

# Physical activity in pregnancy – a review of literature and current recommendations

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## SUMMARY

Physically active women often give up exercise once they are pregnant in fear of the child's health. Exercise has been proven to prevent numerous diseases, which is also relevant for pregnant women. Physical exercise has a positive effect on fetal growth and birth weight. It shortens labor and reduces effort associated with it. Moreover, it decreases the stress level during labor. Women who are physically active before and during pregnancy are characterized by lower incidence of diseases and complications, such as preeclampsia, premature labor or obesity. Exercise has not been shown to affect the occurrence of miscarriages and embryogenesis. Adverse effects of exercise may result from potential trauma. Activities recommended for pregnant women include: swimming, walking, stationary cycling, low-impact aerobics, yoga, Pilates, jogging and strength training (after consultation with a physician). Contact sports, mountain sports and diving are not recommended. Absolute contraindications to physical activity include: severe cardiovascular and respiratory diseases, second and third trimester bleeding, severe anemia, cervical incompetence, placenta previa and preeclampsia. Relative contraindications include poorly controlled metabolic diseases and other chronic diseases, addictions, extremely sedentary lifestyle, etc. Physical exercise during pregnancy should be reasonable, with intensity and duration increased gradually. Proper clothing, hydration and temperature should be borne in mind. Women after natural childbirth can resume physical activities as soon as several days after childbirth to restore cardio-pulmonary efficiency. In women undergoing a cesarean section, resumption of physical activity should be consulted with a physician and depends on potential complications. There is no evidence that low- and moderate-intensity training affects the quantity and quality of breast milk. The PPAQ questionnaire is a useful tool to evaluate the amount, intensity and frequency of physical activity in pregnant women. Encouraging women to commence exercise before and during pregnancy and to continue it after childbirth is becoming a significant element of interdisciplinary care for a pregnant woman.

**Key words:** pregnancy; exercise; physical activity

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## INTRODUCTION

Physical activity and healthy lifestyle are becoming more and more popular, and women-oriented social media promote regular trainings. Numerous women do undertake physical activity, but some give up exercise once they are pregnant out of fear for the safety of the child and the influence of exercise on the fetus. It is known that physical activity reduces the risk of various cardiovascular diseases [1], obesity [2], type 2 diabetes [3] and depression, and effectively eliminates adverse effects of stress on the body [4]. These positive effects have also been noted in pregnant women. An obstetrician is obliged to inform patients about benefits of exercise for both the mother and the fetus. Also, the cooperation between gynecologists, midwives and other doctors is significant to raise awareness of pregnant women and to resolve any doubts associated with commencing exercise in pregnancy.

## AIM

The aim of this study was to review the available literature on physical activity in pregnancy and recommendations of international gynecologic and obstetric societies. The article presents the influence of exercise on the course of pregnancy, enumerates relative and absolute contraindications to training and lists types of exercise allowed during pregnancy.

## PHYSICAL ACTIVITY AND THE COURSE OF PREGNANCY

There are numerous reports that support the positive influence of exercise on physiological pregnancy. Investigations from the year 2000 indicate that regular physical activity initiated in the first trimester of gestation has a positive

influence on fetal growth and birth weight [5]. Other interesting reports mention lower risk of preeclampsia in women who remain physically active before and during pregnancy [6]. Physical activity in pregnancy shortens labor [7,8], reduces effort associated with it [9] and limits the risk of perinatal complications. Moreover, lower exposure to stress, anxiety and exhaustion associated with labor have also been reported [10]. It has been observed that women who exercised before pregnancy and continued to train during pregnancy gained less weight than controls [11]. It is therefore justified to encourage pregnant women to engage in physical activity in order to prevent obesity and its accompanying diseases.

There are no data on premature births induced by exercise in pregnancy. Studies have revealed that women who gave birth prematurely exercised more rarely than women with term pregnancies [12]. Moreover, no correlation has been found between mild and moderate physical exercise and the risk of miscarriage [13]. No negative influence on embryogenesis has been documented [14]. A potential risk of fetal damage may be related with trauma. That is why pregnant women should avoid sports that might lead to injury and to an increase in the body temperature to teratogenic values, i.e. approximately 39°C, which, however, is unlikely with moderate exercise at room temperature [15].

## STARTING EXERCISE DURING PREGNANCY

Table 1 presents proposed types of physical activity adequate for pregnant women according to the American College of Obstetricians and Gynecologists [16].

