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Physical activity and pelvic floor muscle training during pregnancy: review of international recommendations

Skrócony: Physical activity and PFMT during pregnancy: review of international recommendations

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ABSTRACT

Physical activity is associated with beneficial health effects for both mother and her future child, as well as the course of pregnancy. The aim of this review was the comparison of international guidelines with Polish recommendations. Data were collected from PubMed platform and international guidelines and narrowed to open access studies published between 1990–2023 in English, German and Polish. The existing literature shows an increase of interest in the impact of body activity during pregnancy and pelvic floor muscle training (PFMT). The recommendations move away from the more conservative approach, that previously suggested limitation of all exercise-related activities. Recently, The Polish Society of Gynecologists and Obstetricians and Polish Society of Sports Medicine announced a

planned release of joint recommendations on physical activity during pregnancy and after childbirth, as well as the translation of the "Get Active Questionnaire for Pregnancy", a screening tool for pregnant women, doctors and midwives, developed in accordance with the recommendations of international gynecological societies.

Key words: physical exercise; pregnancy; obstetrics; practice guideline; pelvic floor

INTRODUCTION

It is widely accepted that physical activity is associated with beneficial health effects in non-pregnant individuals. It contributes to cardiorespiratory fitness, reduces the risk of obesity and associated comorbidities, and increases life expectancy [1, 2]. Therefore, the World Health Organization (WHO) issued recommendations in accordance with the principles of evidence-based medicine, indicating that the beneficial effects of exercise in most adults are unquestionable and that the benefits far outweigh the risks [3, 4].

Pregnancy, as a particular phase in course of life, leads to numerous changes in anatomy, physiology and metabolism to adapt a woman's body for the proper course of pregnancy and uncomplicated delivery. The major anatomic and physiological changes during pregnancy are weight gain and shift of the center of gravity, leading to progressive lordosis. These changes result in increased force transmission to the joints and spine during weight-bearing exercise. As a result, more than 60% of all pregnant women experience lower back pain [3, 5].

Most observational epidemiological studies showed a beneficial effect of physical activity in pregnant women, such as reduced risk of gestational diabetes mellitus (GDM), lower risk of caesarean section and operative delivery with the use of forceps or vacuum, as well as shorter time of recovery after childbirth. Further, aerobic exercise can positively affect glucose levels in women with GDM and help to prevent preeclampsia [3, 6–8].

Pregnant women are generally more likely to engage in healthy lifestyle behaviors and to adopt a more conscious perception of their health condition [9]. Due to expected increased motivation and frequent contact with health care providers, it seems reasonable to encourage women to modify current behavior and introduce a healthy lifestyle during pregnancy. Specifically, aspects such as body weight control, increase of physical fitness and dietary improvements in accordance with the doctor's recommendations may be discussed [3].

The aim of our review was to summarize international guidelines on physical activity among pregnant women as well as recommendations for pelvic floor muscle training (PFMT) and to compare them with Polish guidelines [3, 10–17].

PubMed and websites of international societies and guideline committees were searched for publication issued between January, 1st 1990 and February, 28th 2023. The following terms and their combinations were used: “physical activity”, “body activity”, “pregnancy”, “pelvic floor muscle training”. The titles abstracts and full texts of relevant studies were screened. The search was narrowed down to open-access studies published in English, German and/or Polish.

CURRENT STATE OF KNOWLEDGE

Over the last two decades, there has been an increased interest in the impact of physical activity during pregnancy on its course and the effects it may cause [1, 18]. After 2000, the beneficial effects of physical activity during pregnancy have gained more recognition and it has been incorporated into official recommendations endorsed by international gynecological societies (Tab. 1) [3–4, 10, 11, 15, 17]. The progress in the medical field of obstetrics and the increasing knowledge about the physiology of pregnancy led to changes in the guidelines of the Polish Society of Gynecologists and Obstetricians concerning pregnancy. In general, a tendency to move away from the more conservative approach and the previously suggested limitation of all exercise-related activities towards a moderate physical activity in low-risk pregnancy was observed [3, 12, 19].

