LEVEL OF PHYSICAL ACTIVITIES IN DIFFERENT TRIMESTERS OF PREGNANCY: A CROSS-SECTIONAL STUDY

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Abstract

Objectives: To compare the level of physical activities in different trimesters of pregnancy

Methodology: This Observational cross-sectional study was conducted in the gynaecology department of Younas Hospital Sialkot. The data was collected through non-probability convenient sampling technique from n=500 pregnant females. The females above 20 years were included. The females having backache problems, sciatica, diabetes, Smoking/Alcohol consumption and spinal cord Injuries were excluded. The self-structured and Pregnancy Physical Activity Questionnaire (PPAQ) were used for data collection. The data was analysed by SPSS v27.

Results: There were n=500 females having mean age 27.18 ± 3.62 years and BMI 24.42 ± 3.28. There were 74% housewives and 26% employee. These females had 40.4% second trimester, and 45.2% third trimester. The mean values of total physical activity, light intensity, moderate intensity, vigorous intensity activities were 21.76, 7.02, 8.30, 6.38 and 0.04 (MET. h /Week) respectively.

Conclusions: The study revealed significant difference in physical activity across pregnancy trimesters, with increasing sedentary behavior and declining light, moderate, and vigorous activities. Light and household activities decrease notably by the third trimester, while moderate activities remain stable due to daily necessities. Vigorous and sports activities drop sharply in later stages, driven by concerns over safety and physical discomfort. The overall decline in activity is linked to common pregnancy-related factors like weight gain, fatigue, and reduced mobility.

Keywords: Activity levels; Pregnancy; Physical activity; Sedentary behaviour; Trimester

INTRODUCTION

Pregnancy is a critical phase in a woman's life, marked by profound physiological and psychological transformations. The importance of physical activity during this period cannot be overstated, as it has been associated with numerous health benefits for both the mother and the developing fetus. However, the level of physical activity often varies significantly across the three trimesters of pregnancy, influenced by a multitude of factors including physical discomfort, psychological barriers, and societal perceptions. Understanding these variations and the underlying factors is essential for promoting maternal health and improving pregnancy outcomes(1-3).

Research has shown that physical activity during pregnancy can lead to improved maternal health outcomes, including reduced risks of gestational diabetes, hypertension, and excessive weight gain (4, 5). The 2019 Canadian Guideline for Physical Activity throughout Pregnancy emphasizes the importance of regular exercise, recommending that pregnant women engage in at least 150 minutes of moderate-intensity physical activity each week(5). This guideline is based on a systematic review that highlights the positive impact of prenatal exercise on neonatal and childhood outcomes, suggesting that regular physical activity can contribute to healthier birth weights and improved developmental trajectories for children (4).

Despite these recommendations, many women experience barriers to maintaining physical activity during pregnancy. A qualitative systematic review identified fatigue, pain, and nausea as prominent barriers that pregnant women face when attempting to adhere to physical activity guidelines. These physical challenges can be exacerbated by the psychological stress associated with pregnancy, leading to a cycle of inactivity that can have detrimental effects on both maternal and fetal health. For instance, women who report higher levels of fatigue and discomfort are less likely to engage in regular exercise, which can contribute to a sedentary lifestyle and associated health risks (2).

Moreover, cultural beliefs and societal norms play a significant role in shaping women's attitudes towards exercise during pregnancy. In some cultures, there may be a perception that physical activity is unsafe for pregnant women, leading to a reluctance to engage in exercise.

This is particularly evident in regions where traditional beliefs about pregnancy and health prevail, which may discourage women from participating in physical activities deemed inappropriate for their condition(6). Conversely, in cultures that promote physical activity as a means of enhancing health, pregnant women may be more likely to engage in regular exercise, thereby reaping its benefits (7).

The timing of physical activity during pregnancy is also crucial. Studies indicate that women often experience a decline in physical activity levels during the first and third trimesters, with the second trimester typically being the most active period(7, 8). This decline can be attributed to various factors, including increased physical discomfort as the pregnancy progresses and the psychological burden of impending labor and delivery. For instance, a study conducted in Ethiopia found that many pregnant women expressed a desire to engage in physical activity but faced significant barriers that hindered their ability to do so(9).

