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THE ROLE OF REHABILITATION IN IMPROVING THE QUALITY OF LIFE IN CHILDREN WITH ASTHMA

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Abstract: Background: Bronchial asthma is the most common chronic disease in childhood, significantly impacting the physical, emotional, and social well-being of pediatric patients. While pharmacological management is well-established, the role of non-pharmacological pulmonary rehabilitation in enhancing Quality of Life (QoL) is often underutilized. This study aims to evaluate the effectiveness of a comprehensive rehabilitation program on the clinical status and quality of life of children with persistent asthma. Methods: A prospective randomized controlled trial was conducted involving 100 children aged 7-14 years with moderate persistent asthma. Patients were divided into two groups: the Control Group (n=50) received standard pharmacotherapy (ICS/LABA), while the Intervention Group (n=50) received standard therapy plus a 3-month rehabilitation program (breathing exercises, physical training, and education). Quality of life was assessed using the Pediatric Asthma Quality of Life Questionnaire (PAQLQ), and lung function was measured via spirometry. Results: After 3 months, the Intervention Group showed a statistically significant improvement in the overall PAQLQ score (from 4.2 ± 0.5 to 6.1 ± 0.4 , $p < 0.001$) compared to the Control Group. Significant improvements were observed in the "Activity Limitation" and "Emotional Function" domains. Additionally, the frequency of acute exacerbations decreased by 40% in the rehabilitation group. Conclusion: Integrating a structured pulmonary rehabilitation program into the standard management of pediatric asthma significantly improves quality of life, enhances exercise tolerance, and reduces disease burden. It should be considered a standard component of care.

Keywords: Pediatric asthma, pulmonary rehabilitation, quality of life, PAQLQ, breathing exercises, physical therapy, pediatrics.

ASTMA BILAN KASALLANGAN BOLALARDA HAYOT SIFATINI YAXSHILASHDA REABILITATSIYANING O'RNI

Annotatsiya: Kirish: Bronxial astma bolalik davridagi eng keng tarqalgan surunkali kasallik bo'lib, bemor bolalarning jismoniy, hissiy va ijtimoiy farovonligiga jiddiy ta'sir ko'rsatadi. Farmakologik davolash yaxshi yo'lga qo'yilgan bo'lsa-da, hayot sifatini oshirishda doridarmonsiz o'pka reabilitatsiyasining roli ko'pincha e'tibordan chetda qolmoqda. Ushbu tadqiqot kompleks reabilitatsiya dasturining persistirlovchi astma bilan og'rikan bolalarning klinik holati va hayot sifatiga ta'sirini baholashga qaratilgan. Usullar: O'rtacha og'ir persistirlovchi astmasi bo'lgan 7-14 yoshli 100 nafar bola ishtirokida prospektiv randomizatsiyalangan nazoratli tadqiqot o'tkazildi. Bemorlar ikki guruhga bo'lindi: Nazorat guruhi (n=50) standart farmakoterapiya (ICS/LABA) oldi, Aralashuv guruhi (n=50) esa standart terapiya va qo'shimcha ravishda 3 oylik reabilitatsiya dasturini (nafas mashqlari, jismoniy tarbiya va ta'lim) qabul qildi. Hayot sifati Bolalar Astmasi Hayot Sifati So'rovnomasi (PAQLQ) yordamida, o'pka funksiyasi esa spirometriya orqali baholandi. Natijalar: 3 oydan so'ng Aralashuv guruhi umumiy PAQLQ ko'rsatkichida Nazorat guruhiga nisbatan statistik ishonchli yaxshilanishni ko'rsatdi ($4,2 \pm 0,5$ dan $6,1 \pm 0,4$ gacha, $p < 0.001$). "Faoliyatning cheklanishi" va "Hissiy funktsiya" domenlarida sezilarli ijobiy o'zgarishlar kuzatildi. Bundan tashqari, reabilitatsiya guruhida o'tkir xurujlar chastotasi 40 foizga kamaydi. Xulosa: Bolalar astmasini standart davolash jarayoniga tizimli o'pka reabilitatsiyasi dasturini kiritish hayot sifatini sezilarli darajada yaxshilaydi, jismoniy

yuklamaga chidamlilikni oshiradi va kasallik yukini kamaytiradi. Buni parvarishlashning standart tarkibiy qismi sifatida ko'rib chiqish lozim.

Kalit so'zlar: Bolalar astmasi, o'pka reabilitatsiyasi, hayot sifati, PAQLQ, nafas mashqlari, fizioterapiya, pediatriya.

