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The effect of pranayama on dyspnea and fatigue in third trimester of pregnancy

Manikandan P [1], Lakshmi Narayana Yeddu [1,*], Sunil Kumar Tadi [2], Yaswanthi.T [2], Suresh Pyla [3] and Chintamani Deshpande [2]

[1] *RJS College of Physiotherapy, Kopargaon.*
[2] *Shree Siddheshwar College of Physiotherapy, Solapur.*
[3] *Raghava College of Physiotherapy, Kakinada.*

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Abstract

Background: Dyspnea and fatigue are common physiological complaints during the third trimester of pregnancy due to hormonal, cardiovascular, and respiratory adaptations. These symptoms can significantly affect maternal comfort, functional capacity, and quality of life. Non-pharmacological interventions such as pranayama have been suggested to improve respiratory efficiency and reduce perceived exertion and fatigue, yet scientific evidence in pregnant populations remains limited. The aim of the study is to evaluate the effect of pranayama on dyspnea and fatigue in women during the third trimester of pregnancy.

Methodology: An Experimental study design was conducted on 30 pregnant women in their third trimester who met the inclusion criteria. Baseline assessment of dyspnea and fatigue was performed using the Modified Borg Dyspnea Scale and Multidimensional Assessment of Fatigue (MAF) Scale, respectively. Participants underwent a structured pranayama program for 6 weeks. Data were analyzed using appropriate statistical tests to compare pre- and post-intervention scores.

Results: The results demonstrated a statistically significant reduction in dyspnea scores measured by Modified Borg Dyspnea Scale and fatigue levels measured by the Multidimensional Assessment of Fatigue scale following 6 weeks of pranayama intervention. This indicates an improvement in respiratory comfort and a reduction in overall fatigue among third-trimester pregnant women.

Conclusion: The study concludes that pranayama is an effective and safe intervention for reducing dyspnea and fatigue in women during the third trimester of pregnancy. Incorporation of pranayama into routine antenatal physiotherapy programs may enhance maternal well-being and functional tolerance.

Keywords: Pranayama; Dyspnea; Fatigue; Third Trimester Pregnancy; Modified Borg Dyspnea Scale; Multidimensional Assessment of Fatigue

1. Introduction

Pregnancy is a normal physiological phenomenon during which women experience a wide range of anatomical, physical, and physiological changes. These changes involve functional, physiological, biochemical, biomechanical, and psychological adaptations that significantly influence the respiratory system. Such adaptations may alter breathing mechanics and respiratory patterns, potentially leading to sensations of breathlessness. These physiological alterations can adversely affect maternal comfort, functional capacity, and overall quality of life.[1-3]

* Corresponding author: Lakshmi Narayana Yeddu

Dyspnea is one of the most commonly reported respiratory complaints during pregnancy, particularly in the later trimesters. It is estimated that approximately 60 – 70% of healthy pregnant women experience dyspnea at some point during the course of pregnancy, even in the absence of underlying cardiopulmonary pathology. Hormonal influences, increased oxygen demand, elevation of the diaphragm, and changes in ventilatory drive are considered major contributing factors to pregnancy-related dyspnea.[4, 5]

Fatigue is another frequent and distressing symptom experienced during pregnancy, affecting nearly 70% of pregnant women. Pregnancy-related fatigue is multifactorial in origin and may result from hormonal changes, increased metabolic demands, sleep disturbances, postural alterations, and emotional stress. Persistent dyspnea and fatigue during the third trimester may limit physical activity, reduce functional independence, and negatively impact maternal well-being and quality of life.[6, 7]

The potential causes of fatigue during pregnancy include physical inactivity, rising levels of hormones, and physiological and respiratory distress.[8] The severity of fatigue tends to increase progressively throughout the course of pregnancy. Pregnant women commonly experience fatigue during the first and third trimesters, while relatively lower levels of fatigue are reported during the second trimester.[9] Several physiological and psychological changes occurring during pregnancy have been identified that may influence fatigue levels, including increased oxygen consumption, fetal metabolic demands, cardiovascular, respiratory, urinary, and metabolic adaptations, as well as physiological stress associated with adjustment to pregnancy and childbirth.[10]

Elevated levels of progesterone, which are known to induce drowsiness and sedation, may further contribute to pregnancy-related fatigue.[11, 12] Despite its high prevalence and impact on maternal well-being, fatigue remains one of the most neglected concerns among pregnant women.[13] Persistent fatigue during pregnancy has been associated with adverse obstetric outcomes and may increase the likelihood of operative interventions, including caesarean delivery.[14]

