European Journal of Molecular & Clinical Medicine
ISSN 2515-8260 Volume 7, Issue 11, 2020

Effectiveness of Breathing Exercise as Play Way Method on Cardiopulmonary Parameters Among Children (3-12 Years) With LRTI (Lower Respiratory Tract Infections) At Tertiary Care Hospital, Bhubaneswar.

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Abstract: Objective: To assess the impact of breathing exercise which was introduced as a method of play therapy to measure the cardiopulmonary parameters among children (3-12 years) with LRTI and to determine the association between the socio-demographic variables of children with group after intervention. Method: Evaluation approach was adopted and the study was based on the conceptual framework of Pender's health promotion revised model. A quasi-experimental control group design was adopted. The sample of 40 children was divided into 20 in each experimental and control group. Data collected by using socio-demographic variables and observational checklist. The tool was validated by verifying it with different experts from professionals of medical science, nursing science, and statistician. Result: There was a maximum of samples (65%) were of 3-5 years of age and (68%) were male. The majority of samples (40%) were from rural area. With regards to diagnosis and immunization status, majority samples (60%) were of bronchitis, and (70%) were fully immunized respectively. There was a significant difference after the administration of the intervention of cardiopulmonary parameters in the interventional group. The post-test of respiration rate, mean ± SD (35.30±4.82) was less than pre-test respiration mean ± SD (38.30±4.70), and 't' =9.57 was revealed extremely statistically significant at P <0.00001. The post-test plus rate mean ± SD(122.60±5.62) is less than the pre-test pulse mean ± SD (128.10±6.62), and 't' =15.63 was revealed extremely statistically significant at P<0.00001. The post-test systolic BP mean ± SD (89.70±7.54) is less than the pre-test systolic BP mean ± SD (92.40±7.12), and 't' =7.42 was recorded extremely statistically significant at P<0.00001 and the post-test diastolic BP mean ± SD (61.10±3.06) is less than the pre-test diastolic BP mean ± SD (63.20±3.25), and 't' =6.84 was recorded to be extremely statistically significant at P<0.00001. The post-test chest expansion mean ±SD (51.60±2.51) was greater than the pre-test chest expansion mean ±SD (50.10±2.54), and the 't' =16.97 was revealed to be extremely statistically significant at P<0.00001. Conclusion: In the present study there was no association between cardiopulmonary parameters with selected demographic variables such as age, gender developmental age, area of residence, diagnosis, and immunization status after the therapeutic intervention. The present study can be implicated in the field of nursing in specific areas of clinical practice, nursing education, administration, and research.

Keywords: Cardiopulmonary Parameters, Lower Respiratory Tract Infection.

INTRODUCTION

Acute lower respiratory infection and undernutrition has played a crucial role in child mortality and morbidity rate. So it always refocusing the attention of researcher & policymaker on the importance of optimal maternal-child-nutrition for promoting neonatal, infant, and child survival, including the prevention

of mortality due to severe acute lower respiratory infection (ALRI). In India ARI, mainly lower respiratory tract infections (Pneumonia, bronchiolitis, and severe influenza) are the most common cause of death among children below 5 years of age, [2-3] due to which nearly 1.9 million childhood deaths are occurring per year. [4-5] All over the world, about 85-88% of ARI infections are due to Acute Upper Respiratory Infections (AURI). In most cases, it is estimated recently that ALRI associated mortality in India is due to pneumonia and which was responsible for 369,000 deaths that is 28% of all deaths due to respiratory infection. among them, most of them were children between 1-59 months. Pneumonia was the single most important killer disease in this age group[6]. In 2017, it is estimated that 5.6% of global LRTI deaths were due to influenza. [11] It was suggested in a study that ARI among under-five children, of incidence rates between 2.4 to 7.4 episodes per child per year and due to the lack of community-based research studies related to ARI from India.[7]

As India is a developing country, due to environmental pollution, exposure to an allergen, and urbanization, the current prevalence of asthma was 2.6%, among which children of 0.2% age of below 9 years which was recorded in the year 1966. In the recent year the study shows the current prevalence was 11.9% among the age group between 5 to 15 years among school children .[8] In Tamil Nadu, the overall prevalence of asthma and breathing difficulty in children of the age of 6-12 years was 18% in both urban and rural area .[9]

This study is an attempt to help the children, parents, and family members by improving the health status of children who are admitted to the pediatric ward with ARI by breathing exercises. Many exercises are there which can improve breathing Parten but when it could be applied as a playing method for the child, it is very much acceptable by him. She/he can easily and eagerly perform it. So, the researcher felt necessary to develop simple breathing exercise which can be accepted by children to do it regularly which will affect positively their lung expansion by reducing the secretion and respiratory complications. Children will be more interested to learn, practice and implement deep breathing if it is entertaining.

