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The Effect of Aerobics Dance and Water Aerobics on Muscle Endurance

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***Abstract*—This researcher aims to examine the effect of aerobics dance and water aerobics on muscle endurance in active students at university. This treatment was carried out 3 times a week for 8 weeks, with an intensity of 65% -85% of the maximum pulse rate. Exercise in Water has the same effect as ground training, but can minimize the risk of injury due to different pressure besides aerobics in water can reduce BMI (Body Mass Index) quickly without sweating. Therefore, exercise in water can be an alternative for adults who do not like sports on land. The sample of this study was 20 people consisting of 10 people from the water aerobics group and 10 people from the aerobics group with a sampling technique using an accidential sampling technique. The Randomized Pretest-Posttest Control Group Design was assigned in this study. The instruments used in this study were wallsit to measure leg muscles endurance, curl up to measure endurance of abdominal muscles, and push-ups to measure endurance of arm muscles. The results of water aerobic wallsit and aerobic exercise the significance value of p = 0.455, for the results of water aerobic curlup and aerobic exercise the significance value of p = 0.832 Whereas the pushup value of water aerobic and aerobic exercise the significance value of p = 0.658. Therefore it can be concluded that there is no significant difference in effect between water aerobics and aerobic exercise on muscular endurance. Nonetheless these results indicate that 6 weeks of aerobic exercise in water three times a week seems to be more beneficial and more effective for endurance of the arm muscles and endurance of the abdominal muscles, whereas for endurance the limbs are less effective for increasing.**

Keywords: aerobic dance, muscle endurance, university students, water aerobic

I. INTRODUCTION

Physical activity is an important health priority for society. Thus, physical function's care is a major concern for the society's health; where physical activity's potential role to prevent illness has received a recognition by the world's health organization [1]. According to Blair some people might assume that physical activity is done only to increase physical fitness [2]. However, physical activity also gives health benefits; which does not depend on physical health. Physical fitness relates to the components of muscle strength, muscle endurance, cardiorespiratory, durability, flexibility, balance, dexterity, and agility [3].

Enough evidence proves that the ability to do physical activity is determined by strength and muscle endurance. Muscle strength, muscle endurance, and flexibility are seen as crucial dimensions for fitness which relates to health and is also a way to increase overall health quality [4]. Another problem that arises is the fact that there are not many people acknowledge the importance of muscle endurance and other training methods that will be useful to increase it. Training programs to gain muscle endurance had been proven for a lot of time by researchers through research. For example, research in Indonesia about overweight/obesity women which was done through a Zumba training program obtained a significant result and could increase muscle endurance, VO2 maximal, and flexibility for the participants [5]. Another research conducted by McRae about Tabata program and the result showed that there was an increase in muscle endurance [6].

Physical activity that becomes a trend or famous these days is an aerobic done in the water. Water aerobics is a physical activity which is an improvement of the usual aerobics. Water aerobics can be done by people of all ages, but it can be used specifically as an alternative for adults who do not like or avoid sports done on the land and can also reduce lower back pain during pregnancy [7]. Water has the same effect with training done on the land but it gives an extra benefit with a less compressive strength that can minimalize the risk to get a musculoskeletal injury and overpressure on the joints [8]. Besides that, this research stated that sport water program training will give a positive change in muscle strength (strength and torque) and durability for sclerosis patients [8].

However, research that utilizes water aerobics to improve muscle endurance on active university students is still limited. By that, the main aim of this research is to identify the impacts of aerobics program in the water on muscle endurance. Researchers hypothesize in 8 weeks, the training will increase muscle endurance.

II. METHODS

A. Design

Design used in this research was the randomized pretest-posttest control group design. Researchers divided the samples into two groups which were assigned randomly. The first group was experiment group (water aerobics) and the second group

was control group (aerobics dance). Both of them were measured twice; where the first one used as a pretest, and the second one used as a posttest [9].

Participant samples used in this research were 20 active sports university students. Accidental sampling was utilized in this research. Accidental sampling is a situation when researchers give a paper or form to samples who have agreed to sign and also interested in the research. Another criteria applied in this research was UPI active students who majored in Science of Sports, Elementary School Sports Teacher Education, Education of Sports Coaching, and Physical, Health and Recreational Education; not athletes nor inactive in sports.

