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Impact of antenatal group exercise therapy among pregnant women on outcome of labor at a selected hospital in Dhaka, Bangladesh

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Abstract

Objective: This study aimed to evaluate the impact of antenatal group exercise therapy on the mode of delivery and maternal health outcomes in pregnant women.

Methods: A total of 50 female participants were enrolled in an antenatal group exercise program from September 2024 to December 2024. All participants were between 17 and 35 years of age, with a mean age of 25.38 years. Participants received one session of antenatal group exercise therapy after 20 weeks of pregnancy, continuing the exercises until delivery. Data on demographic characteristics, exercise frequency, mode of delivery, and post-delivery recovery were collected. Chi-square tests were conducted to assess relationships between exercise frequency, educational level, and mode of delivery.

Results: Among the 50 participants, 70% delivered via normal vaginal delivery, while 30% delivered via Cesarean section. The study found a significant relationship between the frequency of antenatal exercise and the likelihood of normal vaginal delivery ($p < 0.01$). Women who exercised more frequently (5-6 days per week) had a higher proportion of normal vaginal delivery. There was no statistically significant association between educational level ($p = 0.339$) or age group ($p = 0.274$) and mode of delivery. Notably, 18% of participants with a previous Cesarean section were able to deliver vaginally after participating in the exercise program. Most participants (98%) reported no pain during exercises, and 70% resumed walking on the first day after delivery.

Conclusion: Regular antenatal exercise significantly increases the likelihood of normal vaginal delivery, particularly for women who exercise more frequently. The study also suggests that antenatal exercise may provide women with a previous Cesarean section the opportunity to deliver vaginally in subsequent pregnancies. Further research with larger sample sizes is needed to confirm these findings and explore the broader benefits of antenatal exercise.

Keywords: Antenatal exercise, normal vaginal delivery, Cesarean section, pregnancy outcomes, physical fitness, post-delivery recovery, Physiotherapy

Introduction

Antenatal exercise, defined as physical activity performed during pregnancy, is a key component of prenatal care, benefiting both mother and baby [1]. For mothers, regular exercise reduces the risk of gestational diabetes, hypertension, and preeclampsia [2]. It also improves mood and lowers the likelihood of postpartum depression [3]. For infants, maternal exercise supports fetal growth, reduces the risk of preterm birth, and enhances overall health outcomes [4]. Additionally, studies suggest antenatal exercise may contribute to improved cognitive development in babies [5].

Recognizing these benefits, organizations like the World Health Organization (WHO) and the American College of Obstetricians and Gynecologists (ACOG) recommend that pregnant women engage in at least 150 minutes of moderate-intensity aerobic activity per week if no medical complications exist [6]. The National Institute for Health and Care Excellence (NICE) similarly highlights the role of exercise in improving maternal fitness and reducing pregnancy-related discomfort [7].

Despite these endorsements, decreased physical activity during pregnancy remains a public health concern. It is a leading risk factor for maternal mortality [8] and is associated with excessive weight gain, gestational diabetes, and hypertensive disorders [9]. Cultural beliefs and misconceptions also discourage participation in antenatal exercise, particularly in developing

countries, where women may fear it could harm their baby [10]. However, research consistently supports its safety and benefits [11].

To maximize the advantages of antenatal exercise, pregnant women should follow structured routines including aerobic activities (Walking, cycling, swimming, etc.), resistance training, yoga, and pelvic floor exercises [12, 13]. The Pregnancy Physical Activity Guidelines suggest that these exercises be spread over at least three days per week, with sessions lasting 30-60 minutes [14].

Contrary to previous recommendations that used maternal heart rate as an exercise intensity measure, recent guidelines advocate for perceived exertion scales (e.g., Borg's Scale, Talk Test) due to pregnancy-related changes in cardiovascular response [12]. Studies further indicate that women who exercised regularly before pregnancy can maintain higher-intensity workouts as long as they adapt their routines to their condition [15].

Expanding education on antenatal exercise is crucial for improving maternal health outcomes. There is a need for broader awareness campaigns and research on how to implement exercise programs effectively in real-world healthcare settings [16].

