EFFECTIVENESS OF BREATHING EXERCISES AS THERAPEUTIC PLAY ON RESPIRATORY STATUS AMONG CHILDREN UNDERGOING NEBULIZATION THERAPY WITH LOWER RESPIRATORY TRACT DISORDERS

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ABSTRACT

Background: ALRI related mortality in countries was highest in children, as 3, 69,000 deaths of occur among children of age 5-7 yr were the most, making it the single most important killer in this age group. ARIs also appoint a significant universal problem on health systems and community in developing countries. In India the states like Haryana, children are endangered from the occurrence of acute respiratory tract infection, and it is explore that ARI incidence in 0–10 years of age was 5.88 per child year with minimal gender differences. The ARI total incidence rate in the children is 0.37 per child year. In Haryana, district Faridabad had reported 2387,536 cases of respiratory disorder out of which 43 episodes are acute lower respiratory infection. With this background, systematic literature search and meta-analysis were carried out.

Objective: To collect the data and review various studies.

Methodology: The study design were systematic review. The study includes the studies those which are related to the respiratory infections like asthma, pneumonia, bronchiolitis and acute respiratory infection among children and the studies shows the effectiveness of various breathing exercises on respiratory parameters and excludes the study those are related to the upper respiratory infections.

Analysis: The data were grouped and analyzed in terms of Meta-analysis. Studies were identified through the search of MEDLINE, PUBMED, Elsevier and Google Scholar. Abstracted information is about the study design, population characteristics, intervention and outcomes.

Conclusion: The systematic review has concluded that the breathing exercises in any form had been effective to the respiratory infected children to loosen the secretions and improve the respiratory parameters.

INTRODUCTION

Breathing is a continuous bodily activity that controls the mental and emotional process of the body. In today’s fast paced life, where people barely have time to relax, most of them are suffering from many respiratory disorders. The majority of individual do not properly make use of the entire capacity of respiratory organs, i.e. while breathing one use only a small portion of their lungs, which leads to insufficient supply of oxygen to the lungs. By applying the breathing exercise, one can get purged of these impediments and live a healthy lifestyle.¹ The frequency rate of asthma and bronchiolitis in Karnataka, Gujarat, Haryana, Madhya Pradesh, Uttar Pradesh are more than 50% and shown a reduction from 24.7 to 19.2.

The result shows that asthma and bronchiolitis was a leading cause of death in last 3 decade accounting above 9-11%.²

MATERIAL AND METHODS

Research Design: systematic review

Inclusion criteria: The study includes the studies those are related to breathing exercises in lower respiratory infection which shown the effectiveness of various breathing exercises in different ways.

Exclusion criteria: The study excludes the studies those are related to other therapies other than breathing exercises.
Data Analysis: The data was grouped and analyzed. Relevant articles based on the topic prevalence and incidence of lower respiratory tract infection and effectiveness of breathing exercises in children were identified by search of significant articles Pubmed/ Medline, Scopus, CINAHL and Google Scholar.

RESULT

A Systematic review was done to assess the effectiveness of breathing exercises as therapeutic play among children undergoing nebulization therapy. Total 25 studies were selected for review out of which 16 were finding appropriate for systematic review. Data were divided into 2 different sections:-

Section I: review related to prevalence and incidence of lower respiratory tract infection among children

Section II: review related to the effectiveness of breathing exercises among children with respiratory infection

Review Related To Prevalence and Incidence of Lower Respiratory Tract Infection Among Children

A cross-sectional study was conducted to estimate about the risk factor and prevalence of ARIs in less than five year of age among children at Enugu. In this study 436 under-five children were taken with ARI and study was carried out in three hospitals in Enugu and their risk factors i.e inadequate breastfeeding, socio-economic status, parental smoking and use of biofuels. The result shows that out of 436 patients in the study 224 were males and 212 were females and the mean age of the patients were 18.75 (13.38) months and among these patients there were 31.6% cases of pneumonia, 6.9% cases of bronchiolitis and 61.5% cases of acute respiratory tract infections and among these children nearly about 7.5% of inadequately nourished children as compared to 22.6% adequately nourished children. The study concluded that acute respiratory infections are affected by socio-economic and socio-cultural risk factors.3

