

Combined Effect of Moderate Physical Activity and Meditation on Maternal and Fetal Health: A Hospital Based Case Control Observational Study

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Abstract:

BACKGROUND: Moderate physical activity during pregnancy confers many health benefits like decreasing the incidence of PIH, back pain, constipation, leg pain, etc. but it is found to be associated with low birth weight in many studies. On the other hand, meditation during pregnancy has been found to have positive effects like decreasing stress and anxiety, promoting sound sleep and also found to decrease the risk of preterm and low birth weight babies.

OBJECTIVES: to look for the effect of moderate physical activity and meditation on fetal and maternal health

METHOD: The study was conducted in one of the busiest hospitals of Jorhat, Assam. It was a hospital based case-control observational study. Pregnant women who walked for 30 minutes per day and meditated for 15 minutes per day for at least 5 days per week apart from normal household activities were enrolled as cases and those who did not were enrolled as controls. Risk factors like PIH, premature delivery, PROM, maternal back pain, constipation, leg pain, fetal distress, low birth weight, small for gestation age were studied in both the groups. Data was analysed statistically using SPSS.16

RESULT: Total 642 pregnant women were enrolled in the study out of which 320 were cases and 322 were controls. Results showed significantly decreased risk of PIH($p=0.03$), back pain($p=0.000$), painful legs($p=0.000$), constipation($p=0.000$), fetal distress ($p=0.03$), and small for gestational age babies($p=0.04$) in cases as compared to controls group. There was no significant increased risk of PROM ($p=0.63$), LBW babies ($p=0.462$) and premature delivery in cases. On the contrary preterm delivery and LBW babies was less in cases as compared to controls but the result was not statistically significant.

CONCLUSION: Moderate physical activity if combined with meditation can decrease the risk of low birth weight in pregnant women and at the same time confer many other health benefits. However, it is equally important to avoid strenuous physical activity, have regular antenatal check up, taking a healthy nutritious diet, inform and take permission from the treating obstetrician before indulging in any kind of physical activity to sustain a healthy pregnancy.

Keywords: Physical activity, medication, daily walk, pregnancy, LBW, preterm delivery

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I. Introduction

It is well known that moderate physical activity during pregnancy has many benefits but it is also associated with low birth weight⁽¹⁾. Strenuous occupational and household physical activity has been strongly correlated with low birth weight and thus should be avoided in pregnancy⁽²⁾. In the absence of maternal complications, pregnant women should continue doing normal household work and can walk daily slowly upto 1 mile taking rests in between⁽³⁾. American College of Obstetrics and Gynaecology has released guidelines that recommends 30 minutes of moderate intensity physical activity during most of the days in a week in women with no obstetric complications⁽⁴⁾. Due to nausea and fatigue in the first trimester most women avoid physical activity in first few months of pregnancy. Physical activity during pregnancy has been found to decrease the incidence of Pregnancy induced hypertension (PIH), back pain, constipation in pregnant women. Meditation during pregnancy has been found to decrease the risk of preterm and low birth weight babies. Meditation also has other positive effects like decreasing stress, anxiety and promoting sound sleep⁽⁵⁾. Therefore, if moderate physical activity is combined with meditation it may reduce the risk of low birth weight deliveries in pregnant women and at the same time confer many health benefits. Few previous study has been done to see the combined effect of moderate physical activity and meditation on maternal and fetal health. So in this study we have tried to find out the combined effect of mild to moderate physical activity in the form of walk for 30 minutes a day and meditation for 15 minutes on maternal and fetal outcome.

II. Aims And Objectives:

- 1/ to look for the effect of moderate physical activity and meditation on maternal health
- 2/ to look for the effect of moderate physical activity and meditation on fetal health

III. Materials And Method:

Place of Study: the study was conducted in one of the busiest hospitals of Jorhat, Assam

Study Design: Hospital based case control observational study

Duration of Study: 1 year (July 2019 – June 2020)

Method of study: Patients are grouped into two categories – cases and controls. Maternal and neonatal care was given according to standard hospital protocol.

Cases: Healthy pregnant women who walked for 30 minutes a daily and did meditation for 15 minutes a day for at least 5 days a week apart from doing normal household activities.

Controls: Healthy pregnant women who did their normal household activity but walked for less than 30 minutes a day or meditated for less than 15 minutes a day.