Furthermore, the type of physical activity undertaken by pregnant women can vary widely. While some may engage in structured exercise programs, others may incorporate physical activity into their daily routines through activities such as walking or household chores (5). The benefits of such activities should not be underestimated, as even moderate levels of physical activity can contribute to improved health outcomes. For example, a study found that women who engaged in regular walking during pregnancy experienced lower rates of gestational diabetes and improved cardiovascular health (5, 10).

Healthcare providers play a pivotal role in encouraging physical activity among pregnant women. Individualized counseling and education about the benefits of exercise can help to address misconceptions and motivate women to incorporate physical activity into their daily lives(11). However, there is often a gap in knowledge among healthcare providers regarding the importance of physical activity during pregnancy, which can lead to inadequate support for women seeking to maintain an active lifestyle(12).

In addition to healthcare provider support, social support from partners and family members can significantly influence a woman's ability to engage in physical activity during pregnancy. Research has shown that women who receive encouragement and assistance from their partners

are more likely to participate in exercise programs and maintain higher levels of physical activity (13). This underscores the importance of involving partners in discussions about physical activity during pregnancy, as their support can be a crucial factor in promoting a healthy lifestyle.

The psychological benefits of physical activity during pregnancy should also be highlighted. Regular exercise has been associated with reduced symptoms of anxiety and depression, which are common during pregnancy(14, 15). Engaging in physical activity can enhance mood and improve overall well-being, making it an essential component of prenatal care. Furthermore, studies have indicated that women who exercise during pregnancy are more likely to experience positive birth outcomes, including shorter labor times and lower rates of cesarean deliveries(16, 17).

Pregnancy involves various physiological, biomechanical, and health-related changes that impact a woman's body, potentially influencing her physical fitness and overall quality of life. These changes can vary significantly across different trimesters, affecting a pregnant woman’s ability to engage in physical activities and maintain fitness. While research has been conducted on physical fitness levels in pregnant women, there is a need for a more detailed examination of how these fitness levels fluctuate with trimester-specific changes in physical activity. Understanding these variations can inform tailored health and fitness recommendations for pregnant women, ultimately enhancing maternal well-being and quality of life.

Objective

To assess the level of physical fitness during pregnancy, varying according to the types and intensity of physical activities across different trimesters.

METHODOLOGY

This observational cross-sectional study was conducted at the Gynaecology Department of Younas Hospital Sialkot February 2024 to August 2024. The study was approved by Research Ethical Committee (REC), Faculty of Allied Health Sciences, University of Sialkot, Sialkot,

Pakistan with Ref: USKT/FAHS/RECletter-00062. It used a non-probability convenience sampling method. Participants were women over the age of 20, focusing specifically on pregnant women. Exclusion criteria included current low back pain, sciatica, diabetes, smoking, alcohol consumption, and spinal cord injuries.

Data was collected from n=500 pregnant females through a custom questionnaire on physical activity and the Pregnancy Physical Activity Questionnaire (PPAQ), which includes 32 activities categorized into household activities, work, sports/exercise, transportation, and idle activities. Participants reported their leisure activities, such as time spent on sports, reading, or watching TV, with options ranging from 0 to 6 or more hours per day to 3 or more hours per week. Frequency distribution charts helped define category cut points accurately, enhancing the scale's precision. The average weekly energy expenditure (kcal/week) was calculated based on the duration and intensity of all activities, excluding sleep adjustments.

Questionnaire Scoring Method

Duration Calculation: For questions #4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 20, 21, and 22, duration categories are scored as follows: 0, 0.25, 0.75, 1.5, 2.5, and 3.0 hours. These scores are then multiplied by 7 days to yield a weekly duration. For questions #12, 13, 32, 33, 34, 35, and 36, duration categories are scored as 0, 0.25, 1.25, 3.0, 5.0, and 6.0 hours, and are also multiplied by 7 for a weekly total. For questions #17, 18, 19, 23, 24, 25, 26, 27, 28, 29, 30, and 31, duration scores align with the categories: 0, 0.25, 0.75, 1.5, 2.5, and 3.0. These scores are provided on a weekly basis.

