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Evaluate the effectiveness of pursed lip breathing exercise on dyspnoea among chronic obstructive pulmonary disease (COPD) patients in selected hospitals of Mangalore and Karkala Taluk

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Abstract
Dyspnoea is the most frequent symptom of COPD. It has been suggested that dyspnoea is the single most important factor contributing to functional difficulties in COPD and is a better predictor of exercise tolerance and health related quality of life among COPD patients. A study on 131 participants with COPD revealed that 84% experienced severe dyspnoea, while 59% had at least one daily episode of dyspnea.
Objectives: The objectives of the study are to;
1. To assess the pre-test dyspnoea score among experimental group and control group.
2. To assess the post-test dyspnoea score among experimental group and control group.
3. To evaluate the effectiveness of pursed lip breathing on the level of dyspnoea among experimental group.
4. Compare the level of dyspnoea between experimental group and control group.
5. Find the association between pretest dyspnoea score and selected demographic variables.
Material and Methods: Research Approach: An evaluative research approach was adopted for the study
Research Design: The research design adopted for the study was quasi experimental non-equivalent control group design. This design was adopted to assess the level of dyspnoea among COPD patients in selected hospitals of Mangalore and Karkala Taluk following the pursed lip breathing exercise.
Results: The findings of the present study revealed that the 't' value computed was highly significant ($t_{(58)} = 8.798$, $t_{(tab)} = 1.670$, $p < 0.05$). It shows that there was much reduction in dyspnoea among the experimental group as compared to the control group.

Keywords: pursed lip breathing exercise

Introduction
Chronic obstructive pulmonary disease (COPD) refers to the combination of chronic bronchitis and emphysema, resulting in the obstruction of airways and poor oxygen transport in the lungs, respectively. It is a lung disease that is progressive and not fully reversible. COPD obstructs the airways and makes breathing difficult. The hallmark of the disease is difficulty with breathing that slowly gets worse over time [1].
The prevalence of COPD was 280 million cases worldwide in 2004. It affects 6–10% of the adult population and is a leading cause of morbidity and mortality worldwide [3]. It is the fourth leading cause of death in the world and is expected that by the year 2020, it will become the third leading cause of death [4]. In India median prevalence rates of COPD were assessed as 5% in males and 2.7% in females. The disease is distinctly more common in males. The male to female ratio had varied from 1.32:1 to 2.6:1 in different studies with a median ratio of 1.6:1. Dyspnoea is one of the most debilitating aspects of COPD that leads to disability and poor quality of life. It is the most common symptom that limits activities of daily living in these patients and the most frequent reason that patients seek care and rehabilitation. Like pain, dyspnoea is a combination of sensation and perception and involves a complex combination of physiologic and psychological factors.
Dyspnoea is "a term used to characterize a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity. The experience derives from interactions among multiple physiological, psychological, social, and environmental factors, and may induce secondary physiological and behavioural responses [6].
A prospective cohort study was conducted to assess the impact of pulmonary function impairment on the risk of functional limitations among 1,202 COPD patients in northern California in 2005-2007. The results showed that greater pulmonary function impairment, as evidenced by lower forced expiratory volume in 1 second (FEV (1), was associated with poorer Short Physical Performance scores and less distance walking during the 6-Minute Walk Test. Lower forced expiratory volume in 1 second was also associated with weaker muscle strength, severe dyspnoea and with a greater risk of self-reported functional limitation ($p < 0.05$). Study concluded that, pulmonary function impairment is associated with multiple manifestations of physical functional limitation among COPD patients. The study recommended that longitudinal follow-up can delineate the impact of this functional limitations [21].

Material and Methods
Research Approach: An evaluative research approach was

adopted for the study

Research Design: The research design adopted for the study was quasi experimental non-equivalent control group design. This design was adopted to assess the level of dyspnoea among COPD patients in selected hospitals of Mangalore and Karkala Taluk following the pursed lip breathing exercise.

Table 1

Group	Day 1 (Morning)	Intervention	Day 5 (Evening)
Experimental	Pre-test dyspnoea score	Intervention in the form of pursed lip breathing	Post-test dyspnoea score
Control	Pre-test dyspnoea score	-	Post-test dyspnoea score

Variable

Independent Variables: The variable that is believed to cause or influence the dependent variable [27]. In this study, pursed lip breathing exercise was the independent variable.

Dependent Variable: It is the outcome variable of interest, the variable that is hypothesised to depend on or be caused by another variable, i.e. the independent variable [27]. In this study dyspnoea among COPD patients was the dependent variable.

