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Impact of a Structured Group Exercise Intervention on COPD Management and Academic Performance in College Students

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Abstract: A large body of research has shown a connection between COPD and occupational exposures. Coal miners are at increased risk for developing COPD if they breathe in the dust that is common in the industry. There were two sets of 81 people, spanning 36–60 years old, who worked for coal mining businesses and had stable chronic obstructive pulmonary disease (COPD). These individuals were identified at Stages II and III of the illness, respectively. A combination of conventional medical treatment and an integrated yoga curriculum was provided to the yoga group, whereas the control group only got conventional medical treatment. The participants did 90 minutes of yoga daily for 12 weeks. Yoga postures (asanas), breathing exercises (pranayama's), relaxation techniques, and meditation are all a part of this time. The individuals in the control group were added to a yoga waiting list and given the opportunity to rejoin the programme after 12 weeks, if they were still interested. The following outcomes were noted in the yoga group after the intervention: CAT scores, dyspnea, fatigue, depression, anxiety, pulse rate, respiration rate, pain (P<0.001), and blood pressure (systolic and diastolic). When compared to coal miners getting conventional therapy for COPD, those who participated in a 12-week yoga course showed greater improvements in respiratory, autonomic, and psychophysiological parameters. Yoga has the ability to alleviate alleviate COPD symptoms by restoring the body's natural defenses against stress and the brain.

Keywords: Problems with anxiety, chronic obstructive pulmonary disease (COPD), depression, dyspnea, exercise ability, weariness, health, sleep, yoga

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INTRODUCTION

One kind of regulated breathing used in yoga is breathing exercises. To do this, shut one nostril as you inhale and close the other while you exhale. After that, it's backwards and done again. Reducing stress and improving breathing and circulation are just a few of the numerous physical and mental advantages of alternate. The scientific community has found proof for some of these assertions. Safe and effective breathing exercises are within the reach of the majority of individuals. In this article, we will examine the possible advantages of breathing exercises and provide a detailed outline on how to begin.

One of the most dangerous lung diseases that may strike middle-aged and elderly persons is lung disease that is chronically obstructive (COPD). An important issue in global health, chronic obstructive pulmonary disease (COPD) is becoming more common. In primary care, there is a lack of data on how well integrated disease management (IDM) works over the long term to improve exercise capacity and health status in people with moderate to severe COPD (COPD).

Formal cardiopulmonary exercise testing shows reduced exercise capacity and low oxygen consumption

(Vo (2)) in COPD patients, and these patients also score poorly on health-related quality-of-life surveys. There are distinct associations between COPD mortality and each of these three factors when examined independently. The 6-minute the multidimensional BODE index, which is a predictor of survival in COPD, includes the 6-minute walk test (6MWT) as one of its four components. Obstruction to airflow and body mass index (BMI) are the other two factors. The impact of chronic obstructive pulmonary disease (COPD) develops in direct proportion to its severity. profound effect on people's health. Various quality of life surveys is often used to measure it.

While smoking is known to increase the likelihood of developing very little is known about the ways in which people with chronic obstructive pulmonary disease (COPD) manage their symptoms compare to those of non-smokers.

A limiting factor in airflow that is There is currently no cure for COPD, or chronic obstructive pulmonary disease. One physiological metric that is often used to determine the severity of chronic obstructive pulmonary disease (COPD) is forced expiratory volume in one second (FEV1). Nevertheless, the FEV1 may not be able to quantify all systemic symptoms that COPD patients may suffer. We hypothesised that better patient categorization and management of COPD might be achieved using a multi-dimensional grading system that took into account both the respiratory and systemic symptoms of the illness prognosis.

Chronic obstructive pulmonary disease (COPD) is thought to be exacerbated by both smoking and sudden worsening of symptoms. These conclusions, however, are based on research involving current smokers, but data from studies including former smokers is few and often conflicting. The researchers set out to determine if ex-smokers People with COPD who have minor exacerbations on a regular basis also tend to have a quicker decline in forced expiratory volume in one second (FEV1) and worse functional and clinical outcomes.

