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Evaluation of physical activity of women in the second and third trimester of pregnancy using the standardized PPAQ questionnaire-a pilot study

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Summary: Pregnancy is a unique period in a woman's life, so every pregnant woman should be aware of the importance of physical exercise during pregnancy. The purpose of this study was to compare the physical activity of women in the second and third trimesters of pregnancy. The standardized Physical Activity Questionnaire for Pregnant Women (PPAQ-PL) was used to achieve the purpose of the study. Thirty women in the age range of 18-35 years (28 years±3.54) participated in the study. Analysis of the results showed that higher values of total weekly energy expenditure were obtained by the group of women in the third trimester of pregnancy (206.37 MET/h/week) compared to pregnant women in the second trimester (140.42MET/h/week). The women differed in terms of energy expenditure in activities such as housework (in women in the second trimester 49.1% of total activity, in the third trimester 56.7%), passive rest (24.1% and 14.5%), professional work (12.9% and 7.7%), sports and exercise (2.8% and 6.6%), and moving around (10.6% and 14.5%). In both women in the second and third trimesters of pregnancy, a low level of activity intensity prevailed (58.08% and 55.64%). Energy expenditure on sports and exercise consistent with the recommended for the second trimester (≥28 MET/h/week) was declared by only 6% of the

women surveyed, while in the third trimester the recommended energy expenditure on physical activity (≥16 MET/h/week) was fulfilled by 29% of pregnant women. There is an ongoing need to educate women about the benefits of systematic prenatal activity.

Keywords: pregnancy, physical activity, activity recommendations, PPAQ-PL

Introduction

Pregnancy is a special period in a woman's life, so it is important for pregnant women to be aware of how significant health-promoting behaviors are during pregnancy and their prevention afterwards (Bręborowicz and Markwitz 2012). For the proper development of the fetus, the mother's health status before conception is important.

There is still a belief among pregnant women that physical activity during pregnancy can be dangerous for their unborn child. For this reason, they often give up physical activity altogether. The fact is that properly selected exercise has numerous benefits for both mother and child (Bien 2009). Physical activity has the effect of improving respiratory fitness, including a 5-10% increase in maximum oxygen ceiling, an increase in vital lung capacity, an increase in inspiratory volume, an increase in tidal volume, an increase in alveolar ventilation, which improves exercise tolerance during pregnancy. Regular exercise during pregnancy helps to minimize complaints of sacro-lumbar pain and restore proper posture (Bręborowicz 2015). Before starting an activity, the type of exercise should be determined with the doctor in charge of the pregnancy and confirm the absence of contraindications to prenatal activity. Appropriately selected physical, breathing and relaxation exercises allow to shorten the duration of labor, the possibility of preterm labor and perineal incisions is reduced, and the recovery time after childbirth is significantly shorter (Karpinska 1990; Borodulin et al. 2008; Fraś et al. 2012). The effort of childbirth is sometimes compared to the effort required to cover the distance of a marathon run (Ćwiek 2010, p. 45). That is why it is so important to properly prepare a woman's body for this effort. The basis of physical activity for a pregnant woman should be walking. This is undoubtedly the safest form of exercise, available to any woman, at any age. Even a short 15-minute walk, carries positive aspects, namely oxygenates the mother and the fetus. A recommended form of physical activity is also the discipline of Nordic walking, which is gaining popularity among pregnant women; it has the advantage of

stabilizing the body during exercise and engaging a large number of muscles at a slightly higher intensity (Furst and Adamczewska 2017). Pilates and yoga, on the other hand, which helps streamline and make muscles more flexible, and additionally focuses the mother-to-be on proper breathing. Pilates, on the other hand, strengthens the deep muscles, i.e. the abdomen and back (Berk 2009; Skorupinska et al. 2015). On the other hand, not recommended forms of activity are those that involve jumping, vibration, sudden acceleration or very high exertion. Disciplines in which there is a possibility of injury are also not recommended, e.g. winter sports, team games, weightlifting (Bien 2009). Introducing an adequate amount of exercise during pregnancy will help avoid excessive weight gain, and thus avoid such complications as gestational diabetes, hypertension, excess cholesterol (Szostak-Węgielek and Cichocka 2015). Regular exercise reduces the risk of complications during pregnancy and in the postpartum period, helps restore ovulation, and has a positive effect on the physiological processes taking place and the mental state of the woman. However, it should be remembered that any physical activity undertaken during pregnancy should be consulted with the doctor in charge of the pregnancy (Skorupinska et al. 2015)