Exclusion criteria:

- 1/ Mothers with multiple pregnancies
- 2/ Mothers with diabetes
- 3/ Mothers with hypertension prior to the onset of pregnancy
- 4/ Mothers with any known mental health disorder like depression, anxiety
- 5/ Mothers with any chronic disease or on any long term medication
- 6/ Mothers with high risk conditions or with bad obstetric history

A group of healthy pregnant women attending antenatal clinic were selected by simple randomised sampling and explained about the importance of physical activity and meditation during pregnancy and encouraged to walk for 30 minutes a day and meditate for 15 minutes a day from second trimester onwards apart from normal household activity. On follow up the women who fulfilled the inclusion criteria were enrolled as cases. Consent was obtained from all cases and controls. Institutional ethics committee clearance was obtained. Gestational age was calculated from maternal LMP or New Ballard score was done if it was not available. Birth weight was taken in an electronic weighing scale with an accuracy of ± 5 gm and appropriateness of weight, small for gestational age or large for gestational age was determined by plotting on Fenton's chart.

Variables studied

1/ Maternal factors: maternal factors studied in cases and controls were

- a) Pregnancy induced hypertension (PIH)
- b) Premature rupture of membrane(PROM)
- c) Premature delivery
- d) Back pain
- e) Pain in the legs
- f) Constipation

2/ Fetal factors: fetal factors studied in cases and controls were

- a) Low birth weight
- b) Fetal distress
- c) Appropriateness of gestational age

STATISTICAL METHODS : The data obtained was tabulated and analysed statistically using social science system version SPSS.16

IV. Results And Observation:

Total 642 pregnant women were enrolled in the study out of which 320 were cases and 322 were controls.

TABLE 1: COMPARISON OF MATERNAL FACTORS IN CASES AND CONTROLS

VARIABLES	SUBGROUP	CASES n=320	CONTROLS n=322	P value
PRETERM DELIVERY	PRESENT	39(12.1%)	43(13.5%)	0.65
	ABSENT	281(87.9%)	279(86.5%)	
PREMATURE RUPTURE OF MEMBRANE	PRESENT	51(15.9%)	47(14.5%)	0.63
	ABSENT	269(84.1%)	275(85.5%)	

PIH	PRESENT	29(9%)	47(14.5%)	0.03
	ABSENT	291(91%)	275(85.5%)	
BACK PAIN	PRESENT	51(15.9%)	121(37.5%)	0.000
	ABSENT	269(84.1%)	201(62.5%)	
PAINFUL LEGS	PRESENT	68(21.2%)	119(36.9%)	0.000
	ABSENT	252(78.8%)	203(63.1)	
CONSTIPATION	PRESENT	98(30.6%)	146(45.3%)	0.000
	ABSENT	222(69.4%)	176(54.7%)	

Analysis of data showed that there was significantly decreased risk of PIH(p=0.03), back pain(p=0.000), painful legs(p=0.000), and constipation(p=0.000) in cases as compared to controls group. There was no significant increased risk of PROM (p=0.63) and premature delivery in cases. On the contrary, preterm delivery was decreased in cases 12.1%(39 out of 320) as compared to controls where it was 13.5%(43 out of 322). Among the cases 9% pregnant women had pregnancy induced hypertension(PIH), 15.9% pregnant women had back pain, 21.2% had painful legs and 30.6% had constipation and 15.9% women had premature rupture of membrane (PROM) whereas, in control group 14.5% pregnant women had pregnancy induced hypertension(PIH), 37.5% had back pain, 36.9% had painful legs, 45.3% had constipation and 13.5% women had premature rupture of membrane (PROM)

TABLE 2: COMPARISON OF FETAL FACTORS IN CASES AND CONTROLS

VARIABLES	SUBGROUP	CASES n=320	CONTROLS n=322	P value
FETAL DISTRESS	PRESENT	41(12.8%)	69(21.4%)	0.03
	ABSENT	279(87.2%)	253(78.6%)	
LOW BIRTH WEIGHT	PRESENT	47(14.6%)	55(17.1%)	0.462
	ABSENT	273(85.4%)	267(82.9%)	
APPROPRIATENESS FOR GESTATIONAL AGE	SGA	39(12.1%)	58(18.0%)	0.04
	AGA	275(86.0%)	253(78.6%)	
	LGA	6(1.9%)	11(3.4%)	

Analysis of data showed that there was significantly decreased risk of fetal distress (p=0.03) and small for gestational age babies(p=0.04) in cases as compared to the control group. There was no significantly increased risk of LBW babies (p=0.462) in cases. On the contrary, LBW babies were less in cases 14.6%(47 out of 320) as compared to controls where it was 17.1%(55 out of 322) but the result was not statistically significant. Among the cases 12.8% pregnant women had fetal distress, 39% were small for gestational age, 86% were appropriate for gestational age and 6% were large for gestational age whereas, in control group 21.4% pregnant women had fetal distress, 18% were small for gestational age, 78.6% were appropriate for gestational age and 3.4% were large for gestational age.

V. Discussion

In this study we have tried to find out the combined effect of mild to moderate physical activity in the form of walking for 30 minutes a day and meditation for 15 minutes per day for minimum 5 days a week on maternal and fetal health. Total 642 pregnant women were enrolled in the study out of which 320 were cases and 322 were controls.

