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Resistance Training in Pregnancy - A Comprehensive Narrative Review

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ABSTRACT

Pregnancy is a transformative period characterized by significant physiological and psychological changes. Engaging in consistent exercise during pregnancy offers numerous health advantages for both the expectant mother and the child, as recommended by the American Congress of Obstetricians and Gynecologists (ACOG). Resistance training, a form of strength training, is increasingly recognized for its benefits during pregnancy due to its ability to improve muscle strength with potentially lower cardiovascular stress compared to aerobic exercise. This comprehensive narrative review evaluates the safety and efficacy of resistance training during pregnancy, its effects on diastasis recti, blood pressure, gestational diabetes mellitus (GDM), incontinence, low back pain, fetal responses, and postpartum depression.

Keywords: Resistance Training, Pregnancy, Fetal Outcome

INTRODUCTION

Pregnancy is a transformative and dynamic period in women's life, marked by significant physiological and psychological changes. Engaging in consistent exercise during pregnancy offers a multitude of health advantages for both the expectant mother and the child.[1-3] Such physical activity is safe in most patients without any contraindications. The American Congress of Obstetricians and Gynecologists (ACOG) committee advises >30 minutes of aerobic exercise on most days of the week, the new guidelines recommend women with no medical contraindications perform atleast 20 to 30 minutes per day of aerobic and strength-conditioning exercise before, during and after pregnancy [4].

Resistance Training, commonly referred to as strength training, increases muscle strength and is recommended by major health organizations for improving public health [5-7]. During pregnancy, engaging in light resistance exercise might be easier and better tolerated than aerobic exercise, primarily due to reduced cardiovascular stress and lower calorie expenditure.

Therefore, exercise is regarded as a lifestyle component that promotes regular development during pregnancy and reduces the likelihood of complications. Maintaining maternal health and fitness is a topic of growing interest and importance in the field of maternal and fetal medicine.

As researchers continue to explore the potential benefits and safety considerations of resistance training during pregnancy, it is essential to consolidate and evaluate the existing body of evidence. This narrative review aims to provide a comprehensive review regarding the existing knowledge on resistance training during pregnancy. By synthesizing the findings from relevant studies and examining the physiological,

biomechanical and psychological changes to resistance training in context of pregnancy, we aim to shed light on its potential role as a safe and effective exercise modality for expectant mothers.

SAFETY AND EFFICACY OF RESISTANCE TRAINING DURING PREGNANCY

One of the primary concerns surrounding exercise during pregnancy is safety. However, several studies demonstrate that resistance training can be safe for most pregnant women when appropriately executed. In a study conducted by Patrick Connor et al, it was suggested that adoption of a supervised, low to moderate intensity strength training programs during an uncomplicated, singleton pregnancy can be safe and efficacious. Engaging in physical activity prior to, during and post-partum period helps to lower the chances of complication like low back pain, depressive symptoms, pre-eclampsia, gestational Diabetes Mellitus, preterm delivery and emergency caesarean section [9-12]. Additionally, exercise serves as a means for women to prevent excessive weight gain and associated increase in BMI during pregnancy. This is significant because even small increments in maternal BMI are linked to a higher risk of fetal death, still birth and adverse outcomes in neonatal, perinatal and infant health [13].

EFFECT ON DIASTATSIS RECTI

Diastasis Recti Abdominis is defined as the increase between two abdominal rectal muscles located on both sides of linea alba at the height of navel. It has been suggested that Diastasis Recti Abdominis exists in 90% women in the early post-partum period and is associated with negative outcomes related to core strength, urinary incontinence, pelvic girdle/low back pain and body dissatisfaction [14]. In a study conducted by Dominika Gruzczynska et al, it was concluded that diastasis of the recti abdominis muscle can be proactively managed through the implementation of suitable preventive measures. These measures include strengthening of transversus and rectus abdominis muscles, as well as acquiring correct posture and acquiring correct posture and principles of proper performance of activities [15]. A systematic review done by D. R. Benjamin et al, it was found that following a 6 week course of abdominal strengthening exercise, diastasis recti abdominis muscle width during the antenatal period was significantly smaller than the non-exercising control group, due to the effect of maintaining strength and control of abdominal muscles, consequently reducing the stress on linea alba [16].

EFFECT ON BLOOD PRESSURE

Changes in maternal hemodynamics in the cardiovascular system become apparent during early weeks of pregnancy [17]. Maladaptive alterations in these maternal hemodynamic processes can manifest during pregnancy, elevating the likelihood of developing gestational hypertensive disorders [18]. Pre-eclampsia and gestational hypertension are recognized by World Health Organization as primary contributors to maternal and fetal illness and death globally, alongside complications such as hemorrhage and sepsis [19,20].