The Polish Gynecological Society recommends that pregnant women reduce their level of physical activity and adjust their exercise to their current condition and habits. In addition, the introduction of general gymnastics conducted in birthing schools is recommended (PTG 2005) According to a 2002 recommendation by the American College of Obstetricians and Gynecologists, pregnant women should exercise a minimum of 3 times a week for 30 minutes at moderate intensity (ACOG 2002). In contrast, the most recent recommendations from 2015, recommend physical activity at moderate intensity every day for about 30 minutes (ACOG 2015). On the other hand, the Association from the UK, Royal Collage of Obstetricians and Gynecologists (RCOG) recommends moderate physical activity for pregnant women with a total of 150 minutes/week (RCOG 2006). In 2011, the recommendations for women were classified by trimester of pregnancy. Energy expenditure was denoted in MET/hour/week, regardless of whether the pregnant woman had a sedentary or active lifestyle before pregnancy. Women whose energy expenditure devoted to physical activity in the second trimester of pregnancy was ≥28 MET/hour/week or ≥16 MET/hour/week in the third trimester of pregnancy met the recommendations in the table below (Zavorsky and Longo 2011) (Table 1).

Table 1 Physical activity recommendations for pregnant women

Gestational age (weeks)	**%HRR**	**%VO2R**	**RPE**	**Total target energy expenditure (MET/h/week)**
Pregnant women unaccustomed to physical activity - previous sedentary lifestyle and/or overweight/obesity				
1-3	35-39	40-45	12-14	≥16
3-6	45-55	50-60	13-15	28
6-9	60	65	15-16	28
10-26	60	65	15-16	28
27-40	45	60	13-14	16
Pregnant women earlier physically active				
1-3	45-55	50-60	13-15	≥16
3-6	50-60	55-65	14-15	28
6-9	60	65	15-16	28
10-26	60	65	15-16	28
27-40	50	55	14-15	16

%HRR - percentage of heart rate reserve, **%VO2R** - oxygen reserve, **RPE** - subjective feeling of exertion scale according to Borg: 6-20 degrees (rating from perceived exertion), **MET -** metabolic equivalent

Source: own compilation based on: Zavorsky, Longo (2011).

In recent years, there has been increased interest in the impact of physical activity on the health of pregnant women and their fetuses. Adequate levels of physical activity in pregnant women are recommended because of the benefits to maternal and child health. Healthy mothers who are active have a lower risk of heart disease, gestational diabetes and hypertension, as well as a lower risk of birth complications and cesarean sections. Proper physical activity can also improve the health of the fetus, speed up the delivery process and contribute to faster recovery after delivery. Despite the numerous health benefits, many women avoid physical activity during pregnancy because of concerns about their own and their baby's safety. In addition, many pregnant women experience physical symptoms such as back and leg pain, fatigue and nausea, which can hinder physical activity. Research on physical activity during pregnancy has mainly focused on assessing the impact of physical activity on the health of women and their fetuses, but has also investigated factors that affect physical activity among pregnant women and the effectiveness of interventions to increase physical activity among pregnant women.

A questionnaire survey can be an important tool for assessing physical activity during pregnancy, allowing us to identify factors that affect physical activity in pregnant women, as well as to evaluate the effectiveness of measures taken to increase physical activity during pregnancy. In the literature, it can be noted that various research tools are used to assess prenatal activity of women in Poland, the most common being self-administered survey questionnaires. In the world, one way to assess physical activity among pregnant women is the standardized Pregnancy Physical Activity Questionnaire (PPAQ) (Chasan-Taber 2004; Krzepota et al. 2017). In 2017, a Polish version of the questionnaire (PPAQ-PL) was created, which, together with the calculation manual, provides the possibility of using a uniform tool to measure prenatal activity among women in Poland and abroad (Krzepota and Sadowska 2017; Suliga et al. 2017).

The purpose of the study was to evaluate the physical activity of women in the second and third trimesters of pregnancy in terms of weekly energy expenditure associated with the performance of daily activities such as housework and family care, professional work, sports activities, activities resulting from movement and passive rest. In addition, to characterize the weekly energy expenditure associated with the level of intensity of activities undertaken by pregnant women in the following categories: low-intensity activity, moderate-intensity activity, high-intensity activity and sedentary activity. It was also decided to check whether the weekly energy expenditure spent on sports and exercise was in line with that recommended for the trimester. The purpose of the study was concretized with the following research questions: (1) Which group of women achieved higher values of total weekly energy expenditure? (2) Did women in the second and third trimesters of pregnancy differ in their weekly energy expenditure during daily activities such as housework, work, sports activities, mobility activities, and passive rest? (3) Which level of intensity of activities undertaken predominated in women in the second trimester and which in women in the third trimester of pregnancy? (4) Was the energy expenditure for physical activity in women in the second trimester of pregnancy consistent with that recommended for this trimester (28MET/h/week)? (5) Was the energy expenditure on physical activity for women in the third trimester of pregnancy consistent with that recommended in that trimester (16MET/h/week)?