Rationale

Regular antenatal exercise has been linked to shorter labor duration and a reduced risk of Cesarean section (CS) and assisted vaginal deliveries [17]. These benefits are believed to stem from improved muscle tone, endurance, and pelvic floor strength, though evidence remains somewhat mixed [18]. Some studies found lower CS rates among women who exercised throughout pregnancy, while others reported no significant difference [17, 19]. Variations in study findings may be due to differences in exercise duration, intensity, or study populations.

Physical activity during pregnancy has also been associated with reduced odds of gestational diabetes (OR 0.103, 95% CI: 0.013-0.803), lower CS rates (RR 0.69, 95% CI: 0.42-0.82), and better postpartum recovery (ACOG, 2020). Additionally, exercise contributes to reduced pain levels, lower disability from lumbar and sciatic pain, and overall improved well-being. However, further research is needed to explore whether improving fitness before and during pregnancy could decrease pain during labor.

Although antenatal exercise is widely endorsed, there is limited evidence on its direct impact on obstetric interventions and labor outcomes in low-resource settings. This study aims to address that gap by assessing the effect of structured group exercise therapy on labor outcomes at Ashulia Women and Children Hospital, Dhaka.

By analyzing the association between antenatal exercise and mode of delivery, this study hopes to provide data that can support the integration of exercise programs into routine maternity care. Additionally, by investigating exercise adherence among Bangladeshi pregnant women, the study will identify barriers to participation and inform strategies for increasing awareness and engagement.

This study seeks to contribute to reducing unnecessary CS rates and promoting safe, evidence-based antenatal exercise programs in Bangladesh.

Materials and Methods

Study Design and Setting

This was a cross-sectional study conducted at Ashulia Women and Children Hospital (AWCH), Ashulia, Savar, Dhaka, Bangladesh.

Intervention: The study utilized a structured group exercise protocol currently in practice at AWCH as the intervention.

Study Population and Sampling

- **Study Population:** All pregnant women at the hospital during the study period.
- **Final Sample Size:** 50 participants.
- **Sampling Procedure:** Due to a limited number of participants, a Purposive Sampling technique was used to select the study sample.

Inclusion Criteria

- Pregnant women aged 18 to 35 years.
- Women in their first, second, or third pregnancy.
- Pregnant women who attended group therapy at AWCH.

Exclusion Criteria

- Clinically unstable pregnant women.
- Pregnant women who did not attend group therapy at AWCH.

Data Collection and Measurement Tools

Data Collection Method: A structured questionnaire was used for data collection. Since hospital stays were short, face-to-face interviews were not feasible. Instead, one-on-one mobile conversations were conducted to collect data.

Measurement Tool: As part of the research tool, a slightly modified version of the Pregnancy Physical Activity Questionnaire (PPAQ) [20] was used to better suit the local requirements of Bangladesh. This tool allowed pregnant women to self-assess their physical activity in their current trimester.

Data Analysis

Data was analyzed using SPSS Software (Version 30) and Microsoft Excel 2013.

Statistical Analysis

- Descriptive statistics were used to summarize data (mean, median, standard deviation).
- Inferential statistics, such as regression analysis and hypothesis testing, were applied to draw conclusions.
- Cross-tab analysis was conducted to control for confounding variables.
- Data visualization tools (charts and graphs) were used to identify patterns and trends.

Significance Level

The statistical significance level (α) was set at 0.05 (5%). A p-value below 0.05 was considered statistically significant, indicating strong evidence against the null hypothesis.

Controlling for Confounding Variables

To minimize bias and ensure accurate results, the following strategies were implemented:

- **Independent Data Collection:** Data was collected by an assigned professional, not the investigator, to reduce bias.
- **Statistical Control:** Statistical tests such as Cross-tab analysis was conducted to minimize confounding effects.

Ethical Considerations

All ethical guidelines were strictly followed throughout the study process to ensure participant safety, confidentiality, and

compliance with research standards.

Informed Consent

Before data collection, participants were fully informed about the purpose, procedures, potential risks, and benefits of the study. Each participant voluntarily provided consent before participating. They were assured that their participation was completely voluntary, and they had the right to withdraw at any time without any consequences.

Confidentiality and Anonymity

To protect participant privacy, all personal information was kept strictly confidential. Data was de-identified and stored securely, accessible only to the research team. No identifiable details were disclosed in any reports or publications.

