no problem because the predicted level of injury is grade I and II. Even though the neglected injury actually makes the sufferer not free to do sports both in training and in competitions and sports injury sufferers experience stress [11]. after the 2x24 hour injury, it turns out that they do not experience optimal recovery so as to recover Injuries experienced by people engaging in sports require professional help[12].Professional treatment, one of which is massage therapy to restore the condition of the muscles, the injuries suffered are given treatment with massage therapy, repositioned and it is hoped that stress reduction will occur because the injuries experienced are handled properly to help the recovery process [13] The method used to provide massage treatment to injuries are few. In general the techniques used are efflurage, petrissage, tapotement, vibration techniques with a treatment duration of more than 15 minutes to reduce post-exercise pain. Not for injury recovery. For the treatment of injury, the technique used is a combination of existing techniques, namely the Swedish massage technique on the grounds that when providing treatment at least 2 combined techniques can provide time efficiency in trecillnent, so effriction and frirage techniques are selected[14].

The use of efriction was chosen because it is a combination of fluurageficiton in the implementation of the treatment, there is rubbing with the palms of

the hands, there is speed and massage pressure in the surface area that is being treated. Meanwhile, frirage is a combination of friction and efflurage, but the dominant treatment is the pressing of the thumb and there is no speed in rubbing the surface of the treated area. Frirage is a combination of massage techniques or manipulation of friction (scour) and effleurage (rubbing) which are carried out simultaneously in doing massage[15]. The hope of massage therapy that is carried out with the duration of treatment time is that athletes and sportsmen will not return to the same injury in the near future [16].Based on the facts in the field, it was found that the prevalence of injuries was 86% in sportsmen obtained in the preliminary study, and 73.5% of these injuries did not heal completely (Litbang KONI DIY, 2008). In some cases, injuries make a sportsman forced to retire early from the world of performance sports. Tennis player Angelique Wijaya is one example of a case of stopping a sports career due to an injury that did not heal completely. In America, approximately 20% of children and adolescents who participate in sports are injured each year. One in four cases of injury that occur is a serious injury (Konin, 2009). Massage therapy as a method of recovery is believed to be able to prevent muscle damage or wider tissue damage [17] .Massage interventions are carried out when the acute period of injury has passed, ie 3-6 days after injury . When the intervention was carried out, the response that occurred from the massage intervention was swelling of pain in the part that was receiving massage treatment, besides that there was also sties in the muscles. Although this therapy caused inflammation during massage therapy, after the intervention was carried out there was a change, namely a comfortable feeling marked by a decrease in pain when instructed to move the injured part and the wider ring of motion [18.]. Based on the above background and the research conducted by the researchers, there has been no research on the effect of massage on injuries that have a level of injury and experience stress that has been carried out in Indonesia, especially in sports players. Therefore, the researcher tries to find out how massage, injury level and stress level affect creatine kinase in sports players who experience injury[19].

Method

This study consisted of three kinds of factors or variables, which examined their effects on the dependent variable, namely the results of creatine kinase levels. The independent variables include the type of effriction and frirage therapy. While the attribute variable is the stress level, namely the level of injury I and II. Each independent variable has two levels, namely: 1) injury level: injury level I and II, 2) stress level: high and low category. This study used an experimental method with a factorial design. Therefore, the design in this study is a factorial experimental design in block design because the experimental units in the block are relatively homogeneous and the number of experimental units in a block is the same as the many treatments being studied. This study uses a 2 x 2 factorial design. x 2 because it consists of 3 independent variables and each independent variable consists of 2 levels[20]. Based on the literature review and the problems described above, the research hypothesis is as follows:

1. There is an effect of effriction therapy with injury level I with high stress levels on creatine kinase.
2. There is an effect of effriction therapy with level II injury with high stress levels on creatine kinase.
3. There is an effect of injury level I effriction therapy with low stress levels on creatine kinase.
4. There is an effect of effriction therapy with level II injury with a low stress level on creatine kinase.
5. There is an effect of Frirage Therapy with injury level I with high stress levels on creatine kinase.
6. There is an effect of Frirage Therapy with injury level II with high stress levels on creatine kinase.
7. There is an effect of frirage therapy with injury level II with high stress levels on creatine kinase.
8. There is an effect of frirage therapy with injury level II with high stress levels on creatine kinase.
9. There is an interaction of effriction massage therapy, frirage massage therapy at level I injury level and high stress level on creatine kinase level.
10. There is an interaction of effriction massage therapy, frirage massage therapy at level I injury level and low stress level on creatine kinase level.
11. There is an interaction of effriction massage therapy, frirage massage therapy at level II injury levels and high stress levels on creatine kinase levels
12. There is an interaction of effriction massage therapy, frirage massage therapy at level II injury levels and low stress levels on creatine kinase levels.

The population of this study were people who were active in sports or athletes who suffered injuries,

namely levels I and II, and who experienced low and high stress. The sample in this study were people who suffered injuries with homogeneous characteristics, namely injuries caused by sports activities, with almost the same level of injury, the attribute variable age was 18-35 years, male gender. The sampling technique was purposive sampling. The samples that had met the inclusion and exclusion requirements were 40 athletes. From this number, 40 are taken, then put into groups based on the criteria required by each group. Of these 40, a psychological test was carried out to determine the level of stress and to see the completeness of the required data, namely by bringing the CT scan or MRI or Xray results, the data stated that there was no broken ligament in the knee, if there was no supporting data for the athlete or athlete who was injured. performed a test with a drower test with the results that there was no shaking, no swelling was still stable but there was pain around the knee. There are 3 variables in this study, namely the independent variable that is manipulated, the attribute variable and the dependent variable. To avoid differences in the interpretation of terms on the variables contained in the study, it is necessary to describe the definitions of each variable in this study[21].

a. There are 2 independent variables that are manipulated, namely (a) In this. study, the independent variable (independent) consists of (1) massage therapy with the effriction and frirage method. This therapy method is intended as a therapeutic method that will be applied as an integral part of this research. The use of two therapeutic method using effriction and frirage therapy method is intended as a medium for different therapeutic programs to be grouped into research objects. (b) The form of the load is in the form of free weigth and machine weight.

b. The attribute variables in this study are Idan II injury level, and stress levels in the form of low and high stress levels. The intended stress level is the overall result of the selection of tests from athletes who have been selected as objects in this study.

c. The dependent variable in this study is creatine kinase

This level of stress can be measured by many scales. One of them is to use the Depression Anxiety Stress Scale 42 (DASS 42) or more which is summarized as the Depression Anxiety Stress Scale 21 (DASS 21) by Lovibond & Lovibond (1995). Psychometric Properties of The Depression Anxiety Stress Scale 42 (DASS) consists of 42 items and Depression Anxiety Stress Scale 21 consists of 21 items. The DASS is a 42-item questionnaire that includes three self-report scales designed to measure negative emotional states of depression, anxiety and stress. Each of the three scales contains 14 items, divided into subscales of 2-5 items with content equivalent ratings. The Depression Scale assesses dysphoria, hopelessness, devaluation of life, self-depreciation, lack of interest/involvement, anhedonia, and inertia[22]. The Anxiety Scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experiences affecting anxiety. The Stress Scale (item) sensitive to non-specific chronic levels of arousal. It assesses difficulty relaxing, nervous arousal, and irritability/restlessness, irritability/over-reactivity and impatience[23]. Respondents were asked to use a 4-point severity/frequency scale to rate the extent to which they had experienced each country during the past week. Where the research was conducted; 1) a sports injury massage therapy site, checking the level of injury, distributing a questionnaire to measure stress and taking blood samples at the Ngijo Sports Injury Massage clinic: the study population was taken from people who came for massage therapy at the Ngijo Sports Injury Massage therapy clinic who had a knee injury in 2019. To analyze the results of blood samples to determine serum creatine levels, it was carried out at Kimia Farma Semarang laboratory. The study began with a pre-test, in data collection starting in September and ending in December 2019 by conducting a direct post-test at one time when getting patients when getting patients from September to December and until the desired number of sample targets were met. Explanation of the research problem to the research subjects, then proceed with sampling by purposive sampling. Data was processed using SPSSversion 25 software. The difference in measurement results between before and after the intervention in the effriction massage therapy group and the frirage massage therapy group and analyzed using the paired t-test. Measurements after recovery between the effriction therapy group and the effriction massage group were analyzed using an independent t-test. The significance level was set at $p < 0.05$.