Instrument this research adapted 3 kinds of instrument to measure muscles endurance. The first test was curl up to measure abdominal muscle endurance. The second one was push up to measure arm muscles endurance [10], and the last one was wall sit/wall squat to measure leg muscles endurance [11]. Equipment that should be prepared for curl up was two stripes of sticky tape; placed on the floor with a distance of 12 cm. Subject laid down on their back with knees formed in 90 °, legs touched the floor with arms spreaded until the end of their finger touched the closest stripe. Once subject heard instruction "UP" from the audio, they raised their body until 30° with arms went forward until their fingers touched the second stripe. Then, subject did the curl-up when they heard a cue from audio speaker and followed the rhythm. A movement was counted every time the sample reached the right position, meanwhile if they could not reach it in two repetitions, the activity would be stopped [10]. Procedures applied for push up test began from "down" position. Subject needed to push their bodies by straightening their elbows and back to the "down" position with stomach did not touch the floor/mattress. Their backs should be straight and needed to push forward with the same position. Counting the result of push-up was done without a rest and would be counted as a score. Test would be stopped when subject was not able to maintain the right techniques after two repetitions [10]. Procedure wall-sit started when the back have touched the walls, step a leg forward according to the wide of shoulders. Put the samples' body down like a sitting position in 90o. Keep the back pressed to the walls and endure as strong and as maximal as possible [11].

Treatment was done three times a week for six weeks. The training raining was achieved three times a week for eight weeks long according to ACSM's guidelines [12]. All samples were treated properly, either control group (aerobics n = 10) or the experiment group (water aerobics n =10). The training happened in 45 minutes; 10 minutes for warming up with pop songs with a rhythm tempo of 130-136 Bpm, 25 minutes main activity with mixed songs with a rhythm tempo of 142-158 Bpm, and the last 10 minutes for cooling down with pop songs with a rhythm tempo of 130-136 Bpm. Meanwhile, water aerobics training started by stepping their legs inside the water and the movement started from the head, arms, waist, and legs. Warming up was done for 10 minutes. After that, the main activity was done for 25 minutes. Arms moved like punching, scissoring, and butterfly position. The legs part jogged in the position, kicked the legs straightly, lifted a knee highly and some kinds of small jumps. The last move was 10 minutes cooling down with the same activities as warming up. To monitor intensity 60%-85% of maximal pulse, this research used polar.

Aerobics dance training had similar movements with water aerobics but this aerobics dance was done on the land. Movements done in aerobics dance were marching, jogging, kicking, single step, double step, gripevire, leg curl, heel touch. This activity had the same duration as water aerobics.

Procedures researchers gave a paper about this research to sports university student and they would sign the agreement paper to participate in the research as a sample. Then, researchers asked for permission to indoor sports place/sports hall, outdoor swimming pool, and gym place as places to conduct the research. Before taking the data, researchers explained the purpose and objectives of the research. Next, researches started taking the first data or pretest in Sports Hall with 20 people of samples by doing curl-up test, push up test, and wall sit test. After taking the first data, samples were divided into two groups, experiment group, and control group. After treatment was given to the samples, post-test was conducted. Data compiled from the previous activities then analyzed by the researchers.

Statistics Analysis this research applied paired T-test sample and independent T-test sample analysis. Results obtained from pretest and posttest would be analyzed by Paired T-test sample, meanwhile the gainscore achieved from posttest score minus pretest score would be analyzed by Independent T-test sample. Data analysis was helped by software called Statistical Package for Social Science (SPSS) ver. 25.

III. Results and Discussion

Method used in this research was experiment method. After samples were given pretest, posttest, and six week activities, the data was counted and the descriptive result is:

TABLE I. MEAN AND ST.DEV OF WATER AEROBICS GROUP AND AEROBICS DANCE GROUP'S MUSCLE ENDURANCE

Group	Pretest		Posttest		Paired Sample t Test	Independent Sample t Test
	Mean	*Stdev*	*Mean*	*Stdev*		
Push-Up						
Water Aerobics	12,90	6,154	17,20	5,266	0,000	0,455
Aerobics Dance	9,30	3,164	13,90	4,999	0,005	
Curl-Up						
Water Aerobics	24,70	7,424	28,90	7,894	0,000	0,832
Aerobics Dance	24,50	5,662	28,20	4,417	0,006	
Wall Sit						
Water Aerobics	59,10	18,077	83,60	19,051	0,005	0,658
Aerobics Dance	63,10	30,556	93,10	38,854	0,016	

According to Table 1, the result of water aerobics' first push up pretest score has a mean of 12,90 with standard deviation of 6,154. The result is explained in the graphic in Figure 1. After receiving treatments, push up score during the

posttest has a mean of 17,20 with a standard deviation of 5,266 and a significant difference is spotted. An increase with paired T-test sample p=0,000 can be seen in Figure 2. When the result of water aerobics compared with aerobic dance with an independent T-test sample, a result of p=0,455 is shown which means the data does not show a significant result.