An optimal exercise program should contain an aerobic and fitness component. Large muscle groups should be engaged by rhythmic

**Tab. 1.** Types of physical activity adequate for pregnant women according to the American College of Obstetricians and Gynecologists [16]

Types of physical activity for pregnant women
· swimming
· walking
· low-impact aerobics
· stationary cycling
· yoga
· Pilates
· jogging (in consultation with a physician)
· strength training (in consultation with a physician)

exercises, such as swimming or walking, strength-conditioning and stretching. Physiologic anatomic changes during pregnancy, such as progressing lumbar lordosis as well as a shift in the point of gravity and weight gain may lead to back pain. Pain can be eliminated by strengthening the muscles of the abdomen and back. Women who train jogging before pregnancy may continue this activity during pregnancy after consultation with a physician. It is usually recommended to modify the intensity of training and control hydration. Yoga and Pilates are considered safe for pregnant women provided that positions that may pose a risk of fall and injury are modified. Moreover, subtypes called *hot yoga* and *hot Pilates*, whereby exercise is performed in a hot and humid environment, are contraindicated during pregnancy [17].

The current recommendations of the Polish Society of Gynecologists and Obstetricians suggest that commencing physical activity and increasing its intensity during pregnancy are not indicated [18]. However, numerous American societies underline beneficial effects of physical activity in all pregnant women. The recommendations prepared by the Royal College of Obstetricians and Gynaecologists (RCOG) [19] state that physical activity in pregnant women with previously sedentary lifestyle should begin from 15-minute workouts three times a week. The intensity of activity should be gradually increased to 30 minutes each day. Women who exercised before pregnancy should not give up physical activity once they get pregnant. Obese pregnant women should be encouraged to commence physical exercise starting from short low-intensity trainings, and to modify their diets. General principles concerning physical activity in pregnancy include:

- warm-up and stretching should precede each workout (5–10 minutes);
- exercise at high temperature should be avoided (particularly when longer than 45 minutes);
- heart rate should be monitored;
- hydration should be monitored;
- diet should be properly balanced to account for energy expenditure;
- negative symptoms associated with exertion should be observed.

Heart rate and blood pressure monitoring during physical activity enables one to regulate the intensity of exercise. Moreover, individual experience of pregnant women is very important in control and possible modification of

performed exercises. Professional athletes, when pregnant, may use heart rate ranges, prepared in 2016, to monitor training intensity (Tab. 2) [20]. There are no recommendations about heart rate for recreational athletes during pregnancy. It is assumed that the ability to talk freely during physical activity (so-called *talk test*) is a measure of proper exercise intensity.

The American College of Sports Medicine (2014) advises against exercises associated with weight-lifting and other excessively strenuous activities, but the American College of Obstetricians and Gynecologists (ACOG) emphasizes that this form of activity may be performed by pregnant women who were physically active before becoming pregnant. Women in physiological pregnancy who never practiced sports before getting pregnant may start training but should begin from mild workouts and gradually increase the level of intensity. It must be underlined that each pregnant woman who wishes to train should consult with her physician beforehand. It is necessary to conduct further investigations concerning strength-conditioning workouts during pregnancy and puerperium [16]. Women with contraindications to exercise before or during pregnancy should reduce physical activity or avoid it completely. Women with physiological pregnancies should gradually reduce training intensity before the term of delivery [19].

All studies addressing physical activity during pregnancy exclude pregnant patients at risk of miscarriage. There is no reliable information about physical exercise in women with a non-physiological course of pregnancy. Women at a high risk of premature labor and miscarriage are recommended to limit exercise and physical activity. Tables 3 and 4 present absolute and relative contraindications to physical activity in pregnancy according to the ACOG [16].

Pregnant women should avoid sports that might cause fetal injury. Contact sports that carry a risk of abdominal trauma, such as boxing, judo or hockey, are not recommended. Due to overheating the body, pregnant women should not practice hot yoga and hot Pilates. Diving is also prohibited as it may cause decom-

pression sickness. Mountain sports in pregnant patients non-acclimatized to conditions over 2500 meters above sea level are not indicated either due to the risk of fetal hypoxia [16,21]. Exercises involving jumping or rapid changes of movement direction may increase the risk of joint injury due to ligament softening [22]. Women after the 16th week of gestation should avoid exercises involving the supine position as it increases the likelihood of low pressure episodes [21]. Moreover, pregnant women should stop exercising once they notice warning signs, such as: vaginal bleeding, regular painful uterine contractions, amniotic fluid leakage, dyspnea before exertion, dizziness and headache, chest pain and calf pain or swelling. In this situation, a woman should contact a physician. If symptoms appear during physical activity, the patient should not stop exercising abruptly but should remain in motion for a while [19].

