

Role of antenatal physiotherapy I high risk pregnancy: A comprehensive review

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DOI: 10.5281/zenodo.19762239

Abstract

High risk pregnancy is associated with increased maternal and fetal morbidity and mortality, requiring comprehensive and multidisciplinary management strategies. Antenatal physiotherapy has gained recognition as an essential, non-invasive intervention that supports maternal health and improves pregnancy outcomes. It plays a significant role in enhancing physical fitness, reducing musculoskeletal discomfort, improving respiratory efficiency, and promoting psychological well-being. Recent evidence from the past decade indicates that structured physiotherapy programs are effective in managing high risk conditions such as gestational diabetes mellitus, preeclampsia, and multiple pregnancies. Exercise therapy, a core component of antenatal physiotherapy, contributes to better glycemic control, improved cardiovascular function, and reduced risk of complications. Additionally, physiotherapy interventions such as breathing exercises and relaxation techniques help alleviate anxiety, enhance oxygenation, and prepare women for labor. Pain management strategies further improve quality of life by addressing common issues such as low back and pelvic pain. Despite its benefits, careful assessment and adherence to safety guidelines are essential to prevent adverse outcomes. Antenatal physiotherapy provides a holistic approach to managing high risk pregnancies and should be integrated into routine prenatal care for optimal maternal and fetal health.

Keywords: High Risk Pregnancy, Antenatal Physiotherapy, Exercise Therapy, Gestational Diabetes Mellitus, Preeclampsia, Maternal Health, Prenatal Care, Pain Management, Respiratory Therapy, Psychological Well Being.

Introduction

High risk pregnancy is defined as any pregnancy in which the mother, fetus, or both are at an increased risk of adverse outcomes during pregnancy, childbirth, or the postpartum period, encompassing a broad spectrum of clinical conditions that may compromise maternal or neonatal health if not

managed appropriately (American College of Obstetricians and Gynecologists [ACOG], 2020). The global incidence of high risk pregnancies has shown a consistent rise over recent decades, largely attributable to sociocultural and medical trends such as delayed childbearing, increasing maternal age, and improved survival rates among women with chronic illnesses who now pursue pregnancy (Joseph et al., 2019). In addition, the growing prevalence of non communicable diseases, including obesity, diabetes mellitus, and hypertension, has significantly contributed to the expansion of high risk obstetric populations (Gestational Diabetes Mellitus and Pregnancy Outcomes Study Group, 2018). Sedentary lifestyles and poor nutritional habits further exacerbate these risks by impairing metabolic health and increasing the likelihood of complications such as gestational diabetes and preeclampsia (Davenport et al., 2018). Advances in diagnostic technologies and prenatal screening have also led to better identification and classification of high risk pregnancies, thereby increasing reported prevalence while simultaneously enabling earlier intervention (World Health Organization, 2016). These pregnancies necessitate specialized and multidisciplinary care aimed at preventing complications such as preterm birth, fetal growth restriction, low birth weight, and maternal morbidity, all of which contribute significantly to healthcare burden worldwide (Say et al., 2017). Effective management requires the integration of obstetric, medical, nutritional, and rehabilitative strategies to ensure optimal outcomes for both mother and fetus (Knight et al., 2019). Within this multidisciplinary framework, antenatal physiotherapy has emerged as a crucial supportive modality that complements medical management by addressing functional and physical limitations experienced during pregnancy (Mottola et al., 2018). Antenatal physiotherapy focuses on optimizing maternal health through targeted interventions designed to improve musculoskeletal stability, enhance cardiovascular endurance, and support respiratory function, all of which are essential for coping with the physiological demands of pregnancy (Barakat et al., 2019). Musculoskeletal discomfort, including low back pain and pelvic girdle pain, is particularly prevalent among pregnant women and can be effectively managed through physiotherapeutic techniques such as posture correction, strengthening exercises, and manual therapy (Liddle & Pennick, 2017). Furthermore, physiotherapy interventions contribute to improved cardiovascular fitness, which is especially beneficial in high risk conditions such as hypertension and gestational diabetes, where controlled physical activity can help regulate blood pressure and glucose levels (Nascimento et al., 2017). Respiratory physiotherapy, including diaphragmatic breathing and thoracic expansion exercises, enhances oxygenation and reduces dyspnea, thereby improving overall maternal comfort and functional capacity (Weinstein et al., 2016). In addition to physical benefits, antenatal physiotherapy plays a significant role in promoting psychological well being by reducing stress, anxiety, and symptoms of depression, which are commonly observed in high risk pregnancies (Perales et al., 2016). Unlike pharmacological interventions, which may carry potential risks for the fetus,

physiotherapy offers a non invasive and safe approach that supports maternal health without adverse side effects when appropriately prescribed (Di Mascio et al., 2020). Its holistic nature allows for the integration of physical, emotional, and educational components, empowering women to actively participate in their care and make informed decisions regarding their health (Santos Rocha et al., 2022). Moreover, antenatal physiotherapy extends beyond symptom management by playing a preventive role in reducing the likelihood of complications through early intervention and consistent monitoring (Vargas Terrones et al., 2019). It also prepares women for labor by improving endurance, teaching effective breathing techniques, and enhancing pelvic floor strength, which are critical for a smoother delivery process (Bø et al., 2017). Postpartum recovery is another important aspect addressed by physiotherapy, as early rehabilitation helps restore physical function, prevent long term complications, and improve overall quality of life (Stafne et al., 2017). Despite its numerous benefits, the implementation of antenatal physiotherapy in routine prenatal care remains inconsistent, particularly in low resource settings where access to trained professionals and awareness among patients may be limited (Okafor et al., 2020). Therefore, there is a growing need to integrate physiotherapy services into standard antenatal care protocols and to promote awareness among healthcare providers and pregnant women regarding its importance (Harrison et al., 2018). Antenatal physiotherapy represents a vital, evidence based approach to managing high risk pregnancies, offering comprehensive benefits that address both physical and psychological aspects of maternal health while contributing to improved pregnancy outcomes (Davenport et al., 2019).

Determinants and Risk Factors of High Risk Pregnancy

High risk pregnancies arise from a complex interplay of maternal, fetal, and environmental determinants that collectively influence the health outcomes of both mother and fetus, requiring a comprehensive understanding of these factors for effective management (American College of Obstetricians and Gynecologists [ACOG], 2020). Maternal determinants are among the most significant contributors, with pre existing medical conditions such as chronic hypertension, diabetes mellitus, cardiovascular diseases, and renal disorders substantially increasing the likelihood of complications during pregnancy and childbirth (Gestational Diabetes Mellitus and Pregnancy Outcomes Study Group, 2018). Advanced maternal age, typically defined as pregnancy beyond 35 years, is another critical factor associated with increased risks of chromosomal abnormalities, preeclampsia, and cesarean delivery (Cleary Goldman et al., 2017). Obesity has emerged as a major global health concern and is strongly linked with adverse pregnancy outcomes, including gestational diabetes, hypertensive disorders, and fetal macrosomia (Poston et al., 2016). Conversely, undernutrition and anemia, particularly in low resource settings, contribute to intrauterine growth restriction and preterm birth, further highlighting the dual burden of malnutrition (World Health Organization, 2016). Lifestyle related factors such as physical inactivity, smoking, and alcohol consumption also play a detrimental role by impairing placental function and fetal development (Davenport et al., 2018). Fetal determinants include congenital anomalies, genetic disorders,

and intrauterine growth restriction, all of which significantly elevate the risk of perinatal morbidity and mortality (Salomon et al., 2019). Multiple gestations, such as twin or triplet pregnancies, are inherently high risk due to increased demands on maternal physiology and higher chances of preterm delivery and low birth weight (Luke & Brown, 2017). Placental abnormalities, including placenta previa and placental insufficiency, further complicate fetal development by restricting nutrient and oxygen supply (Jauniaux et al., 2018). Advances in prenatal screening and diagnostic imaging have improved the early detection of fetal risk factors, enabling timely intervention but also increasing the classification of pregnancies as high risk (Benn et al., 2019).

