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Bronchiolitis and its Different Ways of Management in Raparin Teaching Hospital, Erbil-Iraq

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Abstract

Background: Despite the prevalence, global impact, financial burden, and mortality and morbidity related to bronchiolitis, clinical management still seems to be difficult.

Objective: To describe the diversity medical treatment options used to manage bronchiolitis and conclude the safest and most effective way to treat it in order to help the development of an evidence based treatment protocol at Raparin teaching hospital.

Patients and Methods: This current study design was randomized controlled trial, in which total of 125 children presented with bronchiolitis enrolled in our study, we divided them into five groups (A, B, C, D and E), each of 25 cases. All the groups received supportive treatment in the form of oxygen and intravenous (IV) fluid in addition to specific treatment except group A subjects who received supportive treatment only. The treatments were The study was conducted at the inpatient wards of Raparin teaching hospital in Erbil city-Iraq, from the period of 1st January to 1st August 2022. The infants and children's age was ranging from 1 to 60 months with clinical diagnosis of bronchiolitis.

Results: There was non-significant statistical association between treatment groups and presence of wheeze after treatment (p:0.538), while statistically significant association between various treatment modalities (groups) and cough after treatment (p:0.006) in the same way the association was significant with accessory muscle use after treatment (p:0.037).

Conclusion: Generally patients in groups B (inhaled bronchodilator) and D (inhaled bronchodilator and intravenous steroids) had better response rates in terms of cough, accessory muscle use, respiratory rate (tachypnea), time to resolution of fever and coryza, duration of IV fluid therapy, oxygen therapy and hospital stay. Which conclude using of inhaled bronchodilator and IV steroid

Keywords: Bronchiolitis, Wheeze, Treatment, Randomized clinical trial, Iraq

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Introduction

Infants who have a lower respiratory tract infection frequently develop bronchiolitis, which was caused by an inflammatory obstruction of the tiny airways [1]. Bronchiolitis epidemics occur annually [2, 3] can occur in late autumn, particularly from November and April, winter, or spring and can continue up to five months in kids younger than two years old [4-6]. In tropical climes, the incidence is less seasonal but focused during the raining season [7]. Even if various maxima occurred in tropical regions,

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the disease was dynamic and it is clinical symptoms can alter fast. The first medical report provided by John Eberle of severe bronchiolitis in 1850. He defined it as "a catarrhal effect in children younger than one year, followed by respiratory failure, coughing, and wheezing, comparable to an asthma symptoms " [8].

The exact age range in which Bronchiolitis most common was unknown [9]. Children suffering for wheezing between the ages of twelve and twenty-four months may be at a greater risk for suffering of asthma, with distinct pathophysiology and prognosis [10]. Despite the prevalence, global impact, financial burden, and mortality and morbidity related to bronchiolitis, clinical management still seems to be difficult. Supportive care is the cornerstone of present therapy as several therapeutic approaches (containing bronchodilator and corticosteroid medications) demonstrated little efficacy in pooled meta studies [11]. Like other lung viral diseases, males may be at higher risk of developing serious breathing syncytial virus bronchiolitis than girls [12]. Possible causes include variations in lung and airway function, as well as hereditary factors [13].

Respiratory syncytial viruses (RSV type A and B), rhinoviruses, peoples bocaviruses, metapneumoviruses, enteroviruses, adenoviruses (already known to produce pneumonia and bronchiolitis obliterans), parainfluenza viruses, coronaviruses, mumps, picornaviruses, echoviruses, herpes simplex, mycoplasma pneumoniae may occasionally be associated with bronchiolitis, Edema, necrosis of epithelial cells, cuboidal epithelial cells replacing the ciliated epithelium, peribronchiolar infiltration, luminal blockage, and increased production of mucus, bronchospasm, V/Q mismatch, hypoxia, hyperventilation, air trapping, and atelectasis are the cornerstones of lower respiratory tract inflammatory response. In 3 to 4 days, epithelial cells begin to regenerate; effective regeneration takes approximately two weeks. Bronchitis risk factors include male gender (1.5 times as probable), preterm birth, low infant weight, age 3 months, cyanotic heart disease, chronic lung disease, neuromuscular disorders, abnormalities of the airways, crowded living conditions, tobacco use, lack of breastfeeding, and low socioeconomic status. Reduced airway diameter, collateral ventilation, lung recoil, chest wall stability, pulmonary and respiratory muscle reserve, direct cytopathic impact, and ciliary dysfunction are some of the elements that affect how severe viral bronchiolitis is [8]. Despite the fact that bronchiolitis has been known for a substantial period of time, there are currently very few therapeutic techniques available other than supportive ones, and there is a great deal of debate concerning the most successful treatment care. In 2006, the American Academy of Pediatrics (AAP) published a treatment guideline for bronchiolitis that remains the standard of care today. The AAP guideline is widely implemented, although some clinicians contend that it does not accurately reflect standard practice.

