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A COMPARATIVE STUDY TO ASSESS THE EFFECTIVENESS OF INCENTIVE SPIROMETRY VERSUS DEEP BREATHING EXERCISES ON SELECTED RESPIRATORY PARAMETERS AMONG PATIENTS WITH BRONCHIAL ASTHMA IN SELECTED PRIVATE HOSPITAL, SALEM

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ABSTRACT

A comparative study was conducted among patients with bronchial asthma at Vinayaka Mission Hospital, Salem with the objective of assessing the effectiveness of incentive spirometry (ISP) versus deep breathing exercises (DBE) on selected respiratory parameters among patients with bronchial asthma. Thirty patients with bronchial asthma were selected by purposive sampling technique and data was collected from the patients by using structured interview schedule, observational check list for assessing breathing pattern, Revised Borg Dyspnea scale, level of spo2 and level of peak expiratory flow rate. Comparison of mean, SD and mean percentage of selected respiratory parameters revealed that mean score was 3.87 ± 4.05 after ISP exercises whereas in DBE group mean score was 3.8 ± 3.78 after breathing exercises. Paired 't'test was calculated to analyze the significance difference revealed in ISP and DBE group, there was highly significant difference in respiratory parameters, revised borg dyspnea scale, and PEFR. However, in DBE group there was no significant difference in level of spo2.

KEYWORDS

Bronchial asthma, Respiratory parameters and Incentive spirometry.

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INTRODUCTION

Bronchial asthma is a disease affecting the airways that carry air to and from the lungs. People who suffer from this chronic condition are said to be asthmatic. The inside walls of an asthmatic's airways are swollen or inflamed. This swelling or inflammation makes the airways extremely sensitive to irritations and increases susceptibility to an allergic reaction. As inflammation causes the

airways to become narrower, less air can pass through them, both to and from the lungs. Symptoms of the narrowing include wheezing (a hissing sound while breathing), chest tightness, breathing problems, and coughing.

The nurse educates the patient to do breathing exercises and instructs to breathe slowly and rhythmically in a relaxed manner and to exhale completely to empty the lungs. The patients are instructed to always inhale through the nose, because this filters, humidifies and warms the air. If the short of breath, the patient should be instructed to concentrate on prolonging the length of exhalation. This help to avoid initiating a cycle of increasing shortness of breath and panic (Brunner and Suddarth, 2017)[1].

Need for the Study

The respiratory system is crucial to every human being without it; we would cease to live outside of the womb. The primary functions of respiration are to obtain oxygen for use by body's cells and excrete carbon-di-oxide that will produce

Worldwide bronchial asthma affects approximately 235 million individuals and cause death of 2, 50,000 people. In India approximately 15-20 million people are affected with asthma (WHO 2015).

Incentive spirometry exercises increases the patient lung expansion through deep breathing. The nurse instruct the patient to inhale through the spirometry with a strong and steady breathe, at the end of inhalation, the patient should hold inhaled breathe briefly to allow for expansion of the lungs. It should be performed 10-15 times per session, 5-6 sessions per day.

Deep breathing techniques are techniques such as diaphragmatic breathing and pursed-lip breathing reduce respirations while improving the expiratory phase by increasing laminar flow of expired air. Patient should take slow, controlled expiration which prevents small-airway collapse, thereby reducing air trapping that occurs with forced expiration.

Nurses play an important role in teaching patients with bronchial asthma how to use an incentive spirometry and perform deep breathing exercises, the effectiveness of these intervention are assessed by measuring certain respiratory parameters includes assessment of dyspnea, respiratory rate, breath sounds, oxygen saturation level.

Statement of the Problem

A comparative study to assess the effectiveness of incentive spirometry versus deep breathing exercises on selected respiratory parameters among patients with bronchial asthma in selected private hospital, Salem.

Objectives of the Study

- To assess the respiratory parameters of patients with bronchial asthma.
- Toassess the effectiveness of incentive spirometry on selected respiratory parameters among patients with bronchial asthma for group I.
- To assess the effectiveness of deep breathing exercises on selected respiratory parameters among patients with bronchial asthma for group II.
- To compare the effectiveness of incentive spirometry and deep breathing exercises on selected respiratory parameters among patients with bronchial asthma.
- To associate the selected respiratory parameters of patients with bronchial asthma and their demographic variables.

Hypotheses

H1

There is significant difference between effects of incentive spirometry and deep breathing exercises on selected respiratory parameters among patients with bronchial asthma.

H2

There is significant association between effects of incentive spirometry and deep breathing exercises with selected demographic variables among patients with bronchial asthma.

Sample size and Technique

The sample size was 30 patients, which includes 15 patients for incentive spirometry and 15 patients for deep breathing exercises.

Purposive sampling technique was used to select the subjects for the study.

Group I: Patients made to perform incentive spirometry,

Group II: Patients made to perform deep breathing exercises.

Development of the tool

Structured interview schedule, observational checklist for assessing respiratory parameters, Revised Borg Dyspnea Scale, Scale to assess the other respiratory parameters was used to collect data from patients with bronchial asthma incentive spirometry and deep breathing exercises.

