

Effects of Gymnastic Methods and Flexibility on Reducing Body Fat of Arimbi Gymnastics Studio Members in Semarang

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Abstract - Fats are a group of organic bonds consisting of elements Carbon (C), Hydrogen (H) and Oxygen (O₂), which have soluble properties in certain solvents (fat solvents) such as petroleum benzene, ether. Flexibility is the effectiveness of a person in adjusting himself to do all the activities of the body with stretching as broad as possible especially the muscles, and ligaments around the joints. Research objectives: 1) Determine the effect of Pilates gymnastics and Zumba gymnastics methods on reducing body fat of Arimbi gymnastics members 2) Knowing the effect of reducing body fat between high flexibility and low flexibility of Arimbi gymnastics members. 3) Determine the effect of the interaction between gymnastic methods and flexibility on reducing body fat of Arimbi gymnastics studio members. The method used in this study was an experimental method with a 2 x 2 factorial design. The population in this study was members of Arimbi gymnastics studios totaling 50 people. Sample consists of 40 people. The study was conducted by the experimental method. Based on the calculated Q count data is greater than Q table (Q count > Q table) at a significant level $\alpha = 0.05$ so that the null hypothesis (H₀) is rejected, and the alternative hypothesis is accepted (H₁), that members with high flexibility are trained by the Zumba gymnastics method (= 5.51 and s = 0.11) higher than Pilates Gymnastics (= 5.22 and s = 0.18).

Keywords: *flexibility, gymnastics methods, reduction in body fat*

I. INTRODUCTION

Fat is a group of organic bonds consisting of elements Carbon (C), Hydrogen (H) and Oxygen (O₂), which, have the property of being soluble in certain solvents (fat solvents) such as petroleum benzene, ether. Fats in the body function to reserve energy, padding certain body organs, provide fixation of these organs such as seeds of the eyes and kidneys, isolation so that body heat does not come out a lot, defend the body from external disturbances such as punches or harmful substances such as substances chemicals that can damage muscle tissue

and give good body shape lines Leane Suniar (2010: 89). Sadoso Sumosardjuno, (2010: 16) concluded "it turns out that excessive fat, from the results of research, is not the result of overeating alone but is a fairly complex fabric, among others: genetic factors, habits of not exercising, daily eating habits, hormones, and gender".

Pilates exercise method is a form of body exercise done by combining the method of flexibility and strength of the body as well as breathing and relaxation. The basic pattern of movement focuses on the pelvic and abdominal muscles. Pilates practice focuses around strengthening the 'core'. The core is defined as a broad band that runs in the middle of the navel to the lower back, extending from the rib cage to the pelvis. The Zumba gymnastic method is a form of bodybuilding exercise done by combining the method of flexibility and endurance in which the movements are accompanied by music. From statistics in Indonesia, women who have never exercised in their 30s have about 33% fat and at 60 years fat has 42%. With increasing fat, the breast will decrease, the hips become thicker, the waist becomes bigger. But the excess fat before, even in old age, can be reduced by managing food and exercising. In fact, weight loss is only the initial stage.

The important thing is to maintain weight. Maintaining weight for a long time requires determination to change eating habits and exercise methods. The study entitled "The Effect of Physical Fitness Exercise on Joint Flexibility in Women Aged 45-50 Years" states the value of joint flexibility of women who follow gymnastics is significantly better than women who follow gymnastics significantly better than women who do not gymnastics. Joint flexibility decreases by up to 50% along with chronological age. Spinal mobility has decreased by 20%, 33% and 50% for anterior flexion, lateral flexion and extension, respectively. Sit and reach movements decrease by around 30% for women

aged 70 years compared to age 20 years (Noor & Huda, 2011). The study entitled "Increased Strength, Flexibility and Balance of Older Muscles Through Independent Gymnastics" the results were the influence of independent gymnastic muscle strength, flexibility and balance before and after independent exercise, based on the results of different test variables of quadriceps femoris muscle strength before and after gymnastics results $p < 0.05$ ($p = 0.000$), with a difference in mean strength of post-gymnastic quadriceps femoris muscle increased compared to pre-gymnastics. Variable flexibility of the pre and post gymnastic trunk p value < 0.05 ($p = 0.000$) with different mean flexibility of the post gymnastics trunk increased compared to pre gymnastics. Pre and post balance variable p value < 0.05 ($p = 0.000$), with different mean post-gym balance increase compared to pre-gymnastics.

