

Effect of Balloon Therapy vs. Bubble Therapy on LRTI among 3-12 Years Children

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ABSTRACT

Objectives - The study was designed to evaluate the effect of balloon and bubble therapy on physiological parameters of lower respiratory tract infection among 3-12 years children.

Methods- 60 children between 3-12 years of age with lower respiratory tract infection were randomized to receive either balloon therapy or bubble therapy. Pre-assessment of physiological parameters (respiration rate, oxygen saturation, abnormal breath sound and using of accessory muscles during coughing) was done then both the groups were instructed to either blow balloon or bubble for 10 times in 1 session for 3 sessions in a day with 1 hour difference between sessions for 6 days. Post assessment was done after intervention.

Result & interpretation- Finding of the study revealed that there was significant difference observed between pre and posttest mean score of physiological parameters both in bubble and balloon group at $p < 0.0001$. Highly statistically significant difference was observed in all physiological parameters between both group (p - value 0.0001, 0.01 and 0.009) respectively. But No significant difference was found in respiration rate between two groups (p - value 0.27).

Conclusion- Present study implies that both bubble and balloon blowing exercise are equally effective in improvement of physiological parameters of children with lower respiratory tract infection.

Keywords: balloon blowing, bubble blowing, lower respiratory tract infection

INTRODUCTION

ARI constitute one-third of the deaths in under-five in developing countries. They contributed 67 million disability adjusted life years in the year 2000. [1] Pneumonia remains the leading infectious cause of death among children under five, killing 2,500 children a day. Pneumonia accounted for 15 per cent of all under-five deaths and killed 920,000 children in 2015. [1,2] The effects of pneumonia on the lungs involve overproduction of mucus and other fluids, leading to difficulty breathing and inhibiting gas exchange in the lungs. Long

term, pneumonia can be associated with permanent lung damage, risk of respiratory failure. The effects of pneumonia on the lungs can lead people to have shortness of breath, a bluish tinge in the extremities, and rapid breathing as they fight for air. Patients may also cough, often producing sputum. In some cases, pneumonia leads to the development of an abscess in the lungs, a potentially serious complication to reduce the sign symptoms of lower respiratory tract infection. Various methods are there but among them pursed lip breathing is one of them. Pursed-lip breathing increases

pressure on the airways, this in turn helps to keep them open. Various Pursued-lip breathing techniques include blowing of balloon, bubble and fluttering paper. These are play way method for children to improve respiratory status. [3,4] Blowing balloons and bubble works out the intercostals muscles responsible for spreading and elevating the diaphragm and ribcage. This allows lungs to absorb oxygen, alter its chemical composition and expel carbon dioxide. Doing daily routine of blowing up balloons steadily increases lung capacity and also amplifies the lungs ability to maintain a sufficient supply of oxygen. [4,5]

MATERIALS AND METHODS

The research was designed to evaluate the effect and comparison of balloon and bubble therapy among the lower respiratory tract infection child, randomized control trial was conducted at pediatric medicine ward of a tertiary care hospital from January 2017 to February 2017. Through using computer generated randomized table, the sample was selected for both the groups. Before the study approval of institutional ethical committee was obtained and Written Informed Consent was taken from parents of Children.

The Inclusion criteria were, children between 3-12 years of age diagnosed with lower respiratory tract infection (pneumonia, bronchitis and bronchiolitis). The exclusion criteria were those who were critically ill and with any oral surgery.

Sample size

To achieve an effect size of 30% with an α error of 0.05 & power 80% the sample size is 64. However due to limited time period of the study, about 60 subjects were planned to be included in the study, the revised sample size was approved by research committee.

Study intervention-

Enrolled children were randomized to receive either balloon therapy or bubble therapy, randomization was done by using computer generated randomized table. Baseline assessment includes Physiological parameters of the client i.e. respiration rate, abnormal breath sound, oxygen saturation, use of accessory muscles during coughing was assessed for the both bubble and balloon group on day-1. The total duration of assessment was 3-4 minutes. First experimental group was instructed to blow balloon and another experimental group was instructed to blow bubble for 10 times in one session for 3 sessions in a day with 1 hour difference between sessions. It took 8-10 minutes to complete 1 session. The total intervention duration was 6 days. Post assessment was done after 6 days.

Statistical analysis

Statistical packages for social science (SPSS) version 20 was used in data analysis was to find out the SD, mean, percentage, and t-test. P value ≤ 0.05 was considered as statistically significant. Analyzed data was presented in the table.

RESULTS

Baseline characteristics of children with lower respiratory tract receiving balloon and bubble therapy were described in [table no-I](#). Out of 30, 17(57%) of children had abnormal breath sound before balloon therapy and none of them had after balloon therapy, around 54% children were using accessory muscle during coughing before balloon therapy where as none of them used accessory muscle after balloon therapy. In pretest 67% and in Posttest 37% children had abnormal breath sound in bubble therapy group. Out of 30, 18 (60%) children were using accessory muscles during coughing before bubble therapy but it reduced to 15 (50%) after bubble therapy.

