

PHYSICAL ACTIVITY DURING PREGNANCY: BENEFITS AND GLOBAL
RECOMMENDATIONSFIZIČKA AKTIVNOST TOKOM TRUDNOĆE: BENEFITI I SVETSKE
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Abstract

Physical activity (PA) has a crucial role in the prevention of noncommunicable diseases on a global scale. Regular PA leads to the enhancement of numerous health aspects by improving numerous physiological, metabolic, and psychological parameters. It is one of the crucial preconditions for much of human health needs, particularly for the reproductive-aged population and pregnant women. During pregnancy, PA has a beneficial impact not only on the well-being of the pregnant mother but also on the health of the baby. There are presently no official national guidelines regarding PA during pregnancy in Serbia, so we advocate for and adhere to the worldwide norms. The widespread agreement is that every woman, excluding those with certain clinical or antenatal contraindications, should engage in PA throughout their pregnancy. While formatting the recommendations, particular attention was placed on the duration of exercising, the number of days per week an activity is performed, a subjective measure of how hard PA feels to a person while doing it (subject perceived exertion), the sort of PA that is suggested, but also those that should be avoided, as well as techniques for supervision with clearly defined indicators that indicate the need to discontinue a certain activity. It has not been effectively established *via* initiatives meant to enhance the general health of a population of Serbian pregnant women, one of the most susceptible demographic groups. Moreover, in Serbia, there have not been enough studies on the impacts and advantages of exercising during gestation, and neither is there any consensus on the best way to counsel expectant mothers during their pregnancies.

Future research should be required to design and promote PA programs for expectant mothers, in an effort to prevent pregnancy difficulties, by outlining the significance and advantages of leading an active lifestyle during pregnancy and keeping track of attitudes and behaviors linked to health. Regarding the physiological changes associated with pregnancy, modest physical exercise during gestation should be promoted and strongly recommended.

Keywords:physical activity,
pregnancy,
physical activity benefits,
physical activity
recommendations,
healthy pregnant women

Sažetak

Širom sveta, fizička aktivnost (FA) predstavlja važan preventivni faktor nezaraznih bolesti. Redovna FA doprinosi poboljšanju zdravstvenog stanja kroz poboljšanje mnogih fizioloških, metaboličkih i psiholoških parametara. Predstavlja posebno važan preduslov zdravlja stanovništva u reproduktivnom periodu, a uže posmatrano, zdravlja trudnica. Poznato je da vežbanje tokom trudnoće pozitivno utiče na zdravlje trudnice, ali i fetusa. Zvanične nacionalne preporuke o FA tokom trudnoće trenutno ne postoje u Srbiji, te se stoga preporučuje praćenje globalnih preporuka. Najvažniji konsenzus je da sve žene, osim onih sa nekim kliničkim ili antenatalnim kontraindikacijama, treba da budu fizički aktivne tokom trudnoće. Smernice su napravljene sa posebnim fokusom na trajanje, učestalost, intezitet i vrstu FA koja se savetuje i/ili koju treba izbegavati, zajedno sa metodama nadzora, a sa definisanim znacima koji pozivaju na prekid određene aktivnosti. Među trudnicama u Srbiji, jednoj od najosetljivijih demografskih grupa, FA nije na adekvatan način implementirana kroz preventivne programe za poboljšanje ukupnog zdravlja ove populacione grupe. Štaviše, u Srbiji je sprovedeno nedovoljno istraživanja o efektima i prednostima vežbanja na trudnoću, a nema dovoljno dokaza ni o najefikasnijem metodi savetovanja trudnice tokom celog toka trudnoće.

Ključne reči:

fizička aktivnost,
trudnoća,
benefiti fizičke
aktivnosti,
preporuke za
fizičku aktivnost,
zdrave trudnice

Potrebna su buduća istraživanja za razvoj i promociju programa FA za trudnice radi smanjenja komplikacija tokom trudnoće pružanjem specifičnih smernica u vezi sa značajem i prednostima aktivnog načina života tokom trudnoće i praćenjem stavova i ponašanja trudnica. Što se tiče fizioloških promena povezanih sa trudnoćom, umereno fizičko vežbanje tokom trudnoće je zdravo i treba ga promovisati i preporučivati.

