ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

The Impact of Physical Activity Level and Sexual Activity During Pregnancy on Labor

Gebelikte Fiziksel Aktivite Düzeyi ve Cinsel Aktivitenin Doğum Eylemi Üzerindeki Etkisi

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ABSTRACT

Aim: *We aimed to obtain epidemiologic data on the level of physical activity during pregnancy, physical activity barriers of pregnant women, and sexual activity during pregnancy in Türkiye. We investigated the relationships between physical and sexual activity in pregnant women and labor-related variables.*

Materials and Methods: *The study included volunteers who gave birth in the maternal ward of tertiary training and research hospital. To determine the physical activity levels in pregnancy, "International Physical Activity Questionnaire (IPAQ)" and "Physical Activity Readiness Medical Examination (PARMED-X)" scales were used. In addition, participants were questioned about their sexual activity during pregnancy. Participants' data on the duration of the first and second phases of labor, postpartum hemorrhage, oxytocin administration for labor induction, and unplanned Cesarean section (Cs) were obtained from patients' electronic medical records.*

Results: *The study included 173 pregnant women. Seventy-seven (44.50%) participants were nulliparous. With increasing age, participants were found to be less physically active (p=0.235). There was no correlation between physical activity levels and duration of the phases of labor, gestational age, oxytocin usage, postpartum hemorrhage, and type of delivery. Lower gestational weight gain was observed in the physically active group. There was a relationship between an increase in sexual activities during pregnancy and a shorter duration of the second phase of labor (p=0.018).*

Conclusion: *Our study showed that physical activity levels tended to decrease in pregnant women, and pregnancy-related side effects were mainly responsible for this situation. It was observed that physical activity levels and sexual activity had limited effects on labor.*

Key words: *exercise; pregnancy; sexual behavior; labor; oxytocin*

ÖZET

Amaç: *Türkiye'de gebelik sırasında fiziksel aktivite düzeyi, gebelerin fiziksel aktivite engelleri ve gebelik sırasında cinsel aktivite hakkında epidemiyolojik veri elde etmeyi amaçladık. Gebe kadınlarda fiziksel ve cinsel aktivite ile doğumla ilgili değişkenler arasındaki ilişkileri araştırdık.*

Materyal ve Metot: *Çalışmaya üçüncü basamak eğitim ve araştırma hastanesinin doğum servisinde doğum yapan gönüllüler dâhil edilmiştir. Gebelikteki fiziksel aktivite düzeylerini belirlemek için "International Physical Activity Questionnaire" (IPAQ) ve "Physical Activity Readiness Medical Examination (PARMED-X)" ölçekleri kullanılmıştır. Ayrıca, katılımcılara gebelik sırasında cinsel aktiviteleri hakkında sorular sorulmuştur. Katılımcıların doğumun birinci ve ikinci evresinin süresi, doğum sonrası kanama, doğum endüksiyonu için oksitosin uygulaması ve planlanmamış sezaryen (Cs) ile ilgili verileri hastaların elektronik tıbbi kayıtlarından elde edilmiştir.*

Bulgular: *Çalışmaya 173 gebe kadın dâhil edilmiştir. Katılımcıların 77'si (%44,50) nullipardı. Katılımcıların yaşları arttıkça fiziksel olarak daha az aktif oldukları bulunmuştur (p=0,235). Fiziksel aktivite düzeyleri ile doğumun evrelerinin süresi, gebelik yaşı, oksitosin kullanımı, doğum sonrası kanama ve doğum şekli arasında bir ilişki bulunmamıştır. Fiziksel olarak aktif grupta daha düşük gestasyonel kilo alımı gözlenmiştir. Gebelik sırasında cinsel aktivitelerin artması ile doğumun ikinci evresinin daha kısa sürmesi arasında bir ilişki saptanmıştır (p=0,018).*

