COMBINED EFFECT OF COGNITIVE BEHAVIOURAL THERAPY AND RELAXED BREATHING POSTURES ON THE PEAK EXPIRATORY FLOW RATE OF ASTHMATIC SCHOOL CHILDREN

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Abstract

Asthma, a chronic respiratory condition prevalent in school-aged children, is exacerbated by psychological stress, impairing pulmonary function and quality of life (QOL). This single-group pre-post intervention study evaluated the synergistic impact of Cognitive Behavioural Therapy (CBT) and relaxed breathing postures on Peak Expiratory Flow Rate (PEFR) in 20 asthmatic children (8–14 years). Over 12 weeks, participants received biweekly CBT sessions and daily breathing exercises (diaphragmatic and alternate nostril breathing) alongside standard care. Post-intervention, significant improvements were observed in PEFR (mean difference: 43.016 L/min, $p < 0.05$) and Pediatric Asthma Quality of Life Questionnaire (PAQLQ) scores ($t = 2.191$, $p < 0.05$). Anxiety levels and asthma-related symptoms decreased, underscoring the intervention's dual psychological and physiological efficacy. These findings advocate integrating nonpharmacological strategies into pediatric asthma management to reduce medication dependence and enhance holistic wellbeing.

Keywords: Asthma, cognitive behavioural therapy (CBT), school children, relaxed postures, peak expiratory flow rate (PEFR), quality of life (QOL).

Introduction

Asthma remains the most prevalent chronic disease among children globally, affecting 1 in 5 individuals and contributing to significant school absenteeism and hospitalizations[1]. The World Health Organization estimates that 300 million people suffer from asthma, with rising prevalence despite pharmacological advancements[2]. Acute asthma episodes involve chronic hyperventilation, reduced PEFR, and heightened anxiety, creating a cyclical relationship between psychological stress and airway constriction[3].

Asthma's pathophysiology involves airway inflammation and bronchoconstriction, often triggered by environmental factors, allergens, and emotional stress[4]. Children are particularly vulnerable to anxiety during attacks, which exacerbates hyperventilation and worsens symptoms[5]. Conventional treatments, such as bronchodilators and corticosteroids, focus on symptom control but fail to address psychological comorbidities[6]. Non-pharmacological interventions like CBT and breathing exercises offer promising adjunctive benefits by targeting stress and respiratory mechanics[7].

CBT equips children with coping strategies to manage anxiety, breaking the cycle of stress-induced exacerbations[8]. Relaxed breathing postures, such as diaphragmatic breathing, stabilize respiratory patterns, improve gas exchange, and reduce airway resistance[9]. While prior studies highlight individual benefits of CBT[10] or breathing exercises[11], limited research explores their combined effect on pediatric asthma. This study bridges this gap by evaluating integrated CBT and breathing interventions to optimize PEFR and QOL in asthmatic school children.

Procedure Study Design

A single-group pre-post intervention design was employed, with outcomes measured at baseline and post-intervention (12 weeks).

Inclusion Criteria:

- Children aged 8–14 years with physician-diagnosed asthma.
- Stable medication regimen for ≥4 weeks.
- Ability to perform breathing exercises.

Exclusion Criteria:

- Status asthmaticus or severe exacerbations in the past month.
- Comorbid cardiothoracic, neurological, or infectious conditions.
- Cognitive impairments affecting CBT participation.

Intervention Phases 1. Cognitive Behavioural Therapy (CBT)

CBT was delivered in three phases by licensed therapists:

Phase 1: Psychoeducation (Weeks 1–2)

Participants and caregivers attended sessions on asthma pathophysiology, stress-symptom interactions, and CBT principles. Children learned to identify anxiety triggers (e.g., "I fear using my inhaler in public") and practiced cognitive restructuring to replace maladaptive thoughts[12].

Phase 2: Skill Development (Weeks 3–6) Techniques included:

- **Thought challenging**: Children analyzed catastrophic thoughts (e.g., "The ambulance won't arrive in time") and reframed them realistically[13]. ○ **Problem-solving**: Role-playing scenarios (e.g., managing attacks during sports) enhanced decision-making.
- **Relaxation training**: Progressive muscle relaxation and mindfulness exercises reduced acute anxiety[14].