A cross-sectional study was conducted to determine the prevalence of Acute respiratory infections and selected related factors among under-five children at Pondicherry. Data were collected from 509 parents of under-five children regarding ARI incidence along with socio-demographic and selected related factors. Result shows that the Overall prevalence of ARI was observed is to be 59.1% respectively and the prevalence in urban and rural area was 63.7% and 53.7% and multiple logistic regression analysis shows that the presence of overcrowding (AOR=1.492), urban residence (AOR=2.32) and second birth order (AOR= 0.371) were significant predictors of acute respiratory infections. This study concluded that the prevalence of ARI is high in urban areas as compared to rural areas and significantly improvement of living conditions may help in decrease the burden of ARI in urban areas.4

A survey was conducted to determine the incidence of ARI and its related risk factors among children in urban and rural areas of Kancheepuram district, India. Overall, prevalence of ARI was found to be 27% and after conducting the survey the researcher estimated that ARI were high among lower middle class (79.3%), uneducated mothers (37.8%), those living in slums (52.6%), overcrowded houses (63.7%), use of biofuel for cooking (67.4%), improper cross-ventilation (70.4%), history of mother smoking in pregnancy (55.6%), low birth weight children (54.8%), and undernourished children (57.8%). Rural community children (62.2%) were more suffer than urban children. The present study had concluded that low socioeconomic status, poor housing conditions, cooking fuel used, birth weight, and nutritional status as vital factor for occurrence of ARI.5

A meta-analysis was conducted to assess the prevalence rate of lower respiratory tract disorders among Indian children. The statistical analysis was done by mean and median and 15 epidemiological studies are identified on the development of asthma in Indian children from 300 relevant articles. The study results revealed that, the mean and SD of prevalence was 7.24±5.42. The median prevalence was 4.75% (with IQR=2.65-12.35%) and overall weighed prevalence was found to be 2.74. The study concluded that the Childhood asthma among children 13-14 years of age was lower than the younger children having 6-7 years of age and Urban and male are the higher risk of having lower respiratory tract infections.6

A cross-sectional study was conducted to assess the prevalence of nocturnal asthma of school children at South Punjab. It was a descriptive survey among children of age 1 to 18 years, and schools were selected by the randomly sampling technique and Questionnaire (6120) were sent to the parents of children out of them 3180 (52%) were received back. Result shown that out of 3180 respondents, 1767(56%) were for boys and 1413 (44%) were for girls having median age was 8.25 years among these 71% of children were between 4 to 11 years of age. The parents reported nocturnal asthma in 177 (6%) of their children with their equal prevalence in boys and girls and out of this 99 (56%) were boys and 78 (44%) were girls and among 1767 boys and 1413, girls the nocturnal asthma reported by parents was 6%. The study concluded that the nocturnal asthma was not reported in 14 to 18 years age group of females.7

A prospective study was conducted to determine the prevalence, age distribution and epidemiological factors associated with asthma in 5 villages of Ludhiana. The study group composed of 2,275 children, 1,253 males and 1,022 females. Data was collected through questionnaire and screening of prescriptions and documents and analysis was done by Fischers Z test. The study results revealed that, 37.9% children with asthma had the family history of allergy, 13.8% of cases had the family history of smoking, overcrowding was noted in 55.2% and pet animals 13.85%. The mean loss of school days over one year was 16.5 days and out of 2,271 children 58 were diagnosed to have asthma (34 males and 24 females) giving the prevalence rate of 2.6%. The study concluded that a significant association was found between family history of smoking and asthma (p<0.05).8