We found that there was a significantly decreased risk of PIH, back pain, painful legs, and constipation in pregnant women who did moderate physical activity and meditation along with normal household activities as compared to pregnant women who were relatively inactive during the pregnancy period. Contrary to the belief that physical activity during pregnancy increases premature delivery and premature rupture of membrane(PROM), we did not find any significant increased risk of PROM and premature delivery in cases. On the contrary preterm delivery was decreased in cases 12.1%(39 out of 320) as compared to controls where it was 13.5%(43 out of 322) but the result was not statistically significant. Among the cases 9% pregnant women had pregnancy induced hypertension(PIH), 15.9% pregnant women had back pain, 21.2% had painful legs , 30.6% had constipation and 15.9% women had premature rupture of membrane (PROM) whereas, in control group 14.5% pregnant women had pregnancy induced hypertension(PIH), 37.5% had back pain, 36.9% had painful legs, 45.3% had constipation and 13.5% women had premature rupture of membrane (PROM).

Pregnancy induced hypertension(PIH) is new onset of hypertension after 20 weeks gestation. PIH is the second most common cause of maternal death accounting for 19% of maternal mortality⁽⁶⁾. PIH increases the risk of preterm delivery and fetal death⁽⁷⁾. Fortner et al in their study have found protective effect of physical

activity during early pregnancy on preeclampsia⁽⁸⁾ whereas some other studies have not found any association between the two⁽⁹⁾. We found that there was significantly decreased risk of PIH in pregnant women who did moderate physical activity and meditation along with normal household activities as compared to pregnant women who were relatively inactive during the pregnancy period. Among the cases only 9% pregnant women had pregnancy induced hypertension(PIH), whereas, in the control group 14.5% pregnant women had pregnancy induced hypertension(PIH).

We also found that preterm delivery was decreased in cases 12.1%(39 out of 320) as compared to controls where it was 13.5%(43 out of 322). Some studies have shown that rigorous physical activity during pregnancy can increase premature delivery⁽¹⁰⁾. But in our study we have found that moderate physical activity and meditation do not increase premature delivery. Hence, moderate physical activity during pregnancy and meditation can decrease PIH and thus the complications associated with it like premature delivery to a great extent.

Premature rupture of membrane is defined as rupture of membrane at any time prior to the onset of uterine contraction⁽¹¹⁾. PROM is an important cause of neonatal mortality and morbidity⁽¹²⁾. There was no significant increased risk of premature rupture of membrane (PROM) in pregnant women who did moderate physical activity and meditation along with normal household activities as compared to pregnant women who were relatively inactive during the pregnancy period.. Some studies have shown that rigorous physical activity during pregnancy can increase premature rupture of membrane⁽²⁾. Previous studies have also shown that meditation and yoga can decrease the risk of premature rupture of membrane⁽¹³⁾. But in our study we found moderate physical activity combined with meditation does not increase premature rupture of membrane. So moderate physical activity if combined with meditation during pregnancy can decrease the risk of PROM associated with physical activity.

Our study shows that there was significantly decreased risk of back pain($p=0.000$) in cases as compared to controls group. Among the cases 15.9% pregnant women had back pain whereas, in control group 37.5% had back pain in due course of pregnancy. Low back pain is commonly experienced during pregnancy and it affects nearly 50% of pregnancies⁽¹⁴⁾. The pain might cause the women to decrease their physical activity which might further contribute towards other obstetric complications⁽¹⁵⁾. So prevention of back pain can lead to positive benefits to both the mother and the baby. In our study we have found that moderate physical activity along with meditation can decrease back pain in mothers and thus lead to a healthy pregnancy

Constipation was defined using Rome II criteria (presence of at least two of the following for at least one quarter of defecation: straining, lumpy or hard stool, sensation of incomplete evacuation, fewer than three defecation per week). Previous studies have showed that the prevalence of constipation is higher in pregnancy due to sedentary lifestyle and decreased physical activity⁽¹⁷⁾. We have found that there was significantly decreased risk of constipation($p=0.000$) in pregnant women who did moderate physical activity and meditation along with normal household activities as compared to pregnant women who were relatively inactive during the pregnancy period. Among the cases 30.6% had constipation whereas, in control group 45.3% had constipation.

Leg and joint pain during the second and third trimester may be caused by weight gain, fluid retention and joint laxity. This pain causes sleep disturbance and has a major impact on daily life⁽¹⁸⁾. Our study shows that there was significantly decreased risk of painful legs($p=0.000$) in cases as compared to controls group. Among the cases 21.2% had painful legs whereas, in control group 36.9% had painful legs. Thus, mild to moderate physical activity along with meditation can benefit the pregnant women.

