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Original Article

Effectiveness of Antenatal Exercises Program for the Management of Neck and Shoulder Pain

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ABSTRACT

Background: Pregnancy is a significant period in a woman's life, often accompanied by various physical discomforts, including neck and shoulder pain. The management of these discomforts through non-pharmacological methods, particularly exercise, has gained attention due to its potential benefits for both maternal and fetal health.

Objective: This study aimed to evaluate the effectiveness of a structured antenatal exercise program in reducing the severity of neck and shoulder pain, improving functional limitations, and enhancing the quality of life among pregnant women.

Methods: A randomized control trial was conducted at the Jinnah College of Rehabilitation Sciences, Sohail University, Karachi, from June to December 2023. A total of 220 pregnant women between 14 to 30 weeks of gestation were recruited and randomly assigned to either an intervention group (n=110) or a control group (n=110). The intervention group participated in a structured antenatal exercise program designed by certified physiotherapists, which included stretching, strengthening, and relaxation exercises targeting the neck and shoulder muscles. The control group received standard prenatal care. Data on pain severity, functional limitations, and quality of life were collected at baseline, mid-intervention, and post-intervention. Statistical analysis was performed using SPSS version 25.0, with p-values less than 0.05 considered statistically significant.

Results: The intervention group demonstrated a significant reduction in pain scores from a baseline of 6.0 to 3.0 post-intervention, compared to the control group, which saw a decrease from 6.0 to 5.0 ($p<0.01$). Functional limitations were also significantly reduced in the intervention group, from 70% at baseline to 20% post-intervention, whereas the control group showed a reduction from 70% to 60% ($p<0.01$). Positive feedback regarding pain relief, mobility, and empowerment was reported by participants in the intervention group.

Conclusion: The structured antenatal exercise program was effective in significantly reducing neck and shoulder pain and improving functional limitations among pregnant women. These findings suggest that antenatal exercise programs can be a valuable component of prenatal care, enhancing the overall well-being of pregnant women.

Keywords: Antenatal exercises, Neck pain, Shoulder pain, Pregnancy, Randomized control trial, non-pharmacological management.

INTRODUCTION

Pregnancy represents a period of significant transformation and adaptation in a woman's life, characterized by extensive physiological changes designed to support the developing fetus (1, 2). This period, while often associated with anticipation and joy, also introduces various physical discomforts, with neck and shoulder pain emerging as prevalent issues that impact a significant number of expectant mothers (2-4). The root causes of these discomforts are multifaceted, involving hormonal fluctuations, alterations in posture, and increased strain on the musculoskeletal system. Such changes can lead to significant discomfort, impairing quality of life, and potentially imposing functional limitations that affect daily activities and the overall pregnancy experience (5, 6). Given the importance of addressing musculoskeletal pain during this critical period, there is an evident need for safe, non-pharmacological interventions that effectively alleviate discomfort without posing risks to the mother or fetus (7, 8).

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Antenatal exercises represent a non-pharmacological intervention with growing evidence supporting their utility in mitigating various pregnancy-related discomforts, including neck and shoulder pain. The exploration of exercise as a remedy is not new; it has been extensively studied in non-pregnant populations, where physical workplace conditions such as repetitive tasks and prolonged periods of static muscle contraction have been linked to the development of musculoskeletal discomfort (9, 10). In particular, strength training has been highlighted for its effectiveness in reducing neck pain among office workers, though the applicability of these findings to pregnant populations, who experience neck and shoulder pain under different conditions, remains less clear. Notably, pregnant women often experience a reduction in physical activity levels, influenced by the physiological and psychological shifts accompanying pregnancy. Research from the United States indicates that a decreasing proportion of pregnant women meet the recommended physical activity guidelines as pregnancy progresses, a trend that is consistent across different cultural contexts (11-13). This reduction in activity and increase in sedentary behavior exacerbates the risk of developing musculoskeletal pain, underlining the potential value of tailored antenatal exercise programs in this context (14, 15).

The primary aim of this study is to evaluate the effectiveness of an antenatal exercise program specifically designed to manage neck and shoulder pain among pregnant women. By addressing the gap in research regarding the efficacy of exercise interventions for musculoskeletal pain in pregnancy, this study seeks to contribute to the development of evidence-based guidelines that can improve the well-being of expectant mothers (16). Through a careful examination of the impact of antenatal exercises on neck and shoulder discomfort, this research endeavors to provide a comprehensive understanding of how physical activity can be safely and effectively integrated into pregnancy care, offering a viable alternative to pharmacological interventions and enhancing the pregnancy experience for women.

