ACTA SCIENTIFIC MEDICAL SCIENCES (ISSN: 2582-0931)

Volume 4 Issue 1 January 2020

Research Article

Effectiveness of Breathing Exercises on Lower Respiratory Tract Infections among School Children at Tertiary Hospitals, Guntur District, Andhra Pradesh

D Padmaja[1] and S Gomathi[2]

[1]*NRI College of Nursing, Guntur, Andhra Pradesh, India*

[2]*Associate Professor, NRI College of Nursing, Guntur, Andhra Pradesh, India*

***Corresponding Author:** S Gomathi, Associate Professor, NRI College of Nursing, Guntur, Andhra Pradesh, India.

Received: December 06, 2019; **Published:** December 11, 2019

DOI: 10.31080/ASMS.2020.04.0502

Abstract

Background: Infection and inflammation of the lungs is particularly troublesome and is seen in many different forms in children. Several educational programmes have been developed for children with Lower respiratory tract infection, in order to promote changes in behavior and to improve health and quality of life. Alexandra Severovna Sterlinkova developed an exercise has the virtue of helping with a wide spectrum of respiratory illnesses, such as asthma, chronic bronchitis and tuberculosis. The present study was undertaken to evaluate the Effectiveness of Breathing Exercises on Respiratory Parameters among Children.

Methods: Non-Equivalent Control Group design was adopted for the study, Children in the age group of 6-12 years with lower respiratory tract infections with a sample size of 60 were selected and divided into two groups by using convenient sampling technique. The setting of the study included NRI General Hospital and Guntur Government General hospital. Data collected using structured questionnaire and checklist on respiratory tract parameters in the pretest and demonstrated to perform sterlinkova Exercises three times every day for 5 days with routine care and conducted posttest on 5th day in the experimental group. In the control group, conducted pretest and no intervention given, only routine care for 5 days and posttest on 5th day.

Results: In the experimental group, pretest Mean, SD scores were 17.33, 1.92 and posttest Mean, SD scores were 14.6, 1.48. The obtained paired "t" value for the experimental group was 5.98. This showed the value higher than the table value at $p < 0.001$. There was statistically significant difference in pretest and post-test scores. This showed that there was an effectiveness of sterlinkova exercises on lower respiratory tract infection. There was no significant association in post-test scores of the experimental group on respiratory parameters among children with lower respiratory tract infection with a selected demographic variable.

Conclusion: The findings revealed that sterlinkova exercises improved the respiratory parameters among children (6-12 years) with lower respiratory tract infection.

Keywords: Breathing Exercises; Respiratory Parameters; Lower Respiratory Tract Infections; Children; Respiratory Tract Infections; Sterlinkova Exercises; Respiratory Disorders.

Introduction

The lung is the internal organ most vulnerable to infection and injury from the external environment because of its constant exposure to particles, chemicals and infectious organisms in ambient air. Globally, atleast 2 billion people are exposed to the toxic smoke of biomass fuel, typically burned inefficiently in poorly ventilated indoor stoves or fireplaces. One billion people inhale polluted outdoor air, and a billion are exposed to tobacco smoke [1].

ARIs are not confined to the respiratory tract and have systemic effects because of the possible extension of infection or microbial toxins, inflammation, and reduced lung function [2].

The most common LRIs in children are bronchiolitis and pneumonia. The most frequent symptoms and signs in these children are cough and an increased respiratory rate. The occurrence of lower chest wall indrawing is indicative of a more severe disease. The most common causes of LRIs are viruses and RSV, a major cause among other viruses [3,4].

For decades, acute lower respiratory tract infections have been among the top three causes of death and disability among both children and adults. Although the burden is difficult to quantify, it is estimated that lower respiratory tract infection causes nearly 4 million deaths annually and is a leading cause of death among children under 5 years old [5]. Pediatric acute infections of the airways continue to play an important role worldwide. The burden of these diseases is reflected by high incidence, substantial morbidity and potential sequelae; tendency of overdiagnosis, especially in streptococcal pharyngitis and acute otitis media; associated overuse and

misuse of antibiotics; and relevant contributor to healthcare costs and indirect societal costs [6].

RTIs are usually manifested by a combination of rhinitis, cough, sore throat, wheeze, and fever. The vast majority of these infections in children are managed in the primary care setting, with only a small number needing hospital admission. Acute RTI is one of the leading causes of childhood mortality [7]. Moreover, acute lower respiratory tract infections in children predispose for chronic respiratory diseases later in life [8]. The Forum of International Respiratory Societies (FIRS) asserts that alleviating the burden of respiratory disease should be a leading strategy of the Sustainable Development Goals and a requirement for nations to achieve [1].

