

EFFECT OF STRETCHING EXERCISE ON PREECLAMPSIA; QUASI EXPERIMENTAL STUDY

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ABSTRACT

INTRODUCTION: Preeclampsia is a pregnancy induced hypertensive disorder mostly appear in second trimester onwards. Pregnancy results in increase in volume of blood, cardiac output and increase in stroke volume as well. Role of physical activity has been tested previously with no definite results. Focusing on specific methods such as stretching is under debate in order to find out active ingredient of physical activity that stabilizes blood pressure.

OBJECTIVE: To determine effect of stretching on preeclampsia in pregnancy.

MATERIAL AND METHODS: This was quasi experimental study conducted on pregnant women with symptoms of preeclampsia dividing into two groups on stretching exercise program and routine care, without randomization on basis of convenient. The outcome measures were systolic and diastolic pressure, heart rate. Demographics included age, body mass index, gestational age, number of pregnancies and daily routine. Data was analyzed in SPSS 20.0. Frequency/percentage, mean standard deviation was calculated for demographics. Active variables were tested with independent samples t test and paired samples t test.

RESULTS: The results of comparison of systolic/ diastolic blood pressure and heart rate means after treatment showed difference of 4.160/ 4.440 and 2.240, respectively, with p value 0.000 showing significant difference all variables. Within group difference was significant for stretching group for all variables while routine care group showed a non-significant difference for diastolic blood pressure and heart with p values 0.634 and 0.791, respectively.

CONCLUSION: The findings of this study concluded that stretching exercises can prevent and reduce preeclampsia as compared to routine care in pregnant women.

KEYWORDS: Preeclampsia, Physical Activity, Stretching, Physical Therapy, Hypertensive Disorder

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INTRODUCTION

Preeclampsia, problem related with pregnancy, is indicated by excretion of proteins in urea and hypertension.¹ In spite of many years of precautionary measures, preeclampsia is still the major cause of perinatal and maternal mortality and morbidity throughout the world.² It has been seen over the time that preeclampsia occurs due to insufficient trophoblastic influx causing poor placental

oxygen supply, immune maladaptation, generalized endothelial dysfunction and inflammation.³ Lack of oxygen, indicated by excessive formation of reactive oxygen, in addition to insufficient or inundated anti-oxidant defense systems, is the theoretical mechanism. However, the latest literature indicates that vitamins (C and E) does not have any effect of antioxidants over preeclampsia.⁴ Nevertheless, preeclampsia and cardiovascular disease have common pathology i.e., endothelial activation and mostly the similar factors, including hyperlipidemia, hypertension, obesity, insulin resistance and other indicatives of oxidative stress.⁵ Routine exercise has a good effect on insulin resistance and risk of cardiovascular disease, as it increases endogenous antioxidant defense, it is rational to write that exercise can decrease probability of preeclampsia.⁶ So objective of the trial is to see comparison of moderate-intensity walking exercise, mostly advised exercise during pregnancy, performed routinely in pregnancy, and a comparison group of stretching exercise in female who had repeatedly experienced preeclampsia and therefore at greater risk to suffer from the disease.⁷

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Preeclampsia is a very common problem of pregnancy. The pregnancy is compromised in its normal hemodynamic. This mainly leads to perinatal mortality and maternal morbidity (5%–7% of all pregnancies).³ Preeclampsia starts by the onset of proteinuria and hypertension in third trimester of gestation. Some of other presentations of preeclampsia include enhanced vasoactivity, generalized vasoconstriction, activation of platelets and decreased perfusion to organs.⁸ Recently, there is no definite inhibitory treatment available as causative and pathophysiology of preeclampsia are unclear. An apparent theory explaining this perplexing and threatening disease includes oxidative stress. Compared to this theory is the role of oxidative stress in routine and acute exercises. The Effect of acute exercise in comparison to regular exercise are opposite and different, and the literature shows that physically fit females have less chances to suffer from preeclampsia. This article explains a summary of the pathogenesis of exercise physiology and preeclampsia.⁹