Intensity Calculation: Intensity values for walking and light- to moderate-intensity domestic tasks are estimated using field-based measures specific to pregnant women. Compendium-based MET (Metabolic Equivalent of Task) values are used for the remaining Physical Activity Questionnaire (PPAQ) activities. MET values for specific questions are assigned as follows: **Example Values**: Question #4 (2.5 METs), #5 (2.0 METs), #6 (3.0 METs), and so on.

Total Activity Calculation: Total activity is the sum of (duration × intensity) for all relevant questions (#4-36).

Activity Intensity Levels: **Sedentary Activity**: Sum of (duration × intensity) for questions #11, 12, 13, 22, and 32. **Light-Intensity Activity**: Sum of (duration × intensity) for questions #4, 5, 7, 15, 16, 17, 18, 20, 34, and questions #30 and #31 if open-ended activities are <2.9 METs. **Moderate-Intensity Activity**: Sum of (duration × intensity) for questions #6, 8, 9, 10, 14, 19, 21, 23, 24, 27, 28, 29, 33, 35, 36, and questions #30 and #31 if open-ended activities fall between 3.0 and 6.0 METs. **Vigorous-Intensity Activity**: Sum of (duration × intensity) for questions #25, 26, and questions #30 and #31 if open-ended activities exceed 6.0 METs.

Activity Type Classification: **Household/Caregiving Activity**: Calculated as the sum of (duration × intensity) for questions #4-10 and #15-19. **Occupational Activity**: Sum of (duration × intensity) for questions #32-36. **Sports/Exercise**: Sum of (duration × intensity) for questions #23-31.

Average Weekly Energy Expenditure (MET-hours per week): Weekly energy expenditure for each activity is calculated by dividing the self-reported duration by intensity for each activity. Activities are classified by intensity level: sedentary (≤1.5 METs), light (1.5-3.0 METs), moderate (3.0-6.0 METs), or vigorous (>6.0 METs). Average MET hours per week are calculated for total exercise, light-intensity activities, and each activity type (household/caregiving, occupational, and sports/exercise).(1-3, 5, 18-22)

Data Collection Procedure: This study began after receiving clearance from the advanced study and research committee (ASRC) of the Isra institute of rehabilitation sciences at Isra University Islamabad. The study enrolled 500 patients who met the inclusion criteria and visited the Al-Nafees Hospital Gynaecology department.

Data Analysis: The data was analysed through SPSS v27. The data was checked for normality by using the Shapiro-Wilk Test and the descriptive statistics were calculated by frequency, mean and standard deviation. As data was normally distributed, one-way ANOVA was used for the analysis of the difference between the three groups. $p<0.05$ was considered significant and Eta-Squared was used to determine the effect size.

RESULTS

Table: 1 Demographics

	N	%
Employment Status		
Housewife	370	74.0
Employee	130	26.0
No of Trimester		
First	72	14.4
Second	202	40.4
Third	226	45.2
No of Pregnancies		
1.00	93	18.6
2.00	260	52.0
3.00	92	18.4
4.00	55	11.0
Mode of Delivery		
SVD	302	60.4
C-Section	198	39.6
Co-Morbidities		
Hyper/Hypothyroidism	10	2.0
Asthma	7	1.4
Hypertension	177	35.4
Migraine	48	9.6
Seizure	10	2.0
None	248	49.6
	Mean	**SD**
Age in Years	27.18	3.62
BMI	24.42	3.28

Table: 2 Mean & SD of Physical Activities among Trimesters

	1st	2nd	3rd	Total
Sedentary	63.38 ± 46.12	61.14 ± 52.33	57.95 ± 51.55	60.03 ± 51.07
Light	139.93 ± 50.63	122.58 ± 62.80	105.59 ± 73.44	117.40 ± 67.33
Moderate	125.13 ± 83.09	111.25 ± 90.10	110.72 ± 150.72	113.01 ± 120.50
Vigorous	0.00 ± 0.00	0.03 ± 0.24	0.62 ± 2.59	0.29 ± 1.77
Household	192.84 ± 85.21	155.27 ± 87.95	126.04 ± 89.71	147.47 ± 91.14
Occupational	80.29 ± 83.41	86.79 ± 105.81	85.56 ± 103.28	85.30 ± 101.56
Sports	6.35 ± 7.96	4.61 ± 4.32	6.98 ± 7.05	5.93 ± 6.34
Total	328.44 ± 142.58	295.00 ± 170.00	275.60 ± 238.72	291.08 ± 201.28

