

**CONTRIBUTION OF THE RESPIRATORY PHYSIOTHERAPY AND THE NEBULIZATION IN THE BRONCHIOLAR AND TRACHEA-BRONCHIAL PATHOLOGIES OF THE INFANT AND THE LITTLE CHILD**S. Ghissassi<sup>2</sup>, M. A. Radouani<sup>2</sup>, Dr. A. Barkat\*<sup>3</sup> and A. E. L. Hassani<sup>1</sup><sup>1</sup>Hôpital Cheikh Zaid, Université Abulcassis, Maroc.<sup>2</sup>Université Mohammed V, Faculté de Médecine et de Pharmacie, Equipe de Recherche en Santé et Nutrition du Couple Mère-Enfant, Maroc.<sup>3</sup>Centre National de Référence en Néonatalogie et Nutrition, Hôpital d'Enfants, CHU Ibn Sina, Rabat, Maroc.

\*Corresponding Author: Dr. A. Barkat

Centre National de Référence en Néonatalogie et Nutrition, Hôpital d'Enfants, CHU Ibn Sina, Rabat, Maroc.

Article Received on 31/07/2017

Article Revised on 21/08/2017

Article Accepted on 11/09/2017

**ABSTRACT**

**Introduction** The bronchiolar pathology and bronchial trachea are particularly frequent in pediatric environment. Nowadays, the respiratory physiotherapy is more and more prescribed by the pediatricians, that is why it always remains a current issue. The purpose of this study is to compare the efficiency of the respiratory physiotherapy, and the respiratory physiotherapy associated with nebulization in those pathologies. **Materials and methods** This forward-looking study was realized from 1<sup>st</sup> September 2016 to 1<sup>st</sup> February 2017. This study concerns 200 patients, who are 1 month to 3 years old sent for respiratory physiotherapy. Four series are compared, in the first series, the patients benefited from a physiotherapy treatment only. In the second, we associated respiratory physiotherapy and nebulization with the saline solution. In the third, we associated a respiratory physiotherapy and a nebulization with Salbutamol. In the fourth, beside the respiratory physiotherapy, we gave the patients Salbutamol in a form of spray. **Results** The reduction of the respiratory frequency was essentially observed in the 3<sup>rd</sup> session. A clear reduction of the bronchial congestion was noticed in all the series at the end of the sessions. The thixotropy was modified in a notable way in the series 2 and 3; the same observations are made as for the aspect of secretions; as well as a decrease of the abundance of secretions is noted in all the series. **Conclusion** The association of the respiratory physiotherapy and nebulization in Salbutamol showed a beneficial effect in the bronchiolar pathology and trachea-bronchial of the infant and the little child.

**KEYWORDS:** Respiratory physiotherapy, nebulization, bronchiolitis, trachea-bronchial pathology, infant, little child.

**INTRODUCTION**

The bronchiolar pathology and bronchial tracheo are particularly frequent in the pediatric practice. If the respiratory physiotherapy is currently more and more prescribed by physicians paediatricians, it always remains a topical problem and its indication is debated.

In effect, the essential purpose of the respiratory physiotherapy in the child is to ensure the evacuation of the secretions tracheo-bronchial, reduce the resistance in the airways and to improve the gas exchanges, thus reducing the work of breathing.

However, the analysis of the literature found conflicting data. Some studies put in doubt the real effectiveness of the respiratory physiotherapy.<sup>[1]</sup> Also, the use of nebulization of broncho-dilators in infants is still controversial,<sup>[2,3]</sup>

The aim of our study is to compare the effectiveness of the respiratory physiotherapy only and the respiratory physiotherapy associated with spraying (salbutamol, serum-salty) in the bronchiolar pathology and tracheo-bronchiolar of infants and little children.

**MATERIALS AND METHODS**

This prospective study was carried out in consultation of Pneumology on a period of 6 months (September 2016 to february 2017). It has focused on 200 patients aged 1 months to 3 years, have seen for respiratory physiotherapy of airway clearance by physicians paediatricians.

These patients are fitted with a good of respiratory physiotherapy which includes their identification, diagnosis as well as the treatment received; and this in order to be able to follow the evolution of their pathologies.

The patients were divided into 4 groups, randomization was made in such a way that the patients recruited on Monday and Tuesday belong to the first group, Wednesday and Thursday in the second group, Friday and Saturday in the third and Sunday and Monday at the fourth group. Recruitment continued as well up to have 50 patients by groups.

- Group (1): patients treated with respiratory physiotherapy only.
- Group (2): patients treated with associated respiratory physiotherapy and the nebulization salted serum.
- Group (3): patients treated with respiratory physiotherapy and the nebulization of salbutamol.
- Group (4): in this group, in addition to the respiratory physiotherapy, we have given Salbutamol in the form of spray (Spacer device).

During the whole duration of our work, the sick were all treated in the same way and it is only at the end of the study that we have lifted the anonymity. It should be noted that the sick have been followed by the same operators during the duration of the study. The farm contains the constants taken in all patients.