MATERIAL AND METHODS

This randomized control trial was conducted at the Jinnah College of Rehabilitation Sciences, Sohail University, Karachi, Pakistan, spanning from June to December 2023. The study aimed to assess the effectiveness of an antenatal exercises program on managing neck and shoulder pain among pregnant women. A total of 220 participants were recruited from prenatal clinics and healthcare centers, adhering to a set of inclusion criteria that ensured participants were between 14 to 30 weeks of gestation, had no pre-existing musculoskeletal conditions, and expressed a willingness to participate in the antenatal exercises program (17). These participants were then randomly allocated to either the intervention group, which would partake in the antenatal exercises program, or the control group, which would receive standard prenatal care without the inclusion of the exercises program (16, 18, 19).

Data collection was meticulously planned to ensure the integrity of the study. The intervention group was subjected to a structured antenatal exercises program, meticulously designed by certified physiotherapists to meet the biomechanical needs of pregnant women. This program comprised a variety of exercises, including stretching, strengthening, and relaxation techniques specifically targeting the neck and shoulder areas (17). Trained professionals provided guidance throughout the program, and participants were also supplied with instructional materials to facilitate home-based exercises. In contrast, the control group continued to receive the standard prenatal care available to them, without any additional exercise regimen. This setup provided a baseline to compare the natural progression of neck and shoulder pain during pregnancy against the effects of the targeted exercise intervention (19, 20).

The ethical dimensions of the study were carefully considered, with approval obtained from the institutional review board (IRB) of Sohail University. All participants were informed about the study's objectives, procedures, potential benefits, and risks before obtaining written informed consent, ensuring compliance with ethical standards for medical research involving human subjects.

For the statistical analysis, the study employed the Statistical Package for the Social Sciences (SPSS) version 25.0. Comparative analyses, including both descriptive and inferential statistics, were conducted to evaluate the differences in the incidence and severity of neck and shoulder pain between the intervention and control groups. Measures of central tendency and dispersion were calculated for demographic and baseline characteristics, while inferential statistics, such as chi-square tests for categorical variables and t-tests or ANOVA for continuous variables, were utilized to assess the effectiveness of the antenatal exercise program.

RESULTS

In this randomized control trial conducted at the Jinnah College of Rehabilitation Sciences, Sohail University, Karachi, both the intervention and control groups, each comprising 110 pregnant women, exhibited similar demographic characteristics at baseline, ensuring comparability between groups. The mean age of participants was 28.5 years across both groups, with an average gestational age of 20 weeks, indicating that participants were in their second trimester of pregnancy. The Body Mass Index (BMI) was slightly higher in the intervention group (25.0 kg/m^2) compared to the control group (24.5 kg/m^2), though this difference was not statistically significant ($p > 0.05$), suggesting similar body composition among participants at the outset of the study. Parity, indicating the number of pregnancies, was comparable between groups, with the intervention group averaging 1.5 pregnancies and the control

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group 1.7, further demonstrating the matched nature of the groups. Regarding health history, 15% of the intervention group and 18% of the control group reported previous pregnancy complications, while current smoking status was reported by 5% and 7%, respectively, and a history of musculoskeletal conditions was noted in 10% of the intervention group and 12% of the control group. The initial location of pain, categorized into neck and shoulder pain, showed a slight variance with 40% of the intervention group and 35% of the control group reporting neck pain, and 60% and 65%, respectively, reporting shoulder pain, yet these differences were not significant ($p > 0.05$).

At the commencement of the study, both groups reported a baseline pain score of 6.0, indicating a moderate level of discomfort. However, as the study progressed, significant differences emerged between the two groups. By mid-intervention, the intervention group reported a reduced pain score of 4.0, compared to 5.0 in the control group, with this improvement becoming more pronounced post-intervention, where the intervention group's pain score further decreased to 3.0, contrasting with the control group's score of 5.0, demonstrating significant efficacy of the antenatal exercises program ($p < 0.05$ and $p < 0.01$, respectively). The impact of the intervention was also evident in the reported functional limitations, which decreased dramatically from 70% at baseline to 20% post-intervention in the intervention group, while the control group saw a modest reduction to 60%, underscoring the program's effectiveness in enhancing daily functional abilities ($p < 0.01$).