(***P<0.001 highly significant; **P<0.05 significant)

Paired 't' test was revealed that analyze the significant difference regarding mean scores of before and after breathing exercises among ISP group. It was found that there is highly significant difference (***p<0.0001) and in DBE group, It was found that there is significant difference (**p<0.05) in respiratory parameters.

Paired 't' test was revealed that analyze the significant difference regarding mean scores of before and after breathing exercises among ISP and DBE group. It was found that there is highly significant difference (***p<0.001) in level of Revised Borg Dyspnea Scale.

Paired 't' test was revealed that analyze the significant difference regarding mean scores of before and after breathing exercises among ISP group. It was found that there is highly significant difference (***p<0.0001) However DBE group, it was found that there is no significant difference (p<0.05) in level of SPO2.

Paired 't' test was revealed that analyze the significant difference regarding mean scores of before and after breathing exercises among ISP group. It was found that there is highly significant difference (***p<0.0001) and in DBE group, it was found that there is significant difference (p<0.05) in peak expiratory flow rate.

Hence, it can be interpreted that research hypotheses was accepted (Table No.7).

Chi-square values are calculated to find out the association between effects of incentive spirometry with selected demographic variables shows that there was no significant association between the effect of incentive spirometry and demographic variables (P>0.05). Thus it can be interpreted that the difference in mean score values were by chance and not the true difference. Hence the research hypotheses was rejected and null hypotheses was accepted (Table No.8).

Chi-square values are calculated to find out the association between effects of deep breathing exercises with selected demographic variables shows that there was no significant association between the effect of deep breathing exercises and demographic variables (P>0.05). Thus it can be interpreted that the difference in mean score values were by chance and not the true difference. Hence the research hypotheses was rejected and null hypotheses was accepted (Table No.9).

Section I

Table No.1: Description of Demographic Variables of Patients with Bronchial Asthma

S.No	Socio demographic variables	Incentive spirometry	Deep breathing exercises
	Age		
1	31-40 years	13 %	13%
2	41-50 years	33%	20%
3	51- 60 years	27%	27%
4	above 60 years	27%	40%
	Sex		
5	Male	60%	53%
6	Female	40%	47%
	Education		
7	No formal education	27%	33%
8	Primary education	40%	40%
9	High school education	20%	13%
10	Higher secondary education	13%	13%
	Occupation		
11	Unemployed	7%	27%
12	Daily wagers	40%	20%
13	Self employed	13%	13%
14	Private employees	7%	7%
15	Industrial workers	33%	33%
	Personal Habits		
16	Smoking	27%	20%
17	Alcoholism	7%	7%
18	Tobacco use	20%	7%
19	Smoking and alcoholism	13%	27%
20	None	33%	20%
	Duration of Illness		
21	Less than 1 year	27%	27%
22	2-3 year	40%	47%
23	4-5 year	27%	20%
24	Above 5 year	7%	7%

Section II

Table No.2: Percentage level of respiratory parameters among patients with bronchial asthma before and after breathing exercises

S.No	Level of respiratory Parameters	Incentive spirometry					Deep breathing exercise				
		Before		After		Effect	Before		After		Effect
		N	%	N	%		N	%	N	%	
1	Mild	5	33.3	12	80	46.7%	8	53.3	11	73.3	20%
2	Moderate	3	20	2	13.3	6.7%	5	33.3	3	20	13.3%
3	Severe	7	46.7	1	6.7	40%	2	13.3	1	6.7	6.6
4	Total	15	100	15	100		15	100	15	100	

N= number of patients

Table No.3: Level of Revised Borg Dyspnea scale among patients with bronchial asthma before and after breathing exercises

S.No	Level of Dyspnea and score	Incentive spirometry				Deep breathing exercise			
		Before		After		Before		After	
		N	%	N	%	N	%	N	%
1	Nothing at all (0)	-	-	2	13.3	-	-	2	13.3
2	Just noticeable (1)	-	-	1	6.7	1	6.7	4	26.7
3	Very slight (2)	2	13.3	5	33.3	3	20	2	13.3
4	Slight (3)	3	20	2	13.3	3	20	2	13.3
5	Slight-moderate (4)	4	26.7	3	20	4	26.7	4	26.7
6	Moderate (5)	1	6.7	2	13.3	4	26.7	1	6.7
7	Some difficulty (6)	5	33.3	-	-	-	-	-	-
8	Total	15	100	15	100	15	100	15	100

Table No.4: Level of SPO2 among patients with bronchial asthma before and after breathing exercises

S.No	Level of spo2	Incentive spirometry				Deep breathing exercise			
		Before		After		Before		After	
		N	%	N	%	N	%	N	%
1	Normoxemia	3	20	6	40	2	13.3	5	33.3
2	Mild hypoxemia	5	33.3	7	46.7	10	66.7	7	46.7
3	Moderate hypoxemia	7	46.7	2	13.3	3	20	3	13.3
4	Total	15	100	15	100	15	100	15	100

Table No.5: Level of peak expiratory flow rate (PEFR) among patients with bronchial asthma before and after breathing exercises