Physical activity: definition

Physical activity (PA) has a crucial role in the prevention of noncommunicable diseases on a global scale. Regular PA leads to the enhancement of numerous health aspects by improving numerous physiological, especially-metabolic features and reducing the likelihood of death and morbidity from diseases such as heart disease, high blood pressure, diabetes, being overweight, losing muscle mass and bone mass, and suffering from neurocognitive disorders, as well as certain malignancies (1, 2).

Physical activity during pregnancy: physiological changes and benefits

Numerous women have integrated PA into their lifestyles (3). Women who are pregnant are vulnerable and susceptible to both internal and external stimuli, with a particular emphasis on fetal well-being (4,5). In this sense, PA is one of the crucial preconditions for much of human health needs, particularly for the reproductive-aged population and pregnant women (6). However, some pregnant women quit exercising out of worry about the health of their unborn child. Exercise may benefit a pregnant woman in the absence of perinatal or clinical concerns, despite the fact that pregnancy is related to a variety of changes in the body and that pregnancy differs from nonpregnancy in the adaptation to exercise (3).

Maintaining excellent health without attempting to attain a peak fitness level is the goal of exercise during pregnancy (7).

It is common knowledge that PA during pregnancy has a beneficial impact not only on the well-being of the

pregnant mother, but also on the health of the baby (1, 2).

Benefits for the pregnant woman include a decreased chance of abnormal weight gain throughout pregnancy, the occurrence of diabetes in pregnancy, preeclampsia/pregnancy-related hypertension, perinatal depression, postpartum melancholy, and anxiety. Also, PA enhances cardiovascular and respiratory performance, self-esteem, postural control, muscle strength and tone and tolerance, and fitness levels in mothers generally (3, 8-10). In addition, PA reduces miscarriage rates, the occurrence of lower limb edema and muscular spasms (11), decreases musculoskeletal discomfort during pregnancy (12), shortens labor, decreases the likelihood of injuries and delivery difficulties, especially operative deliveries, and shortens postpartum recovery (3, 8-10). Moreover, PA during pregnancy may enhance women's mental health and quality of life, as well as reduce tiredness rates during the postpartum period (13, 14).

Numerous perinatal risk factors have been discovered to have a strong association with excessive weight gain during pregnancy. Such stressors have the ability to influence not just the period of gestation but also its outcome and the newborn's early motor development (15).

Pregnancy exercise is strongly connected with a greater frequency of natural births and a decreased risk of cesarean births (16).

Moderate-intensity exercise may help women with pregnancy-related disorders, most notably gestational diabetes and hypertension in pregnancy, lower their blood pressure, enhance the management of their gestational weight gain, improve their cells' response to insulin, and achieve safer blood glucose levels (17). By improving glucose absorption *via* insulin-independent pathways and lowering the mother's insulin resistance, regular PA

lowers blood glucose levels (18). By participating in PAs, numerous additional physical discomforts (e.g., lower back pain) may be handled during pregnancy and lessened in intensity (19). There are benefits for the fetus, such as less fat buildup, more stress tolerance, and faster brain and behavior development (20).

Physical activity during pregnancy may be a key strategy for enhancing the placenta's functional ability, blood flow, and oxygen and carbon dioxide exchange by boosting the nutrition supply and the fetus's overall development rate (21, 22).

Physical activity official guidelines recommendations

There are presently no official national guidelines regarding PA during pregnancy in Serbia, so we advocate for and adhere to the worldwide norms. The United Kingdom, the United States of America, Canada, Australia, and Asia-Pacific were the four nations and one area that contributed to the development of PA and exercise recommendations for pregnant women. The widespread agreement is that every woman, excluding those with certain clinical or antenatal contraindications, should engage in PA throughout their pregnancy, with differing opinions solely on whether this should begin prior to or following the conclusion of the first trimester (23-28).