Results

Baseline Characteristics

Participants were selected and included in the antenatal group exercise therapy program from September 2024 to December 2024. The baseline characteristics of the participants are outlined in Table 1. All participants were female, with a mean age of 25.48 years. The total number of participants in the antenatal group exercise therapy was 50. All participants were married and most were highly educated - 46% had secondary education, 26% had higher secondary education, 14% had primary education, and the remaining participants had completed graduation or a master's degree (10% and 4%, respectively).

All participants attended at least one session of antenatal group therapy after 20 weeks of pregnancy and continued exercises until delivery. Among all participants, 64% were experiencing their first pregnancy, while 26% were in their second pregnancy

and 10% were in their third pregnancy. In terms of delivery history, 18% had previously given birth via normal vaginal delivery (NVD), while another 18% had a history of CS.

Regarding exercise frequency before delivery, 34% of participants exercised daily (7 days a week), 30% exercised 6 days a week, 20% exercised 5 days a week, 12% exercised 4 days a week, and 4% exercised 3 days a week. All participants except one reported experiencing pain during exercise.

Post-delivery outcomes revealed that 80% of participants had no complications, 16% experienced reduced mobility, and 4% reported urinary incontinence. In terms of mobility after delivery, 70% resumed walking on the first day, 26% on the second day, and 4% on the third day. As for postpartum exercise habits, 58% of participants continued exercising after delivery, 12% did not engage in any physical activity, and 30% intended to start exercising soon.

All 50 participants completed the antenatal group exercise sessions before delivery and continued the prescribed exercises at home. Among them, 70% delivered healthy babies via NVD, while 30% had CS. A majority (98%) of participants believed that antenatal exercise was beneficial for their physical fitness, while 2% were unsure.

Cross-Tab Analysis

Association between Exercise Frequency at Home and Mode of Delivery

A cross-tab analysis showed that participants who continued prescribed exercises at home with higher frequency were more likely to have an NVD. Women who exercised 5 or 6 days per week had the highest NVD rates. Chi-square analysis showed a statistically significant association, with a p-value of <0.01.

