Immunoglobulin-A (IgA) Improvement through Sports and Frirage Massage

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Abstract Background: All massages, including sports massages and frirage massage can reduce muscle tension, improve blood circulation, increase aggressiveness, increase nerve delivery, and reduce blood pressure and pulse rate. The aim of this study was to evaluate the effect of sports massage on changes in IgA levels. **Method:** This research is an experimental study with a pretest-posttest design. The research sample was 27 subjects divided into three groups: Technique collection data with blood drawing in vena of the three groups before and after treatment. **Results** showed that the sports massage treatment results in $P > 0.05$, which means that there is no positive effect of sports massage treatment on increasing IgA immunity. In the frirage massage treatment, $P > 0.05$ was obtained, which means that no positive effect on the increasing of immune IgA was found. Likewise in the control group the P value was not significant with a P value > 0.05 . This means that the one way ANOVA statistical test found that the two treatment groups, namely the sports massage and frirage massage groups did not have a significant effect on increasing IgA levels in the blood. When seen in the data on the mean results of the sports massage treatment group of 36.22 mg / dl, the frirage massage treatment was 32.44 mg / dl, but after being tested by one way ANOVA showed that the two groups were not significant. **Conclusion:** Sports massage to athletes performed heavy work and or exercise at high intensity may increase IgA.

Keywords Massage, High Intensity, Weight Training,

Antibody IgA

1. Introduction

Massage therapy is one of many forms of rehabilitation treatment that has long been used as an additional treatment for various mental and physical conditions [1]. In recent times, massage has gained more popularity in clinical wards because of its application to different ranges of patients from children and also in professional people in the competitive sports field and sedentary people from all walks of life. The best way to describe massage practices is as the mechanical manipulation of body tissues by applying rhythmic pressure [2]. One of the starting mechanisms of massage is through stimulation of different mechanoreceptors nervous system found on the skin (e.g. Meissner and Pacinian corpuscles, Merkel disc ends, Ruffini and free nerve ends) [3]. The pressure given to this receptor is then translated into different effects. More specifically, it can activate pathways that send signals along long nerve fibres and myelin to the limbic region of the brain or can affect release such as substance P or serotonin which is considered responsible for mediating 'relaxing effects' [4]. This evidence shows that emotional well-being and neuronal modulation are key elements for the effectiveness of massage therapy. The catecholamine's released on lymphoid organs under central nervous system

level control are known as regulators of the immune repertoire. To test the possibility that the mediation of the effects of massage therapy increases catecholamine. Immunofluorescence analysis of the thymus section for catecholamine nerve fibres shows a significant reduction in fluorescence intensity in both cortical and cortico-medulla junction areas in rat samples as treated with effleurage massage compared to controls [5].

Sports massage is very well known in Indonesia and almost all experts in massage therapy for national athletes have practiced them so that all athletes have benefited a lot from sports massage in which the manipulation techniques include effleurage, petrissage (squishing and pressing), shaking, friction, tapotemen (beating, hacking, clapping), walken (variation of effleurage), vibration, stroking, skin-rolling, and chiropractice.

Sports massage is a massage that is specifically used or given to healthy people, especially sportsmen. The target of sports massage is certain parts of the body of a healthy person. The types and methods of massage are preferred to improve the smooth circulation of blood [6] Sports massage is known as manual therapy, manipulative therapy, or manual manipulative therapy, this is a physical treatment mainly used on the neuromusculoskeletal system to treat pain and disability. The most common technique includes squeezing and muscle manipulation, joint mobilization, and joint manipulation. [7] argues that sports massage is a specific application of massage techniques, hydrotherapy protocols, various principles of flexibility motion and strength used to achieve certain goals when treating an athlete that is divided to before competing and after competing. Massage increases muscle fulfilment and reduces worse conditions in cross-coupling coupling, vertical jump, speed, and reaction time [8]. The purpose of application of sports massage in general is: (1) to improve blood circulation, especially the urge to venous blood to the heart. The continuity of blood circulation will then accelerate the process of removing the residues of incineration and the spread of food extracts to tissues; (2) to stimulate nerve, especially peripheral nerves to increase sensitivity to stimulation; (3) to increase muscle tension (tone) and muscle elasticity to enhance work power; (4) to cleanse and smoothen the skin; (5) to reduce or eliminate nervous tension and reduce pain, in order to be able to put the patient to sleep [9] Sports massage can cause multi-direct changes in the metabolism of selected biological compounds. Stimulation massage increases the functional state of neuromuscular devices and activates energy production which shows the formation of mechanisms needed for 'emergency' adaptation [10]. Effleurage massage therapy can reduce pain and disability of Myofascial Triggerpoint Syndrome in the upper trapezius muscle [11]. Mark Rapaport in his study states that the time needed for effective massage was 45 minutes [12]. Sports massage which is also known as the manual therapy and manipulative therapy is a physical treatment mainly

