Research Article

Effectiveness of breathing exercises as play method on cardiopulmonary parameters among children with acute respiratory tract infections in a selected area of Dehradun, Uttarakhand

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Received: May 22, 2017; **Accepted:** January 29, 2018

ABSTRACT

Background: Respiratory tract infections are the major cause of morbidity and mortality among children and are responsible for around 12 million under-five deaths in a year. **Objective:** The aim of this study is to evaluate the effectiveness of breathing exercises as play method on cardiopulmonary parameters among children with acute respiratory tract infections. **Materials and Methods:** True experimental pretest and posttest design was used. A total of 67 children aged 3–12 years having acute respiratory tract infections were randomly divided into experimental (34) and control group (33). The data collection tool included baseline information of participants, cardiopulmonary parameters assessment, and pediatric dyspnea scale. Pretest data were collected in both the groups. Balloon blowing breathing exercises were administered to the experimental group. Post interventional cardiopulmonary parameters were assessed after 1 week in both the groups. **Result:** The mean posttest heart rate (96.47), respiration rate (25.47), and Spo2 (95.2) of the experimental group was significantly near to normal as compared to control group. The mean posttest cough score (1.62), breath sound score (2.18), chest expansion score (2.16), and dyspnea score (3.74) of experimental group was significantly low than the control group. There was significant association between cardiopulmonary parameters and selected demographic variables. **Conclusion:** Breathing exercises have advantageous effects on cardiopulmonary parameters among children with acute respiratory infections.

KEY WORDS: Acute Respiratory Tract Infections; Breathing Exercises; Cardiopulmonary Parameters; Play Method

INTRODUCTION

Respiratory tract infections are the most common human health problems and a source of discomfort as well. They are a major cause of morbidity and deaths among children.[1] Children are the most susceptible group in terms of existence.[2] Acute respiratory infections (ARIs) may affect upper or lower respiratory tract. ARIs are not only limited to the respiratory tract but also may affect other systems of body as there is a probability of spread of infection and microbial toxins.[3]

ARIs are the most common causes of death in children <5 years of age. They face average three to six episodes of ARIs per year regardless of their area of living and financial situation.[4] Respiratory tract infections in children are often reported by physicians in developed countries also.[5] Around 12 million deaths per year among under five children are due to respiratory tract infections in developed countries.[6] About 30–50% of visits to hospital and 20–40% of admissions to hospitals are due to respiratory tract infections.[7] Childhood ARI/pneumonia is a significant public health problem in India, although robust epidemiological data is not available on its incidence.[8]

Access this article online	
Website: http://www.ijmsph.com	Quick Response code
DOI: 10.5455/ijmsph.2018.0513829012018	

In young children, the airway is relatively smaller. It can become extensively narrowed by inflammation and mucus, which makes breathing hard for children. Extreme narrowing of airways may cause gasping and even cyanosis in children.[9] Breathing exercises are helpful in reducing breathing difficulty, making the individuals comfortable, and helps in full recovery.[10]

Need of the Study

Breathing exercises are an essential part and plays an important role in clearing the airway and making parenchyma to expand. They help in improving the efficiency of respiratory muscles. Breathing exercise need to be modified for children as they might not cooperate like adults. Modified breathing exercises may be helpful in catching the attention of children. Various modified forms of breathing exercises are found to be helpful in children such as group exercises, running, balloon blowing, abduction, adduction and forward movement of upper limbs, blowing air into the water with a straw, blowing a trumpet, flute and mouth organ playing, etc.[11]

Problem Statement

A study to assess the effectiveness of breathing exercises as play method on cardiopulmonary parameters among children with acute respiratory tract infections in a selected area of Dehradun, Uttarakhand.

Objectives

- To assess pre-interventional cardiopulmonary parameters of children with acute respiratory tract infections.
- To assess post-interventional cardiopulmonary parameters of children with acute respiratory tract infections.
- To evaluate the effectiveness of breathing exercises as play method on cardiopulmonary parameters.
- To find association of cardiopulmonary parameters with selected demographic variables.

