



Effect of moderate exercise on blood pressure "(studies in primigravida in the health center of the Banyumas district health office)

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ABSTRACT

Background

The pregnancy process is a physiological condition but there are some things that can endanger the mother and her baby. Pregnancy complications are experienced by about eight million women per year, and half a million more die, of which 99% of deaths are in developing countries. In developed countries complications in pregnancy cause maternal mortality rates of around 1 in 5000 women, and in developing countries it is very much higher, ie 1 in 11 pregnant women experiences complications in pregnancy and death.

Objective

To find out that moderate exercise (moderate exercise) affects blood pressure in Primigravida.

Methods

This study is a Quasi Experimental study, with a pre and post test with control group design. The number of samples in this study were 32 respondents, with 16 respondents in the intervention group and 16 respondents in the control group. In this group, one treatment group was used, namely getting moderate exercise intervention, namely walking for 30 minutes with an intensity of 5 times a week for 4 weeks and ANC according to standards and pregnancy exercises in the class of pregnant women according to the class schedule of pregnant women ie once a month and the control group that is to get ANC intervention according to standards and pregnancy exercise in the class of pregnant women according to the class schedule of pregnant women which is once a month.

Results

There were significant differences in systolic and diastolic blood pressure between the intervention group and the control group at week 3 and week 4 with $p < 0.05$. There were significant differences in systolic and diastolic blood pressure before and after intervention in the intervention group and the control group with a value of $p < 0.05$

Conclusions and recommendations

Medium intensity exercise in the form of walking for 30 minutes 5 times a week for 4 weeks is effective for blood pressure. The results of this study are expected to be one of the programs in midwifery care for pregnant women as an alternative to prevent the occurrence of risks in pregnancy related to blood pressure

Keywords: Sports, Blood pressure

INTRODUCTION

The pregnancy process is a physiological condition but there are some things that can endanger the mother and baby. Pregnancy complications are experienced by about eight million women per year, and half a million more die, of which 99% of deaths are in developing countries. In developed countries complications in pregnancy cause maternal mortality rates of around 1 in 5000 women, and in developing countries it is very much higher, ie 1 in 11 pregnant women experiences complications in pregnancy and death [1].

According to WHO there are mothers who die during pregnancy or maternity around 585,000 per year and 58.1% of them are caused by hypertension in pregnancy. In 2014 according to international health agencies, hypertension in pregnancy was ranked as the third highest in the world causing death during pregnancy, contributing 14% of all deaths during pregnancy throughout the world. Whereas in Indonesia, 15% to 25% of maternal deaths are caused by hypertension in pregnancy [2].

The prevalence of hypertension in pregnancy is around 1.3% - 6% in developed countries, and in developing countries it is much higher at 1.8% - 18%. WHO estimates that the incidence of hypertension in pregnancy in developed countries is 7 times lower than developing countries. In Indonesia, the incidence of hypertension in pregnancy is around 5.3% or 128,273 cases per year [1].

Primigravida mothers or pregnant for the first time have a risk of developing hypertension in pregnancy 6-8 times greater than multigravida. In the first pregnancy about 85% experience hypertension in pregnancy, most primigravidas at 28 weeks gestation to 32 have an increase in diastolic pressure of around 20 mmhg, and can lead to hypertension in pregnancy. Increased risk in primigravida for hypertension in pregnancy (HDK) is caused in the first pregnancy, the immune system (immunology) is not perfect in the formation of blocking antibodies against placental antigen by HLA-G (human leukocyte antigen G) compared to multigravida [3].

The impact of pregnancy complications such as hypertension in pregnancy and gestational diabetes is not only in women undergoing the process of

pregnancy and childbirth, it can also cause problems after childbirth due to decreased endothelial function in various organs, including cardiovascular disease, metabolic syndrome and other complications. Another consequence of hypertension in pregnancy and preeclampsia is the long-term impact on infants, among others: low birth weight, due to premature birth or due to obstructed fetal growth [4].

The amount of impact that can be caused due to complications of pregnancy, childbirth and childbirth, especially those caused by preeclampsia, efforts are needed to prevent the occurrence of cases of hypertension in pregnancy. Various efforts have been made by the government to reduce maternal mortality in Indonesia, both preventive, curative, promotive and rehabilitative. Starting in 2016 the government launched a national movement program namely the Healthy Living Society Movement (GERMAS). This program focuses on promotive and preventive efforts without putting aside curative and rehabilitative efforts by involving all elements in the community. One form of GERMAS activity is an increase in physical activity [5]. Physical activity is one alternative to non-pharmacological therapy to prevent the occurrence of pregnancy complications [6].