used on the neuromusculoskeletal system to treat pain and disability where the types and methods of the massage are preferred at improving muscle relaxation, the blood circulation [13], recovery between training or high intensity competition sessions, reducing the possibility of tissue damage, decreasing heart rate, improving the blood circulation and pressure, reducing muscle tension, increasing joint motion, and reducing pain, as well as multidirectional changing in the metabolism of important biological compounds, improving the functional state of neuromuscular devices and activating energy production. Therefore the massage can help the athlete achieves the effectiveness and the rate of the recovery [14].

In the recent 7 years in Indonesia, there is a new fitness massage method named frirage massage from Faculty of Sports, Yogyakarta State University in which the manipulation techniques only friction and effleurage which are carried out simultaneously. Frirage massage is a hand movement for massaging given to healthy people, especially sportsmen, which employ only the 2 main manipulations namely effleurage and friction using only the thumb and it has the same purpose as sports massage. The two manipulations begin with a.) the supine position and starting from the left leg, namely the back of the foot and toes, front calf / lower leg, groin / upper thighs, followed by the right leg, the foot and fingers -finger, front calf / lower leg, groin / upper thigh, the upper arm area, the back of the hand, palm, forearm, upper arm, abdomen and chest, forehead and face area., b.) the prone position starts from the left leg, namely the soles of the feet, ankles, lower limbs, upper limbs, followed by the right leg namely the soles of the feet, ankles, lower limbs, upper limbs, then the buttocks, back, shoulders, neck and neck.

Frirage massage, which is a massage done only with the thumb, uses the combination of two manipulation techniques, namely friction and efflurage simultaneously so that it is named "frirage" [3] Frirage massage is one of the applied science in the field of therapy and rehabilitation, both for the interests of sports medication, health education, and eastern medication (alternative medication) which can be useful to help cure before medical treatment or after medical treatment as a prevention and treatment for injuryb [15]. Frirage massage can only be done with right and left thumbs depending on your preference and it is performed by moving your thumb to go forward towards and ends to the index finger while the other fingers act as footing for support. This movement is very easy to do and you will not easily get tired. In its development, frirage massage has been divided into 4 fields based on: namely 1) frirage massage for infants, 2) frirage massage for joint injury and muscle shear, 3) frirage massage for organ dysfunction, and 4) frirage massage for fitness and or rehabilitation.

The two types of massage, namely sports massage and frirage massage, can improve muscle performance, reduce pain, and increase aggressiveness, this increasing must also have an effect on increasing immunity. The possibility of

this immune system is what makes it fitter and more aggressive to feel healthy, the immune system is called immunity. There are five different types (classes) of immunoglobulins or antibodies in human blood: IgG, IgA, IgM, IgD and IgE [14-15]. IgG is present in the largest amount, followed by IgM and IgA. IgD is much lower, and IgE is present in only minutes. IgM and IgG mainly protect us from infection in our body tissues, organs and blood. Immunoglobulin A (IgA) is an antibody that plays an important role in mucosal immunity. IgA exists in two forms, four-chain monomers in the blood and eight-chain structures, or dimers, in exocrine glandular secretions from mucous membranes, including mucus, saliva, and tears (OpenStax College., 2013: 959) are also secreted from mucosal epithelium. and neutralizes microbes in the lumen of mucosal tissues, such as the respiratory and digestive tracts [15].

According to B cells in different anatomical sites switch to different isotypes, partly because of the cytokines produced at those sites. In particular, B cells in mucosal tissue switch to IgA, which is the class of antibodies most efficiently transported through the epithelium to mucosal secretions, in charge of defending against microbes that try to enter through the epithelium. Switching to IgA is stimulated by transforming growth factor- β (TGF- β), which is produced by many cell types, including T helper cells, in the mucosa and other tissues. Cytokines also stimulate switching to IgA. Because these cytokines are produced by myeloid cells, they can stimulate the IgA response in the absence of T helper cells [15].