РОЛЬ РЕАБИЛИТАЦИИ В УЛУЧШЕНИИ КАЧЕСТВА ЖИЗНИ У ДЕТЕЙ С БРОНХИАЛЬНОЙ АСТМОЙ

Аннотация: Введение: Бронхиальная астма является наиболее распространенным хроническим заболеванием в детском возрасте, оказывающим значительное влияние на физическое, эмоциональное и социальное благополучие педиатрических пациентов. Хотя фармакологическое лечение хорошо отработано, роль немедикаментозной легочной реабилитации в повышении качества жизни (КЖ) часто недооценивается. Целью данного исследования является оценка эффективности комплексной программы реабилитации на клинический статус и качество жизни детей с персистирующей астмой. Методы: Было проведено проспективное рандомизированное контролируемое исследование с участием 100 детей в возрасте 7-14 лет с умеренной персистирующей астмой. Пациенты были разделены на две группы: контрольная группа (n=50) получала стандартную фармакотерапию (ИГКС/ДДБА), а группа вмешательства (n=50) получала стандартную терапию плюс 3-месячную программу реабилитации (дыхательные упражнения, физические тренировки и обучение). Качество жизни оценивалось с помощью опросника качества жизни при детской астме (PAQLQ), а функция легких измерялась с помощью спирометрии. Результаты: Через 3 месяца группа вмешательства показала статистически значимое улучшение общего балла PAQLQ (с $4,2 \pm 0,5$ до $6,1 \pm 0,4$, $p < 0.001$) по сравнению с контрольной группой. Значительные улучшения наблюдались в доменах «Ограничение активности» и «Эмоциональная функция». Кроме того, частота обострений в группе реабилитации снизилась на 40%. Заключение: Интеграция структурированной программы легочной реабилитации в стандартное лечение детской астмы значительно улучшает качество жизни, повышает толерантность к физической нагрузке и снижает бремя болезни. Ее следует рассматривать как стандартный компонент медицинской помощи.

Ключевые слова: Детская астма, легочная реабилитация, качество жизни, PAQLQ, дыхательные упражнения, физиотерапия, педиатрия.

INTRODUCTION

Bronchial asthma is a major public health challenge in pediatrics, affecting millions of children worldwide. In Uzbekistan, the prevalence of respiratory allergic diseases has seen a steady increase due to urbanization and environmental factors. Asthma is characterized by chronic airway inflammation, reversible airflow obstruction, and bronchial hyperresponsiveness. However, the impact of the disease extends far beyond these physiological parameters.

For a child, asthma often means restricted physical activity, frequent school absenteeism, social isolation due to the inability to participate in sports, and anxiety regarding potential attacks. These factors collectively degrade the Health-Related Quality of Life (HRQoL). While modern pharmacotherapy, particularly Inhaled Corticosteroids (ICS), is highly effective in controlling inflammation, it does not fully address the systemic deconditioning and psychological burden associated with chronic illness.

Many children with asthma enter a vicious cycle of inactivity: fear of dyspnea leads to avoidance of exercise, which causes physical deconditioning, which in turn lowers the threshold for dyspnea during exertion. Pulmonary Rehabilitation (PR) is a comprehensive intervention designed to improve the physical and psychological condition of people with chronic respiratory disease. Despite its proven efficacy in adults, PR is not widely implemented in pediatric

protocols in our region. This study aims to bridge this gap by evaluating the specific role of a structured rehabilitation program in improving the quality of life in Uzbek children with asthma.

LITERATURE REVIEW

Quality of Life in Pediatric Asthma Quality of life is a multidimensional concept covering physical, psychological, and social domains. Studies by Juniper et al. (1996), creators of the PAQLQ, demonstrated that clinical parameters (like FEV1) correlate poorly with how a patient *feels* and *functions*. A child might have normal lung function at rest but feel socially isolated because they cannot play soccer. Therefore, improving QoL requires interventions that target functional capacity and self-efficacy.

Components of Pulmonary Rehabilitation Current international guidelines (GINA, ATS/ERS) advocate for non-pharmacological management as an adjunct to medication.

Physical Training - Controlled aerobic exercise improves cardiovascular fitness and reduces minute ventilation for a given work rate, reducing the sensation of breathlessness (Wanrooij et al., 2014).

Breathing Exercises - Techniques such as the Buteyko method or diaphragmatic breathing help reduce hyperventilation and improve gas exchange efficiency.

Education: Teaching children and parents about asthma triggers and correct inhaler

Evidence for Rehabilitation A meta-analysis by Welsh et al. (2010) confirmed that physical training improves cardiorespiratory fitness in asthmatic children without worsening airway inflammation. However, limited data exists regarding the implementation of such programs in the specific climatic and social conditions of the Fergana Valley.