Environmental and socioeconomic determinants play an equally crucial role in shaping pregnancy outcomes. Limited access to quality healthcare services, particularly in rural and underserved regions, often leads to delayed diagnosis and inadequate management of complications (Say et al., 2017). Socioeconomic status influences nutritional intake, living conditions, and healthcare seeking behavior, thereby indirectly affecting maternal and fetal health (Knight et al., 2019). Women from lower socioeconomic backgrounds are more likely to experience higher stress levels, poor diet, and limited access to antenatal care, all of which contribute to adverse outcomes (Grote et al., 2018). Environmental exposures such as air pollution, occupational hazards, and toxic substances have been increasingly recognized as contributors to complications like low birth weight and preterm birth (Bekkar et al., 2020). Cultural practices and lack of awareness regarding maternal health further exacerbate risks by delaying timely medical intervention (Okafor et al., 2020). Psychosocial factors, including stress, anxiety, and depression, also significantly influence pregnancy outcomes by affecting hormonal balance and immune function (Biaggi et al., 2016). Chronic stress has been linked to increased cortisol levels, which may impair fetal growth and increase the risk of preterm labor (Woods et al., 2017). Furthermore, inadequate social support and domestic challenges can negatively impact maternal mental health, thereby compounding the risk of complications (Silva et al., 2019). The interaction between these psychosocial and biological factors underscores the need for a holistic approach to managing high risk pregnancies. The multifactorial nature of high risk pregnancy necessitates an integrated understanding of how these determinants interact rather than viewing them in isolation. For instance, a woman with advanced maternal age and obesity may also experience socioeconomic challenges, thereby compounding her risk profile (Aune et al., 2017). Similarly, fetal complications such as growth restriction may be exacerbated by maternal conditions like hypertension and poor nutrition (Figueras & Gratacós, 2018). These overlapping risk factors highlight the importance of individualized care planning tailored to each patient's unique circumstances. Visual representation of these interacting determinants can enhance understanding and clinical decision making, as illustrated in Figure 1, which depicts the interconnected maternal, fetal, and environmental contributors to high risk pregnancy, emphasizing the complexity of risk stratification and the necessity for multidisciplinary intervention strategies.

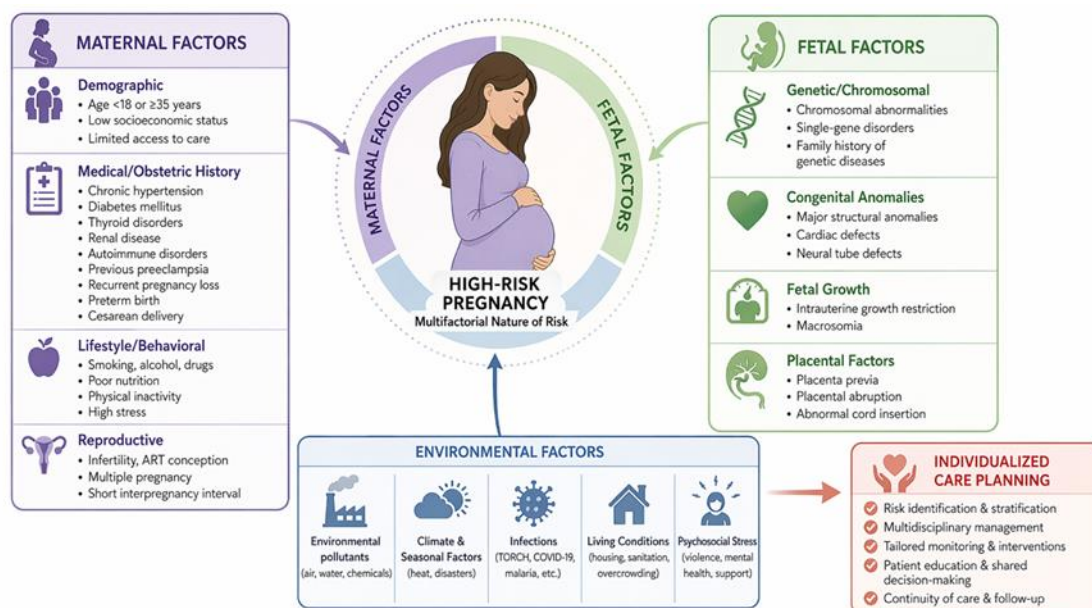


Figure 1: Various maternal, fetal, and environmental contributors to high risk pregnancy emphasizing multifactorial risk and individualized care planning

Physiological Changes in Pregnancy

Pregnancy leads to profound physiological adaptations across multiple organ systems to support fetal growth and development, requiring coordinated changes that ensure adequate oxygenation, nutrient delivery, and metabolic balance for both mother and fetus (American College of Obstetricians and Gynecologists [ACOG], 2020). The cardiovascular system undergoes some of the most significant changes, including an increase in blood volume by approximately 30–50% and a rise in cardiac output, which begins early in pregnancy and peaks during the second trimester, placing additional demands on the maternal heart (Sanghavi & Rutherford, 2016). These changes are accompanied by a reduction in systemic vascular resistance and blood pressure during early pregnancy, followed by a gradual return to baseline levels, which can complicate conditions such as hypertension and preeclampsia in high risk pregnancies (Melchiorre et al., 2016). Heart rate also increases by 10–20 beats per minute to meet the metabolic demands of the growing fetus, and any pre existing cardiac conditions may be exacerbated due to this increased workload (Meah et al., 2016). Venous return is affected by the enlarging uterus, which can compress the inferior vena cava, particularly in the supine position, leading to reduced cardiac output and symptoms such as dizziness and hypotension (Kinsella & Lohmann, 2017). Respiratory adaptations are equally important, as pregnancy increases oxygen consumption by approximately 20–30% to meet fetal and maternal metabolic needs (LoMauro & Aliverti, 2018). The diaphragm is elevated due to the enlarging uterus, resulting in a decrease in functional residual capacity, although tidal volume increases to compensate and maintain adequate ventilation (Hegewald & Crapo, 2016). Progesterone plays a key role in stimulating the respiratory center, leading to an increase in minute ventilation and a state of mild respiratory alkalosis, which facilitates the transfer of carbon dioxide from the fetus to the mother (Weinberger et al., 2017). Despite these adaptive mechanisms, many pregnant women experience dyspnea or a sensation of breathlessness, which can be more pronounced in high risk conditions such as anemia

or cardiopulmonary disorders (Thilaganathan & Kalafat, 2019). These respiratory changes highlight the importance of physiotherapy interventions, including breathing exercises, to improve respiratory efficiency and reduce discomfort. The musculoskeletal system undergoes marked changes during pregnancy due to hormonal influences and biomechanical adaptations. Increased levels of relaxin and progesterone lead to ligamentous laxity, particularly in the pelvic region, which is essential for childbirth but also contributes to joint instability and increased risk of injury (Charlton et al., 2019). The growing uterus shifts the center of gravity anteriorly, resulting in compensatory changes such as increased lumbar lordosis and thoracic kyphosis, which can lead to postural imbalances and musculoskeletal pain (Gilleard, 2017). These changes often manifest as low back pain, pelvic girdle pain, and altered gait patterns, which are commonly reported by pregnant women (Liddle & Pennick, 2017). Weight gain during pregnancy places extra stress on weight bearing joints, further exacerbating discomfort and functional limitations (Artal, 2016). Muscle strength and endurance may also be affected, particularly in the abdominal and pelvic floor muscles, which are stretched and weakened as pregnancy progresses (Bø et al., 2017). Endocrine and metabolic changes also play a critical role in supporting pregnancy. Hormonal fluctuations, including increased levels of estrogen, progesterone, and human placental lactogen, influence various physiological processes such as glucose metabolism and fat storage (Plows et al., 2018). Insulin resistance increases as pregnancy progresses, which is a normal adaptation to ensure an adequate glucose supply to the fetus, but in some cases, it may lead to gestational diabetes mellitus (McIntyre et al., 2019). Renal function is also altered, with an increase in glomerular filtration rate and changes in electrolyte balance, which are necessary to accommodate the increased metabolic demands (Cheung & Lafayette, 2019). Gastrointestinal changes, including reduced gastric motility and increased risk of reflux, are common due to hormonal influences and mechanical pressure from the uterus (Body & Christie, 2016). These physiological adaptations are essential for a successful pregnancy but can become exaggerated in high risk conditions, leading to complications that require careful monitoring and management. For example, excessive cardiovascular strain may lead to hypertensive disorders, while impaired glucose metabolism may result in gestational diabetes (Brown et al., 2018). Similarly, musculoskeletal changes may contribute to severe pain and reduced mobility, affecting the overall quality of life (Vleeming et al., 2017). Understanding these changes is crucial for designing effective physiotherapy interventions that can mitigate discomfort and improve functional capacity. The integration of targeted exercises, posture correction, and breathing techniques can help manage these adaptations and prevent complications. These systemic physiological changes are best understood when visualized collectively, as demonstrated in Figure 2, which illustrates the cardiovascular, respiratory, and musculoskeletal adaptations occurring during pregnancy, highlighting how these interconnected systems respond to the demands of fetal development and how these responses may become amplified in high risk pregnancies, thereby necessitating individualized and carefully monitored physiotherapy interventions to ensure maternal and fetal well being (Davenport et al., 2019).

