

PHYSICAL ACTIVITY IN RELATION TO AFFECTIVE STATES AND LABOR ANXIETY IN PREGNANT WOMEN

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Abstract

Aim: The aim of the study was to compare pregnant women pursuing physical activity with those inactive during pregnancy for their affective states and anxiety in the situation of visualized labor.

Methods: Participants in the study were 199 women aged 19 to 38 years, in the second or third trimester of uncomplicated first pregnancy. The exercise subgroup ($n=135$) consisted of pregnant women participating in exercise programs and exercising systematically at least twice a week, while the inactive group ($n=64$) included those who never participated in any form of physical exercise during pregnancy. The following standard psychological instruments were used: the Profile of Mood States (POMS) by Dudgeon & Koniarek, the State-Trait Anxiety Inventory (STAI) by Wrześniewski et al. (the trait anxiety subscale), as well as the state anxiety subscale of the STAI with instruction modified for the purposes of this study.

Results: Pregnant women participating in exercise program were characterized by a better mood and lower anxiety when visualizing labor. The trimester of pregnancy did not differ the levels of emotional states. Trait anxiety as controlled variable was significantly related to emotional states and labor anxiety.

Conclusions: The findings confirm a beneficial role of physical activity as a factor improving pregnant women's quality of life.

Key words: pregnancy, physical activity, mood, labor anxiety

Introduction

Research findings concerning physical activity during pregnancy suggest that systematic physical exercise adjusted to individual physical capability are beneficial to health of both the mother and her child [1-3]. Mothers-to-be are encouraged to perform mainly aerobic physical exercise of moderate intensity for at least 30 minutes on most days of the week, and even daily [2-4].

Despite educational efforts aimed at convincing pregnant women that physical activity in uncomplicated pregnancy is safe and desirable, its level is known to generally decrease. Both the intensity and duration of physical exercise performed in leisure time systematically decrease over the successive trimesters of pregnancy [5-8].

Changes occurring in the course of pregnancy (growing body mass, increasing symptoms of fatigue, depressed mood, less attractive body image) may contribute to the reduction of physical activity. A considerable number of women suffer from marked mood shifts during pregnancy and after childbirth, depression levels in that time may be even higher than in the postpartum period [9-12]. In a prospective study depression symptoms scores were higher at 18 and 32 weeks of pregnancy than at postpartum [10]. Williams et al. [13] observed a general trend for increased confusion from the first to third trimester of pregnancy.

Tiredness significantly increasing during pregnancy is accompanied by a decrease in the vigor level [14], which is important since fatigue in this period is positively correlated with depression and anxiety indicators [6, 14]. The largest changes in fatigue and vigor in pregnant women were observed during weeks 12-16 (fatigue decreased, vigor increased) and weeks 32-36 (fatigue increased, vigor decreased) [6]. Reductions of physical activity and a worsening mood are common during pregnancy, especially in the third trimester. Physical activity may effectively reduce depression [15-18] or fatigue [18, 19]. These factors are psychological barriers of exercise taking during pregnancy.

Pregnant women often experience strong fears about labor and delivery. In the last trimester of pregnancy many of them manifest an above-average level of neuroticism [20], associated with enhanced emotional lability, anxiety proneness, and negative mood states. High anxiety and tension levels during labor are undoubtedly detrimental. Physical exercise producing anti-anxiety effects confirmed by numerous studies [e.g. 21, 22] may help to reduce also labor anxiety. Research findings evidence that physically active pregnant women have a more positive attitude towards pregnancy and stronger motivation for breastfeeding, experience less anxiety about childbirth, and remain more mentally balanced both during pregnancy and in the postpartum period [23].

Earlier research, both correlational and experimental, carried out in the general population revealed close relationships between physical activity and mood. However, there were rather few studies of this type in the population of pregnant women. Significantly lower fatigue indicators were found in pregnant participants of an aerobic physical exercise program than in non-exercising women [18]. Physically active pregnant women as compared to those not exercising during pregnancy displayed fewer symptoms of anxiety [24]. A stable relationship was found between well-being and physical activity in leisure time, especially during the first and second trimesters of pregnancy [25]. However, in a study by Poudevigne and O'Connor [6] no relationship was found between anxiety and depression levels on the one hand and the intensity of physical activity on the other.