The results obtained from before doing post gymnastics are definitely better than pre-gymnastic tests, if done in earnest (Utomo, Wahyono, & Takarini, 2012). The research entitled "Tuning of Hula-Hoop Coordination Geometry in a Dy Dimer" in the design of certain core motifs with different coordination environments (organic ligands, bridging ligands and co ligands) providing the opportunity to investigate the relaxation dynamics of poly-nuclear complexes, thereby enriching the correlation between structure and magnetic properties in the family of dysprosium complexes (Peng, Mereacre, Anson, & Powell, 2016). Research entitled "Differences in the Effects of Pilates and Gymnastics Pilates Gymnastics Method on the Decrease in Body Fat Percentage of Overweight Students at ASIYAH University YOGYAKARTA This research resulted based on the ANOVA test obtained the average value of the decrease in body fat percentage in the Pilates gymnastics group by 3.62 while in the group of Pilates gymnastics group Pilates exercises average decrease in body fat percentage by 2.86, which means that the Pilates Gymnastics group has a greater reduction in body fat percentage than Pilates Gymnastics group (Fatmawati & Syurrahmi, 2018).

The study entitled "Optimal Waist Circumference for Identification of Metabolic Syndrome in Urban Populations in Indonesia Optimal Waist Circumference for Identification of Subjects with Metabolic Syndrome in Indonesian Urban Population" shows the cutoff value of the optimal waist circumference determined by the ROC curve (Bantas, Yosepheph, & Moelyono, 2013). (Faridah, 2017) The study entitled "Aerobic and Zumba Influences for the Upper Arm, Thigh and Waist Size on Mother's Fit Fishing Club Medan in 2016" is based on research data and t-test statistical calculations can be concluded as follows: 1) Method aerobic and zumba gymnastics affect changes in size of the upper arms, thighs and waist of the participating mothers as well as the Bugar Pancing

Medan Club gymnastics. 2) The experimental group who were given aerobic methods experienced better changes in upper arms, thighs and waist circumference compared to the control group trained in the Zumba method for mothers of members of the Medan Club's Fit-Fit-Line Gymnastics (Faridah, 2017). The results of this study were to determine the prevalence of dyslipidemia and central flexibility, as well as factors related to central flexibility in the elderly in Padang, areas with a high prevalence of cardiovascular disease (Setiowati, 2014). Study entitled "Dyslipidemia in the Elderly in Padang City" average BMI (21.6 ± 3.57), percent more body fat ($15.81 \pm 3.63\%$), the level of energy consumption ($54.45 \pm 6.77\%$) and protein ($63.93 \pm 11, 43\%$) less, the percentage of more carbohydrate intake ($68.97 \pm 6.3\%$) and the percentage of normal fat intake ($29.95 \pm 4.88\%$) (Kamso, Purwastyastuti, & Juwita, 2016).

The study entitled "Obesity Risk Factors in Urban Adults and Rural Obesity Risk Factors in Urban and Rural Adults" results of this study are the positive effects of physical activity on human health. Regarding body composition, physical activity results in a reduction in body fat, an excessive level which causes many public health problems throughout the world (Endang, Ratu, & Dewi, 2010). Pilates and Zumba gymnastics methods are effective for increasing cardio respiration endurance including resting pulse, blood pressure and breathing frequency. Both types of exercises (Pilates and Zumba exercises) can reduce body fat. Equality in the Pilates gymnastics method and the Zumba gymnastics method are both forms of exercise if the body is done by combining the method of flexibility and endurance and body strength, which is focused on strengthening the core of the stomach and waist.

