The Peerian Journal
Open Access | Peer Reviewed
Volume 37, December 2024
Website: www.peerianjournal.com
ISSN (E): 2788-0303
Email: editor@peerianjournal.com

Efficiency Of Kinesiotherapy In Rehabilitation Of Recurrent Obstructive Bronchitis In Post-Covid-19

Sodikova N.B., Karimjonov I.A., Zakirova U.I., Karimova U.N
Tashkent Medical Academy

Abstract

The aim of this study was to analyze the effectiveness of kinesiotherapy in the rehabilitation of children with recurrent obstructive bronchitis (ROB) who had COVID-19 by determining spirometric indicators. The subjects were children aged 7 to 15 years with recurrent obstructive bronchitis, and the initial indicators of their external respiratory function (FER) were determined during the exacerbation period. In the experimental group, rehabilitation measures included the effective integration of kinesiotherapy (KT). A comparative study of the respiratory function in children with recurrent obstructive bronchitis after a six-month course of kinesiotherapy demonstrated the positive effectiveness of the method: an increase in the number of children with standard values of VC from 76.4% to 98.7%, FVC from 51.4% to 82.3%, FEV1 from 52.3% to 93.1%, IT from 64.5% to 89%, POS from 61.2% to 94.1%, MOS-75 from 65.9% to 92.2%, and MVL on average from 27.2 L to 46.3 L was observed. In children with ROB, there was a decrease in the number of hospitalizations, the frequency of recurrent bronchial obstruction, and the duration of exacerbations; doses of medications were reduced or discontinued during the recovery period. The results showed that the use of kinesiotherapy in patients with ROB increases the functional capabilities of the respiratory system and has a positive effect on rehabilitation.

Keywords: children, bronchitis, obstruction, rehabilitation, kinesiotherapy, spirometry

Эффективность Кинезиотерапия При Реабилитации С Рекуррентным Течением Обструктивного Бронхита Перенёсших Covid-19

Содикова Н.Б., Каримджанов И.А., Закирова У.И.,Каримова У.Н
Ташкентская Медицинская Академия

Резюме

Анализ эффективности кинезиотерапии в реабилитации детей с рекуррентным течением обструктивного бронхита (РОБ) перенёсших COVID-19 методом определения спирометрических показателей явилось целью нашей работы. Материалом для наблюдения были дети с рекуррентным течением обструктивного бронхита в возрасте от 7 до 15 лет, у которых в период обострения определены исходные показатели функции внешнего дыхания (ФВД). В экспериментальной группе рекомендованы реабилитационные мероприятия с эффективным включением кинезиотерапии (КТ). Сравнительное исследование функции внешнего дыхания у детей с рецидивирующего обструктивного бронхита перенёсших COVID-19 после проведения полугодового курса кинезиотерапия показал положительную эффективность метода: отмечалось увеличение числа детей с рецидивирующего обструктивного бронхита с нормативными значениями ЖЕЛ с- 76,4% до 98,7%, ФЖЕЛ с -51,4% до 82,3% , ОФВ1- с 52,3% до 93,1%, ИТ- 64,5% до 89%, ПОС с 61,2% до

The Peerian Journal
Open Access | Peer Reviewed
Volume 37, December 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

94,1%, МОС-75 с 65,9% до 92,2% и МВЛ в среднем с 27,2л до 46,3 л. У детей с РОБ наблюдалось уменьшение количества госпитализаций, частоты рецидива бронхиальной обструкции и длительности обострений , снизились дозы или была отмена применяемых препаратов в период восстановления. Результаты исследований показали, что использование кинезиотерапия у больных с РОБ перенёсших COVID-19 повышает функциональные возможности дыхательной системы и дает положительный эффект в реабилитации.
Ключевые слова: дети, бронхит, обструкция, реабилитация, кинезиотерапия, спирометрия

Introduction

Respiratory diseases are prevalent in early childhood pathology, significantly affecting infant mortality, causing persistent deviations in children's health, and representing one of the most pressing issues in modern pediatrics. Due to the difficulty of early diagnosis, long remission periods, and ineffective anti-relapse treatment, recurrent bronchitis with bronchial obstruction syndrome (BOS) has become widespread in recent years. The high interest of scientists and practitioners in recurrent bronchial obstruction (RBO) in children is associated with the frequent recurrent course and transition of the disease to a chronic form, particularly bronchial asthma (BA) [2,7]. Studies have shown that the immunological, functional, and anatomical immaturity of the child's body, along with a wide range of possible pathogens, contribute to the high frequency of respiratory diseases, diagnosed in approximately 20, 40, and 10 per 1000 children aged <1 year, preschool, and adolescence, respectively (Shamsiev F.M., Mirsalikhova N.Kh. 2015).