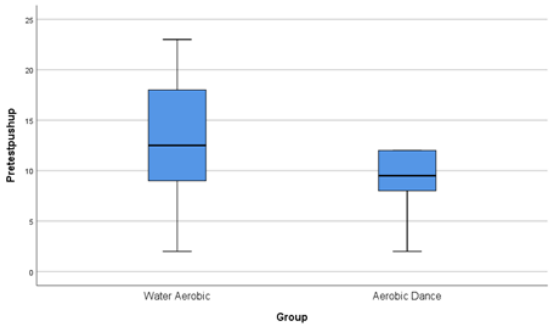

Fig. 1. Graphic data of pretest pushup from water aerobics group and aerobics dance group

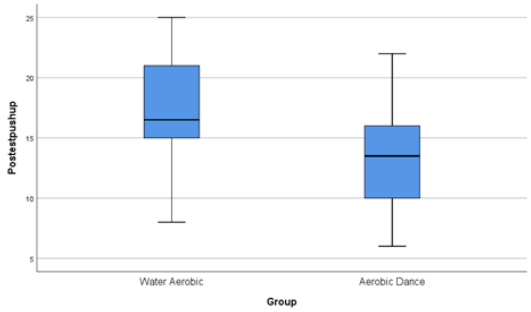

Fig. 2. Graphic data of posttest pushup from water aerobics group and aerobics dance group

The first outcome of water aerobics' curl up during pretest has a mean of 24,70 with standard deviation of 7,424. A detailed result can be seen in the graphic shown in Figure 3. After treatment was implemented, the result score of curl up during posttest has a mean of 28,90 with a standard deviation of 7,894. A significant difference shows by an increase with paired sample T-test result of p=0,000 which can be seen in Figure 4. Meanwhile for aerobics dance's result in curl up, pretest has a mean of 24,50 with standard deviation of 5,662 which can be seen in graphic shown in Figure 3. The outcome of curl up posttest has a mean of 28,20 with standard deviation of 4,417 and a significant difference shown by an increase with paired T-test sample of p=0,006, which can be seen in graphic shown in Figure 4. When the outcome of water aerobics and aerobics dance being compared with independent T-test sample of p=0,832, the data obtained shows that there is no significant difference.

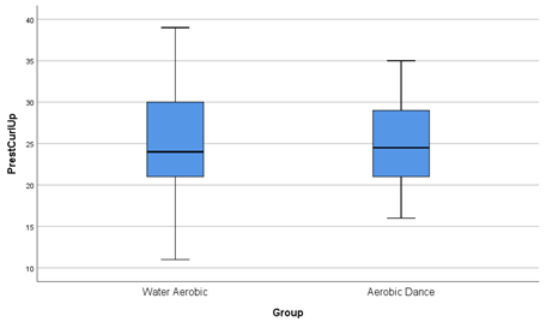

Fig. 3. Graphic data of pretest curlup from water aerobics group and aerobics dance group

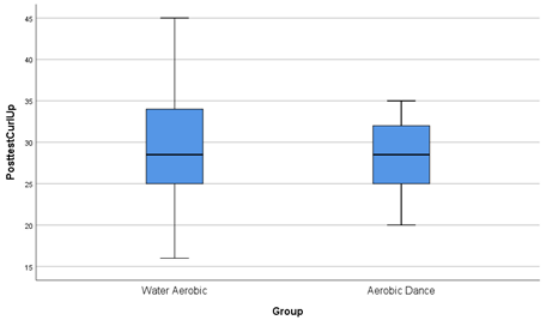

Fig. 4. Graphic data of posttest curlup from water aerobics group and aerobics dance group

First score of water aerobic's wall sit prestest shows with a mean of 59,10 with standard deviation of 18,077 which can be seen in detail with a graphic shown in Figure 5. After treatments, the result score of wall sit has a mean of 83,60 with standard deviation of 19,051. A significant difference can be seen increasing with paired T-test sample result of p=0,005 which can be seen in the graphic shown in Figure 6. Meanwhile for aerobics dance group, the result score of wall sit has a mean of 63,10 with standard devition of 30,556 which can be seen in detail shown in Figure 5. Posttest wall sit's result has a mean of 93,10 with standard deviation of 38,854 and a significant increasing result is shown with paired T-test sample result of p=0,016 which can be seen in a graphic shown in Figure 6. After the results are compared with independent sample T-test result, an outcome of p=0,658 is shown which means there is no significant difference.