Material and methods

The study included 30 women, with an age range of 18-35 years (28 years ± 3.54). The main criterion for participation in the study was the second and third trimesters of a

physiological pregnancy. Among the respondents, there were 16 women in the second trimester of pregnancy (53.3%), and 14 women in the third trimester (46.7%). The average age of women in the second trimester of pregnancy was 26 years ± 4.05, and the average age of women in the third trimester was 25 years ± 2.85. 56% of women in the second trimester of pregnancy indicated higher education, 5 women indicated secondary education (31.25%), vocational education and primary education were marked by 6.25% of respondents (1 woman).

As a place of residence, 43.75% of pregnant women indicated a city of more than 100,000 residents, while a city of up to 100,000 residents was indicated by 18.75% of respondents, as was a city of up to 50,000 residents (18.75%) and a village (18.75%). Among women in their third trimester of pregnancy, half of them (50%) had a college education, 6 women had a high school education (42.86%), and only 1 woman indicated a vocational education (7.14%). Among the respondents, 42.86% of the pregnant women indicated as their place of residence, a city of more than 100,000 residents, a city of up to 100,000 residents was indicated by 1 pregnant woman (7.14%), 4 women were from a city of up to 50,000 residents (28.57%), and only 21.43% of the surveyed women were from rural areas.

The study was conducted by a diagnostic survey method, using the standardized Pregnancy Physical Activity Questionnaire for Pregnant Women - Polish version (Pregnancy Physical Activity Questionnaire PPAQ-PL). The questionnaire is designed to determine the type, duration and intensity of physical activity of pregnant women during pregnancy. It consists of two parts - a metric, which helps systematize data on the respondents, and a main part. The main part consists of 35 questions relating to various forms of activity such as work done at home, professional work, sports activities and exercise, movement and passive rest. The questions were closed single-choice. There were two categories by which energy expenditure could be classified (by type of activity or intensity of effort). Wanting to calculate the average energy expenditure spent on a given activity, one should multiply the time spent doing this activity by its intensity. This is expressed in MET/hour/week (Curyło et al. 2014; Krzepota and Sadowska 2017). MET is the metabolic equivalent, which corresponds to the energy expenditure of a person in a sitting position (oxygen uptake of about 3.5ml/kg/min = 1 kcal/kg/h = 0.017 kcal/kg/min). The MET multiple is a measure of exercise intensity (Mynarski et al. 2012).

The collected data were entered into a database created in MS Excel 2016, and then imported into STATISTICA 13.0 by StatSoft Poland. Statistical significance was determined at p=0.05

The study was conducted in accordance with the provisions of the Declaration of Helsinki and in accordance with the Law of December 5, 1996 on the Profession of Physician and Dentist No. 28 item 152, it is not subject to the Bioethics Committee and is also not a medical experiment.

Results

Analysis of the results of the study showed that the average values for total weekly energy expenditure of the women studied were significantly higher in women in the third trimester of pregnancy by 66.7 MET/h/week compared to women in the second trimester of pregnancy. The greatest differences between the given groups of women were found in physical activities related to work at home. The mean value of energy expenditure related to household activities was 68.52 MET/h/week in women in the second trimester of pregnancy, while in women in the third trimester of pregnancy it was 116.97 MET/h/week. This means that women in the last trimester of pregnancy definitely spend more time on activities such as cooking, washing, cleaning and shopping. A disturbing difference that can be noted is that women in the second trimester of pregnancy show physical activity at 3.23 MET/h/week, while women in the third trimester have a MET rate of 13.55, which means that they are more willing to engage in physical activity despite the greater constraints of pregnancy. It can be noted that both women in the second (19.23 MET/h/week) and third trimester (15.90 MET/h/week) of pregnancy have reduced activity. The results of the questionnaires show that the energy expenditure of women in the second trimester of pregnancy for physical activity related to movement was 14.86 MET/h/week), while in women in the third trimester of pregnancy this rate was twice as high (29.98 MET/h/week). Women in the second trimester of pregnancy spent significantly more time using the computer, phone or watching TV (33.64 MET/h/week). Respondents who were in the third trimester of pregnancy spent less time on passive rest (29.97 MET/h/week) (Table 2).

