

## Physical activity during pregnancy: beliefs, benefits, recommendations, and contraindications

## Actividad física durante el embarazo: creencias, beneficios, recomendaciones y contraindicaciones

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### Abstract:

The practice of physical activity and physical exercise (PA/ PE) is fundamental to the health of the entire population. Despite erroneous beliefs that have been held for many years, more recent studies have shown that PA/PE is safe and confers health benefits to the mother and her baby. However, several studies have shown that the prescription of physical activity by health personnel is often limited, inaccurate, and in some cases absent, which is perpetuated by the mothers' own beliefs. In this sense, a reduction in PA during pregnancy is frequently reported, motivated by popular beliefs about the contraindication of its practice, the mother's age, ethnicity, schooling, and socioeconomic level. Furthermore, from the preventive point of view, the hygienic-dietary recommendations have been more important than PA/PE recommendations during prenatal care. In this sense, the aim of this review is to describe the beliefs, benefits, recommendations, and contraindications of PA/PE during pregnancy, in order to facilitate decision making by prenatal care providers.

### Keywords:

*Physical activity, physical exercise, pregnancy, benefits, contraindications*

### Resumen:

La práctica de actividad física y el ejercicio físico (AF/EF) son fundamentales para la salud de toda la población. A pesar de las creencias erróneas que se mantuvieron por muchos años, los estudios más recientes han demostrado que la AF/EF es segura y que confiere beneficios a la salud de la madre y de su bebé. Sin embargo, diversos estudios han evidenciado que la prescripción de la actividad física por parte del personal de salud suele ser limitada, inexacta y en algunos casos ausente, lo cual se perpetúa con las creencias propias de las madres. En este sentido, con frecuencia se reporta una reducción de la AF durante el embarazo, motivada por creencias populares sobre la contraindicación de su práctica, la edad de la madre, la etnia, la escolaridad y el nivel socioeconómico. Además, desde el punto de vista preventivo, las recomendaciones higiénico-dietéticas han sobresalido por encima de las recomendaciones de AF/EF durante la atención prenatal. En este sentido, el objetivo de esta revisión es describir las creencias, beneficios, recomendaciones y contraindicaciones de la AF/EF durante el embarazo, para facilitar a los prestadores de atención prenatal la toma de decisiones.

### Palabras Clave:

*Actividad física, ejercicio físico, embarazo, beneficios, contraindicaciones*

### INTRODUCTION

Physical activity (PA) is any movement or activity that involves energy expenditure, while physical exercise (PE) is a subclass of

PA that differs in that it is structured, type, time, and intensity.<sup>1</sup> Pregnancy is a time of various physiological, psychological, and behavioral changes that can lead to lifestyle changes for pregnant women.<sup>2</sup> Several authors consider pregnancy as an important

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time to start exercising, as it is associated with increased motivation to maintain or start a healthy lifestyle, and a higher frequency of medical appointments, which in turn facilitates follow-up PA/PE.<sup>3</sup> Regular PA/PE during pregnancy is associated with numerous benefits, such as decreased incidence of gestational diabetes (GD), hypertensive disorders, operative or cesarean deliveries, excessive gestational weight gain (EGWG), postpartum weight retention, postpartum depression, among others, which reduces morbidity and mortality of the mother-child pair.<sup>4-9</sup> However, several studies have shown that PA/PE prescription by health care providers is often limited, inaccurate, and in some cases absent<sup>10</sup>. Despite the existence of several national<sup>11</sup> and international<sup>12</sup> guidelines that can help in the prescription of PA/PE, many professionals do not have adequate knowledge for prescribing PA/PE during pregnancy.<sup>13,14</sup> On the other hand, a reduction in PA/PE during pregnancy is frequently reported, motivated to a large extent by popular beliefs rooted in different populations, which sometimes take the form of social norms such as the belief that performing PA/PE generates spontaneous abortions, or that pregnancy is a time to rest and reducing PA/PE is one of the most determining factors in the practice of PA/PE.<sup>15</sup> In addition, factors such as age, ethnicity, schooling, and socioeconomic status may also interfere with adherence to PA/PE recommendations during pregnancy, as they are related to knowledge, affordability, and discrimination.<sup>16,17</sup> On the other hand, the main motivation reported by pregnant women to engage in PA/PE has been the health of their baby.<sup>18</sup> In general, PA/PE is recommended at any stage of life, and it has been reported that in the absence of obstetric complications or medical contraindications, it is safe and advisable during pregnancy, therefore, pregnant women should be encouraged to continue or initiate physical activity.<sup>19</sup> This is especially important since the epigenetic effects of PA/PE in conjunction with diet impact fetal programming during a window of at least 1000 days, from conception to the first 2 years of life, conditioning the health of the future baby.<sup>20,21</sup> On the other hand, the current epidemiological panorama, with the pandemic of obesity and other chronic diseases, the greater participation of women in the workplace with its respective challenges (inequality, discrimination, etc.) and more sedentary lifestyles, has increased the proportion of women of reproductive age who begin their pregnancies with some health problem.<sup>22</sup>