Material and method:

In this study sample are children of age 3-12 years of pediatric ward with LRTI at Selected Hospital, Bhubaneswar, Odisha. The sample size is 40 children with 20 in each control and Experimental group. The research design for the study was a quasi-experimental control group design and conceptual framework of Pender's health promotion revised model. In the present study independent variable is breathing exercise as a play way method by playing with flute and the dependent variables are cardiopulmonary parameters i.e respiratory rate, pulse rate, blood pressure, and chest expansion. The sampling technique used for the present study is the non-probability purposive sampling technique. Self –structured tools used for this study, which is validated by 5 experts from various fields of medical, nursing & statistics. Reliability was established by using Cronbach alpha formula & found to be 0.71 for structure knowledge questionnaire which indicates reliable.

The tool is divided into 2 parts, i.e Demographic data which consists of 6 items that record the children's age, gender, developmental stage, area of residence, diagnosis and immunization status, and cardiopulmonary parameters that are respiration, pulse rate, blood pressure, and chest expansion. The investigator has to carefully record parameters manually before and after the intervention (blowing air into a flute for 10 times within 1 hour in 2 times per day that is in the morning shift and evening shift) and record the result in the experimental group. The investigator records the same for 3 consecutive days. In the control group, the data are without any intervention at the same time. The collected, analyzed, and interpreted according to the objectives of the study by using descriptive & inferential statistics.

Result:

Finding related to sociodemographic variable of total sample under study (Table No.1)

The Majority of the samples 26 children (65%) were within 3-5 years of age among them 27 children (67.5%) were male. Pre-schooler were 26 children (65%), from rural areas 16 children (40%), children with bronchitis were 24 (60%) and children were complete immunized 23 Nos (57.5%).

Finding related to effectiveness of breathing exercise on cardiopulmonary parameters among children with LRTI by "t" value (Table no-02)

Significant difference was observed in before intervention respiration mean ±SD(38.30±4.70) and the after-intervention **respiration rate** mean ±SD (35.30 ±4.82) of the experimental group. There was a notable difference between the pre and post-intervention respiration rate. The mean post-intervention **respiration rate** (35.30±4.82) is less than the mean pre-intervention respiration rate (38.30±4.70), and the obtained 't' value (9.57) was observed extremely statistically significant at P <0.00001.

The before therapy **pulse rate** mean ±SD (128.00 ±6.62) was higher than the after-intervention pulse rate mean ±SD (122.60 ±5.62. The mean post-intervention **pulse rate** (122.60±5.62) is less than the mean pre-intervention pulse rate (128.10±6.62), and the obtained 't' value (15.63) was observed extremely statistically significant at P <0.00001.

There was a significant difference in before intervention **systolic blood pressure** mean ±SD (92.40 ±7.12) was higher than the after-intervention mean ±SD (89.70 ±7.54) and the before intervention **diastolic blood pressure** mean ±SD (63.20 ±3.25) was higher than the post-administration mean ±SD (61.10 ±3.06). The mean post-intervention of **Systolic BP**(89.70±7.54)is less than the mean pre-intervention **Systolic BP** (92.40±7.12), and the obtained 't' value (7.42) was recorded extremely statistically significant at P <0.00001 and the mean post-intervention diastolic BP (61.10±3.06) is less than the mean pre-intervention **Diastolic BP** (63.20±3.25), and the obtained 't' value(6.84) was recorded extremely statistically significant at P <0.00001.

Accordingly, there was a significant difference in after intervention **chest expansion** mean±SD (51.60 ±2.51) the before intervention mean ±SD (50.10 ±2.54). Hence breathing exercise was exercise effective on cardiopulmonary parameters of children. The mean post-intervention **chest expansion** (51.60±2.51) was greater than the mean pre-intervention chest expansion (50.10±2.54), and the obtained 't' value (16.97) was observed extremely statistically significant at P <0.00001.

For the control group, there were no significant changes in respiration, pulse systolic blood pressure, diastolic blood pressure, and chest expansion pre and after 15 minutes without administration of breathing exercise.

