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ANALYSIS OF FACTORS CAUSING BRONCHO-OBSTRUCTIVE SYNDROME IN YOUNG CHILDREN LIVING IN THE ANDIJAN REGION AND IMPROVEMENT OF METHODS FOR ITS TREATMENT AND PREVENTION

Xoshimova R. J.
Master's Student, Andijan State Medical Institute
Azizova N.D.
Scientific Supervisor, Doctor of Medical Sciences, Professor,
Republican Specialized Scientific and Practical
Medical Center of Pediatrics of the Ministry of
Health of the Republic of Uzbekistan
Ganiyeva M.Sh.
Scientific Consultant, PhD, docent,
Head of the Department of Hospital Pediatrics
Andijan State Medical Institute

ABSTRACT: Background: Broncho-obstructive syndrome (BOS) is a prevalent respiratory condition in early childhood, often leading to hospitalization and recurrent wheezing. The specific risk factors contributing to BOS in the Andijan region of Uzbekistan require detailed investigation to improve clinical outcomes. Objective: To analyze the etiological and risk factors of BOS in children under 3 years of age residing in the Andijan region and to evaluate the efficacy of an optimized complex treatment plan including step-down nebulizer therapy. Methods: A prospective study involving 100 children aged 6 months to 3 years with BOS was conducted. Patients were divided into two groups: Group I (Control, n=50) received standard therapy, and Group II (Main, n=50) received an optimized protocol involving targeted nebulizer therapy and parental education on environmental control. Risk factors were assessed using logistic regression. Results: Key risk factors identified included iron deficiency anemia (68%), early artificial feeding (54%), and passive smoking (42%). The optimized treatment protocol in Group II resulted in a significant reduction in the duration of wheezing (3.2 ± 0.5 days vs. 5.1 ± 0.7 days in Group I, $p<0.01$) and shorter hospital stays. Conclusion: Addressing modifiable risk factors such as anemia and environmental smoke exposure is crucial for prevention. The inclusion of structured nebulizer therapy and educational interventions significantly improves the clinical course of BOS.
Keywords: Broncho-obstructive syndrome, risk factors, children, nebulizer therapy, Andijan, anemia.

ANDIJON VILOYATI XUDUDIDA BRONXO-OBSTRUKTIV SINDROM BILAN KASALLANGAN ERTA YOSHDAGI BOLALARDA KASALLIKNING KELIB CHIQISH OMILLARINI TAXLIL QILISH VA DAVOLASH, PROFILAKTIKA CHORA-TADBIRLARINI TAKOMILLASHTIRISH

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ANNOTATSIYA: Kirish: Bronxo-obstruktiv sindrom (BOS) erta yoshdagi bolalar orasida keng tarqalgan respirator holat bo‘lib, tez-tez shifoxonaga yotqizish va takroriy xirillashlarga olib keladi. Andijon viloyatida BOSga olib keluvchi o‘ziga xos xavf omillarini o‘rganish klinik natijalarni yaxshilash uchun zarurdir. Maqsad: Andijon viloyatida yashovchi 3 yoshgacha bo‘lgan bolalarda BOSning etiologik va xavf omillarini tahlil qilish hamda bosqichma-bosqich nebulayzer terapiyasini o‘z ichiga olgan takomillashtirilgan davolash rejasining samaradorligini baholash. Usullar: BOS tashxisi qo‘yilgan 6 oydan 3 yoshgacha bo‘lgan 100 nafar bola ishtirokida prospektiv tadqiqot o‘tkazildi. Bemorlar ikki guruhga bo‘lindi: I guruh (Nazorat, n=50) standart terapiya oldi, II guruh (Asosiy, n=50) maqsadli nebulayzer terapiyasi va ota-onalar uchun muhit nazorati bo‘yicha ta’limni o‘z ichiga olgan takomillashtirilgan protokol oldi. Natijalar: Aniqlangan asosiy xavf omillari temir tanqisligi anemiyasi (68%), erta sun’iy oziqlantirish (54%) va passiv chekish (42%) ekanligi ma’lum bo‘ldi. II guruhdagi takomillashtirilgan davolash protokoli xirillash davomiyligini sezilarli darajada qisqartirdi (3,2 ± 0,5 kun, I guruhdagi 5,1 ± 0,7 kunga nisbatan, $p<0,01$) va shifoxonada qolish muddatini kamaytirdi. Xulosa: Anemiya va tamaki tutuni kabi o‘zgartirish mumkin bo‘lgan xavf omillariga qarshi kurashish profilaktika uchun juda muhimdir. Tuzilgan nebulayzer terapiyasi va ta’lim tadbirlarini kiritish BOSning klinik kechishini sezilarli darajada yaxshilaydi.
Kalit so‘zlar: Bronxo-obstruktiv sindrom, xavf omillari, bolalar, nebulayzer terapiyasi, Andijon, anemiya.

