



THE EFFECTIVENESS OF PASSION FRUIT JUICE CONSUMPTION AS PAIN RELIEVER FOR BRUISE TRAUMA IN *PENCAK SILAT* ATHLETES

Januardi Roy Irawan 

Faculty of Sport Science, Universitas Negeri Surabaya

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Abstract

Pencak Silat is a martial art that has a risk of causing micro-trauma due to physical impact. This trauma will stimulate the secretion of prostaglandin, a compound in the body which is a mediator of pain and inflammatory response that promote pain in bruised trauma. Passion fruit contains high level of anti-inflammatory and antioxidant substances. The objective of this study was to understand the effectiveness of passion fruit juice consumption in reducing bruised trauma pain in *Pencak Silat* athletes of PSHT Belotan Magetan. The research design is a quantitative descriptive with quasi-experimental. The pretest and posttest group of 20 people PSHT Belotan Magetan *Pencak Silat* athletes with an average age of 13.4 ± 0.94 years were divided into treatment group (K1) and control group (K0) with 10 subjects respectively. Each treatment group (K1) subject was given the juice twice a day for 10 consecutive days. We used paired sample T-test to assess the mean variance of the group. The result showed that there was a decrease of pain intensity in both the treatment group and the control group. The pain intensity difference assessed by a Bourbonnais Rating Scale in the treatment group showed a significant difference with the t value of 7,216 and a probability value of 0,000, while the control group showed t value of 3,000 and probability value of 0,015. There was a decrease in the athlete's muscle soreness who were given passion fruit juice twice a day for 10 days. The athlete's pain intensity was in middle category.

Introduction

Pencak Silat is a martial art which originated from Indonesia which possesses a high risk of injury. One of the common injury that occurs is bruised trauma from the impact with a blunt object at the time of a match. Bruise is an injury that is caused by a collision with blunt object / hardware that causes blood to extravasate and settle in tissues around the injury. In general, swelling and skin discoloration will accompany the bruise. Pain will also accompany the bruise since mediators of pain (prostaglandins) are released as a result

of cell damage.

Nonsteroidal anti-inflammation drugs (NSAIDs) is still the preferred way to eliminate pain in athletes, for example ibuprofen, which is commonly used in the sports world as pain-killers.

Russell (2000) stated that NSAIDs has shown various adverse health effects with prolonged use, from the mildest effects which are nausea, stomachache, dyspepsia, until the most severe which are the appearance of lesions, bleeding and even perforation of the gastrointestinal tract. Therefore, herbal

 Correspondence Address:

Fakultas Ilmu Keolahragaan, Universitas Negeri Surabaya
Email : royjanuardi@unesa.ac.id

ingredients often become the alternative therapy to reduce pain.

Researchers have done many scientific research on medicinal plants and its effect, including medicinal plants that serve as analgesic. Lazarus (2013), stated that papaya leaf extract has an analgesic effect in mice and has publicly been used empirically as an analgesic. Substances in the herbal ingredients useful to reduce pain are flavonoids and polyphenols. Flavonoids act as an analgesic by inhibiting the cyclooxygenase enzyme, thereby reducing the production of prostaglandins by arachidonic acid, and furthermore reducing pain. Secondly, the flavonoids also inhibit neutrophil degranulation that will inhibit cytokines, free radicals, and enzymes that play a role in inflammation (Patel, 2008; Children Allergy Center, 2009).

Passion fruit (*Passiflora edulis*) is a plant that flourish well in Indonesia and is rich in flavonoids. The study by Zeraik (2012), concluded that there are flavonoids and antioxidants in passion fruit. We, therefore, are interested in conducting a study on the effectiveness of the passion fruit juice as a pain-reliever on bruised trauma of martial arts athletes specifically, *Pencak Silat* athletes.

Bruise or contusion is an injury that occurs in the tissue beneath the skin surface as a result of a blow or blunt trauma on the skin. Ueblacker (2012), stated that contusion is commonly seen in athletes and could cause complex injury that will result in pain on the muscle tissue and, often, hematoma.