The purpose of this research was to describe the diversity and appropriateness of diagnostic and therapeutic treatments used to manage bronchiolitis in the pediatric department of the Raparin teaching hospital in Erbil, Iraq.

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Patients and Methods

Study design and setting

The study design was randomized controlled trial, in which a total of 125 children presented with bronchiolitis enrolled in our study, we divided them into five groups (A, B, C, D and E), each of 25 cases. The study was conducted at the inpatient wards of Raparin teaching hospital in Erbil City-Iraq, from the period of 1st January to 1st August 2022. The infants and children's age was ranging from 1─ 60 months with clinical diagnosis of bronchiolitis. All the groups received supportive treatment in the form of oxygen and intravenous (IV) fluid in addition to specific treatment except group A subjects who received supportive treatment only. For diagnosis of bronchiolitis there is some important criteria like effectiveness of diagnosis ،efficacy of pharmaceutical therapies for treatment, role of prophylaxis in prevention of bronchiolitis and cost-effectiveness of prophylaxis for management of bronchiolitis [14].

Data were collected using pre-tested questionnaire designed to collect information on characteristics, age, gender, the height and weight of infants, the questionnaire provided questions such as body temperature, family history (first degree relative) having asthma, atopy and tobacco smoking, some of them used kerosene heater indoors while the others did not, according to type of feeding was breast, bottle and mixed , some of children took $\leq$ 4 days and other patients took > 4 days of respiratory symptoms episode of SOB or wheeze were defined as 1st episode and recurrent. The different modalities or groups of treatment were group A who received supportive treatment alone, group B, treated with inhaled bronchodilator, group C had IV steroid as the main corner stone of therapy, group D children treated with IV steroid + inhaled bronchodilator while group E patients received inhaled hypertonic saline. The researcher then followed up the patients and the symptoms and signs of bronchiolitis registered daily encompassing before and after treatment RR, HR, SPO2, presence and duration of noisy breathing (wheeze), accessory muscle (retraction) use and cough, in addition to time to achieve normal sleep and feed, time of resolution of fever and coryza, duration of IV fluid therapy, duration of O_2 therapy finally, duration stay in the hospital. The dose of IV steroid was 0.6 mg/kg/day of dexamethasone in 2-3 divided doses.

Exclusion criteria

Patients with the following conditions were excluded from the study: any child with previous wheezing, patients with congenital heart disease, patients with chronic lung disease, and finally critically ill patients.

Inclusion criteria

Any child presented with signs and symptoms of bronchiolitis within the age limit of 1-60 months, male or female, not having other systematic diseases, admitted to the inpatient wards of the hospital and the parent(s) gave approval to participate in the study.

Statistical Analysis

The data recorded on a specially designed questionnaire, collected and entered in the computer via Microsoft Excel worksheet (Excel 2016) and then analyzed using appropriate data system which is called Statistical Package for Social Sciences (SPSS) version 28 and the results were

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compared between patients with different variables. The results presented as rates, ratio, frequencies, percentages in tables and figures and analyzed using independent t-test, and Chi square tests sample were used and a p-value < 0.05 was consider significant.

Results

Table (1) shows that, there was non-significant statistical association between treatment groups and presence of wheeze after treatment. Most of the patients in all groups still had wheeze after treatment. Chi square test was done and p-value was 0.538.

