ROLE OF STRETCHING EXERCISE ON PREECLAMPSIA; QUASI EXPERIMENTAL STUDY

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ABSTRACT

BACKGROUND: 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: The objective was to determine effect of stretching on preeclampsia in pregnancy.

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

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)

Preeclampsia is a very common problem of pregnancy. The pregnancy is compromised in its normal hemodynamics. This mainly leads to perinatal mortality and maternal morbidity (5%–7% of all pregnancies).(3)

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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)

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.(10)

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 quanitity. 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 metals(11)

There is variety of evidence regarding benefits of exercise that can favor pregnant women with preeclampsia but they rarely stick an exercise program especially the ones that are shaped as some sort of workouts or series and sequence of different exercises. In this context a randomized clinical trial conduced in which 124 women were allocated to two groups, one taking walking as exercise therapy and one taking stretching as per planned protocol. The patients were of sedentary life style in different stages of pregnancies with symptoms of preeclampsia. The patients with walking carried on walk while those of stretching patients could not maintain a regular routine of walk. The measures included blood pressure, heart rate and weight showed that stretching group performed better in improvement of blood pressure and heart rate while weight was not improved in both the patients. Therefore, when the outcome is reducing symptoms of preeclampsia stretching exercises should be preferred in sedentary pregnant women with preeclampsia.

American College of Obstetricians and Gynecologists is known for defining parameters for activities, exercises, medications, and general care before, during and after pregnancies. The guidelines are based on extensive research. About exercise during pregnancy, this organization does not recommend exercise which are based on walking or aerobics. Although, there have been multiple clinical trials on effect of aerobics and walking on preeclampsia related blood pressure and heart rate. There are many studies which shows favorable results for these kinds of exercise. Still there level and quality is debatable, primarily due to non-randomized nature of these trial and other unaddressed confounding variables. Other than these trial observational studies of cohort and cross-sectional designs have been found which also

show a poor relationship for aerobics and preeclampsia. These exercises have been found negatively associated which means they worsen symptoms of preeclampsia such as blood pressure and heart rate.

However, there is another theoretical perspective that seems to more correct considering evidence suggested so far. This debates that chances of preeclampsia decrease to significant level in women who used to be in a regular routine of any exercise such aerobics, walk, gym or any other sports activity. Regular exercise reduces oxidative by counteract and prevent dysfunction of endothelial tissue. Endothelial dysfunction can lead to later hypertension related disorders. The biochemical explanation of research in this regard explain that regular exercise reduces overall chances of hypertension by strictly affecting development of oxidative stress, major cause of preeclampsia related disorders. It worth noticing that these exercises are to be done before pregnancy. During pregnancy they impact in a converse way.(12)

Interestingly there are other epidemiological studies which have pleaded for favorable results of physical activity during pregnancy. These physical activities are based on versatile range of recreational activities, walking, aerobics and sports. Some of these studies also covered aspects of fitness and therapeutic exercises such as stretching and yoga poses. The parameters of research such as intensity, type, duration and type has been noted and discussed for these studies. Women with a record of doing exercise before pregnancy, and carried exercise during pregnancies yielded beneficial results while those of sedentary women were more benefited by stretching exercises.(13, 14)

Women health care is one of primary domains in human health care, especially in context of gynecology and obstetrics. There are mixture of physiological and pathological phenomenon that are exclusively related to these phases. Preeclampsia has been one such problem which carries risk for women and child health. This study was expected to find a in a homebound easy way to manage it without drug therapy. Also, it helped to testify various myths related to preeclampsia.

The findings have important impact on women in specific and community, in general. This showed how easily physiotherapy techniques can be used to handle otherwise troubling issues. This also provides a cost-effective way to manage preeclampsia by saving time, human and hospital resources at large.

OBJECTIVES

The objective of study was to figure out effect of stretching exercises on preeclampsia in terms of stabilizing systolic, diastolic pressure and heart rate.

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 The pregnant female of age more than 18 years, irrespective of number of children with symptoms of preeclampsia were include 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 (15, 16)

The baseline measure that was 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.(17)

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 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.

Table 1 Descriptive Statistics

	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 2 Comparisons of Means between Stretching and Routine Care Group

	Sig. (2-tailed)	**Mean Difference**
Pre-Interventional Systolic BP	0.221	-1.60000
Post-Interventional Systolic BP	0.024	-4.16000
Pre-Interventional Diastolic BP	0.512	-.72000
Post-Interventional Diastolic BP	0.003	-4.44000
Pre-Interventional Heart Rate	0.311	-.76000
Post-Interventional Heart Rate	0.000	-2.24000

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.(18) 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.(18-21)

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.(22, 23)

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, 24)

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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