Before the session: the patient installed, we measure the pulse, respiratory rate and the assessment of the degree of congestion.

During the session: we observed the thixotropy of sputum, their appearance as well as their abundance. After the session: it gives the patient a time of rest, then remeasuring the constants.

The number of sessions vary between 1 to 5 or more for some patients. The duration of the meeting is 20 min approximately, it can vary depending on the status of the patient.

For the session of respiratory physiotherapy, we need syringes and physiological serum for the nasal toilet as well as paper handkerchiefs to retrieve the secretions.

The complete apparatus of the nebulization consists of an air compressor that is used to spray the drug suspension, a nebulizer (plastic container in which it pays the suspension to atomize and which allows to transform the suspension in cloud of droplets) and a facial mask connected to the nebulizer by a suitable tubing in the face of the child.

The suspension used is a solution of 0.5% of salbutamol 0.03 ml/kg (min = 0.3 ml and max = 1 ml). The salted serum is added so that the mixture with salbutamol make 4 ml. The Salbutamol in the form of spray is administered to the assistance of an inhalation chamber.

The 200 patients are supported in ambulatory management for the majority; it is the first episode of bronchiolitis and broncho-pneumonia.

Excluded were patients with severe forms requiring hospitalization.

The evaluation criteria were only clinics. We assessed the heart rate, respiratory rate, the aspect of the sputum, the thixotropy, the abundance of the secretions as well as the degree of congestion tracheobronchial before and after the sessions of respiratory physiotherapy. Informed consent has been obtained for the whole of the patients recruited.

## RESULTS

The age of the children varies from 1 months to 3 years, the average age is 9 months. The sex ratio M/F is 1.4. No patient has been excluded for the duration of the study. The results are reported in Tables I, II and III.

Table 1 summarizes the changes in the respiratory rate (RR) during the different sessions of respiratory physiotherapy. At the same time, we held to compare the evolution of this parameter for the different groups.

The thixotropy (Table 3) is changing significantly in groups 2 and 3. The use of spraying is decisive for this parameter. The same findings are made for the aspect of secretions.

The decrease of the abundance of the secretions is noted in all groups. It is to say that the improvement of this parameter is linked more to the respiratory physiotherapy.

If the heart rate (HR) has not been noted in a systematic way, we have noted at least, that the use of salbutamol has not resulted in significant changes of this parameter.

In the different group, the average age is substantially the same (8 months, 9 months, 10 months). Also, we have not noted difference in the response to treatment in the function of the age.

**Table I : The variations of the respiratory rate during the course of the sessions of physiotherapy.**

	Average respiratory frequency									
	1st session		2 <sup>nd</sup> session		3 <sup>rd</sup> session		4 <sup>th</sup> session		5 <sup>th</sup> session	
	Before	After	Before	After	Before	After	Before	After	Before	After
Group 1	52,42	51,38	51,86	50,7	50,7	48,88	49,99	47,88	48,7	48,04
Group 2	35,62	33,92	34,42	32,04	33,34	32,68	32,7	32,6	33	32,54
Group 3	40,28	38,24	39,44	37,94	37,78	36,76	36,92	34,3	36,24	35,6
Group 4	44,56	42,64	44,22	41,98	41,86	41,6	41,12	39,84	41,44	39,32

The decrease of the RR is observed in all groups, it is mainly in the group (3) of the nebulization by salbutamol that the decrease is more clear.

For tracheobronchial sputum retention (Table 2), in all groups, we have observed a net decrease to the end of the sessions, it is essentially the respiratory physiotherapy which improves the ETB.

**Table II: The variations of the Average tracheobronchial sputum retention during the course of the sessions of physiotherapy.**

	Average tracheobronchial sputum retention									
	1st session		2 <sup>nd</sup> session		3 <sup>rd</sup> session		4 <sup>th</sup> session		5 <sup>th</sup> session	
	Before	After	Before	After	Before	After	Before	After	Before	After
Group 1	2,8	1,72	1,56	0,94	0,92	0,44	0,32	0,18	0,2	0,18
Group 2	2,68	1,54	1,72	0,66	0,8	0,38	0,46	0,28	0,38	0,18
Group 3	2,76	1,8	1,42	0,96	0,9	0,34	0,42	0,34	0,4	0,26
Group 4	2,54	1,56	1,12	0,64	0,68	0,28	0,3	0,22	0,24	0,2

**Table III : The variations of the thixotropy during the course of the sessions of physiotherapy.**

	Average thixotropy				
	1st session	2 <sup>nd</sup> session	3 <sup>rd</sup> session	4 <sup>th</sup> session	5 <sup>th</sup> session
Group 1	1,66	1,12	0,84	0,36	0,16
Group 2	1,68	1,08	0,86	0,2	0,02
Group 3	1,5	1,1	0,82	0,2	0,02
Group 4	1,7	1,28	0,86	0,4	0,22

## DISCUSSION

The objective of our work is to assess the effectiveness of spraying and the respiratory physiotherapy in the bronchiolar pathology and tracheobronchial of infants and small children.