Recurrent (relapsing) bronchial diseases are a medical and social problem caused by untimely treatment during relapses and a protracted course of the disease. Therefore, early diagnosis, improved therapy, proper rehabilitation, and prevention of chronic inflammation in the bronchi are crucial for reducing its prevalence and improving the prognosis and quality of life of affected children.Rehabilitation of children with bronchopulmonary pathology (BLP) who have had COVID-19 is a primary concern in modern pediatrics. During rehabilitation, it is essential to follow the basic principles of drug rehabilitation and maximize the use of non-drug restorative treatments. Currently, the main focus of non-drug methods for treating BLP is training the respiratory system, which is underutilized in healthcare institutions. Almost all patients with BLP require comprehensive rehabilitation, especially those with chronic obstructive pulmonary disease, asthma, and protracted forms of RB. This underscores the need to enhance the effectiveness of non-drug rehabilitation measures with an individualized approach [5,8].Pulmonary function testing using spirometry is the preferred initial test to assess the presence and severity of airway obstruction [6]. Spirometry is a reliable method for diagnosing bronchial diseases and chronic obstructive pulmonary diseases (S.E. Tsyplenkova, Yu.L. Mizernitsky, 2015). Some scientists and practitioners have studied the effect of KT on respiratory function in children with bronchial asthma. Yashchuk A.V. and Yezhov S.N. provided a pathogenetic justification for kinesiotherapy at the stage of long-term rehabilitation of children with bronchial asthma (BA). Their studies showed that KT training reduces bronchial inflammation and increases respiratory function indices (FER) [10]. Other authors studied spirography indices in children with recurrent bronchitis after thermal exposure to ENT organs with low-frequency ultrasound and a magnetic field with inhalation of an oxygen mixture.

The Peerian Journal
Open Access | Peer Reviewed
Volume 37, December 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

Therefore, KT should be considered a method of pathogenetic therapy, as it involves physiological mechanisms in the general reaction of the body. The LFK method increases the body's adaptation to hypoxia and the effects of hardening, which are necessary for bronchial diseases.

Objective

The objective of our work was to analyze the effectiveness of kinesiotherapy in the rehabilitation of children with recurrent bronchial obstruction who have had COVID-19 by conducting spirometry.

Materials and Methods

To achieve our objective, we set the following tasks: determining the clinical and anamnestic parameters of the examined children, effectively implementing a six-month kinesiotherapy (KT) program considering spirometry parameters, and conducting a comparative analysis of forced vital capacity (FVC) in children with recurrent obstructive bronchitis (ROB) who have had COVID-19 before and after comprehensive rehabilitation with the inclusion of KT.We conducted a study involving 67 children aged 7 to 15 years admitted for inpatient treatment with a diagnosis of "Obstructive bronchitis, recurrent course" (ROB). Inpatients received traditional drug treatment and physiotherapy, including UHF, medicinal electrophoresis, and inhalations. On the 2nd day of fasting, initial indicators of respiratory function (ERF) were determined for children with ROB during an exacerbation of their hospitalization.The diagnosis in patients with recurrent bronchitis (RB) was established considering family and allergological history, clinical and laboratory data, in accordance with the "Classification of clinical forms of bronchopulmonary diseases in children," adopted at a symposium of pediatricians to improve the classification of non-specific lung diseases in children and ICD-10.The children with ROB were divided into two groups: the experimental group (EG) consisting of 37 patients who underwent a six-month course of complex rehabilitation with the effective inclusion of KT under the supervision of parents and exercise therapy specialists, and the comparison group (CG) of 30 children of the same age with ROB who received traditional recommendations upon discharge. Upon discharge, children in the EG were given recommendations for complex rehabilitation and KT over the next six months. Parents of the EG and CG were notified to bring their children back in six months for a clinical and functional study. To analyze FVC disorders in the examined children, spirography was performed using the Neurosoft spirometer initially on days 1-2 of the hospital stay and six months after the recovery period. The main indicators analyzed in the obtained spirograms included: vital capacity of the lungs (VC), forced vital capacity of the lungs (FVC), forced expiratory volume in the first second (FEV1), Tiffeneau index (FEV1/VC), peak expiratory flow rate (PEF), instantaneous volumetric air velocity (MVAV) at levels of 25% to 75% of the FVC volume (MVAV25-75), and maximum voluntary ventilation (MVL).