Hypotheses

H_1: The mean posttest cardiopulmonary parameters score of experimental group would be significantly different than the mean posttest cardiopulmonary parameters score of the control group.

- The mean posttest blood pressure, heart rate, respiration rate, and Spo2 of experimental group would be significantly near to normal than the mean posttest parameters of the control group.
- The mean posttest cough score, breath sound score, chest expansion score, and dyspnea score of the experimental group would be significantly lower than the mean posttest score of the control group.

H_2: There would be a significant association between cardiopulmonary parameters and selected demographic variables.

Conceptual Framework

The conceptual framework of the present study was based on Modified Wiedenbach's "Prescriptive Theory" of Nursing (1960).

MATERIALS AND METHODS

This true experimental pretest and posttest study was conducted in a rural area of Dehradun, Uttarakhand from December 2014 to January 2015. Sixty-seven children with acute respiratory tract infection were selected using random sampling. Tool used in the present study was structured observational checklist for assessing cardiopulmonary parameters, i.e., blood pressure, heart rate, respiration rate, Spo2, cough, chest expansion, breath sounds, chest expansion, and pediatric dyspnea scale. The content validity of the tool was ensured by submitting tool to experts from the field of pediatric medicine, child health nursing, maternal and child health nursing and medical surgical nursing. Pilot study was conducted on 10 samples in selected area of Dehradun. Reliability of the physiological tool was established using inter rater method. Karl Pearson's coefficient was calculated which was found to be 0.9. Reliability of pediatric dyspnea scale was established using inter rater method. Karl Pearson's co-relation coefficient was calculated which was found to be 0.8.

RESULTS

Sociodemographic Variables

According to Table 1, most of the children in the experimental group (44.11%) were in the age group of 4–6 years and in control group (48.48%) were in the age group of 7–9 years. Most of the mothers in experimental group (44.10%) and in control group (48.50%) had primary education. Most of the fathers (44.10%) in the experimental group and (48.50%) in the control group had secondary level of educational status. Majority of the children (52.90%) in the experimental group and (66.70%) in the control group belonged to lower middle class family. Most of the children (41.40%) in the experimental group and (48.50%) in the control group were vegetarian. Most of the children (58.80%) in the experimental group were mildly malnourished, whereas most of the children (54.50%) in the control group were moderately malnourished. All (100%) children in the experimental as well as control group were breastfed by their mother. Most of the children (50%) in experimental and (42.40%) in control group were breastfed for >6 months to 1 year by their mother. None of the children in the experimental as well as control group received seasonal influenza vaccine. Most of the children (52.90%) in experimental group and (60.60%) in control

Table 1: Sociodemographic characteristics of the study participants, *n*=67

Sociodemographic variables	Sample characteristics	F (%)	
		Experimental group (*n*=34)	Control group (*n*=33)
Age of child	4–6 years	15 (44.11)	14 (42.42)
	7–9 years	12 (35.29)	16 (48.48)
	10–12 years	07 (20.58)	04 (12.12)
Gender	Male	17 (50)	17 (51.50)
	Female	17 (50)	16 (48.50)
Educational status of mother	Graduate	03 (8.80)	0 (0)
	Secondary	06 (17.60)	08 (24.20)
	Primary	15 (44.10)	16 (48.50)
	No formal education	10 (29.40)	09 (27.30)
Educational status of father	Postgraduate	02 (5.90)	0 (0
	Graduate	05 (14.70)	04 (12.10)
	Secondary	15 (44.10)	16 (48.50)
	Primary	10 (29.40)	12 (36.40)
	No formal education	02 (5.90)	01 (3)
Socioeconomic status	Upper class	04 (11.80)	03 (9.10)
	Upper Middle class	08 (23.50)	04 (12.10)
	Lower Middle class	18 (52.90)	22 (66.70)
	Upper Lower class	0 (0	04 (12.10)
	Lower class	04 (11.80)	0 (0
Type of Diet	Vegetarian	14 (41.10)	16 (48.50)
	Non vegetarian	16 (47)	13 (39.40)
	Eggetarian	04 (11.70)	04 (12.10)
Nutritional status	Well nourished	02 (5.90)	01 (3)
	Mildly malnourished	20 (58.80)	14 (42.40)
	Moderately malnourished	12 (35.30)	18 (54.50)
Ever breastfed	Yes	34 (100)	33 (100)
	No	0	0
Duration of breastfeeding	< 6 months	05 (14.70)	11 (33.30)
	>6 months - 1 year	17 (50)	14 (42.40)
	1 year	11 (32.30)	8 (24.20)
Received Influenza vaccination	No	34 (100)	33 (100)
	Yes	0	0
Exposure to passive smoking	Yes	18 (52.90)	20 (60.60)
	No	16 (47.10)	13 (39.40)
Immunization status	Fully immunized	05 (14.70)	06 (18.20)
	Partially immunized	24 (70.60)	25 (75.80)
	Not at all immunized	05 (14.70)	02 (6.10)
Cooking fuel used in house	LPG	26 (76.50)	22 (66.70)
	Woodstove	08 (23.50)	11 (33.30)
Type of House	Concrete	21 (61.80)	12 (36.40)
	Semi concrete	08 (23.50)	15 (45.50)
	Mud house	05 (14.70)	06 (18.20)
Overcrowded environment	Yes	10 (29.40)	16 (48.50)
	No	24 (70.60)	17 (51.50)
Pet animal at home	Yes	24 (70.60)	16 (48.50)
	No	10 (29.40)	17 (51.50)