LITERATURE REVIEW

Hogg (2012) After completing pulmonary rehabilitation, how do individuals How do people living with COPD feel about maintaining an active lifestyle? A grounded theory-based qualitative analysis of two focus groups. This study included sixteen COPD patients who had successfully finished pulmonary rehabilitation. The benefit of pulmonary rehabilitation, continuing exercise, professional assistance, social support from peers, and health status were the five major themes that emerged from the focus group data, which were in agreement with one another. The goal of pulmonary rehabilitation was to help patients overcome their fears of exertion and improve their physical abilities so that they could take part in more daily activities without experiencing shortness of breath. After rehabilitation, participants felt it was crucial to stick to an exercise programme in order to keep moving. They also mentioned the need of regular, supervised sessions to keep their new skills sharp. Because it can make people feel threatened or embarrassed, the fitness center was a potential deterrent to going. Important factors were deemed to be professional and peer support; individuals wanted to work out with a group of their peers and have the chance to socialize. Physical activity engagement was shown to be significantly impacted by health status related to COPD symptoms. Among the most common threads was the need of believing in one's own abilities to engage in physical exercise. In order to help individuals with chronic obstructive pulmonary disease (COPD) have more physically active lives after pulmonary rehabilitation, they value the chance to

participate in organized, continuous exercise programmes where they may get assistance from both peers and professionals. The extent to which people believe in their own abilities to engage in physical exercise may correlate with their desire for such chances.

Hong (2023) The impact of exercise training on various cognitive and memory functions in COPD patients is debatable, despite the fact that pulmonary rehabilitation and regular exercise have enhanced cognitive ability and reduced negative emotions in COPD patients. Finding out if fitness training improved mental health and cognitive performance in COPD patients was the main goal of this research. Processes and Resources For this pilot trial, 33 people were considered who had advanced to stage B or above on the Global Initiative for Chronic Obstructive Lung Disease (GALD) scale. The exercise group and the control group were both open to all eligible patients., in accordance with the subjects' rights. The exercise therapy group consisted of twelve patients and lasted for two months, whereas the control group consisted of sixteen patients. The Stroop test, psychomotor vigilance task (PVT), and Wechsler Memory Scale-III Word List Test were used to determine cognitive ability results. For this purpose, researchers used the Beck Depression Inventory (BDI) and the Beck Anxiety Inventory (BAI) to assess mood states. Final Product After 60 days of treatment, the majority of patients showed significant improvement on the BDI and BAI scales. During PVT, there was an improvement in attention performance as the hit rate climbed and the omission rate fell. In addition, the results of the word-list test and the instant verbal memory test showed a considerable improvement in this study. On Stroop analysis, however, no significant changes in performance were detected. In summary This study found that negative emotions, attentiveness, recognition memory, and immediate memory all saw considerable improvements after participating in an exercise training programme for only two months.

Tsaousi (2024) It is critical to provide COPD patients the tools they need to be active participants in their care and to develop well-informed self-management plans. This research studied primary care patients with chronic obstructive pulmonary disease (COPD) and their functional status, quality of life, education, depression, and anxiety as outcomes. In a randomised controlled study, we enrolled COPD patients from four primary care centres in Crete, Greece. Forty patients were assigned to the intervention group, which received educational assistance for self-management, and eighty patients were assigned to the control group, which received standard treatment. These evaluations were given both before and six months after the intervention. The results showed that most PROMs in the intervention group showed substantial improvements at the conclusion of the 6-month intervention ($p < 0.05$), whereas the control group showed no changes. The following health outcomes showed the largest improvement between baseline and follow-up assessments: conditions after COPD discharge (CCQ-34.1%), anxiety (BAI-35%), depression (BDI-20.2%), and the Health Assessment Inventory's actively managing my health subscale Literacy Questionnaire (HLQ) (23.5%). Our findings point to the possibility that a self-management intervention is a viable option for enhancing PROMs in primary care settings. Policymakers might institute such programmes to enhance the patients' general health, even if further research must be conducted to ascertain the long-term impacts of such interventional initiatives.