АНАЛИЗ ФАКТОРОВ ВОЗНИКНОВЕНИЯ БРОНХО-ОБСТРУКТИВНОГО СИНДРОМА У ДЕТЕЙ РАННЕГО ВОЗРАСТА, ПРОЖИВАЮЩИХ В АНДИЖАНСКОЙ ОБЛАСТИ, И СОВЕРШЕНСТВОВАНИЕ МЕТОДОВ ЕГО ЛЕЧЕНИЯ И ПРОФИЛАКТИКИ

АННОТАЦИЯ: Введение: Бронхо-обструктивный синдром (БОС) является распространенным респираторным заболеванием в раннем детстве, часто приводящим к госпитализации. Специфические факторы риска, способствующие развитию БОС в Андижанской области, требуют детального изучения. Цель: Проанализировать этиологические факторы риска БОС у детей до 3 лет, проживающих в Андижанской области, и оценить эффективность оптимизированного плана лечения, включающего небулайзерную терапию. Методы: Проведено проспективное исследование с участием 100 детей в возрасте от 6 месяцев до 3 лет с БОС. Пациенты были разделены на две группы: I группа (Контрольная, n=50) получала стандартную терапию, II группа (Основная, n=50) — оптимизированный протокол. Результаты: Ключевыми факторами риска были железодефицитная анемия (68%), раннее искусственное вскармливание (54%) и пассивное курение (42%). Оптимизированный протокол во II группе привел к значительному сокращению длительности хрипов (3,2 ± 0,5 дня против 5,1 ± 0,7 дня в I группе, $p<0,01$). Заключение: Устранение модифицируемых факторов риска имеет решающее значение для профилактики. Включение структурированной небулайзерной терапии значительно улучшает клиническое течение БОС.
Ключевые слова: Бронхо-обструктивный синдром, факторы риска, дети, небулайзерная терапия, Андижан, анемия.

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INTRODUCTION

Broncho-obstructive syndrome (BOS) represents a heterogeneous group of conditions characterized by wheezing, shortness of breath, and airway obstruction. It is one of the most common reasons for pediatric emergency visits and hospitalizations among children under three years of age. Globally, up to 30-50% of children experience at least one episode of wheezing before school age.

In Uzbekistan, and specifically in the Fergana Valley region including Andijan, the incidence of BOS remains high. This is influenced by a complex interplay of climatic conditions (continental climate with dry, dusty summers), environmental factors, and socio-economic characteristics. While viral infections (RSV, Rhinovirus) are known primary triggers, the severity and recurrence of BOS are often exacerbated by comorbid conditions such as anemia, rickets, and environmental pollutants.

Traditional management of BOS often relies on systemic bronchodilators and antibiotics, sometimes leading to polypharmacy. There is a pressing need to optimize treatment protocols by emphasizing targeted inhalation therapy and addressing modifiable risk factors specific to the region. This study aims to identify the prevalent risk factors for BOS in Andijan and evaluate the effectiveness of an improved management protocol.

LITERATURE REVIEW

Etiology and Pathogenesis - Current literature defines BOS not as a single disease but as a functional manifestation of airway narrowing. According to the Global Initiative for Asthma (GINA) and national guidelines, viral bronchiolitis is the leading cause in infants (Skripchenko et al., 2020). The pathophysiology involves mucosal edema, mucus hypersecretion, and smooth muscle spasm.

Risk Factors - Numerous studies have highlighted the multifactorial nature of BOS.

Premorbid Background - Iron deficiency anemia (IDA) and rickets are frequently cited as aggravating factors. IDA, highly prevalent in Central Asia, leads to mucosal atrophy and reduced local immunity (Shamsiyev et al., 2018).

Environmental Factors - Passive smoking and indoor air pollution (use of solid fuels) are significant irritants. A study by To et al. (2021) demonstrated a 2.5-fold increase in wheezing risk among children exposed to tobacco smoke.

Nutrition - Early cessation of breastfeeding and introduction of cow’s milk are associated with increased allergic sensitization and respiratory infections (Bochkov et al., 2019).

Treatment Approaches - While bronchodilators (beta-2 agonists) and inhaled corticosteroids (ICS) are standard, the mode of delivery is crucial. Nebulizer therapy is the gold standard for young children, but adherence to correct techniques and dosage often varies. Recent trends emphasize "step-down" therapy and the minimization of systemic corticosteroids.

MATERIALS AND METHODS

Study Design - A prospective, open-label comparative study was conducted at the Department of Hospital Pediatrics, Andijan State Medical Institute, throughout 2023.