(Contd...)

Table 1: (*Continued*)

Sociodemographic variables	Sample characteristics	F (%)	
		Experimental group (*n*=34)	Control group (*n*=33)
Family history of RTI	Yes	34 (100)	33 (100)
Past history of hospitalization for RTI	Yes	18 (52.90)	15 (45.50)
	No	16 (47.10)	18 (54.50)
Presently taking antibiotics	Yes	07 (20.60)	03 (9.10)
	No	27 (79.40)	30 (90.90)
Currently taking Steam	No	34 (100)	33 (100)

LPG: Liquefied petroleum gas

group were exposed to passive smoking. Majority of the children (70.60%) in experimental group and (75.80%) in control group were partially immunized. Source of the cooking fuel used in majority of the families (76.50%) in the experimental group and (66.70%) in the control group was liquefied petroleum gas. Majority of the children (66.80%) lived in concrete house while most of the children (45.40%) in the control group lived in semi concrete house. Majority of the families (70.60%) in the experimental group and most of the children (51.50%) do not live in overcrowded environment. Majority of the children (70.60%) in the experimental group and most of the children (51.50%) in the control group had pet animals in their families. Nearly 100% of children in the experimental as well as control group had family history of respiratory tract infections. Majority of the children (79.40%) in the experimental group and (90.90%) in the control group were not taking antibiotics at present. None of the children in the experimental as well as control group was taking steam.

Baseline Cardiopulmonary Parameters

Table 2 illustrates that the mean baseline systolic blood pressure of the experimental group was 90.29 ± 8.343 and of control group was 92.12 ± 8.929. The mean baseline diastolic blood pressure of the experimental group was 57.64 ± 6.988 and of control group was 57.58 ± 7.513. The mean baseline heart rate of the experimental group was 112.53 ± 10.082 and of control group was 108.36 ± 8.536. The mean baseline respiration rate of the experimental group was 27.82 ± 3.205 and of control group was 27.82 ± 3.548. The mean baseline Spo2 of the experimental group was 82.82 ± 2.961 and of control group was 81.91 ± 2.213. The mean baseline cough score of the experimental group was 2.18 ± 0.584 and of control group was 2.56 ± 0.613. The mean baseline breath sound score of the experimental group was 2.76 ± 0.431 and of control group was 2.33 ± 0.736. The mean baseline chest expansion score of the experimental group was 2.67 ± 0.479 and of control group was 2.35 ±.544. The mean baseline dyspnea score of the experimental group was 4.56± 0.991 and of control group was 4.60 ± 1.212. There was no significant difference between the base line parameters of both the groups as the *P* value was more than 0.005.