Table (1): Association between treatment groups and presence of wheeze after treatment

Treatment groups	presence of wheeze after treatment		p-value
	negative	Positive	
Group A	6 (24%)	19 (76%)	0.538
Group B	8 (32%)	17 (68%)	
Group C	3 (12%)	22 (88%)	
Group D	5 (20%)	20 (80%)	
Group E	5 (20%)	20 (80%)	
Total	27 (21.6%)	98 (78.4%)	

Table (2) reveals that, there was statistically significant association between treatment study groups and accessory muscle use after treatment. It was obvious the participants of group D benefited most from the treatment, in (52%) of them the accessory muscles was not used after treatment followed by group B cases in which (32%) of them did not use the accessory muscles after the treatment. Chi square test was done and p-value was significant 0.037.

Table (2): Association between treatment groups and accessory muscle use after treatment

Treatment groups	accessory muscle use after treatment		p-value
	negative	Positive	
Group A	6 (24%)	19 (76%)	0.037
Group B	8 (32%)	17 (68%)	
Group C	3 (12%)	22 (88%)	
Group D	13 (52%)	12 (48%)	
Group E	7 (28%)	18 (72%)	
Total	37 (29.6%)	88 (70.4%)	

Table (3) shows a statistically significant association between various treatment modalities (groups) and cough after treatment. Most (68%) of group B cases did not have cough, almost half (48%) of group D participants were cough free followed by group A and E did not have cough with the same amount (28%) for each. Chi square test was done and p-value was 0.006.

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Table (3): Association between treatment groups and cough after treatment

Treatment groups	Cough after treatment		p-value
	negative	Positive	
Group A	7 (28%)	18 (72%)	0.006
Group B	17 (68%)	8 (32%)	
Group C	6 (24%)	19 (76%)	
Group D	12 (48%)	13 (52%)	
Group E	7 (28%)	18 (72%)	
Total	49 (39.2%)	76 (60.8%)	

Outcomes of Table (4) reveal that, there was non-significant statistical difference in average heart rate after treatment among the five treatment groups. There was statistically non-significant difference in mean SPO2 after treatment among the five treatment groups. There was non-significant statistical difference in mean time to achieve normal sleep and feeding in between the five treatment study groups. ANOVA test was done and p-values were >0.05 for the above mentioned variables. There was statistically significant difference in average respiratory rate (RR) after treatment between the five groups, group B had the lowest RR average (42.36 breath/min) and group D cases also most benefited from the treatment protocol with average RR of 43.84 breath/min (p<0.001). In the same way, a statistically significant difference was observed in average time to resolution of fever and coryza among the five treatment groups, the immediate action showed up in the results of group B,C and A that they recovered immediately after the treatment. ANOVA test performed to show differences among treatment groups and p-value was significant (0.004). There was statistically significant difference in mean duration of IV fluid therapy among the five groups of treatment, group A participants after 1.48 days no longer required IV fluid followed by group B was 1.72 days of duration of IV fluid therapy while the state of group E participants became stable after 3.68 days. ANOVA test was done and p-value was highly significant (<0.001). There was significant statistical difference in mean duration of O_2 therapy among the five treatment groups, group D patients results were healthiest among all of them with (1.88 days) of O2 therapy, group B participants used O_2 for 2.08 days while duration of O_2 therapy among group E cases was 3 days. ANOVA test performed and p-value was 0.003. There was statistically significant difference in average duration stay in the hospital among the five treatment groups, group A treatment receivers stayed the most in the hospital for 3.20 days, followed by group D participants stayed for 2 days while group B cases ended up in the hospital only 0.64 day after the treatment. ANOVA test fulfilled to perceive the difference among the five treatment groups and p-value was highly significant (<0.001).

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Table (4): The difference in numerical parameters for the five treatment groups