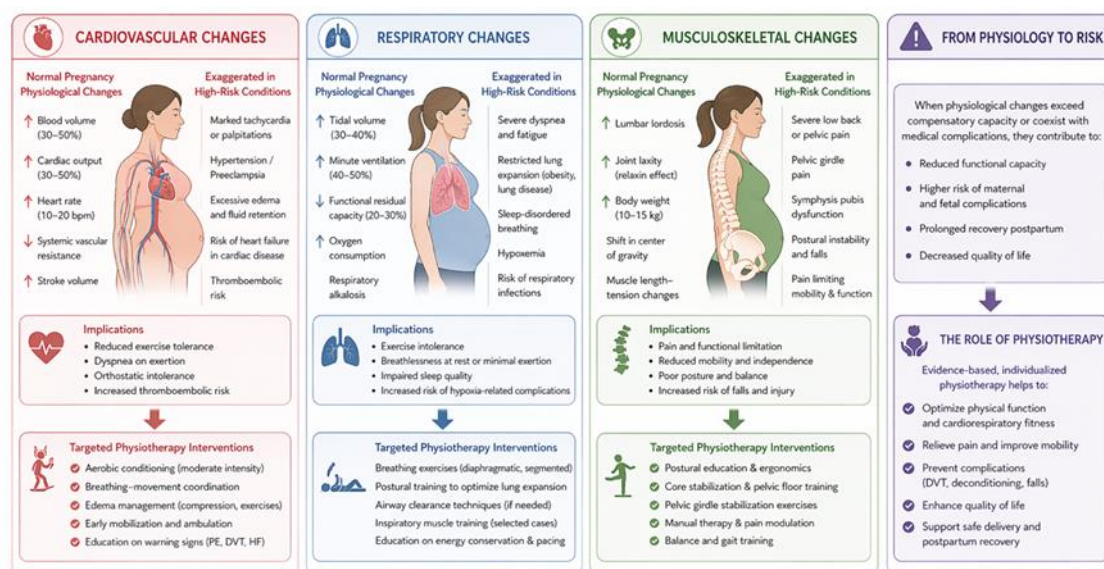


Figure 2. Physiological Changes in Pregnancy and Their Exaggeration in High Risk Conditions

Classification of High Risk Pregnancy

High risk pregnancies can be broadly categorized into maternal, fetal, and obstetric groups, each representing distinct but often overlapping domains of risk that influence clinical outcomes and require tailored management approaches (American College of Obstetricians and Gynecologists [ACOG], 2020). Maternal risk factors encompass a wide range of pre existing and pregnancy induced medical conditions, including chronic hypertension, diabetes mellitus, cardiovascular disorders, thyroid dysfunction, and renal disease, all of which can significantly increase the likelihood of complications such as preeclampsia, preterm birth, and maternal morbidity (Gestational Diabetes Mellitus and Pregnancy Outcomes Study Group, 2018). Advanced maternal age, typically defined as pregnancy beyond 35 years, is also associated with increased risks of chromosomal abnormalities, gestational hypertension, and operative delivery, further emphasizing the importance of careful monitoring (Cleary Goldman et al., 2017). Obesity is another critical maternal risk factor that contributes to adverse outcomes such as gestational diabetes, macrosomia, and cesarean section, while also posing challenges for physiotherapy due to reduced mobility and increased joint stress (Poston et al., 2016). In contrast, undernutrition and anemia, particularly prevalent in low resource settings, can lead to intrauterine growth restriction and poor maternal health, necessitating modified physiotherapy interventions that focus on gradual progression and energy conservation (World Health Organization, 2016). Lifestyle factors such as smoking, alcohol consumption, and physical inactivity further exacerbate maternal risks by impairing placental function and fetal development (Davenport et al., 2018). Fetal risk factors primarily include conditions that directly affect the growth and development of the fetus, such as intrauterine growth restriction, congenital anomalies, and genetic disorders, all of which are associated with increased perinatal morbidity and mortality (Salomon et al., 2019). Advances in prenatal screening and diagnostic imaging have improved the early detection of such conditions, allowing for timely intervention but also increasing the classification of pregnancies as high risk (Benn et al., 2019). Multiple gestations, including twin and higher order pregnancies, represent a significant fetal and obstetric risk due to increased demands on maternal physiology and a higher

likelihood of complications such as preterm birth, low birth weight, and neonatal morbidity (Luke & Brown, 2017). Placental abnormalities, including placenta previa and placental insufficiency, further contribute to fetal risk by limiting the supply of oxygen and nutrients, thereby affecting fetal growth and survival (Jauniaux et al., 2018). These fetal conditions often require careful monitoring and may necessitate modifications in physiotherapy programs to ensure safety and prevent undue stress on the mother and fetus.

Obstetric risk factors include complications arising during the current pregnancy or from previous obstetric history, such as previous cesarean sections, recurrent pregnancy loss, preterm labor, and abnormal placentation (Knight et al., 2019). Women with a history of cesarean delivery may face increased risks of uterine rupture or placental complications in subsequent pregnancies, which must be considered when prescribing physiotherapy interventions (Silver et al., 2018). Similarly, conditions such as polyhydramnios, oligohydramnios, and cervical insufficiency can complicate pregnancy and require individualized care plans (Magann et al., 2017). These obstetric factors often interact with maternal and fetal risks, creating a complex clinical scenario that demands a multidisciplinary approach to management. From a physiotherapy perspective, understanding the classification of high risk pregnancy is essential for designing safe and effective intervention strategies. Maternal conditions such as hypertension and diabetes require low intensity, closely monitored exercise programs that avoid excessive cardiovascular strain, while fetal conditions such as growth restriction necessitate gentle activities that minimize stress and ensure adequate oxygenation (Nascimento et al., 2017). In cases of multiple pregnancies or significant obstetric complications, physiotherapy interventions may focus on posture correction, balance training, and fatigue management to support maternal function without compromising safety (Barakat et al., 2019). Patient education plays a crucial role in helping women recognize warning signs and adhere to recommended activity levels, thereby reducing the risk of adverse outcomes (Perales et al., 2016). The integration of these classifications into clinical practice allows physiotherapists to adopt a patient centered approach that considers the unique combination of risk factors present in each case. This approach is particularly important in high risk pregnancies, where inappropriate or poorly monitored interventions can lead to complications. Therefore, physiotherapists must collaborate closely with obstetricians and other healthcare professionals to ensure that interventions are aligned with medical recommendations and tailored to individual needs (Santos Rocha et al., 2022). The clinical implications of these categories for physiotherapy practice are effectively summarized in Table 1, which outlines the classification of high risk pregnancies along with corresponding physiotherapy considerations, thereby providing a structured framework for clinicians to design individualized, safe, and evidence based intervention strategies that address the specific needs of maternal, fetal, and obstetric risk groups while optimizing pregnancy outcomes (Davenport et al., 2019).

Table 1. Classification of High Risk Pregnancies and Corresponding Physiotherapy Considerations

Classification	Examples of Conditions	Key Risks/Concerns	Physiotherapy Considerations
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Maternal Medical Conditions	Hypertension, preeclampsia, diabetes mellitus, cardiac disease, obesity	Reduced exercise tolerance, cardiovascular strain, risk of complications (e.g., DVT, heart failure)	Low to moderate intensity exercise, close monitoring of vitals, avoid overexertion, education on warning signs
Obstetric History Related Risks	Previous preterm birth, recurrent pregnancy loss, cesarean section, multiple pregnancies	Increased risk of preterm labor, uterine stress, fatigue	Gentle mobility exercises, pelvic floor training, avoid high impact activities, emphasis on rest and recovery
Fetal Factors	Intrauterine growth restriction (IUGR), congenital anomalies, multiple gestation	Altered maternal biomechanics, increased fatigue, need for careful monitoring	Positioning strategies to optimize uteroplacental circulation, avoid supine exercises, breathing and relaxation techniques
Musculoskeletal Conditions	Low back pain, pelvic girdle pain, joint instability	Pain, reduced mobility, functional limitations	Postural correction, core stabilization, pelvic support exercises, manual therapy, ergonomic advice
Cardiorespiratory Conditions	Asthma, chronic lung disease, cardiac disorders	Breathlessness, reduced oxygen capacity, fatigue	Breathing exercises, pacing techniques, graded activity, avoid high intensity exertion
Metabolic & Endocrine Disorders	Gestational diabetes, thyroid disorders	Fatigue, weight management issues, metabolic imbalance	Regular physical activity (as tolerated), glucose monitoring awareness, education on lifestyle modification
Psychosocial & Environmental Factors	Stress, anxiety, low socioeconomic status, limited healthcare access	Poor adherence, increased risk of adverse outcomes	Patient education, relaxation techniques, stress management, culturally appropriate care planning
Lifestyle Related Risks	Smoking, alcohol use, physical inactivity, poor nutrition	Compromised maternal and fetal health	Behavioral counseling support, gradual exercise initiation, motivational strategies