"The American College of Sports Medicine (ACSM) and the American College of Obstetricians and Gynecology" recommends pregnant women to exercise as much as 150 minutes in one week or equivalent to 30 minutes and carried out five times a week to obtain health benefits and prevent the occurrence of deep hypertension gestational pregnancy and diabetes. Based on "Cardiovascular Medicine" exercise carried out with a duration of 30 minutes and an intensity of 3 or more times a week, calorie burning is estimated at 1000 to 2000 calories per week, with a maximum pulse increase of around 60 to 70% including moderate or moderate exercise category [7].

Sports that are safe and can be done by pregnant women include prenatal yoga, swimming, aerobics, pregnancy exercises and walking. But the sport requires supervision from trained personnel / experts. Sports walking, has the advantage of 5 M which is Easy exercise, can be done by everyone, Cheap without the need for tools or trained

personnel, Meriah because it can be done casually in a cheerful atmosphere, Mass because it can be done in groups, or with family members, and benefits are very good for freshness and health, if done regularly [8].

Contradictory research was also carried out in Iran from 2011 to 2012, concluding that stretching exercises reduce systolic and diastolic blood pressure in the second trimester of pregnancy and control them in the third trimester of pregnancy. Conversely, walking does not affect blood pressure during pregnancy [9].

Based on the above data, researchers are interested in conducting research with the title "The Effect of Moderate Exercise on Blood Pressure"

STUDY OBJECTIVES

Knowing that moderate exercise (moderate exercise) affects blood pressure in Primigravida.

METHODS

This research is a Quasi Experimental study, with a pre and post test with control group design. The number of samples in this study were 32

RESULTS

Univariate Analysis

Table 1 Characteristic Distribution of Respondents based on education and gestational age

Characteristics	Intervention		Control	
	N	%	N	%
Education				
Primary school	3	18.8	3	18.8
Junior high school	4	25.0	5	31.3
senior High School	5	31.3	5	31.3
College	4	25.0	3	18.8
Pregnancy Age				
TM2	8	50	9	56.3
TM3	8	50	7	43.7

Based on table 1, the data on the frequency distribution of the education characteristics of the majority in the intervention group were as high as 31.3%. In the control group the frequency

respondents, with 16 respondents in the intervention group and 16 respondents in the control group. In this group, one treatment group was used, namely getting moderate exercise intervention, namely walking for 30 minutes with an intensity of 5 times a week for 4 weeks and ANC according to standards and pregnancy exercises in the class of pregnant women according to the class schedule of pregnant women ie once a month and control that is to get ANC intervention according to standards and pregnancy exercise in the class of pregnant women according to the class schedule of pregnant women, ie once a month.

DATA ANALYSIS

Data displayed Univariate analysis is the characteristics of respondents and a description of the respondent's blood pressure before and after being given treatment. Bivariate analysis was to look at the comparison of the treatment and control groups after moderate exercise intervention in the form of walking was carried out using the t test for parametric test and Mann-Whitney test for non-parametric tests.

education distribution the majority of respondents were junior high school graduates 31.3% and high school graduates 31.3%.

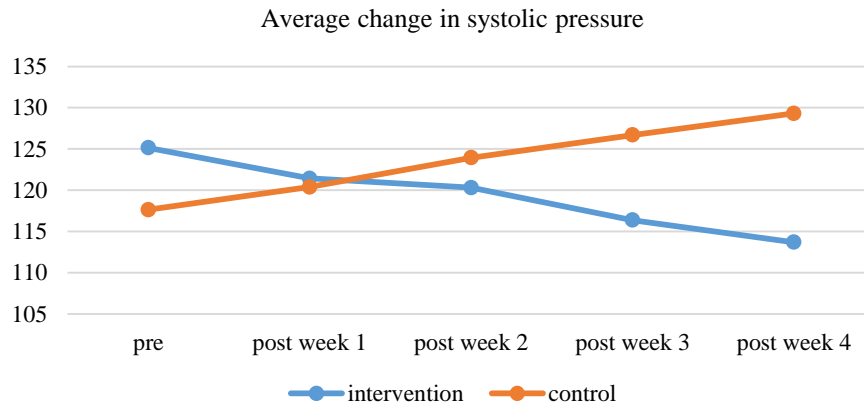


Figure 1 Changes in mean systolic blood pressure in the intervention group and the control group.