## PHYSICAL ACTIVITY AFTER PREGNANCY

Physiologic and anatomic changes resulting from natural childbirth return to the state from

**Tab. 2.** Recommended heart rate ranges during physical activity in professional athletes during pregnancy

Age [years]	Heart rate [bpm]
20-29	145-150
30-39	140-156

**Tab. 3.** Absolute contraindications to physical activity during pregnancy

### Absolute contraindications to physical activity during pregnancy:

- Severe cardiovascular diseases
- Severe respiratory diseases
- Persistent bleeding in the second or third trimester of gestation
- Severe anemia
- Preeclampsia or pregnancy-induced hypertension
- Multiple pregnancy at risk of premature delivery
- Ruptured membranes
- Premature labor during the current pregnancy
- Cervical incompetence
- Placenta previa after 26 weeks of gestation

**Tab. 4.** Relative contraindications to physical activity during pregnancy

### Relative contraindications to physical activity during pregnancy:

- Anemia
- Maternal arrhythmias
- Chronic bronchitis
- Poorly controlled type 1 diabetes
- Morbid obesity
- Underweight with BMI < 12
- Poorly controlled hypertension
- Orthopedic limitations
- Poorly controlled epilepsy
- Poorly controlled hyperthyroidism
- Nicotine addiction

before pregnancy approximately 6 weeks after delivery [23]. Women after natural childbirth can resume their exercises as soon as several days after childbirth to restore cardio-pulmonary efficiency. Their training should be adjusted to their individual skills, fitness and doctor's opinion.

Each woman after a cesarean section should consult with her physician before resuming physical activity. In women undergoing a cesarean section, a return to physical activity depends on potential complications (e.g. anemia, thrombocytopenia) as well as postoperative complications (e.g. difficult wound healing) and postoperative pain [25]. The American College of Obstetricians and Gynecologists advises against lifting objects heavier than their newborn infant [16].

A woman after childbirth should prepare herself properly for training. It is important for her to wear an adequate sport bra and sport clothing that is not too tight. She must also remember about good hydration during workouts. Women should breastfeed before workouts [16].

## PHYSICAL EXERCISE AND POSTPARTUM BENEFITS

Physical activity during pregnancy has a positive effect on health. In the postpartum period, women often lose control over their urinary bladder. Research has demonstrated that urinary incontinence less frequently affected women who exercised during pregnancy than controls [25]

More and more pregnant women suffer from antenatal depression. It has been shown that exercise relieves depression symptoms [26]. The influence of physical activity on the composition and quantity of milk is a common concern of women. Research has revealed no changes in milk of women engaging in low- and moderate-intensity activities. Increased amounts of lactic acids, which entail its worse tolerance by a newborn, are observed in women after strenuous workouts [27]. Breastfeeding women lose approximately 200 mg of calcium daily, which results in bone mineral density loss by approximately 3–9% within 6 months. Studies have shown that physical activity may reduce bone mass loss during lactation [28].

## PHYSICAL ACTIVITY DURING PREGNANCY AND CHILD'S DEVELOPMENT

There have been studies that checked how physical activity during pregnancy affects morphometric parameters and neurodevelopment in children up to 5 years of age. It has been shown that children of physically active women had lower body mass and performed better in Wechsler scales and tests of oral language skills compared to controls. It has also been observed that birth weight and postnatal fat mass were lower in children of exercising mothers compared to controls [29].

## ASSESSMENT OF PHYSICAL ACTIVITY IN PREGNANT WOMEN

Measuring physical activity in pregnant women is a complex and difficult process. It requires reliable methods that take into consideration time, intensity and frequency of workouts. The simplest and the most common tool is a survey that contains given parameters.

In order to estimate average physical activity in pregnant women, the Pregnancy Physical Activity Questionnaire (PPAQ) can be applied. It consists of 32 questions divided into 4 main parts. In each part, women provide answers referring to the current trimester of pregnancy. The first part of the survey concerns the amount and frequency of physical activity associated with household maintenance. The second part is associated with physical activity resulting from using transport means. The third part includes questions about physical activity during exercise. The last part consists of questions on the activity related with professional work or studying [30]. This questionnaire is worth performing in practice to evaluate the level of physical activity of a pregnant woman.

## CONCLUSION

Most international medical associations recommend physical activity in pregnancy with a physiological course. Pregnant women should be informed about benefits resulting from exercise. The development of precise guidelines for pregnant women is very necessary. Bedrest regime is rarely recommended during pregnancy, and in the absence of contraindications or complications, physical activity becomes a desirable element of the pregnant woman's lifestyle. The type and intensity of training must



be individually adjusted considering the current fitness level, activity before pregnancy, comorbidities and spare time. Attention should be paid to proper hydration and ambient temperature. Exercise intensity should be increased gradually. Any adverse events are a signal to cease exercises or reduce their intensity. A return to

physical activity after childbirth should be slow and reasonable. This will help the woman restore a good fitness level and normal body weight. Further studies on physical activity during pregnancy of a non-physiological course and in women with a history of health problems are needed.

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