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AEROBIC EXERCISE DECREASE BODY WEIGHT GAIN OF PRIMIGRAVIDA WITH HYPERTENSION HISTORY

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ABSTRACT
Objectives: *To determine the effect of aerobic exercise on body weight gain in primigravida mothers with a history of hypertension*
Method: *This study used a quasi experimental with pre and post control group design of twenty primigravida mothers who were divided into 2 groups: those who did aerobic exercise for 12 weeks (intervention group) and did not do aerobic exercise (control group), and then body weight gain were taken in both groups.*
Result: *The research results are body weight gain during the 12 weeks intervention was lower in the intervention group (Mean= 0.44) compared to the control group (Mean= 0.58) and was statistically significant (p= 0.03).*
Conclusion: *The conclusion of this study that aerobic exercise can be the alternative way for pregnant women mostly to primigravida with a history of hypertension to decrease their body weight gain during pregnancy.*
Keywords*: Aerobic Exercise, Body Weight Gain, Primigravida, Hypertension*

INTRODUCTION

Preeclampsia is one of the leading causes of maternal death in the World. Women with chronic hypertension have a higher number of Preeclampsia than those who have no history of this disease. Hypertension that occurs before 20 weeks gestation or before pregnancy is called chronic hypertension. Chronic hypertension is at high risk for Preeclampsia if effective prevention is not carried out[1].

The risk of maternal death is 7.22-fold in pregnant women with chronic hypertension that have a blood pressure range of 160/110 mmHg compared to pregnant women with chronic hypertension who have a blood pressure range of 140/90 mmHg. Chronic Hypertension with a blood pressure range of 160/110 mmHg in pregnancy has a worse maternal outcome and perinatal outcome (lower birth weight, lower Apgar score, fetal death in the womb, stillbirth, and abruption of the placenta) which is worse compared to pregnant women with chronic hypertension with a blood pressure range of 140/90 mmHg[2]. Primigravida is defined as a woman who is pregnant for the first time. Pre eclampsia is common to say as primigravida disease because it is more commonly occurs in primigravida than in multigravida[3].

During pregnancy, many women experience the effects of hypertension, especially in primigravida. These problems are divided into four categories, problems that existed before pregnancy, chronic hypertension, problems that arise during pregnancy, gestational hypertension, preeclampsia/eclampsia, and superimposed preeclampsia. Each of these categories is difficult to determine, and almost 10% of pregnancies are considered to be affected by high blood pressure problems, and almost 30% of first pregnancies are considered to be affected by problems of gestational hypertension, preeclampsia or eclampsia[4].

Preeclampsia during pregnancy is the second highest cause of maternal death after embolism in the United States. Preeclampsia is a condition where hypertension occurs after the 20th week of pregnancy and is accompanied by proteinuria. In pregnancy with preeclampsia, trophoblast cell invasion only occurs in a part of the spiral arteries in the myometrium region, causing placental dysfunction, the placenta does not meet the need for blood for nutrition and oxygen to the fetus. The impaired placental function can cause stunted fetal growth[5].

Hypertension in pregnancy is associated with complications, including placental abruption, cerebral hemorrhage, liver failure, and acute kidney failure. Preeclampsia, which is one of the hypertension disorders, occurs in 3% to 4% of pregnancies and contributes to perinatal morbidity and mortality. Little is known about the occurrence of preeclampsia associated with modifiable risk factors, such as daily physical activity. Although the health benefits of daily physical

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activity, such as reducing the risk of essential hypertension, coronary heart disease, and type two diabetes are well documented, very little is known about the relationship between maternal physical activity and the risk of hypertension-pregnancy disorders[6].

Despite hypertension, obesity and exessive weight gain are also become risk factors for preeclampsia, and lifestyle interventions consider to reduce this risk. But more study are need to find out the efficacy of this lifestyle interventions such as prevention of obesity and weight gain in pregnancy may help prevent preeclampsia[7].

Based on research conducted by Puspitasari in 2008 in Yudianti in 2015, at RSUP Kariadi Hospital Semarang stated that the factors associated with the incidence of preeclampsia were maternal history of hypertension, obesity, and age during pregnancy. Yudianti also said that excess weight gain or obesity in pregnant women can trigger hypertension, and hypertension can cause damage to the kidney organs so that proteinuria can occur[8].

The relationship between maternal body weight and the risk of preeclampsia is progressive. Increased from 4.3% with a body mass index of less than 19.8 Kg/m^2 for a women[9].