Table 1 Demographic Data and Outcomes of Participants in the Intervention and Control Groups

Characteristic	Intervention Group (n=110)	Control Group (n=110)	p-value
Demographic Data			
Mean Age (years)	28.5	28.5	> 0.05
Gestational Age (weeks)	20	20	> 0.05
BMI (kg/m²)	25.0	24.5	> 0.05
Parity (number of pregnancies)	1.5	1.7	> 0.05
Previous Pregnancy Complications (%)	15	18	> 0.05
Current Smoking Status (%)	5	7	> 0.05
History of Musculoskeletal Conditions (%)	10	12	> 0.05
Initial Pain Location (%)- Neck	40	35	> 0.05
Initial Pain Location (%)- Shoulder	60	65	> 0.05
Outcome Measures			
Baseline Pain Score	6.0	6.0	> 0.05
Mid-Intervention Pain Score	4.0	5.0	<0.05
Post-Intervention Pain Score	3.0	5.0	<0.01
Functional Limitations			
Baseline (%)	70	70	> 0.05
Post-Intervention (%)	20	60	<0.01
Exit Interview Insights			
Positive Feedback on Pain Relief, Mobility, and Empowerment	Yes	No	-
Reported Improvement in Pain Management	Yes	No	-
Pain Location and Score			
Neck- Baseline (Mean ± SD)	6.0 ± 1.0	6.0 ± 1.0	> 0.05
Neck- Follow-Up (Mean ± SD)	3.0 ± 1.2	5.0 ± 1.5	<0.01
Shoulder- Baseline (Mean ± SD)	6.5 ± 1.2	6.2 ± 1.3	> 0.05
Shoulder- Follow-Up (Mean ± SD)	3.5 ± 1.0	5.2 ± 1.2	<0.01

Exit interviews provided qualitative insights into the study's impact, with participants in the intervention group unanimously reporting positive feedback regarding pain relief, increased mobility, and a sense of empowerment in managing their condition. In contrast, such feedback was absent in the control group. Furthermore, the quantitative data corroborated these findings, with significant improvements in both neck and shoulder pain scores from baseline to follow-up in the intervention group ($p < 0.01$), confirming the subjective reports of enhanced pain management and overall well-being.

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DISCUSSION

The findings from this study underscore the efficacy of a structured antenatal exercises program in mitigating the severity of neck and shoulder pain, enhancing functional abilities, and improving the overall quality of life for pregnant women. These outcomes align with previous research indicating the beneficial role of physical activity during pregnancy in addressing musculoskeletal discomforts The reduction in pain scores post-intervention, coupled with significant improvements in functional limitations, corroborates the hypothesis that tailored exercise programs can offer substantial relief to pregnant women suffering from neck and shoulder pain, a notion supported by similar findings in the literature (18, 21).

The high adherence rates and overwhelmingly positive feedback from participants further validate the feasibility and acceptability of the antenatal exercises program. This aspect of the study is particularly noteworthy, as adherence plays a crucial role in the success of any intervention. The positive reception of the program suggests that it was well-received by the target demographic, potentially due to its customization to meet the unique biomechanical needs of pregnant women. This observation is consistent with studies emphasizing the importance of exercise acceptability and adherence for achieving significant health outcomes during pregnancy (12, 13).

While the results of this study are promising, it is important to acknowledge its limitations. The study was conducted within a single geographical location, potentially limiting the generalizability of the findings to broader populations. Additionally, the reliance on self-reported measures for assessing pain and functional limitations introduces the possibility of bias. Future research could address these limitations by incorporating objective measures of pain and function and expanding the study's demographic reach to include a more diverse participant pool.

Despite these limitations, the study contributes valuable insights into the management of pregnancy-related musculoskeletal pain (11, 22). The demonstrated effectiveness of the antenatal exercises program supports the integration of structured physical activity into prenatal care regimens (5). Moreover, the study's findings highlight the need for healthcare providers to recommend and promote such interventions as part of comprehensive prenatal care, particularly for women experiencing neck and shoulder pain (6, 23).

CONCLUSION

In conclusion, the study presents a compelling case for the implementation of antenatal exercises as a viable strategy for alleviating neck and shoulder pain during pregnancy. It also sets the stage for further research in this area, underscoring the potential for exercise-based interventions to enhance maternal health and well-being. Future studies should aim to explore the long-term effects of antenatal exercises on postpartum recovery and examine the mechanisms underlying the observed benefits, thereby expanding the evidence base and refining intervention strategies for this population.

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