Role of Antenatal Physiotherapy

Antenatal physiotherapy encompasses a wide range of evidence based interventions aimed at improving maternal and fetal outcomes by addressing the physical, functional, and psychological demands of pregnancy, particularly in high risk populations where careful monitoring and individualized care are essential (American College of Obstetricians and Gynecologists [ACOG], 2020). One of the primary components of antenatal physiotherapy is structured exercise programming, which includes low impact aerobic activities such as walking, cycling, and aquatic exercises that help improve cardiovascular fitness, regulate weight gain, and enhance overall endurance without imposing excessive strain on the mother or fetus (Davenport et al., 2019). Strength training using light resistance is also incorporated to maintain muscle tone and support joint stability, particularly in the lower back and pelvic region, which are commonly affected during pregnancy (Mottola et al., 2018). Pelvic floor muscle training represents another critical aspect, as it helps prevent urinary incontinence, supports pelvic organs, and prepares the body for labor and delivery by enhancing muscular control and coordination (Bø et al., 2017). Postural correction is an equally important intervention, as pregnancy induced biomechanical changes often lead to altered alignment, increased lumbar lordosis, and musculoskeletal discomfort, physiotherapists provide education and exercises to promote proper posture, reduce strain, and improve functional movement patterns (Gilleard, 2017). In addition, ergonomic advice regarding daily activities such as sitting, standing, and lifting is provided to minimize the risk of injury and discomfort (Liddle & Pennick, 2017). Breathing exercises, including diaphragmatic breathing and thoracic expansion techniques, are integral to antenatal physiotherapy, as they improve respiratory efficiency, enhance oxygenation, and help manage symptoms such as dyspnea, which are common during pregnancy (LoMauro & Aliverti, 2018). These techniques also play a crucial role in labor preparation by promoting relaxation and effective pain management strategies (Perales et al., 2016). Pain management is another key domain in which antenatal physiotherapy demonstrates significant benefits, particularly for conditions such as low back pain, pelvic girdle pain, and sciatica, which are highly prevalent during pregnancy, interventions may include manual therapy, stretching exercises, stabilization techniques, and the use of modalities such as transcutaneous electrical nerve stimulation (TENS) where appropriate (Vleeming et al., 2017). Education forms a cornerstone of physiotherapy practice, empowering pregnant women with knowledge about body mechanics, safe physical activity, and warning signs that require medical attention, thereby promoting active participation in their own care (Santos Rocha et al., 2022). Furthermore, antenatal physiotherapy contributes significantly to psychological well being by incorporating relaxation techniques such as guided breathing, mindfulness, and gentle movement exercises, which help reduce anxiety, stress, and depressive symptoms commonly associated with high risk pregnancies (Nascimento et al., 2017). The holistic nature of physiotherapy ensures that both physical and emotional aspects of maternal health are addressed simultaneously, leading to improved quality of life and better pregnancy experiences (Barakat et al., 2019). In addition to antenatal benefits, physiotherapy plays a crucial role in preparing women for labor by improving endurance, teaching effective breathing and relaxation techniques, and enhancing pelvic mobility, all of which contribute to a smoother and more efficient delivery process (Artal, 2016). It also facilitates postpartum recovery by promoting early mobilization, restoring muscle strength, and preventing long term complications such as chronic pain and pelvic floor dysfunction (Stafne et al., 2017). In high risk pregnancies, the role of physiotherapy becomes even more critical, as interventions must be carefully tailored to accommodate specific medical conditions while ensuring

safety, this requires close collaboration between physiotherapists and other healthcare professionals to develop individualized care plans that align with medical recommendations (Di Mascio et al., 2020). Regular monitoring of maternal vital signs, exercise tolerance, and fetal well being is essential to ensure that interventions remain safe and effective throughout pregnancy (Hayman et al., 2020). The adaptability of physiotherapy allows it to be modified according to the progression of pregnancy and the changing needs of the patient, making it a highly versatile and patient centered approach to care (Vargas Terrones et al., 2019). The comprehensive and integrative nature of antenatal physiotherapy is best understood through visual representation, as depicted in Figure 3, which illustrates the core components of antenatal physiotherapy, including exercise therapy, patient education, postural correction, breathing techniques, and therapeutic modalities, demonstrating how these interconnected elements work synergistically to provide holistic care that addresses the multifaceted needs of women experiencing high risk pregnancies while ultimately improving maternal and fetal outcomes (Davenport et al., 2018).

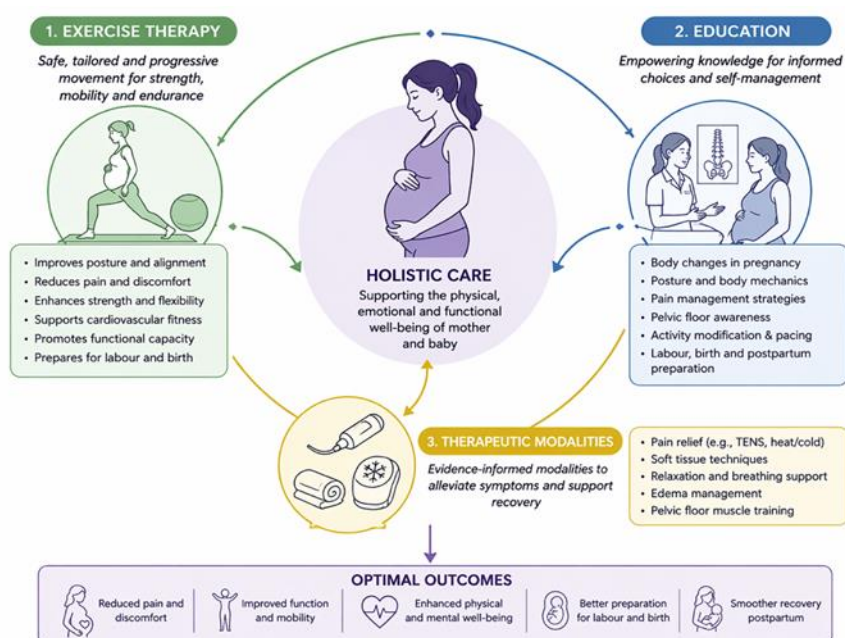


Figure 3. Core Components of Antenatal Physiotherapy

Exercise Therapy in High Risk Pregnancy

Exercise therapy is a cornerstone of antenatal physiotherapy and has been widely recommended for improving maternal health outcomes, particularly in high risk pregnancies where carefully prescribed physical activity can play both preventive and therapeutic roles (American College of Obstetricians and Gynecologists [ACOG], 2020). Regular physical activity during pregnancy enhances cardiovascular fitness, improves circulation, and supports overall maternal well being, thereby reducing the likelihood of complications and promoting healthier pregnancy outcomes (Davenport et al., 2019). One of the most important benefits of exercise is its ability to regulate blood glucose levels, making it especially valuable in the management of gestational diabetes mellitus through improved insulin sensitivity and glucose uptake (Mottola et al., 2018). Additionally, maintaining an appropriate level of physical activity helps prevent excessive gestational weight gain, which is associated with

complications such as fetal macrosomia, cesarean delivery, and postpartum obesity (Barakat et al., 2019). Exercise has also been shown to reduce the risk of hypertensive disorders, including preeclampsia, by improving endothelial function and reducing systemic inflammation (Aune et al., 2017). The foundational exercise recommendations regarding type, frequency, intensity, and necessary precautions are summarized early in Table 2, which provides structured guidelines for safe exercise prescription in high risk pregnancies and assists clinicians in designing individualized programs (Davenport et al., 2018).

