Medical Journal of Bakırköy

Med J Bakirkoy 2025;21(3):232-239
DOI: 10.4274/BMJ.galenos.2025.2024.11-2

The Effect of an Exercise Programme for a Healthy Pregnancy

Sağlıklı Bir Gebelik İçin Egzersiz Programının Etkisi

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ABSTRACT

Objective: This study aims to reduce musculoskeletal pain and increase physical activity capacity during pregnancy, thereby enhancing daily living activities. It aims to manage the increased musculoskeletal pain and decreased physical activity capacity during pregnancy with exercise and to determine the benefits on activities of daily living.

Methods: The study was conducted with 42 pregnant women between 16-34 weeks gestation who participated in a 6-week exercise program at the Pregnancy School of Sakarya Training and Research Hospital and Physiotherapy and Rehabilitation Application and Research Center. Short Form-36 (SF-36) was used for quality of life, Visual Analogue Scale (VAS) for pain severity, Pregnancy Physical Activity Questionnaire for physical activity levels, and McGill Pain Questionnaire for pain characteristics.

Results: Post-intervention analyses showed that pain was reduced and quality of life significantly improved. SF-36 scores showed significant improvements in the sub-parameters of physical role, emotional well-being, social functioning, and general health. VAS scores showed significant reductions in pain during activity, rest, and at night. Participants also showed significant improvements in the home/care and sport/exercise subdomains of physical activity.

Conclusion: Regular physical activity during pregnancy effectively reduces pain levels and improves quality of life. The study supports the inclusion of structured exercise programs in antenatal care, highlighting the benefits of physical activity in managing pain and improving the overall well-being of pregnant women. This approach not only facilitates daily activities but also helps reduce complications during and after labour.

Keywords: Exercise, pain, pregnancy, physical activity, quality of life

ÖZ

Amaç: Bu çalışma, hamilelik sırasında kas-iskelet ağrısını azaltmayı ve fiziksel aktivite kapasitesini artırmayı, böylece günlük yaşam aktivitelerini geliştirmeyi amaçlamaktadır. Gebelikte artan kas-iskelet sistemi ağrısı ve azalan fiziksel aktivite kapasitesinin egzersiz ile düzenlenmesi ve günlük yaşam aktiviteleri üzerine faydalarının belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışma Sakarya Eğitim ve Araştırma Hastanesi Gebelik Okulu ve Fizyoterapi ve Rehabilitasyon Uygulama ve Araştırma Merkezi'nde, 6 haftalık egzersiz programına katılan 16-34 gebelik haftaları arasındaki 42 gebe ile yürütüldü. Değerlendirmelerde yaşam kalitesi için Kısa Form-36 (SF-36), ağrı şiddeti için Görsel Analog Ölçeği (GAS), fiziksel aktivite düzeyleri için Gebelik Fiziksel Aktivite Anketi ve ağrı özellikleri için McGill Ağrı Anketi kullanılmıştır.

Bulgular: Müdahale sonrasında yapılan analizler, ağrının azaldığını ve yaşam kalitesinin anlamlı derecede iyileştiğini göstermiştir. SF-36 skorları fiziksel rol, duygusal refah, sosyal işlevsellik ve genel sağlık alt parametrelerinde anlamlı iyileşmeler göstermiştir. GAS skorları aktivite, dinlenme ve gece ağrılarında önemli azalmalar olduğunu göstermiştir. Katılımcılar ayrıca fiziksel aktivitenin ev/bakım ve spor/egzersiz alt alanlarında da anlamlı iyileşmeler göstermiştir.

Sonuç: Hamilelik sırasında düzenli fiziksel aktivite ağrı seviyelerini etkili bir şekilde azaltır ve yaşam kalitesini artırır. Çalışma, yapılandırılmış egzersiz programlarının doğum öncesi bakıma dahil edilmesini desteklemekte, fiziksel aktivitenin ağrıyı yönetmede ve hamile kadınların genel refahını iyileştirmedeki faydalarını vurgulamaktadır. Bu yaklaşım sadece günlük aktiviteleri kolaylaştırmakla kalmaz, aynı zamanda doğum sırasında ve sonrasında komplikasyonların azaltılmasına da yardımcı olur.