Table 2. Weekly energy expenditure of pregnant women in MET/h/week by type of activity performed

Weekly energy expenditure - second trimester	**Average**	**Min**	**Max**	**Standard deviation**	**p**
Total activity	140,42	82,81	441,31	91,48	
Work at home	68,52	19,07	213,85	49,83	
Professional work	19,42	0	141,40	42,15	
Physical activity	3,97	0	28,73	7,16	
Movement	14,86	3,36	63,00	14,62	
Passive rest	33,64	8,86	74,20	17,61	
Weekly energy expenditure - 3rd trimester	Average	Min	Max	Standard deviation	
Total activity	206,37	46,67	570,8	133,88	
Work at home	116,97	25,89	255,46	77,38	
Professional work	15,90	0	155,40	41,01	
Physical activity	13,55	0,38	53,35	17,77	
Movement	29,98	2,10	94,50	30,74	
Passive rest	29,97	9,21	82,60	17,61	

Analysis of the percentage of the listed activities in relation to total physical activity shows that for women in both the second and third trimesters of pregnancy, the greatest energy expenditure among the types of physical activity analyzed was related to housework. In women in the second trimester of pregnancy, this accounted for 49.1%, while in women in the third trimester it accounted for more than half of total physical activity - 56.7%. Work activity accounted for 13.9% of total activity in the first group of women, while in the second group of women it decreased to 7.7% of total activity. Sports and exercise occupied women in the second trimester of pregnancy only 2.8%, and women in the third trimester of pregnancy already occupied 6.6% of total activity. Differences can also be seen in physical activity related to movement, in women in the second trimester of pregnancy it accounted for 10.6%, while in women in the third trimester it accounted for 14.5% of total activity during the week. Women in the second trimester of pregnancy spent more time on passive rest (24.1%), while pregnant women in the third trimester accounted for only 14.5% of total activity (Figure 1).

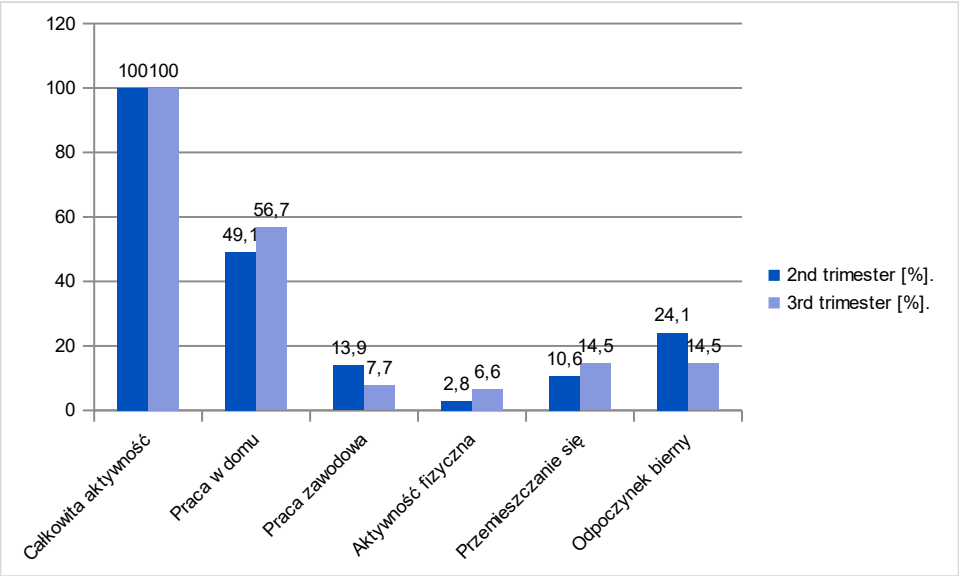


Figure 1: Percentage of individual activities in the structure of total activity.

Source: own elaboration

Analysis of the results of the intensity level of activities undertaken showed little difference between the study groups of women in sedentary activities (24.60 MET/h/week and 20.30 MET/h/week). The average values of low-intensity weekly energy expenditure (e.g., cleaning, ironing or cooking) in women in the second trimester of pregnancy were 81.55 MET/h/week, and as high as 114.83 MET/h/week in the second group of women studied.

The results of moderate-intensity activity (e.g., recreational swimming 100 m - 3:00 or dancing) were similar, with women in the second trimester of pregnancy having an average energy expenditure of 33.32 MET/h/week, and respondents in the third trimester of pregnancy having twice as much - 66.17 MET/h/week. In contrast, high-intensity activity (e.g., walking uphill at 5.5 km/h or jogging at 7 km/h) in the second trimester was (0.35 MET/h/week), and in the third trimester the value increased to 4.47 MET/h/week (Table 3).