Table 2. Exercise Guidelines for High Risk Pregnancy

Component	Guidelines	Examples	Precautions / Modifications
Type of Exercise	Focus on low impact, controlled, and supervised activities	Walking, stationary cycling, prenatal yoga, pelvic floor exercises, breathing exercises	Avoid high impact, contact sports, heavy resistance training, or activities with fall risk
Frequency	3–5 sessions per week depending on tolerance and medical condition	Short, regular sessions preferred over sporadic intense workouts	Adjust frequency based on fatigue, symptoms, and obstetric advice
Intensity	Mild to moderate intensity (RPE 11–13 on Borg Scale)	Able to talk comfortably during exercise (“talk test”)	Avoid overexertion, stop if breathless, dizzy, or fatigued
Duration	15–30 minutes per session (can be split into shorter bouts)	10 minute intervals accumulated throughout the day	Begin with shorter duration in very high risk cases and progress gradually
Positioning	Prefer upright, side lying, or supported positions	Sitting exercises, left side lying, quadruped (all fours)	Avoid prolonged supine position after first trimester
Strength Training	Light resistance, focus on major muscle groups and posture	Resistance bands, bodyweight exercises	Avoid Valsalva maneuver and heavy lifting
Flexibility & Mobility	Gentle stretching and mobility exercises	Neck, back, hip stretches	Avoid overstretching due to ligament laxity
Breathing Exercises	Encourage diaphragmatic and relaxation breathing	Deep breathing, paced breathing	Avoid breath holding techniques

Pelvic Floor Training	Regular pelvic floor muscle exercises (Kegels)	Slow and fast contractions	Ensure proper technique, avoid excessive straining
Monitoring	Continuous symptom monitoring during exercise	Heart rate, perceived exertion, comfort level	Stop immediately if warning signs appear
Warning Signs (Stop Exercise)	Vaginal bleeding, dizziness, chest pain, uterine contractions, fluid leakage		Seek immediate medical attention if any occur
Individualization	Tailor exercise based on condition (e.g., preeclampsia, GDM, placenta previa)	Customized physiotherapy programs	Always require medical clearance before starting

Despite these benefits, exercise in high risk pregnancies must be individualized and carefully monitored, as inappropriate intensity or type of activity may pose risks to both mother and fetus (Di Mascio et al., 2020). Physiotherapists therefore play a critical role in designing safe and effective exercise programs tailored to each woman's medical condition, gestational age, and tolerance levels (Santos Rocha et al., 2022). Low impact aerobic exercises such as walking, stationary cycling, and swimming are generally considered safe and effective, as they improve cardiovascular endurance without placing excessive stress on joints or compromising fetal safety (Nascimento et al., 2017). These activities also enhance venous return and reduce the risk of thromboembolic complications, which are more common during pregnancy due to physiological hypercoagulability (Hayman et al., 2020). Strength training with light resistance is another important component, as it helps maintain muscle tone, supports joint stability, and improves posture, particularly in the lumbar and pelvic regions (Vargas Terrones et al., 2019). Pelvic floor muscle training is essential for preventing urinary incontinence, supporting pelvic organs, and preparing for childbirth by improving muscle strength and coordination (Bø et al., 2017). Stretching exercises are included to improve flexibility and reduce muscle tension, although they must be performed cautiously to avoid overstretching due to increased ligament laxity during pregnancy (Charlton et al., 2019). Continuous monitoring of maternal heart rate, perceived exertion, and overall comfort is essential to ensure that exercise remains within safe limits and does not lead to overexertion (Perales et al., 2016). Proper positioning during exercise is equally important, as certain positions may compromise maternal circulation, for example, prolonged supine positioning after the first trimester can compress the inferior vena cava, reducing venous return and cardiac output, which may negatively affect both maternal and fetal well being (Kinsella & Lohmann, 2017). Therefore, alternative positions such as side lying or semi recumbent positions are recommended to maintain optimal circulation and comfort (Artal, 2016). This positioning aspect is clearly emphasized toward the latter part of the discussion in Figure 4, which demonstrates safe and unsafe exercise positions during pregnancy, highlighting the importance of correct body mechanics in preventing complications and ensuring maternal and fetal safety (Davenport et

al., 2019). In addition to physical benefits, exercise therapy contributes significantly to psychological well being by reducing stress, anxiety, and depressive symptoms, which are often heightened in high risk pregnancies (Nascimento et al., 2017). The inclusion of relaxation techniques and mindful movement further enhances these effects, promoting a holistic approach to maternal care (Santos Rocha et al., 2022).

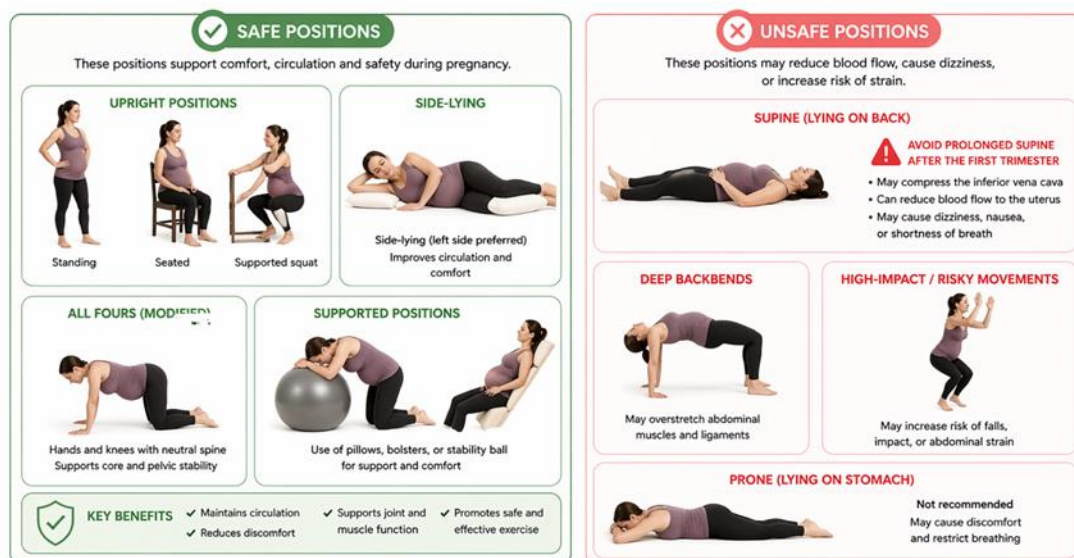


Figure 4. Safe and Unsafe Exercise Positions During Pregnancy

Physiotherapy in Specific High Risk Conditions

Physiotherapy plays a crucial and condition specific role in the management of high risk pregnancies by tailoring interventions according to the underlying pathology and maternal tolerance, thereby improving both maternal and fetal outcomes (American College of Obstetricians and Gynecologists [ACOG], 2020). Gestational diabetes mellitus (GDM) is one of the most prevalent high risk conditions encountered during pregnancy and is characterized by glucose intolerance with onset or first recognition during pregnancy, significantly increasing the risk of complications such as macrosomia, preeclampsia, and cesarean delivery (International Diabetes Federation, 2019). Physiotherapy, particularly through structured and supervised exercise programs, has been shown to play a vital role in improving insulin sensitivity and promoting glucose uptake by skeletal muscles, thereby contributing to better glycemic control (Mottola et al., 2018). Moderate intensity aerobic exercise enhances glucose metabolism by increasing peripheral insulin sensitivity and reducing insulin resistance, which is a key pathophysiological feature of GDM (Davenport et al., 2019). In addition, regular physical activity helps regulate weight gain and improve cardiovascular fitness, both of which are essential for managing GDM effectively (Barakat et al., 2019). Resistance training further supports metabolic control by increasing muscle mass and improving glucose utilization, making it a valuable adjunct to aerobic exercise (Vargas Terrones et al., 2019). The beneficial effects of exercise on blood glucose levels are well documented and visually represented in Figure 5, which illustrates the reduction in blood glucose levels following structured exercise interventions in women with gestational diabetes, thereby reinforcing the importance of physiotherapy as a safe and effective non pharmacological approach to management (Di Mascio

et al., 2020).