Phase 3: Application (Weeks 7–12)

Children applied CBT strategies in simulated stress scenarios (e.g., timed breathing during mock attacks). Homework assignments included maintaining anxiety journals and peer discussions to reinforce skills[15].

2. Relaxed Breathing Postures Participants practiced daily:

- **Diaphragmatic Breathing (15 minutes)**:

Slow inhalation through the nose (4 seconds), breath-holding (2 seconds), and controlled exhalation (6 seconds) to reduce hyperventilation[16].

- **Alternate Nostril Breathing (5 minutes)**:

A yoga-based technique involving alternating nostrils during inhalation/exhalation to balance autonomic nervous system activity[17].

Outcome Measures

1. **PEFR**: Measured using a calibrated spirometer (Micro Medical Ltd), with the highest of three readings recorded.
2. **PAQLQ**: A validated 23-item questionnaire assessing symptoms, activity limitations, and emotional function[18].

Statistical Analysis Paired *t*-tests compared pre- and post-intervention outcomes using SPSS v28. Statistical significance was set at $p < 0.05$.

Data Analysis Peak Expiratory Flow Rate (PEFR)

Post-intervention PEFR increased significantly (*mean difference* = 43.016 L/min, *SD* = 12.4, $p < 0.05$) (Table 1). This aligns with studies showing relaxed breathing enhances pulmonary mechanics by reducing airway resistance[19].

Table 1: **PEFR Changes Post-Intervention**

Parameter	Pre-Test (Mean ± SD)	Post-Test (Mean ± SD)	*t*-value	*p*-value
PEFR (L/min)	248.3 ± 45.2	291.3 ± 38.6	4.72	<0.05

Pediatric Asthma Quality of Life Questionnaire (PAQLQ)

PAQLQ scores improved markedly (*mean difference* = 59.3, *SD* = 27.1, $t = 2.191$, $p < 0.05$), reflecting enhanced emotional well-being and symptom control (Table 2).

Table 2: **PAQLQ Score Analysis**

Domain	Pre-Test (Mean ± SD)	Post-Test (Mean ± SD)	*t*-value
Symptoms	3.8 ± 1.2	5.1 ± 0.9	2.45
Activities	4.0 ± 1.1	5.4 ± 1.0	2.67
Emotional	3.5 ± 1.3	5.0 ± 1.2	2.21

Discussion Synergistic Benefits of CBT and Breathing Exercises

The 43.016 L/min improvement in PEFR corroborates Nisha Laila et al.'s findings, where yoga breathing elevated PEFR by 38.5 L/min in moderate asthma[20]. Diaphragmatic breathing optimizes carbon dioxide retention, dilating bronchioles and reducing airway resistance[21]. Concurrently, CBT's anxiety-reducing effects disrupt the stress-inflammatory axis, lowering cortisol levels and airway hyperresponsiveness[22].

The PAQLQ score increase (59.3 points) surpasses Juniper et al.'s reported 1.2-point gains from CBT alone[23], suggesting additive benefits from breathing exercises. Mindfulness and cognitive restructuring empowered children to reframe fears (e.g., "I'll manage my inhaler discreetly"), enhancing self-efficacy and social participation[24].

Limitations and Future Directions

The single-group design limits causal inferences, and the 12-week duration precludes long-term efficacy assessment. Adherence to home exercises, though monitored via journals, may have varied. Future studies should employ randomized designs with larger samples and follow-ups ≥6 months, as proposed in Karolinska Institute's ongoing Internet-CBT trials[25].

Conclusion

Integrating CBT and relaxed breathing postures significantly improves pulmonary function and psychological well-being in asthmatic children. This dual approach offers a sustainable, non-pharmacological strategy to reduce medication dependence and enhance quality of life. Clinicians should consider incorporating these interventions into standard pediatric asthma care protocols.

Conflict of Interest
Nil

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