		N	Mean	Std. Deviation	p-value
RR after treatment	Group A	25	43.72	8.16	<0.001
	Group B	25	42.36	1.70	
	Group C	25	50.56	7.73	
	Group D	25	43.84	7.02	
	Group E	25	46.48	7.30	
	Total	125	45.39	7.31	
HR after treatment	Group A	25	131.36	19.17	0.060
	Group B	25	136.80	4.76	
	Group C	25	128.16	12.30	
	Group D	25	126.16	11.63	
	Group E	25	128.84	15.01	
	Total	125	130.26	13.72	
SPO2 after treatment	Group A	25	96.24	2.04	0.373
	Group B	25	95.84	3.05	
	Group C	25	95.28	2.33	
	Group D	25	95.76	3.21	
	Group E	25	94.40	5.35	
	Total	125	95.5	3.40	
time to achieve normal sleep and feeding	Group A	25	2.20	1.65	0.074
	Group B	25	1.72	0.980	
	Group C	25	2.52	1.22	
	Group D	25	1.92	1.28	
	Group E	25	2.60	1.11	
	Total	125	2.19	1.29	
time to resolution of fever and coryza	Group A	25	0.24	0.43	0.004
	Group B	25	0	0	
	Group C	25	0	0	
	Group D	25	0.32	0.74	
	Group E	25	0	0	
	Total	125	0.11	0.40	
duration of IV fluid therapy	Group A	25	1.48	0.51	<0.001
	Group B	25	1.72	0.98	
	Group C	25	2.52	1.22	
	Group D	25	1.84	0.68	
	Group E	25	3.68	2.13	
	Total	125	2.25	1.46	
duration of O_2 therapy	Group A	25	2.96	1.24	0.003
	Group B	25	2.08	1.47	
	Group C	25	2.52	1.41	
	Group D	25	1.88	0.88	
	Group E	25	3.00	1.08	
	Total	125	2.49	1.29	

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duration stay in the hospital	Group A	25	3.20	2.95	<0.001
	Group B	25	0.64	0.49	
	Group C	25	1.20	1.65	
	Group D	25	2.00	1.55	
	Group E	25	1.36	1.99	
	Total	125	1.68	2.07	

Discussion

The majority of the time, a diagnosis of bronchiolitis is made based on clinical symptoms, and laboratory tests have a very little role in both therapy and diagnosis. There is agreements between result of present work that shows non-significant effect for wheeze symptom between different treatment groups with reault in this reference . The group of patients who treated with IV steroid + inhaled bronchodilator is strongly interested (52%) and they didn't used accessory muscle. This result was in good agreement with investigation proved that IV steroid + inhaled bronchodilator in well-defined populations have indicated a benefit and their use has become standard practice [15].

Group B of patients for whom inhaled bronchodilator was used for treatment. The percentage of patients was (32%) who didn't need accessory muscles anymore. There is still a lot of debate about the usage of bronchodilator agents. The use of bronchodilator medicines for the treatment of viral bronchiolitis has been the subject of a number of research as well as reviews. Only if there is a proven favorable clinical response to the study using an objective method of assessment, may inhaled bronchodilators be maintained to be used (option) [16]. This two types of management shows hopeful result comparing with other groups of treatment. Inhaled bronchodilators predominately work by modulating activity of receptors of the autonomic nervous system leading to airway smooth muscle relaxation, which relieves bronchospasm.

The study shows significant effect of different modalities (groups) of managements with cough after treatment. This result shows disagreement with Cochrane review [17]. It shows that patients in group B mostly interested and secondly half of those patients who categorized as group D. Patients who received supportive treatment alone and received inhaled hypertonic saline were (18 %) free of cough.

A previous meta-analysis conducted by Flores and Horwitz came to the conclusion that beta-2 agonists had an impact on oxygen saturations and heart rate that was statistically significant but clinically unimportant when they were administered in milder instances and in an outpatient environment. The most recent Cochrane review of 22 trials involving 1428 infants with bronchiolitis who received inhaled bronchodilators reported a significant improvement in overall average clinical score, but found that the treatment had no effect on either pulse oximetry measurements or on the risk of hospitalization. The results in our study emphasize that there is no significant effect between different groups of treatment on patient's heart rate and SPO2. This shows disagreement between our data with their data.

In addition, we compared between 5 groups for feeding and normal sleep. The obtained

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results show non-significant results. There was significant difference in average respiratory rate (RR) after treatment between the five groups, group B had the lowest RR group D cases also most benefited from the treatment protocol with p-value <0.001. In pervious study shows that there is not difference in respiratory rate which indicate disagreement with this study [18].

Patients in groups A,B and C shows immediate action, they recovered immediately from suffering of fever and coryza after treatment. Calculated p-value was 0.004 which is significant between different groups of treatments. Children who have bronchiolitis who are unable to feed themselves effectively due to symptoms such as fever, tachypnea, moderate or severe respiratory distress, bouts of coughing, and upper respiratory secretions benefit greatly from receiving fluids intravenously this require critical intervention. Based on the findings of past research, it seems that IV fluid does not have a substantial impact [19]. There was complete disagreement between their data and our data which confirm significant effect for patients in group A,B and E.