A study was conducted to estimate the prevalence of asthma in children and to study the possible differences in prevalence of childhood asthma in rural and urban area of Tamil Nadu. A total of 584 children from Chennai and 271 children from 25 villages around Chennai Village was selected and data was collected by questionnaire which is a simplified version of International Study of Asthma and Allergy in Children and this questionnaire was administered by trained students and the analysis was done separately for children who are 0-5 and 6-7 years of age. Result shows that out of 855 children, the overall
prevalence of breathing difficulty was 18% and the prevalence of diagnosed asthma was 5%, 22% of urban and 9% rural children of 6 to 12 years reported breathing difficulty at any time in the past (p<0.01). The study concluded that a significantly higher proportion of 6 to 12 years of urban children also reported nocturnal dry cough (24.4% v.18.7%, p=0.05) and also associated with wheezing which is occur more often rather than rural children (92%v.77%, p=0.01).9

Review of literature related to effectiveness of breathing exercises in children

A randomized control trial was conducted to assess the effectiveness of breathing exercises in children with asthma. The study includes 112 children mainly who are younger than 18yr of age and diagnose with asthma and other respiratory disorder and the data was assessed as the primary outcome i.e. quality of life, asthma symptoms and serious adverse events and the secondary outcome were reduction in medication usage. Number of acute exacerbation, physiological measures, in this control group received different interventions, one received placebo treatment, one an educational programme and one was not described and the results show that there was no difference shows between group comparison for any of the primary outcome. The study concluded that the breathing exercises were part of a comprehensive package of care.10

A randomized controlled trial was conducted to assess the effectiveness of blow bottle exercise on respiratory status among children with lower respiratory tract tract infection in Porur, Chennai. A quantitative research approach was used with a pre-test post-test design and the sample was selected by simple random sampling and the sample consists 30 in study group and 30 in control group with lower respiratory tract infections after that blow bottle exercise was given thrice a day for ten days for study group along with routine care and no intervention was given in the control group. The result showed that in pre-assessment the overall mean of respiratory status in study group was 13.9 with SD of 5.45 whereas in control group was 138.63 with SD 4.88. In post-assessment mean value in study group 125.4 with SD 2.94 and the respiratory parameters within the study group and control group pre assessment and post-assessment day 2 and 3 were found statistically significant at level of 0.001. The study concluded that there was a significant difference in the respiratory parameters in the study group than the control group which was attributed to the use of respiratory exercise and shows that blow bottle exercise is one of the effective non-pharmacological method in treating the children with lower respiratory tract disorders.11

A quasi-experimental study was conducted to assess the effectiveness of strelnikova breathing exercises on respiratory signs and parameters among children with Lower respiratory tract infections (LRTI) in Coimbatore with nonequivalent control group pretest and posttest design and sample were selected by purposive sampling technique. 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 days and in control group, the same hospital routine was practiced. The data gathered and analyzed by using descriptive and inferential statistics and the result shows that 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 concluded 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 LRTI.12

A quasi-experimental study was conducted to compare the effectiveness of breathing exercises and aerobic exercises in asthmatic children at Nottingham, UK by using non-equivalent control group pre-test post-test design with a sample size of forty (20 in each group) and one group was given breathing exercise intervention and other group was given aerobic exercise intervention. Before and after the intervention period, the child was investigated with spirometric analysis to find out the changes in the lung volumes after the effect of exercises in each group and both exercises were administrated for 6 weeks consecutively. The results shows that in pre and post-intervention in breathing exercises was reduction in lung obstruction from 2.25 to 3.2 and the computed ‘t’ value is2.09 whereas mean value in pre-post intervention in aerobic exercise was reduction in lung obstruction from 2.45 to 3.65 and the ‘t’ value is 3.64 and the comparison between the two experimental group in which ‘t’ value is 1.66 which found to be significant . The shows the overall improvement of lung function was significantly more in aerobic exercise interventions than breathing exercise interventions. The study concluded that the breathing exercise and aerobic exercises both was effective in improving the lung volumes in asthmatic children.13

A quasi experimental study was conducted to assess the effectiveness of breathing exercise in the form of play on cardiopulmonary parameters of children with abdominal surgery at Mangalore. Thirty children with abdominal surgery were selected using non probability purposive sampling. Fifteen children in experimental group were supervised breathing teaching and 15 children in control group with no intervention. Selected breathing exercise was taught one day prior to surgery to the children of experimental group. Cardio pulmonary parameters of children were recorded on first, second and third post operative day, the parameters were assessed twice in the day with 3 hours of interval between two recordings. On post operative day 1, difference was found in mean respiratory rate (t=1.86) and mean lung volume (t=2.169) of children of both the group. On post operative day 2nd (t=1.71) and 3rd (t=1.877) difference was found in mean lung volume change was not found between the cardio pulmonary parameters of children of experimental group with abdominal surgery before and after intervention. The study concluded that the selected breathing exercise which has given in the form of play was found to be effective in prevention of post operative cardiac pulmonary complications.14