Anahtar Kelimeler: Egzersiz, ağrı, gebelik, fiziksel aktivite, yaşam kalitesi

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Cite as: Yıldız A, Fidan Ö, Tarnı T, Aktaş B, Tanrıkulu Y. The effect of an exercise programme for a healthy pregnancy. Med J Bakirkoy. 2025;21(3):232-239

Received: 11.11.2024
Accepted: 11.02.2025
Publication Date: 03.09.2025

INTRODUCTION

Pregnancy is the term used to describe the period during which a foetus develops in a woman's uterus. Pregnancy is a sensitive period in the mother's life during which she experiences significant physiological and psychological changes (1). Hormonal and physical changes during this period have significant effects on many systems of the body, especially the musculoskeletal, cardiovascular, and respiratory systems (2). These changes manifest as physiological adaptations such as joint laxity, increased cardiac output, and metabolic adjustments (2). These factors can negatively affect activities of daily living, physical activity (PA) capacity, and pain levels. Exercise programmes can help in adapting to these changes and improve quality of life (3). Pilates and various exercises can be performed according to the physiological changes of pregnancy. Regular training has been shown to strengthen the pelvic floor muscle and increase its structural integrity and function. Pelvic floor muscle contraction exercises are part of modern Pilates. Pilates exercise during pregnancy is a safe method to shorten the duration of the active and second stages of labour, reduce birth pain and increase the mother's satisfaction with the birth process (4).

Perceived quality of life is a key component of perinatal health, influenced by physical, psychological, and social factors (5). Potential mechanisms of the PA and quality of life/health relationship include PA-induced changes in neurotransmitters in the brain and endogenous opioids known to be associated with depression, anxiety, and other mood constructs (6-8). The critical role of PA in health has been consistently demonstrated in numerous studies. PA is associated with at least a 20-30% reduction in premature mortality and with a reduced risk of developing more than 25 chronic medical conditions (6). PA improves lifestyle and is recommended for women during pregnancy as a way to limit complications that may occur (7). Especially because the responsibilities of being a parent start before birth, it indicates pregnant women enter a psychologically and physically difficult process (7). Physiological changes during pregnancy, including weight gain, intra-abdominal pressure, hormonal fluctuations, and fluid retention, significantly increase the risk of musculoskeletal disorders and pain (8). Changes in the body during pregnancy can increase the intensity of pain and make it worse if there is a pre-existing history of pain (8). Musculoskeletal, rheumatological, neuropathic, and pelvic-abdominal pain syndromes can be classified into groups. Pelvic girdle pain (PGP) and low back pain (LBP) occur in many pregnant women and can also have a negative impact on their quality of life (9). During pregnancy, abdominopelvic musculoskeletal issues, particularly lower back strain, are the primary source of pain. LBP occurs in pregnant women due to weight gain, laxity in the ligaments, and the growth of the uterus, causing mechanical tension. Apart from pain, the changes that occur during pregnancy also affect the quality of sleep, as they affect fatigue and energy (10).

This study was planned to reduce the difficulties experienced during pregnancy and to facilitate activities of daily living. PA facilitates life in every sense before and after pregnancy. Facilitates birth and reduces complications (11). In our country, the difficulty of access to services for pregnant women due to the high cost in private sectors, the partially inadequate facilities for pregnant women in public institutions, and the inadequacy of the existing facilities in pregnancy education were considered one of the main factors in this study. Based on these reasons, exercise training, especially in pregnancy, is of great importance. During the training of the pregnant women, the physical conditions were examined, hormonal and mental disorders, and changes occurring in the respiratory systems were examined. It was planned to create exercise programmes for these conditions during pregnancy and to make the necessary follow-ups. During our study, we aim to convey the importance of pregnancy education to pregnant individuals, follow their processes with exercise, and provide better quality of life.