Duration of O_2 therapy and stay in the hospital according to our results shows significant effect among different groups of treatments. The obtained result was in good agreement when compared to past investigations [20].

Conclusions

The patients were divided in five different groups for treatment. Group A who received supportive treatment alone, group B, treated with inhaled bronchodilator, group C had IV steroid as the main corner stone of therapy, group D children treated with IV steroid with inhaled bronchodilator while group E patients received inhaled hypertonic saline. Depending on the study of different parameters for patients categorized for different treatment.

Recommendations

This study calls attention for further researches to define the risk factors of Bronchiolitis and to understand more fully these factors.The Study report ways of management and treatment of bronchodilator and show which treatment is more effective on patients

Source of funding: The current study was funded by our charges with no any other funding sources elsewhere.

Ethical clearance: This study was submitted to the Research Protocol Ethics and Scientific committees of College of Medicine at Hawler Medical University. This study explained for each patient's parents and a verbal consent obtained from them. Confidentiality and anonymity of data ensured.

Conflict of interest: Nil

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التهاب القصيبات الهوائيةومختلف طرق علاجاتها في المستشفى رابرين التعليمي، أربيل/ العراق

ساسان لوقا حنا [١]

الملخص

خلفية الدراسة: على الرغم من انتشار التأثير العالمي ، والعبء المالي ، والوفيات والمراضة المتعلقة بالتهاب القصيبات ، لا تزال الإدارة السريرية لهذا المرض يبدو أنه صعب.

اهداف الدراسة: وصف خيارات العلاج الطبي المتنوعة المستخدمةوإدارة التهاب القصيبات وإبرام أكثر الطرق علاجه أمانًا وفعاليةمن أجل المساعدة في تطوير علاج قائم على الأدلةوالبروتوكول في مستشفى رابرين التعليمي.

المرضى والطرائق: تم اختيار تصميم الدراسة الحالية بشكل عشوائيى تجربة مضبوطة ، حيث أصيب ما مجموعه ١٢٥ طفلاً بالتهاب القصيبات المسجلين في دراستنا ،قسمناهم إلى خمس مجموعات (أ ، ب ، ج ، د وهـ) ، كل ٢٥ حالة. تلقت جميع العلاج الداعم في شكل من أشكال الأكسجين والسوائل الوريدية بالإضافة إلى علاج محدد باستثناء المجموعة أ الأشخاص الذين تلقوا علاجًا داعمًا فقط. الدراسة قد أجريت في أجنحة المرضى الداخليين مستشفى رابرين التعليمي في مدينة اربيل - العراق اعتباراً من ١ كانون الثاني حتى الأول من آب (أغسطس) ٢٠٢٢. تراوحت أعمار الأطفال والرضع من ١ إلى ٦٠ شهرًا مع التشخيص السريري لالتهاب القصيبات.

النتائج: لم تكن هناك علاقة ذات دلالة إحصائية بين العلاج ووجود أزيز(wheeze) بعد العلاج (P: 0.538) بينما احصائيا ارتباط كبير بين طرق العلاج المختلفة (المجموعات) وسعال بعد العلاج (P:0.006) بنفس الطريقة التي كان بها الارتباط مهم مع استخدام العضلات الإضافية بعد العلاج (P: 0.037).

الاستنتاجات: بشكل عام المرضى في المجموعة ب (موسعات الشعب الهوائية المستنشقة) ومجوعة د (استنشاق موسع الشعب الهوائية والستيرويدات الوريدية) كان له استجابة أفضل معدلات من حيث السعال ، واستخدام العضلات الإضافية ، ومعدل التنفس (تسرع النفس) وقت للشفاء من الحمى والزكام ، مدة العلاج السائل الوريدي والعلاج بالأكسجين والإقامة في المستشفى. التي اختتمت استخدام استنشاق موسعات الشعب الهوائية والستيرويد الوريدى.

الكلمات المفتاحية: التهاب القصيبات ، الصفير ، العلاج ، التجارب السريرية العشوائية ،العراق

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تاريخ استلام البحث: ٢٠ تشرين الاول ٢٠٢٢

تاريخ قبول البحث: ٤ كانون الاول ٢٠٢٢

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[١] كلية الطب – جامعة هولير الطبية – اربيل - العراق