Pranayama is a simple, easily modifiable breathing exercise that can provide significant maternal and fetal benefits when practiced regularly during pregnancy.[15] It is considered an effective non-pharmacological intervention that may contribute to the prevention and improvement of quality of life in pregnant women experiencing dyspnea and fatigue.[16] [17] Pranayama is cost-effective, safe, and generally free from adverse effects when performed under proper guidance.[18]

Pranayama not only assists in regulating respiratory function but also positively influences hormonal balance and physical factors that may cause or exacerbate pregnancy-related symptoms.[19] Regular practice of pranayama has been shown to improve autonomic balance and may enhance cardiovascular efficiency, thereby contributing to improved cardiac output.[20]

A typical pranayama session includes pranayamic breathing, commonly referred to as deep breathing. Pranayamic breathing is defined as the voluntary regulation and manipulation of breathing movements and serves as the cornerstone of all pranayama practices. This technique primarily stimulates the parasympathetic nervous system through stretching of pulmonary tissues and activation of vagal pathways.[21] As a result, pranayamic breathing may help alleviate fatigue and reduce the perception of dyspnea in pregnant women.

The purpose of this study is to evaluate the effectiveness of pranayama in reducing dyspnea and fatigue in women during the third trimester of pregnancy. This study is important as it provides scientific evidence for the effectiveness of pranayama and supports its inclusion in antenatal physiotherapy care..

2. Methodology

- Study design: Experimental design (Pretest – Posttest study)
- Study setting: The study was conducted in the RJS Physiotherapy OPD, Kopargaon.
- Study Population: Pregnant women in their third trimester (28 – 40 weeks of gestation).
- Sample size: A total of 30 pregnant women who fulfilled the inclusion criteria were selected for the study using a convenience sampling technique.
- Sampling method: Non-probability convenience sampling was used.
- Study duration: 6 months
- Treatment duration: 6 weeks

Inclusion & Exclusion Criteria: Pregnant women aged between 20 and 35 years with a gestational age ranging from 28 to 40 weeks (third trimester) who reported complaints of dyspnea and fatigue were included in the study. Participants

were required to be medically stable, cleared for exercise by an obstetrician, and willing to participate in the study by providing written informed consent. Women with high-risk pregnancies, a history of chronic respiratory, cardiac, or neurological disorders, multiple pregnancies, recent abdominal or thoracic surgery, or any contraindication to breathing exercises were excluded from the study. Additionally, women who were unwilling to participate were not included.

Material Used: Pranayama Mat, Pillows**,** Multidimensional Assessment of Fatigue (MAF) Scale**,** Modified Borg Dyspnea Scale

2.1. Outcome Measures

- Modified Borg Dyspnea Scale: Used to assess the subjective perception of breathlessness. Scores range from 0 (no dyspnea) to 10 (maximal dyspnea).
- Multidimensional Assessment of Fatigue (MAF) Scale: Used to evaluate severity, distress, timing, and impact of fatigue on daily activities.

2.2. Procedure:

Ethical clearance was obtained from the Institutional Ethics Committee prior to commencement of the study. Written informed consent was obtained from all participants. Baseline assessment of dyspnea and fatigue was performed using the Modified Borg Dyspnea Scale and Multidimensional Assessment of Fatigue (MAF) scale, respectively.

Participants underwent the structured pranayama program for 6 weeks. Post-intervention assessments were conducted at the end of the 6-week period using the same outcome measures.

Intervention Protocol (Pranayama Program)

- The pranayama program was administered for a duration of 6 weeks, under supervision.
- Frequency: 5 sessions per week for 6 weeks
- Duration: 30 minutes per session
- Position: Comfortable sitting position with back supported

- **Components of Pranayama:**

- Relaxation (5 minutes): Gentle relaxation with awareness of breathing with diaphragmatic breathing.
- Pranayamic Breathing (20 minutes): Slow inhalation through the nose with diaphragmatic expansion. Controlled exhalation through the nose. Breathing ratio maintained as 1:1 initially and progressed as tolerated. Emphasis on rhythmic and relaxed breathing.
- Cool down (5 minutes): Gentle breathing awareness & Relaxation in sitting position

Participants were instructed to avoid breath holding and to stop the exercise if they experienced dizziness, discomfort, or undue fatigue.

Figure 1 Subject performing the pranayama

2.3. Data Collection

Data were collected at two time points. Pre-intervention (Baseline) **and** Post-intervention (After 6 weeks)

2.4. Statistical analysis

Data were analysed using SPSS software (2021). Descriptive statistics (mean and standard deviation) were used to summarize data. Paired t-test was used to compare pre and post-intervention scores. The level of significance was set at $p < 0.05$. The data also tabulated and graphically represented.

