

Ziółkowska Anna, Wojtczak Paweł, Śniegowska Wiktoria, Ciecierska Dominika, Piechocka Edyta, Wrześniński Bartłomiej, Dzierżanowski Maciej, Kaźmierczak Urszula. Does physical activity affect the pain and mobility of the lumbosacral spine in pregnant women? - case-control study. *Journal of Education, Health and Sport*. 2018;8(7):418-423. eISSN 2391-8306. DOI <http://dx.doi.org/10.5281/zenodo.1325244>
<http://ojs.ukw.edu.pl/index.php/johs/article/view/5750>
<https://pbn.nauka.gov.pl/sedno-webapp/works/872829>

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part b item 1223 (26/01/2017).
1223 Journal of Education, Health and Sport eissn 2391-8306 7

© The Authors 2018;

This article is published with open access at Licensee Open Journal Systems of Kazimierz Wielki University in Bydgoszcz, Poland
Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike.
(<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 20.06.2018. Revised: 28.06.2018. Accepted: 31.07.2018.

Does physical activity affect the pain and mobility of the lumbosacral spine in pregnant women? - case-control study

Anna Ziółkowska¹, Paweł Wojtczak¹, Wiktoria Śniegowska, Dominika Ciecierska², Edyta Piechocka¹, Bartłomiej Wrześniński¹, Maciej Dzierżanowski³, Urszula Kaźmierczak³

1- Scientific Circle at the Department of Ergonomics and Physiology of Physical Effort Collegium Medicum UMK, Toruń, Bydgoszcz, Poland

2- Interdisciplinary Scientific Society of Geriatrics, NICOLAUS COPERNICUS UNIVERSITY IN TORUN Ludwik Rydygier Collegium Medicum in Bydgoszcz

3- NICOLAUS COPERNICUS UNIVERSITY IN TORUN Ludwik Rydygier Collegium Medicum in Bydgoszcz, Department of Physiotherapy

Key words

Physical activity, pregnancy, spine

Abstract

Background: Daily physical training is safe and brings many benefits to pregnant woman. When there are no contraindications, regular exercise of gymnastics has a positive effect on the overall physical fitness, well-being of the woman. In addition it reduces the symptoms of typical pregnancy.

Material and methods: The study involved pregnant women who were in the second or third trimester during the study. The study group consisted of 45 healthy pregnant women (n=45). During the research, range of motion and the shape of the curvature of the lumbar spine using the CMS10 Zebris device was performed. Additionally, the author's questionnaire was also used, which allowed to gather important information about the practiced physical activity in the pregnancy of the surveyed women and check the knowledge about physical activity during pregnancy. The questionnaire was also used to gather basic information such as age, weight, height or education.

Results: In the examined group of pregnant women the mean flexion of the lumbar spine to the front was 54.5°, to the back 16°, to the left 23° and to the right 24.5°. The average spine turn to the left is 16.5° and to the right 15.5°. 100% of the surveyed women, responded that physical activity during pregnancy is recommended, 82.22% of them are active during pregnancy. The most common physical activities are walking, next is swimming and special exercises for pregnant women and yoga. The fewest group were the women exercising Pilates. 31.11% of women exercise three times a week, 37.78% - twice a week, 22.22% - one a week and 6.67% less than one a week. 64.44% of women feel good thanks to practiced physical activity, 31.11% of women say that exercises improve their wellbeing.

Conclusions: Regular physical activity has a positive impact on the wellbeing of women which participated in the research. Women's knowledge about physical activity during pregnancy is quite high although it does not always translate to real world performed exercises. The study did not show the impact of physical activity on the mobility of the lumbar spine, but the study should be continued at a larger study group.

Introduction

Physical activity has a broadly defined definition that speaks of any form of body movement caused by muscular contractions, where the energy expenditure is greater than the level of resting energy and which can be understood as any activity, both professional sport and recreational dance or walks and daily physical activity in home. Scientific research shows that a sedentary lifestyle results in a low quality of life, many chronic diseases, e.g. cardiovascular diseases, which are a frequent cause of death. In addition, physical activity brings many psychosocial benefits, improves the quality of life, reduces the risk of morbidity and increases life expectancy. The World Health Organization (WHO) recommends daily, moderate physical activity, lasting at least 30 minutes [1]. The above-mentioned recommendations do not apply only to young, healthy people, but both elderly people and women in physiological pregnancy. According to the American College of Obstetricians and Gynecologists, moderate, everyday physical training is safe and brings many benefits. When there are no contraindications, regular exercise of gymnastics has a positive effect on the overall physical fitness, well-being of the woman and reduces the symptoms typical of pregnancy. Thanks to the physical activity of a woman, there is an improvement in the efficiency of the body's ventilation, which means that the mother and child's organisms are better oxygenated and there is a general improvement in the performance of the circulatory system. In addition, regular physical activity has a positive effect on the course of labour as well as on the parturition. Women who are physically active feel less pain during labour, so they are not forced to take strong painkillers, and much earlier they return to form after childbirth. An additional advantage of regular gymnastics is the influence on the woman's psyche, because thanks to this, she copes better with stress and also knows how to manage emotional balance. However, it should be remembered that there are also contraindications to physical activity during pregnancy and not all types of activity are indicated. Avoid extreme sports, winter sports, mountain climbing, diving or horse riding. Recommended exercises for pregnant women include yoga, Pilates, aqua aerobics, Nordic walking and walks [2, 3].