Table: 3 One Way ANOVA for Comparison among Trimesters (1st, 2nd, 3rd)

	SS	df	MS	F	p-value	Tukey Test

Sedentary	Between Groups	2025.053	2	1012.526	0.387	0.679	1st vs 2nd= 0.945, 1st vs 3rd= 0.713, 2nd vs 3rd= 0.797
	Within Groups	1296785.191	496	2614.486			
	Total	1298810.244	498				
Light	Between Groups	73490.706	2	36745.353	8.345	0.000	1st vs 2nd= 0.138, 1st vs 3rd= 0.001, 2nd vs 3rd= 0.023
	Within Groups	2188419.644	497	4403.259			
	Total	2261910.350	499				
Moderate	Between Groups	12379.174	2	6189.587	0.425	0.654	1st vs 2nd= 0.680, 1st vs 3rd= 0.652, 2nd vs 3rd= 0.999
	Within Groups	7232954.655	497	14553.229			
	Total	7245333.829	499				
Vigorous	Between Groups	43.409	2	21.704	7.081	0.001	1st vs 2nd= 0.989, 1st vs 3rd= 0.026, 2nd vs 3rd= 0.002
	Within Groups	1523.438	497	3.065			
	Total	1566.847	499				
Household	Between Groups	264262.776	2	132131.388	16.921	0.000	1st vs 2nd= 0.006, 1st vs 3rd= 0.000, 2nd vs 3rd= 0.002
	Within Groups	3880998.780	497	7808.851			
	Total	4145261.557	499				
Occupational	Between Groups	2272.902	2	1136.451	0.110	0.896	1st vs 2nd= 0.887, 1st vs 3rd= 0.922, 2nd vs 3rd= 0.991
	Within Groups	5144270.571	497	10350.645			
	Total	5146543.473	499				
Sports	Between Groups	612.757	2	306.378	7.839	0.000	1st vs 2nd= 0.108, 1st vs 3rd= 0.736, 2nd vs 3rd= 0.000
	Within Groups	19425.270	497	39.085			
	Total	20038.027	499				
Total	Between Groups	157464.253	2	78732.127	1.951	0.143	1st vs 2nd= 0.446, 1st vs 3rd= 0.128, 2nd vs 3rd= 0.580
	Within Groups	20017580.398	496	40358.025			
	Total	20175044.651	498				

Table 3 presents the One-Way ANOVA results, revealing significant differences among trimesters in various physical activity categories during pregnancy. Sedentary, moderate, and occupational activities showed no significant differences across trimesters, indicating consistent levels throughout pregnancy. However, significant declines were observed in light ($p < 0.001$), vigorous ($p = 0.001$), household ($p < 0.001$), and sports activities ($p < 0.001$) as pregnancy progressed. Specifically, light and household activities significantly decreased between the 1st and 3rd trimesters, while vigorous and sports activities notably declined by the 3rd trimester. These results suggest that physical activity levels, particularly in light, vigorous, and household categories, tend to decrease as pregnancy advances, with a marked reduction in the final trimester.

DISCUSSION

The findings of this study provide valuable insights into the patterns of physical activity among pregnant women across different trimesters. The results indicate a concerning trend of increasing sedentary behavior and decreasing levels of light, moderate, and vigorous physical activity as pregnancy progresses. This discussion will contextualize these findings within the broader literature on physical activity during pregnancy, highlighting the implications for maternal and fetal health.

The stability of sedentary activity levels throughout pregnancy, as observed in this study, is consistent with findings from other research indicating that while some women may become more sedentary due to physical discomfort and fatigue, others maintain their activity levels, particularly if they are engaged in desk-based occupations or have not made significant lifestyle changes (23). However, the increase in sedentary behavior is alarming, as prolonged inactivity during pregnancy has been associated with adverse health outcomes, including gestational diabetes, hypertension, and postpartum depression (24) (25, 26) found that women who engaged in only light physical activity during pregnancy were significantly less likely to experience psychological distress, underscoring the importance of maintaining even minimal levels of activity for mental health(26).

