

THE INTEREST OF MUCOLYTIC DRUGS IN BRONCHIAL AIRWAY CLEARANCE IN LITTLE CHILDSF. Z. Aglili², M. A. Radouani², A. Barkat^{*2,3} and A. El Hassani^{1,2}¹Hôpital Cheikh Zaid, Université Abulcassis, Maroc.²Université Mohammed V, Faculté de Médecine et de Pharmacie, Equipe de Recherche en Santé et Nutrition du Couple Mère-Enfant, Maroc.³Centre National de Référence en Néonatalogie et Nutrition, Hôpital d'Enfants, CHU Ibn Sina, Rabat, Maroc.***Corresponding Author: A. Barkat**

Université Mohammed V, Faculté de Médecine et de Pharmacie, Equipe de Recherche en Santé et Nutrition du Couple Mère-Enfant, Maroc.

Article Received on 08/09/2017

Article Revised on 29/09/2017

Article Accepted on 19/10/2017

ABSTRACT

Introduction The tracheobronchial obstruction is often associated with various respiratory diseases. Chest physiotherapy is the most effective way to treat bronchial congestion while the usefulness of mucolytic drugs remains controversial. The aim of this study is to compare the effectiveness of single chest physiotherapy and respiratory physiotherapy associated with mucolytic drugs in bronchiolar pathology of infants and small childs. **Materials and methods** this prospective study was conducted during the period between October 2016 and Mars 2017. 100 patients aged 6 months to 3 years were recruited. We compared 2 groups; one group receiving in addition to the chest physiotherapy mucolytic drugs, the second group followed only physiotherapy treatment. **Results** The study shows that mucolytic treatment has no impact on the easiness of airway clearance by chest physiotherapy; and neither the appearance, the abundance or thixotropy are modified and mucoregulators would not help with evacuation at bronchial decluttering but it's a way of adaptation to the to the effort of chest physiotherapy session. **Conclusion** However, mucolytics prescription has no impact on the easiness of airway clearance but can be useful to facilitate the adaptation of the infant and small child illness and stress.

KEYWORDS: Mucolytic drugs, bronchial clearance, infant, chest physiotherapy, tracheobronchial pathologies.**INTRODUCTION**

The tracheobronchial sputum retention is often found associated with different pathologies (bronchiolitis, tracheo-bronchial pathologies, asthma...) which leads to a respiratory discomfort, more particularly in the infant whose vital prognosis is sometimes threatened because of the sensitivity of its organization to hypoxia.^[1]

The respiratory physiotherapy is a natural method of rehabilitation based on techniques refined having for goal to combat the bronchial sputum retention (occasional or chronic) so as to allow the discount on the road of the activity muco-ciliary action and improve the respiratory dynamic and this by maneuvers favoring the sputum production and thus improving the capacity ventilatory^[2]

The objective of the mucolytics is classically to change the quality of the secretions, to improve the purification muco-ciliary action.^[3] This treatment must be for the purpose of restoring the rheological characteristics of bronchial secretions in order to promote the transport

muco-ciliary action, it allows as well to facilitate the evacuation of the bronchial mucus.^[4]

The mucolytics have long been used in the treatment of these different respiratory diseases. Nevertheless the usefulness of these drugs remains to discuss.^[5]

Our study is assigns the objective to assess the usefulness of mucolytics in association with the respiratory physiotherapy of bronchial decluttering and tracheobronchial in the infant and little childs.

MATERIALS AND METHODS

This study has focused on 100 children aged 6 months to 3 years and who had a broncho-pneumonia, broncho-alveolitis or a lung disease, sent for respiratory physiotherapy of decluttering by physicians paediatricians.

The patients were divided into two groups, the first group benefiting in addition to the respiratory rehabilitation of a mucolytic treatment and the second group followed a physiotherapy only

The randomisation was made by chance, the patients recruited Monday, Wednesday and Friday were assigned to the group without mucolytics and the patients recruited the other days of the week to the group with.

The physiotherapist was making the same techniques and the same number of sessions, without knowing to what group belonged to the patient, 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 research methodology consists in a form of the parameters identified by the study to know the respiratory frequency, pulse, the degree of congestion, the abundance of sputum, its appearance and its thixotropy.