Aim of the study

The project aims to collect accurate data on spine mobility in pregnant women in the second or third trimester and their correlation with the type of physical activity.

Materials and methods

The research was carried out at the turn of 2017 and 2018 in Bydgoszcz. They participated in the pregnant women, which in the course of the study were in the second or third trimester of pregnancy and self-reported to the safe, free study of spinal mobility. For the study, 49 reported pregnant women, 4 which are excluded due to the presence of negative factors (degeneration of the spine-1, the pathological-3). The study group consisted of 45 healthy pregnant women ($n = 45$). The age group in the group of examined persons ranged from 23 to 37 years (mean age - 29 years). For the majority (73.33%) of the women it was the first pregnancy for 26.67% was the second pregnancy (at 4.44% - earlier miscarriages occurred). The examined pregnant women were in the second (40%) or third (60%) trimester of pregnancy. Examination of range of motion and shape of the curvature of the lumbar spine was performed using the CMS10 Zebris device. The method used in the study uses the phenomenon of delay in propagation of the ultrasonic wave in the air. Two markers were placed on the patient's body using the elastic Valcro belts. One was located on the first lumbar vertebra, while the other on the sacral bone, in the axis of the spine. The patient after the adoption of a neutral position, performed three times all the movements of the spine: slope to the maximum for each other respect and snap to the neutral position (without dredging), rotation of the spine to the right and to the left (with the stabilization of the pelvis) and bend to the side, right and left (with pelvic stabilization). The collected results were subjected to basic analysis using Microsoft Excel and statistical analysis. The compatibility of the distribution of the analyzed variables with the normal distribution was assessed using the Shapiro-Wilk test. The U Mann-Whitney test and the ANOVA test were used in the non-normal distribution groups. The p value ≤ 0.05 was assumed to be statistically significant. Statistical software used was STATISTICA 13.1 PL.

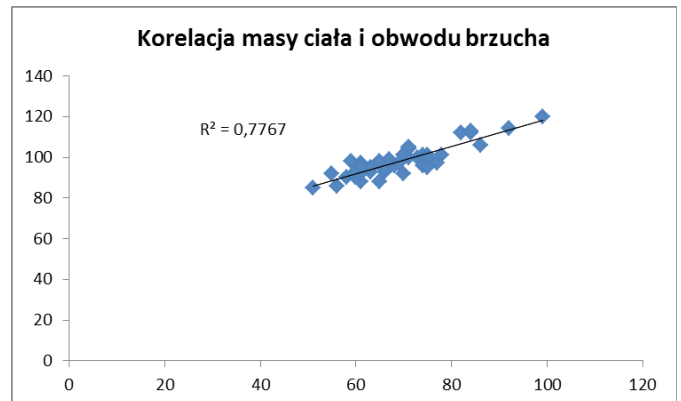


Diagram 1. Correlation of body weight and abdominal circumference of pregnant women

Results

In the examined group of pregnant women, the average bend of the lumbar spine was 54.5° , in the back 16° , the left bend was 23° and the right 24.5° . The average spine turn to the left was 16.5° and right 15.5° . In the examined group of pregnant women, correlations of anthropometric results and correlations of particular lumbar spine movements were checked. Very high correlation of abdominal circumference and weight of pregnant women (Paerson's linear correlation coefficient raised to the square - R^2 is 0.7767). Other examined coefficients: mean correlation of the average bending of the lumbar spine to the right and left side ($R^2 = 0.3299$), mean correlation of the mean lumbar rotation of the spine to the right and left ($R^2 = 0.4191$), low correlation of the bending of the segment lumbar spine and pelvic anteversion ($R^2 = 0.1555$), uncorrelated variables of motion of the lumbar spine flexion in the back and pelvic tilt ($R^2 = 0.0021$).