II. METHODS

The design used in this study was 2x2 factorial (Sevilla, Consuelo G. et. al. in Tuwu A, 1993: 113). It explained about factorial experiments that measured not only the effect of the main factors of each independent variable on the dependent variable, but also the effect of interaction between independent variables. The research design can be described as follows:

Table 1. Factorial Experiment Design 2x2

Atributive Variable		High Flexibility (b ₁)	Low Flexibility (b ₂)
		Manipulative Variable	
Pilates (a ₁)		a ₁ b ₁	a ₁ b ₂
Rhythmic Gymnastics using Hula Hoop (a ₂)		a ₂ b ₁	a ₂ b ₂

Explanation :

A1b1 : Groups of women who take part in Pilates with high Flexibility

A1b2 : Groups of women who participate in Pilates with low Flexibility

A2b1 : Group of women who take part in Rhythmic Gymnastics use Hula hoops with high Flexibility

A2b2 : Groups of women who take part in Rhythm Exercise Using Hula Hoops with low flexibility

Population is the whole object that becomes the focus of research and a place to generalize research findings (Sandjaja, 2006: 180). The population in this study was the Arimbi Gymnastics Sanggar

Members who had age range 30-50 years, totaling 50 people. A large sample of 40 people is representative enough for the large population in this study. The sampling technique in this study used to purposive sampling which is a sampling technique determined by providing equal opportunities from each member of the population as a sample, ie the amount is adjusted to the members of the subject in each group, then the experimental group uses the Pilates exercise method and the control group did the zumba gymnastic method with different days. (Suharsimi Arikunto, 2010: 82).

Table 2. The Result of Waist Fat Test for Each Group Based on Use of Gymnastic Methods and Flexibility

Treatment	Flexibility	Statistic	Initial Test Result	Final Test Result	Decreased waist fat
Pilates	High	Total	764.00	726.00	38.00
		Average	76.400	72.600	3.800
		SD	7.336	7.121	1.619
	Low	Total	803.00	736.00	67.00
		Average	80.300	73.600	6.700
		SD	8.693	8.897	1.889
Rhythmic using Hula Hoop	High	Total	783.00	714.00	69.00
		Average	78.300	71.400	6.900
		SD	9.753	8.462	2.234
	Low	Total	758.00	693.00	65.00
		Average	75.800	69.300	6.500
		SD	9.426	10.067	1.581

III. RESULTS

The description of data analysis from the waist fat tests conducted in accordance with the groups compared are presented as follows:

Things that need to consider from the data in the table above are as follows:

1. In the treatment group with the Pilates, it has an average initial measurement of 76,400 and a final test of 72,600 with an average reduction in waist fat of 3,800. In the treatment group with the rhythmic gymnastics method using hula hoops had an average initial test of 75,800 and a final test of 69,300 and an average reduction in waist fat of 6,500. When the two treatments compared, the average reduction in waist fat with treatment using the rhythmic gymnastics

method using hula hoop was better than the Pilates.

2. Treatment groups in subjects who have high flexibility have a mean initial measurement of 77,350 and a final measurement of 72,000 with a decrease in waist fat 5,350. In the group of subjects who had low Flexibility had an average initial measurement of 78,050 and a final measurement of 71,450 with a decrease in waist fat of 6,600. If the two groups are compared then the groups of subjects who have high Flexibility better the average decrease in waist fat than the group of subjects who have low Flexibility.
3. To get a complete picture of the values of decreasing waist fat for each of the main factors of the study, comparisons need to be made. Each

cell (treatment group) had a different decrease in waist fat. The average value of decreasing waist fat reaching each treatment group is presented in the form of a histogram.