In comparison with international reports, we found a lower number of Polish publications and recommendations regarding physical activity during pregnancy.

Professional societies such as the American College of Obstetricians and Gynecologists (ACOG), the Royal College of Obstetricians and Gynaecologists (RCOG), the Swiss Society for Gynecology and Obstetrics (Schweizerische Gesellschaft für Gynäkologie und Geburtshilfe), the German Ministry of Nutrition (Bundesernährungsministerium), and the Society of Obstetricians and Gynecologists of Canada all recommend the promotion of physical activity during pregnancy [3, 10, 11, 15–17]. The newest guidelines published by the Society of Obstetricians and Gynecologists of Canada recommend at least 150 minutes of moderate-intensity physical activity per week in order to achieve clinically significant health benefits and reduce the risk of pregnancy complications [11]. Swiss and British guidelines recommend muscle strengthening at least twice per week. According to the Canadian guidelines women are recommended to continue their usual activities of everyday life even in case of pregnancy-related complications such as premature labor, unexplained persistent vaginal bleeding, placenta praevia after 28 weeks’ gestation, pre-eclampsia, incompetent cervix, **IUGR [full name?]** and ruptured membranes. However, it is emphasized that in such

circumstances, pregnant women should not participate in more strenuous exercise, and recommended that women with recurrent pregnancy loss, gestational hypertension, and history of spontaneous preterm birth should discuss their physical activity with their obstetric care provider in order to modify and adjust its intensity level [11]. Similarly, the recommendations issued by the Swiss Health Promotion Foundation (Gesundheitsförderung Schweiz) state that physical activity can be beneficial even for women with health problems, and that the benefits and risks must be carefully weighed against each other in case of the above-mentioned pathologies [15]. Regarding the type of physical activity, it is widely agreed that a combination of aerobic with resistance training has a more positive effect on pregnancy than aerobic activity alone [11].

POLISH RECOMMENDATIONS ON PHYSICAL ACTIVITY

Previously published recommendations of the Polish Society of Gynecologists and Obstetricians issued in 2005 emphasized above all the risks associated with too much physical activity and highlighted activities with a potentially harmful impact on pregnancy. The 2005 guidelines stated that the level of physical activity in uncomplicated pregnancy "must be reduced and taking up *de novo* physical activity or increasing it during pregnancy is contraindicated", while the latest recommendations by the Polish Society of Gynecologists and Obstetricians from 2012 in the field of maternity care for obese pregnant women recommend increasing physical activity in the preconception period in order to improve the energy expenditure and indicate that similar rules are also valid during pregnancy, unless there are contraindications [12, 13]. The Polish Society of Gynecologists and Obstetricians considers obesity in pregnant women an independent risk factor for obstetric complications, such as miscarriage, GDM, gestational-induced hypertension and preeclampsia, thromboembolic complications, fetal macrosomy, vaginal-operative delivery, perinatal hemorrhage, intrauterine fetus's death (in the second half of pregnancy), congenital malformations, increased morbidity and increased neonatal mortality [13].

Recently, the positive impact of physical activity during pregnancy has been promoted through the Prenatal Project initiative, with support of the Polish Society of Gynecologists and Obstetricians [20]. Later in 2022 an infographic consistent with international recommendations has been released. Worth noting is the announced update of Polish guidelines regarding physical activity during pregnancy and after childbirth with an adaptation of the "Get Active Questionnaire for Pregnancy", a screening tool for pregnant

women, doctors and midwives, developed in accordance with the recommendations of international gynecological societies [21].