- Before the session: the patient installed, we measure the pulse, respiratory rate and the assessment of the degree of congestion (non-congested, little crowded, congested, very crowded).
- During the session: We retrieve the secretions and we observe their condition by their color (clear transparent, white clear, yellow, green).
- At the end of the session: The previous values have been identified in more than some characters of secretions (The abundance (absent, medium, abundant, very abundant), the aspect of sputum (absent, clear, transparent, white clear, yellow or green) and the thixotropy of sputum (absent, liquid, thick, very thick).

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 number of sessions was to 5 for each patient. The duration of the session was to 20 min approximately, it can vary depending on the state of the patient.

The results of the two groups were compared by statistical methods: Fisher test and student to find a statistically significant difference between the groups. The tests are based on the predictive value P. It is statistically significant if $p < 0.05$. Informed consent has been obtained for the whole of the patients recruited.

RESULTS

No Patient has been excluded for the duration of the study. In the two groups, the average age is substantially the same (18 months). The results are reported in Tables I, II and III.

The value of the respiratory frequency has changed significantly after the session of physiotherapy in the group without mucolytics ($p = 0.02$). The difference was not significant after the meeting of physiotherapy at the group among which we have administered mucolytic drugs ($p = 0.07$).

Also, we found that the respiratory frequency differs significantly after the physiotherapy in the group without treatment ($p = 0.008$).

For the pulse, the value has changed significantly after physiotherapy in the group without treatment ($p = 0.03$). The group with mucolytics where the pulse has not changed not significantly after the meeting of physiotherapy ($p = 0.09$). The value of the pulse was not different in the two groups ($p = 0.07$).

Concerning the sputum retention, the value has changed significantly after the meeting of physiotherapy in the group without treatment ($p = 0.02$) as well as in the group with ($p = 0.005$).

In addition, the change in the value of the sputum retention before and after the session of physiotherapy has not been significant in the group without treatment compared to that in the group with ($p = 0.25$).

We have reported that the sputum retention was not significantly different in the two groups with and without mucolytics before and after the meeting of physiotherapy ($p = 0.93$) and ($p = 0.37$) respectively.

The difference was not significant between the two groups nor for the abundance of sputum ($p = 0.35$) nor for their aspect ($p = 0.46$) nor for their thixotropy ($p = 0.42$).

Table I summarizes the variations of the respiratory rate before and after each session of physiotherapy in all patients of the two groups during the different sessions.

There is the acceleration of the respiratory frequency which is only valid for the group that does not take treatment. This acceleration is only transient and we have noticed that it decreased from one session to another. However we note a significant difference after the meeting of physiotherapy characterized by a low respiratory rate in infants treated by drugs, in comparison to those treated by isolated physiotherapy; where a lesser fatigability for the first group

We have also noted an increase in the Pulse (Table II), which is of interest to the first group after each meeting. It is less noticed for children who take mucolytics.

For tracheobronchial sputum retention (Table III), we observed a net decrease to the end of the sessions. This decrease was increasingly noticed a meeting to another to be very important to the fifth sessions where the congestion becomes almost zero.

Table I: Respiratory frequency average before and after each session in all patients of the two groups.

	Mucolytiques -		Mucolytiques +	
	Before	After	Before	After
1 st session	41,15	43,04	35,2	39,34
2 nd session	43,47	45,69	41,48	42,25
3 rd session	43,45	44,28	36,13	42
4 th session	40,45	45,14	38,95	42,15
5 th session	37,8	48,88	33,86	37,42

Table II: The pulse before and after each session in all patients of the two groups.

	Mucolytiques -		Mucolytiques +	
	Before	After	Before	After
1 st session	83,18	91,15	94,54	106,72
2 nd session	88,04	102,9	100	103,08
3 rd session	94,47	103	99,59	105,2
4 th session	97	107,9	99,25	114,8
5 th session	98,27	111,33	99,2	109,5

Table III: The average footprint before and after each session in all patients of the two groups.