Demographic Variables: Age, gender, religion, occupation, income, area of residence, smoking status and duration of illness

Settings: The study was conducted in Alva's Health Centre, Moodbidri, Prabu Hospital, Moodbidri, Community health centre, Moodbidri, and Government hospital, Karkala.

Population: The population for the study consists of chronic obstructive pulmonary disease patients between the age group of 35-65years in selected hospitals of Mangalore and Karkala Taluk.

Sample

Sampling Techniques: In this study non probability convenient sampling technique has been used to select the sample.

Sample Size: Study sample consists of 60 COPD patients (30 each for experimental and control group) of selected hospitals of Mangalore and Karkala taluk.

Sampling criteria

Inclusion criteria

The COPD patients who

1. Are between the age group of 35-65years.
2. Are available at the time of study.
3. Have moderate to severe dyspnoea.

Exclusion criteria

The COPD patients who

1. Are below the age of 35 years and above the age of 65years.
2. Have mild and maximal dyspnoea.
3. Are attending outpatient departments.

Description of the tool

It consists of two section i.e section A and section B

Part A

Section A: It deals with socio demographic variables like sex, age, religion, education, previous occupation, and marital status, type of family, habits, and duration of the illness.

Section B: Deals with the stress rating scale

Content validity of the tool

Content validity is concerned with the degree to which an instrument has an appropriate sample of items for the construct being measured. Modified University Of California, San Diego Shortness of Breath Questionnaire along with the demographic proforma, problem statement, objectives of the study, hypotheses, operational definition, inclusion and exclusion criteria and criteria checklist were submitted to nine experts. Six were from the field of nursing speciality. Two were doctors (physicians) and one was a physiotherapist.

Reliability

The reliability co- efficient of tool was calculated using test-retest method followed by Spearman's rank correlation formula. The reliability of the tool was found to be $r_{(6)} = 0.82$ which was statistically significant. This indicated that the tool was reliable.

Pilot Study

A small scale version or trial run done in preparation for a major study is referred to as the pilot study.After obtaining the written permission from the Managing Director, City Hospital, Karkala, the pilot study was conducted from 03.10.2010 to 10.10.2010 among 12 COPD patients (6 each in both groups). Samples were selected based on pre-determined criteria set by the investigator through non probability convenient sampling. After taking written consent, objectives of the study were explained to each subject and confidentiality was assured. Modified University of California, San Diego Shortness of Breath Questionnaire was administered and only subjects who had moderate to severe dyspnoea were included for the study to carry out the intervention. Subjects were divided alternatively in to experimental and control group. On day one in the morning intervention was started in the form of pursed lip breathing to experimental group. Subjects were asked to follow pursed lip breathing following all incidences of shortness of breath during their activities. Intervention was continued till 5^{th} day and on the 5^{th} day evening post test dyspnoea scores were assessed in both the groups. All the subjects were receiving prescribed dosage of medication during the study.

Data collection instrument

Demographic proforma and Modified University of California, San Diego Shortness Of Breath Questionnaire were used to collect the data from subjects. Intervention was given in the form of pursed lip breathing to experimental group.

Development of the tool

Data collection is the gathering of information needed to address the research problem [27].

Data collection tools are the procedures or instruments used by the researcher to observe or measure the key variables in the research problem [27]. The present study was planned primarily to evaluate the effectiveness of pursed lip breathing exercise on dyspnoea among chronic obstructive pulmonary disease (COPD) patients and to find out the association between the level of dyspnoea and selected demographic variables. Hence, the data collection instrument of the study consisted of demographic proforma and Modified University of California, San Diego Shortness of Breath Questionnaire.

Section 1: Demographic data

This section deals with the demographic characteristics of the 60 COPD patients in terms of frequency and percentage.

Table 1a: Frequency and percentage distribution of subjects according to selected demographic variables

Sl. No	Variables	Experimental group		Control group		Total	
		f	%	f	%	F	%
1	Age in years						
a	35-45	5	16.7	6	20	11	18.3
b	46-55	10	33.3	11	36.7	21	35
c	56-65	15	50	13	43.3	28	46.7
2	Gender						
a.	Male	25	83.3	24	80	49	81.7
b.	Female	5	16.7	6	20	11	18.3
3	Religion						
a.	Hindu	13	43.3	16	53.3	29	48.3
b.	Christian	10	33.3	10	33.3	20	33.3
c.	Muslim	7	23.3	4	13.3	11	18.3

Table 1b: Frequency and percentage distribution of subjects according to selected demographic variables.