ATTITUDES TOWARDS PHYSICAL ACTIVITY DURING PREGNANCY

Frequently, both patients and their obstetrician-gynecologists or other obstetric care providers express their fear of negative effects of regular physical activity in pregnancy such as miscarriage, poor fetal growth, musculoskeletal injury, or preterm delivery. However, in case of uncomplicated low-risk pregnancy, previous studies did not find an association between these events and physical activity [3]. According to Habecker et al. encouraging pregnant women to limit their physical activity is still a common practice among both gynecologists and other health care providers, even though among the surveyed obstetricians many did not expect such practice to prevent possible adverse outcomes in pregnancy [22]. Further, while guidelines issued by international gynecological societies recommend that pregnant women should engage in physical activity, data collected from the 2003–2006 by the National Health and Nutrition Examination Survey (NHANES) showed that less than 15% of women in the U.S. achieved the recommended minimum of 150 minutes of moderate-intensity physical activity per week [23]. Similar trends have been observed in the Polish population. Wojtyła et al. showed that out of more than 6,000 tested pregnant women, up to 96% reduced their physical activity during pregnancy [9, 24]. Interestingly, a discrepancy between the accomplished amount of physical activity (150 minutes of weekly moderate-vigorous) and actual participation in recommended training (3 or more sessions of adequate intensity lasting at least 30 minutes) has been reported by researchers from Iowa State University [25]. This may be due to the lack of one unified test for quantitative and qualitative assessment of the degree of physical activity [26].

Limited data is available regarding the level of knowledge on physical activity among Polish pregnant women. Several studies have shown that most pregnant women find information on the internet and not from health providers [27]. According to the data from 9889 participants of the Avon Longitudinal Study of Parents and Children (ALSPAC) in the UK, “younger pregnant women tend to be more active compared to older ones” [1]. In contrast, studies including Polish pregnant women identified women under 25 years old, nulliparous, unmarried and with basic level of education as a group with a particularly low level of knowledge about physical activity during pregnancy [9].

PELVIC FLOOR MUSCLE TRAINING

In this context, more and more emphasis are being placed on perinatal prophylaxis of the pelvic floor muscles, which is reflected in the international guidelines [11, 14, 16, 28]. The Swiss Society of Gynecology and Obstetrics (Schweizerische Gesellschaft für Gynäkologie und Geburtshilfe) underlines the importance of documenting patient's symptoms as well as medical history regarding urine incontinence at the beginning of the pregnancy. Targeted exercises under supervision (physiotherapy, midwife), *e.g.*, as part of birth preparation classes are recommended. Importantly, the women should be advised that premature contractions are not triggered by pelvic floor exercises during pregnancy [16]. The National Institute for Health and Care Excellence recommends pelvic floor training to every woman of reproductive age and regular continuation during pregnancy, providing women with exact instructions of exercise. It should be mentioned that Polish guidelines on pelvic floor muscles prophylaxis have been available since 2015. According to the Polish Urogynecological Society PFMT consists of behavioral therapy, rehabilitation techniques, kinesitherapy, relaxation techniques, electrotherapy and kinesiotaping. Depending on the results of clinical examination and patient's medical history, rehabilitation techniques should be started in the early puerperium, optimally after 12 hours and not later than 2 weeks after delivery [28].

BED REST

Bed rest is defined as no more than 1–2 hours per day outside of bed, with permitted activities, including the use of the toilet, bath and brief doctor's visits. It used to be widely recommended for women with various obstetric complications with the aim of prolonging pregnancy; these include but are not limited to a threatened miscarriage, premature delivery, preterm premature rupture of the membranes, intrauterine fetal growth restriction, gestational hypertension, pre-eclampsia and multiple pregnancy [3, 29, 30]. The analysis of questionnaire surveys, carried out among gynecology and obstetrics specialists, showed that 71% of them would recommend bed rest in case of cervical dilatation and risk of premature delivery, and 87% in case of preterm premature rupture of the membranes (PPROM). Interestingly, 72% and 56% of the respondents answered that they would not expect the beneficial effects of the above-mentioned restrictions in the event of premature delivery or PPRM, respectively [29, 31]. Further, one needs to keep in mind that bed rest may potentially lead to adverse outcomes such as an increased risk of thromboembolism for the mother, bone demineralization, muscle atrophy, negative effect on cardiovascular system, maternal weight and psychological condition and has a negative economic impact [29].