Table 3. Weekly energy expenditure of pregnant women in MET/h/week by intensity level

Weekly energy expenditure - second trimester	**Average**	**Min**	**Max**	**Standard deviation**
Total activity Second trimester	140,42	82,81	441,31	91,48
Sedentary activity	24,60	7,35	43,40	11,72
Low intensity	81,55	39,31	228,55	45,89
Moderate intensity	33,32	0	175,58	49,69
High intensity	0,35	0	7,78	2,04
Weekly energy expenditure - 3rd trimester	Average	Min	Max	Standard deviation
Total activity Third trimester	206,37	46,67	570,8	133,88
Sedentary activity	20,30	3,50	44,80	11,75
Low intensity	114,83	27,99	273,00	65,34
Moderate intensity	66,17	0,80	232,50	67,47
High intensity	4,47	0	20,50	7,31

The results of the percentage distribution of individual activities in relation to the total physical activity of the pregnant women surveyed showed that in both the second and third trimesters of pregnancy, low-intensity physical activity accounted for more than half (58.08% and 55.64%, respectively) of the total activity during the week. In contrast, sedentary activity was higher in women in the second trimester of pregnancy (17.52%) in relation to pregnant women in the third trimester (9.84%). Looking at moderate intensity, energy expenditure consumed at this intensity was the second highest in both groups, with women in the second trimester of pregnancy at 23.73%, and women in the third trimester of pregnancy at a slightly higher 32.06% of total activity per week. In contrast, high intensity did not account for a large proportion of total activity in both women in the second trimester of pregnancy (0.56%), while in the third trimester it was significantly more (2.17%) (Figure 2).

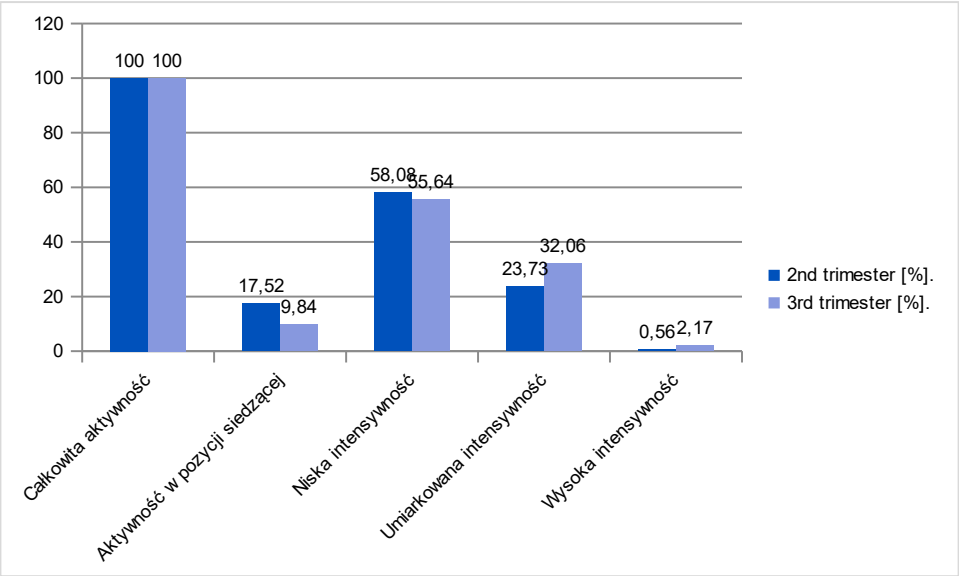
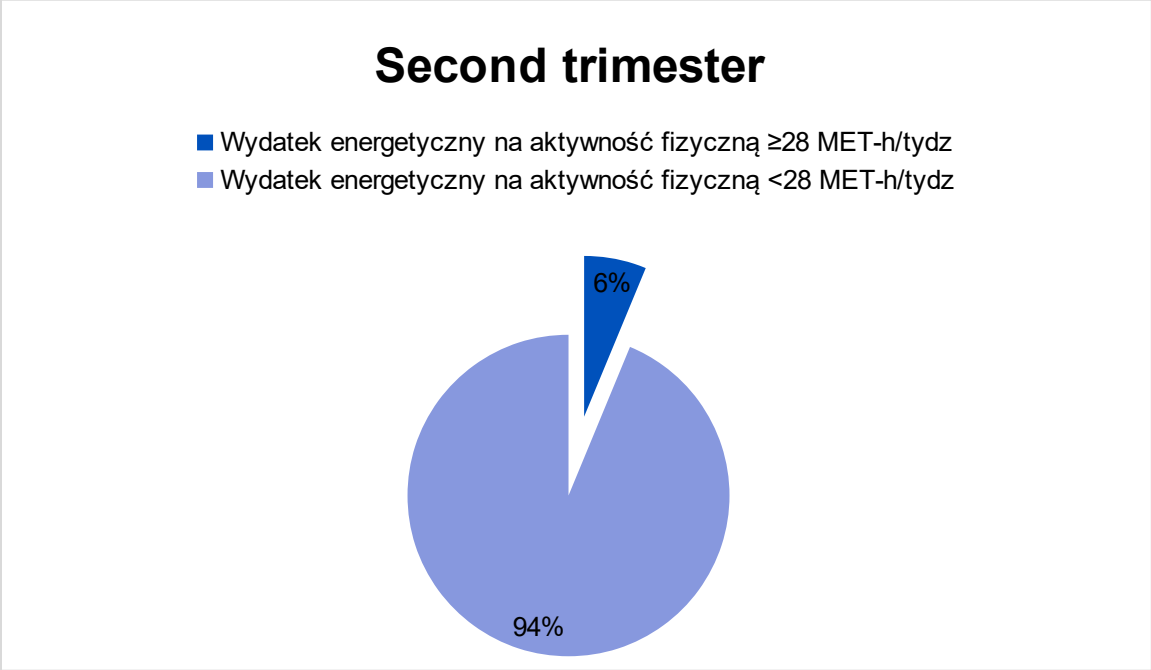