3. Data analysis

Table 1 Comparison of pre and post-test mean values of Modified Borg Scale (MBS) of dyspnea

MBS	MEAN	Standard deviation (SD)	Mean difference	t value	P-value
PRE	3.4	0.5632	1.833	16.959	0.0060
POST	1.56	0.5683			

The paired 't' test was done to measure the mean score of dyspnea. Pre-test mean 3.4 and Post-test 1.567. Mean difference was found to be 1.833 with a P value of 0.0060 which was considered significant.

Table 2 Comparison of pre and post-test mean values of Multidimensional Assessment (MAF) Scale of Fatigue

MAFS	Mean	Standard deviation (SD)	Mean difference	t value	P-value
PRE	39.03	3.917	20.633	30.234	0.0389
POST	18.4	1.793			

The paired 't' test was done to measure the mean of fatigue. Pre-test mean 39.03 and post-test mean 18.4. Mean difference was found to be 20.633with a P value of 0.0389 which was significant.

4. Results

Following six weeks of pranayama practice, participants demonstrated a statistically significant reduction in dyspnea scores on the Modified Borg Dyspnea Scale and fatigue scores on the Multidimensional Assessment of Fatigue scale, indicating improvement in respiratory comfort and reduction in fatigue.

5. Discussion

The present study was undertaken to evaluate the effect of pranayama on dyspnea and fatigue in women during the third trimester of pregnancy. The findings of the study demonstrated a significant reduction in perceived dyspnea and fatigue levels following a six-week pranayama intervention, as measured by the Modified Borg Dyspnea Scale and the Multidimensional Assessment of Fatigue (MAF) scale, respectively. These results support the alternative hypothesis and suggest that pranayama is an effective non-pharmacological intervention for managing pregnancy-related dyspnea and fatigue.

Gracia et al., in their study explained that the dyspnea during pregnancy can be caused due to hyperventilation for compensating reduced diffusion capacity. They suggested that can be due to a decrease in alveolar $PaCO_2$ or the fact that the pregnant women are more aware of increase in their ventilation. P.Weiner et.al., reported a significant reduction in dyspnea during daily activities fallowing the Pranayama training protocol. Pranayama improves respiratory mechanics and reduces perceived dyspnea by optimizing breathing patterns and reducing respiratory muscle workload (Sivashankar & Kulandaivelan, 2020).

Fatigue during pregnancy is multifactorial in origin and is influenced by increased metabolic demands, hormonal changes, sleep disturbances, and psychological stress (Bodin et.al., 2020). Stephanie JE et al., has been reported that fatigue during pregnancy can lead to obstetrics risks, further predicting chances of caesarean delivery. Studies have shown that women living sedentary life style prior to pregnancy was more common. The effect of Pranayama have been proven in improving the maternal quality of life. The result of this study to believe that who received Pranayama training

showed significant improvement in reducing dyspnea grade and helped in reducing fatigue during third trimester pregnant women.

These results are consistent with previous studies on yoga and pranayama interventions during pregnancy. Satyapriya et al. (2013) reported that yoga-based breathing practices improved maternal comfort and reduced pregnancy-related stress. Another study by Rakhshani et al. (2012) found that pranayama significantly improved maternal cardiovascular response and reduced pregnancy-related discomforts, including breathlessness. The present study adds to the growing evidence by demonstrating specific improvements in dyspnea and fatigue two symptoms commonly overlooked but strongly affecting maternal quality of life in the third trimester.

The study's strengths include the use of a structured pranayama protocol and standardized outcome measures. However, some limitations must be acknowledged. First, the sample size may limit generalizability. Second, self-reported measures of dyspnea and fatigue may introduce subjective bias. Third, factors such as activity level, sleep quality, and psychological stress were not controlled, although they can influence both dyspnea and fatigue. Future studies should incorporate larger multicentric samples, objective respiratory measures such as spirometry, and long-term follow-up to determine whether benefits persist during labour and postpartum recovery.

Despite these limitations, the study demonstrates that pranayama is a safe, non-pharmacological, cost-effective intervention that can be easily incorporated into antenatal care. Considering the limited pharmacologic options available for managing breathlessness and fatigue during pregnancy, pranayama offers a promising complementary therapy.

6. Conclusion

The present study concludes that pranayama is an effective, safe, and non-pharmacological intervention for reducing dyspnea and fatigue in women during the third trimester of pregnancy. A structured six-week pranayama program resulted in a significant improvement in perceived breathlessness and fatigue levels, as measured by the Modified Borg Dyspnea Scale and the Multidimensional Assessment of Fatigue scale.

The findings of this study suggest that pranayama enhances respiratory efficiency, promotes relaxation, and improves overall maternal comfort without causing adverse effects. Given its simplicity, cost-effectiveness, and safety, pranayama can be recommended as an adjunct to routine antenatal physiotherapy care to improve quality of life in pregnant women during late pregnancy.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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