The aim of the study was to determine the relationships of physical activity level and trimester of pregnancy and emotional states in pregnant women as well as their state anxiety in the situation of visualized labor.

Material and methods

Participants in the study were 199 healthy women aged 18 to 38 years ($M=27.36$; $SD=3.637$), either in the second ($n=71$; 35.7%) or third ($n=128$; 64.3%) trimester of uncomplicated first pregnancy (primigravidae). As regards the subgroup of women exercising during pregnancy ($n=135$), the inclusion criterion was attending a physical fitness program for pregnant women, at least two days a week. Their participation in the exercise program had been approved by their obstetrician-gynecologist. The program lasted 12 weeks (two sessions per week) and included pilates, yoga and body ball exercises. During each 60-minute session the participants performed to music in a friendly atmosphere strengthening, stretching, relaxing and slightly stimulating exercises, supplemented by those preparing for childbirth. The non-exercising subgroup ($n=64$) consisted of those who neither attended any physical fitness class for pregnant women, nor exercised at home during pregnancy. The inclusion criterion was negative answering to the following questions: a. Have you participated in any program of exercise for pregnant women in course of pregnancy? b. Have you performed any physical exercise individually being pregnant? Exercise and comparison subgroups were equalized in respect of obstetrics history (uncomplicated first pregnancy, without earlier miscarriage) and trimester of pregnancy. Their matrimonial status did not differ.

Exercising group was significantly older than non-exercising one ($M=28.05$; $SD=3.484$ vs. $M=25.89$; $SD=3.542$; $t=4.066$; $P<0.001$) and less prone to react with anxiety (lower trait-anxiety scores were observed

in active group: $M=37.62$; $SD=7.750$ vs. $M=43.02$; $SD=7.029$; $t=4.772$; $P<0.001$).

The first questionnaire used in the study was The State-Trait Anxiety Inventory (STAI) by Spielberger et al. in the Polish adaptation by Wrześniewski et al. [22]. Modified instruction to the state anxiety scale was used. The respondents were asked to visualize their own labor and then to respond to the statements. The state anxiety scale score as the indicator of anxiety level in the situation of visualized childbirth was termed "labor anxiety". It ranged from 20 to 80. Polish version of STAI had good psychometric properties (Cronbach's alpha varied from 0.89 to 0.92 in state-anxiety subscale and from 0.76 to 0.91 in trait-anxiety subscale for men and women in different age groups, validity was satisfactory).

The second scale was The Profile of Mood States (POMS) by McNair, Lorr and Droppleman in the Polish adaptation by Dudek & Koniarek [23]. Polish version of POMS consisted of seven subscales which measure: five negative emotional states (anger, confusion, depression, fatigue and tension) and two positive states (vigor and friendliness). The scores ranges for subscales varied (anger: 0-48; confusion: 0-28; depression: 0-60; tension: 0-36; fatigue: 0-28; friendliness: 0-28; vigor: 0-32). Polish version did not contain the total index of mood (sum of subscales scores). Its reliability measured with Cronbach's alpha for individual sub-scales varied between 0.73 (vigor) and 0.85 (fatigue). Test validity established in comparisons of different groups (healthy adults, psychiatric patients, students, drivers, dentists) was satisfactory.

The participants were examined individually at their gynecologist's office or in fitness clubs providing exercise classes for pregnant women. In the scales measuring affective states and mood dimensions the respondents were asked to rate how they had been feeling in the past week. The research project had been approved by the Senate Committee on Ethics in Scientific Research affiliated with the Academy of Physical Education in Warsaw.

Results

In the first step of analysis relationships between emotional states and age were established because of age differences between subgroups. Pearson's r linear correlation coefficients indicated no significant relationships.

Subgroups differed also in trait anxiety. However, trait anxiety was significantly and strongly correlated with all emotional states measured by POMS on $P<0.0001$ (anger $r=0.588$; depression $r=0.612$; tension $r=0.537$; confusion $r=0.579$; fatigue $r=0.576$; vigor $r=-0.488$; friendliness $r=-0.417$;) and with state anxiety in the situation of labor visualization ($r=0.368$; $P<0.001$).

Because of these dependences in further analyses trait anxiety was controlled.