While formatting the recommendations, particular attention was placed on the duration of exercising, the number of days per week an activity is performed, a subjective measure of how hard PA feels to a person while doing it - subject perceived exertion, the sort of PA that is suggested, but also those that should be avoided, as well as techniques for supervision with clearly defined indicators that indicate the need to discontinue a certain activity. When recommending pregnancy-specific exercise, the regimen should be extensively personalized. Moreover, socioeconomic and cultural elements that are unique to a community influence an individual's level of PA during pregnancy.

A comprehensive clinical examination should be conducted to identify any possible health hazards related to PA. In the absence of contraindications, the PA condition prior to pregnancy (inactive vs. active) ought to be used to determine the beginning and intensity of PA. Women who have not previously engaged in physical activity are advised to start their exercise regimens gradually, with a reduced intensity, and for a shorter period of time. This should be followed by an increase in aerobic activity, starting with fifteen to thirty minutes of workout four times a week and working up to a daily routine. Depending on the guideline, the maximum bound for a single session is determined by various methods, including the "talk test," the Borg ratings of perceived exertion scale, and observing and maintaining the heartbeats inside a specified period (roughly maximum 60% of the heart rate in most recommendations). Women who frequently engaged in strong aerobic training or

vigorous-intensity exercise regimens before becoming pregnant may maintain their exercises throughout pregnancy and afterward. Furthermore, it is essential to have a conversation with medical professionals about how and when the schedule of such exercises ought to be altered as needed. Overall, they shouldn't drastically cut down on their level of activity; instead, they could adjust their PA as their pregnancy gets farther along. Pregnant women should be aware of the increased nutritional demands that come with being pregnant, the increased risk of excessive heat from exercise, and the effects of conducting PA in cooler temperatures. Accordingly, pregnant women could perhaps engage in PA on the majority of days during the week, if not all, with a limit of two to three days each week. At least 150 minutes of moderate PA should be completed, which may be achieved by being active for 30 minutes most days each week. It is strongly suggested that both aerobic and strength conditioning exercises be included in a workout routine in order to get optimal results. Walking, riding a stationary bike, aerobic water exercises, and swimming are examples of aerobic workouts, while resistance exercise involves activities with dumbbells and resistance straps. Yoga, mild stretching, practicing balance and posture, and strengthening the pelvic floor muscles are all generally advised, but they should be done under close supervision and with care since there is little data supporting them. In addition, it is always recommended to do moderate warm-ups and cool-downs before and after PA. These are measures that encourage muscular support, which lowers the chance of injury. Certain types of PA should be avoided during pregnancy because they pose a potential danger to the mother and/or the developing child. These include physical contact sports, cycling, activities where there is a chance of falling while changing directions quickly and bouncing, and activities where pressure changes occur (sky diving and scuba diving). When creating a workout regimen, it's important to remember to eat enough calories and drink enough water prior to, during, and even after exercise (23-28).

Physical activity and public health policies in Serbia

In Serbia, most of the female population was categorized as sitting or standing (45.6%), a little less were excessively sedentary (23.8%), only 7.6% were found to be walking more than 30 minutes per day, and only 7.2% engaged in aerobic physical exercise as part of their daily regimen (29).

It has not been effectively established *via* initiatives meant to enhance the general health of a population of Serbian pregnant women, one of the most susceptible demographic groups. Moreover, in Serbia, there have not been enough studies on the impacts and advantages of exercising during gestation, and neither is there any consensus on the best way to counsel expectant mothers during their pregnancies. Thus, primary care doctors

should play a central role in encouraging their patients to exercise at recommended intensities and frequencies. Therefore, a useful tool for evaluating and monitoring PA in the Serbian population of pregnant women is the Pregnancy Physical Activity Questionnaire—Serbian version (PPAQ-SRB), which has good psychometric properties and is validated for use in the population of pregnant Serbian women (30).