Sonuç: *Çalışmamız, gebelerde fiziksel aktivite düzeylerinin azalma eğiliminde olduğunu ve bu durumdan esas olarak gebeliğe bağlı yan etkilerin sorumlu olduğunu göstermiştir. Fiziksel aktivite düzeylerinin ve cinsel aktivitenin doğum eylemi üzerinde sınırlı etkileri olduğu gözlenmiştir.*

Anahtar kelimeler: *egzersiz; gebelik; cinsel aktivite; doğum; oksitosin*

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Introduction

It is common knowledge that physical activity during and after pregnancy benefits both the health of the mother and the fetus. Pregnant women with a combination of diet and exercise are less likely to have fetal risks such as fetal death and macrosomia and maternal risks such as gestational diabetes and pre-eclampsia[1]. However, in this period, physical activity decreases due to factors such as motivation, knowledge, and family support[2].

In animal studies, there is evidence that exercise increases oxytocin production and oxytocin receptor production[3]. Similar to the impact of exercise, Cera et al. showed that oxytocin concentrations in plasma and various secretions increased during sexual activity in humans[4]. However, during pregnancy, women consider sexual activity to be unsafe, and sexual functions decrease[5]. Furthermore, oxytocin causes positive feedback on its secretion[6]. Oxytocin is known to have effects on pregnancy, childbirth, and breastfeeding. Following these effects, oxytocin receptor expression increases significantly in many tissues, especially in the brain, during pregnancy but returns to pre-pregnancy levels after delivery[7]. Besides these physiological roles, oxytocin has been used for labor induction and treatment of postpartum hemorrhage[8].

There is limited information on the relationship between physical activity levels and sexual activity in the labor event. A study conducted in Sweden investigated the effects of physical activity and sedentary time separately on factors such as gestational weight gain (GWG) and indication for emergency cesarean section[9]. In another recent study, the physical activity levels of pregnant women were evaluated with the Kaiser Physical Activity Questionnaire. Pregnant women with high and low physical activity levels were divided into two groups, and variables such as the duration of the active phase of labor, operative vaginal delivery, and maternal complications related to delivery were compared between these groups[10]. A meta-analysis shows that sexual activity during pregnancy did not affect spontaneous labor onset[11].

In this study, we aimed to obtain epidemiologic data on the level of physical activity during pregnancy, physical activity barriers of pregnant women, and sexual activity during pregnancy in Türkiye. In addition, we investigated the relationships between physical and sexual activity in pregnant women and labor-related variables.

Method

The study included volunteers who gave birth in the maternal ward of a tertiary training and research hospital. Data were obtained from a questionnaire and electronic medical records of patients. In the first part of the questionnaire, sociodemographic data of the participants; in the second part, the level of physical activity during pregnancy and the frequency of vaginal sexual intercourse in the first, second, and third trimesters and after 37 weeks of pregnancy were questioned.

Since physical activity during pregnancy is more limited than in other periods of life, special scales are used to classify the level of physical activity. For this purpose, the "International Physical Activity Questionnaire" (IPAQ) was used to question pregnant women's sitting, walking, moderate activity, and vigorous physical activity[12]. According to the questionnaire responses, pregnant women were categorized into three groups: inactive, minimally active and very active. In addition, pregnant women were divided into three groups: unfit, active, and fit, using the Physical Activity Readiness Medical Examination (PARMED-X) prepared by the Canadian Society of Exercise Physiology, which specifically questions exercise levels during pregnancy[13,14]. This template questioned how many days per week pregnant women exercised in the last trimester and whether these exercises lasted more than 20 minutes.

Participants' data on the duration of the first and second phases of labor, postpartum hemorrhage, oxytocin administration for labor induction, and unplanned Cesarean section (Cs) were obtained from patient files.

Pregnant women were also divided into two categories, nulliparous and multiparous, and the analyses were performed separately for both categories.