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Even though conclusive, the study has limitation in generalizability due to its methodology. This hypothesis can only be proven by a Randomized Controlled trial. The delayed Effect of exercise should act against the increase of oxidative stress, thus suppressing the endothelial dysfunction. It's quite uncommon that exercise can decrease or reverse the problem, that is, activation of factors of coagulation, enhanced vascular reactivity, or damage to vascular integrity. Nonetheless, there are special methods of habituation to regular exercise that should decrease risk factors that increase oxidative stress in female during pregnancy. One habituation that regular exercise causes in women's body is opposition to formation of pro-oxidants by enhancing the mitochondrial quantity. This opposition against oxidative stress should decrease or slow down the process of lipid peroxidation. Enhanced iron-carrying capacity in blood also should decrease the process of lipid peroxidation, as its transport needs the availability of a low molecular weight collection of iron or other metals¹¹

METHODOLOGY

The design was quasi experimental study. Data was collected from UOL Teaching Hospital and Nawaz Sharif Social Security Hospital. The study completed in a duration from April 2018 to September 2018, excluding time of

synopsis approval. The sample size was 50, 25 in each of stretching and routine care group. Convenient Sampling Technique was used for data collection. The pregnant female of age more than 18 years, irrespective of number of children with symptoms of preeclampsia were included. Females not willing to sign consent or not willing to give rights for supervision of blood pressure medicine were excluded from study.

Patients were recruited, according to eligibility parameters as per mentioned in inclusion/ exclusion criteria, through word of mouth and TV cable ads by signs and symptoms of preeclampsia. Circular was issued to hospital doctors to spot and refer any patient with symptoms, which were further screened and included if given signed consent.

American College of Obstetrics and Gynecologists have issued recommendations for physical therapy intervention and use of various therapeutic techniques in pregnancy such as stretching. Although, basic concept of stretching is injury prevention and flexibility enhancement in sports medicine and protocols of physical therapy, stretching during pregnancy do not tends to achieve range rather to increase muscle flexibility. The program devised usually comprised of 20 minutes of exercise in various positions and intensity. The stretching exercise is done with a sequence involving large muscles from neck to upper limb musculature and from lower limb to torso. Usually this 20 minute session is divided into two parts 10 minutes' upper part and 10 minutes lower limb. The stretching movements are done on knees and hands or in sitting position. The precautions of stretching to keep it safe and effective, all instructions were provided in written and translated form. Furthermore, videos were given to see and follow the demonstration. In addition to this, physical therapy student, as research assistant, also supervised to ensure correct exercise as demonstrated by video.^{12,13}

The baseline measure that were expected to impact overall result were measured. These contextual factors included age, pregnant weight, gestational week, height, weight and body mass index were measured in their units.

Peripheral brachial blood pressure and heart rate was measured by routine method by experienced nurses with a 7-10 year experience and reliable repute. Two readings were taken on assessment with two minutes of gap, while patients stayed semi fowler position.¹⁴

The data was analyzed using SPSS 20, Statistical Package for Social Sciences. The demographics were presented in frequency/ percentage or mean standard deviation, according to type of variable i.e. categorical or continuous respectively.

Inferential statistics included independent samples t test and paired samples t test for comparisons of means between two groups and comparisons of means at pre/post intervals of measurements within each group separately.

Institutional review board reviewed the project before employment and expressed no concern regarding ethical

Table 1: Comparisons of Means between Stretching and Routine Care Group

Variables	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
			Lower	Upper
Pre-Interventional Systolic BP	0.220	-1.60000	-4.18750	.98750
Post-Interventional Systolic BP	0.000	-4.16000	5.29975	3.02025
Pre-Interventional Diastolic BP	0.511	-.72000	-2.90719	1.46719
Post-Interventional Diastolic BP	0.000	-4.44000	-5.59432	-3.28568
Pre-Interventional Heart Rate	0.311	-.76000	-2.25239	.73239
Post-Interventional Heart Rate	0.000	-2.24000	-3.25120	-1.22880

Table 2: Descriptive Statistics

Variables	Stretching Exercises		Routine Care Group	
	Mean	Std. Deviation	Mean	Std. Deviation
Number of Pregnancy	1.24	.523	1.08	.277
Daily Routine	1.56	.821	1.64	.907
Stretching Sessions per Week	2.28	.458	4.00	.000