Future research should be required to design and promote PA programs for expectant mothers in an effort to prevent pregnancy difficulties. This can be achieved by outlining the significance and advantages of leading an active lifestyle during pregnancy and keeping track of attitudes and behaviors linked to health. Notably, the national recommendations might be useful for future public policies aimed at resolving mother-child couples' health difficulties, modifying health promotion activities, and making comparisons between PA throughout the world in order to undertake transnational collaborative research in this sector.

Conclusion

While aiming to fulfill the elevated metabolic requirements of the mother and offspring, certain physiological alterations occur during pregnancy. Regarding the physiological changes associated with pregnancy, modest physical exercise during gestation is healthy and should be promoted. The advantages of exercise exceed the hazards for healthy pregnant women who have no obstetric or medical issues. Therefore, as long as certain instructions are followed, pregnant women should continue exercising. Nevertheless, pregnant women may need to adapt their exercise routines due to pregnancy-related physiologic changes.

Literature

- World Health Organization. Global Recommendations on Physical Activity for Health; World Health Organization: Geneva, Switzerland, 2010.
- Melzer K, Kayser B, Pichard C. Physical activity: the health benefits outweigh the risks. *Curr Opin Clin Nutr Metab Care*. 2004; 7(6):641-7.
- Nahed M, Ezmerli MD. Exercise in pregnancy. *Prim Care Update Ob Gyns*. 2000; 7:260-5.
- González-Duarte A, Zambrano-González E, Medina-Franco H, Alberú-Gómez J, Durand-Carbajal M, Hinojosa CA, et al. The research ethics involving vulnerable groups. *Rev Invest Clin*. 2019; 71(4):217-25.
- Rockliffe L, Peters S, Heazell AE, Smith DM. Factors influencing health behaviour change during pregnancy: A systematic review and meta-synthesis. *Health Psychol Rev*. 2021; 15(4):613-32.
- Mate A, Reyes-Goya C, Santana-Garrido Á, Vázquez CM. Lifestyle, maternal nutrition and healthy pregnancy. *Curr Vasc Pharmacol*. 2021; 19(2):132-40.
- Davies GA, Wolfe LA, Mottola MF, MacKinnon C. Joint SOGC/CSEP clinical practice guideline: exercise in pregnancy and the postpartum period. *Can J Appl Physiol*. 2003; 28(3):329-41.
- Okafor UB, Ter Goon D. Physical activity in pregnancy: beliefs, benefits, and information-seeking practices of pregnant women in South Africa. *J Multidiscip Healthc*. 2021; 14:787.
- Hinman SK, Smith KB, Quillen DM, Smith MS. Exercise in pregnancy: a clinical review. *Sports health*. 2015; 7(6):527-31.
- Ribeiro MM, Andrade A, Nunes I. Physical exercise in pregnancy: Benefits, risks and prescription. *J Perinat Med*. 2022; 50(1):4-17.
- Arena B, Maffulli N. Exercise in pregnancy: how safe is it?. *Sports Med Arthrosc Rev*. 2002; 10(1):15-22.
- Pivarnik JM, Chambliss HO, Clapp JF, Dugan SA, Hatch MC, Lovelady CA, et al. Impact of physical activity during pregnancy and postpartum on chronic disease risk. *Med Sci Sports Exerc*. 2006; 38(5):989-1006.
- Barakat R, Pelaez M, Montejo R, Luaces M, Zakyntinaki M. Exercise during pregnancy improves maternal health perception: a randomized controlled trial. *Am J Obstet Gynecol*. 2011; 204(5):402-e1.
- Kołomańska-Bogucka D, Mazur-Bialy AI. Physical activity and the occurrence of postnatal depression—a systematic review. *Medicina*. 2019; 55(9):560.