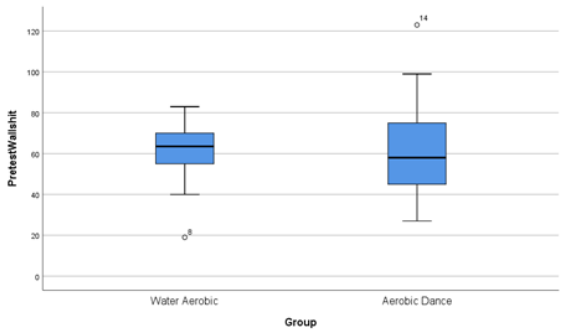

Fig. 5. Graphic data of pretest Wallshit from Water Aerobics Group and Aerobics Dance Group

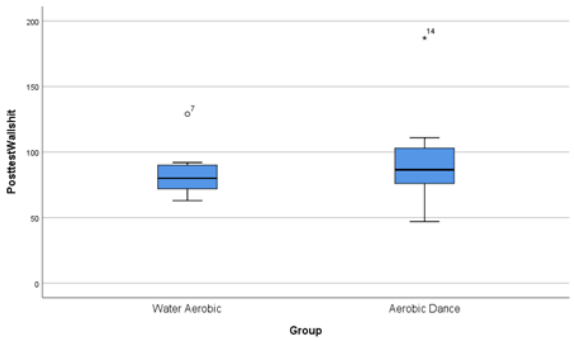

Fig. 6. Graphic data of posttest wallsit from water aerobics group and aerobics dance group

There are also researches about the impact of water aerobics and aerobics dance found. According to Dinata, "Cardiac muscle endurance, arm muscle endurance, abdominal muscle endurance, and flexibility impacts the prior components of physical condition". Aerobics training also increases flexibility, explosive/static strength, muscle endurance, speed, and balance parameter [13].

Some of their result of research about water aerobics has the same opinion that "Water aerobics have increased rapidly in the society after the last years and since then, it is proved that water aerobics gives the same impact which resembles a term in physical fitness as a training based on program on land and has the advantage of producing a little impact on lower leg improvement" [14]. Besides that, water sports can increase the cardiovascular breathing durability, strength, muscle endurance, and flexibility [15]. After 12 weeks of aerobics dance, explosion, upper leg's endurance strength, and overall cardiorespiratory fitness improved [16]. A significant aquatic exercise will gain leg's muscle strength [17]. But, there was a divided opinion in research titled "Impact of Twenty Four Weeks Aquatic Program for Healthy Women's Inner Muscle Strength" with participants who participated inside a shallow pool for 60 minutes a day, 3 days a week. This training program had 10 minutes of warming up, 25 minutes of endurance-type of sports with a heartbeat (HR) done by dancing, and 20 minutes for endurance exercise for the upper and lower body. But, it was also stated that the activities were not specific enough to gain strength muscle, flexibility, or body composition [18].

A. The Difference between Aerobics Dance and Water Aerobic Towards Muscle Endurance.

Based on the result of processing and data analysis done by researchers towards two groups of water aerobics physical activity and aerobic dance, researchers can conclude that water aerobics' physical activity can give a significant impact to increase muscle endurance. Researchers also compare water aerobics' physical activity with aerobic dance because, during the application, both physical activities have their traits. Water aerobics' physical activity was conducted inside the water that only reaches to the waist or chest, similar movements with dance aerobic which was done on the land. During the application of both activities, all of them cause an improvement in gaining muscle endurance which matches the previous description presented for the experiment group's improvement of muscle endurance.

IV. CONCLUSION

It can be concluded that a significant impact of water aerobics and aerobics dance was seen. If it should be compared between the impact of water aerobics and aerobics dance on muscle endurance, then it can be concluded that there is no significant difference in both of them towards muscle endurance. Nevertheless, the output of water aerobics' six weeks activity three times a week shows that this treatment will be more useful and effective for aerobic dance and its impact on leg muscle endurance.

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