CONCLUSIONS

The above comparison of the guidelines of international gynecological and obstetrical societies is an attempt to summarize available knowledge about physical activity and PFMT in both physiological and complicated pregnancies. The results of observational studies highlight limitations in the quantitative and qualitative assessment of the forms of physical activity used, as well as the potential incompatibility of the guideline recommendations with the information provided to pregnant women by health providers [23, 26].

Appropriate prenatal education should increase the awareness among women in the reproductive age on the beneficial effects of physical activity in pregnancy and use of PFMT. Future mothers should know that in order to achieve effects exercises must be systematically performed already in the pre-conceptual period and continued throughout the entire pregnancy and after delivery [9]. Postpartum period is a convenient time for obstetricians and other pregnancy care takers to encourage women and engage them to continue a healthy lifestyle. The return to physical activity after childbirth and the introduction of new exercises is important in the context of a healthy lifestyle [3, 32].

There is no doubt about the need to popularize the subject of physical activity among women in the reproductive age. Therefore, it is highly needed to promote the announced recommendations on educational program in the field of physical activity and pelvic floor muscle training for Polish pregnant women in accordance with the international guidelines [21].

Conflict of interest

All authors declare no conflict of interest.

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Table 1. Recommendations on physical activity during pregnancy [3–4, 10, 11, 15, 17]

	Canada	Switzerland	Germany	Poland	USA	England
Date of issue	2019	2018	2015	2005, 2012	2020	2017
Organization	Society of Obstetricians and Gynaecologists of Canada	Gesundheitsfoerderung Schweiz	Bundesernährungsministerium	Polish Society of Gynecologists and Obstetricians UPDATE ANNOUNCED	American College of Obstetricians and Gynecologists	Royal College of Obstetricians and Gynaecologists

<p>General recommendations</p>	<p>Moderate-intensity physical activity at least 150 min./week</p> <p>Aerobic and resistance training, incorporating yoga and light stretching</p> <p>Intensity level: Pulse < 29 years old 125–146 beats/min, 30+ years old 121–141 beats/min „Talk-test”</p>	<p>At least 2 ½ hours of exercise per week in the form of everyday activities or moderate-intensity sports</p> <p>Strength training at least twice a week, ideally spread over several days a week</p> <p>Intensity level: little out of breath, but not necessarily sweating</p>	<p>Moderate-intensity physical activity at least 150 min./week, on most days of the week</p> <p>Outdoor physical activity(increased vit. D production)</p> <p>Intensity level: „Talk test”</p>	<p>The level of physical activity in uncomplicated pregnancy "must be reduced and taking up "de novo „physical activity or increasing it during pregnancy is contraindicated"</p>	<p>Moderate-intensity physical activity at least 20–30 min./day, on most days of the week</p> <p>Aerobic exercise</p> <p>Individual creation of care programs with patient</p>	<p>Moderate-intensity physical activity at least 150 min./week</p> <p>Muscle strengthening training 2×/week</p>
<p>Recommended activities</p>	<p>Walking, stationary bicycle, swimming, aquaerobics, aerobic exercises</p>	<p>Brisk walking, nordic walking, dancing, cycling, swimming or water aerobics</p>	<p>Nordic walking, swimming, fitness, stationary bicycle, yoga, pilates</p>	<p>-</p>	<p>Walking, swimming, stationary bicycle, aerobic exercise with little intensity, modified yoga/running/pilates, strength training Continuation, if used before pregnancy, after consultation</p>	<p>-</p>