Table no.1-frequency and Percentage distribution of demographic characteristics of children with lower respiratory tract infection of balloon and bubble therapy group. N=60

Sl no.	Demographic variables		Frequency		Percentages	
			Balloon group	Bubble group	Balloon Group	Bubble group
I	Age	3-5 years	11	12	36.66%	40%
		6-8 years	14	14	46.34%	47%
		9-11 years	5	3	17%	10%
		>12 years	0	1	0%	3%
II	Sex	male	18	19	60%	63.33%
		female	12	11	40%	36.66%
III	Education of child	Not started	7	10	23.33%	35%
		1 st standard	6	3	20%	6.66%
		2 nd standard	6	6	20%	20%
		3 rd standard	4	5	13.33%	17%
		4 th standard	3	1	10%	4%
		5 th standard	1	1	3%	4%
		6 th standard	3	3	10%	10%
IV	Diagnosis	Pneumonia	18	11	60%	37%
		Bronchitis	8	9	26.67%	30%
		Bronchiolitis	4	10	13.33%	33%
V	Duration of hospitalization	<3 days	9	9	30%	30%
		4-6 days	15	9	50%	30%
		7-9 days	6	12	20%	40%
		> 9 days	0	0	0%	0%

Table no. II- Findings related to assessment of effect of balloon and bubble therapy on physiological parameters and comparison of post test result of balloon and bubble therapy. N=60

Sl.no.	Physiological parameters.		Pre and post test	Mean± SD	Paired t value	P value	Unpaired t value	P value
I	respiration rate	Balloon therapy	Pre	29.47±4.47	4.96	0.0001 **	1.1	0.27 NS
			Post	19.53±2.32				
		Bubble therapy	Pre	29.5±3.97	5.49	0.0001 **		
			Post	23.9±3.95				
II	O ₂ saturation	Balloon therapy	Pre	93.77±1.83	15.88	0.0001 **	5.5	0.0001 **
			Post	97.9±1.57				
		Bubble therapy	Pre	94.4±1.43	8.05	0.0001 **		
			Post	95.93±1.31				
III	abnormal breath sound	Balloon therapy	Pre	1.63±0.48	31.5	0.0001 **	2.5	0.01*
			Post	1±0.05				
		Bubble therapy	Pre	1.63±0.48	8	0.0001 **		
			Post	1.4±0.4				
IV	using accessory muscles during coughing	Balloon therapy	Pre	1.53±0.49	176.66	0.0001 **	2.68	0.009**
			Post	1±0.01				
		Bubble therapy	Pre	1.6±0.48	3.95	0.0001 **		
			Post	1.43±0.49				

(p<0.05) (**= extremely significant, *= significant, NS= not significant)

There was extremely statistically significant difference between pre and posttest of respiration rate, oxygen saturation, abnormal breath sound and using of accessory muscles during coughing in balloon and bubble therapy at p value 0.0001. There was statistically significant found between post test result of balloon and bubble therapy group in oxygen saturation (P=0.0001), abnormal breath sound (P=0.01) and using of accessory muscles during coughing (P=0.009) but there was no statistical significant difference was found between posttest of respiration rate (P=0.27) (table no. II)

DISCUSSION

The present study finding reports that there was significant difference observed between the mean pretest score of respiration rate (29.47±4.47) and the posttest respiration rate (19.53±2.32) at p = 0.0001, the pretest and posttest mean score of oxygen saturation of children receiving balloon therapy was 93.77±1.83 and 97.9±1.57 respectively at p value 0.0001.

The similar study conducted by Rafaqat A et al. to compare between Balloon Blowing Exercise and Incentive Spirometry in Patients with Chest Intubation after Trauma. In balloon therapy pre and

post treatment differences are found statistically significant. Pre and posttest of respiration rate (27.43 ± 01.98) and (25.01 ± 01.79) respectively at p value 0.0001. Pre and posttest of oxygen saturation (90.73 ± 02.34) and (94.36 ± 01.71) respectively at p value 0.0001 which is statistically significant. [6]

Other study was done by Arunima Sreelatha also reported that in balloon therapy, it was found that the difference was statistically significant ($P \leq 0.05$) between pre (23.980 ± 1.4006) and posttest (23.060 ± 1.6835) respiratory rate, Oxygen saturation pre and posttest (97.38 ± 3.384) and (98.31 ± 3.983) respectively at $p \leq 0.05$ which was statistically significant. [7]

The present study also supported to the study finding of Renuka K. et al. to assess effectiveness of balloon therapy on respiratory status of the patient with lower respiratory tract disorders. There was a highly significant improvement in the pretest and posttest respiratory rate ($P < 0.001$). [8]

The present study finding reveals that, after giving balloon therapy among 57% of children, abnormal breath sound was reduced .in balloon therapy group. After balloon therapy there was a reduction of 54% in the use of accessory muscle during coughing

This present study finding supported to the study finding of Arunima Sreeletha the study finding reveals that after giving balloon therapy there was a reduction of (45.0%) in abnormal breath sound and (57.9%) in use of accessory muscles during coughing. It shows that there was a significant improvement in respiratory status of children with lower respiratory tract infection after balloon therapy. [7]

CONCLUSION

This study is on the basis of findings balloon therapy and bubble therapy is more acceptable among children as it is a part of their normal routine play activity and excitement to explore blowing balloons and bubbles. It is cost effective, convenient, requires less skills so the researcher strongly suggest to approach the hospitalized sick children with acceptable form of innovative therapeutic regimen for their complete participation in their health care.

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