The description of the value of decreasing waist fat in each group based on gymnastics and Flexibility methods can be seen in the histogram as follows:

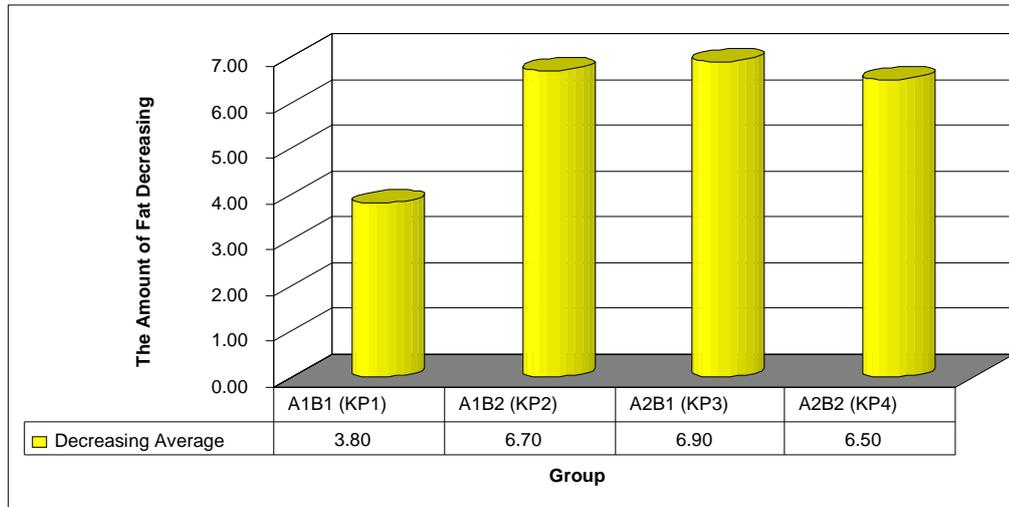


Figure 1. Histogram of The Average Value of Decreased Waist Fat in Each Group Based on the Type of Gymnastic Method and Type of Flexibility

The group of women who received Pilates gymnastics methods and rhythmic gymnastics methods using hula hoops had a different decrease in waist fat. If between two groups of women who received Pilates gymnastics methods and rhythmic gymnastics methods using hula hoops compared, it can be seen that the treatment group rhythmic gymnastics using hula hoop had a decrease in waist fat of 1.45 which was greater than the group of Pilates gymnastics methods

Pilates gymnastics training and groups of women who received rhythmic exercise using hula hoops to reduce fat at the waist. In the group of women who received rhythmic exercise using hula hoop had a decrease in fat at the waist which was better than the group of mothers who received Pilates exercise.

Different levels of flexibility affect the decrease in waist fat. If between groups of women who have high flexibility and low flexibility compared, it can be seen that the group of women who have high flexibility has a decrease in waist fat by 1.25 which is greater than the group of mothers who have low flexibility.

From the data obtained in the data analysis, it was shown that the comparison of the average decrease in the percentage of waist fat produced by rhythmic exercise using a hula hoop was 1.45 greater than that of Pilates exercise.

IV. DISCUSSION

The discussion of the results in this study provides further interpretation of the results of data analysis that has been put forward. Based on hypothesis testing has produced two groups of conclusion analysis, namely: (a) there is a significant influence between the main factors of the study (b) there are significant interactions between the main factors in the form of a two-factor interaction. The group conclusion analysis can be explained further as follows:

2. The Effect of High Flexibility and Low Flexibility
Based on the second hypothesis testing it turns out that there is a significant influence between groups of mothers with high flexibility and low flexibility to decrease waist fat. In the group of women with high flexibility have a decrease in waist fat greater than the group of women with low flexibility.

1. Effect of Pilates Gymnastics Method and Rhythmic Gymnastics Method using hula hoops

Based on the testing of the first hypothesis it was found that there was a significant difference between groups of women who received

From the numbers generated in the analysis of the data shows that the comparison of the average decrease in waist fat in women who have high flexibility 1.25 is greater than the group of women who have low flexibility.

3. Effect of Interactions between Intensity of Gymnastic Methods and Flexibility

Based on the summary of the results table of two-factor variants, it appears that the main factors of research in the form of two factors show a real interaction. For the purpose of testing the form of interaction AB forms the table below.