A multivariate analysis of variance (MANOVA) in 2 x 2 design (group x trimester) with trait anxiety as a covariates was performed to establish the relationships of physical activity level and trimester of pregnancy with the joint distribution of all emotional states measured by POMS. The significant but moderate effect of group ($F=6.710$; $P<0.001$; $\eta^2=0.200$); stronger effect of trait anxiety ($F=18.251$; $P<0.001$; $\eta^2=0.405$) and significant interaction between group and trimester of pregnancy ($F=2.945$; $P=0.006$; $\eta^2=0.099$) were observed. There was no significant direct effect of trimester ($F=1.053$; $P=0.396$; $\eta^2=0.038$).

Table 1 presents the means and standard deviations of POMS scores in comparison: exercising – non-exercising women and second – third trimester of pregnancy. The results of univariate analyses of variance (ANOVA) for each emotional state are shown in table 2.

The direct effect of group (exercising – non-exercising) was significant for depression, fatigue, confusion, tension and vigor. Intergroup difference in anger

reached tendency level ($0.01<P<0.1$). Subgroups did not differ in friendliness. Participants of fitness classes for pregnant women displayed a significantly better psychological wellbeing. They were characterized by lower levels of depression, fatigue, confusion, tension and a higher level of vigor.

Trimester of pregnancy did not differentiate the levels of emotional states. Significant interaction between group and trimester was observed only in vigor scores (Fig. 1). In exercising group higher level of vigor was observed in third trimester, while non-exercising group was more vigorous in second trimester. Intergroup difference in vigor was more evident in third than in second trimester of pregnancy.

Significant effects of trait anxiety as controlled variable were observed for all emotional states as measured by the POMS.

An univariate analysis of variance (ANOVA) in 2 x 2 design (group x trimester) with trait anxiety as a covariates was performed to establish the effect of physical activity level and trimester of pregnancy on the labor anxiety (Table 1, Table 2). The level of labor anxiety was significantly lower in participants of fitness

Table 1. Mean scores – M (SD) of scales measuring emotional states and labor anxiety in non-exercising and exercising pregnant women in second and third trimester

Variable (scale)	Non-exercising ($n=86$) M (SD)	Exercising ($n=117$) M (SD)	Second trimester ($n=71$) M (SD)	Third trimester ($n=128$) M (SD)
Anger	15.41 (10.418)	8.90 (8.704)	9.72 (8.863)	11.70 (10.177)
Confusion	12.86 (5.228)	8.03 (4.396)	9.83 (5.307)	9.58 (5.186)
Depression	20.06 (12.371)	8.80 (9.240)	11.61 (11.168)	12.88 (11.833)
Fatigue	14.36 (6.844)	7.97 (5.594)	9.10 (6.866)	10.54 (6.594)
Tension	17.98 (9.892)	10.43 (5.994)	11.72 (8.009)	13.39 (8.335)
Friendliness	17.12 (5.035)	18.41 (4.727)	18.04 (4.695)	17.98 (4.957)
Vigor	14.77 (6.512)	19.70 (6.183)	18.48 (5.791)	17.91 (7.147)
Labor anxiety	46.91 (9.585)	38.96 (9.683)	42.45 (11.354)	40.99 (9.711)

Table 2. Univariate analyses of variance (ANOVA) – F for emotional states and labor anxiety

Variable (scale)	Group F	Trimester F	Group x trimester F	Trait anxiety F	Adjusted R^2
Anger	3.844	1.350	1.187	79.332**	0.369
Confusion	22.226**	0.044	0.103	68.921**	0.406
Depression	26.291**	0.015	0.368	84.520**	0.451
Fatigue	24.982**	0.715	0.217	66.636**	0.412
Tension	18.792**	2.024	1.196	52.813**	0.370
Friendliness	0.155	0.026	0.794	37.837**	0.179
Vigor	5.456*	1.508	11.318**	45.037**	0.318
Labor anxiety	16.445**	2.789t	0.701	18.556**	0.197