According to Anggiat (2011), bruise is a bleeding in subcutaneous tissue due to the rupture of capillaries and veins, caused by a blunt force. Bruises sometimes provide clues about the shapes of causal objects, such as tires lesion, which is actually a sign of peripheral bleeding (Budiyanto, 1997). Damage of the

tissue below the skin and the rupture of small blood vessels, resulting in the seeping of blood and cellular fluids into local tissue and produce bluish or blackish skin. Bruise will also cause vasodilation at the site of injury so that nutrients and oxygen can flow more in order to speed up healing and it results in reddish color (dolor) of the bruise.

Passion fruit has the highest content of total phenol, a substance with antioxidant and anti-inflammatory properties, 61 ± 32 mg TAE / 100 g compared to other fruits (Vascol, 2007).

Flavonoids are phenolic compounds with analgesic effect. *Kayu Rapat* (*Parameria laevigata*) bark contains chemical compounds such as flavonoids and polyphenols. Flavonoids analgesic properties is its ability to inhibit cyclooxygenase enzyme as stated before, whereas, the polyphenols is by suppressing the function of NF-kB and other enzymes involved in the inflammatory process (Hurst, 2007).

Pain intensity is an idea of pain severity that one feels and is a very subjective measurements as pain in the same intensity perceived very differently by two different people. An objective approach to measure pain is most likely by using the body's physiological response to pain itself. This technique, however, is also unable to give a clear picture about the pain itself (Tamsuri, 2007). Based on the Bourbonnais Rating Scale, score of 0 indicates that there is no pain, scale of 1-3 patients experience mild pain, scale of 4-6 patients experience moderate pain which is characterized by hissing and grinning of the patient but still able to follow orders well. Scale of 7-9 objectively patients can not follow commands but they can respond by action, for example indicates the location of the pain but cannot describe it, and on a scale of 10 the pain is very severe, that the patient is no longer able to communicate.

Method

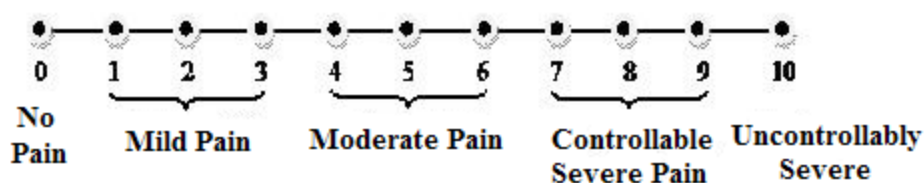


Figure 1. Bourbonnais Rating Scale

Research design used in this study was quasi-experimental design with a control group pretest and posttest design. Dependent variable in this study was the sensation of pain, while the independent variable were administration of passion fruit juice. The controlled variables were gender and age.

Research subjects were *Pencak Silat* athletes of PSHT Belotan Magetan village with the number of 20 males with the age between 13-16 years old, and were randomly divided by casting lots into 2 groups: the treatment group (K1) and the control group (K0).

Another inclusion criteria for the test subjects were as follows: (1) able to communicate properly, (2) was not consuming antioxidant supplements, (3) was not taking anti-inflammatory medication, (4) to not have any kinds of therapy to relieve muscle pain, such as acupuncture, ice treatment, sports massage, and others during the research study, (5) and was willing to be the subject of study by completing the informed consent.

The dependent variable in this study was the sensation of bruise trauma pain measured using Bourbonnais Rating Scale. The independent variable in this research was giving passion fruit juice twice a day with the composition of 4 grams of passion fruit blended with 240 ml of water. We used this measurement since this dose is presumably still in the safety range and will be given to the treatment group (K1), whereas the control group (K0) will be given a placebo drinks that was a mix of water

and brand X syrup which reached 240 ml.

On the pretest activities, research subjects conducted martial arts match with the standard regulations. The match was done to get the expected bruise trauma on each subject, then they were given a questionnaire of Bourbonnais Rating Scale to determine the pain intensity felt as the pretest data. The K1 consumed passion fruit juice, whereas the K0 consumed placebo twice a day for 10 days. On the tenth day, the subjects completed a questionnaire of Bourbonnais Rating Scale as the posttest data.