The picture above shows that in the intervention group the average systolic blood pressure decreased after intervention for 4 weeks and in the control

group there was an increase in the average systolic blood pressure.

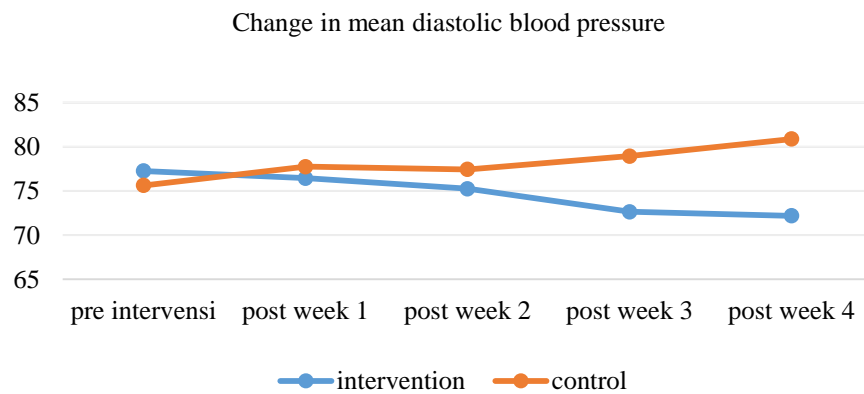


Figure 2 Changes in mean diastolic blood pressure in the intervention group and the control group.

From the picture above shows the average diastolic blood pressure in the intervention group

has decreased and in the control group the average diastolic blood pressure has increased.

Bivariate Analysis

Table 2 results of different systolic blood pressure tests before and after intervention in the intervention group and the control group

Intervention (n=16)				Control (n=16)			
Measurement	Measurement	Difference Mean	p value	Measurement	Measurement	Difference Mean	p value
Pre Test	Post Mgg 1	3.668	0,001	Pre Test	Post mgg 1	-2.750	0,357
Post mgg 1	Post Mgg 2	1.125	0,668	Pre Mgg 1	Post Mgg 2	-3.563	0.233
Post mgg 2	Post Mgg 3	3.938	0.030	Post Mgg 2	Post Mgg 3	-2,750	0,316
Post mgg 3	Post Mgg 4	2.668	0.175	Post Mgg 3	Post Mgg 4	-2.625	0.310
Pre Test	Post Mgg 4	11.438	0,000	Pre	Post Mgg 4	-11.688	0,000

Based on table 2, there was a significant difference in systolic blood pressure in the intervention and control groups before and after the intervention. In the intervention group there was a decrease in blood pressure after the 4th week intervention with a p value of 0.000 (<0.005) with a

systolic decrease of 11,438 mmHg. In the control group there was a statistically significant difference at week 4, namely an increase in systolic blood pressure with a p value of 0.000 (<0.005) with an increase of 11,688

Table 3 Differences in Systolic Blood Pressure Between Intervention Groups and Control Groups

Variable	Intervention (n=16)	Control (n=16)	Pvalue*
	Mean ± SD	Mean ± SD	
Pre	125.13±7.210	117.63±7.684	0.008
Post 1	121.44±8.862	120.38±9.736	0.749
Post 2	120.31±8.276	123.94±9.553	0.260
Post 3	116.38±8.334	126.69±10.157	0.004
Post 4	113.69±6.131	129.61±8.031	0.000

From table 3 shows that in the intervention group the average blood pressure has decreased since the first week of intervention until the third week, but a significant decrease in systolic blood pressure occurred at week 4 after the intervention

with a value of p 0.000. In the control group, the average systolic blood pressure from week 1 and week 3 increased, and at week 4 there was a significant increase with a value of p 0.000.

Table 4 Diastolic Blood Pressure Difference Test Before and After Intervention in the Control Group and Intervention Group

Intervention (n=16)				Control (n=16)			
Measurement	Measurement	Difference Mean	p value	Measurement	Measurement	Difference Mean	p value
Pre Test	Post Mgg 1	0,813	1,000	Pre Test	Post mgg 1	-2,125	0,144
Post mgg 1	Post Mgg 2	1,188	1,000	Pre Mgg 1	Post Mgg 2	0,313	1.000
Post mgg 2	Post Mgg 3	2,625	0.606	Post Mgg 2	Post Mgg 3	-1,500	1.000
Post mgg 3	Post Mgg 4	0,438	1.012	Post Mgg 3	Post Mgg 4	-1,938	0.155
Pre Test	Post Mgg 3	4,625	0,001	Pre Test	Post Mgg 3	-3,313	0,038
Pre Test	Post Mgg 4	5.063	0.000	Pre	Post Mgg 4	-5.250	0,001

From table 4, it can be concluded that the mean values of diastolic blood pressure in the intervention group and the control group from before intervention until weeks 1 and 2 were no different. In the intervention group, the average systolic blood pressure at week 3 and week 4 after the intervention there were significant differences in the average value of diastolic blood pressure of 5,060 mmHg with a value of p 0,000 (<0.05). In the

intervention group, blood pressure decreased in week 4 of the intervention with an average decrease of 5,060 mmHg.