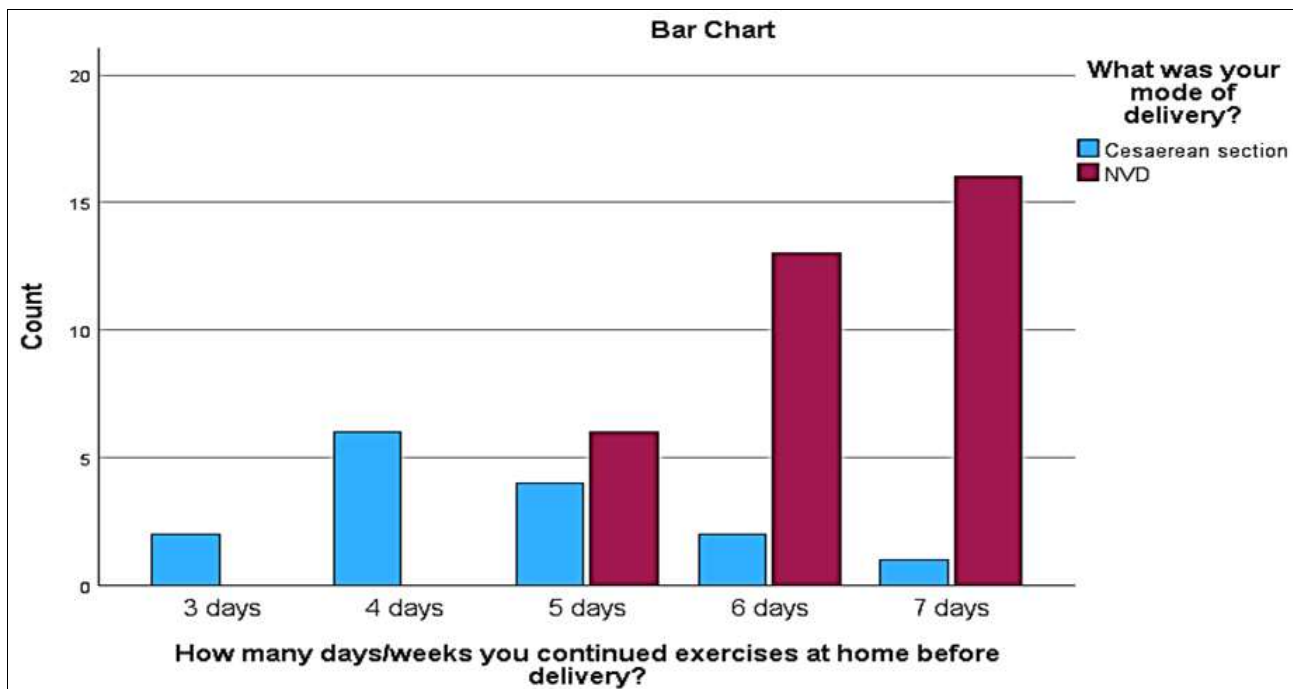


Fig 1: Association between Exercise Frequency and Mode of Delivery

Association between Participant Age and Mode of Delivery

Chi-square analysis indicated that there was no statistically significant relationship between age and mode of delivery ($p = 0.274$). While NVD rates were slightly higher among participants aged 18-25 years compared to older participants, the difference was not statistically significant.

Association between Education Level and Mode of Delivery

Chi-square analysis indicated no significant relationship between education level and mode of delivery ($p = 0.339$). Participants with graduation or higher education had slightly higher NVD rates compared to those with lower education levels, but the difference was not statistically significant.

Association between Previous Labor Outcome and Mode of Delivery after Antenatal Exercise Therapy

A common societal belief is that a woman who has had a previous CS will automatically require another CS for

subsequent deliveries. However, in this study, 3 women who had undergone a previous CS successfully delivered via NVD after participating in antenatal exercises.

Table 1: Baseline Characteristics of all participants

Variables	No. of respondents - n (%) [N = 50]
Age (Mean age = 25.48)	
Number of Pregnancy	
First Pregnancy	32 (64%)
Second Pregnancy	13 (26%)
3 or more Pregnancies	05 (10%)
Last Labor Outcome	
NVD	09 (18%)
C-Section	09 (18%)
N/A (1 st Pregnancy)	32 (64%)
Days of continued exercise at home pre-delivery	
3 Days	02 (04%)
4 Days	06 (12%)
5 Days	10 (20%)
6 Days	15 (20%)
7 Days	17 (34%)
Experienced pain during exercise?	
Did not experience pain	49 (98%)
Experienced pain	01 (02%)
Post-delivery physical complication	
No complication	40 (80%)
Reduced mobility	08 (16%)
Urinary incontinence	02 (04%)
Started walking on which day post-delivery	
Day 1	35 (70%)
Day 2	13 (26%)
Day 3	02 (04%)
Will continue exercise at home post-delivery?	
Yes	29 (58%)
No	06 (12%)
Will start soon	15 (30%)
Mode of Delivery	
NVD	35 (70%)
C-Section	15 (30%)
Believe antenatal exercises improved physical fitness	
Yes	49 (98%)
Not sure	01 (02%)

Pregnancy Physical Activity Questionnaire (PPAQ) Results

Table 2 presents the PPAQ results, categorizing physical activity by intensity and type. Among the 50 pregnant women surveyed, the median total activity level was 246.41 metabolic-equivalent-hours/week (MET-h/week). Highest median energy expenditure

was recorded for moderate-intensity activity (153.91 MET-h/week). As for activity type, household/caregiving tasks accounted for the highest median energy expenditure (69.04 MET-h/week).

Table 2: PPAQ results

PPAQ Measures	PPAQ 1st (MET-h/week)		
	25 th	Median	75 th
Summary activity			
Total activity	204.48	246.41	318.25
Total activity of light intensity and above	152.35	198.26	259.79
By intensity			
Sedentary (< 1.5 METs)	30.63	44.63	65.10
Light (1.5 - < 3.0 METs)	122.50	153.91	191.63
Moderate (3.0-6.0 METs)	22.66	44.39	81.48
Vigorous (> 6.0 METs)	0.00	0.00	1.63
By type:			
Household/caregiving	54.60	69.04	98.67
Occupational activity	0.00	0.00	71.05
Sports/exercise	7.20	13.78	25.01
Transportation	28.22	51.63	91.00
Inactivity	42.18	64.31	83.48

Discussion

The aim of this study was to assess the impact of antenatal group exercise therapy on the mode of delivery and overall maternal health outcomes. A total of 50 pregnant women participated in a structured antenatal exercise program from September to December 2024. The findings provide valuable insights into the role of antenatal exercises in promoting positive pregnancy outcomes.