Frequency and Percentage Distribution of Participants According to Cardiopulmonary Parameters in Experimental Group

Table 3 illustrates that in the experimental group before intervention blood pressure of 20.58% of children was normal while blood pressure of 79.41% of children was abnormal. After intervention, blood pressure of 52.94% of children was normal and of 40.05% was abnormal. Heart rate of 29.41% of children was normal while of 70.58% of children were abnormal. After intervention, heart rate of 55.88% of children was normal and of 44.11% was abnormal. Respiration rate of 23.52% of children was normal while of 76.47% of children were abnormal. After intervention respiration rate of 40.05% of children was normal and of 52.94% was abnormal. Spo2 of 29.41% of children was normal while of 70.58% of children were abnormal. After intervention, Spo2 of 67.64% children was normal and of 32.35% was abnormal. Chest expansion of 32.35% of children was normal while of 67.64% of children were abnormal. After intervention chest expansion of 70.58% of children was normal and of 29.41% was abnormal. Breath sounds of 41.17% of children were normal while of 58.82% of children were abnormal. After intervention breath sounds of 76.47% of children was normal and of 23.52% was abnormal. Cough was absent in 38.23% of children while it was present in 61.76% of children. After intervention cough was absent in 64.70% of children and was present in 35.29% of children. Dyspnea was absent in 23.52% of children while it was present in 76.47% of children. After intervention, cough was absent in 58.82% of children and was present in 41.17% of children.

Frequency and Percentage Distribution of Participants According to Cardiopulmonary Parameters in Control Group

Table 4 illustrates that in the control group before intervention blood pressure of 21.21% of children was normal while blood pressure of 78.78% of children was abnormal. Posttest blood pressure of 24.24% of children was normal and of 75.75% was abnormal. Heart rate of 15.15% of children was normal, whereas of 84.84% of children were abnormal. Posttest heart rate of 18.18% of children was normal and of 81.81% was abnormal. Respiration rate of 24.24% of children was normal

Table 2: Baseline cardiopulmonary parameters of children with acute respiratory tract infections in experimental and control group

Cardiopulmonary parameters	Experimental group (*n*=34) Pre test Mean±SD	Control group (*n*=33) Pre test Mean±SD	Mean difference	*t* value calculated	*P* value
Systolic B.P.	90.29±8.343	92.12±8.929	2.112	0.876	0.3891
Diastolic B.P.	57.64±6.988	57.58±7.513	1.772	0.033	0.973
Heart rate	112.53±10.082	108.36±8.536	2.285	1.824	0.072
Respiration rate	27.82±3.205	27.82±3.548	0.826	0.000	1.000
Spo2	82.82±2.961	81.91±2.213	0.910	1.421	0.159
Cough score	2.18±0.584	2.56±0.613	0.601	4.259	0.214
Breath sounds score	2.76±0.431	2.33±0.736	0.431	2.939	0.069
Chest expansion score	2.67±0.479	2.35±0.544	0.130	2.503	0.072
Dyspnea score	4.56±0.991	4.60±1.212	7.44	2.756	0.066

At df=66, $P<0.05$

Table 3: Frequency and percentage distribution of participants according to cardiopulmonary parameters in experimental group

Variables	Pretest *n*=34		Post test *n*=34	
	Normal (%)	Abnormal (%)	Normal (%)	Abnormal (%)
Blood pressure	07 (20.58)	27 (79.41)	18 (52.94)	16 (40.05)
Heart rate	10 (29.41)	24 (70.58)	19 (55.88)	15 (44.11)
Respiration rate	08 (23.52)	26 (76.47)	16 (40.05)	18 (52.94)
Spo2	10 (29.41)	24 (70.58)	23 (67.64)	11 (32.35)
Chest expansion	11 (32.35)	23 (67.64)	24 (70.58)	10 (29.41)
Breath sounds	14 (41.17)	20 (58.82)	26 (76.47)	08 (23.52)
Cough	13 (38.23)	21 (61.76)	22 (64.70)	12 (35.29)
Dyspnea	08 (23.52)	26 (76.47)	20 (58.82)	14 (41.17)

Table 4: Frequency and percentage distribution of participants according to cardiopulmonary parameters in control group