Figure 2: Percentage of activities with different levels of intensity in the structure of total activity



According to the recommendations (Zavorsky and Longo, 2011), it is suggested to adopt an appropriate energy expenditure for exercise depending on the period of pregnancy (energy expenditure for physical activity in the second trimester of pregnancy ≥28 MET/h/week, while in the third trimester of pregnancy ≥16 MET/h/week). Of the 16 pregnant women surveyed in the second trimester of pregnancy, only one met the above recommendations, while as many as 15 women (94% of those surveyed) did not meet the given standard (Figure 3).

Figure 3: Percentage of women in the second trimester of pregnancy (n=16) whose weekly energy expenditure on sports and exercise was in line with or less than recommended

In contrast, among the 14 respondents who were in the third trimester of pregnancy, 4 (29%) had a sports and exercise expenditure of ≥ 16 MET/h/week, and 71% of the remaining respondents did not fulfill the recommendations (Figure 4).

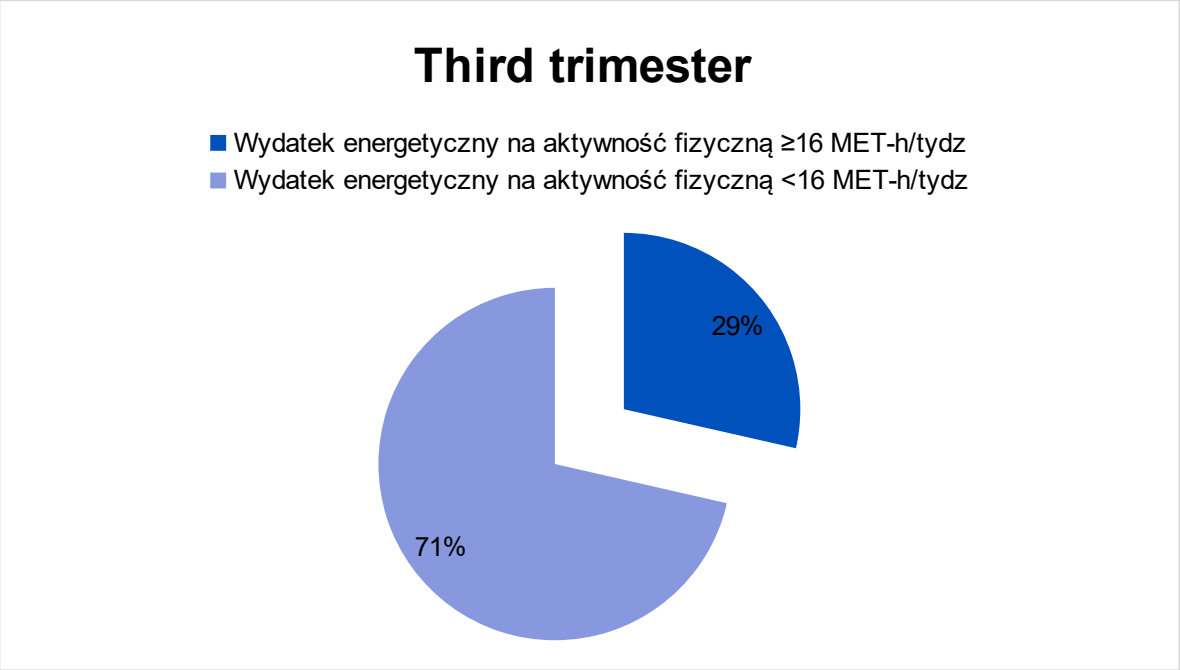


Figure 4: Percentage of women in the third trimester of pregnancy (n=14) whose weekly energy expenditure on sports and exercise was in line with or less than recommended