Result and Discussion

This study was conducted on 48 respondents who were divided into two groups of stress levels, namely high stress levels and low stress levels. Each implementation of massage therapy is always carried out

pre-test and post-test because the pres-test and post-tenst and massage interventions are given directly at one time. Respondents were verified as the target population when they had a therapy schedule, at the time of scheduling there was already a screening process so that someone who was injured would be the study sample. At the time of the study, researchers used sportsmen or athletes, it was expected that injuries were an effect of the sport they were doing. The results of this study were to look at serum creatine levels after massage therapy was carried out on athletes or athletes who had experienced Idan II level injuries and those with high stress and low stress. **Effect of Effriction Therapy with Injury Level I with High Stress on Creatine Kinase** Analysis of research data to determine the effect of effriction therapy with injury level I and high stress levels in this group with a total sample of 6 people who were given intervention in the form of effriction therapy for 15 minutes, the significance was 0.043. The test results are known to be smaller than 0.05 (0.043 <0.05) so that the hypothesis is accepted, meaning that there is a significant effect of massage effriction therapy on high level I injuries at high stress levels. From these results it can be interpreted that massage effriction therapy significantly reduces creatine levels in grade I injuries with high stress levels. Based on the data, the creatine kinase level in the first level injury group and the high stress level of the pre-test, all samples were in normal condition, namely the target of 130U/L, after being given the effriction massage therapy intervention, there was a decrease and in normal conditions, when analyzed by t test between pre test and There was a significant reduction in post test, meaning that massage effriction therapy helped the process of decreasing creatine kinase significantly in the injury level I group with high stress levels. Effriction massage therapy at the time of intervention even though it gives a painful effect at the time of massage therapy. In the section given effriction massage therapy intervention. So it can be concluded that massage effriction therapy can be given to patients who have level I injury and with high stress conditions

Effect of effriction therapy with injury grade II with high stress levels on creatine kinase.: Analysis of research data to determine the effect of effriction therapy with injury level II and high stress levels with the number of samples in the group with a sample size of 6 people who were given intervention in the form of effriction therapy for 15 minutes, that the significance was obtained 0.188. The test results are known to be greater than 0.05 (0.188> 0.05) so that the hypothesis is rejected, meaning that there is no significant effect of massage effriction therapy on level II injuries at high stress levels. The creatine kinase levels in this group were normal, i.e. they did not cross the reference limit for creatine kinase, but between the pre-test and post-test there was no increase or decrease in creatine kinase, even though at the time of massage effriction therapy intervention, there was a decrease in pain perception received by patients who were given therapeutic intervention.

Massaseeffriction, meaning that although there was no decrease in the creatine kinase pain received by the sample at the time of intervention was not part of the tissue damage at the time of injury, this was evidenced by the absence of an increase in creatine kinase levels in the blood at the time of the post test for the group with grade II injury and high stress levels. **Effect of injury rate I effriction therapy with low stress levels on creatine kinase** Analysis of research data to determine the effect of effriction therapy with injury level I and low stress levels in the group with a sample size of 6 people who were given intervention in the form of effriction therapy for 15 minutes, it was known that the significance was 0.061. The test results are known to be greater than 0.05 (0.061> 0.05) so the hypothesis is rejected, meaning that there is no significant effect of massage effriction therapy on high level I injuries at low stress levels. Effriction massage therapy that was intervened in the group with low stress level I injury did not experience a significant reduction in creatine kinase levels. This means that the creatine kinase level in the injury level I group and the low stress level under normal conditions, namely in the category in reference so that between the pre test and post test does not experience a significant decrease, if it is analyzed statistically, other influencing factors need to be studied in depthbecause it can it is assumed that with low stress levels in this group the kneeinjuries occurring are negligible and the likelihood of an increase in injury from grade I to grade II has a high potential. **Effect of effriction therapy with low stress level II injury to creatine kinase** Analysis of research data to determine the effect of effriction therapy with injury level II and low stress levels in the group with a sample size of 6 people who were given intervention in the form of effriction therapy for 15 minutes, the significance was 0.089. The test results are known to be greater than 0.05 (0.089> 0.05) so that the hypothesis is rejected, meaning that there is no significant effect of massage effriction therapy on high level II injuries at low stress levels. In the