METHODS

Sample of the Research

Our study was carried out with pregnant individuals attending the Pregnancy School of Sakarya Training and Research Hospital and Physiotherapy and Rehabilitation Application and Research Center between October 2023 and January 2024. We included 42 people in the study because there was a possibility of participant dropout. The exercise program was conducted for 45 minutes a day, 3 days a week for 6 weeks. The inclusion criteria were pregnant women between 16-34 weeks who were volunteering to participate in the study. Exclusion criteria included the presence of significant heart disease, risk of preterm delivery, pregnancy intoxication, pregnancy-induced hypertension, and significant lung disease such as chronic obstructive pulmonary disease.

The study was conducted in accordance with the rules of the Helsinki Declaration. Ethical approval for the study was obtained from the Sakarya University of Applied Sciences Ethics Committee (approval no: E-26428519-044-89268,

date: 07.07.2023). The study was explained to the patients face to face, and verbal consent was obtained.

The exercise program outlines an exercise routine designed for pregnant women. First, low-impact general warm-ups were performed to provide mobility in the main joints. Afterwards, aerobic activities requiring moderate effort were performed to increase the heart rate along with breathing exercises, using sports equipment. Muscle strengthening exercises were performed with resistance bands and light weights to work different muscle groups of the body. Another part of the program consisted of simple coordination and balance exercises with sports equipment. Kegel exercises were performed to strengthen the pelvic floor muscles, and the program ended with stretching and relaxation movements (12,13).

Data Collection Tools

Short Form-36 (SF-36): It is a scoring system used to evaluate eight subcategories. These parameters are: physical role, bodily pain, physical functioning, energy, social functioning, emotional role, general health, change in health. There is a scale from 0 to 100 for each subcategory. An increase in the scoring result indicates an increase in quality of life (14).

Visual Analogue Scale (VAS): It is a reliable and valid scale that measures pain intensity. The scale consists of a 10 cm long horizontal line. According to VAS, pain intensity is graded between 0 and 10. The patient marks a point on the line that accurately reflects their pain. The intensity of the pain increases as the number he/she marks gets closer. The distance, usually measured in millimeters, is reported as points. In pregnancy, back, low back, knee, and hip pain are very high, and the pregnant woman marks the degree of pain with this scale (15).

Pregnancy Physical Activity Questionnaire (PPAQ): This questionnaire is a 35-question scale that assesses the level of PA during pregnancy. A total of 32 activities are evaluated in these 35 questions. The scale has 4 sub-dimensions: (housework and care), occupation, (sports and exercise), and (transport and sedentary activities). The validity and reliability of the Turkish version were validated and tested by Tosun et al. (16).

McGill-Melzack Pain Questionnaire (MPQ): Mainly used by patients to indicate the subjective level of pain. The questionnaire consists of three main classes of word descriptors: sensory, emotional, and evaluative. It also includes an intensity scale and other items to determine the level and characteristics of the pain experienced. The questionnaire is designed to provide quantitative measures of clinical pain that can be treated statistically (17).

Statistical Analysis

G*Power analysis program (version 3.1.9.7; Heinrich Heine University, Düsseldorf, Germany) was used to determine the number of people to be included in the study. Using the light PA values, from the reference article, it was found that a total of 38 people should be included with an effect size of 0.489 at a margin of error of 0.05 and a power of 0.90. Due to the possibility of participants leaving the study unfinished, it was planned to include 46 people, which is 10 percent more than the original 42 people (18). The SPSS version 27.0 program (IBM Corp., Armonk, NY, USA) was used for data analysis. In data analysis, descriptive characteristics were presented as number, percentage, median, interquartile range and minimum-maximum values. The normality assumption of continuous variables was evaluated by paired t-tests and Pearson correlation tests. Since the data were not normally distributed, the relationship between PPAQ and SF-36 should be evaluated by a more appropriate method than Pearson correlation analysis. The strength of the correlation was categorised as weak (rho=0.00-0.24), moderate (rho=0.25-0.49), strong (rho=0.50-0.74) and very strong (rho=0.75-1.00).