Sl. No	Variables	Experimental group		Control group		Total	
		f	%	f	%	f	%
4	Occupation						
a.	Professionals	3	10	2	6.7	5	8.3
b.	Agriculture	6	20	8	26.7	14	23.3
c.	Coolie	7	23.3	3	10	10	16.7
d.	Factory worker	14	46.7	17	56.7	31	51.7
e.	Housewife/unemployed	0	0	0	0	0	0
5	Monthly income in rupees						
a.	≤ 5000	13	43.3	10	33.3	23	38.3
b.	5001-10,000	15	50	16	53.3	31	51.7
c.	10,001-15,000	2	6.7	4	13.3	6	10
d.	> 15,000	0	0	0	0	0	0
6	Area of residence						
a.	Urban	13	43.3	16	53.3	29	48.3
b.	Rural	17	56.7	14	46.7	31	51.7

Table 1c: Frequency and percentage distribution of subjects according to selected demographic variables.

Sl. No	Variables	Experimental group		Control group		Total	
		F	%	f	%	f	%
7	Smoking status						
a.	Current smoker	7	23.3	4	13.3	11	18.3
b.	Former smoker	3	10	4	13.3	7	11.7
c.	Chronic smoker	15	50	16	53.3	31	51.7
d.	Never smoked	5	16.7	6	20	11	18.3
8	Duration of illness						
a.	< one year	2	6.7	3	10	5	8.3
b.	1-5 year	3	10	5	16.7	8	13.3
c.	6-10 year	15	50	10	33.3	25	41.7
d.	> 10 years	10	33.3	12	40	22	36.7

Table 2: Frequency and percentage distribution of subjects according to pre-test level of dyspnea

Level of dyspnoea	Experimental Group		Control Group	
	F	%	F	%
Moderate	0	0	3	10
Somewhat severe	11	36.7	8	26.7
Severe	19	63.3	19	63.3

The data presented in Table 2 shows that in the experimental group majority of subjects (63.3%) had severe dyspnoea and 36.7% of them had somewhat severe dyspnoea before intervention, whereas in the control group majority of subjects (63.3%) had severe dyspnoea, 26.7% subjects had somewhat severe dyspnoea and 10% of subjects had moderate dyspnoea. The data is shown in figure no 12.

Table 3: Frequency and percentage distribution of subjects according to post-test level of dyspnoea.

Level of dyspnoea	Experimental Group		Control Group	
	F	%	F	%
Moderate	8	26.7	5	16.7
Somewhat severe	20	66.7	17	56.7
Severe	2	6.7	8	26.7

The data presented in Table 3 shows that in the experimental group majority of subjects (66.7%) had somewhat severe dyspnoea, 26.7% of subjects had moderate dyspnoea and 6.7% of subjects had severe dyspnoea, whereas in the control group

majority of subjects (56.7%) had somewhat severe dyspnoea, 26.7% subjects had severe dyspnoea and 16.7% of subjects had moderate dyspnoea

Table 4: Mean, median, mean percentage and standard deviation of pre-test and post-test dyspnoea scores of experimental and control group

Dyspnoea score		Min score	Max score	Max. Possible score	Mean	Median	Mean %	SD	Reduction in dyspnoea score (%)
Experi mental	Pre	21	38	50	31.30	32	62.60	4.324	13.20
	Post	15	32	50	24.70	25.50	49.40	4.735	
Control	Pre	20	39	50	30.67	32	61.33	5.779	5.73
	Post	18	36	50	27.80	30	55.60	5.378	

Table 5: Item wise pre-test and post-test dyspnoea score of experimental group

Dyspnoea score		Min score	Max score	Max. Possible score	Mean	Median	Mean %	SD	Reduction in dyspnoea score (%)
Q_1	Pre	1	2	5	1.60	2	32	0.498	18.00
	Post	0	2	5	0.70	1	14	0.535	
Q_2	Pre	1	3	5	1.93	2	38.67	0.521	14
	Post	0	2	5	1.23	1	24.67	0.626	
Q_3	Pre	2	4	5	3.13	3	62.67	0.571	10
	Post	1	3	5	2.63	3	52.67	0.615	
Q_4	Pre	3	5	5	4.50	5	90	0.572	4
	Post	3	5	5	4.30	4	86	0.596	
Q_5	Pre	1	4	5	2.77	3	55.33	0.679	15.33
	Post	1	3	5	2	2	40	0.695	
Q_6	Pre	1	3	5	2.23	2	44.67	0.626	14.67
	Post	1	3	5	1.50	1	30	0.572	
Q_7	Pre	3	5	5	4.03	4	80.67	0.414	10
	Post	3	4	5	3.53	4	70.67	0.507	
Q_8	Pre	1	3	5	1.83	2	36.67	0.592	14.67
	Post	0	2	5	1.10	1	22	0.403	
Q_9	Pre	3	5	5	4.40	4.50	88	0.675	22.67
	Post	2	4	5	3.27	3	65.33	0.740	
Q_{10}	Pre	4	5	5	4.87	5	97.33	0.346	8.67
	Post	3	5	5	4.43	4	88.67	0.568	