Variables	Pretest *n*=33		Post test *n*=33	
	Normal (%)	Abnormal (%)	Normal (%)	Abnormal (%)
Blood Pressure	07 (21.21)	26 (78.78)	08 (24.24)	25 (75.75)
Heart Rate	05 (15.15)	28 (84.84)	06 (18.18)	27 (81.81)
Respiration rate	08 (24.24)	25 (75.75)	10 (30.30)	23 (69.69)
Spo2	10 (30.30)	23 (69.69)	12 (36.36)	21 (63.63)
Chest expansion	11 (33.33)	22 (66.66)	13 (39.39)	20 (60.60)
Breath sounds	12 (36.36)	21 (63.63)	15 (45.45)	18 (54.54)
Cough	13 (39.39)	20 (60.60)	15 (45.45)	18 (54.54)
Dyspnea	07 (21.21)	26 (78.78)	10 (30.30)	23 (69.69)

while of 75.75% of children were abnormal. Posttest respiration rate of 30.30% of children was normal and of 69.69% was abnormal. Spo2 of 30.30% of children was normal while of 69.69% of children were abnormal. Posttest Spo2 of 36.36% of children was normal and of 63.63% was abnormal. Chest expansion of 33.33% of children was normal while of 66.66% children were abnormal. Posttest chest expansion of 39.39% of children was normal and of 60.60% was abnormal. Breath sounds of 36.36% children were normal while of 63.63% of children were abnormal. Posttest breath sounds of 45.45% children were normal and of 54.54% were abnormal. Cough was absent in 39.39% children, whereas it was present in 60.60% children. During posttest cough was absent in 45.45% children and was present in 54.54% children. Dyspnea was absent in 21.21% children, whereas it was present in 78.78% children. During posttest, dyspnea was absent in 30.30% children and was present in 69.69% children.

Related to Effectiveness of Balloon Blowing Exercise Within Experimental Group

Data presented in Table 5 shows that within the experimental group there was no significant difference between the mean pretest systolic blood pressure (90.29 ± 8.343) and the mean

posttest systolic blood pressure (96.36 ± 4.88), $P < 0.05$. There was no significant difference between mean pretest diastolic blood pressure (57.64 ± 6.988) and the mean posttest diastolic blood pressure (63.23 ± 6.382), $P < 0.05$.

Data presented in Table 6 shows that the mean posttest heart rate significantly reduced to normal (96.47 ± 6.730) as compared to the mean pretest heart rate (112.53 ± 10.082).

Data presented in Table 7 shows that the mean posttest respiration rate significantly reduced to normal (25.47 ± 1.911) as compared to the mean pretest respiration rate (27.82 ± 3.205)

Data presented in Table 8 shows that the mean posttest Spo2 significantly increased to normal (95.23 ± 2.774) as compared to the mean pretest Spo2 (82.82 ± 2.961).

Data presented in Table 9 shows that the mean posttest cough score significantly decreased (1.62 ± 0.493) as compared to the mean pretest cough score (2.18 ± 0.584).

Data presented in Table 10 shows that the mean posttest breath sound score significantly decreased to normal (2.18 ± 0.769) as compared to the mean pretest breath sound score (2.76 ± 0.431).

Data presented in Table 11 illustrates that the mean posttest, chest expansion score significantly decreased to normal (2.16 ±.702) as compared to the mean pretest chest expansion score (2.67 ±.479).

Data presented in Table 12 illustrates that the mean posttest dyspnea score significantly decreased to normal (3.74 ± 1.024) as compared to the mean pretest dyspnea score (4.56 ± 0.991).