** $P<0.001$; * $P<0.05$; t $0.5<P<0.1$

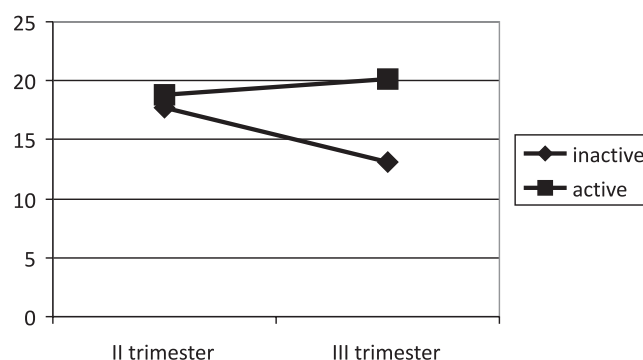


Fig. 1. The level of vigor – interaction of group and trimester

classes for pregnant women. The effect of trimester reached only tendency level ($0.01 < P < 0.1$); labor anxiety was slightly lower in third trimester. There was no significant interaction between group and trimester. Significant effect of trait anxiety as controlled variable was observed.

Discussion

The findings are in line with earlier data concerning positive relationships between regular physical activity during pregnancy and mood [7, 18, 24, 25]. Pregnant women participating in a fitness program were found to manifest lower levels of fatigue and higher levels of vigor, which corroborates the earlier research results [18], and suggests that physical exercise helps to overcome both fatigue and a decrease in vital energy, so typical of pregnancy [13].

Exercising pregnant women were found to be less depressed, which is particularly important considering the high depression levels reported in pregnancy [9-12]. Moreover, the presented results are more optimistic than those obtained by Poudevigne and O'Connor [6], who found no relationship between physical activity and either anxiety or depression.

Participants in a fitness program for pregnant women were less confused and tense than women in comparison group. These findings are in line with results obtained by Wallace et al. [18], Goodwin et al. [24] and DaCosta et al. [25].

However, the study findings should be interpreted with caution. It should be remembered that a correlational paradigm was used, so it is not possible to establish any causative relationships between physical exercise and emotional states. It should be also emphasized that the two groups differentiated in physical activity significantly differed in their trait anxiety levels. Therefore, further research is needed controlling for trait anxiety as a determinant of pregnant women's emotional wellbeing.

For the same reason caution needs to be exercised when drawing conclusions about the relationship between physical activity and labor anxiety. Exercising women manifested lower anxiety during labor visual-

ization, which seems to corroborate the results of our earlier research on anxiety in non-pregnant physically active women [21, 22].

The intensity of labor anxiety was somewhat lower in third trimester. Against intuitive expectations women in more advanced pregnancy experienced less anxiety. Perhaps they not only have had more time to psychologically prepare for childbirth, but also experienced pregnancy ailments over a longer period, so they regarded childbirth as a liberation from the discomfort and as a moment of meeting their eagerly awaited child rather than as a source of negative feelings.

Despite the results of earlier studies, mood states of pregnant women in second and third trimester did not differ. It is especially surprising with reference to the fatigue and vigor. Pugh and Milligan [28] reported a steady increase over the course of pregnancy in fatigue. Elek et al. [29] reported increase in fatigue during the last trimester. Poudevigne and O'Connor [6] reported that fatigue increased and vigor decreased from weeks 32-36; during weeks 12-16 the changes tended in the opposite direction. Thus, it is not clear how fatigue evolves over the course of pregnancy.

Williams et al. [13] observed a general trend for increased confusion from the first to third trimester of pregnancy. Our results did not confirmed this observation.

The presented research findings suggest that relationships between the investigated variables are complex, requiring further study and more advanced methods of statistical analysis. It is still uncertain how the relationship between physical activity and mood is maintained as women progress during pregnancy [7].

Limitations of the study

The major limitation of this study is the fact that the exercising group did not comply with the usually used criterion of being physically active defined by ACSM i.e. exercising 3 times a week, at moderate intensity for the past 3 months. In physically active group the inclusion criterion was attending a physical fitness program for pregnant women lasting two-three months, at least two days a week. It may be supposed that the ACSM

criterion is very rarely fulfilled by Polish pregnant women. Exercise classes for pregnant women usually take place twice a week and most of their participants do not perform further exercise at home.

Conclusions

Despite the considerable methodological limitations of the study outlined above, a circumspect conclusion seems justified that physical exercise during pregnancy may be used to enhance the pregnant woman's quality of life by improving her mood and decreasing her anxiety about labor and delivery.

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