



EFFECT OF SIX-WEEK PRANAYAMA PRACTICE ON PEAK EXPIRATORY FLOW RATE IN FIRST-YEAR MBBS STUDENTS

Physiology

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ABSTRACT

Introduction: Peak Expiratory Flow Rate (PEFR) is an important indicator of airway function and respiratory efficiency. Medical students are exposed to academic stress and reduced physical activity, which may negatively influence pulmonary functions. Pranayama, a yogic breathing technique, has been shown to improve respiratory parameters. **Aim:** To evaluate the effect of regular pranayama practice on Peak Expiratory Flow Rate among first-year MBBS students. **Materials and Methods:** This interventional study was conducted on 190 first-year MBBS students aged 17–20 years. Baseline PEFR was measured using Wright's Peak Flow Meter. Participants practiced pranayama for 30 minutes daily for 6 weeks under supervision. Post-intervention PEFR was recorded. Data were analysed using paired t-test. **Results:** The mean baseline PEFR was 412.6 ± 48.3 L/min, which increased significantly to 462.9 ± 50.1 L/min after the pranayama intervention ($p < 0.001$). Both male and female students showed statistically significant improvement. **Conclusion:** Regular practice of pranayama significantly improves PEFR in first-year MBBS students. Incorporation of pranayama into the medical curriculum may enhance respiratory health and overall well-being.

KEYWORDS

Pranayama, Peak Expiratory Flow Rate, PEFR, Medical Students, Yoga

INTRODUCTION

Peak expiratory flow rate (PEFR) is the maximum flow achieved during forceful expiration and reflects airway caliber and respiratory muscle strength (Guyton & Hall, 2016). It is a simple, inexpensive, and reliable method for assessing pulmonary function in both clinical and community settings, and reduced PEFR may indicate compromised ventilatory efficiency.

First-year MBBS students face a sudden transition into a demanding academic environment, often accompanied by increased psychological stress and reduced physical activity (Miller et al., 2005). Long study hours and a sedentary lifestyle may adversely affect respiratory function, but early preventive measures can help maintain respiratory health.

Yoga, an ancient holistic discipline, includes physical postures, breathing exercises, and meditation. Pranayama, the conscious regulation of breathing, improves lung volumes and respiratory muscle strength (Joshi et al., 1992). Several studies have reported improvement in pulmonary function parameters such as forced vital capacity (FVC), forced expiratory volume in one second (FEV₁), and PEFR following regular pranayama practice (Sharma et al., 2013; Madanmohan et al., 2003; Makwana et al., 1988; Pal et al., 2004); however, limited studies have focused specifically on first-year MBBS students.

Medical students are frequently exposed to stress and irregular breathing patterns, potentially compromising pulmonary function. Pranayama promotes slow, rhythmic breathing and enhances ventilatory efficiency, which may be beneficial for improving respiratory function in this population.

Although available literature supports the benefits of pranayama on lung function, evidence in first-year MBBS students with a large sample size is limited. Therefore, the present study aimed to evaluate the effect of a structured pranayama program on PEFR in first-year MBBS students.

MATERIALS AND METHODS

Study Design and Setting

This interventional study was conducted in the Department of Physiology of a tertiary care teaching hospital.

Study Population

A total of 190 first-year MBBS students aged 17–20 years participated in the study.

Inclusion Criteria

- Apparently healthy first-year MBBS students

- Both genders
- Willing to participate with informed consent

Exclusion Criteria

- History of bronchial asthma or chronic respiratory disease
- Smokers or tobacco users
- Students practicing yoga or pranayama regularly
- Recent respiratory tract infection

Ethical Approval

The study was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants.

Measurement of PEFR

PEFR was measured using a Wright's Peak Flow Meter. Students stood upright, inhaled maximally, and exhaled forcefully into the mouthpiece. Three readings were recorded, and the highest value was taken as the PEFR.