Related to Effectiveness of Balloon Blowing Exercise between Experimental and Control Group

Data presented in Table 13 illustrates that there is no significant difference between the mean post test systolic blood pressure in the experimental group (96.36 ± 4.88) and control group (97.88 ± 6.963). There was no significant difference between mean posttest diastolic blood pressure in the experimental group (63.23 ± 6.382) and control group (62.42 ± 7.513). The mean posttest heart rate of the

Table 5: Effectiveness of breathing exercises on blood pressure, *n*=34

Variable	Pretest Mean±SD	Post test Mean±SD	*t*- value calculated	*P* value
Systolic B.P.	90.29±8.343	96.36±4.88	11.354	0.231
Diastolic B.P.	57.64±6.988	63.23±6.382	8.245	0.325

df=33, P value>0.05. BP: Blood pressure

Table 6: Effectiveness of breathing exercises on heart rate, *n*=34

Variable	Pretest Mean±SD	Post test Mean±SD	*t*- value calculated	*P* value
Heart rate	112.53±10.082	96.47±6.730	12.518	0.001*

df=33, *P* value>0.05 *significant

Table 7: Effectiveness of breathing exercises on respiration rate, *n*=34

Variable	Pretest Mean±SD	Post test Mean±SD	*t*- value calculated	*P* value
Respiration rate	27.82±3.205	25.47±1.911	6.356	0.001*

df=33, *P*>0.05 * significant

Table 8: Effectiveness of breathing exercises on Spo2, *n*=34

Variable	Pretest Mean±SD	Post test Mean±SD	*t*- value calculated	*P* value
Spo2	82.82±2.961	95.23±2.774	10.520	0.001*

df=33, *P*>0.05 *significant

Table 9: Effectiveness of breathing exercises on cough, *n*=34

Variable	Pretest Mean±SD	Post test Mean±SD	*t*- value calculated	*P* value
Cough	2.18±0.584	1.62±0.493	6.465	0.001*

df=33, *P*>0.05 * significant

Table 10: Effectiveness of breathing exercises on breath sounds, *n*=34

Variable	Pretest Mean±SD	Posttest Mean±SD	*t*- value calculated	*P* value
Breath sounds	2.76±0.431	2.18±0.769	3.973	0.001*

df=33, *P*>0.05 *significant

experimental group (96.47 ± 6.730) significantly reduced to normal as compared to the control group (100.55 ± 8.750). The mean posttest respiration rate of the experimental group (25.47 ± 1.911) significantly reduced to normal as compared to the control group (27.18 ± 3.583). The mean posttest Spo2 of the experimental group (95.23 ± 2.774) significantly increased to normal as compared to the control group (92.27 ± 2.020). The mean posttest cough score of the experimental group (1.62 ± 0.493) significantly reduced to normal as compared to the control group (1.86 ± 0.496). The mean posttest breath sound score of the experimental group (2.18 ± 0.769) significantly reduced to normal as compared to the control group (2.44 ± 0.613). The mean posttest chest expansion score of the experimental group (2.16 ± 0.702) significantly reduced to normal as compared to the control group (2.36 ± 0.699). The mean posttest dyspnea score of the experimental group (3.74 ± 1.024) significantly decreased to normal as compared to the control group (4.55 ± 1.063).

Association Between PreInterventional Cardiopulmonary Parameters and Sociodemographic Variables

Heart rate was found to be significantly associated with overcrowding environment (P = 0.039) and the presence of pet animals at home (P = 0.001). Respiration rate was found to be significantly associated with lower socioeconomic status (P = 0.004) and contact with passive smoking (P = 0.031). Chest expansion was found to be significantly associated with lower socioeconomic status (P = 0.001) and moderately malnourished (P = 0.029). Breath sounds were found to be significantly associated with overcrowding environment (P = 0.018). No significant association was found between blood pressure and any sociodemographic variable. No significant association was found between Spo2 and any sociodemographic variable.

Paired *t*- test was used to check effectiveness of balloon blowing exercise on blood pressure, heart rate, respiration rate, spo2, cough score, breath sound score, chest expansion score, and dyspnea score within the experimental group.

Independent *t*-test was used to check effectiveness of balloon blowing exercise on blood pressure, heart rate, respiration rate, spo2, cough score, breath sound score, chest expansion score, and dyspnea score between experimental and control group.

Chi-square was used to determine association between preinterventional cardiopulmonary parameters and sociodemographic variables.