Nurses also play an extended role in supporting parents who may be worried and anxious about their child's symptoms, by ensuring appropriate follow-up arrangements are provided, and that written and verbal safety net explanations are given and understood with regard to what should be done if the child deteriorates at home. Nurses also play an important role in encouraging uptake of immunization, which has been found to play a preventive role in development of further RTIs [8].

The technique of A.N. Strelnikova has hyperventilation and hypercapnic nature, exercises performed with active inhale, without breath-holding, in a combination with dynamic physical exercises [9].

Strelnikova breathing exercises can restore voice, eliminate symptoms of chronic diseases, such as asthma and bronchitis, and even create a voice for those people who could not sing [10].

Regulation of breathing, according to Sterlinkova, must begin with a breath, as it is primary, and exhalation is secondary. Inhale should be short, active, with compression of the wings of the nose, but shallow. Exhalation - passive, carried out by itself. These exercises are simple and are performed with a pulse of less than 100 beats per minute, approximately eight breaths in six seconds, which corresponds to a walking pace of 80 steps per minute [11].

A study to evaluate the effectiveness of breathing exercises as play method on cardiopulmonary parameters among children with acute respiratory tract infections. 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. 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. The mean posttest heart rate 96.47, respiration rate 25.47, and SpO_2 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 lower than the control group. There was significant association between cardiopulmonary parameters and selected demographic variables. Breathing exercises have advantageous effects on cardiopulmonary parameters among children with acute respiratory infections [12].

A study aimed to assess the effectiveness of strelinikova breathing exercises on respiratory signs and parameters among children with Lower respiratory tract infections (LRTI) in Masonic Hospital, Coimbatore. A Quasi experimental, non-equivalent control group pretest and posttest design. The purposive sampling technique was used to select 30 samples for experimental group and followed by 30 samples for control group. In experimental group, the intervention of Strelnikova breathing exercise was taught to the child and made them to do the exercises daily for 30 minutes in the morning, afternoon and evening for 5 consecutive days. In control group, the existing hospital routine was practiced. On the 5th day post test was done in both experimental and control group. There is significant difference in independent 't' test regarding respiratory signs ('t' value =5.2), peak flow rate ('t' value=16) and oxygen saturation level ('t' value=5.27) at $p< 0.05$ level of significance between experimental group and control group. The study findings revealed that Strelnikova breathing exercises was beneficial and there was a significant reduction in respiratory signs and improvement in respiratory parameters in experimental group among child with Lower respiratory tract infections (LRTI) [13].

The aim of the study was to evaluate the effectiveness of breathing exercises on respiratory parameters among children (6-12 years) with Lower Respiratory Tract Infections among experimental group and control group.

Methods

A Quasi-experimental, Non-Equivalent Control Group design adopted to conduct the study. Children in the age group of 6-12 years with lower respiratory tract infections with a sample size of 60 were selected by using Convenient sampling, subjects were selected, because of their convenient, accessibility and proximity to the researcher. Out of which 30 children were allocated in the experimental group and 30 children in the control group. The setting of the study included NRI General Hospital, Chinakakani, Guntur and Government General Hospital.

A structured questionnaire was prepared with the help of review of literature and experts in the field. The questionnaire comprises of 3 sections.

Section-A

Socio-Demographic data: Socio-demographic data include age of the child, gender of the child, religion of the child, education, type of residential area, type of house, type of diet, type of the family,

income of the family, Birth order of the child, duration of present hospital stay, previous history of admission in the hospital with lower respiratory tract infections, previous episode of lower respiratory tract infection

Section-B

Interview schedule: To assess environmental factors for lower respiratory tract infections. The Interview schedule included 8 items about the predisposing factors of lower respiratory tract infections.

Section-C

Observational checklist to assess the respiratory tract parameters included: Temperature, Skin color, Respiratory rate, Depth of respiration, Rhythm, Breath sounds, Chest movement, Mode of breath, Oxygen saturation, Sputum color clear, Accessory muscle used for respiration.

Content validity of the tool from the field of experts. Reliability of the tool was 0.81. Data collected from 15-2-2018 to 30-3-2018, Informed consent obtained from the parents, Pre-test was conducted for both the experimental group and the control group. The experimental group were demonstrated and supervised sterlinkova breathing exercise three times a day for 5 days. The main requirement of the exercise was to do exercise inhalations and count inhalations. Short sniffs are performed simultaneously with exercises pressing the chest. It improves nasal breathing and arouses the diaphragmatic activity. Control group were provided with routine care.