Finding related to comparison of cardiopulmonary parameters between experimental and control group based on unpaired 't' test (Table no.-03)

There was a significant reduction in the **respiration rate** between the experimental and control groups, mean ±SD (28.60±4.82) of the experimental group was significantly lower than the control group (38.50±2.75). The mean difference was 9.90. The unpaired't'= 7.776, at df 38 and p=0.00001 which was extremely statistically significant.

There was a significant reduction in **pulse rate** between the experimental and control group, Post mean ±SD (122.60±5.62) of the experimental group was significantly lower than the control group (135.70±4.83). The mean difference was 13.10. The unpaired 't'= 7.703, at df 38 and p=0.00001 which was extremely statistically significant.

There was no significant reduction in **systolic BP and diastolic BP** between experimental and control groups as the post-test systolic mean ±SD (89.70±7.54) of the experimental group was not significantly lower than the control group (93.90±8.66). The mean difference was 4.20. The unpaired 't'=1.595, at df 38 and p=0.1190 which was not statistically significant, and the post-test diastolicmean±SD (61.10±3.06) of the experimental group was not significantly lower than the control group(62.40 ±2.42). The meandifferencewas1.30.The unpaired't'=1.452, at df 38 and p=0.1547 which was not statistically significant.

There was no significant increase in **chest expansion** between the experimental and control group as the post-test mean ±SD (50.43±2.51) of the experimental group was not significantly higher than the control group (50.20±2.56). The mean difference was0.23. The unpaired 't'=0.279, at df 38 and p=0.7818 which

was not statistically significant.

Finding related to association between post-administration cardiopulmonary parameters with selected demographic variables (Table no-04)

The association between respiration rates with selected demographic variables was not statistically significant at p-value 0.05 level.

Discussion:

The present study was supported by Mathew J, D'Silva F. (2011)[10] who conducted research by taking 30 children with abdominal surgery and gave the breathing exercise as a method of play therapy. He has recorded the Cardiopulmonary parameters for 3 days continuously after surgery, which was 2 times in a day. Between 2 recording 3 hours of interval was there. The result was recorded for three days and the difference was noticed in mean lung volume which was recorded through the 't' test. Complication was not seen between the cardiopulmonary parameters of children of the experimental group with abdominal surgery before and after intervention. The above findings reported that the breathing exercise prevents the complication of cardiopulmonary parameters.

Conclusion:

To conclude, this study has educated us that the breathing exercise which can be introduced as play therapy was beneficial among children with LRTI. It's cost also very less. As nursing professionals, if we apply such evidence base practice along with other medical therapy the patient and family members also benefited, and prompt recovery also possible. Along with Medicare cost, hospital stay, and exposure to nosocomial infection also reduced. Hence, there is a need for further research on this subject with a large number of samples, which would clear our understanding of the role of different breathing exercises and its effect on lower respiratory tract infection.

Funding: None

Ethical statement: This study was approved by the institutional ethical committee and the prior consent of the parents of children was taken before the collection of the samples.

Conflict of interest: The author declares that there is no conflict of interest.

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Table no. 01: Description of study samples according to socio-demographic variables by using frequency (f) and percentage (%)

N=40

Demographic variables		**Frequency (f)**	**Percentage (%)**
Age	3-5 yrs	26	65
	6- 12 yrs	14	35
Gender	Male	28	68
	Female	12	32
Developmental Age	Pre-schooler	26	65
	School going	14	35
Area of residence	Rural	16	40
	Urban	14	35
	Slum	10	25
Diagnosis	Pneumonia	10	25
	Bronchitis	24	60
	Bronchiolitis	6	15
Immunization Status as per National Immunization schedule	Completed	28	70
	Incomplete	12	35

Table no. 02: Analysis of the effectiveness of breathing exercise on cardio-pulmonary parameters by using 't' test in the experimental group

N=20

cardio-pulmonary parameters	**Intervention day**	**Group**	**Mean**	**S.D**	**Paired t-test value**	**df**	***P*-value**	**Inference**
	Day-1	Pre-test	41.50	3.94	13.07	19	P<0.00001	SS
		Post- test	36.70	4.06				
	Day-2	Pre-test	37.70	3.91	14.45	19	P<0.00001	SS
		Post- test	32.20	4.28				