According to [16] one of the mechanisms by which massage initiates its effects is through stimulation of the nervous system different mechanoreceptors found in the skin (e.g. Meissner and Pacinian corpuscles, Merkel disc tip, Ruffini and free nerve endings). The pressure exerted on these receptors is then translated into different effects. More specifically, it can activate a pathway that sends signals along long nerve fibers and myelin to the limbic area of the brain [17] or can affect the release of substances such as P or serotonin which are thought to be responsible for mediating the 'chain effect. or relax [18]. Together this evidence suggests that emotional well-being and neuronal modulation are key elements for the effectiveness of massage therapy [19] argue that catecholamines released in lymphoid organs under the control of the central nervous system level are known regulators of the immune repertoire. To examine the possibility that the mediating effect of massage therapy increases catecholamines, [20] measured noradrenaline concentrations and fluorescence intensity and density of noradrenergic nerve fibers in both thymus and spleen. Immunofluorescence analysis of the thymus section for catecholamine nerve fibers showed a significant reduction in fluorescence intensity in both cortical and cortico-medullary junction regions in rat samples treated with effleurage massage compared to controls. This is in line with the opinion of [21. 22], the fact that large

noradrenergic nerve plexuses predominate in the subcapsular cortex and corticomedullary junction, where thymocytes reside are more mature. Reinforced by the results of [19], previous studies conducted in humans showed that effleurage massage increases vagal activity through stimulation of pressure receptors which ultimately signals the limbic system or reduces the release of norepinephrine in the bloodstream causing overall regulation of sympathetic activity. Interestingly, research and other research groups have shown sympathetic nerves which innervate lymphoid tissue as one of the main pathways of the nervous and immune systems communicating to maintain body homeostasis [23, 24] Most importantly according to [26, 27] the evidence suggests that the homeostatic cross-talk is responsible for "information processing. "such as behavioral conditioning or changes in external environmental factors and their translation into specific immune responses.

Giving effleurage massage to mouse samples showed a tendency to increase the number of thymocytes in T cells in lymphoid organs, this will result in increased excitability triggering the production of excess IgA immune [19].

In Indonesia, there has been no research on increasing immunity in the form of IgA through sports massage and frirage massage in athletes, although almost all therapists who graduated from the Sports Faculty of Yogyakarta State University apply this kind of massage. Furthermore, based on observational reports and information from students and athletes who have been treated using both types of massage, there are very significant changes in feelings of being fit, healthy, fit, and energetic. Of course, all these reports are sketchy and unproven.

On the basis of the foregoing, the researcher wants to prove the truth in a laboratory that IgA type immunoglobulin can be increased through sports massage and frirage massage.

In this study, group sports massage and frirage massage have applied for 45 minutes after a one-hour break of high-intensity physical activity in the form of circuit weight training. After a phase of frirage massage, the participant rested for one hour and then completed the blood test taken in the cubital vein to determine the modulation effect of frirage massage on IgA antibody levels.

Immunoglobulin levels in normal IgA serum are 69 - 382 mg/dl, or 49 - 269 IU / ml [28] while in this study, the normal levels of IgA antibodies were determined at 40-350 mg/dl.

In sports massage and frirage massage there are similarities and also typical differences found at the time of implementing the phrase. The similarity of two massages is 1) in terms of its purpose, both are to promote blood circulation, relax muscles, remove metabolic remnants, stimulate nerve edges, and reduce nervous tension, 2) in terms of the technique, both have friction, effleurage, tapotement, and walken, 3) in terms of targets,

both are aimed for the common people and sportsmen, 4) the direction of both massage is towards the heart, 5) in both message, manipulation begins with legs, and 6) massage time ranges 45-60 minutes.