Normal weight gain during pregnancy is 1-2 kg during the first trimester and 0.34-0.5 kg per week in the second and third trimester. Pregnant women should have a normal weight gain so that the mother and baby are healthy. Pregnant women who have less weight can give birth to Low Birth Weight Babies (LBW), while pregnant women who have more weight can trigger diabetes mellitus, heart disease, and hypertension in pregnancy. Based on Yudianti's (2015) research results obtained respondents who experienced the incidence of preeclampsia-eclampsia have a weight gain > 0.5 kg (overweight gain) every week[8].

Weight gain is part of the pregnancy process that describes the development of pregnancy. Weight gain in pregnancy must be monitored properly because become one indicator of pregnancy goes well.

Pregnancy exercises are recommended for pregnant women with hypertension or pregnant women with a risk of preeclampsia to reduce the adverse effects of hypertension including reducing the incidence of preeclampsia. The aim is to prevent the incidence of preeclampsia in pregnancy, by reducing blood pressure and cardiovascular repair, but the results are still lacking data on the results of the effects of aerobic exercise on the incidence of preeclampsia[1].

Theoretically, there are fears of premature labor and the risk of giving birth to babies with low birth weight due to women who do sports activities during pregnancy. But this contrasts with a meta-analysis study that included more than 2000 women and found that aerobic exercise and moderate-intensity strength training performed three to four days per week during pregnancy were not associated with an increased risk of preterm or infant birth low birth weight for babies. However, this should be done by women of normal weight with a single pregnancy and without complications. The problem is that only about 40% of pregnant women engage in aerobic exercise, even though carrying out aerobic exercise can help reduce the discomfort experienced by the mother during pregnancy and help prepare their body for labor and delivery[10].

Barakat in his research on exercise during pregnancy as prevention of hypertension gets the results that pregnant women who do not exercise three times in a week get more hypertension than those who do and 1.5 times have more body weight gain[11].

An exercise that is recommended for pregnant women are walking, aerobic exercise, dancing, hydrotherapy, aerobic in water, and stretching exercise. Exercise can begin in the first trimester (more than 12 weeks of pregnancy) until delivery, with duration 30-60 minutes, as much as 3-4 times a week. Increased maternal heart rate by 60-80% from normal[12].

Aerobic exercise during pregnancy can improve maternal health such as improving quality and physical function, bodily pain, bodily health, mental health, vitality, social and emotional functions, as well as preventing complications such as depression during pregnancy and emotional disturbances[13].

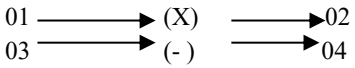
Aerobic exercise as an effort to prevent preeclampsia is still controversial so that various studies are still needed so that this can be used as a reference in pregnancy care. But based on evidence that low impact aerobic exercise is not harm full to maternal and fatal health and is not related to premature birth[14].

So this study aims to analyze the effect of aerobic exercise on body weight in a prim gravida with a history of hypertension.

MATERIAL AND METHOD

This research was a quasi-experiment study with a pre and post control group design to determine the effect of aerobic exercise on body weight of prim gravida with a history of hypertension. The intervention group was primigravida with a history of hypertension with an aerobic exercise intervention, and the control group was primigravida with a history of hypertension without intervention.

The design approach in this study can be described as follows:



01 Intervention group before Aerobic exercise intervention
02 Intervention group after Aerobic exercise intervention
03 Control group before study
04 Control group after the study
(X) Aerobic exercise intervention
(-) Control group with no intervention

Operational Definitions of Independent Variables and Dependent Variables:

a. Aerobic exercise
Definition: a series of movements combined with the rhythm of the music that has been selected with a certain duration.
How to measure: Conduct aerobics twice in a week with 30 minutes each, for twelve weeks starting from the second trimester (16 weeks of pregnancy).
Measuring instrument : observation form.
Measuring results: If aerobic exercise is performed then a value of one will be given, and if not performed then a value of 0 will be given.
Measuring scale: nominal

b. Body Weight Gain
Definition: body weight gain of primigravida
How to measure: measure body weight gain
Measuring instrumen: weight scales
Measure results: weight in Kg
Measuring scale: interval

The research was conducted for six months. The population in this study were all prim gravida with a history of hypertension in Padangsidimpuan city. Samples were all populations that meet the inclusion and exclusion criteria. The sample chosen for the study was a woman who fulfilled inclusion criteria; 20-35 years old, normal weight, the second trimester of primigravida, has a history of hypertension with blood pressure 140/90 mmHg. The exclusion criteria were heart disease.

The number of samples has taken must be the same between the two groups so that the results of the study are more significant. The sample in this study was the total population of all primigravida with a history of hypertension in the city of Padangsidimpuan at the time of the study (data collection time), January - July 2018, found that there were twenty pregnant women, divided into two groups of the same size, ten people per group.