Respiration	Day-3	Pre-test	38.30	4.70	9.57	19	P<0.00001	SS
		Post- test	35.30	4.82				
Pulse Rate	Day-1	Pre-test	136.10	6.65	15.63	19	P<0.00001	SS
		Post- test	134.20	6.30				
	Day-2	Pre-test	132.10	6.50	17.37	19	P<0.00001	SS
		Post- test	126.20	6.00				
	Day-3	Pre-test	128.00	6.62	12.33	19	P<0.00001	SS
		Post- test	122.60	5.62				
Systolic BP	Day-1	Pre-test	95.70	8.52	10.16	19	P<0.00001	SS
		Post- test	93.20	8.18				
	Day-2	Pre-test	93.60	7.74	8.81	19	P<0.00001	SS
		Post- test	90.60	7.77				
	Day-3	Pre-test	92.40	7.12	7.42	19	P<0.00001	SS
		Post- test	89.70	7.54				
Diastolic BP	Day-1	Pre-test	49.68	2.50	16.88	19	P<0.00001	SS
		Post- test	51.16	3.49				
	Day-2	Pre-test	49.85	2.84	9.30	19	P<0.00001	SS
		Post- test	50.33	2.45				
	Day-3	Pre-test	50.10	2.54	16.97	19	P<0.00001	SS
		Post- test	51.60	2.51				
Chest Expansion	Day-1	Pre-test	49.68	2.50	16.88	19	P<0.00001	SS
		Post-test	51.16	3.49				
	Day-2	Pre-test	49.85	2.84	9.30	19	P<0.00001	SS
		Post-test	50.33	2.45				
	Day-3	Pre-test	50.10	2.54	16.97	19	P<0.00001	SS
		Post-test	51.60	2.51				

*SS=Statistically Significant

Table no. 03: comparison of cardiopulmonary parameters between experimental and control groups based on unpaired 't' test. N=40

Cardio-pulmonary parameters	**Intervention day**	**Comparison Between-group**	**Mean**	**SD**	**Mean difference**	**Unpaired 't' test**	**df**	**Inference**
Respiration	Day- 1	Exp. group	36.70	4.06	3.00	2.679	38	SS at p=0.0109
		Control group	39.70	2.70				
	Day- 2	Exp. group	32.20	4.28	6.80	5.980	38	ESS p=0.0001
		Control group	39.00	2.49				
	Day- 3	Exp. group	28.60	4.82	9.90	7.776	38	ESS p=0.0001
		Control group	38.50	2.75				
Pulse rate	Day- 1	Exp. group	130.60	6.30	7.00	3.703	38	ESS at p=0.0007
		Control group	137.60	5.31				
	Day- 2	Exp. group	126.20	6.00	10.10	5.661	38	ESS at p=0.0001
		Control group	136.30	4.95				
	Day- 3	Exp. group	122.60	5.62	13.10	7.703	38	ESS at

		Control group	135.70	4.83				p=0.0001
Systolic BP	Day- 1	Exp. group	93.20	8.18	0.70	0.256	38	NSS at p=0.7993
		Control group	93.90	8.66				
	Day- 2	Exp. group	90.60	7.77	3.30	1.236	38	NSSat p=0.2240
		Control group	93.90	8.66				
	Day- 3	Exp. group	89.70	7.54	4.20	1.595	38	NSSat p=0.1190
		Control group	93.90	8.66				
Diastolic BP	Day- 1	Exp. group	63.60	3.72	1.20	1.179	38	NSSat p=0.2457
		Control group	62.40	2.42				
	Day- 2	Exp. group	62.50	3.84	0.10	0.096	38	NSSat p=0.9240
		Control group	62.40	2.42				
	Day- 3	Exp. group	61.10	3.06	1.30	1.452	38	NSSat p=0.1547
		Control group	62.40	2.42				
Chest expansion	Day- 1	Exp. group	50.13	2.49	0.07	0.091	38	NSSat p=0.9280
		Control group	50.20	2.56				
	Day- 2	Exp. group	50.33	2.45	0.13	0.153	38	NSSat p=0.8792
		Control group	50.20	2.56				
	Day- 3	Exp. group	50.43	2.51	0.23	0.279	38	NSSat p=0.7818
		Control group	50.20	2.56				

*SS=Statistically Significant**ESS=Extremely Statistically Significant***NSS= Not Statistically Significant

Table no. 04: Association between the respiration rate with selected demographic variables after intervention N=40

Group	Chi Value	df	P value	Inference
Age	1.8315	1	0.17595	NS
Gender	0.741	1	0.3894	NS
Developmental Age	0.659	1	0.4168	NS
Area of residence	5.6	2	0.06081	NS
Diagnosis	0.5202	2	0.77096	NS
Immunization Status	0.01	1	0.9185	NS

NS= Not Statistically