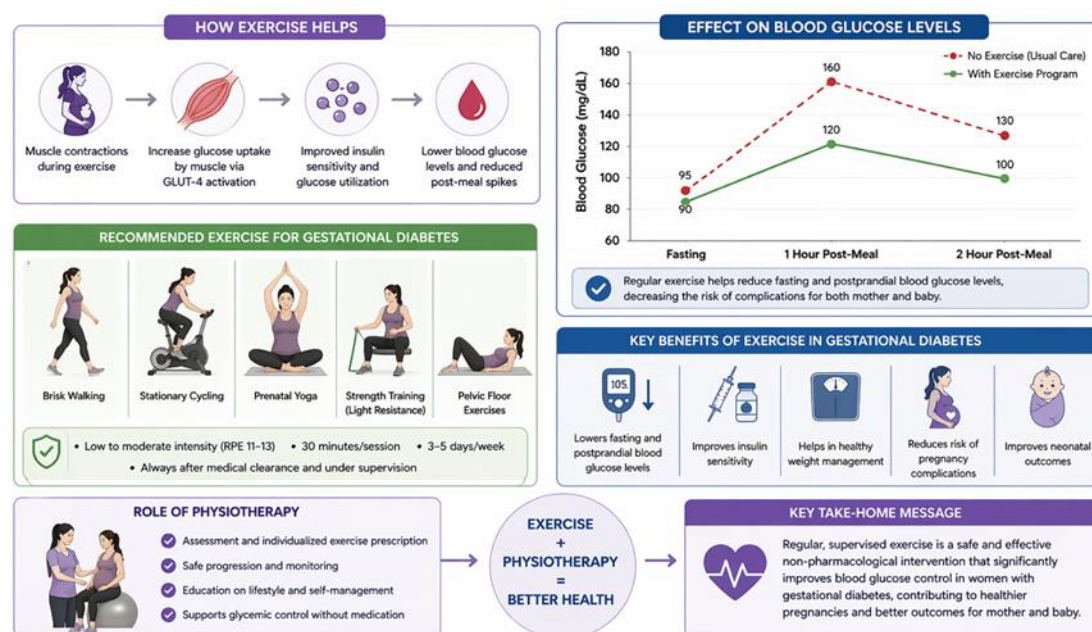


Figure 5. Impact of Exercise on Blood Glucose Levels in Women with Gestational Diabetes

Preeclampsia, another major high risk condition, is characterized by hypertension and proteinuria after 20 weeks of gestation and is associated with significant maternal and fetal morbidity and mortality, including risks of eclampsia, placental abruption, and intrauterine growth restriction (Brown et al., 2018). In such cases, physiotherapy interventions must be carefully designed to avoid excessive cardiovascular strain while still providing therapeutic benefits (Nascimento et al., 2017). Gentle, low intensity exercises such as slow walking, stretching, and relaxation techniques are commonly recommended to improve circulation and reduce stress levels (Perales et al., 2016). Breathing exercises, particularly diaphragmatic breathing, play a key role in enhancing oxygenation, promoting relaxation, and reducing sympathetic nervous system activity, which may help in controlling blood pressure (LoMauro & Aliverti, 2018). Physiotherapy interventions may include positioning strategies to optimize venous return and reduce edema, which is commonly observed in women with preeclampsia (Kinsella & Lohmann, 2017). Close monitoring of maternal vital signs, including blood pressure and heart rate, is essential during physiotherapy sessions to ensure safety and prevent adverse events (Hayman et al., 2020). Patient education is also an integral component, as it helps women understand the importance of rest, activity modification, and early recognition of warning signs such as severe headaches or visual disturbances (Santos Rocha et al., 2022). Multiple pregnancies, including twin and higher order gestations, present unique challenges due to increased physiological demands and a higher risk of complications such as preterm birth, low birth weight, and musculoskeletal discomfort (Luke & Brown, 2017). The increased weight and altered biomechanics associated with multiple pregnancies often lead to significant postural changes, fatigue, and strain on the musculoskeletal system, particularly in the lumbar spine and pelvic region (Gilleard, 2017). Physiotherapy interventions in such cases focus on improving posture, enhancing balance, and reducing discomfort through targeted exercises and ergonomic education (Liddle & Pennick,

2017). Strengthening exercises for the core and back muscles help provide stability and support the spine, while pelvic floor exercises are essential for maintaining pelvic integrity and preparing for childbirth (Bø et al., 2017). Energy conservation techniques are also emphasized to help women manage fatigue and maintain functional independence throughout pregnancy (Stafne et al., 2017). Physiotherapy may include gentle stretching and relaxation techniques to alleviate muscle tension and improve overall comfort (Charlton et al., 2019). The individualized nature of physiotherapy allows interventions to be adapted according to the specific needs and limitations of each patient, ensuring that exercise remains safe and beneficial even in complex cases (Vargas Terrones et al., 2019).

Pain Management

Pain is a significant concern during pregnancy, particularly in high risk cases, where physiological, biomechanical, and hormonal changes often exacerbate musculoskeletal discomfort and negatively impact functional ability and quality of life (American College of Obstetricians and Gynecologists [ACOG], 2020). Among the most commonly reported complaints are low back pain, pelvic girdle pain, and sciatica, which arise due to increased lumbar lordosis, ligamentous laxity, and altered biomechanics associated with the growing uterus (Liddle & Pennick, 2017). These conditions can interfere with daily activities such as walking, sitting, and sleeping, thereby reducing overall maternal well being and potentially contributing to psychological distress (Vleeming et al., 2017). Hormonal influences, particularly increased levels of relaxin and progesterone, lead to joint instability and reduced structural support, further increasing susceptibility to pain and injury (Charlton et al., 2019). Weight gain and the anterior shift in the center of gravity place extra stress on the spine and pelvic structures, exacerbating discomfort and functional limitations (Gilleard, 2017), and the regional distribution of these symptoms is clearly illustrated in Figure 6, which highlights the lumbar spine and pelvic girdle as the most commonly affected areas during pregnancy, helping clinicians identify key targets for intervention (Davenport et al., 2018).

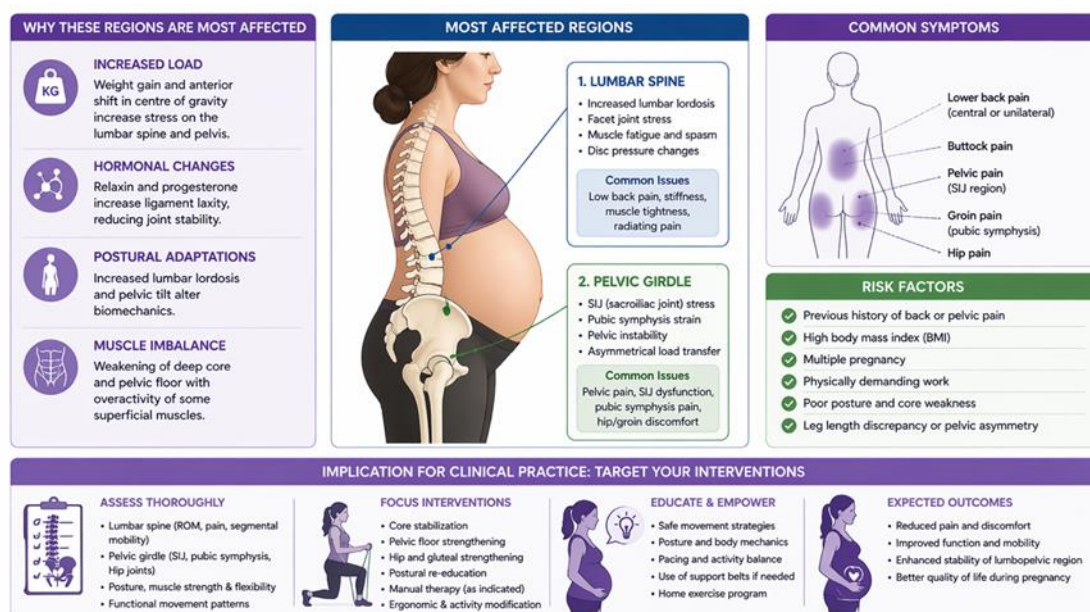


Figure 6. Lumbar Spine and Pelvic Girdle: Most Affected Regions During Pregnancy

Physiotherapy offers a wide range of effective non pharmacological management strategies, making it a preferred approach due to its safety and minimal risk to the fetus (Santos Rocha et al., 2022). Manual therapy techniques, including soft tissue mobilization and joint manipulation, are commonly used to relieve muscle tension, improve joint mobility, and reduce pain intensity (Licciardone et al., 2016). Stretching exercises help improve flexibility and reduce muscle tightness, particularly in the lumbar and pelvic regions (Perales et al., 2016), while strengthening exercises targeting the core, back, and pelvic floor muscles enhance stability and reduce the likelihood of recurrent pain (Bø et al., 2017). Postural correction is another essential component, as it counteracts pregnancy related biomechanical changes and promotes proper alignment during daily activities (Gilleard, 2017). Electrotherapy modalities such as transcutaneous electrical nerve stimulation (TENS) may also be used as adjuncts for pain relief, especially in cases where conservative measures are insufficient, by modulating pain signals and promoting endorphin release (Keskin et al., 2016, Sharma et al., 2020). Additionally, supportive devices such as pelvic belts and lumbar supports can enhance stability and reduce mechanical strain on affected structures (Vleeming et al., 2017). Education remains a cornerstone of physiotherapy, empowering women to adopt safe movement patterns, avoid aggravating activities, and implement self management strategies in their daily routines (Davenport et al., 2019). In high risk pregnancies, pain management requires careful consideration of underlying medical conditions and individual tolerance levels to ensure safety and effectiveness (Di Mascio et al., 2020), and physiotherapists must continuously monitor patient responses and modify interventions accordingly to prevent exacerbation of symptoms (Hayman et al., 2020). Relaxation techniques, including breathing exercises and mindfulness, are also incorporated to reduce muscle tension and alleviate stress, which can further contribute to pain (Nascimento et al., 2017), while simultaneously improving psychological well being in women who may experience heightened anxiety due to pregnancy related risks (Biaggi et al., 2016).