RESULTS

The mean age of the pregnant women who participated in the study was 27.88±4.67 years. The mean body mass index (BMI) before and during pregnancy were 23.23±3.11 and 25.97±3.22. The mean gestational weeks was 25.57±4.06. 92.8% of the pregnant women included in the study are having their first child. 69% of the participants stated that they had planned pregnancies, and 31% stated that they had unplanned pregnancies. While 81% of the pregnant women participating in the study did not have a history of miscarriage, 19% had experienced a miscarriage previously. 11.9% of the pregnant women included in the study had previously been at risk of miscarriage. Of the women surveyed, 88.1% did not have a risk of miscarriage. 42.9% of the pregnant women participating in the study had premature births, while 54.8% did not have premature births. 80.9% of the pregnant women did not have a chronic disease. In the other participants, 4.8% had familial Mediterranean fever, 4.8% had anxiety disorder, 4.8% had anaemia, 2.4% had hypertension, 2.4% had panic attacks, and 2.4% had thyroid disease.

When we evaluated the correlation of the sub-dimensions of the SF-36 quality of life questionnaire with pain and BMI, a significant correlation was found between BMI and the sub-dimensions of general health (p=0.016) and health change (p=0.043). A significant correlation was found between the total score of the MPQ and the sub-dimensions of physical

function (p<0.001), physical health role limitation (p<0.001), energy/fatigue (p=0.026), and pain (p<0.001). When we looked at the correlation with VAS parameters, a significant correlation was found between health change (p=0.001) the VAS night score, as well as between pain (p=0.046) and the VAS night score (see Table 1).

When VAS activity, nighttime, and resting parameters of the participants were compared before and after exercise, statistically significant differences were found in all three parameters (p<0.001). Comparison of the values before and after treatment for the parameters of pain intensity, pain characteristic, pain-time relationship, and total questionnaire score of the MPQ showed a statistically significant difference in all parameters (p<0.001, p<0.001, p=0.044, p<0.001, respectively) (see Table 2).

In our study, a statistically significant difference was found in the comparison of the physical role subparameter (p=0.008), emotional well-being subparameter (p=0.014), social function subparameter (p=0.011), pain subparameter (p<0.001), and general health subparameter (p=0.002), before and after the application of the SF-36 questionnaire. This questionnaire was to evaluate daily living activities. No statistically significant difference was found in the physical, the emotional role, fatigue, and the health change sub-parameters of the SF-36 questionnaire (see Table 2).

When we looked at the evaluation of PPAQ sub-parameters, we found statistically significant differences in household/caregiving (p=0.043), sports/exercise (p<0.001), and total PA score (p<0.001). There was no statistically significant difference in the sub-dimension of occupational activities (see Table 2). Additionally, the mean pre- and post-exercise PA scores and pain scores are given in Figure 1.