In the control group at week 1 to week 2 the intervention had no significant difference in the value of diastolic blood pressure with a value of $p > 0.05$, but at weeks 3 and 4 there were significant differences in diastolic blood pressure, with an average increase of 5,250 mmHg.

Table 5 Analysis of Differences in Diastolic Blood Pressure Between Intervention Groups and Control Groups

Variable	Intervention (n=16)	Control (n=16)	Pvalue*
	Mean ± SD	Mean ± SD	
Pre	77.25±5.285	75.63±7.210	0.473
Post week 1	76.44±7.238	77.75±8.054	0.631
Post week 2	75.25±7.532	77.44±9.366	0.472

Post week 3	72.63±5.702	78.94±7.945	0.016
Post week 4	72.19±5.443	80.88±7.320	0.004

From table 5 it can be concluded that the value of the average pressure in the intervention group and the control group is within normal limits. At 3 and 4 weeks after the intervention $p < 0.05$, which means that there is a significant difference in diastolic blood pressure between the intervention group and the control group.

DISCUSSION

In this study it can be concluded that moderate exercise intervention by walking for 30 minutes with an intensity of 5 times a week for 4 weeks showed changes in systolic blood pressure at week 3 and week 4 of the intervention.

Regular exercise has a positive impact on blood vessels, because it decreases the composition of atherosclerosis plaque and reduces calcification of the aortic wall, thereby increasing blood circulation. Increased blood circulation caused by regular exercise stimulates increased shear stress or shear stress which stimulates eNOS production in Larginin with the help of oxygen. Increased eNOS production, causes levels of nitric oxide to also increase, causing vasodilation of blood vessels which can cause a decrease in blood pressure.

Exercise is also beneficial for improving heart health where there is a decrease in fat oxidation, and a decrease in plasma lipid profile, which can cause a decrease in heart rate, decrease cardiac output and reduce the size of myocytes, so that heart performance improves, and blood pressure decreases. Heart muscle in people who exercise regularly is very strong, so the heart muscles of individuals who diligently exercise contract less than the heart muscle of people who rarely exercise to pump the same blood volume. Increased cardiac work efficiency is reflected by a decrease in systolic pressure, while a decrease in peripheral resistance is reflected by a decrease in diastolic pressure

Exercise can also cause nerve activity, hormone receptors, and the production of certain hormones to decrease and the beta endorphin hormone increases so that it can be used for non-pharmacological therapy for sufferers of anxiety and stress. Beta blockers caused during exercise

can calm the sympathetic nervous system and slow down the heart rate. Exercise that is carried out will reduce the levels of the hormone norepinephrine (noradrenalin) in the body, which is a substance released by the nervous system that can raise blood pressure.

The results of the meta-analysis of 891 respondents stated that increased physical activity can reduce systolic blood pressure by 5-10 mmHg and diastolic by 1-6 mmHg. Results Research conducted in Iran, Makassar and Surabaya in 2013 showed that the majority of respondents who did exercise did not experience hypertension.

Previous research on the benefits of 30 minutes of walking exercise carried out by Sabar Subakti (2014) with the title "the effect of 30 minutes walking exercise on blood pressure reduction in patients with hypertension at the Kaban Ginger General Hospital" was obtained after being given exercise interventions during walking 30 minutes with an intensity of 3 times a week for 6 weeks decreased systolic and diastolic blood pressure with a value of $p < 0.05$.

The results of this study are also in line with research conducted by Ruben Barkat (2017) through randomized clinical trials conducted from 2011 to 2015 with the number of intervention group respondents as many as 382 pregnant women and the control group 383 pregnant women found that pregnant women who did not exercise during pregnancy there is an increase in risk 3 times for hypertension compared to pregnant women who regularly exercise with a p value of 0.01 (< 0.05).