Post-test was carried out after 5 days of intervention among the experimental and control group.

Data analysis

Frequency and percentage, Mean and standard deviation were calculated, Paired t' test was used to find the differences between pretest and post-test scores of Experimental and control groups. Independent 't' test used to analyze and compare the pre and post-test scores of both Experimental and control groups. Chi-square test used to analyze the association of post-test scores with the selected socio-demographic variables.

Results

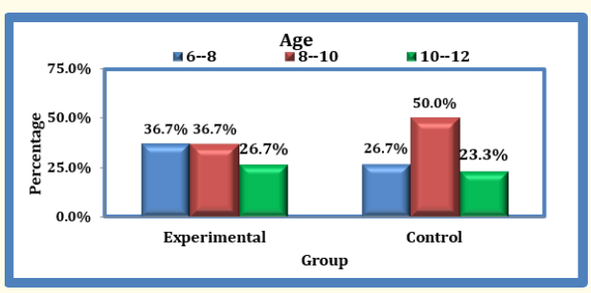

Figure 1: Percentage distribution of Lower Respiratory Tract Infection in children by age.

Regarding the age of the child in the experimental group, most of the respondents 11(36.7%) were in the age group of 6-8 years and 8-10 years of age. Whereas in the control group most respondents 15 (50%) were in the age group of 8-10 years.

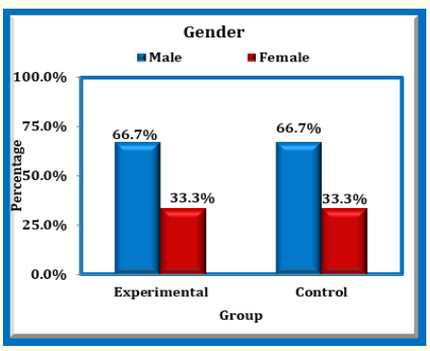

Figure 2: Percentage distribution of Lower respiratory tract infection in children by Gender.

Regard to the gender of the child, most respondents in the experimental group and control group were male child 20 (66.7%).

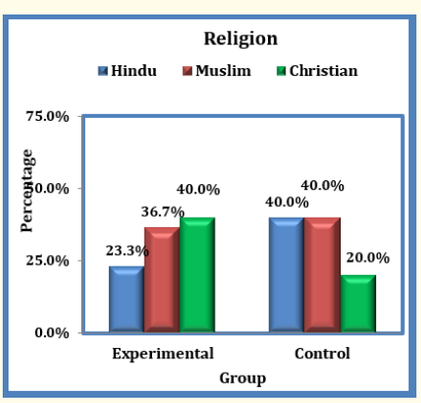

Figure 3: Percentage distribution of Lower respiratory tract infection in children by religion.

Regard to religion of the child, in the experimental group, most of the respondents were Christians 12(40.0%). Whereas in control group majority of the respondents, were Hindus and Muslims 12(40.0%).

Groups	Mild		Moderate	
Experimental group	**f**	**%**	**f**	**%**
Pre-test	28	93.3%	2	6.7%
Post-test	30	100%	0	0.0%
Control group				
Pre-test	28	93.3%	2	6.7%
Post-test	28	93.3%	2	6.7%

Table 1: Severity of Lower Respiratory tract Infection in the experimental group and control group.

The data represented in table 1, regarding the severity of lower respiratory tract infection in the experimental group, majority of respondents had mild lower respiratory tract infection 28(93.3%) and few respondents had moderate lower respiratory tract infections 2(6.7%) in the pretest. In posttest majority of respondents had mild lower respiratory tract infection 30(100%) and none had moderate lower respiratory tract infection. In the control group, most respondents had mild lower respiratory tract infection 28(93.3%) in pretest and posttest. Few respondents 2(6.7%) had moderate lower respiratory tract infections in both pretest and posttest.

	Experimental				Control Group			
	Mean	SD	Paired t value	p-Value	Mean	SD	Paired-t value	p-Value
Pre-test	17.3	1.92	5.98	<0.001	17.37	2.08	0.07	0.05
Post-test	14.6	1.48			17.33	1.92		

Table 2: Paired t' test of experimental group and control group with Lower respiratory tract infections among children.

In experimental group pre- test mean scores were 17.33 and post -test mean scores were 14.6 and standard deviation of pre-test and post -test of experimental group were 1.92 and 1.48 respectively. The obtained paired "t" value for experimental group was 5.98. This showed the value was higher than the table value 3.66 at p <0.001. This clearly indicated that there was statistically significant difference in pre- test and post test scores. This showed that there was effectiveness of strelinkova exercises on lower respiratory tract infection.