The data analysis was performed using SPSS and hypothesis testing using a paired sample T-test.

Results and Discussion

Subjects of this study consisted of 20 male that were divided into 2 groups: the treatment group and the control group. The mean age of treatment group (K1) was 13.1 ± 0.5676 , while the mean age of the control group was 13.7 ± 1.1595 .

Pretest data were taken as a result of Bourbonnais Scale Ratings of the subject in the treatment group (K1) and the control group (K0) on the first day shortly after getting a bruise trauma.

Based on the calculation, the K1 average was 4,70 with a standard deviation of 0.675, minimum value of 4,00, maximum value of 6,00, and a range of 2,00.

The K0 average was 4,80 with a standard deviation of 0,7889, minimum value of 4,00, maximum value of 6,00, and a range of 2,00.

Table 1. One-Sample Kolmogorov-Smirnov Test of K1

		K1pre	K1post
N		10	10
Normal	Mean	4,7000	2,9000
Parameters(a,b)	Std. Deviation	,67495	,56765
Most Extreme	Absolute	,272	,370
Differences	Positive	,250	,330
	Negative	-,272	-,370
Kolmogorov-Smirnov Z		,859	1,170
Asymp. Sig. (2-tailed)		,452	,130

a Test distribution is Normal.

b Calculated from data.

Source : Primary Data

Table 2. One-Sample Kolmogorov-Smirnov Test of K0

		K0Pre	K0Post
N		10	10
Normal Parameters(a,b)	Mean	4,8000	4,3000
	Std. Deviation	,78881	,67495
Most Extreme Differences	Absolute	,245	,272
	Positive	,245	,272
	Negative	-,200	-,250
Kolmogorov-Smirnov Z		,774	,859
Asymp. Sig. (2-tailed)		,587	,452

a Test distribution is Normal.

b Calculated from data.

Source : Primary Data

Posttest data obtained were the result of Bourbonnais Scale Ratings of the subject in the treatment group (K1) and the control group (K0) after 10 days of consuming the juice (K1) and water syrup (K0).

Based on the calculation, the K1 average was 2.90 with a standard deviation of 0.568, minimum value of 2.00, maximum value of 4.00, and a range of 2.00. The K0 average was 4.30 with a standard deviation of 0.675, minimum value of 3.00, maximum value of 5.00, and the range of 1.00.

Normality test was required to determine the hypothesis test used for this research. We used one-sample Kolmogorof-Smirnov test for both pretest and posttest data of K1 and K0 .

Table 1 showed insignificant p value ($>0,05$) for both pretest (p value = 0,452) and posttest (p-value = 0,130) data of K1. Therefore,

we concluded that both data were normally distributed.

Table 2 showed insignificant p value ($>0,05$) for both pretest (p value = 0,587) and posttest (p-value = 0,452) data of K0. Therefore, we concluded that both data were normally distributed.

We used paired sample t test to analyze the effectiveness of passion fruit consumption (K1) to reduce traumatic bruise compared to syrup/placebo (K0). Table 3 showed the result of K1 paired sample t test.

The result of K1 group paired sample t test obtained from SPSS ver 16 showed that the t count was 7,216 (p value = 0,0000). We concluded that there were significant difference between pain sensation before and after passion fruit consumption in ten days. Table 4 and 5 showed the result of K0 paired sample t test.

Table 3. Paired Sample t test of K1

		Paired Differences			95% Confidence Interval of the Difference		T	df	Sig.
		Mean	Std. Deviation	Std. Error Mean	Upper	Lower			
Pair 1	K1Pre - K1Post	1,80000	,78881	,24944	1,23572	2,36428	7,216	9	,000

Source : Primary Data

Table 4 Paired Sample Statistic of K0

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	K0Pre	4,8000	10	,78881	,24944
	K0Post	4,3000	10	,67495	,21344

Source : Primary Data

The result of K0 group paired sample t test obtained from SPSS ver 16 showed that the t count was 3,000 (p value = 0,015). We concluded that there were significant difference between pain sensation before and after syrup/ placebo consumption in ten days.