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Specific recommendations	<p>Patients professionally involved in physical activity--required consultation with an obstetrician dealing with similar cases (guidelines of the Olympic Committee)</p> <p>Staying at altitude up to 2500 m, activity at moderate intensity recommended at an altitude of 1800–2500 m.</p>	<p>Women who were already active before pregnancy: Continue physical activity and sports activities to the same extent, adapt the type and technique and reduce the frequency, duration or intensity</p> <p>Women who were not regularly physically active before pregnancy: start with a lower intensity or duration and slowly increase it until they reach the basic recommendations</p> <p>Women with health problems: exercise can have a variety of</p>	<p>Patients professionally involved in physical activity can continue strength and aerobic exercises at a level similar to pre-pregnancy</p>	<p>Patients professionally involved in physical activity--warning that during pregnancy, it may be necessary to limit excessive physical effort</p> <p>Obese women — preparation for pregnancy (< 2000 kcal/day, recommended physical activity--walking assessed on the basis of the number of steps (min.1000 0/day), physical activity 15 min./day min. 3×/week, start with the lowest load, increase by 2 minutes, up to 40 min/week)</p>	<p>Bed rest does not effectively prevent premature delivery and should not be recommended</p> <p>Overweight patients — lifestyle modification (start with a low —intensity activity of short duration and gradually increase)</p> <p>Patients professionally involved in physical activity--more often and more carefully controlled (attention: avoiding overheating, adequate hydration, calorie intake, avoiding weight loss)</p> <p>Staying at an altitude</p>	-

		positive effects. carefully weigh the benefits and risks from a medical point of view			under 1888.8 m	
Contraindications	Premature rupture of membrane, premature labor, unexplained vaginal bleeding, 28 hbd placenta previa, preclampsia, cervical dilation, IUGR, triple pregnancy, uncontrolled diabetes mellitus, uncontrolled hypertension, uncontrolled thyroid disease, serious cardiovascular disease, respiratory, systemic disease It is recommended to continue everyday activities	–	–	The guidelines relate to pregnancy with physiological course	Persistent vaginal bleeding (2/3 trimester), cardiovascular disease — hemodynamically significant, shortening of the cervix, history of IUGR (limitation of physical activity in 2/3 trimester), premature labor (limitation of physical activity in 2/3 trimester), respiratory disease, multiple pregnancy, placenta previa after 26 hbd, preclampsia, gestational hypertensi	Persistent vaginal bleeding (2–3 trimester), cardiovascular disease, cerclage, incompetent cervix, IUGR, history of preterm birth, lung disease-restrictive, multiple gestation, placenta previa, preeclampsia, pregnancy induced hypertension, premature contractions or labor, premature rupture of membranes

	without taking excessive physical activity				on, premature uterine contractions, premature rupture of membranes,	
Activities to avoid during pregnancy	Scuba-diving, sports causing excessive overheating, activity with high risk of injury (skiing)	Horseback riding, skiing, martial arts or team sports, scuba diving	Scuba-diving, activity with high risk of injury (skiing)	Activity at high risk of injury (skiing, surfing, horse riding, on roller skates, ice skating)	Contact sports (box, hockey, football, basketball) sports with risk of falling (skiing, surfing, bike, diving, "hot yoga", "hot Pilates")	Activity on higher altitude, contact or collision sports, in hot or humid weather, causing hyperthermia, sedentary position, in supine position after 16 hbd,
Signs and symptoms to end exercise during pregnancy	Permanent feeling of short breath, which does not disappear at rest, acute chest pain, regular/painful uterine contractions, vaginal bleeding, leakage of vaginal fluids, persistent dizziness, feeling of	–	–	Symptoms of overheating, miscarriage or threatening miscarriage, preterm delivery	Vaginal fluid leakage, pain or swelling of the calf, chest pain, decreased frequency of fetal movements, dizziness, shortness of breath before exercise, headache, muscle weakness, premature delivery,	Abdominal pain, amniotic fluid leakage, calf pain nor swelling, chest pain, decreased fetal movement, dizziness or presyncope, dyspnea before exertion, fatigue, headache, muscle weakness,

	fainting, unremittin g in resting				vaginal bleeding	general pain, tachycardi a, pelvic pain, preterm labor, excessive shortness of breath, uterine contraction s, vaginal bleeding
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IUGR — Intrauterine Growth Restriction