In the control group pretest mean, standard deviation scores were 17.37, 2.08 and posttest mean, standard deviation scores were 17.33, 1.92 respectively. The obtained paired "t" value for the control group was 0.07. This showed the value was lesser than the table value of 1.70. There was no statistically significant difference in pretest and post-test scores of the control group.

Table 3 represents the data about the comparison of the experimental group and control group with pretest and posttest scores.

Independent 't' test				
	Mean	SD	Independent t- value	P-value
Experimental Pre test	17.33	1.92	0.065	0.949
Control Pre test	17.37	2.08		
Experimental Post test	14.6	1.48	6.19	<0.001
Control Post test	17.33	1.92		

Table 3: Independent 't' test of experimental group and control group with Lower respiratory tract infections among children.

Pretest Mean, Standard deviation scores of experimental group and control group were 17.33,1.92 and 17.37,2.08 Independent "t" value was 0.065. This showed the value was higher than the table value at p=0.949. This clearly indicated that there was statistically significant difference in pre-test scores of the experimental and control group.

Posttest Mean, Standard deviation scores of experimental group and control group were 14.6, 1.48 and 17.33, 1.92. Independent "t" value was 6.19. This showed the value was higher than the table value at p<0.001. This clearly indicated that there was statistically significant difference in and post-test scores of experimental and control groups.

The computed chi-square values of posttest for respiratory parameters scores were found not to be statistically significant at p <0.05 level, which indicated that there was no significant association between respiratory parameters scores and selected demographic variables.

Discussion

Among the experimental group and control group, in the pre-test, most of the respondents had a temperature of 98.4-99.4of, skin color were pale, <20 respirations, had deep respiration, irregular Rhythm, Wheeze, asymmetrical chest movement 22(73.3%), mouth breathing. an oxygen saturation of> 95, clear sputum, thick sputum and used accessory muscles for respiration.

In experimental group pretest scores regarding the severity of lower respiratory tract infection, majority of respondents had mild lower respiratory tract infection 28(93.3%); in post-test majority of respondents had mild lower respiratory tract infection 30(100%).

In the control group, pretest and posttest scores regarding the severity of lower respiratory tract infection, the majority had mild lower respiratory tract infection 28(93.3%).

In the experimental group the mean and S.D 5.97 and 1.56. In the control group the mean and S.D 6.27 and 1.55. The obtained "t" value for the experimental group was 5.98. This showed the value was higher than the table value at p <0.001. This clearly indicated that there was a statistically significant difference in pre-test and post-test scores. This showed that there was an effectiveness of sterlinkova exercises on lower respiratory tract infection.

Studies of Vimala, Arul showed that Strelinikova breathing exercise was effective in part II respiratory signs. The findings revealed that the administration of Strelinikova breathing exercise has a better effect in reducing lower respiratory tract infection [13].

The study results showed a significant difference in independent 't' test regarding respiratory signs at $p<0.05$ level of significance between experimental group and control. The study concluded that strelnikova breathing exercise was beneficial and there was a significant reduction in respiratory signs and improvement in respiratory parameters in experiment group among children with lower respiratory tract infection.

Other studies showed that significant increases in maximum inspiratory pressure and maximum expiratory pressure were demonstrated [14].

The computed chi-square values in post-test for respiratory parameters scores were found not to be statistically significant at $p <0.05$ level. which indicated that there was no significant association between respiratory parameters scores and demographic variables. Clinical trials show that regular practicing of exercise reduces the frequency of attack and can eliminate chronic infection caused by asthma. It also benefits by strengthening breathing apparatuses well as through keeping the nose clean and developing a strong habit of nasal breathing that reduces exposure to allergens. Education of parents and children is an important aspect of lower respiratory tract infection treatment [15]. Parents should also be asked to maintain a record of daily symptoms such as cough, wheezing, breathlessness and sleep disturbance.

Conclusions

The following conclusion was formed on the bases of the study results:

- The findings revealed that sterlinkova exercises improved the respiratory parameters among children (6-12 years) with lower respiratory tract infection.

The findings revealed that the sterlinkova exercise had effective results.

This study implies health care providers can use these adjuvants as therapeutic play in the day to day practice so that it helps the child to recover from the respiratory illness. The findings of the study serve as a basis for further studies on different breathing exercise in children. The study will motivate the beginning researchers to conduct the same study with different variables at a large scale.

Conflict of Interest

No conflicts to children and parents.

Ethical Standards

The author declares that participation was voluntary, all subjects gave their informed consent before entering the study.

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