The patients in the experimental group followed a kinesiotherapy program which included: 1) general developmental breathing morning exercises in the open air (or in a ventilated room), 2) exercise therapy with elements of track and field and game sports 2-3 times a week, and 3) swimming with special recommended elements (butterfly, backstroke, breaststroke, front crawl, underwater exercises with breath-holding, diving, lifting objects from the pool bottom, scuba diving) 2-3 times a week. The training was conducted for six months to one year in exercise therapy classes at city sports facilities and water sports bases in Tashkent 2-3 times a week for 1-1.5 hours. All these children adhered to the standard treatment regimen in the hospital and drug therapy with individual correction during the rehabilitation period. During the six-month KT

The Peerian Journal
Open Access | Peer Reviewed
Volume 37, December 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

program, clinical and anamnestic studies of children with ROB included data on the duration of exacerbations, the frequency of relapses of bronchial obstruction, the number of hospitalizations, the incidence of acute respiratory viral infections, the duration and volume of drugs used, and maximum ventilation of the lungs.

Results and Discussion

We obtained clinical and anamnestic characteristics of 67 children with RB, occurring with bronchial obstruction syndrome (BOS), at the time of admission to the multidisciplinary clinic №1 in Tashkent. These children were characterized by a short disease duration of 1-2 years. The criteria for including children in the RB group were: a history of at least 2-3 episodes of bronchial obstruction (BO) over the past two years, a duration of an episode of bronchitis of two weeks or more, the presence of a mandatory cough symptom, and at least one additional symptom such as sputum, physical changes (hard breathing, the presence of wheezing), catarrh of the upper respiratory tract, and increased body temperature. RB in the examined group presented in mild to moderate severity in 76.4% of cases without BOS, while 23.5% had a more severe course with obstruction.

Upon examining the children, it was found that the majority of patients with both acute and recurrent bronchitis were aged 3 to 7 years. This age range is based on the characteristics of the respiratory and immune systems, which are largely associated with their development and maturation processes. At the age of 1-6 years, a reorientation of the immune response to infectious antigens occurs, leading to high sensitivity to infections. Additionally, in children of the first years of life, the processes of differentiation of bronchopulmonary structures are intensively occurring, which determines the vulnerability of the respiratory tract. The biocenosis of the upper respiratory tract in young children is also in the process of formation, and the microbial landscape is very unstable and polymorphic, depending on the environment and changing with the child's age [7,9]. On the 1st-2nd day of hospital stay, an initial spirometric study (study 1) was performed to determine FVC and analyze the activity of the inflammatory process in the respiratory tract in children with ROB. After six months of comprehensive rehabilitation with the inclusion of KT, a second analysis of FVC indicators was performed in these children (study 2). The initial studies in children with RBO during spirometry showed signs of impaired respiratory function (ERF), characteristic of broncho-obstructive syndrome. This condition may be due to edema of the bronchial mucosa, hypersecretion of mucus, impaired rheological properties of bronchial secretion, and desquamation of bronchial epithelial cells. These factors, along with a decrease in the drainage function of the bronchi, lead to a narrowing of the bronchial lumen, i.e., their obstruction. The results of the spirographic study correlated with the clinical examination findings, where diffuse, non-constant large- and medium-sized bubbling rales were heard during auscultation. In some patients, along with wet rales, dry but not wheezing rales were heard, indicating pronounced changes in the rheological properties of bronchial secretions. In the general group of children studied (72 patients), respiratory failure was manifested by a decrease below 80% of the expected FEV1, maximum volume velocities, and FEV1/FVC ratio. Moderate violations of MEF50 and MEF25 were determined in 53 (73.6%) children with RBO. According to the indicators, moderate violations of MVL were noted in 26 (36.1%), FVC and POS in 1/3 of patients with RBO. Moderate violations of bronchial patency, i.e., a decrease in IT to 55%, were observed in 12 (16.6%) patients. Higher violations of bronchial patency, i.e., a decrease in IT from 54 to 40%,

The Peerian Journal
Open Access | Peer Reviewed
Volume 37, December 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

were noted in 16 (22.2%) patients. Moderate MEF75 indicators in children with RBO were observed in 19 (26.4%) of the examined.

Obstructive type of ventilation disorders was observed in 38 (52.8%) patients, restrictive type in 7 (9.7%), and mixed type in 27 (37.5%) patients with RBO. The obstructive type of ventilation disorders was characterized by a reduced FEV1/FVC ratio with normal (or reduced) FVC.