	Mucolytiques -		Mucolytiques +	
	Before	After	Before	After
1 st session	2,46	2,03	2,33	1,5
2 nd session	1,96	1,46	2,34	1,6
3 rd session	1,91	1,34	2	1,13
4 th session	1,86	1,27	1,65	0,78
5 th session	1,45	0,85	1,53	0,71

DISCUSSION

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

On the basis of the Bibliographic Research (Medline, Index Medicus, etc.), it has not been found of data accrediting a contingent interest of mucolytics during the access of acute bronchiolitis.^[7]

Furthermore, contrary to the received ideas on the important effect that had the mucolytic drugs on the ease of evacuation.^[8,9]

According to the results of our work, the decrease is identical and is statistically significant between the data of congestion before and after the meeting of respiratory physiotherapy, as well for the group that took the treatment that for the group that did not take.

The degree of abundance of secretions is in relationship with the degree of congestion. Being very abundant during the first meeting, the secretions decreased more and more up to become slightly abundant at the end of the meeting.

The difference between the two groups was not significantly related to the abundance of the secretions which leads us to conclude that the decrease in congestion and the degree of abundance is identical for the two groups.

The aspect of sputum attests to the presence of lung infection or not. Indeed, during the first sessions, the most part of sputum are greenish see same purulent, they clarify more and more of a meeting at the other up to become transparent at the end of the fifth meeting. The result obtained regarding the aspect of sputum is not significant, and the aspect is identical for the two groups.

The thixotropy shows that secretions are very thick for most infants and become liquid at the end of the fifth meeting for the two groups.

As well, this prospective work has led to some conclusions which can be summarized as follows:

- The prescription of mucolytic drugs is without impact on the facilitation of the decluttering by the physiotherapy and that neither the aspect, nor the abundance, neither the thixotropy are modified. On the other hand, those drugs would be useful on the facilitation of the adaptation of the infant and the small child to the disease and to the effort.
- The pulse and respiratory frequency among children who had received the mucolytics are lower than the baseline status and their increase during the course of the meeting of physiotherapy is more low compared to those who do not take mucolytics.

Our results suggest that if the mucolytics are not a means of help for the evacuation during the bronchial decluttering, they can be a good way of adapting to the effort of the meeting of respiratory physiotherapy.

CONCLUSION

The respiratory physiotherapy has always demonstrated effectiveness in the treatment of lung diseases and proved to be a paramount need in the improvement of the respiratory status of the small child.^[6]

In contrast, the prescription of mucolytic drugs is without impact on the ease of the decluttering but can be useful to facilitate the adaptation of the infant and the small child to the disease and to the effort.

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. Roqué i 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 of Systematic Reviews*, 2016; 1(2): CD004873.
2. 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*, February, 2006; 6(50): 25-34.
3. Gadowski AM, Bhasale AL. Bronchodilators for bronchiolitis. *Cochrane Database Syst Rev*, 2010; (12): CD001266.
4. G. Lenoir. Mucolytiques et mucorégulateurs que sait-on ? Quelle action clinique ? *Journal de Pédiatrie et de Puériculture*, April - May 1990; 3(3): 157-160.
5. Nicolas Roche, Bernard Lebeau, Jean-Claude Pujet, Gérard Lenoir, François Liard, Karim Keddad. Les mucorégulateurs dans les syndromes bronchiques aigus : point sur les pratiques en médecine générale et les données de la littérature. *Thérapie* Novembre – Décembre, 2003; 58 (6): 519-524.
6. B. Sterling, E. Bosdure, N. Stremler-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.
7. A. Labbé. Mucolytiques, antitussifs et autres médicaments. *Archives de Pédiatrie*, January 2001; 8(1): 98-99.
8. M. Davida, C. Luc-Vanuxem, A. Loundoub, E. Bosdure, P. Auquier, Application de la Conférence de consensus sur la bronchiolite aigüe" du nourrisson en médecine générale: evolution entre 2003 et 2008 = Assessment of the French Consensus Conference for Acute Viral Bronchiolitis on outpatient management: Progress between 2003 and 2008. *Archives de Pédiatrie*, February 2010; 17(2): 125–131.
9. M Chalumeau, G Chéron, R Assathiany, F Moulin, F Bavoux, G Bréart, G Pons. Fluidifiants bronchiques dans les infections respiratoires aiguës du nourrisson: un problème pharmacoépidémiologique ? *Archives de Pédiatrie*, Novembre 2002; 9(11): 1128-1136.