Sarah Murphy et al, conducted study on the effect of different types of exercises on maternal blood pressure adaptation and found that at 36 weeks of gestation, women enrolled in the resistance exercise group had the most significant decrease in systolic blood pressure (SBP), followed by women in aerobic exercise group. However, Diastolic blood pressure (DBP) was significantly decreased after combined aerobic and resistance training. This may occur due to muscle sympathetic nerve activity adaptations and the consequent effects of reducing norepinephrine on vascular smooth muscle tone.

In Resistance training, factors such as workload, overall training volume, rest periods between sets and exercise, choice of exercise, range of motion, and training

techniques significantly effect the blood pressure [21]. Pre-pregnancy BMI was a significant predictor of overall trend in both SBP and DBP throughout the pregnancy. A higher pre-pregnancy BMI, along with increased gestational weight gain, was linked to overall higher SBP and DBP [22].

GESTATIONAL DIABETES MELLITUS

Gestational diabetes mellitus (GDM) refers to the first detection of any degree of impaired glucose tolerance during pregnancy and accounts for 90–95% of the total number of patients with diabetes during pregnancy.[23] Resistance training allows the body to maintain stability, making it particularly effective for enhancing physical strength and posture. This type of exercise can also help alleviate discomfort caused by the increasing fetal growth and forward shift of the body's center of weight in late pregnancy. Given that gestational diabetes mellitus (GDM) screening typically occurs between 24 to 28 weeks of pregnancy, during the middle to late stages, fetal body weight may restrict maternal activity, making aerobic exercise challenging [24]. In contrast, resistance exercises can be easily adapted for home use or even performed in bed with simple movements, offering a feasible option for GDM patients to stay active [25]. Moreover, resistance training has been shown to lower the risk of cardiovascular disease and requires less calorie expenditure compared to aerobic exercises, potentially reducing physical strain [26]. Therefore, resistance training presents itself as a favourable exercise choice for women with GDM.

INCONTINENCE

Urinary incontinence (involuntary leakage of urine) is a common problem during pregnancy. Pelvic floor muscle training (PFMT) involves repeatedly contracting the pelvic floor muscles according to a specific protocol detailing the frequency, intensity, progression of exercises, and training duration. Typically, a PFMT program consists of daily sessions, with one or more sets of exercises performed on several days each week for at least eight weeks. To maintain long-term effectiveness, it is advised to continue with maintenance pelvic floor muscle exercises after initial training [27].

LOW BACK PAIN AND SCIATICA

Strength training can be highly beneficial for postnatal women experiencing low back pain. Postnatal low back pain is common due to the physical changes and stresses associated with pregnancy and childbirth, such as weakened abdominal muscles, altered posture, and increased lumbar lordosis. Engaging in targeted strength training can help alleviate this pain by enhancing core stability, improving posture, and strengthening the muscles supporting the spine. Core exercises that focus on the transverse abdominis, multifidus, and pelvic floor muscles are particularly effective. Additionally, incorporating exercises for the gluteal and hip muscles can further support spinal alignment and reduce strain on the lower back.[28]

EFFECT ON FETAL RESPONSES

Birth body size serves as an indicator of the intrauterine environment. Newborns with a low birth weight are at a higher risk of both perinatal and adult morbidity and mortality. Conversely, newborns with a high birth weight face increased risk of various complications, including shoulder dystocia, operative delivery, and birth canal lacerations. Exercise training during the second and third trimesters of pregnancy may reduce the negative impact of high maternal body weight before pregnancy on the newborn's birth size and help prevent excessive gestational weight gain. Several studies have shown that excessive maternal weight gain during pregnancy and maternal obesity are associated with a higher risk of birth defects. Supervised, light-intensity resistance exercise training during the second and third trimesters of pregnancy does not negatively affect the newborn's

body size. Strength training during pregnancy is positively correlated with fetal heart adaptability and heart rate variability, both important features of a healthy fetus.[29]

POST-PARTUM DEPRESSION

Postpartum depression is defined as a serious mental disorder that occurs after one month of childbirth. It is affected by hormonal changes in women during labour and post-partum. Physical Activity significantly affects both physical and mental well-being of Pregnant women. The American College of Obstetricians and Gynecologists recommends at least 150 minutes of moderate activity per week during pregnancy and post-partum [30]. This has been attributed due to increased levels of neurotransmitters such as 5HT, dopamine and noradrenaline. It also increases the secretion of BDNF (a neurotic factor produced in brain), the concentration of which is lower in depressed people. A meta-analysis conducted by Mc Curdy et al showed that light or moderate physical activity effectively reduces the symptoms of post-partum depression.[31]

CONCLUSION

This review synthesizes existing research to highlight the potential of resistance training as a safe and effective exercise modality for expectant mothers, underscoring the importance of tailored exercise programs and further research to optimize maternal and fetal outcomes.

Declaration by Authors

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