effriction intervention group with injury level II and low stress levels there was also a decrease but not significant because in the pre test the creatine kinase level was obtained in normal conditions and after the intervention massage therapy, there was a decrease but not significant so that if analyzed there was no significant decrease in kratin levels. kinase. So that during the intervention process of massage effriction therapy, if there is pain during the intervention it can be assumed that the pain that arises is not due to inflammation in the muscle tissue or in the joints, so looking at creatine levels that are still in a normal state means that massage therapy can still be intervened even though it does not experience it. a significant reduction in creatine levels.

Effect of frirage therapy with injury level I with high stress levels on creatine kinase Analysis of research data to determine the effect of frirage therapy with injury level I and high stress levels in this group with a total sample of 6 people who were given intervention in the form of frirage therapy for 15 minutes, that the significance was 0.056. The test results are known to be smaller than 0.056 (0.056> 0.05) so that the hypothesis is rejected, meaning that there is no significant effect of frirage massage therapy on level I injuries at high stress levels. The creatine kinase level in the group that received the frirage massage therapy intervention did not decrease significantly, although it was not significant between the pre-test and post-test, the creatine kinase level in the reference group was in the normal category. The difference with effriction massage therapy, frirage massage therapy is only on the surface and takes a long time because based on observations of frirage massage therapy, according to the researcher, it is assumed that the technique is intended for parts of the body with a low level of muscle tissue thickness, such as the shoulder so that the creatine kinase level is decreased in the group. this is not optimal. **Effect of frirage therapy with injury grade II with high stress levels on creatine kinase** Analysis of research data to determine the effect of frirage therapy with injury levels II and high stress levels in the group with a sample size of 6 people who were given intervention in the form of frirage therapy for 15 minutes, that the significance was 0.188. The test results are known to be greater than 0.05 (0.188 <0.05) so that the hypothesis is rejected, meaning that there is no significant effect of frirage massage therapy on level II injuries at high stress levels. The creatine kinase levels in this group were normal, which did not exceed the creatine kinase reference limit, but between the pre-test and post-test there was no increase or decrease in creatine kinase, even though at the time of the frirage massage therapy intervention there was no pain perception received by the patient at the time of the intervention. Frirage massage therapy, because basically frirage massage therapy is only a rubbing that rubs and does not cause pain perception in patients who are treated with massage. This means that even though there is no decrease in creatine kinase and do not feel the pain received by the sample, there is no inflammation like during an injury during an acute condition, this is evidenced by the absence of an increase in creatine kinase levels in the blood at the time of the post test for the group with level injuries. II and high stress levels.

Effect of frirage therapy with injury level I with low stress levels on creatine kinase Analysis of research data to determine the effect of frirage therapy with injury level I and high stress levels in the group with a sample size of 6 people who were given intervention in the form of effriction therapy for 15 minutes, it was known that the significance was 0.079. The test results are known to be greater than 0.05 (0.079 <0.05) so that the hypothesis is rejected, meaning that there is no significant effect of frirage massage therapy on high level I injuries at low stress levels. The creatine kinase level in this group was normal, that is, it did not cross the reference limit for creatine kinase, but between the pre-test and post-test there was no increase or decrease in creatine kinase, even though at the time of the frirage massage therapy intervention there was no pain perception received by the patient at the time of the intervention. Frirage massage therapy, because basically frirage massage therapy is only a rubbing that rubs and does not cause the perception of pain in patients who are treated with massage. This means that even though there is no decrease in creatine kinase and do not feel the pain received by the sample, there is no inflammation like during an injury during an acute condition, this is evidenced by the absence of an increase in creatine kinase levels in the blood at the time of the post test for the group with level injury. I wish low stress levels.