Table 1. Aspect of Sports Massage and Frirage Massage

Aspect	Sports Massage	Frirage Massage
Specific Goal	Stimulating comfortable and fit feelings	Stimulating comfortable and fit feelings
Main Technique	The main technique is effleurage	The main techniques are effleurage and friction
Tool	The surface of hands, fist, fingers	Thumbs
The number of Manipulation	9 manipulations	2 manipulations
Direction of Movement	Starting from upper limb to the lower	Starting from foot sole to upper parts of the body
Initial Position	Face downward	Supine position
Pressing Rhythm	Adjusted to the muscle size	Adjusted to the muscle size

Table 1 showed the strong aspect between two different of massage: Sports massage and Frirage massage. Sport massage was based on effleurage technique while frirage m based on effleurage and friction. On the hand of tool sport massage used surface hand, fist and fingers in case frirage massage used Thumbs only. Differences of the two massage are also seen in the movement direction while that sport massage starting from upper limb to the lower but frirage was vice-visa. The initial position was different, for sport massage face downward and supine position for the frirage massage. Finally, the number of manipulations was different: 9 manipulations for sport massage and 2 manipulations for the frirage massage. Nevertheless, were some similarities like: comfortable and fit feelings. A very striking difference can be seen from his movement techniques, sports massage has reliable manipulation, namely effleurage carried out using the entire surface of the palm. The pressure in the sport massage is so soft and smooth that effleurage throughout the body gives warm and comfortable feelings for the massaged person [29].

2. Materials and Research Methods

2.1. Procedure

This research is an experimental study with a pretest-posttest design [30] the procedure in this study 1. The subjects were measured blood pressure, respiratory rate, total pulse per minute, 2. The strenuous activity was done in the form of weight training with the circuit method, 3. After doing the load training the circuit is immediately measured again blood pressure, respiratory rate and pulse per minute, 4. Immediately taking 17 mL of blood through

the cubital vein., 5 Divided into 3 groups, namely group 1 who will be treated with sports massage, group 2 who will be treated with frirage massage, and group 3 who will not be treated as control, 6. Rest for 1 hour. 7. Giving massage treatment for 45 minutes to the two treatment groups, 8. The second blood was drawn with a cubital vein of 17 mL to all treatment and control groups, 9. The results of the blood collection were taken to Prodia's laboratory on Jl. Bintaran Kulon No 28 Yogyakarta to analyze IgA levels in the blood.

Weight training procedure with the following circuit: physical activity training that is a circuit weight training of 12 sessions and repetition 10 times / set as many as 3 sets at high intensity for 60 minutes, the training load of each muscle is 30% from 1 RM, each session lasted for 30 seconds, breaking intervals between training sessions was 60 seconds session, exercises were performed for 3 sets, and breaks between sets were 3-5 minutes. This is used as a basis for substituting tiring workout before being treated with massage.

Table 2. Implementation Guidelines for Sports Massage and Frirage massage

1.	Programme	Sports Massage	Frirage Massage
2.	Frequency	2 blood tests in every treatment	2 blood tests in every treatment
3.	Intensity	The pressure intensity depending on the muscle size	The pressure intensity depending on the muscle size
4.	Time	45 minutes, divided into 9 kinds of manipulation = 2700 seconds: 48 total manipulation = 32 seconds: 3,375 seconds/repetition = 7-8 repetition / manipulation	45 minutes, divided into 2 kinds of manipulation with 25 repetitions
5.	Type	Figures and massage order attached	Figures and massage order attached

Table 2 showed the volume of each type of massage. Both of two massage sport massage and frirage massage were based on frequency, intensity, time, and type. Firstly, they had 2 blood tests in every treatment in the hand of frequency. For both of the two massage the pressure was based on the side of muscle. It has been seen a strong different on the hand of manipulation time while that sport massage has 48 manipulations in 2700 seconds for the first time and 32 manipulations in 3375 seconds for the second time. For the frirage massage only 2 types of manipulations with the same time with 25 repetitions.

Meanwhile, masseurs are professional therapists from the Therapy Clinic of the Sports Faculty of Yogyakarta State University.

The procedure for implementing the treatment in the two experimental groups was as follows:

Procedure Sports Massage		
A. Face down (26 minutes)		
Area of Contact	Kinds of Manipulation	Duration
1. Upper Limbs	Effleurage 1, 2, 3; Petrissage 1, 2; Effleurage 1.2.3. (Closing)	Time 11 minutes
2. Lower Limbs	Effleurage 1.2; Petrissage; Shaking; Effleurage 1,2. (Closing)	
3. Feet and soles	Effleurage 1,2; Petrissage; Effleurage 1,2. (Closing)	
4. Waist and back	Effleurage 1, 2; Friction, Walken, Seterika, Tapotement (Beating, Clapping, Hacking), Effleurage 1,2. (Closing)	Time 15 minutes
5. Butt	Effleurage; Friction, Walken, Tapotement, effleurage (Closing)	
6. Nape and Shoulders	Effleurage 1, 2; Petrissage; Shaking; Effleurage 1,2 (Closing)	
	Total Time A	26 minutes
A. Supine Position (19 Minutes)		
1. Upper Limbs	Effleurage 1, 2, 3; Petrissage 1, 2; Effleurage 1.2.3. (Closing)	Time 10 minutes
2. Lower Limbs	Effleurage 1.2; Petrissage; Shaking; Effleurage 1,2. (Closing)	
3. Instep and Foot	Effleurage 1,2; Petrissage; Shaking; Effleurage 1,2. (Closing)	
4. Lower and Upper Arms	Effleurage 1,2; Petrissage; Shaking 1,2; Effleurage 1,2. (Closing)	Time 8 minutes
5. Backs of Hands and Palms	Effleurage; Shaking; Effleurage (Closing)	
6. Chest and Stomach	Effleurage; Walken; Shaking; Effleurage (Closing)	
7. Forehead and Nose	Effleurage Forehead; Effleurage on the nose and down the temples	Time 1 minutes
	Total Time B	19 minutes
	Total Sum of Time A + B	45 minutes

Procedure Frirage Massage		
Supine Position (20 Minutes)		
Area of Contact	Kinds of Manipulation	Duration
Backs, Fingers Legs and Feet.	With your thumb, work on areas 1, 2, 3 and 4.	Time 10 minutes
Front calves and knees.	With your thumb, work on areas 1, 2, 3 and 4.	
Front thigh and groin.	With your thumb, work on areas 1, 2, 3 and 4.	
Backs Right hand and Left	With your thumb, work on areas 1, 2, 3 and 4.	
Palm of the hand	With your thumb, work on areas 1, 2, 3 and 4.	Time 10 minutes
Forearm Massage starts on the outer arm from the wrist to the elbow area.	Do this with the thumbs on the outer forearms in areas 1, 2, and 3 followed by on the inner forearms in areas 4, 5 and 6.	
Upper arm Massage starts from the elbow area to the shoulder area, the position of the arm bent over the chest.	Do this with the thumb on the outer upper arm in areas 1, 2 and 3, followed by the inner upper arm in areas 4, 5 and 6.	
Stomach Massage starts from the right abdomen from the bladder border rib area.	Do it with the left thumb followed by the lower middle stomach starting 2 fingers from the navel to the point of the stomach	
Chest The massage starts from the right side by applying the ribs to the clavicle area.	Do it with the thumb from the edge along the chest from the bottom outwards continued upwards around the inside of the chest.	
	Total Time A	20 Minutes

Prone Position (25 Minutes)		
Area of Contact	Kinds of Manipulation	Duration
Left foot. Massage starts from the left leg in the way shown in the picture.	<i>a) Only with the thumb Perform friction and effleurage (frirage) straight ahead towards the heart with the thumb striking the edge (1) middle (2) and the concave part.</i>	Time 10 minutes
Left ankle The grip for the ankle area is adjusted according to the direction or target of the manipulation.	With the thumb, the lateral (outer) part of the ankle, do it with the right hand, on lines 1, 2 and 3.	
3) Lower limbs	With your thumb, start from the calcani to the back of the knee crease	
4) Upper limbs	With your thumbs, starting from the top of the knee to the crease of the thigh, apply the movement to the upper, inner and outer sides of the thigh.	
5) Butt	With the thumb, start from the bottom of the buttocks towards the upper buttocks, hitting the top, outer side and a little inside	Time 15 minutes
6) Back	With the thumb starting from the top of the buttocks to the nape of the neck along the side of the vertebrae, starting from the bottom again around the back muscles to the nape of either the right side of the vertebrae or on the left	
7) Shoulders	With your thumbs starting from the shoulder muscles to the nape	
8) Nape and Neck	With the thumb, start from the muscle beside the cervical spine up to the back of the ear	
	Total Time B	25 Minutes
	Total Time A + B	45 minutes

2.2. Participants

This experimental research was conducted using the pretest-posttest design. The number of samples as research subjects was obtained in accordance with the inclusion criteria of 1) male, 2) the age range of 19-21 years, 3) were not athletes of district, regional, national and international, 3) willing and able to carry out tasks in this study, 4) willing to be the sample, and 5) the status of 4th semester students of the Study Program of Sports Science and Health of Faculty of Sports, Yogyakarta State University class 2016. The research subjects are 32 males and during the research there were 5 subjects who could not continue the study, so that the overall subjects were 27 male students of the study programme of IKOR Yogyakarta State University, Indonesia. Prior to the research, the subjects signed consent letters, the willingness to be the subject of research. During the research the subjects divided into 3 groups, namely the groups of sports massage (X1), frirage massage (X2) and control (X3) treated with the placebo massage or control.