Table 1. Correlation between SF-36 subdomains, pain and BMI

	BMI		MPQ total		VAS-resting		VAS-activity		VAS-nignt	
	r	p	r	p	r	p	r	p	r	p
Physical functioning	-0.080	0.613	-0.663	**<0.001***	0.190	0.228	-0.038	0.811	-0.227	0.157
Role limitations due to physical health	0.165	0.296	-0.527	**<0.001***	0.012	0.938	0.039	0.805	-0.287	0.066
Role limitations due to emotional problems	0.036	0.823	-0.253	0.106	0.203	0.198	-0.107	0.500	-0.211	0.181
Energy/fatigue	-0.230	0.143	-0.344	**0.026***	0.017	0.916	-0.030	0.849	-0.105	0.507
Emotional well-being	-0.063	0.691	-0.223	0.156	0.154	0.331	0.194	0.219	-0.129	0.414
Social functioning	0.119	0.455	-0.192	0.224	-0.058	0.717	0.224	0.154	-0.124	0.432
Pain	0.240	0.125	-0.519	**<0.001**	-0.045	0.777	-.131	0.409	-0.494	**0.001**
General health	0.368	**0.016***	0.087	0.584	0.048	0.764	0.119	0.451	0.091	0.568
Health change	-0.314	**0.043***	-0.152	0.338	-0.230	0.143	-0.167	0.290	-0.310*	**0.046***

*: Pearson correlation test, statistical significance p<0.05.
MPQ: McGill-Melzack Pain Questionnaire, VAS: Visual Analogue Scale, BMI: Body mass index, SF-36: Short Form-36

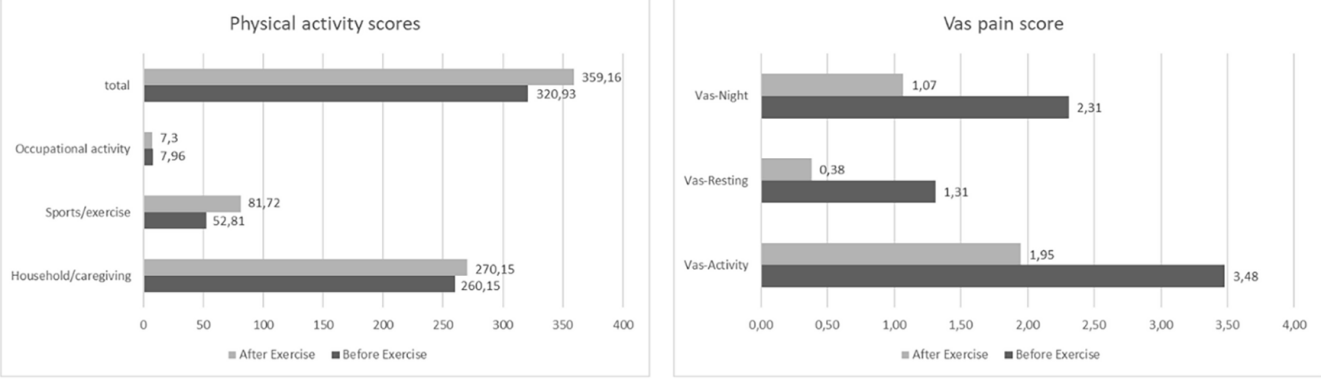

Figure 1. Mean of physical activity and pain scores before and after exercise
VAS: Visual Analogue Scale

Table 2. Comparison of post-exercise pregnancy physical activity questionnaire assessment

	Mean differences±SD	95% CI of the difference			
		Lower	Upper	t	p
VAS-activity	1.50±1.30	1.10	1.90	7.327	**<0.001***
VAS-resting	0.90±1.30	0.50	1.30	4.715	**<0.001***
VAS-night	1.20±1.50	0.80	1.70	5.310	**<0.001***
SF-36					
Physical functioning	-0.60±3.50	-1.70	0.00	-1.094	0.281
Role limitations due to physical health	-6.70±15.60	-11.60	-1.80	-2.782	**0.008***
Role limitations due to emotional problems	0.70±9.00	-2.10	3.00	494	0.624
Energy/fatigue	-1.90±6.60	-4.00	1.00	-1.864	0.069
Emotional well-being	-2.10±5.30	-4.00	0.00	-2.577	**0.014***
Social functioning	-4.80±11.70	-8.00	-1.00	-2.662	**0.011***
Pain	-9.30±11.00	-12.80	-6.00	-5.528	**<0.001***
General health	-1.80±3.50	-2.90	-0.70	-3.344	**0.002***
Health change	-2.90±10.00	-6.00	0.20	-1.901	0.064
MPQ					
Pain intensity	0.93±1.46	0.48	1.38	4.136	**<0.001***
Pain characteristic	4.43±3.09	3.47	5.39	9.302	**<0.001***
Pain-time relationship	-0.19±0.59	-0.38	0.00	-2.077	**0.044***
PPAQ					
Household/caregiving	-10.00±30.98	-19.65	-0.34	-2.092	**0.043***
Sports/exercise	-28.90±20.99	-35.44	-22.36	-8.924	**<0.001***
Occupational activity	0.67±5.84	-1.15	2.49	0.739	0.464
Total	-38.23±37.07	-49.79	-26.68	-6.684	**<0.001***