The research procedure began by giving information to participants about the purpose of the study. Those who agree to be a participant in the research are asked to sign an informed consent form. Then the intervention and control groups were divided. Aerobic exercise was carried out twice a week with a duration of 30 minutes each for 12 weeks, starting from 16 weeks of pregnancy. The exercise was carried out during the pregnancy class, bodyweight calculated before and after the intervention. The control group did not get any intervention but their body weight was measured.

Data were analyzed by the Mann-Whitney test to compare pre-test and post-test data.

RESULT

The study was conducted in the city of Padangsidimpuan from March 2018 to October 2018. The results of this study can be seen by following table.

Table 1: Characteristics of Respondents.

Characteristics of Respondents	Intervention Group Mean ± SD	Control Group Mean ± SD	Sig
Age	27.4 ± 2.1	25.8 ± 3.2	*p>0.05*

Body Weight (BW) Kg	56.2 ± 7.3	53.4 ± 4.0	*p>0.05*
Systolic (mmHg)	147.7 ± 9.0	153.3 ± 10.1	*p>0.05*
Diastolic (mmHg)	96.3 ± 7.8	97.8 ± 7.7	*p>0.05*

Source : Primary data, 2018.

Table 1 shows the characteristics of respondents. Based on its characteristics, the mean age of the respondent was 27.4 ± 2.1 years for the intervention group and 25.8 ± 3.2 years for the control group. The mean weight was 56.2 ± 7.3 Kg for the intervention group and 53.4 ± 4.0 kg for the control group. The mean systolic was 147.7 ± 9.0 mmHg for the intervention group and 153.3 ± 10.1 mmHg for the control group. The mean diastolic was 96.3 ± 7.8 mmHg for the intervention group and 97.8 ± 77 mmHg for the control group. Statistically, with the Mann-Whitney technique, there was no significant difference between the two groups with a value of p> 0.05.

Table 2: Effects of Aerobic Exercise After 12 Weeks on Average ± SD in Primigravida Body Weight Gain.

	Mean ± SD (Kg)	Sig
Intervention Group	0.44 ± 0.7	0.03
Control Group	0.58 ± 0.9	

Source : Primary data, 2018

Table 2 shows the mean weight gain after 12 weeks of aerobic exercise intervention in the intervention group was 0.44 ± 0.7 Kg and in the control group, 0.58 ± 0.9 Kg. The mean weight gain in the intervention group was lower than in the control group and statistically, with the Mann-Whitney technique, there were significant differences with p values <0.05.

The measurement results obtained from the mean age and weight were almost the same or homogeneous in both groups. The weekly increase in body weight for 12 weeks of the intervention was lower when compared to the control group and there were statistically significant differences.

DISCUSSION

Overall the characteristics of respondents, the average age, systolic, diastolic, and the average body weight gain showed results that did not differ significantly between the intervention group and the control group. This shows homogeneity between the two groups. All respondents in this study were primigravidas.

Primigravida often experiences stress during childbirth. Emotional stress that occurs in primigravida causes an increase in the release of corticotropin-releasing hormone (CRH) by the hypothalamus which then causes an increase in cortisol. The effect of cortisol is to prepare the body to respond to all stressors by increasing sympathetic responses including responses aimed at increasing cardiac output and maintaining blood pressure. In women with preeclampsia – eclampsia, there is no decrease in sensitivity to the vaso peptidase so that a large increase in blood volume directly increases cardiac output and blood pressure[15].

All respondents in this study had the same mean systolic and diastolic blood pressure in both groups of respondents before the study or before the intervention. However, after doing aerobic exercise, the systolic and diastolic blood pressure in the intervention group was lower than in the control group, but all respondents in the intervention group and the control group from chronic hypertension become preeclampsia. This is in line with Lene study which found that aerobic exercise activities in pregnant women reduce resting diastolic blood pressure in pregnant women who prior to pregnancy were not actively doing aerobic exercise[16]. This study found that the mean weight gain after 12 weeks of aerobic exercise intervention in the intervention group was 0.44 ± 0.7 kg and in the control group 0.58 ± 0.9 kg. The mean weight gain in the intervention group was lower than in the control group and statistically, with the Mann-Whitney technique, there were significant differences with p values <0.05. The measurement results obtained from the mean age and weight were almost the same or homogeneous in both groups before this study held. The weekly increase

in body weight for 12 weeks of the intervention was lower when compared to the control group and there were statistically significant differences.