The data in the Table 5 shows that in experimental group, the mean percentage of pre-test dyspnoea scores were, at rest 32%, while getting up from bed 38.67%, while brushing teeth 62.67%, while bathing 90%, while dressing 55.33%,while combing hair 44.67%, while eating 80.67%,while standing up from chair 36.67%, while walking on a pace at your own pace 88%, while walking upstairs 97.33%, whereas the post-test dyspnoea scores were, at rest 14%, while getting up from bed 24.67%, while brushing teeth 52.67%, while bathing 86%, while dressing 40%,while combing hair 30%, while eating 70.67%,while standing up from chair 22%, while walking on a pace at your own pace 65.33% and while walking upstairs was 88.67%.

Table 6: Item wise pre-test and post-test dyspnoea score of control group

Dyspnoea score		M.S	Max score	Max. Possible score	Mean	Median	Mean %	SD	Reduction in dyspnoea score (%)
Q_1	Pre	0	2	5	1.37	1	27.33	0.615	6.67
	Post	0	2	5	1.03	1	20.67	0.718	
Q_2	Pre	1	3	5	1.87	2	37.33	0.571	3.33
	Post	0	3	5	1.70	2	34	0.596	
Q_3	Pre	2	4	5	3.47	4	69.33	0.730	8.67
	Post	2	4	5	3.03	3	60.67	0.718	
Q_4	Pre	3	5	5	4.77	5	95.33	0.504	3.33
	Post	4	5	5	4.60	5	92	0.498	
Q_5	Pre	1	4	5	2.73	3	54.67	0.907	6.67
	Post	1	3	5	2.40	2.50	48	0.675	
Q_6	Pre	1	3	5	2.03	2	40.67	0.765	2.67
	Post	1	3	5	1.90	2	38	0.662	
Q_7	Pre	2	5	5	4	4	80	0.788	2.67
	Post	2	5	5	3.87	4	77.33	0.681	
Q_8	Pre	0	5	5	1.70	2	34	0.877	8
	Post	0	2	5	1.30	1	26	0.596	
Q_9	Pre	3	5	5	4	4	80	0.743	12.67
	Post	2	5	5	3.37	4	67.33	0.850	
Q_{10}	Pre	4	5	5	4.73	5	94.67	0.450	2.67
	Post	3	5	5	4.60	5	92	0.675	

The data in the Table 6 shows that in control group, the mean percentage of pre-test dyspnoea scores were, at rest 27.33%, while getting up from bed 37.33%, while brushing teeth 69.33%, while bathing 95.33%, while dressing 54.67%,while combing hair 40.67%, while eating 80%,while standing up from chair 34%, while walking on a pace at your own pace 80%, while walking upstairs 94.67%, whereas the post-test dyspnoea scores were, at rest 20.67%, while getting up from bed 34%, while brushing teeth 60.67%, while bathing 92%, while dressing 48%,while combing hair 38%, while eating 77.33%, while standing up from chair 26%, while walking on a pace at your own pace 67.33% and while walking upstairs was 92%.

Table 7: Mean, standard deviation (SD), mean difference, and't' value of experimental group and control group

Group	Paired differences		Mean difference	Std error difference	't' value	Remark
	Mean	S.D				
Exp-Group	6.60	1.94	3.733	0.424	8.798	Significant
Contr l Group	2.867	1.279				

Table 8: Item-wise mean, standard deviation (SD), mean difference, standard deviation difference and 't' value of pre-test and post-test dyspnoea scores among experimental group.

Item	Dyspnoea score	Mean	S.D	Mean difference	S.D difference	't' Value
Q_1	Pre-test	1.60	0.498	0.90	0.48	*10.26
	Post-test	0.70	0.535			
Q_2	Pre-test	1.93	0.521	0.70	0.54	*7.17
	Post-test	1.23	0.626			
Q_3	Pre-test	3.13	0.571	0.50	0.63	*4.35
	Post-test	2.63	0.615			
Q_4	Pre-test	4.50	0.572	0.20	0.55	*1.99
	Post-test	4.30	0.596			
Q_5	Pre-test	2.77	0.679	0.77	0.68	*6.19
	Post-test	2	0.695			
Q_6	Pre-test	2.23	0.626	0.73	0.58	*6.89
	Post-test	1.50	0.572			
Q_7	Pre-test	4.03	0.414	0.50	0.51	*5.39
	Post-test	3.53	0.507			
Q_8	Pre-test	1.83	0.592	0.73	0.52	*7.71
	Post-test	1.10	0.403			
Q_9	Pre-test	4.40	0.675	1.13	0.43	*14.30
	Post-test	3.27	0.740			
Q_{10}	Pre-test	4.87	0.346	0.43	0.50	*4.71
	Post-test	4.43	0.568			