Ethical approval of the study was obtained from the XXX Training and Research Hospital Ethics Committee for Scientific Research with the date 14.12.2022 and number 2022/147. All participants provided informed consent, and voluntary participants were included in the study. The study was conducted in accordance with the principles of the Helsinki Declaration.

Frequency, mean, standard deviation, minimum, and maximum values were used in descriptive epidemiologic data statistics related to physical activity levels, sexual activity, and labor. Shapiro Wilk test was applied to determine the normal distribution of the groups. One-way ANOVA, Independent T test, and Kruskal Wallis tests were then applied. Simple and multiple linear regression

tests were used to investigate the relationship between numerical variables. All analyses were performed using R Statistical Software (v4.2.2; R Core Team 2022). $p < 0.05$ was considered statistically significant.

Results

The study included 173 pregnant women. Seventy-seven (44.50%) participants were nulliparous, and the others were multiparous. The mean age of the study group was 26.89±5.09 years.

Physical Activity in Pregnancy

Physical activity levels increased in 26 (33.7%) and decreased in 23 (29.8%) with pregnancy in nulliparas. In multiparous women, it increased in 20 (20.61%), decreased in 42 (43.29%), and remained unchanged in 34 (35.41%) participants. The most common reason stated by those whose physical activity level decreased was the side effects of pregnancy in 40 (61.53%) of the participants. Eight participants indicated that they did less physical activity due to lack of motivation, eight due to fear of harm to pregnancy, four due to lack of time, one due to medical reasons, and three due to other causes.

The Relationship Between Physical Activity Levels and Labor

There was no effect of the change in physical activity level on the duration of the phases of labor, postpartum hemorrhage, OT usage and gestational age.

Participants were divided into three groups according to their physical activity levels using PARMED-X scoring as fit 74 (42.8%), active 60 (34.7%) and unfit 39 (22.5%). Unfit women were older than active and fit pregnant women (p=0.235). There was no correlation between physical activity level, the duration of labor phases and gestational age. Chi-square tests showed no association between physical exercise levels and postpartum hemorrhage, oxytocin usage and unplanned Cs. Less gestational weight gain was observed in the fit group (p=0.06). The relationship between physical activity levels and labor is summarized in Table 1.

Pregnants were divided into three groups: very active 15 (8.7%), minimally active 68 (39.3%), and inactive 90 (52%) based on their physical activity levels using the IPAQ scale. It was observed that physical activity levels did not affect the duration of labor phases, gestational age, postpartum hemorrhage, oxytocin use, and unplanned Cs (Table 2).

Relationship between Sexual Activity Levels and Labor

Sexual activity in any trimester during pregnancy did not affect the duration of the phases of labor and gestational age. Similarly, chi-square tests showed that sexual activity did not pose a risk for postpartum hemorrhage and unplanned Cs. However, the linear regression test showed that an increased frequency of sexual intercourse was associated with a shorter duration of the second phase of labor in nulliparous (R^2=0.089, p=0.023) as represented in Table 3.

Table 1. *The relationship between physical activity levels and labor*

		Unfit (Mean ± SD or Number)	Active (Mean ± SD or Number)	Fit (Mean ± SD or Number)	*p Value*
First phase of labor in nulliparous		758.46±544.08	852.94±621.20	936.25±741.52	0.726
Second phase of labor in nulliparous		53.25±51.67	50.29±35.44	52.629±42.11	0.972
First phase of labor in multiparous		411.73±326.69	540.38±463.90	421.52±413.38	0.409
Second phase of labor in multiparous		25.18±23.02	31.14±49.05	23.05±24.63	0.646
Oxytocin usage in nulliparous	Yes	6	15	21	0.475
	No	8	13	13	
Oxytocin usage in multiparous	Yes	8	11	11	0.852
	No	17	21	28	
Unplanned Cs in nulliparous	Yes	2	1	7	0.154
	No	12	27	28	
Unplanned Cs in multiparous	Yes	2	3	2	0.781
	No	23	29	37	
Postpartum hemorrhage in nulliparous	Yes	1	1	1	0.777
	No	13	27	34	
Postpartum hemorrhage in multiparous	Yes	2	2	3	0.961
	No	23	30	36	

Cs: cesarean section, SD: standard deviation. One-way ANOVA and Tukey post-hoc test were used to compare the means of the groups. Chi-square test was used to analyze categorical data.