2.3. Data Collection

In this study, the taking of IgA serum in the form of blood was through the cubital vein performed twice. The first was before carrying out heavy workout of weight training circuit with a 7 mL and the second was one hour after massage. The IgA antibody was determined by the ELISA (Enzyme-Linked Immunosorbent Assay) method carried out by indirect sandwich using Siemen Healthcare

Diagnostics Inc., SIEMENS. Data were interpreted using Elisa Reader with 95% sensitivity. The level of immunoglobulin in normal serum IgA is 40-350 mg/dl [31].

Statistical Analysis

Normality (Shapiro-Wilks), homogeneity (Levene Test), and T-test of data were undertaken by using SPSS V.19.0 suit off program.

2.4. Research Formulations

On the basis of background of the study above, the problem is formulated as follows:

1. Does sports massage have effects on changes in IgA antibody levels?
2. Does frirage massage have effects on changes in IgA antibody levels?
3. Which of sports and frirage massage is most effective on changes in IgA antibody levels?

3. Results

Table 3 showed the characteristics of three groups which are sports massage, frirage massage, and group control. In this table the result of pre-test and posttest of IgA IMUN has been presented. Therefore, it was found a difference between their means and standard deviation (SD).

3.1. Data Analysis

The normality test of immunoglobulin A (IgA) levels data indicates that data is normally distributed with $p > \alpha$ 0.05.

Table 4 showed that in statistics, normality tests are used to determine if a data set is well-modeled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed. In this table the result showed that P value

was > 0.05 and it can conclude that data were normal distributed.

Table 5 showed that homogeneity test of immunoglobulin A (IgA) levels data were analyzed by using the Levene's technique. It is obtained that $F > \alpha$ 0.05, meaning the working hypothesis is rejected and the null hypothesis is accepted. Thus it can be concluded that the final data of the population variants in the treatment group is homogeneity.

Table 3. Descriptive Data Group Experiment and Control

KET	SPORTS MESSAGE		FRIRAGE MESSAGE		CONTROL	
	IgA IMUN		IgA IMUN		IgA IMUN	
	POST	PRE	POST	PRE	POST	PRE
	337	302	258	232	192	194
	307	258	275	221	388	361
	320	284	229	205	197	187
	237	208	242	203	307	298
	250	205	226	193	220	211
	242	214	166	147	178	174
	220	183	316	272	229	228
	304	259	207	182	209	213
	276	254	217	189	316	325
Sum	2493	2167	2136	1844	2236	2191
Mean	277.0000	240.7778	237.3333	204.8889	248.4444	243.4444
Median	276.0000	254.0000	229.0000	203.0000	220.0000	213.0000
Variance	1735.250	1603.694	1834.500	1221.361	5125.778	4514.778
Std. Deviation	41.65633	40.04615	42.83106	34.94798	71.59454	67.19210
Minimum	220.00	183.00	166.00	147.00	178.00	174.00
Maximum	337.00	302.00	316.00	272.00	388.00	361.00
Range	117.00	119.00	150.00	125.00	210.00	187.00

Table 4. Tests of Normality

EXPERIMENT	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SPORTS-MESSAGE	.170	9	.200*	.956	9	.757
SPORTS-MESSAGE	.209	9	.200*	.923	9	.414
SPORTS-MESSAGE	.206	9	.200*	.930	9	.481

Table 5. Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.	Sig
PRE-TEST IgA	4.039	2	24	.031	Sig F > α 0.05
POST-TEST IgA	2.670	2	24	.090	Sig F > α 0.05