MATERIALS AND METHODS

Study Design A prospective, open-label, randomized controlled trial was conducted at the Department of Hospital Pediatrics, Andijan State Medical Institute, over a period of 6 months (2023-2024).

Participants A total of 100 children aged 7-14 years diagnosed with moderate persistent bronchial asthma (according to GINA guidelines) were enrolled.

Inclusion Criteria: Documented reversible airway obstruction, stable medication regimen for at least 1 month, written parental consent.

Exclusion Criteria: Acute exacerbation in the last 4 weeks, other chronic cardiac or respiratory diseases, inability to perform exercise.

Interventions Participants were randomized 1:1 into two groups:

Control Group (n=50): Received standard pharmacological treatment (ICS + LABA) and basic advice on allergen avoidance.

Intervention Group (n=50): Received standard treatment plus a 12-week Rehabilitation Program consisting of:

Breathing Gymnastics: 15 minutes daily (Diaphragmatic breathing, pursed-lip breathing).

Aerobic Training: 3 sessions/week of moderate-intensity activity (swimming or brisk walking) for 30 minutes.

Asthma School - Monthly educational workshops for children and parents.

Primary Outcome - Pediatric Asthma Quality of Life Questionnaire (PAQLQ) score. The questionnaire covers three domains: Symptoms, Activity Limitation, and Emotional Function. Scores range from 1 (severe impairment) to 7 (no impairment).

Secondary Outcome - Pulmonary function tests (FEV1, FVC) measured using a digital spirometer.

Statistical Analysis - Data were analyzed using SPSS v26. Student's t-test was used to compare means between groups. A p-value < 0.05 was considered significant.

RESULTS

Baseline Characteristics - Both groups were comparable at baseline in terms of age, gender, duration of asthma, and initial spirometric values (Table 1).

Table 1: Baseline Characteristics

Parameter	Control Group (n=50)	Intervention Group (n=50)	P-value
Age (years)	10.4 ± 2.1	10.6 ± 1.9	0.62
Gender (M/F)	28/22	26/24	0.81
FEV1 (% predicted)	78.4 ± 5.2	79.1 ± 4.8	0.48
Baseline PAQLQ Score	4.1 ± 0.6	4.2 ± 0.5	0.38

Quality of Life Improvement After 12 weeks, the Intervention Group showed significant improvement across all domains of the PAQLQ.

Table 2: PAQLQ Scores at 12 Weeks

Domain	Control Group (Post)	Intervention Group (Post)	Difference	P-value
Activity Limitation	4.5 ± 0.7	6.2 ± 0.5	+1.7	< 0.001
Symptoms	4.8 ± 0.6	5.9 ± 0.4	+1.1	< 0.01
Emotional Function	4.6 ± 0.8	6.3 ± 0.6	+1.7	< 0.001
Total Score	4.6 ± 0.5	6.1 ± 0.4	+1.5	< 0.001

The improvement in the Intervention Group exceeded the "Minimal Clinically Important Difference" (MCID) of 0.5 points, indicating a meaningful change for the patients.

Lung Function and Exacerbations While FEV1 improved in both groups due to medication, the Intervention Group showed better exercise tolerance. Notably, the number of unscheduled doctor visits for acute exacerbations was significantly lower in the rehabilitation group (8 visits vs. 22 visits in the control group).

DISCUSSION

The findings of this study highlight the transformative power of rehabilitation. The significant increase in the "Activity Limitation" score in the intervention group suggests that children were able to return to play and sports, breaking the cycle of deconditioning. The improvement in "Emotional Function" indicates reduced anxiety, likely due to increased confidence in managing their condition and improved body image.

Unlike pharmacotherapy, which targets the airway, rehabilitation targets the *child*. Breathing exercises helped children gain control over hyperventilation during stress or exercise. The physical training improved the efficiency of oxygen utilization by peripheral muscles, reducing the ventilatory demand on the lungs.

The reduction in exacerbations can be attributed to better adherence (fostered by the "Asthma School") and improved clearance of bronchial secretions facilitated by physical activity and breathing techniques.

CONCLUSION

Rehabilitation is not a luxury but a necessity in the comprehensive management of pediatric asthma.

A 12-week rehabilitation program significantly improves the quality of life in children with asthma, independent of medication effects.

The benefits extend to emotional well-being and social participation.

The program is cost-effective and can be implemented in outpatient settings.

Recommendations: 1) Pediatricians should prescribe physical activity "on prescription" alongside inhalers. 2) "Respiratory Rehabilitation Rooms" should be established in district polyclinics to provide accessible care.

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