Table 2. *The relationship between physical activity levels and labor*

		Inactive (Mean ± SD or number)	Minimally active (Mean ± SD or Number)	Very Active (Mean ± SD or Number)	*p Value*
First phase of labor in nulliparous		805±635.2	912.2±661	1008±622.7	0.72
Second phase of labor in nulliparous		54.70±44.58	47.97±40.12	66±32.86	0.60
First phase of labor in multiparous		557.3±472.6	348.2±314.7	420.6±337.3	0.071
Second phase of labor in multiparous		26.39±22.43	27.88±47.26	20±19.03	0.831
Oxytocin usage in nulliparous	Yes	22	16	4	0.835
	No	19	13	2	
Oxytocin usage in multiparous	Yes	19	9	2	0.266
	No	30	29	7	
Unplanned Cs in nulliparous	Yes	4	5	1	0.666
	No	37	25	5	
Unplanned Cs in multiparous	Yes	4	3	0	0.675
	No	45	35	9	
Postpartum hemorrhage in nulliparous	Yes	1	2	0	0.579
	No	40	28	6	
Postpartum hemorrhage in multiparous	Yes	5	2	0	0.459
	No	44	36	9	

Cs: cesarean section, SD: standard deviation. One-way ANOVA and Tukey post-hoc test were used to compare the means of the groups. Chi-square test was used to analyze categorical data.

Table 3. *Relationship between sexual activity levels and labor*

	R^2	Estimate	Std error	t value	*p Value*
Nulliparous	(Intercept)	5.688	40.169	0.142	0.135
	First phase	-0.0007	0.002	-0.270	0.788
	Second phase	0.0968	0.041	2.330	0.023
	Gestational age	0.0064	0.144	0.044	0.964
Multiparous	(Intercept)	49.618	43.528	1.14	0.258
	First phase	-0.004	0.003	-1.29	0.199
	Second phase	0.037	0.040	0.92	0.360
	Gestational age	-0.14	0.157	-0.91	0.365

Table 4. *The effect of gestational history on labor*

		Nulliparous (mean ± SD or number)	Multiparous (mean ± SD or number)	*p-value*
First phase of labor		863.8±645	459.9±411	<0.001
Second phase of labor		51.08±41.2	26.02±34.11	<0.001
Oxytocin usage	Yes	42	30	0.0015
	No	34	66	
Unplanned Cs	Yes	10	7	0.211
	No	67	89	
Postpartum hemorrhage	Yes	3	7	0.3416
	No	74	89	

Cs: cesarean section, SD: standard deviation. The Independent Samples t Test used to compare the means of groups. Chi-square test was used to analyze categorical data.

The Effect of Gestational History on Labor

The mean duration of the first phase of labor was 863.8±645 min in nulliparous women and 459.9±411 min in multiparous women. This difference was statistically significant (p<0.001). Similarly, the duration of the second phase of labor was significantly higher in nulliparous women (p<0.001). A similar finding was observed with an increase in the number of deliveries with shorter duration of the first and second phases of labor (p<0.001).

No association was found between pregnancy history and gestational age (p=0.84) and number of births and gestational age (p=0.88).

Oxytocin administration for labor induction occurred in 55% of nulliparous women and was significantly lower (31.25%) in multiparous women (p=0.0015). However, no significant difference was observed in unplanned Cs and postpartum hemorrhage in nulliparous and multiparous women. The relationship between pregnancy history and delivery is shown in Table 4.