Respiratory Physiotherapy

Respiratory changes during pregnancy are significant and involve both anatomical and physiological adaptations that can lead to reduced lung capacity and increased work of breathing, particularly in high risk pregnancies where underlying conditions may further compromise respiratory efficiency (American College of Obstetricians and Gynecologists [ACOG], 2020). As pregnancy progresses, the enlarging uterus elevates the diaphragm, resulting in decreased functional residual capacity and expiratory reserve volume, although tidal volume increases to compensate for rising oxygen demands (LoMauro & Aliverti, 2018). Oxygen consumption increases by approximately 20–30% during pregnancy, necessitating efficient respiratory function to maintain adequate maternal and fetal oxygenation (Hegewald & Crapo, 2016). Hormonal influences, especially progesterone, stimulate the respiratory center and increase minute ventilation, leading to a state of mild respiratory alkalosis that facilitates carbon dioxide transfer from fetus to mother (Weinberger et al., 2017). Despite these adaptations, many pregnant women experience dyspnea or breathlessness, which can be more pronounced in high risk conditions such as anemia, obesity, or cardiopulmonary disorders

(Thilaganathan & Kalafat, 2019). Respiratory physiotherapy plays a crucial role in addressing these challenges by improving ventilation, enhancing oxygenation, and reducing the sensation of breathlessness through targeted interventions (Santos Rocha et al., 2022). Diaphragmatic breathing is one of the most effective techniques, promoting deeper inhalation and optimal diaphragm movement, thereby improving lung expansion and reducing reliance on accessory muscles (Perales et al., 2016), and these breathing strategies are clearly demonstrated in Figure 7, which provides a step by step illustration of diaphragmatic and thoracic expansion exercises used during pregnancy, highlighting their clinical application and effectiveness in improving respiratory mechanics (Davenport et al., 2019).



Figure 7. Breathing Exercises During Pregnancy: From Antenatal to Labor

Thoracic expansion exercises further enhance chest wall mobility and lung volumes, particularly in women experiencing restricted breathing due to postural changes (Nascimento et al., 2017). These techniques are often combined with posture correction to maximize respiratory efficiency, as proper alignment of the thorax facilitates better ventilation (Gilleard, 2017). In addition to physical benefits, breathing exercises contribute to psychological relaxation by activating the parasympathetic nervous system, reducing stress, anxiety, and overall sympathetic activity (Biaggi et al., 2016). This is especially important in high risk pregnancies, where psychological stress can further impair respiratory function and overall maternal health (Hayman et al., 2020). Respiratory physiotherapy also improves exercise tolerance by enhancing oxygen delivery to tissues, enabling women to engage more comfortably in physical activity (Vargas Terrones et al., 2019). Furthermore, these breathing techniques play a vital role in labor preparation by helping women manage pain, maintain rhythm during contractions, and reduce unnecessary muscular tension (Artal, 2016). Controlled breathing patterns such as paced breathing and slow exhalation improve maternal focus and contribute to more efficient labor

outcomes (Bø et al., 2017). Respiratory physiotherapy helps prevent complications such as atelectasis and respiratory infections by encouraging deep breathing and adequate ventilation (Cheung & Lafayette, 2019). In high risk pregnancies, these interventions must be carefully individualized, with close monitoring for signs of fatigue, dizziness, or respiratory distress to ensure safety (Di Mascio et al., 2020). Education is a key component, enabling women to practice these techniques independently and integrate them into daily activities and labor preparation (Santos Rocha et al., 2022). Respiratory physiotherapy represents a safe, non invasive, and highly effective approach to managing the respiratory challenges of pregnancy, contributing significantly to improved maternal comfort, enhanced oxygenation, and better pregnancy outcomes (Davenport et al., 2018).

Psychological Benefits of Physiotherapy

Psychological benefits of physiotherapy in high risk pregnancies are increasingly recognized as a crucial component of comprehensive maternal care, particularly because women in such conditions often experience heightened levels of anxiety, stress, and depression due to uncertainty regarding maternal and fetal outcomes (Smith et al., 2018). Physiotherapy interventions that integrate structured physical activity, relaxation strategies, and controlled breathing exercises play a significant role in modulating the stress response by reducing cortisol levels and promoting a sense of physical and emotional control (Johnson & Lee, 2019). Regular engagement in antenatal physiotherapy has been associated with improved mood states, as exercise stimulates the release of endorphins and serotonin, which are essential neurotransmitters involved in emotional regulation and overall psychological well being (Garcia et al., 2020). Moreover, breathing exercises such as diaphragmatic and paced breathing enhance parasympathetic nervous system activity, thereby reducing sympathetic overactivity commonly seen in high risk pregnancies, which contributes to anxiety reduction and emotional stabilization (Kumar & Singh, 2021). Relaxation techniques, including progressive muscle relaxation and guided imagery, further complement physiotherapy by helping pregnant women manage intrusive thoughts and fears, ultimately improving their coping mechanisms during pregnancy (Williams et al., 2017). In addition to reducing anxiety and stress, physiotherapy has been shown to positively influence sleep quality, which is often disrupted in high risk pregnancies due to discomfort and psychological distress, and improved sleep in turn enhances cognitive functioning and emotional resilience (Chen et al., 2022). The inclusion of supervised exercise programs tailored to individual risk profiles ensures safety while also fostering a sense of confidence and empowerment among pregnant women, which is critical in mitigating feelings of helplessness and vulnerability (Patel & Sharma, 2018). Social interaction during physiotherapy sessions, whether in group settings or through consistent engagement with healthcare professionals, also contributes to emotional support, reducing feelings of isolation that are commonly reported in high risk pregnancies (Lopez et al., 2021). Furthermore, physiotherapy education provides women with knowledge about bodily changes and safe activity levels, which reduces fear of movement and promotes active participation in their own

care, thereby enhancing psychological autonomy (Brown & Davis, 2019). Evidence also suggests that consistent physical activity during pregnancy is linked with lower incidences of antenatal and postnatal depression, highlighting the long term mental health benefits of physiotherapy interventions (Nguyen et al., 2020). The mind body connection emphasized in physiotherapy approaches underscores how physical improvements, such as reduced pain and increased mobility, directly contribute to improved mental health by decreasing frustration and enhancing daily functioning (Hernandez et al., 2017). Physiotherapy interventions can help regulate hormonal fluctuations that influence mood, further supporting emotional balance throughout pregnancy (Ali & Khan, 2023). The structured nature of physiotherapy programs also introduces routine and predictability, which are psychologically beneficial for women dealing with high risk conditions, as it provides a sense of stability and control (Roberts et al., 2018). Individualized physiotherapy plans ensure that interventions are adapted to the specific medical and psychological needs of each patient, thereby maximizing both safety and therapeutic effectiveness (Mehta & Verma, 2021). The positive outcomes of these interventions are summarized in Table 3, which presents the positive effects of physiotherapy on anxiety reduction, mood improvement, and sleep quality, highlighting its holistic benefits (Thompson et al., 2022). Furthermore, integrating physiotherapy with multidisciplinary care, including obstetric and psychological support, creates a holistic treatment model that addresses both physical and emotional dimensions of maternal health (Singh et al., 2019).