Discussion

The present study aimed to analyze the physical activity of women in the second and third trimesters of pregnancy in terms of weekly energy expenditure associated with daily activities such as housework and family care, professional work, sports activities, activities resulting from movement and passive rest. In addition, determining the weekly energy expenditure based on the level of intensity of the activities performed, which was classified as low-, moderate- and high-intensity activities and sedentary activities. In addition to this, checking whether the energy expenditure of the women surveyed for sports and exercise was in line with that recommended for the trimester.

The analysis of the results of the study showed that the energy expenditure of women in the second trimester of pregnancy was 140.42 MET/h/week, while that of pregnant women in the third trimester was 206.37. The total physical activity of pregnant women in Wojtyla et al. (2012) was higher at 211.07 MET/h/week. In our study, the total weekly energy expenditure of women in the third trimester of pregnancy was 65.95 MET/h/week higher compared to pregnant women in the second trimester. A completely different finding can be

seen in the study by Gałązka et al. (2013), which revealed that total physical activity decreases at the end of the second and third trimesters of pregnancy. In the second trimester of pregnancy, 56% of women were physically active, while in the following trimester only 41% of the subjects were active. Also according to a publication by Sass and Mączka (2013), women's physical activity in the last trimester significantly decreased compared to pregnant women in the second trimester of pregnancy.

Considering the types of activities, housework amounted to the largest percentage of total activity (49.1% in women in the second trimester, 56.7% in the third trimester). This is consistent with the fact that women in the last trimester of pregnancy definitely spend more time on activities such as taking care of children, cooking, dishwashing, cleaning or shopping. The assumption that pregnant women spend most of their time engaging in household chores is confirmed by the research of other authors, in which this part of the activity accounted for as much as 74.54% (Wojtyla et al. 2012), while in the study of Cohen et al. (2013) this result was 50% of total activity.

With regard to work, women in the second trimester of pregnancy had a higher energy expenditure of 13.9%, while those in the third trimester of pregnancy decreased to 7.7% of total activity. In a study by Wojtyla et al. (2012), the percentage of women who were active was 9.81% of CA.

Another type of activity presented by the PPAQ-PL questionnaire is passive rest (watching TV or video, using the computer, talking on the phone); in our study, the results in women in the second and third trimesters accounted for 24.1% and 14.5% of CA, respectively. The results of other authors' studies (Torbé et al. 2013) confirm that pregnant women are reluctant to engage in physical activity and prefer passive rest, but in our study, ladies who were in the second trimester of pregnancy rested more, while pregnant women in the third trimester clearly limited passive rest.

Physical activity performed during leisure time in women in the second trimester of pregnancy accounted for only 2.8%, while in the third trimester of pregnancy it was slightly higher at 6.6% of total activity. The lack of participation in physical activity is also confirmed by a study by Wojtyla et al. (2012), in which physical exercise accounted for 3.17% of the total activity of pregnant women. One of the most common forms of activity undertaken by female respondents was walking, indicated by 20.17% of respondents in the second trimester, and as many as 51.61% of respondents in the third trimester. This is also confirmed by the

study of Stadnicka et al. (2015), in which walking was preferred by 38.15% of pregnant women surveyed. It can be assumed that it was chosen because it is widely available and the safest form of activity (ACOG 2015). Gymnastics for pregnant women was indicated by 31.25% of women in the second trimester and 42.86% of women in the third trimester of pregnancy. General gymnastics is one of the activities recommended by PTG (2005). Swimming, which is one of the more beneficial activities during pregnancy (ACOG 2002; RCOG 2006; ACOG 2015) was chosen by 12.50% of women in the second trimester and 21.43% in the third trimester of pregnancy. In a study by Ćwiek et al. (2012) swimming was indicated by 16% of the women surveyed. Pregnant women may forgo this form of activity because they fear complications, as the pH of the vagina changes from acidic to alkaline during pregnancy, and this promotes the development of intimate infections (Bręborowicz and Markwitz 2012).