- Lackovic M, Filimonovic D, Mihajlovic S, Milicic B, Filipovic I, Rovcanin M, et al. The influence of increased prepregnancy body mass index and excessive gestational weight gain on pregnancy course and fetal and maternal perinatal outcomes. *Healthcare* 2020; 8(4):362.
- Di Mascio D, Magro-Malosso ER, Saccone G, Marhefka GD, Berghella V. Exercise during pregnancy in normal-weight women and risk of preterm birth: a systematic review and meta-analysis of randomized controlled trials. *Am J Obstet Gynecol*. 2016; 215(5):561-71.
- Huifeng Z, Yaping X, Meijing Z, Huibin H, Chunhong L, Fengfeng H, et al. Effects of moderate-intensity resistance exercise on blood glucose and pregnancy outcome in patients with gestational diabetes mellitus: A randomized controlled trial. *J Diabetes Complicat*. 2022; 36(5):108186.
- Wolfe LA, Weissgerber TL. Clinical physiology of exercise in pregnancy: a literature review. *J Obstet Gynaecol Can*. 2003; 25(6):473-83.
- Wang SM, Dezinno P, Maranets I, Berman MR, Caldwell-Andrews AA, Kain ZN. Low back pain during pregnancy: prevalence, risk factors, and outcomes. *Obstet Gynecol*. 2004; 104(1):65-70.
- Clapp III JF, Lopez B, Harcar-Sevcik R. Neonatal behavioral profile of the offspring of women who continued to exercise regularly throughout pregnancy. *Am J Obstet Gynecol*. 1999; 180(1):91-4.
- Erkkola R. The physical work capacity of the expectant mother and its effect on pregnancy, labor and the newborn. *Int J Gynecol Obstet*. 1976; 14(2):153-9.
- Clapp III JF, Kim H, Burciu B, Lopez B. Beginning regular exercise in early pregnancy: effect on fetoplacental growth. *Am J Obstet Gynecol*. 2000; 183(6):1484-8.
- US Department of Health and Human Services. Physical activity guidelines for Americans: be active, healthy, and happy!. Available from: <http://www.health.gov/paguidelines/guidelines/default.aspx>.
- Bell BB, Dooley MMP. Exercise in Pregnancy RCOG Statement n4. Available from: https://www.bournesportsmedicine.com/advice/Exercise_in_pregnancy.pdf.
- American College of Obstetricians and Gynecologists. ACOG Committee Opinion No. 650: Physical Activity and Exercise During Pregnancy and the Postpartum Period. *Obstet Gynecol*. 2015; 126:e135–e142.
- Mottola MF, Davenport MH, Ruchat SM, Davies GA, Poitras V, Gray C, et al. No. 367-2019 Canadian guideline for physical activity throughout pregnancy. *J Obstet Gynaecol Can*. 2018; 40(11):1528-37.
- Pre- and Post-Natal Exercise Guidelines Fitness Australia 2013 Health and Fitness Industry Association. Available from: https://bp-fitnessaustralia-rodution.s3.amazonaws.com/uploads/uploaded_file/file/219/Pre-and-Post-Natal-Exercise-Guidelines.pdf.
- Lee R, Thain S, Tan LK, Teo T, Tan KH. Asia-Pacific consensus

- on physical activity and exercise in pregnancy and the postpartum period. *BMJ Open Sport Exerc Med.* 2021; 7(2):e000967.
29. Milic N, Stanisavljevic D, Krstic M, Jovanovic V, Brcanski J, Kilibarda B, et al. The 2019 Serbian National Health Survey—Study. OMNIA BGD: Belgrade, Serbia 2021. Available from: <https://publikacije.stat.gov.rs/G2021/pdfE/G20216003.pdf>.
 30. Rovcanin M, Jankovic S, Mikovic Z, Sipetic Grujicic S, Ersk IR, Lackovic M, et al. The Translation and Cross-Cultural Adaptation of the Pregnancy Physical Activity Questionnaire: Validity and Reliability of a Serbian Version (PPAQ-SRB). *Healthcare.* 2022; 10(8):1482.