Despite all that the weakness of this study was the maternal body weight range was not classified whether underweight, normal weight or obesity, and then differences in nutritional intake of pregnant women were also not carried out research and there was no treatment. Raguel in his study found that chronic hypertension pregnant women had more weight gain and become preeclampsia[17]. Yudianti (2015), in her research, found that respondents who did not experience preeclampsia - eclampsia, tended to gain bodyweight < 0.34 Kg or less every week, while respondents who experienced preeclampsia-eclampsia tended to gain bodyweight > 0.5 Kg or more every week, and draw conclusions the higher the body weight gain of the third trimester pregnant women, the higher the risk of preeclampsia-eclampsia. According to Istiany is Yudianti (2015), normal body weight gain during pregnancy is 1-2 Kg during the first trimester and 0.34 – 0.5 Kg each week in the second and third trimester. Pregnant women should have a normal body weight gain so that the mother and baby are healthy. Pregnant women who have more body weight can trigger diabetes mellitus, heart disease, and hypertension in pregnancy[8].

Safe weight gain for pregnant women to avoid the incidence of preeclampsia before 34 weeks gestation is 0.2 Kg per week. Chronic hypertension is one of the factors causing preeclampsia after 34 weeks of pregnancy[18]. The risk of a proportional increase in the incidence of preterm preeclampsia will occur in a pregnant woman if the BMI category before pregnancy is at the obesity level with a range of 35.0-39.9 kg / m2 (Obesity class III). The risk of preterm preeclampsia in pregnant women with class III obesity or BMI ≥ 40 kg / m2 is 5.23 times higher than for pregnant women who have normal weight. The greater the increase in obesity in pregnant women, the risk of premature pregnancy preeclampsia will also increase and will affect health care providers such as the determination of medical or surgical management, the determination of the length of stay and the risk of permanent damage, this will also put emotional pressure on the patient's family and will ultimately be at risk for fetal death[19].

It turns out that preeclampsia does not occur in all obese pregnant women. The data shows that the highest incidence of preeclampsia is experienced by obese pregnant women if they have metabolic disorders. This shows that there are mechanisms that influence obesity that encourage hypertension in obese pregnant women and there are also mechanisms that protect normal blood pressure in obese pregnant women. This will open a new protocol for the treatment of preeclampsia. Increased circulating leptin, glucose, insulin and lipids which are metabolic disorders tend to increase the risk of preeclampsia in pregnant women with obesity, whether each of these factors contributes to the incidence of preeclampsia or the accumulation of all of these factors that influence it needs to be understood. This is relevant to obese pregnant women who have gestational diabetes mellitus where all of these factors increase and are the highest risk for preeclampsia. These factors may be potential factors for anti-angiogenic and proinflammatory mechanisms of vascular dysfunction induced by placental ischemia, thus contributing to an increased incidence of preeclampsia[20].

Wiebe on their meta-analysis about the effect of prenatal exercise on fetal growth found that prenatal exercise reduced the odds of having a large newborn (birth weight greater than 4,000 g or greater than the 90th percentile for gestational age and sex) by 31% (without altering the risk of having a small newborn (birth weight less than 2,500 g or less than the 10th percentile for gestational age and sex) or gestational age at delivery (weighted mean difference −0.00 weeks, 95% CI −0.09 to 0.09; I2 0%). Newborns of mothers assigned to exercise were lighter than those of nonexercising controls (weighted mean difference –31 g, 95% CI –57 to −4; I2 0%). Maternal gestational weight gain (weighted mean difference −1.1 kg, 95% CI −1.5 to −0.6; I2 53%) and odds of cesarean delivery (OR 0.80, 95% CI 0.69–0.94; I2 0%) were also reduced. Wiebe also concluded that structured prenatal exercise reduces the risk of having a large newborn without a change in the risk of having a small newborn[21].
Current recommendations are for pregnant women to continue and maintain a sedentary lifestyle with active activities during their pregnancy when there are no medical contraindications. Because of the anatomic and physiological changes associated with pregnancy, exercise routines during pregnancy must be adjusted to the mother's condition. Regular aerobic exercise during pregnancy is known to maintain or improve physical fitness. Compared to women who do not do sports activities, pregnant women who are active in sports activities have improved aerobic fitness and muscle strength, gave birth to babies of normal weight, had fewer cesarean sections, and recovered more quickly in the postpartum period. Exercise in pregnancy can reduce the risk of developing gestational diabetes, preeclampsia, and macrosomia. Besides exercise is also beneficial in pregnancy such as reducing lower back pain, decreased constipation

rates, normal maternal weight gain during pregnancy and infant weight loss after delivery, maternal psychological conditions, which are good mood, muscle strengt, and endurance, can increase the ability to undergo labor[10,22].