We are based on criteria of assessment clinical only, therefore easily usable everywhere in current practice. For what is the parameters used, a number of remarks can be issued. The RR alone is not a marker of gravity. Normally, he should be associate of other detailed clinical scores.<sup>[4,5]</sup>

It is clear from the different studies.<sup>[5,6]</sup> that the gravity of the initial table is decisive as regards the response to treatment, the efficiency is lower in the serious forms. The fact that our work was carried out in ambulatory, we excluded the severe forms.

Some studies<sup>[1,7]</sup> reveal results more favorable among the child of more than a year, mainly in the bronchiolar pathology. Other authors do not find any significant difference in function of the age.

In our series, we have noted the same findings. Moreover, it is currently demonstrated that infants respond to salbutamol as early as the age of a month. The presence of bronchial musculature is demonstrated in the first months of life. Similarly, the existence of beta-adrenergic receptors of airways in infants of less than a year is currently proven.<sup>[4]</sup>

During the course of the study, the tolerance of salbutamol nebulised has proved satisfactory, we have used the recommended doses. Unfortunately, the absence

of pulse oximeter in the unit (during the study) has not allowed us to study the effect of the respiratory physiotherapy and the nebulization on the pulse oxymetry. If the majority of the studies reported an improvement in the pulse oxymetry after the nebulization, others have observed a deterioration.<sup>[4,5]</sup> These paradoxical effects may be a consequence of modification of the ventilation report infusion.

If the respiratory physiotherapy seems a logical treatment in the bronchiolar pathology and tracheobronchial. To the extent that it allows airway clearance; some studies<sup>[8]</sup> affirm that the respiratory physiotherapy is unnecessary. Clinical trials comparing the effectiveness of the respiratory physiotherapy in the bronchiolitis in infants are state of contradictory results. The character useless, see even harmful to the respiratory physiotherapy, is emphasized.

It seems that these divergent findings resulting in over the fact that these publications come from the teams using different techniques of physiotherapy. Since the development of the increased-exhalation technique (IET) and its standardisation, the recent work tell the beneficial nature of the respiratory physiotherapy.

## CONCLUSION

It is clear that the association of the respiratory physiotherapy and the nebulization Salbutamol has a beneficial effect in the bronchiolar pathology and tracheobronchial of infants and small children. The use of salbutamol was well tolerated.

The complexity of the mechanisms which are at the origin of the bronchial and bronchiolar pathologies

(inflammation, hypersecretion, congestion, bronchospasm,...etc.) explains the divergence of the results found in the literature.

The response to salbutamol, seems to be linked to the participation of the component "bronchospasm."

It would be interesting that our patients must be followed by longitudinal studies to determine the existence of a correlation between the response to salbutamol and the evolution toward the asthma of these infants.

### COMPETING INTERESTS

The authors declare that they have no conflicts of interest related to this article.

### ACKNOWLEDGEMENTS

Many thanks to all people who participated in the study, especially the Cheikh Zaed Hospital, the reference center of neonatology and nutrition and all infants and families.

### REFERENCES

1. B. Sterling, E. Bosdure, N. Stremmer-Le Bel, B. Chabrol, J.-C. Dubus. Bronchiolite et kinésithérapie respiratoire : un dogme ébranlé. *Journal Européen des Urgences et de Réanimation*, April 2015; 27(1): 14–20.
2. Wu S, Baker C, Lang ME, et al. Nebulized hypertonic saline for bronchiolitis: A randomized clinical trial. *JAMA Pediatr*, 2014; 168(7): 657–63.
3. Gadomski AM, Bhasale AL. Bronchodilators for bronchiolitis. *Cochrane Database Syst Rev.*, 2010; (12): CD001266.
4. Liu LL, Gallaher MM, Davis RL, Rutter CM, Lewis TC, Marcuse EK. Use of a respiratory clinical score among different providers. *Pediatr Pulmonol*, 2004; 37(3): 243–8.
5. Duarte-Dorado DM, Madero-Orostegui DS, Rodriguez-Martinez CE, Nino G. Validation of a scale to assess the severity of bronchiolitis in a population of hospitalized infants. *J Asthma*, 2013; 50(10): 1056–61.
6. M. Verstraete, P. Cros, M. Gouin, et al. Update on the management of acute viral bronchiolitis: proposed guidelines of Grand Ouest University Hospitals. *Arch Pediatr*, January 2014; 21(1): 53–62.
7. Joëlle André-Vert, Marylis Gazave, Patrick Goudenège, José Moreno. Symptômes avant et après kinésithérapie respiratoire: étude prospective auprès de 697 nourrissons du Réseau Kinésithérapie Bronchiolite Essonne. *Kinésithérapie, la Revue*, 2006; 6(50): 25-34.
8. Roquéi Figuls M, Giné-Garriga M, Granados Rugeles C, Perrotta C, Vilaró J. Chest physiotherapy for acute bronchiolitis in paediatric patients between 0 and 24 months old. *Cochrane Database Syst Reviews*, 2012; 15(2).