S.No	Level of Peak expiratory flow rate	Incentive spirometry				Deep breathing exercise			
		Before		After		Before		After	
		N	%	N	%	N	%	N	%
1	Normal	-	-	4	26.7	-	-	3	20
2	Mildly decreased	7	46.7	9	60	6	40	5	33.3
3	Moderately decreased	8	53.3	2	13.3	9	60	7	46.7
4	Total	15	100	15	100	15	100	15	100

Section: III

Table No.6: Comparison of mean, SD and mean percentage of selected respiratory parameters among patients with bronchial asthma in both ISP versus DBE group

S.No	Area	Group		Range	Mean	SD	Difference in mean
1	Respiratory parameters	ISP group	Before	2-17	9.27	4.89	5.4
			After	0-16	3.87	4.05	
		DBE group	Before	1-14	6.07	4.49	2.27
			After	0-15	3.8	3.78	
2	Level of revised Borg Dyspnea Scale	ISP group	Before	2-6	4.27	1.49	1.67
			After	0-5	2.6	1.59	
		DBE group	Before	1-5	3.47	1.30	1.14
			After	0-5	2.33	1.63	
3	Level of spo2	ISP group	Before	3-5	2.27	0.79	0.533
			After	2-6	1.73	0.70	
		DBE group	Before	2-10	2.07	0.59	0.2
			After	3-7	1.87	0.74	
4	Level of PEFR	ISP group	Before	7-8	2.53	0.52	0.67
			After	2-4	1.87	0.64	
		DBE group	Before	6-9	2.6	0.51	0.33
			After	3-7	2.27	0.79	

Section IV: Testing of Hypotheses

Table No.7: Paired 't'-test to assess the level of significance of effectiveness of ISP versus DBE group among patients with bronchial asthma

S.No	Area	Group		Mean	SD	Mean difference	't'-value	P- value
1	Respiratory parameters	ISP group	Before	9.27	4.89	5.4	5.51	0.000***
			After	3.87	4.05			
		DBE group	Before	6.07	4.49	2.27	3.18	0.006**
			After	3.8	3.78			
2	Level of revised borg dyspnea scale	ISP group	Before	4.27	1.49	1.67	6.17	0.000***
			After	2.6	1.59			
		DBE group	Before	3.47	1.30	1.13	4.79	0.000***
			After	2.33	1.63			
3	Level of spo2	ISP group	Before	2.27	0.79	0.533	4	0.001**
			After	1.73	0.70			
		DBE group	Before	2.07	0.59	0.2	1.87	0.082
			After	1.87	0.74			
4	Level of PEFR	ISP group	Before	2.53	0.52	0.67	4.18	0.000***
			After	1.87	0.64			
		DBE group	Before	2.6	0.51	0.33	2.65	0.019*
			After	2.27	0.79			

Table No.8: Chi-square test to find out the Association between effects of incentive spirometry with selected demographic variables

S.No	Demographic variables	Df.	Table value	Chi-square	p-value	Level of significance
1	Age	6	12.59	4.87	0.56	Not significant
2	Sex	2	5.99	3.89	0.143	Not significant
3	Education	6	12.59	3.75	0.710	Not significant
4	Occupation	8	15.51	12.63	0.125	Not significant
5	Personal habits	8	15.51	9.04	0.339	Not significant
6	Duration of illness	6	12.59	5.31	0.504	Not significant

(P<0.05 not significant)

Table No.9: Chi- square test to find out the Association between effects of deep breathing exercise with selected demographic data

S.No	Demographic variables	Df.	Table value	Chi-square	p-value	Level of significance
1	Age	6	12.59	8.18	0.225	Not significant
2	Sex	2	5.99	2.09	0.35	Not significant
3	Education	6	12.59	8.72	0.19	Not significant
4	Occupation	8	15.51	6.00	0.647	Not significant
5	Personal habits	10	18.31	9.24	0.509	Not significant
6	Duration of illness	6	12.59	6.67	0.353	Not significant

(P<0.05 not significant)

CONCLUSION

The present study assessed the effectiveness of incentive spirometry (ISP) versus deep breathing exercises (DBE) on selected respiratory parameters among patients with bronchial asthma. The study shows that after breathing exercises mean score of incentive spirometry was 3.87 and of deep breathing exercises were 3.8 in respiratory parameters and level of revised borg dyspnea scale, after breathing exercises the mean score of ISP group was 2.6 and DBE group was 2.33. It was found that there was highly significant difference in mean score among ISP group and DBE group. Hence it was concluded that ISP group is more effective than DBE group.

Chi-square values are calculated to find out the association between effects of Incentive Spirometry and deep breathing exercises with selected demographic variables shows that there was no significant association between the effect of deep breathing exercises and demographic variables (P>0.05).

RECOMMENDATION

- A similar study can be replicated on a large sample to generalize the findings.
- A comparative study could be conducted to evaluate the effectiveness of incentive spirometry and deep breathing exercises in improving peak expiratory flow rate among the patients with bronchial asthma.
- Effectiveness of incentive spirometry to improve the breathing pattern among patients with bronchial asthma.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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