Based on the survey, information on the lifestyle, occupational and physical activity of the examined pregnant women was collected. Among the women surveyed, 86.67% have a university degree, 11.11% have a secondary education and 2.22% have a vocational education. 62.22% of women are professionally active during pregnancy, while 37.78% of women do not practice their professional activity during pregnancy. 64.44% of women work mentally and 40% do physical work (2 women marked both answers, one woman did not respond). Both pregnant women (73.33%) and another

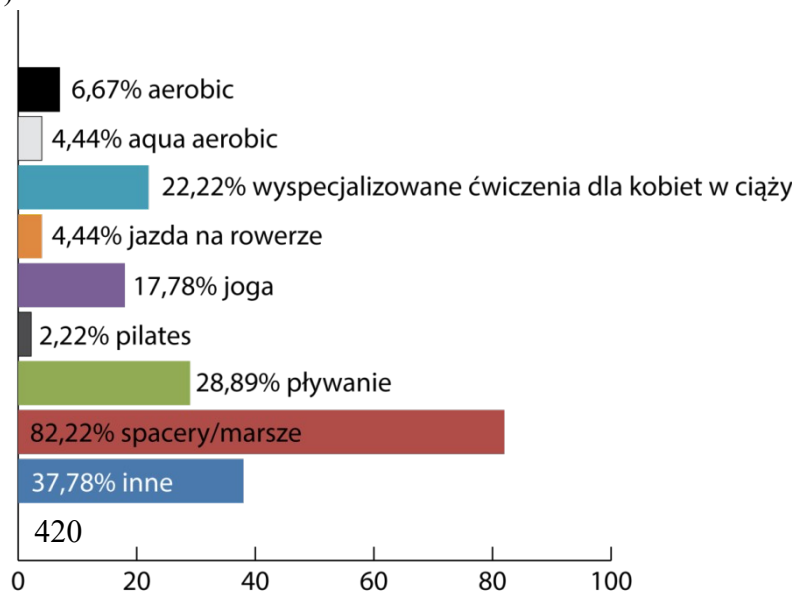


Diagram 2. Physical activity practiced by examined pregnant women

(26.67%) were examined. 60% of women during the study were in the third trimester of pregnancy and 40% of women were in the second trimester. Any functional disorders of the spine, diseases such as discopathy, ankylosing spondylitis, degenerative changes or osteoporosis were the factors excluding pregnant women from the study - 100% of healthy women were examined. Most of the pregnant women examined (82.22%) think that they are physically active during pregnancy. 17.78% of women think that they are not physically active during pregnancy. 37.78% of women take physical activity three times a week, 31.11% - twice a week, 22.22% once a week, 6.67% less than once a week (one woman did not respond). Cultivated physical activity has a very good effect on pregnant women - 64.44% of women surveyed feel well thanks to physical activity, 31.11% of women say that exercises improve their mood and 2.22% women do not feel any difference (2 women do not answered). 100% of respondents believe that physical activity is appropriate for pregnant women: 64.44% of women are of the opinion that physical activity is indicated and 35.56% of women say that physical activity is indicated as moderate.

The influence of physical activity on the body of a pregnant woman, according to respondents:

- physical activity gives a good feeling (91.11% of answers)
- physical activity reduces the pain related to pregnancy (66.66% of responses)
- thanks to physical activity, childbirth may be easier (57.78% of responses)
- thanks to physical activity during pregnancy, a woman can recover faster after giving birth (60% of responses)
- physical activity improves overall physical fitness (44.44% of responses)
- due to physical activity there is less weight gain during pregnancy (33.33% of responses)

The mean sum of the slope of the lumbar spine in women exercising yoga or Pilates was 69°, while for women going for walks 71°. The difference between the groups was not statistically significant (0.7624). The mean sum of the lumbar spine flexion in women undertaking physical activity less than once a week was 65°, in women undertaking physical activity once a week was 67.5°, in women undertaking physical activity twice a week was 72° and in women undertaking physical activity three times a week it was 72.5°. There is a tendency of increase and the difference between groups, however, it is not statistically significant (0.6467).