Table 6. One Way Anova

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
SPORTS MESSAGE	Between Groups	5904.222	1	5904.222	3.537	.078
	Within Groups	26711.556	16	1669.472		
	Total	32615.778	17			
FRIRAGE MESSAGE	Between Groups	4736.889	1	4736.889	3.100	.097
	Within Groups	24446.889	16	1527.931		
	Total	29183.778	17			
CONTROL	Between Groups	112.500	1	112.500	.023	.880
	Within Groups	77124.444	16	4820.278		
	Total	77236.944	17			

Table 6 showed that the sports massage treatment results in $P > 0.05$, which means that there is no positive effect of sports massage treatment on increasing IgA immunity. In the frirage massage treatment, $P > 0.05$ was obtained, which means that the frirage massage treatment did not have a positive effect on the increase in immune IgA. Likewise in the control group the P value was not significant with a P value > 0.05 . This means that the one way ANOVA statistical test found that the two treatment groups, namely the sports massage and frirage massage groups did not have a significant effect on increasing IgA levels in the blood. When seen in the data on the mean results of the sports massage treatment group of 36.22 mg / dl, the frirage massage treatment was 32.44 mg / dl, but after being tested by one way ANOVA showed that the two groups were not significant.

Although the results show that the two treatment groups are declared insignificant, it can be seen whether the increase in IgA levels in the two groups is more effective as followed table 7.

The results of the discussion in Table 7. The Least Significance Difference (LSD) Technique the Mean Difference between Treatment Groups of Each Dependent Variable explains the differences in the increase in IgA immune levels:

Because the results of the calculation of the significance of sports massage with frirage massage is less than $\alpha 0.05$ ($0,000 < 0.05$), there is a significant difference between sports massage with frirage massage on increasing levels

of IgA immune. Because the sports massage with the frirage massage results of the Confidence Interval For Difference results does not contain zero (0) and has a positive (+) value, the sports massage is greater for an increase in IgA immune levels compared to the frirage massage.

The results show that: Sports massage is more effective in increasing IgA antibody levels than frirage massage ($0,000 < 0.05$).

4. Discussions

The best way to describe the practice of massage to mechanically manipulate body tissue is by applying rhythmic pressure. Furthermore, one of the mechanisms giving to massage impacts is by stimulating mechanoreceptors nervous system found in the skin (eg. Meissner and Pacinian corpuscles, Merkel disc tip, Ruffini and free nerve endings). The pressure applied to the receptors activates pathways that send signals along nerve fibres and myelin to limbic regions of the brain [32, 33] or affects the release of such substances P or serotonin considered responsible for mediating 'relax', These suggest that emotion and neuronal modulation are key elements for the effectiveness of massage therapy. Catecholamine released in lymphoid organs under central nervous system control is known as regulators of the immune repertoire [34].

Table 7. Multiple Comparisons

LSD

Dependent Variable	(I) EXPERIMENT	(J) EXPERIMENT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
POST-TEST IgA	SPORTS-MASSAGE	FRIRAGE MASSAGE	39.66667	25.37938	.131	-12.7138	92.0471
		CONTROL GROUP	28.55556	25.37938	.272	-23.8249	80.9360
	FRIRAGE MASSAGE	SPORTS-MASSAGE	-39.66667	25.37938	.131	-92.0471	12.7138
		CONTROL GROUP	-11.11111	25.37938	.665	-63.4916	41.2694
	CONTROL GROUP	SPORTS-MASSAGE	-28.55556	25.37938	.272	-80.9360	23.8249
		FRIRAGE MASSAGE	11.11111	25.37938	.665	-41.2694	63.4916

•
*. The mean difference is significant at the 0.05 level.

IgA levels in the blood increase with moderate exercise, sports massage and the frirage massage applied with weight circuit training for 1 hour and rest of 1 hour cannot increase immune. This can all occur because it is suspected that weight training is considered too heavy so that it results in psychological and physiological pressure, this is reinforced by the results of research from [35] who conducted a study to determine the response of s-IgA on top 10 Brazilian professional futsal players after 2 very competitive matches separated by 7 days. Unstimulated saliva was collected for 5 minutes before and after the match. S-IgA is measured. The results showed that competitive match training triggered a decrease in the s-IgA levels of top-level futsal players, which suggests an increase in susceptibility to infection was mediated by the training stimulus. This decrease indicates that athletes are at increased risk of developing upper respiratory tract infections. This conclusion is reinforced by Rosa Adriana Jarillo-Luna, et al [36] that intense psychological and physical stress can increase susceptibility to infection by various pathogens in the upper respiratory tract. [37] studied Decreased salivary immunoglobulins after intense interval exercise before and after training, the results showed that IgA and IgM concentrations relative to total protein decreased after each exercise session; IgG concentrations relative to total protein did not change after exercise. IgA, IgM, and IgG flow rates decrease 50-65% after interval training. No training effect on the immune parameters was measured, although the total work done in the five attacks 60 seconds increased after training. These data suggest that salivary IgA and IgM output decreases after brief supramaximal interval training, and that the reduction in output is due, at least in part, to decreased salivary flow. In addition, there appears to be a specific effect of intense exercise at greater IgA concentrations than those caused by decreased salivary flow alone.