Table 3. Simple Influence, Main Influence, and Interaction between Factors A and B against Waist Fat Decreasing

Variable	A = Gymnastics Method				
	Type	A ₁	A ₂	Average	A ₁ - A ₂
B = Flexibility	B ₁	3.800	6.900	5.350	3.100
	B ₂	6.700	6.500	6.600	0.200
		5.250	6.700	5.975	1.25
		2.900	0.400	1.45	

The interaction between two research factors can be seen in the following figure :

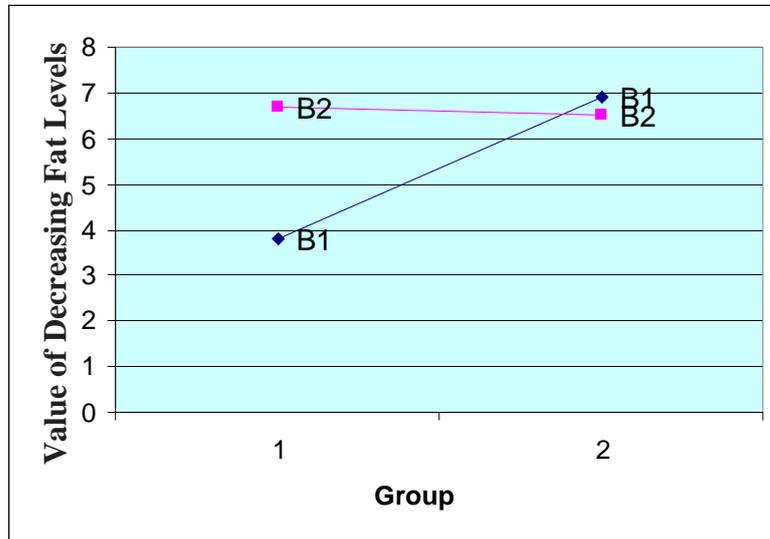


Figure 2. Interaction Form of the Amount of Waist Fat Changing

Note:

- A₁ = Pilates gymnastics method
- B₁ = High Flexibility
- B₂ = Low Flexibility
- A₂ = Rhythmic exercise using hula hoops

Based on the figure above, the shape of the changing line in the value of waist fat is not parallel and crossed. The changing line in waist fat decreasing between the two groups have a meeting point or crossing. Between the types of intensity levels of the gymnastics method to reduce waist fat levels and Flexibility have a crossing point. That means there is a significant interaction between both of them. The figure shows that the level of Flexibility affects the results of the gymnastic method. Based on the results of the research achieved, it turns out that, women who have high flexibility have a large decrease in waist fat if trained with rhythmic exercise using hula hoops. Women who have low flexibility with Pilates

gymnastics methods have a better reduction in waist fat than women with low flexibility and get treatment for Pilates exercise. Count = 7.962 > F_{table} = 4.11. Effectiveness of the exercise method applied to reduce waist fat influenced by high flexibility and low flexibility that women have.

Based on the results of the research and the results of data analysis that has been done, conclusions can be obtained as follows:

1. There is a significant influence between Pilates gymnastics and rhythmic gymnastics using hula hoops to reduce waist fat. The effect of rhythmic exercise using hula hoop is better than with Pilates exercise on decreasing waist fat. Because low flexibility can only slightly reduce waist fat levels, in contrast to high flexibility allows for a decrease in waist fat more.
2. There is a significant effect of decreasing waist fat among mothers who have low flexibility

with high flexibility. Decrease in waist fat in mothers who have high flexibility in decreasing waist fat than mothers who have low flexibility with only a slight decrease in fat on their waist.

3. There is a significant interaction between exercise and Flexibility to decrease waist fat.
 - a. Groups of women who have high flexibility have a large decrease in waist fat if trained with rhythmic exercise using hula hoops.
 - b. Groups of women who have low flexibility have a better decrease in waist fat if they get Pilates exercise.

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