*: Paired t-test, statistical significance p<0.05.
MPQ: McGill-Melzack Pain Questionnaire, PPAQ: Pregnancy Physical Activity Questionnaire, SF-36: Short Form-36, SD: Standard deviation, CI: Confidence interval, VAS: Visual Analogue Scale

DISCUSSION

In this study, we aimed to evaluate the functional and psychological effects of exercise in pregnancy and its contribution to activities of daily living. The mean age of our participants, when their sociodemographic characteristics were compared with the literature, was 27.40 years. In our study, 69% of the pregnant women were aged 26-30, while 31% were over 30. According to the Türkiye 2018 Demographic and Health Survey (TDHS) data, the highest fertility rate was reported between the ages of 25-29 (19). In other studies, the age range of pregnant women is typically between 18 to 40 years (20). In our study, the lower age limit was 20 years. Among the pregnant women included in our study, 19.2% had chronic diseases. 4.8% of our participants had familial Mediterranean fever, 4.8% had anxiety disorder, 4.8% had anaemia, 2.4% had hypertension, 2.4% had panic attack, 2.4% had thyroid disease. In comparison, the prevalence of chronic diseases among pregnant women was reported as 8.1% in a study conducted in Ordu, and 2.4% in another study in Edirne (21). These differences may stem from regional variations and the differing characteristics of the institutions where the studies were conducted. the studies were conducted. When the education levels of our participants were analysed, it was found that 52.4% were university graduates. According to TDHS data, 59% of women in Türkiye received high school and lower level education (19). In our study, the level of education was higher than the TDHS average. In a study conducted at University of Health Sciences Türkiye, İzmir Tepecik Training and Research Hospital, 27.9% of pregnant women reported that they had previously been informed about pregnancy exercises (22). Similarly, a study conducted in Karaman reported that 61.1% of pregnant women had information

about which exercises would be beneficial during pregnancy and that they received counselling (23). In our study, the rate of counselling reached 50%, which is relatively high.

In our study, it was observed that increasing PA decreased pain levels and significantly improved quality of life. Similar findings have been reported in the literature. While PA during pregnancy can reduce the intensity and severity of pain, it is not entirely effective in preventing its occurrence (10,24). Pain during pregnancy is very common, affecting between 20% and 80% of people and various parts of the body (25). PA during pregnancy improves common pregnancy-related conditions such as LBP and PGP. It provides an easier and more comfortable pregnancy process (23). Pain during pregnancy reduces quality of life and limits daily activities. This study shows that this effect can be reduced by PA (26). Apart from the use of medication to reduce pain, PA is a treatment option with many benefits that will improve quality of life during pregnancy (27). Rodríguez-Díaz et al. (28) demonstrated that 8 weeks of Pilates exercises significantly reduced labour pain. While many studies have reported decreased levels of PA (29), further research is needed to understand the implications of this decline. Oktaviani (30) showed in a study of 40 pregnant women that Pilates exercises could effectively suppress pain. However, conflicting findings also exist. For example, one study reported no significant impact of Pilates on pain reduction (31). Mazzarino et al. (32) found insufficient evidence to support the effectiveness of Pilates in relieving LBP during pregnancy. Nevertheless, Mendo and Jorge's (33) meta-analysis stated that Pilates was beneficial against pain during pregnancy. PA, which has proven health benefits and continuously enhances individuals' quality of life, is critical for pregnant women. However, the parameters used to evaluate PA outcomes are also significant. In conclusion, given the considerable physical changes experienced during pregnancy due to the growing foetus, it may be challenging to prevent pain or discomfort. Nevertheless, we believe that increasing PA levels can effectively reduce these pains and improve overall well-being.