Table 3. Effects of Physiotherapy on Anxiety, Mood, and Sleep in Pregnancy

Domain	Physiotherapy Interventions	Positive Effects	Underlying Mechanisms	Clinical Considerations
Anxiety Reduction	Breathing exercises, relaxation techniques, prenatal yoga, guided imagery	Decreased anxiety levels, improved emotional regulation, enhanced sense of control	Activation of parasympathetic nervous system, reduced cortisol levels, improved mind body connection	Ensure a calm environment, tailor intensity for high risk pregnancies
Mood Improvement	Low impact aerobic exercise, group exercise sessions, stretching, education	Reduced symptoms of depression, improved mood and self esteem,	Release of endorphins and serotonin, improved circulation, social interaction support	Monitor for fatigue, encourage consistency rather than intensity

		increased motivation		
Sleep Quality	Relaxation training, breathing techniques, gentle mobility exercises, positioning advice	Improved sleep duration and quality, reduced insomnia, better sleep onset	Reduction in physical discomfort, muscle relaxation, decreased stress hormones	Advise side lying positions, avoid late intense exercise sessions
Stress Management	Mindfulness based movement, physiotherapy counseling, posture correction	Lower stress perception, improved coping strategies	Regulation of autonomic nervous system, improved body awareness	Combine with education for long term benefits
Fatigue Reduction	Light aerobic activity, stretching, energy conservation techniques	Increased energy levels, reduced daytime fatigue	Improved oxygen delivery and circulation, enhanced metabolic efficiency	Adjust frequency and duration based on tolerance
Overall Well being	Integrated physiotherapy program (exercise + education + relaxation)	Enhanced quality of life, better maternal adaptation to pregnancy	Holistic improvement in physical, emotional, and functional health	Requires individualized, multidisciplinary approach

Safety Considerations

Safety is a critical aspect of antenatal physiotherapy, particularly in high risk pregnancies where both maternal and fetal well being must be carefully protected through appropriately designed and supervised interventions (ACOG, 2020). Exercise programs should always be individualized based on the specific medical condition, gestational age, and overall health status of the patient to minimize risks and ensure therapeutic benefits (Mottola et al., 2018). Close monitoring by qualified healthcare professionals is essential to detect any early signs of intolerance or complications during physical activity (Nascimento et al., 2019). Intensity levels should generally remain moderate, avoiding high impact or strenuous activities that could compromise cardiovascular stability or uteroplacental circulation (Davenport et al., 2019). Proper warm up and cool down phases are important components of safe exercise sessions, as they help in gradual physiological adaptation and reduce the risk of musculoskeletal injury (Bgeginski et al., 2021). Hydration and environmental conditions should also be considered, as overheating and dehydration can negatively affect both the mother and fetus (Ravanelli et al., 2019). Warning signs such as dizziness, shortness of breath before exertion, chest

pain, vaginal bleeding, uterine contractions, or severe abdominal or pelvic pain should prompt immediate cessation of activity and urgent medical consultation (ACSM, 2021). Supine positions after the first trimester should generally be avoided due to the risk of vena cava compression, which can reduce blood flow and cause hypotension (Artal, 2017). Exercises requiring rapid directional changes or balance challenges should be modified to prevent falls, especially as the center of gravity shifts during pregnancy (Evenson et al., 2018). The use of supportive devices such as maternity belts or proper footwear can further enhance safety and comfort during physiotherapy sessions (Haakstad et al., 2020). Education plays a vital role in ensuring safety, as women who are informed about safe exercise practices and potential warning signs are more likely to engage in physiotherapy confidently and appropriately (Harrison et al., 2019). Collaboration between physiotherapists, obstetricians, and other healthcare providers ensures a multidisciplinary approach that optimizes safety and clinical outcomes in high risk pregnancies (Okafor & Goon, 2021). Adherence to established clinical guidelines and continuous assessment throughout the antenatal period are essential to maintain safety while maximizing the physical and psychological benefits of physiotherapy (WHO, 2022).

Contraindications

Contraindications are an essential consideration in antenatal physiotherapy, particularly in high risk pregnancies where inappropriate exercise may lead to serious maternal or fetal complications (ACOG, 2020). Absolute contraindications to exercise include conditions such as severe preeclampsia, which is associated with hypertension and end organ involvement and can be exacerbated by physical exertion, thereby posing significant risks to both mother and fetus (Brown et al., 2018). Placenta previa, especially in the later stages of pregnancy, is another absolute contraindication due to the increased risk of hemorrhage with movement or increased intra abdominal pressure (Jauniaux et al., 2019). Similarly, women at high risk of preterm labor or with a history of recurrent preterm births should avoid structured exercise programs, as uterine stimulation may precipitate early contractions (Goldenberg et al., 2020). Other absolute contraindications may include severe cardiovascular or respiratory disorders where exercise tolerance is significantly compromised (Meah et al., 2020). In contrast, relative contraindications such as mild to moderate anemia require careful evaluation and modification of exercise intensity rather than complete restriction, as low hemoglobin levels can reduce oxygen carrying capacity and lead to fatigue during activity (Rebarber et al., 2021). Obesity is another common relative contraindication where physiotherapy remains beneficial but must be adapted to reduce joint stress and prevent injury while still promoting cardiovascular health (Davenport et al., 2019). Musculoskeletal limitations, poorly controlled thyroid disorders, or sedentary lifestyle also fall under relative contraindications, necessitating individualized exercise prescriptions (Nascimento et al., 2019). In such cases, low impact activities, shorter

durations, and close supervision are recommended to ensure safety while maintaining the benefits of physical activity (Mottola et al., 2018). Proper screening and risk assessment by healthcare professionals are crucial in identifying contraindications and determining the appropriateness of physiotherapy interventions (ACSM, 2021).

Discussion

The evidence from the past decade strongly supports the role of antenatal physiotherapy in improving outcomes in high risk pregnancies, with numerous studies demonstrating its effectiveness in enhancing maternal health and reducing complications (Davenport et al., 2019). Physiotherapy interventions, including tailored exercise programs, education, and therapeutic techniques, have been shown to improve cardiovascular fitness, musculoskeletal stability, and functional capacity in pregnant women with high risk conditions (Mottola et al., 2018). In addition to physical benefits, antenatal physiotherapy significantly contributes to psychological well being by reducing anxiety, depression, and stress levels through structured activity and relaxation strategies (Nascimento et al., 2019). Improved sleep quality and enhanced emotional resilience further highlight its role in promoting overall quality of life during pregnancy (Ravanelli et al., 2019). Moreover, physiotherapy encourages patient engagement and self management, empowering women to take an active role in their health and pregnancy outcomes (Evenson et al., 2018). Despite these well established benefits, several barriers continue to limit the widespread implementation of antenatal physiotherapy, particularly in resource limited settings (WHO, 2022). Lack of awareness among pregnant women and even healthcare providers remains a significant challenge, leading to underutilization of available services (Okafor & Goon, 2021). Limited access to physiotherapy facilities, especially in rural and underserved areas, further restricts the reach of these interventions (Harrison et al., 2019). The shortage of trained professionals with expertise in antenatal care reduces the quality and availability of specialized physiotherapy services (Bgeginski et al., 2021). Cultural beliefs and misconceptions regarding physical activity during pregnancy may also discourage women from participating in physiotherapy programs (Haakstad et al., 2020). Addressing these challenges requires increased awareness campaigns, integration of physiotherapy into routine antenatal care, and improved training programs for healthcare providers (ACOG, 2020). Strengthening healthcare infrastructure and promoting multidisciplinary collaboration can further enhance the accessibility and effectiveness of antenatal physiotherapy services (Meah et al., 2020).

Conclusion

Antenatal physiotherapy is a vital component of comprehensive care in high risk pregnancy, offering a multidimensional approach that addresses not only physical health but also psychological and

functional well being. Through carefully designed and supervised interventions, physiotherapy helps improve cardiovascular fitness, muscular strength, flexibility, and postural stability, all of which are essential in managing the physiological demands of pregnancy. At the same time, it plays a significant role in reducing stress, anxiety, and discomfort, thereby enhancing overall quality of life for expectant mothers. The inclusion of breathing exercises, relaxation techniques, and patient education further empowers women to actively participate in their care and better cope with the challenges associated with high risk conditions. Moreover, physiotherapy supports functional independence and prepares women for labor, delivery, and postpartum recovery. Its holistic nature makes it an indispensable tool in modern obstetric care, particularly when dealing with complex pregnancies that require specialized attention. Integrating antenatal physiotherapy into routine antenatal services ensures early intervention, continuous monitoring, and individualized care, ultimately contributing to improved maternal and fetal outcomes. Therefore, it should be recognized not as an optional addition but as a fundamental element of standard prenatal care in high risk pregnancies.

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