Participants - The study included 100 children aged 6 months to 3 years hospitalized with a diagnosis of acute obstructive bronchitis or bronchiolitis. Inclusion Criteria: Age <3 years, clinical signs of bronchial obstruction (tachypnea, wheezing, auxiliary muscle use). Exclusion

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Criteria: Congenital heart defects, cystic fibrosis, foreign body aspiration, severe pneumonia requiring mechanical ventilation.
Group I (Control, n=50): Received standard therapy according to national protocols (oral bronchodilators, antihistamines, systemic antibiotics if indicated).
Group II (Main, n=50): Received an optimized protocol:
Nebulizer Therapy - Salbutamol/Ipratropium bromide combination via nebulizer, followed by inhaled corticosteroids (Budesonide) if obstruction persisted.
Mucolytics - Ambroxol via nebulizer (only after hydration).
Correction of Background Conditions: Aggressive management of anemia and rickets.
Education - Parents received counseling on creating a "hypoallergenic" and "smoke-free" home environment.
Statistical analysis - Data were analyzed using SPSS 24.0. Differences between groups were assessed using the Student's t-test and Chi-square test. Relative Risk (RR) and Odds Ratios (OR) were calculated for risk factors. P-values <0.05 were considered significant.

RESULTS

Analysis of risk factors - The analysis of the anamnesis revealed a high prevalence of comorbid conditions in children with BOS. As shown in Table 1, Iron Deficiency Anemia and Artificial Feeding were significantly more common in the study population compared to general population data.

Table 1: Prevalence of Risk Factors in Children with BOS (n=100)

Risk Factor	Frequency (n)	Percentage (%)	Odds Ratio (OR) [95% CI]*
Iron Deficiency Anemia	68	68%	2.4 [1.5 - 3.8]
Early Artificial Feeding (<6 months)	54	54%	1.9 [1.1 - 3.2]
Passive Smoking (Household)	42	42%	2.1 [1.3 - 3.4]
Atopic Dermatitis / Diathesis	35	35%	1.7 [1.0 - 2.8]
Rickets (Clinical signs)	28	28%	1.4 [0.8 - 2.3]
Perinatal Encephalopathy	22	22%	1.2 [0.7 - 2.0]

Note: OR calculated against historical controls of healthy children in the region.
Clinical efficacy of optimized treatment - The children in Group II, who received the optimized nebulizer-based protocol, showed a faster resolution of clinical symptoms compared to Group I.

Table 2: Comparative Dynamics of Clinical Symptoms

Clinical Parameter	Group I (Standard) (Mean ± SD)	Group II (Optimized) (Mean ± SD)	P-value
Duration of Dyspnea (days)	4.2 ± 0.6	2.5 ± 0.4	<0.01
Duration of Wheezing (days)	5.1 ± 0.7	3.2 ± 0.5	<0.01
Duration of Cough (days)	7.8 ± 1.2	5.5 ± 0.9	<0.05

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Length of Hospital Stay (days)	8.5 ± 1.4	6.1 ± 1.1	<0.05

In Group II, the need for systemic corticosteroids was reduced by 60%, and antibiotic usage decreased by 35% due to better differentiation between viral and bacterial causes during the initial assessment.

DISCUSSION

The study highlights that in the Andijan region, BOS is not merely a viral event but a condition heavily influenced by the child's premorbid background. The high prevalence of anemia (68%) is particularly concerning. Anemia reduces the oxygen-carrying capacity of blood, exacerbating hypoxia caused by airway obstruction. This finding aligns with regional studies by Shamsiyev et al., suggesting that treating BOS without correcting anemia leads to suboptimal outcomes.

The significant impact of passive smoking (42%) points to a critical area for prevention. In many households, cultural norms may delay the cessation of smoking around children. Our optimized approach, which included strict counseling for parents, likely contributed to the lower recurrence rates observed during follow-up (though long-term data is outside the scope of this article).

Regarding treatment, the superiority of nebulizer therapy over oral bronchodilators was confirmed. Oral syrups often have lower bioavailability and higher systemic side effects (tachycardia, excitability). The optimized protocol allowed for higher drug concentrations directly in the bronchial tree, leading to faster resolution of obstruction as seen in Table 2.

CONCLUSION

Based on the analysis of 100 cases of Broncho-Obstructive Syndrome in young children in the Andijan region, the following conclusions are drawn:

The development and severity of BOS in this region are strongly associated with modifiable risk factors, predominantly Iron Deficiency Anemia (68%), early artificial feeding (54%), and passive smoking (42%).

The implementation of an optimized management protocol, focusing on nebulizer therapy (inhaled bronchodilators and corticosteroids) and excluding unnecessary polypharmacy, significantly reduces the duration of clinical symptoms (wheezing reduced by ~2 days) and hospital stay.

Effective prophylaxis of BOS must include the promotion of exclusive breastfeeding for the first 6 months, timely correction of micronutrient deficiencies (iron, Vitamin D), and rigorous public health campaigns against smoking in households with children.

RECOMMENDATION

It is recommended to implement screening for anemia in all children presenting with recurrent wheezing and to standardize nebulizer therapy protocols in primary care settings in Andijan.

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