The subjects of this research were 20 men divided into control and treatment group. The mean of age was $13,1 \pm 0,5676$ in treatment group (K1) and $13,7 \pm 1,1595$ in control group (K0).

The measurement of pain level using Bourbonnais pain scale showed no significant difference in pretest pain level of both group. Both group showed moderate level of pain. Meanwhile, the measurement of pain scale showed that K1 was in mild pain category and K0 was in moderate pain category.

The subject attended a competition on the first day to get pain from a traumatic bruise. The subjects' pain level was measured using Bourbonnais pain scale right after the match. These data were used as pretest data and both groups showed moderate pain category. Furthermore, the subjects of K1 consumed passion fruit juice and the subjects of K0 consumed syrup for ten days. In the tenth day, we remeasured the pain using Bourbonnais pain scale and both groups showed reduction of pain level. However, the reduction of pain level of control group before and after treatment

tested using Wilcoxon test was not significant (p-value = 0,015).

Within ten days, the subjects of both groups were prohibited to receive antioxidants, anti-inflammatory drugs, acupuncture, ice treatment, and sport massage during the research, and they were to always attend the training session. The subjects were prohibited to receive antioxidants because it could reduce the muscle pain. Macrophage that was released as a response to inflammation would produce reactive oxygen species (ROS) that would increase muscle damage and increase the pain. Supplementation of antioxidants would decrease the muscle damage and reduce the pain. Despite the pain level of both groups were reduced after the treatment, K1 showed more reduction than K0 with significant difference in pretest and posttest (p value = 0,000).

Pain sensation felt by the martial art athlete happened because of the inflammation after injury or impact with hard object, so that it caused acute muscle damage. The cytokines were released when the muscle was injured and it localized edema because of the migration of monocytes, macrophages, prostaglandins, and histamines. The release of prostaglandins and histamines caused pain from muscle damage (Peake J, 2005).

Several previous studies found that most athlete consumed a non-steroidal anti-

Table 5. Paired Samples Correlations

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	t	df	Sig. (2-tailed)
Paired Differences								
			Upper	Lower				
Pair 1	K0Pre - K0Post	,50000	,52705	,16667	,12297 ,87703	3,000	9	,015

Source : Primary Data

inflammatory drugs (NSAIDs) to reduce pain. It functions as an inhibitor of cyclooxygenase that plays a role in the biosynthesis of prostaglandins, a mediator or inflammatory substance. The long term usage of NSAIDs could cause several adverse effects, such as gastrointestinal disturbance, kidney injury, and cardiovascular disorder (Kuehl, 2010).

Yellow passion fruit (*Passiflora edulis*) contains flavonoid. Previous study found that flavonoid has a prostaglandins secretion inhibitory effect and subsequently reduces pain of traumatic bruise. Therefore, the passion fruit that contained flavonoid could be used as an anti-inflammatory agent (Zeraik, 2011; Jothimanivannan, 2010). Yellow passion fruit also contained Phenol. Phenol was also an anti-inflammatory agent (Dhawan, 2004).

In this research, we did not test the prostaglandins and leukotriene in the laboratory. Moreover, the usage of syrup as placebo made the subjects knew the difference between treatment and control group.

Conclusion

This study showed that the pain of traumatic bruise in martial art athlete after a competition is on the moderate category (scale 4 to 6). Passion fruit juice is effective to reduce muscle pain on PSHT martial art athlete. There was a significant reduction of muscle pain after consumption of passion fruit juice (0,8 gram) twice daily in ten days (p value = 0,000). We conclude that consumption of passion fruit juice can reduce muscle pain after injury.

However, we still need further investigation about effectiveness of passion fruit juice in reducing pain caused by traumatic bruise with laboratory testing for inflammatory markers such as prostaglandins and leukotriene. It is recommended to drink passion fruit juice twice daily in ten days to reduce pain of traumatic bruise.

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