Table 3: Descriptive Statistics

	Variable	Frequency	Percentage
Sessions Stretching Exercise	4-5 Sessions	18	72.0
	5-6 Sessions	7	28.0
	Total	25	100.0
Stretching Sessions Routine Care Group	NA	25	100.0
	House Wife	16	64.0
	Student	4	16.0
	Employee	5	20.0
Work Status Routine Care Group	House Wife	16	64.0
	Student	2	8.0
	Employee	7	28.0

issues in its conduct and impact. Furthermore, the informed consent was taken from all patients.

RESULTS

The results of comparison of systolic/ diastolic blood pressure and heart rate means after treatment showed difference of 4.160/ 4.440 and 2.240, respectively, with p value 0.000 showing significant difference all variables. Within group difference was significant for stretching group for all variables while routine care group showed a non-significant difference for diastolic blood pressure and heart with p values 0.634 and 0.791, respectively.

DISCUSSION

The findings revealed that demographic features of stretching and routine care group were similar without a significant difference such as age, body mass index, gestational age, number of pregnancies and daily routine

i.e. housewife or worker. This has minimized influence of these contextual factors that were to affect blood pressure or heart rate, the main outcomes in this study.

Testing both groups before intervention and at termination of intervention which is 3 weeks. Analysis showed significant difference in terms of improvement in blood pressure, diastolic pressure and heart rate at terminal time of intervention while before treatment both groups were presenting same scores for aforementioned parameters. Furthermore, diastolic pressure of blood and heart did not improve even when checked separately in each group using paired sample test, while stretching group significantly improved in this analysis too. Briefly saying stretching exercises improved blood pressure and heart rate and are recommended method to stabilize these parameters during pregnancies. It also worth noticing that routine care group was not barred from walking or doing daily activities and was free to increase or decrease daily routine. So it revealed that walking and routine work does not stabilize blood pressure or heart rate.

Pregnancy results in increase in volume of blood, cardiac output and increase in stroke volume as well slightly. Despite this hype in blood volume, blood pressure does not change, rather literature showed a drop in blood pressure second trimester.¹⁵ The same situation was observed in our study as well, there was a drop in blood pressure slightly, although it remained high in comparison to values that have been reported in literature. One reason to this may be common stress, anxiety, less education regarding course of pregnancy and cultural pressure of bearing a child. This sort of oxidative stress increase blood pressure which is because of imbalance between free radicals and antioxidant agents.¹⁵⁻¹⁸

The stretching exercise proved to decrease blood pressure, both systolic and diastolic, so it seems supporting the hypothesized mechanics of increasing endogenous antioxidants resulting in decrease in blood pressure.^{19,20}

There is immense literature showing increase in energy consumption doing mild to moderate level of exercise decrease preeclampsia risk during pregnancy. There are other studies which support his finding that exercise before or during pregnancy decreases hypertensive disorders and preeclampsia specifically.^{7,21}

Another study conducted focusing impact of stretching in comparison to walking on increase or decrease in preeclampsia risk during pregnancy. Stretching proved to decrease blood pressure significantly while walking showed reverse effect i.e. rise in blood pressure to significant level. However, diastolic blood pressure remained unchanged on average in walking group while in stretching group it reduced significantly.

In another report published by same author, the incidence of preeclampsia in stretching group as compared to walking group was less by around 12%. The mean transferrin levels also found to higher in stretching group which is indicator endogenous antioxidants, the blood pressure stabilizing agent.

Another study debated that physical activity, before pregnancy do not reduce risk of preeclampsia and or hypertensive episodes. Although there is broad range of inconsistency regarding results or influence of physical activity on preeclampsia. The main reason for this is considered to be no well-defined definition or outcome measure of physical activity.

CONCLUSION

The findings of this study concluded that stretching exercises can prevent and reduce preeclampsia as compared to routine care in pregnant women.

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NOTES ON CONTRIBUTORS

The study was part of NI, FT and DAK all authors were involved in every part of Manuscript writing, analysis, Protocol developments and data collection process.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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