Discussion

The findings of the study have been discussed with reference to the objectives and hypotheses stated in introduction and in relation with the findings of other studies.

Section 1: Demographic data

The findings of the study demonstrated that the majority of the subjects in experimental group (50%) and in control group (43.3%) were in the age group of 56-65 years. In both the groups majority of subjects (experimental group-83.3% and control group- 80%) were males. In experimental group-43.3% and in control group-53.3% were Hindus. Regarding occupation majority of subjects in both the groups (experimental group-46.7%and control group-56.7%) were factory workers. In experimental group-50%and control group-53.3% had the monthly income of rupees 5,001-10,000. Majority of subjects in the experimental group (56.7%) were the residents of rural areas and in control group (53.3%) were the residents of urban areas. In both the groups majority of subjects (experimental group-50%and control group-53.3%) were chronic smokers. In the experimental group majority of subjects (50%) were suffering from COPD since 6-10 years and in control group majority of subjects (40%) were suffering from COPD since more than 10 years.

Section 2: Dyspnoea scores among experimental and control group

Findings of the study revealed that in the pre-test, majority of subjects (63.3%) had severe dyspnoea and 36.7% of subjects had somewhat severe dyspnoea while in the post test majority of subjects (66.7%) had somewhat severe dyspnoea, 26.7% of subjects had moderate dyspnoea and 6.7% of subjects had severe dyspnoea in experimental group. On the other hand, in control group during pre-test majority of subjects (63.3%) had severe dyspnoea, 26.7% subjects had somewhat severe dyspnoea and 10% of subjects had moderate dyspnoea, whereas in posttest majority of subjects (56.7%) had somewhat severe dyspnoea, 26.7% subjects had severe dyspnoea and 16.7% of subjects had moderate dyspnoea.

Section 3: Effectiveness of pursed lip breathing exercise

The findings of the study revealed that there was significant difference between the mean pre-test and post-test dyspnoea scores. The mean percentage of pre-test dyspnoea score (62.60%) was found to be higher than the mean percentage of post-test dyspnoea score (49.40%).And the't' value computed

was highly significant ($t_{(29)} = 18.63$, $t_{(tab)} = 1.70$, $p < 0.05$). This finding showed that the pursed lip breathing exercise was effective in reducing dyspnoea among COPD patients.

A study was conducted to evaluate the effects of pursed lip breathing on dyspnoea among chronic obstructive pulmonary disease patients revealed that pre-test dyspnoea score was higher (5.6 ± 1.1) than the post-test dyspnoea score (4.6 ± 0.5.) as measured with Borg scale, which supports the present study.[57]

Section 4: Comparison of the level of dyspnoea between experimental group and control group

The findings of the present study revealed that the't' value computed was highly significant ($t_{(58)} = 8.798$, $t_{(tab)} = 1.670$, $p < 0.05$). It shows that there was much reduction in dyspnoea among the experimental group as compared to the control group.

A Randomized controlled trial was conducted to evaluate the effect of pulmonary rehabilitation programme among 40 stable COPD patients. Result showed that in the experimental group, after four weeks, the mean (±SD) difference in six-minute walking distance was 54.2 (26.7) meters, dyspnoea,0.96 (0.26), fatigue,0.90 (0.40) and emotion scores were 0.91 (0.32) respectively. Changes in all these parameters were statistically significant ($p < 0.001$) as compared to the control group. Study concluded that pulmonary rehabilitation for four weeks results in significant reduction in dyspnoea, improvement in the quality of life and exercise tolerance[7], which supports the present study.

Conclusion

The following conclusions were drawn on the basis of the findings of the study:

- Comparison of the level of dyspnoea between the experimental group and the control group was highly significant ($t_{(58)} = 8.798$, $t_{(tab)} = 1.670$, $p < 0.05$).
- There was significant association between pre-test dyspnoea score and demographic variables such as age, gender, occupation, smoking status and duration of illness. And there was no significant association between the pre-test dyspnoea score and the demographic variables such as religion, monthly income and the area of residence.

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