The benefits of exercise during pregnancy encompass both physical and mental capacities. It is known from previous studies that regular exercise in pregnant women reduces their stress and increases their self-awareness (34). However, the relationship between stress and exercise during pregnancy is not yet fully understood. Still, there is a clear association between low exercise frequency and higher levels of stress-related symptoms (35). Perales et al. (36) investigated exercise and depression reduction during pregnancy in a study of 167 women. Participants were randomly assigned to the exercise group and completed 60-minute sessions of supervised PA three times per week throughout pregnancy. Compared to the control group, women in the exercise intervention group scored significantly lower on a depression scale at the end of the study (36). In our study, it was also found that regular exercise improves mental status and emotional well-being. In our study, when the SF-36 emotional well-being section was analyzed before and after treatment, a significant difference was found. Ünver and Aylaz (37), in his 2014 study, found that exercise had a direct positive effect on the quality of life in pregnant women. In our study, no significant difference was found in the SF-36 energy parameter of pregnant women before and after exercise.

Study Limitations

This study highlights the benefits of structured exercise during pregnancy but has several limitations. The small sample size limits generalizability, and the lack of a control group makes it difficult to attribute improvements solely to the intervention. Additionally, the six-week program may not reflect long-term effects. Future studies should include larger, more diverse samples, use control groups to strengthen causal inferences, and extend intervention durations to assess sustained benefits. Incorporating psychological and social factors, objective measurements, and standardized exercise protocols can provide more comprehensive and clinically applicable findings.

CONCLUSION

This study demonstrates that regular PA during pregnancy significantly reduces pain levels and improves quality of life, supporting the integration of structured exercise programs into antenatal care. These findings align closely with the mission of advancing maternal health by promoting evidence-based clinical practices. By enhancing the physical and emotional well-being of pregnant women, exercise facilitates daily activities, reduces complications during and after delivery, and contributes to a healthier pregnancy process.

In the context of public health, the adoption of such programs can serve as a preventive strategy to address common pregnancy-related challenges, such as musculoskeletal pain and limited PA. Given the barriers many women face in accessing antenatal care, especially in resource-constrained settings, implementing structured exercise programs as part of routine prenatal care could help bridge gaps in maternal health services.

These findings can guide health authorities in integrating structured exercise programs into prenatal care policies,

promoting maternal and neonatal health. Future research should build on this foundation by exploring longer intervention periods, larger sample sizes, and diverse populations to better understand the broader implications of exercise on maternal health and its role in public health initiatives.

ETHICS

Ethics Committee Approval: The study was conducted in accordance with the rules of the Helsinki Declaration. Ethical approval for the study was obtained from the Sakarya University of Applied Sciences Ethics Committee (approval no: E-26428519-044-89268, date: 07.07.2023).

Informed Consent: The study was explained to the patients face to face, and verbal consent was obtained.

Acknowledgments

We would like to thank all participants in our study, and TÜBİTAK for their support.

FOOTNOTES

Authorship Contributions

Concept: A.Y., Ö.F., T.T., B.A., Design: A.Y., Ö.F., T.T., B.A., Y.T., Data Collection or Processing: Ö.F., T.T., B.A., Y.T., Analysis or Interpretation: A.Y., Literature Search: A.Y., Ö.F., T.T., B.A., Y.T., Writing: A.Y., Ö.F., T.T., B.A.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The study was supported by TÜBİTAK (project no: 2209-A) a project.

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