#### **BELIEFS ABOUT PHYSICAL ACTIVITY/EXERCISE DURING PREGNANCY**

For a long time, PA/PE was believed to be harmful during pregnancy, and women were advised to reduce or in some cases completely avoid exercise, as there was concern that maternal exercise could have adverse health consequences for the offspring, such as malformations, growth restriction, hypoxia, miscarriage, premature delivery, and brain damage<sup>23</sup>; however, women's beliefs and attitudes towards prenatal PA/EF vary across cultures<sup>24</sup> and are therefore often very heterogeneous. Despite the inherent differences between countries or cultures,

these beliefs coupled with perceived barriers such as lack of time or lack of knowledge of the benefits during pregnancy, have impacted adherence to PA/PE recommendations by pregnant women, in addition, it is estimated that more than 60% of physicians are not familiar with current guidelines for exercise during pregnancy<sup>25</sup>, and practitioners rarely discuss PA with their pregnant patients.<sup>26</sup> In addition, there are other physical barriers such as age, nausea, vomiting and general malaise, psychological factors (lack of motivation, fear and worry) and environmental factors (cultural beliefs, social pressure, lack of family support, lack of parks or exercise areas and insecurity), which intervene in adherence to PA/PE recommendations.<sup>27</sup> This could explain the low levels of PA/PE in pregnant women in various countries such as the United States<sup>28</sup>, Brazil<sup>29</sup>, Ireland<sup>30</sup>, Denmark<sup>31</sup> and Mexico.<sup>32</sup> Therefore, it is necessary to improve the strategies for prescribing and recommending PA/PE during pregnancy, and better strategies to promote adherence to the recommendations as an important strategy for promoting a healthy pregnancy, which is a challenge, since many women consider pregnancy as a time of rest from diet and PA/PE.<sup>33</sup>

#### **BENEFITS OF PHYSICAL ACTIVITY/EXERCISE DURING PREGNANCY**

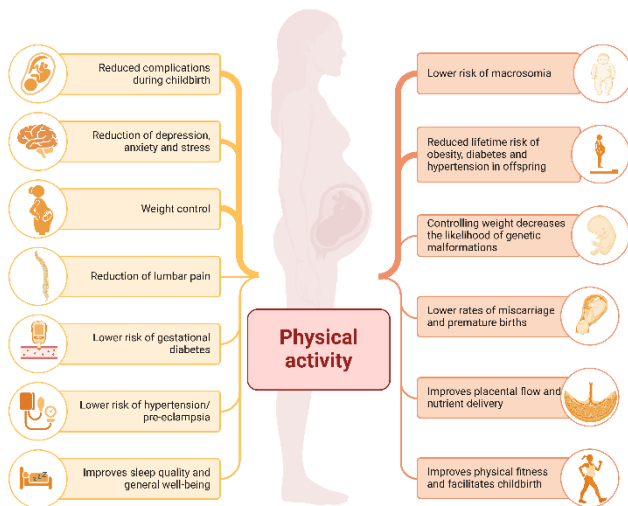
The most recent studies have shown that PA/PE during pregnancy is safe and confers health benefits to the mother and her baby, as long as there are no other complications or contraindications.<sup>19</sup>