Many articles report that pregnant women give up or greatly reduce the regularity of their activity. According to Ćwiek (2012), as many as 75% of pregnant women avoid regular exercise. On the other hand, a study by Banaszak-Zak (2005) shows that half of the respondents (50%) do not engage in leisure-time physical activity. This may be due to insufficient knowledge, lack of reliable sources of information, or the belief that exercise can be dangerous for the baby. In a study (Torbé et al. 2014), the majority of women (72%) indicated the Internet as a source of information on prenatal activity, followed by books and guides (64%), women's magazines (58%), and birthing school (37%), while the doctor accounted for only 2% of the knowledge of the women surveyed about taking exercise during pregnancy.

Analyzing weekly energy expenditure by intensity, it can be seen that the highest values in both groups were obtained for low intensity. In women in the second trimester of pregnancy, low-intensity movement accounted for 58.08%, and in the third trimester of pregnancy, 55.65% of total prenatal activity. Activities performed in this intensity range in Wojtyla et al. (2012) reported 43.55% of CA, which was slightly lower than in their study. Moderate intensity exercise is recommended by ACOG (2002; 2015) and RCOG (2006) as the optimal body load for pregnant women. In our study, in women in the second trimester of pregnancy, activities performed at this intensity accounted for 23.73%, and in the third trimester slightly more, 32.06% of total activity. The lowest results were found for high-intensity exercise. In women in the second trimester of pregnancy, they accounted for 0.56% of total activity, and in women in the third trimester, 2.17% of CA, also in Wojtyla's (2012)

study, this result was at a low level of 0.35%. The low percentage of high-intensity activity has its justification and is in line with the recommendations of ACOG (2015), RCOG (2006), as well as PTG (2005), as they note the risk of contractions and preterm labor and can lead to miscarriage.

Considering the guidelines (Zavorsky and Longo 2011) for energy expenditure in MET/h/week in the second trimester of pregnancy, only 6% of pregnant women fulfilled the recommendation for sports and exercise (≥ 28 MET/h/week), while the recommendations proposed for the third trimester of pregnancy were fulfilled by 29% of the women surveyed. In our study, unsurprisingly, women in the third trimester of pregnancy spent more time on slow-time physical activity, rested less, and a higher percentage of them completed the recommendations for prenatal activity.

Based on the results of our own research conducted for this study, we can conclude that the knowledge of pregnant women regarding the positive impact of physical activity on the course of pregnancy, labor and postpartum is still insufficient. There is a need to educate pregnant women and increase their awareness of what benefits can be derived from prenatal activity. It is important for every pregnant woman to have access to reliable sources of information. It is also necessary to create programs based on safe and recommended forms of exercise under the supervision of qualified instructors .

Strengths and limitations

Questionnaire surveys allow a large number of respondents to be reached, which allows the results to be generalized to the population of pregnant women. Nevertheless, the survey has several limitations. First, limited reliability of the results - the results of a questionnaire survey may be less reliable than those obtained by other methods, since they are based on the subjective responses of respondents. Second, possible errors due to subjective assessments - female respondents may overestimate or underestimate their physical activity, which can lead to errors due to subjective perception. Third, low quality of responses - female respondents may answer haphazardly or hastily, which can lead to errors in survey results.

The study can help identify areas where pregnant women need more support to stay physically active, so that appropriate programs and activities can be created at various levels of health policy. The results of the study can help educate pregnant women about the benefits of physical activity and encourage them to engage in it. The study can help understand what

types of physical activity are most appropriate for pregnant women at different periods of pregnancy, so that activities can be tailored to their individual needs. The study may also provide clues about areas that need further research, such as the effects of different types of physical activity on maternal and child health during pregnancy. Further research may focus on examining factors that influence willingness to engage in more physical activity and identify ways in which obstacles and limitations to physical activity during pregnancy can be reduced. Further studies may focus on examining the impact of physical activity on obstetric birth outcomes, such as duration of labor, number of medical interventions and neonatal outcome.

Applications

The study showed that higher values of total weekly energy expenditure were obtained by the group of women in the third trimester of pregnancy compared to the pregnant women surveyed in the second trimester. The women's physical activity also differed in terms of energy expenditure in activities such as housework, passive rest and occupational work, while smaller differences could be seen in the other categories: physical activity of moving, passive rest. In both women in the second and third trimesters of pregnancy, low levels of activity intensity prevailed. Energy expenditure on sports and exercise was in line with that recommended in the second trimester in a small percentage of women. In contrast, energy expenditure for physical activity was consistent with that recommended in the third trimester in one-third of women.

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