DISCUSSION

The present study showed that the mean posttest heart rate (96.47), respiration rate (25.47), and Spo2 (95.2) of the

Table 11: Effectiveness of breathing exercises on chest expansion, *n*=34

Variable	Pretest Mean±SD	Post test Mean±SD	*t*- value calculated	*P* value
Chest expansion	2.67±0.479	2.16±0.702	6.465	0.001*

df=33, *P*>0.05 *significant

Table 12: Effectiveness of breathing exercises on dyspnea, *n*=34

Variable	Pretest Mean±SD	Post test Mean±SD	*t*- value calculated	*P* value
Dyspnea score	4.56±0.991	3.74±1.024	10.954	0.001*

df=33, *P*>0.05 *significant

Table 13: Effectiveness of breathing exercises on cardiopulmonary parameters in experimental and control group

Variables	Experimental group *n*=34 Post test Mean±SD	Control group *n*=33 Post test Mean±SD	*t* value calculated	*P* value
Systolic B.P.	96.36±4.88	97.88±6.963	1.037	0.303
Diastolic B.P.	63.23±6.382	62.42±7.513	0.476	0.635
Heart rate	96.47±6.730	100.55±8.750	2.143	0.035*
Respiration rate	25.47±1.911	27.18±3.583	2.447	0.017*
Spo2	95.23±2.774	92.27±2.020	4.980	0.001*
Cough	1.62±0.493	1.86±0.496	1.903	0.001*
Breath sounds	2.18±0.769	2.44±0.613	2.0474	0.044*
Chest expansion	2.16±0.702	2.36±0.699	2.648	0.010*
Dyspnea	3.74±1.024	4.55±1.063	0.745	0.002*

df=66, *P*>0.05 *Significant

experimental group was significantly near to normal as compared to control group. The mean posttest cough score (1.62), breath sound score (2.18), chest expansion score (2.16), and dyspnea score (3.74) of experimental group was significantly lower than the control group.

Similar results were obtained in a study conducted by Bernadi, Spadacini (1998) to assess the effect of selected breathing exercise on cardiopulmonary parameters of children with abdominal surgery. The result showed that on the post-operative day 1, significant difference was found in mean respiratory rate (t = 1.86) and mean lung volume (t = 2.196). On the post-operative day second (t = 1.71) and third (t = 1.877), difference was found in mean lung volume and respiratory rate.

The above results are supported by a study conducted by Cecily and Alotaibi to assess the effectiveness of breathing exercises among chronic obstructive pulmonary disease (COPD) patients in the reduction of dyspnea, improvement of pulmonary functional parameters, and quality of life (QOL). The results showed that after undergoing breathing exercises, in the experimental group, the level of dyspnea was significantly reduced ($P < 0.001$), and there was significant improvement in the QOL and pulmonary functional parameters such as forced expiratory volume (FEV1), forced vital capacity (FVC), FEV1/FVC ratio, and peak expiratory flow rate.[12]

In the present study, the mothers reported good compliance of children to balloon blowing exercises when asked by the investigator. This finding was supported by a study conducted by Chun Shi, Ying Hong (2008–2011) to survey the compliance of patients with COPD to balloon blowing pendulum lung function exercise. The result indicated that time and frequencies for exercises were more in improved group than in traditional group. COPD patients having balloon blowing lung function exercises better compliance than those having traditional exercises.

The strength of the study is that the researcher selected the statistical test based on the distribution of the data. The limitation of this study was that the relative resistance of the balloon was not constant as single balloon was inflated for ten times in one cycle of balloon blowing exercise.

CONCLUSION

From the findings of the study, it can be concluded that breathing exercises incorporated as play activity among children have more acceptances. Breathing exercises as play method (balloon blowing) had advantageous effects on cardiopulmonary parameters of children with acute respiratory tract infections.

ACKNOWLEDGMENT

We would like to express our special thanks of gratitude to Ethical Committee, Swami Rama Himalayan University, and all others for their support and cooperation.

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How to cite this article: Pundir N, Sylvia R, Chanu SE, Pugazhendi S, Kumar C. Effectiveness of breathing exercises as play method on cardiopulmonary parameters among children with acute respiratory tract infections in a selected area of Dehradun, Uttarakhand. Int J Med Sci Public Health 2018;7(4):269-276.

Source of Support: Nil,**Conflict of Interest:** None declared.