##### **Benefits for pregnant women**

Physically active pregnant women have lower rates of preterm delivery, impaired fetal growth, miscarriage, cesarean section, or prolonged postpartum recovery, which reduces the risk of injury to both mother and baby.<sup>34-38</sup> In addition, PA/PE has been shown to decrease the risk of GERD and maternal obesity.<sup>39,40</sup> Other benefits include shorter labor duration and complications<sup>41</sup>, reduced perception of fatigue, stress, anxiety, and depression<sup>42-46</sup>, and reduced low back pain and the presence of limb edema.<sup>47,48</sup> PA/PE decreases the likelihood of GD due to the increased affinity of insulin for its cellular receptor, with a consequent decrease in insulin resistance<sup>49</sup>, together with a lower risk of developing gestational hypertension and preeclampsia.<sup>50</sup> On the other hand, it has been reported that PA/PE can also improve sleep quality and increase motivation to exercise, and generally improve pregnant women's sense of well-being.<sup>48</sup> In addition, there is strong evidence for the benefits associated with physical activity during pregnancy, including increased functional mobility and reduced nausea and vomiting.<sup>51,52</sup> In addition, some other studies have reported a positive impact of PA/PE by increasing the practice of breastfeeding; this has been explained by the fact that pregnant women who practice PA/PE tend to follow healthier lifestyles and have greater knowledge of the benefits of PA/PE and breastfeeding<sup>53</sup>, which is positive for the health of both the mother and her baby.

##### **Benefits for baby**

The benefits that PA/PE can confer on the baby include a lower risk of macrosomia<sup>54</sup> and a decreased risk of obesity, hypertension, and type 2 diabetes throughout life.<sup>55</sup> PA/PE furthermore normalizes maternal blood glucose, thereby reducing insulin resistance, which in turn, regulates fetal size, while placental blood flow and nutrient supply to the developing fetus are stabilized.<sup>56,57</sup> Pregnancy is generally associated with decreased functional status; however, exercise before, during and after pregnancy, in conjunction with good hygienic and dietary practices, promotes the growth and development of the baby and can improve health status throughout pregnancy and the postpartum period (Figure 1).<sup>58</sup>



**Figure 1. Benefits of physical activity during pregnancy.**<sup>34-58</sup>

### PHYSICAL ACTIVITY/EXERCISE RECOMMENDATIONS DURING PREGNANCY

PA recommendations do not vary much from the recommendations for the general population. Pregnant women should engage in at least 150 minutes of moderate-vigorous intensity aerobic activity per week during pregnancy and postpartum. Women who were regularly engaged in vigorous-intensity aerobic activity or who were physically active prior to pregnancy can continue these activities during pregnancy and the puerperium.<sup>19</sup>

However, it is important for women to be under the care of a healthcare professional who can monitor the evolution of the pregnancy, as well as adjust PA before and after the birth of the baby.<sup>59</sup> Pregnancy produces anatomical and physiological changes that should be taken into account when prescribing exercise, for example, the most distinctive changes are weight gain and a change in the point of gravity resulting in progressive lordosis, which leads to increased forces on the joints and spine during weight-bearing exercise, and as a result, more than 60% of all pregnant women experience low back pain.<sup>60</sup> Strengthening the abdominal and back muscles could minimize this risk. Blood volume, heart rate, stroke volume and cardiac output normally increase during pregnancy, and systemic vascular resistance decreases. These hemodynamic changes

establish the circulatory reserve necessary to sustain the pregnant woman and fetus at rest and during exercise. On the other hand, the growth of the pregnant uterus generates diaphragmatic ascent, which conditions a decrease in total lung capacity; the ventilatory rate increases by 1 or 2 ventilations per minute, while oxygen consumption rises up to 20%. In addition, the respiratory volume per minute increases by 40 to 50%, resulting in hyperventilation and dyspnea, which can be reduced with regular PA/PE.<sup>61</sup> Maintaining a supine position during exercise after 20 weeks gestation may result in decreased venous return due to aorto-caval compression of the gravid uterus, leading to hypotension, and this hemodynamic change should be considered when prescribing exercise modifications in pregnancy.<sup>62,63</sup> On the other hand, hormonal changes such as increased relaxin, progesterone and estradiol not only affect the laxity of the ligaments of the pelvic joints, but also affect the collagen of the connective tissues and, therefore, the ligaments and tendons in general, which is why it is recommended to avoid the mechanical loading of heavy weights since pregnant women are more prone to injuries.<sup>64</sup> Some disciplines or exercises that have been extensively studied and proven to be safe and beneficial have been described and are shown in Figure 2.