Discussion

Physical activity of pregnant women is still an unverified medical problem. There is a small amount of research on the indications of quality, quantity and duration of exercise and forms of physical activity [4]. Studies analyzing the impact of physical activity on the pregnant woman's body are random and chaotic [5]. Despite the recommendations of the American

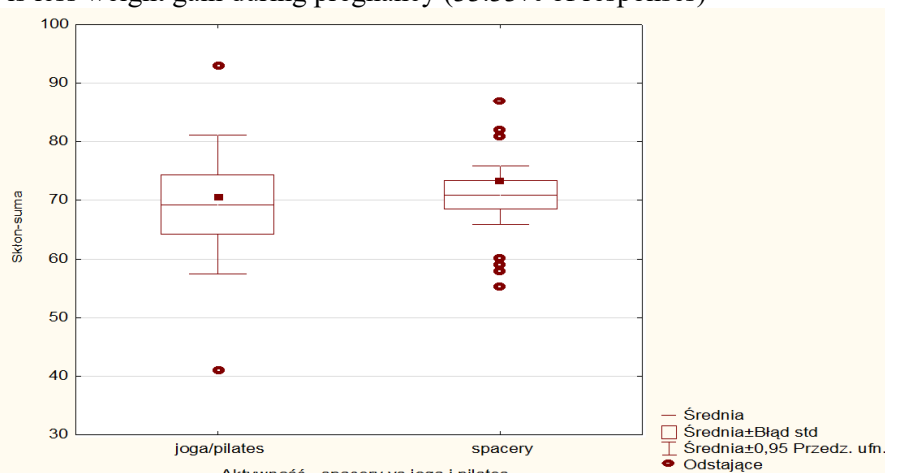


Diagram 3. Correlation of bending of the lumbar spine and type of physical activity (yoga / pilates or walking)

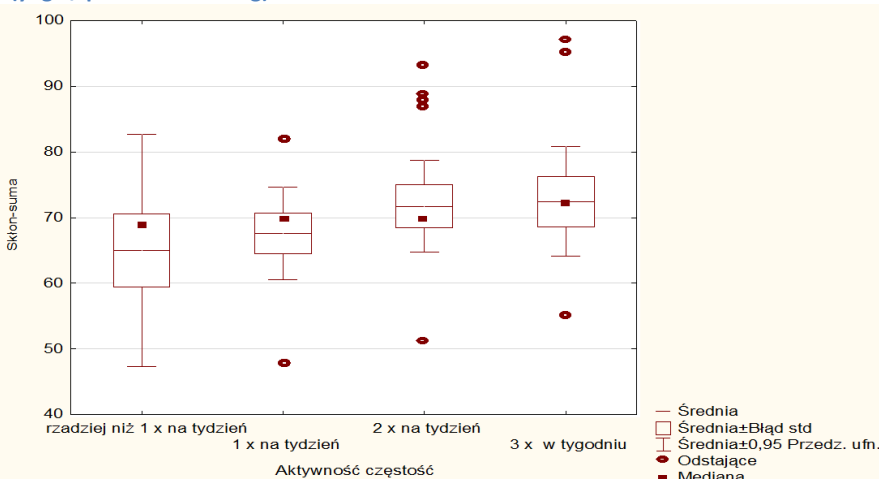


Diagram 4. Correlation of the lumbar spine flexion and the frequency of physical activity

College of Obstetricians and Gynecologists from 1994 and the positive influence of physical activity, it does not convince women to do everyday exercises [6, 7]. The most often chosen form of physical activity by women are walking and marches [2, 8, 9]. Pain in the lumbosacral segment is the most common disorder in pregnancy and it accompanies over half of women (moderate to severe pain) [10]. Shirl et al. noticed that physical activity of pregnant women reduced the frequency of sick leave associated with lower back discomfort, as the exercises increase endurance and muscular strength, which helps to prevent the habitual pain of the spine [11]. The results of a questionnaire survey conducted by I. Gałązka also speak about a very good influence of physical activity during pregnancy, where 91% of women who limited physical activity during pregnancy had such disorders as: abdominal cramps, uterine contractions, bleeding, spotting, pains head and vomiting, while among women undertaking physical activity during pregnancy, these symptoms occurred only in 9% of the respondents [8]. Research suggests that yoga has a beneficial effect on pregnant women. Among the examined women practicing yoga during pregnancy, almost all of them noticed improved posture and body strengthening and increased endurance. They noticed improvement in both physical and mental well-being [12]. Among the examined pregnant women, one patient, practicing yoga is a very good example of the influence of yoga on well-being and pain in the spine. This patient was already in the third pregnancy in the third trimester and it was the first pregnancy, during which she did not feel any pain in the lumbar spine due to practicing yoga. Dvorak J. et al. showed the following normative mean of the range of lumbar spine mobility in healthy women, not pregnant, aged 20-29 years: flexion of 67.9° (in the case of pregnant women, the average is 54.5°), bend backwards 28.5° (in pregnant women examined - 16°), left side bending 32° (in pregnant women examined - 23°), right side bend 31.4° (in the case of pregnant women - 24.5°), rotation to the left 40.5° (in the case of pregnant women - 16.5°), rotation to the right 46° (in the case of pregnant women - 15.5°) [13]. According to the normative norms, all ranges of mobility in examined pregnant women are reduced. According to I.A. Kapandji, the range of motion of the lumbar spine is: 60° bending forward, 20° backward bend, 20° bend and 5° rotation [14]. However, it is not possible to compare the ranges of lumbar mobility, presented by A. I. Kapandji with the ranges of women examined, because both tests were done in a different way, with different test methodology and other angles measuring the mobility of the lumbar spine were measured. A comparison of the examined pregnant women with other pregnant women is not possible because similar studies of ranges of spine mobility have not been performed before.