Due to the possibility that in this group with low stress levels, it is assumed that the sample who suffered knee injuries ignored the injuries they experienced because during the activity it was not too disturbing and was considered to be able to recover on its own, it turned out that they did not immediately recover and eventually needed therapy to help the recovery process from the injury suffered. **Effect of Frirage Therapy with Low**

Level II Injury Stress on Creatine Kinase Analysis of research data to determine the effect of frirage therapy with injury level I and low stress levels in a group with a sample size of 6 people who were given intervention in the form of effriction therapy for 15 minutes, it is known that the significance is 0.091. The test results are known to be greater than 0.05 (0.091> 0.05) so that the hypothesis is rejected, meaning that there is no significant effect of frirage massage therapy on high level II injuries at low stress levels. In this group the intervention with frirage massage therapy with injury level II and low stress levels decreased but not significant because in the pre-test, creatine kinase levels were found in normal conditions and after intervention, frirage massage therapy decreased but not significant so that if analyzed there was no significant decrease. cratin kinase levels. So that when the interventional process of frirage massage therapy does not occur pain during the intervention, it can be assumed that there is no expansion of muscle tissue or ligament damage in the joints after the acute period, so looking at creatine levels that are still in a normal state means that massage therapy can still be intervened even though it has not decreased. creatine levels significantly. To determine the effectiveness of each intervention and to find out the difference in a significant reduction in the effect of the intervention, it can be seen in the following table:

Table 1 Factorial test of the effect of massage therapy, injury levels and stress levels on creatine kinase

Tests of Between-Subjects Effects					
Dependent Variable:Creatin_kinase					
Source	**Type III Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Corrected Model	1307.250[a]	7	186.750	4.692	.001
Intercept	330.750	1	330.750	8.310	.006
JT	420.083	1	420.083	10.555	.002
TC	290.083	1	290.083	7.289	.010
TS	126.750	1	126.750	3.185	.082
JT * TC	374.083	1	374.083	9.399	.004
JT * TS	.083	1	.083	.002	.964
TC * TS	44.083	1	44.083	1.108	.299
JT * TC * TS	52.083	1	52.083	1.309	.259
Error	1592.000	40	39.800		
Total	3230.000	48			
Corrected Total	2899.250	47			
a. R Squared =,451 (Adjusted R Squared =,355)					

Based on the table of important values, it can be concluded as follows: The effect of all independent variables on the type of massage, level of injury, level of stress and levels of keratin kinase. The level of injury concurrently against the dependent variable (keratin kinase levels). If Significance (Sig.) <0.05 (Alfa) = Significant. Based on the table, the significance (Sig.) Of the Corrected Model shows 0.001 means that the model is valid independent, the dependent variable can change its value. If Significance (Sig.) <0.05 (Alfa) = Significant. Based on the Significance Table (Sig.) Of the Intercept, it shows 0.006 means that the Intercept is significant. The error value of the model, the smaller the model the better. The value of multiple determination of all independent variables with the dependent. Based on the R Squared Table shows 0.451 which is close to 1, which means strong influence.

Conclusion

The conclusion of this study is that effriction massage therapy and frirage massage therapy can reduce creatine kinase so that it can be used for the therapy of grade I and grade II injuries, high and low stress levels,

especially effriction massage therapy as a therapy that has better effectiveness than frirage in reducing creatine levels. kinase for knee injury cases, because one group in the effriction group experienced a significant reduction. The effect of all independent variables on the type of massage, level of injury, level of stress and levels of keratin kinase. The level of injury concurrently against the dependent variable (keratin kinase levels).

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