On comparing the fetal factors in cases and controls we found that there was significantly decreased risk of fetal distress, and small for gestational age babies in cases as compared to controls group .

Among the cases 12.8% pregnant women had fetal distress, whereas, in control group 21.4% pregnant women had fetal distress. Fetal distress is an important cause of emergency Caesarean section⁽¹⁸⁾. Lower incidence of fetal distress in pregnant women who did moderate physical activity and meditation as compared to pregnant women who were relatively inactive during the pregnancy period may be attributed to decreased PIH, sound sleep, decreased anxiety, stress and pain in the cases.

Studies done earlier have found that maternal physical activity reduces fetal size and helps in easy labour⁽¹⁾. It was found that pregnant women who continued a programme of moderate to high intensity exercise experienced a 300-500 gram reduction in birth weight compared to sedentary control group⁽¹⁹⁾. Meditation, on the other hand, has been found to promote sound sleep; provides relief from anxiety, stress and depression; prepares the body for pregnancy changes and thus decreases the incidence of preterm and low birth weight babies⁽¹⁶⁾. In our study, there was no significant increased risk of LBW babies in cases. On the contrary LBW babies were decreased in pregnant patients who performed mild to moderate exercise and meditation. Among the cases 12.8% pregnant women had fetal distress, 39% were small for gestational age, 86% were appropriate for gestational age and 6% were large for gestational age whereas, in control group 21.4% pregnant women had fetal distress, 18% were small for gestational age, 78.6% were appropriate for gestational age and 3.4% were large for gestational age.

Small for gestational age is birth weight less than 10th centile for gestational age. Large for gestational age is birth weight more than 90th centile for gestational age. In our study we found that there was significantly lower risk of small for gestational age babies ($p=0.04$) in cases as compared to controls group. Among the cases 39% were small for gestational age, 86% were appropriate for gestational age and 6% were large for gestational age whereas, in control group 21.4% pregnant women had foetal distress, 18% were small for gestational age, 78.6% were appropriate for gestational age and 3.4% were large for gestational age. A study in Auckland showed that Indian mothers were at higher risk for SGA babies. This can be attributed to pregnancy induced hypertension during pregnancy⁽¹⁷⁾. Lower incidence of small for gestational age births in pregnant women who did moderate physical activity and meditation as compared to pregnant women who were relatively inactive during the pregnancy period may be attributed to decreased PIH, sound sleep, decreased anxiety, stress and pain in the cases group.

Previous studies have shown that moderate physical activity during pregnancy has many benefits like decreased incidence of PIH, back pain, constipation, etc but it is also associated with low birth weight in many studies⁽¹⁾. American college of Obstetrics and Gynaecology has released guidelines that recommend 30 minutes of moderate intensity physical activity during most of the days in a week in women with no obstetric complication⁽⁴⁾. Meditation during pregnancy has been found to decrease the risk of preterm and low birth weight babies. Meditation also has other positive effects like lowering stress, anxiety, promoting sound sleep⁽¹⁶⁾. Hence, in this study we have tried to find out whether moderate physical activity combined with meditation can decrease the risk of low birth weight in pregnant women and at the same time confer other health benefits. Few previous studies have been done to see the combined effect of moderate physical activity and meditation on maternal and fetal health. This is the first study done so far to see the combined effect of mild to moderate physical activity in the form of walking for 30 minutes a day and meditation for 15 minutes on maternal and fetal outcome. We have found that the combined effect of walking for 30 minutes a day and a few minutes of meditation on most of the days in a week can have significant positive health outcome in both the mothers and the baby and it is also not associated with any adverse pregnancy outcome like low birth weight, prematurity which can occur with moderate to severe physical activity alone.

Our study has one limitation, that is, we did not use any scale to grade the level of normal household activities that both cases and controls were doing. But we ensured that none of them were doing strenuous household chores like lifting heavy objects, excessive bending, participating in any kind of sports during the pregnancy. They were doing the normal household activities like cooking, dusting, washing their clothes, etc.

VI. Conclusion:

Moderate physical activity during pregnancy confers many health benefits like decreasing the incidence of PIH, back pain, constipation, joint pain, etc but it is found to be associated to low birth weight in many studies. On the other hand meditation during pregnancy has been found to have positive effects like decreasing stress and anxiety, promoting sound sleep, and also found to decrease the risk of preterm and low birth weight babies. In this study we have found moderate physical activity if combined with meditation can decrease the risk of low birth weight babies in pregnant women and at the same time confer many other health benefits. However, it is equally important to avoid strenuous physical activity, have regular antenatal check up, taking a healthy nutritious diet, inform and take permission from the treating obstetrician before indulging in any kind of physical activity to sustain a healthy pregnancy.

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