A 2023 study found that only 30.2% of participants engaged in exercise during pregnancy, despite 56.1% demonstrating good knowledge and 47.8% expressing positive attitudes toward it. Logistic regression indicated that the unemployment status (AOR = 2.42, 95% CI [0.78-6.38], $P = .03$) and practicing exercise before pregnancy (AOR = 1.97, 95% CI [0.92-4.24], $P = .02$) were significantly associated with a higher likelihood of engaging in antenatal exercise. Key barriers included lack of time, poor knowledge, fatigue, and concerns about harming the baby^[21].

Similarly, an updated 2022 systematic review analyzed 31 randomized controlled trials and confirmed that group exercise programs improve maternal health, fitness, and social support. Exercises included aerobic, resistance, pelvic floor training, stretching, and relaxation sessions. The review emphasized that multidisciplinary healthcare teams should promote group exercise to improve pregnancy outcomes^[16].

In our study, 70% of participants delivered via NVD, while 30% had CS. A notable trend emerged: women who exercised more frequently (five to six days per week) were significantly more likely ($p < 0.01$) to experience NVD than those who exercised less frequently. This supports previous research indicating that regular antenatal exercise improves muscle tone, stamina, and overall physical fitness, facilitating smoother labor and delivery. The study highlighted that vaginal delivery is often perceived as a facilitator of physical and mental health, whereas CS are associated with reduced labor pain but potential long-term complications^[22].

Additionally, 98% of participants reported no pain during antenatal exercise sessions, indicating that the program was well-tolerated. Despite the strong link between exercise and NVD, no statistically significant relationship was found between educational level and mode of delivery or age and mode of delivery. This suggests that exercise participation may have a greater impact on delivery outcomes than demographic factors like education or age.

A study conducted in Saudi Arabia found that 58.4% of pregnant women had low awareness of antenatal exercise benefits, and 84.2% did not engage in any form of exercise during pregnancy^[23]. Similarly, in Ethiopia, nearly 60.5% of pregnant women lacked knowledge about antenatal exercise, and only 30.9% participated in physical activity during pregnancy^[24]. These findings highlight the global challenge of insufficient awareness and participation in antenatal exercise programs.

Our study adds to this discussion by demonstrating that women with a previous CS (18% of participants) were able to deliver via NVD after participating in the antenatal exercise program. This challenges the common misconception that a prior CS necessitates future CS and suggests that exercise may improve the chances of a successful NVD in subsequent pregnancies.

In terms of postpartum recovery, most participants (70%) resumed walking on the first day after delivery, with smooth recovery experiences reported, demonstrating that antenatal exercise not only enhances labor outcomes but also promotes faster postpartum recovery.

Conclusion

This study highlights the positive impact of antenatal group exercise therapy on pregnancy outcomes, particularly in increasing the likelihood of normal vaginal delivery (NVD). Regular exercise participation was significantly associated with higher NVD rates, especially among those who exercised more frequently. Additionally, findings suggest that antenatal exercise may enable women with a previous Cesarean section to achieve NVD in subsequent pregnancies.

While no significant associations were found between educational level, age, and mode of delivery, these factors did not diminish the overall benefits of antenatal exercise. The study reinforces the importance of integrating antenatal exercise programs into routine prenatal care, as they contribute to maternal fitness, reduced pregnancy complications, and improved labor outcomes.

Furthermore, this research provides valuable insights into physical activity behaviors during pregnancy, showing that household and caregiving activities are primary contributors to moderate-intensity exercise. Encouraging practical, moderate-intensity activities may be an effective strategy to promote maternal health.

The study also supports the continued use of the PPAQ for assessing activity levels in pregnant women, with considerations for adapting it to specific populations. Future research with larger, more diverse populations could help refine recommendations and explore the specific effects of different physical activities on pregnancy outcomes.

Overall, these findings emphasize the need for greater awareness, structured exercise programs, and policy support to encourage antenatal physical activity, ultimately benefiting maternal and fetal health.

Conflict of Interest

Not available.

Financial Support

Not available.

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