Discussion

In this study, it was observed that pregnancy caused a change in physical activity levels, and the most important obstacle to being less physically active was pregnancy-related side effects. It was determined that physical activity levels decreased with increasing age during pregnancy. Physical activity level and sexual activity during pregnancy were found to be neither protective nor risky for the duration of labor, postpartum hemorrhage, oxytocin use and operative vaginal delivery. However, physical activity was found to be helpful in controlling weight gain during pregnancy.

Previous studies have shown that pregnant women do not have sufficient awareness of physical activity during pregnancy. Therefore, most pregnant women tend to lead a sedentary life. In our study, a relatively balanced distribution was observed in nulliparous women regarding physical activity change, whereas multiparous women's physical activity levels mainly decreased with pregnancy. In a study conducted in Türkiye, pregnant women stated that the most critical barriers to physical activity were lack of motivation and lack of time[2]. However, our study showed participants stated that they had difficulty in doing physical activity, especially due to the side effects of pregnancy and motivation problems

Several studies have shown that physical activity during pregnancy is safe. Scientific evidence suggests that aerobic exercise has additional benefits for almost all pregnant women[15]. Leet and Flick reported that maternal exercise may have minimal or no effect on the baby's birth weight[16]. Watson et al. showed that physical activity during pregnancy does not have risks for fetal development and provides benefits in controlling gestational weight gain[17]. All these data support our study.

In a randomized controlled trial, the total delivery time of women who exercised in water was 3 hours shorter than the control group[18]. Watkins et al. showed that a higher physical activity level was associated with a shorter duration of labor stages but not with postpartum hemorrhage, perineal laceration, or operative vaginal delivery[10]. The main difference of this study, which is similar to the results of our research in most aspects, is the relationship between the duration of labor and physical activity levels. We used two different physical activity scales in our study to clarify this relationship. In addition, in the IPAQ scale, we assessed the data on both categorical and total MET scores, and these analyses were performed separately in nulliparous and multiparous women, but no correlation was found. Therefore, there may be factors that were not considered in the two studies.

In a study conducted in Cameroon, pregnant women who were sexually active after 37 weeks of gestation had shorter labor times, less oxytocin requirement and higher rates of spontaneous vaginal delivery[19]. Schaffir showed in a study that women who were sexually active in the week before delivery had a higher gestational age, but there was no significant difference in Bishop scores between the physically active group and the control group[20]. In contrast, another study revealed that sexual activity was associated with lower gestational age[21]. The same study found that sexual activity during pregnancy did not affect the type of labor. In a meta-analysis, it was stated that it does not cause a risk for the onset of spontaneous labor and that it is not necessary to restrict sexual activity in low-risk pregnancies[11]. These studies suggest no clarity about the effects of sexual activity during pregnancy on delivery. However, although the possible benefits of sexual activity are controversial, there is consistent evidence that it is not a restriction for low-risk pregnancies. Similarly, in our study, sexual activity did not pose an additional risk. Still, only a weak association was found between the frequency of sexual activity and the second phase of labor. Apart from this, no effect on delivery was observed. Therefore, it is understood that this issue has not yet been fully clarified.

The most obvious limitation of the study was the low participant numbers. This limitation was particularly noticeable in the analysis of categorical data. However, analyzing our data with multiple scales and statistical analysis methods reduces this restriction.

Conclusion

In conclusion, this study provides essential epidemiologic data on the attitudes of pregnant women toward exercise and sexual activity in Türkiye. It was observed that physical activity levels decrease during pregnancy, and the biggest obstacle to physical activity is the side effects of pregnancy. Pregnant women exercised less as their age increased. It was observed that exercise levels during pregnancy have limited impacts on labor and may be helpful in controlling weight gain during pregnancy. Similarly, it was confirmed that the effects of sexual activity during pregnancy on labor were minimal, and sexual activity did not need to be restricted in low-risk pregnancies. It was also reconfirmed that pregnancy history accelerates and facilitates labor in parallel with the literature.

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