In addition to cell proliferation, the recovery phase from exercise, especially after very long endurance-based exercise, is characterized by a marked change in the functional capacity of some blood leukocyte populations. Neutrophilic bactericidal activity is strongly influenced by the intensity and duration of exercise. For example, 1 hour cycling at 50 vs. 80% $\dot{V}O_{2max}$ increased respectively and reduced the oxidative blast activity of neutrophils [38]. During the early stages of recovery after exercise, neutrophilic bactericidal activity continues to increase after 40 minutes to 1 hour of moderate intensity exercise, whereas it remains disrupted after tiring or prolonged exercise (86). NK cell cytotoxicity after exercise attacks of relatively short duration tends to remain unchanged on a per cell basis during recovery [39] but may decrease after very long attacks [40]. T cell proliferation in response to mitogen stimulation usually decreases during and after exercise, regardless of exercise modality, intensity, or duration [Prolonged exercise can also reduce T-cell movement and displacement [41],

lipopolysaccharide-induced cytokine secretion by monocytes [42] and the percentage of T cells that produce effector cytokines in response to mitogen stimulation [43]. Thus, a general trend during exercise recovery is that brief, moderate-intensity exercise has little effect on (or perhaps even enhances) cellular immune function, whereas prolonged bouts (> 1.5 hours) of strenuous activity appear to reduce the normal functioning of all major activities. immune cell subtypes. This effect can make athletes susceptible to disease during recovery from vigorous competition or training [44].

Studies over a short period (2–4 weeks) of excess function have reported decreased resting neutrophil degranulation [45] lymphocyte proliferation, and antibody production [45]. Neutrophil counts, plasma cytokine concentrations, CD4-to-CD8 T-cell ratio, and salivary IgA concentrations varied more (or did not change) in response to borderline function [46, 47, 48, 49]. Athletes who show signs of nonfunctional overreach and / or frequent upper respiratory disease with lower salivary IgA concentrations [50, 51, 52]; decreases cytokine production by monocytes, neutrophils, and dendritic cells [53] and more activated lymphocytes (CD25 +) [54]. Changes in differential blood cell counts, lymphocyte subsets, and NK cell counts after an extended period of intense training varied [55, 56, 57]. Studies of athletes demonstrating the features of overtraining syndrome (including disease) have not revealed a consistent or characteristic immune profile [58, 59].

On the basis of the foregoing, the treatment of sports massage and frirage massage has not been able to increase IgA levels in the blood because it is suspected that including a rest time of only 1 hour. Then the massage for 45 minutes results in inhibiting T cell movement, secretion of cytokines induced by lipopolysaccharides by monocytes and cell percentage. T which produces effector cytokines in response to mitogen stimulation which results in little effect on cellular immune function, on the other hand, circuit weight training only once including massage treatment in each group also only once.

5. Conclusions

1. Massage exercises cannot significantly increase IgA antibody levels after strenuous exercise.
2. Frirage massage cannot significantly increase IgA antibody levels after strenuous exercise.
3. Sports massage was more effective in increasing IgA antibody levels after strenuous exercise than frirage massage and the control.

It is recommended to expand and increase the number of samples in order to draw more precise conclusions from the research results. Blood draws should be done before getting any activity. Data collection in the form of blood tests to measure IgA antibody levels was only done twice.

Firstly before strenuous exercise and secondly after resting for 1 hour after massage, which should be measured four times before doing strenuous activity, after resting for 1 hour of strenuous activity, after massage, and 1-2 hours after massage in order to get precise results in research. Data collection should not only be done in one day, but preferably for 2 weeks and training and measurements should be carried out three times a week to obtain more objective and accurate results.

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