Pranayama Intervention

Participants practiced pranayama for 30 minutes daily, six days a week, for six weeks under supervision. Techniques included:

- Anulom Vilom – 10 minutes
- Bhastrika – 5 minutes
- Kapalbhati – 10 minutes
- Bhramari – 5 minutes

Statistical Analysis

Data were expressed as mean $\pm$ SD. Pre- and post-intervention values were compared using paired t-test. A p-value $< .05$ was considered statistically significant.

RESULTS

Baseline Characteristics- Table 1: Baseline Characteristics of Study Participants

Parameter	Mean $\pm$ SD
Age (years)	18.6 ± 0.8
Height (cm)	168.4 ± 8.2
Weight (kg)	62.1 ± 9.6
BMI (kg/m ²)	21.8 ± 2.4

Effect of Pranayama on PEFR

Table 2: Comparison of PEFR Before and After Pranayama Intervention

PEFR (L/min)	Mean $\pm$ SD	p-value
Baseline	412.6 ± 48.3	–
Post-intervention	462.9 ± 50.1	$< .001^*$

*Statistically significant

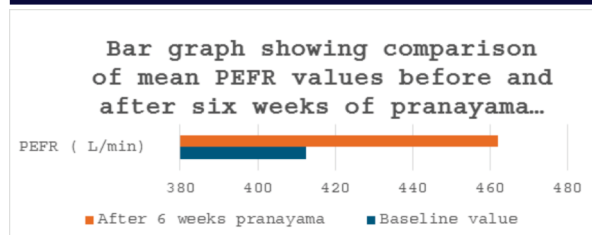


Figure 1: Bar Graph Showing Comparison of Mean PEFR Values Before and After Six Weeks of Pranayama Practice.

(X-axis: Study period; Y-axis: PEFR in L/min)

DISCUSSION

The present study demonstrated a statistically significant improvement in PEFR following six weeks of structured pranayama practice in first-year MBBS students. This suggests that pranayama positively influences respiratory mechanics, even in young, apparently healthy individuals (Guyton & Hall, 2016).

PEFR is an effort-dependent parameter reflecting the functional status of large airways and expiratory muscle strength (Ross & Thomas, 2010). An increase in PEFR indicates improved airway patency and enhanced expiratory muscle performance. Pranayama involves voluntary regulation of inspiration and expiration, which may strengthen respiratory muscles, improve lung compliance (Joshi et al., 1992), and reduce airway resistance (Sharma et al., 2013).

Medical students experience multiple stressors, including academic pressure, long study hours, and decreased physical activity, potentially contributing to altered breathing patterns and reduced respiratory efficiency (Miller et al., 2005). Stress increases sympathetic activity, whereas pranayama promotes parasympathetic dominance, inducing relaxation and potentially facilitating bronchodilation (Bhavanani et al., 2011).

Improved neuromuscular coordination of respiration may also contribute to higher PEFR values. Pranayama emphasizes slow, deep, and rhythmic breathing, enhancing synchronization of respiratory muscles (Sharma et al., 2013; Madanmohan et al., 2003).

These findings align with previous studies reporting improvement in pulmonary function following pranayama practice. Joshi et al. (1992), Madanmohan et al. (2003), Makwana et al. (1988), and Pal et al. (2004) all reported improvements in ventilatory parameters, including PEFR.

Unlike studies on experienced yoga practitioners, this study assessed first-year MBBS students with no prior exposure, demonstrating that even short-term practice induces rapid physiological adaptations (Sharma et al., 2013). The large sample size strengthens reliability, and improvements were observed across genders, though absolute PEFR values were higher in males, likely due to larger lung volumes and greater respiratory muscle mass (Guyton & Hall, 2016).

Six weeks of practice was sufficient to produce measurable improvement, suggesting that short-duration pranayama programs are feasible within academic schedules.

Limitations

- Absence of a control group
- Short duration of follow-up
- Long-term effects were not assessed

Future studies should include control groups, longer follow-up, and comprehensive pulmonary function testing.

CONCLUSION

Regular pranayama practice for six weeks significantly improves PEFR in first-year MBBS students. Pranayama is a simple, cost-effective, and non-pharmacological intervention that can be incorporated into the medical curriculum to enhance respiratory health and overall well-being.

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Conflict of Interest -None declared

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