Table 1 presents the average values of spirometric indices from the expected values before and after KT in children with ROB. After the six-month rehabilitation course, both the experimental and comparison groups showed a reliable positive effect. In the EG, during comprehensive rehabilitation with the inclusion of KT, an increase in the number of children with ROB with normative values of VC from 76.4% to 98.7% ($p < 0.05$), FVC from 51.4% to 82.3% ($p < 0.001$), FEV1 from 52.3% to 93.1% ($p < 0.001$), IT from 64.5% to 89.4% ($p < 0.001$), POS from 61.2% to 94.1% ($p < 0.001$), MOS-75 from 65.9% to 92.2% ($p < 0.001$), MOS-50 from 58.1% to 96.7% ($p < 0.001$), MOS-25 from 53.5% to 89.4% ($p < 0.001$), and the average MVL increased from 27.2 L to 46.3 L ($p < 0.05$). As shown in the table, after six months of rehabilitation, children with RBO showed a gradual recovery of FVC. In the group of patients with ROB, spirometry indicators showed a statistically significant increase in the number of patients with normal values of FVC from 57.3% to 76.2% ($p < 0.001$), FEV1 from 58% to 78.4% ($p < 0.001$), POS from 48.8% to 75.6% ($p < 0.001$), MOS-75 from 61.2% to 80.3% ($p < 0.001$), and MVL from 23.6 L to 42.1 L ($p < 0.05$). In the control group of patients with RBO, it was noted that after six months of rehabilitation, the FVC, FEV1, and FEV1/FVC ratio increased insignificantly. In some patients of both groups, changes in the POS did not have a stable trend, which can be explained by irregular training. Spirometry showed that for children with ROB, the largest number of cases belonged to the obstructive type of ventilation disorders.

A comparative analysis of spirometric indicators revealed that in children with recurrent obstructive bronchitis, a comprehensive six-month rehabilitation program with regular inclusion of KT had a positive effect

Table 1: Comparative analysis of spirometric parameters in children with ROB and COVID-19 survivors before and after kinesiotherapy (KT), % of expected values

Patient Groups	Time of the Event	VC	FVC	FEV1	FEV1/VC	POS	MOS25	MOS50	MOS75
I gr (37 children)	**Original**	76.4 ± 4.2	51.4 ± 2.8	52.3 ± 2.3	64.5 ± 5.1	61.2 ± 2.1	53.5 ± 2.4	58.1 ± 2.8	65.9 ± 5.2
	In 6 months	98.7 ± 3.4	82.3 ± 5.4	93.1 ± 4.3	89.4 ± 3.7	94.1 ± 1.6	89.4 ± 4.3	96.7 ± 3.2	92.2 ± 4.1
	R1	P < 0.05	P < 0.001	P < 0.001	P < 0.05	P < 0.001	P < 0.001	P < 0.001	P < 0.05
II gr (30 children)	**Original**	78.0 ± 2.1	57.3 ± 1.8	58.0 ± 2.8	61.8 ± 4.5	48.8 ± 2.3	59.6 ± 2.1	57.3 ± 2.1	58.0 ± 4.3

The Peerian Journal
Open Access | Peer Reviewed
Volume 37, December 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

	In 6 months	81.6 ± 3.2	76.2 ± 4.3	78.4 ± 2.3	73.6 ± 3.0	75.6 ± 2.4	73.4 ± 3.1	76.1 ± 4.3	80.3 ± 2.1
	R2	-	P < 0.05	P < 0.001	-	P < 0.001	-	-	P < 0.001

- **R1**: Statistical significance for the Experimental Group
- **R2**: Statistical significance for the Comparison Group

Note: P1 - reliable differences between the initial and 6 months in the experimental group (EG); P2 - reliable differences between the initial and 6 months in the comparison group (CG).

The clinical and anamnestic data of the study in the EG of patients with ROB after a six-month course of rehabilitation measures with the inclusion of KT showed a decrease in the number of relapses, admissions for inpatient treatment, the frequency of exacerbations, and the dose and discontinuation of the drugs used. Additionally, the incidence of ARVI in the following years sharply decreased. The results of our study showed that the effects of physical training in the kinesiotherapy program reduce the number of cases of intercurrent ARI and the frequency of exacerbations of recurrent bronchitis. After a year of training, the incidence of ARVI in children with ROB decreased by 2.5 times, the number of attacks of broncho-obstruction by 2.3 times, the duration of exacerbations by 2.1 times, and the need for bronchodilators by 3.6 times.Thus, the results of our study showed positive outcomes from the effective use of kinesiotherapy in the recovery period of children with ROB. Spirometry allows us to identify violations of the ventilation function of the lungs and diagnose obstruction of the upper respiratory tract in inflammatory diseases of the bronchi.