The significant decrease in light physical activity observed in this study, particularly from the first to the third trimester, aligns with previous research that attributes this decline to common pregnancy-related symptoms such as fatigue, nausea, and back pain (2). As pregnancy progresses, these symptoms often lead to reduced mobility and a preference for more sedentary activities, particularly in the later stages when physical discomfort increases(4, 23). The findings of Syazwani et al. (2020) support this notion, as they reported that women who engaged in sufficient physical activity during pregnancy were less likely to be diagnosed with gestational diabetes, highlighting the protective effects of maintaining activity levels(27).

In terms of moderate physical activity, the lack of significant differences across trimesters suggests that women may continue to engage in routine moderate activities, such as cooking or caring for children, as part of their daily lives(6). This finding is consistent with literature indicating that moderate activities, such as walking, are often maintained throughout pregnancy

because they are perceived as manageable and beneficial without causing undue fatigue or discomfort(7). However, it is crucial to encourage women to incorporate structured moderate-intensity exercises into their routines, as these have been shown to reduce the risk of gestational diabetes and improve overall maternal health(24).

The significant decline in vigorous activity levels, particularly from the second to the third trimester, reflects the common belief that high-intensity exercise may pose risks to both maternal and fetal health(6). This aligns with findings from Kołomańska et al. (2019), which indicated that even minimal levels of physical activity could help reduce the frequency and severity of depressive symptoms in pregnant women(19). The absence of vigorous activities throughout pregnancy may also be influenced by societal perceptions and fears regarding the safety of exercise during this period, as highlighted by Mckeough et al. (2022), who noted that social support and beliefs about the consequences of physical activity can significantly impact women's engagement in exercise during pregnancy(2).

The significant decrease in household activities throughout pregnancy, particularly from the first to the third trimester, raises concerns about the potential implications for maternal health. Pregnant women often prioritize bed rest over maintaining an active lifestyle, which can lead to increased physical discomfort and a decline in overall well-being(8). The cultural context of participants, particularly among housewives, may significantly contribute to reduced physical activity levels during pregnancy. Research indicates that traditional roles often impose barriers to physical activity due to increased domestic responsibilities and societal expectations. For instance, Mckeough et al. (2022) found that women perceived fatigue, pain, and nausea as prominent barriers to physical activity during pregnancy, which can be exacerbated by household duties(2). Similarly, Rabiepoor et al. (2019) noted that most pregnant women engage in only light physical activity, often constrained by their daily responsibilities(28). Cultural and social factors also play a crucial role in influencing physical activity during pregnancy. Phiri (2024) highlighted that cultural perceptions of pregnancy discourage women from engaging in strenuous physical activity, as family members may advise them to rest (29). Kowalska et al. (2022) further supported this by demonstrating that social support and cultural norms significantly impact physical activity levels among pregnant women, indicating that traditional

expectations can create barriers to maintaining an active lifestyle (30). Additionally, Davenport et al. (2018) emphasized the importance of understanding these barriers, as they can hinder women's ability to meet physical activity guidelines during pregnancy (31).

In the realm of sports activities, the significant differences observed across trimesters highlight the need for targeted interventions to promote safe and effective exercise during pregnancy. The reluctance to engage in sports may stem from a lack of understanding of the benefits of moderate exercise during pregnancy and the influence of traditional medical advice, which often encourages women to limit physical exertion(9).

The findings of this study underscore the importance of promoting physical activity during pregnancy to mitigate the risks associated with sedentary behavior. Engaging in regular physical activity has been linked to numerous health benefits, including reduced risks of gestational diabetes, hypertension, and improved psychological well-being(10, 12).

Conclusion: This study highlights a concerning increase in sedentary behavior and a decline in light and vigorous physical activity among pregnant women across trimesters, posing potential risks to maternal and fetal health.

Limitations: The findings are limited by a potentially unrepresentative sample size, reliance on self-reported data prone to recall bias, and lack of consideration for socioeconomic and cultural factors influencing activity levels.

- **Recommendation:**
  Develop targeted educational programs to inform pregnant women about the safety and benefits of physical activity.
- Encourage healthcare providers to include physical activity counseling as part of routine prenatal care.
- Conduct further research to design personalized interventions that address specific barriers to exercise during pregnancy.
- Establish community-based support initiatives to motivate and sustain physical activity among pregnant women.

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