A comparative study was conducted to assess effectiveness of various breathing exercises in patient with bronchial asthma. Fifty cases of bronchial asthma were studied for 12 weeks. Patients were allocated to two groups: group A and group B (control group). Patients in group A were treated with breathing exercises for 20 minutes twice daily for a period of 12 weeks. Patients were trained to perform these breathing exercises for 12 week. Group B was treated with meditation for 20 minutes
twice daily for a period of 12 weeks. Subjective assessment, FEV1%, and Peak Expiratory Flow Rate (PEFR) were done in each case initially and after 12 weeks and the results shows that there is reduction in symptoms i.e cough 73% to 12% in group A, whereas 77% to 75% in group B. In wheezing 76% to 8% in group A and it remain same in group B 80% to 80%, in Dyspnoea 73% to 10% in group A and 77% to 79% in Group B and all found statistically significant (p<0.001) and also improvement in FEV1 and PEER in group A as compared to group B. This study concluded that the Breathing exercises mainly expiratory exercises, improved lung function subjectively and objectively and should be regular part of therapy.15

A study was conducted to evaluate the effectiveness of combined self management and relaxation-breathing training for children with moderate to severe asthma compared to self management only training by using two-group experimental design and participants were randomly assigned to an experimental or comparison group and matched by gender, age, and asthma severity and both groups participated in an asthma self management programmed. Children in the experimental group were also given 30 min of training in a relaxation breathing technique and a CD for home practice. Data on anxiety levels, self perceived health status, asthma signs/symptoms, peak expiratory flow rate, and medication use were collected at base line and at the end of the 12 week intervention. Result shows that differences in the four physiological variables were noted between pre and post intervention, but these changes did not differ significantly between groups.16

A randomized study was conducted to evaluate the effectiveness of breathing exercise training program on pulmonary function and exercise tolerance in mildly to moderately impaired patients with cystic fibrosis. Seventy two patients with CF (7-19 years) were randomly assigned to an exercise group (minimum of 20 minutes of breathing exercise, at a heart rate of approximately 150 beats/min, 3 times weekly) or a control group (usual physical activity participation).Pulmonary function, exercise tolerance, clinical status, hospitalization, and compliance with therapy were monitored during scheduled visits to the hospital’s CF clinic. The result showed that sixty five patients were included in the analyses. The control group demonstrated a greater annual decline in percent of predicted forced vital capacity compared with the exercise group(mean slope±SD,-2.42±4.15 vs.-0.25±2.81;P=.02),with a similar trend for forced expiratory volume in 1 second (-3.47±4.93 vs.-1.46±3.55;P=.07). Patients remained compliant with the exercise program over the study period. An improved sense of well being was reported with the exercise. Results shows that pulmonary function declined more slowly in the exercise group than in the control group, suggesting a benefit for patients with CF participating in breathing exercise. The study concluded that the breathing exercise program is the conventional treatment regimen of patients with CF.17

A experimental study was conducted to assess the effectiveness of breathing exercises taught by physical therapists to 40 post operative upper abdominal surgery patients aged between 10-15 years at USA. The experimental group received the breathing exercises in addition to the incentive spirometry, balloon blowing ultra sonic nebulization, and routine instructions by nurses in deep breathing and coughing provided for the control group. 38 % post operative pulmonary complication rate was found for the control group. The experimental group, whose subjects were instructed and monitored by physical therapist, had only a 16 percent complication rate. The post operative pulmonary complications were defined as temperature higher than 38.5°C, radiographic changes or abnormal breath sounds. This study concluded that the method of deep breathing in a manner different from that routinely care taught by nurses.18

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