Conclusions

Regular physical activity has a positive impact on the well-being of the women surveyed. Their knowledge about physical activity in pregnancy is at a fairly high level. The effect of physical activity on the mobility of the lumbar spine was not proven because no statistically significant difference was found. The research carried out indicates that the subject is worth continuing. It would be necessary to perform research in a significantly enlarged group of patients, so that you can observe differences in individual trimesters of pregnancy and differentiate the ways and involvement of women in physical activity.

Literature

1. G. R. U. "i. Zdrowie" i L. B. A. i współautorzy, „Wytyczne UE dotyczące aktywności fizycznej. Zalecane działania polityczne wspierające aktywność fizyczną wpływającą pozytywnie na zdrowie.” Bruksela, 2008.
2. Ćwiek D., Szczęsna M., Malinowski W. i współautorzy, „Analiza aktywności fizycznej podejmowanej przez kobiety w czasie ciąży,” *Perinatologia, Neonatologia i Ginekologia*, 2012; 5(1): 51-54
3. Torbe D., Torbe A., Ćwiek D., „Aktywność fizyczna kobiet w ciąży o fizjologicznym przebiegu,” *Nowa Medycyna*, 2013; 4: 174-179
4. Liu J., Teng Y., Blair S. N., Riddoch C.; „Physical activity during pregnancy in a prospective cohort of British women: results from the AVON longitudinal study of parents and children”; *European Journal of Epidemiology*; 2010; 26(3): 237-47
5. Sass A., Mączka M.; „Aktywność fizyczna kobiet w ciąży w świetle badań naukowych – przegląd piśmiennictwa”; *Journal of Education, Health and Sport*; 2017; 7(8): 550-565
6. Wojtyła A., Kapka-Skrzypczak L., Biliński P., Paprzycki P.; „Physical activity among women at reproductive age and during pregnancy (Youth Behavioural Polish Survey – YBPS and Pregnancy-

- related Assessment Monitoring Survey – PrAMS) –epidemiological population studies in Poland”; *Annals of Agricultural and Environmental Medicine*; 2011; 18(2): 365-374
7. Banyś J. M., Bukowska B., Dziwulska M. i wsp.; „Aktywność fizyczna u kobiet w ciąży o przebiegu fizjologicznym”; *Pielęgniarstwo i Zdrowie Publiczne*; 2016; 6(2): 143-147
 8. Gałązka I., Kotlarz B., Płóciennik A. i wsp.; „Physical activity during pregnancy - factors affecting access to or limit the exercise”; Institute of Obstetric Propaedeutics Department of Women’s Health School of Health Sciences Medical University of Silesia; 2013; 2: 37-55
 9. Evenson K., Savitz D., Huston S.; „Leisure-time physical activity among pregnant women in the US”; *Paediatric and Perinatal Epidemiology*; 2004; 18: 400-407
 10. Kovacs F. M., Garcia E., Royuela A., Gonzalez L., Abaira V. „Prevalance and factors associated with low back pain and pelvic girdle pain during pregnancy: A multicenter study conducted in the Spanish National Health Service”; *Spine*; 2012; 37: 1516-1533
 11. Shirl R., Coggon D., Falah-Hassani K.; „Exercise for the prevention of low back and pelvic girdle pain in pregnancy: A meta-analysis of randomized controlled trials”; *European Journal of Pain*; 2018; 22(1): 19-27
 12. Bieniec A., Grabara M.; „KORZYŚCI PŁYNĄCE Z ĆWICZEŃ JOGI DLA KOBIEC W CIAŻY” *ZESZYTY METODYCZNO-NAUKOWE AWF Katowice*; 2010; 28: 165-175
 13. Dvorak J., Vajda E. G., Grob D., Panjabi M. M.; „Normal motion of the lumbar spine as related to age and gender.”; *European Spine Journal*; 1995; 4(1): 18-23
 14. Kapandji A. I.; *Anatomia funkcjonalna stawów, tom 3*; edra URBAN&PARTNER; Wrocław; 2015