In the control group that did not get walking exercise intervention there was an increase in systolic blood pressure at week 3 and week 4. Increased blood pressure in the control group at week 4 increased by 11 mmHg. Diastolic pressure also increased at week 4 by 5 mmHg with a significance value of $p 0.001$

The increase in blood pressure that occurs in pregnancy is caused by a decrease in blood flow and uterine perfusion that stimulates excessive renin release, this causes the released renin to flow with the blood to the liver and react with angiotensinogen to convert angiotensin I to angiotensin II which if accumulating with

trochomboxane will cause vasospasms which causes the anterior lumen to narrow and anterol pressure to increase. In this situation a very complex process occurs in organs such as the brain, blood vessels, heart and kidneys. At the walls of blood vessels atherosclerosis will occur, and decreased levels of nitric oxide which causes blood vessels to experience vasoconstriction, subsequently resulting in increased blood pressure.

The increase in systolic and diastolic blood pressure in the control group can be caused by various factors including an increase in excessive weight, where the results of this study the majority control group experienced more weight gain in the category of 43.8%.

In obesity, peripheral resistance decreases while the sympathetic nerve increases with low plasma renin activity. The greater the body mass, the more blood is needed to supply oxygen and food to the body's tissues. Obesity conditions are associated with increased intravascular volume and cardiac output. Pumping power of the heart and circulation of blood volume of hypertensive patients is higher than those with normal weight hypertension. Weight loss is the most important element in the

prevention and treatment of hypertension. Every 1 kg increase in body weight has HR to suffer from hypertension of 1.36 (95% CI: 1.29-1.45). In addition, based on the results of previous studies, it was shown that every kilogram of weight loss could reduce systolic blood pressure by 1.05 mmHG and diastolic by 0.92 mmHg. Relationship between Obesity and Occurrence of Degree 1 Hypertension in the Integrated Post Non-Communicable Disease Development Post (Posbindu PTM) of the Port Health Office of Bandung in 2016)

CONCLUSION

Medium intensity exercise in the form of walking for 30 minutes 5 times a week for 4 weeks is effective for blood pressure.

RECOMMENDATION FUTURE

The results of this study are expected to be one of the programs in midwifery care for pregnant women as an alternative to prevent the occurrence of risks in pregnancy related to blood pressure

REFERENCE

- [1]. Wibowo N, Irwinda R, Frisdiantiny E, Karkata M, Mose J, Chalid M. Pedoman Nasional Pelayanan Kedokteran Diagnosis Dan Tatalaksana Pre-Eklampsia. Jakarta: Perkumpulan Obstetri dan Ginekologi Indonesia Himpunan Kedokteran Feto Maternal; 2016.
- [2]. Anas MN. Hubungan Lingkar Lengan Atas (LILA) Ibu Hamil dengan Angka Kejadian Preeklampsia di RS. PKU Muhammadiyah Surakarta: Universitas Muhammadiyah Surakarta; 2013.
- [3]. Denantika O, Serudji J, Revilla G. Hubungan Status Gravida dan Usia Ibu terhadap Kejadian Preeklampsia di RSUP Dr. M. Djamil Padang Tahun 2012-2013. J Jurnal Kesehatan Andalas. 4(1), 2015.
- [4]. Rahmayanti R. Faktor-faktor risiko maternal yang berhubungan dengan kejadian preeklampsia berat pada ibu di RSUP DR M Djamil Padang tahun 2010. J Padang: Fakultas Keperawatan Universitas Andalas. 2011.
- [5]. Adiba S. Strategy of Building Medical and Health Library Networking Through Ministry in Indonesia. 2017.
- [6]. Robledo-Colonia AF, Sandoval-Restrepo N, Mosquera-Valderrama YF, Escobar-Hurtado C, Ramírez-Vélez R. Aerobic exercise training during pregnancy reduces depressive symptoms in nulliparous women: a randomised trial. J Journal of physiotherapy. 58(1), 2012, 9-15.
- [7]. Zavorsky GS, Longo LD. Exercise guidelines in pregnancy. J Sports Medicine. 41(5), 2011, 345-60.
- [8]. Shady NW, Sallam HF, Ali SS, Abbas AM. The effect of regular daily walking on adverse pregnancy outcomes among overweight primigravidas: a prospective cohort study. J Proceedings in Obstetrics. 7(3), 2017, 1-9.
- [9]. Bahadoran P, Pouya F, Zolaktaf V, Taebi M. The effect of stretching exercise and walking on changes of blood pressure in nulliparous women. J Iranian journal of nursing midwifery research. 20(2), 2015, 205.

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