Adinma in his study Perception and Practice of Exercise during Pregnancy by Antenatal Women in Southeastern Nigeria concluded exercise has been proven to have amazing benefits in pregnancy, especially normal pregnancy without contraindications[23]. Cooper said that exercise is safe for pregnant women to do and recommends doing this activity, including pregnant women who in the period before pregnancy has not moved many activities. It is also recommended to start an exercise program early in pregnancy. Exercise is also considered safe in some high-risk pregnancies such as pregnant women suffering from chronic hypertension and gestational diabetes[10].

This study is in line with Wang in Berghella (2017), who found that cycling in pregnant women who started after 13 weeks of pregnancy for 30 minutes three times in a week carried out until 37 weeks of pregnancy significantly increased fetal body weight lower than pregnant women who don't do sports[12]. Various problems in pregnancy have been proven to be reduced by exercising during pregnancy, such problems as macrosomia, gestational diabetes, preeclampsia, Caesarea section, low back pain, pelvic girdle pain, and urinary incontinence. It is better when pregnancy counseling care is given recommendations for pregnant women to do sports activities, and free him to choose what type of exercise he wants and when to start doing. This also applies to pregnant women who routinely do sports activities before pregnancy, but should be done by reducing the intensity of exercise during pregnancy. Aerobic exercise is a sport that is considered the most beneficial. These aerobic sports activities are sometimes referred to as cardio exercises which involve the work of the heart to pump oxygenated blood to the muscles of the working body. This is due to large muscle groups (legs/arms) that move repeatedly for a continuous amount of time[12].

Aerobic exercise should be carried out for 150 minutes per week, and this activity can be divided into smaller sessions of around 30 minutes per day for five days each week. Pregnant women who will start aerobic exercise can start with only five minutes a day, after that the time can add 5-10 minutes every week. When a pregnant woman's heart rate increases to around 110-120 x/minute, it means that the exercise is quite hard. However this varies according to age, but this is according to the age range of pregnant women aged between 18-35 years. Ways to monitor the intensity of exercise is already in the weight category or not, then there is a practical way that can be done that is "speaking test. Sports can be categorized in intensity that is not heavy for pregnant women if during exercise the pregnant woman can still communicate with others. If a pregnant woman while doing sports activities cannot communicate with others then this has been categorized as sports with severe intensity and can cause complications in pregnancy and should be avoided[10].

Although aerobic exercise is associated with a decrease in body weight gain in pregnant women, does not mean that aerobic exercise will adversely affect the development of the fetus in the womb, because exercise increases the placental growth and balance of angiotensin (which is related to the stability of blood pressure). Exercise also affects the growth of the fetus in the womb and is associated with placental development. Decreased intermittent fetal and oxygen supply to the placenta as a result of preeclampsia is believed to be a stimulus for exercise and induces an increase in placental and blood vessel growth. The size of the placenta will only increase if deemed necessary for the needs of the fetal and placenta. Aerobic exercise prevents excessive weight gain and will result in gestational diabetes mellitus[24].

But Cadotte et al had different results from their review that aerobic exercise is "absolutely contraindicated" in pregnant women with pregnancy-induced hypertension, preeclampsia, HELLP, and hemodynamically significant to heart disease[25]. Adolescent primigravida with an age range of 16-19 years has a lower cesarean birth rate, diabetes mellitus, chronic hypertension, placenta previa, and cephalopelvic disproportion (CPD) compared to adolescent primigravida with an age range of ≤15 years. Midwifery care during pregnancy that is not optimal in adolescents will increase the level of PIH which has an impact on perinatal outcome. Early detection and immediate treatment are important for the prevention of complications that can be detrimental to pregnant women, especially the prevention of hypertension, premature labor and infections. Because of the increased risk of an anomaly in the fetal screening with USG should be done at 18-20 weeks' gestation[26].

Therefore, preconception and antenatal prevention of chronic hypertension are needed in pregnant women to get a good maternal outcome and perinatal outcome[2]. Above all, early detection and screening are the safest way of finding

complications in pregnancy. Midwifery care must be done four times in pregnancy to give comprehensive care and continuity of care for pregnant women's health and perinatal health.

CONCLUSION

Based on the results of data analysis, it can be concluded that aerobic exercise can be the alternative way for pregnant women mostly to primigravida with a history of hypertension to decrease their body weight gain during pregnancy.

Ethical Clearance: The intervention of primigravida mothers has received permission from the ethics committee of Health Polytechnic of Health Ministry Medan.

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Conflict of Interest: Nil

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