Conclusion

Studies have shown that the use of kinesiotherapy in patients with RBO who have had COVID-19 during the recovery period increases the functional capabilities of the respiratory system. During the recovery period, positive clinical dynamics were noted in children with RBO, including a decrease in cough, its productive nature, the disappearance of dyspnea under load, and a decrease in the number of wheezing over the lung fields, recorded in parallel with an improvement in FVD indicators.The kinesiotherapy program reduced the incidence of intercurrent ARI and the frequency of exacerbations of recurrent bronchitis. After six months of comprehensive rehabilitation measures, including KT, in children with ROB who had COVID-19, the incidence of ARI, the number of relapses, the duration of exacerbations, and the need for drug therapy decreased.

In the experimental group, the comprehensive rehabilitation with the inclusion of KT showed an increase in the number of children with ROB with normative values of VC from 76.4% to 98.7% ($p<0.05$), FVC from 51.4% to 82.3% ($p<0.001$), FEV1 from 52.3% to 93.1% ($p<0.001$), IT from 64.5% to 89.4% ($p<0.001$), POS from 61.2% to 94.1% ($p<0.001$), MOS-75 from 65.9% to 92.2% ($p<0.001$), MOS-50 from 58.1% to 96.7% ($p<0.001$), MOS-25 from 53.5% to 89.4% ($p<0.001$), and MVL on average from 27.2 L to 46.3 L.Therefore, the obtained data indicate that kinesiotherapy in patients with recurrent obstructive bronchitis improves the functional indices of the bronchopulmonary system, complementing the data on the therapeutic and prophylactic effects of regular physical training.

The Peerian Journal
Open Access | Peer Reviewed
Volume 37, December 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

References

1. Georgieva, N.G. Efficiency of using kinesitherapy in correcting the functional state of the body of students of a special medical group. // Man. Sport. Medicine. - 2016. - Vol. 16, No. 3. - P. 60-66. DOI: 10.14529/hsm160307
2. Davidenko E.V. Prediction of development of bronchial asthma in children who suffered from acute obstructive bronchitis at an early age. // Scientific News.- 2014.- No. 4 (175). - Issue 25. - P. 89-91.
3. Zakirova U.I., Karimzhanov I.A. Method of complex rehabilitation of children with recurrent bronchitis. Methodical recommendations. Tashkent. 2020. 62 p.
4. Krasavina E.S., Alekseeva S.I. Physical rehabilitation of children aged 6-9 years with bronchial asthma by means of adaptive physical culture. // Physical culture. Sport. Tourism. Motor recreation. - 2018. - Vol. 3, No. 1. - P. 58-62.
5. Lunina M.D., Nikiforov V.S., Yakovleva N.G., Baluster N.S. Current issues in the clinical use of spirometry. // Archive of Internal Medicine. S.P. -2016. - No. 6. - P. 19-24.
6. Nesterenko Z.V. Recurrent bronchitis as a clinical variant of functional changes in the respiratory system in children. // Pediatrician.- 2017.- Vol. 8.- No. 5.- P. 44-48.
7. Yashchuk A.V., Yezhov S.N., Gvozdenko T.A. Pathogenetic substantiation of kinesitherapy at the stage of long-term rehabilitation of children with bronchial asthma. // Bulletin of Physiology and Pathology of Respiration. - 2014. - Issue 54. - P. 42-47.
8. Karimdzhanov I.A, Zakirova U.I, Sodikova N.B., “Rehabilitation measures in children with recurrent forms of bronchitis in outpatient conditions.” eurasian journal of medical and natural sciences innovative academy research support center uif = 8.3 | sjif = 5.995 www.in-academy.uz page 193-199
9. Закирова У.И., Содикова Н.Б Научно- патогенетическое обоснование подходов к физической реабилитации детей с рецидивирующим бронхитом, Инфицированных короновирусом (covid-19) tibbiyotda yangi kun.buxoro. Received: 10.09.2023, accepted: 20.09.2023, published: 10.10.2023.удк 616.233-0026:616-036.82 :616-053.2.10(60)2023