**Figure 2. Recommended physical activities during pregnancy.**<sup>67</sup>

Walking and exercise cycling are usually the most recommended PA/PE in clinical guidelines as they tend to be more accessible<sup>12</sup>, another study through a pilates program reported beneficial results for maternal health<sup>65</sup>, while swimming has been reported as an activity that in addition to the physical benefits, for example, a study in mice reported that swimming in pregnant mice stimulated brain-derived neurotrophic factor in the offspring and increased neuronal proliferation.<sup>66</sup> The characteristics of an effective exercise regimen during pregnancy have also been described (Table 1).<sup>67</sup>

**Table 1.** Strategy and characteristics of physical activity/exercise prescription during pregnancy.<sup>62</sup>

Characteristic	Strategy
<b>When to start?</b>	First trimester (<12 weeks of gestation).
<b>Session duration</b>	30-60 minutes.
<b>Frequency</b>	At least 3-4 (can be daily)
<b>Exercise intensity</b>	<60-80% of age-predicted maternal heart rate (usually not exceeding 140 beats per minute).
<b>Self-declared intensity of exercise</b>	Moderate intensity (12-14 on the Borg scale: the Borg scale is a scale of 15 categories (from 6-20) to measure the level of perceived exertion: light exercise is approximately 6-11; 13 is somewhat hard; 15 is hard; 19 is extremely hard).
<b>Supervision of the exercise</b>	Preferred, if available.
<b>When to end?</b>	Until delivery (according to tolerance or medical contraindication).

Women who are considered sedentary prior to pregnancy can start with 10 minutes of light, low-intensity PA (such as walking), and progressively increase to 30-60 minutes of moderate-intensity PA/PE.

#### CONTRAINDICATIONS TO PHYSICAL ACTIVITY/EXERCISE DURING PREGNANCY

While PA/PE is known to be safe and beneficial during pregnancy, there are also certain situations or contraindications to PA/PE. Contact activities with a high risk of abdominal trauma or imbalance should be avoided, as well as scuba diving due to the inability of the fetal pulmonary circulation to filter bubble formation.<sup>68</sup> In addition, avoid exercises that involve the supine position as it complicates venous return and can lead to hypotension.<sup>69,70</sup> There are situations that contraindicate PA/PE such as: vaginal bleeding, dyspnea at rest, dizziness, headache, precordial pain, swelling of the calves and muscle weakness that affects balance.<sup>71</sup> At the appearance of any of these signs and symptoms, PA/PE should be paused and the treating physician should be consulted. On the other hand, there are contraindications considered relative such as: severe anemia,

unmonitored maternal cardiac arrhythmia, heart disease with hemodynamic repercussions, asthma, restrictive pulmonary disease, decompensated type 1 diabetes, morbid obesity, severe malnutrition (BMI less than 12 kg/m<sup>2</sup>), extreme sedentary lifestyle, intrauterine growth restriction, orthopedic limitation, severe smoking, uncontrolled hypothyroidism, nephropathy, unconscious hypoglycemia and neuropathic dysautonomia, which, as far as possible, should be identified by specialist physicians.<sup>69-71</sup> These contraindications will largely depend on the health and functional status of the pregnant woman. Finally, there are obstetric situations that are considered absolute contraindications for PA/PE because of the risks involved, such as: cervical isthmus incompetence, cerclage, multiple pregnancy with risk of preterm delivery, persistent bleeding in the second and third trimester, placenta previa before 26 weeks of gestational age, premature chorioamnionitis, and hypertensive syndromes of pregnancy.<sup>69,71</sup> Pregnant women with a medical history or history of any of these conditions should refrain from PA/PE and pay even more attention to their lifestyle.

#### CONCLUSION

PA/PE is considered safe and desirable during pregnancy in most women without complications or contraindications; however, some exercise routines may need to be modified due to normal anatomical and physiological changes and fetal requirements throughout the pregnancy process. In addition, it is necessary that health personnel in charge of prenatal care have the necessary knowledge to be able to recommend and prescribe PA/PE safely and efficiently during pregnancy, and encourage pregnant women to adhere to these recommendations and other healthy lifestyles, addressing the erroneous beliefs and knowledge of pregnant women.

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