Gilworth (2024) When it comes to alleviating the symptoms and impairment caused by chronic obstructive pulmonary disease, the gold standard therapy is pulmonary rehabilitation (PR), an exercise and education plan. Poor uptake and completion, however, restrict the advantages of PR. Recruiting lay health volunteers

with training, dubbed "PR buddies," to encourage more people to take part in and finish PR while keeping costs low is the goal of this experiment. The procedures for determining acceptability, cost-effectiveness, and efficacy are detailed in this study protocol. Methods A total of 38 public relations agencies in the UK are set to participate in the IMPROVE experiment, which is an open-minded, pragmatic cluster trial that was not predetermined. Standard therapy and an intervention arm with PR buddies will be randomly allocated to COPD patients. Training in recruiting and training PR buddies will be provided to PR professionals at trial locations that were randomly assigned to the intervention arm. Volunteers, selected from among those who have just finished PR in their service, will get instruction from them. Helping patients overcome barriers to attending PR is the goal of the three-day PR-buddy training session, which includes topics such as effective communication, maintaining confidentiality, the limitations of the PR-buddy position, and methods for changing behaviour. Eight locations, two groups—one receiving an intervention and another receiving a control—will take part in an internal pilot to evaluate the trial's execution. Enrollment in and completion of PR constitute the major endpoint of the experiment. The fidelity of the intervention and its acceptability to patients, PR professionals, and volunteer PR buddies will be investigated via a process assessment. Additionally, we will evaluate the cost-effectiveness of the plan. Subject under consideration The long-term strategy of a British healthcare system known as the National Health Service... focuses on expanding access to pulmonary rehabilitation (PR) and improving COPD outcomes. Assumption number one in the research is that local PR teams can increase PR uptake and completion rates with the help of volunteer PR buddies who get training. This experiment is practical since it will examine the feasibility of integrating the intervention within the public relations services provided by the NHS. Policy decisions on the adoption of PR pals and comparable programmes throughout the NHS may be informed by the data collected from this research.

Jang (2019) More and more people are suffering from chronic obstructive pulmonary disease (COPD) in the United States. globe, yet few people understand what it is or are aware of its symptoms. Proving that structured educational intervention works was the primary goal of this prospective research. Participants and procedures: People who were using an inhaler for chronic obstructive pulmonary disease were part of the trial. Three consecutive hospital visits were made by patients in this prospective study: baseline, one month, and three months. The outcomes are: The research included 55 individuals. Prior to schooling, the average COPD knowledge score was 12.51±3.19, and after education, it increased significantly to 17.89±1.37 ($P<0.001$). Education also led to a substantial improvement in the assessment of patients' inhaler technique (5.40±1.50 vs 6.83±0.37 $P=0.01$). Following schooling, there was a 10.9% drop in the incidence of depression and a 12.7% decrease in the rate of anxiety ($P<0.001$). Using subgroup analysis, we contrasted Group A, which showed no change in score, with Group B, whose score had an increase of more than 5 points. When comparing Group B to Group A, there was a notable improvement with a significantly shorter time from COPD diagnosis to enrollment (2.72±2.43 vs 5.22±5.11 years, $P=0.038$) and an average CAT score of 2.61±5.88 compared to -2.41±7.48 ($P=0.01$). Conclusion: A systematic training approach improved knowledge of certain illnesses. An essential component of COPD is therapy that influences patients' emotional and quality of life status is disease-specific education. Getting a COPD diagnosis early might help with education.

RESEARCH METHODOLOGY

Sample Size

Using G*Power 3.0.10, the sample size was calculated. The variable for 6MWT was taken from the previous research "Yoga Therapy Decreases Dyspnoea-Related Distress and Improves Functional Performance in People with Chronic Obstructive Pulmonary Disease: A Pilot Study" (Donesky-Cuenco et al., 2009). We obtained the necessary sample size of n=72 (36+36) by using Cohen's technique has a power of 0.9, an alpha of 0.05, and an effect size of 0.78.

Inclusion Criteria

For inclusion, the following were needed: male coal miners who did not smoke and were in the age bracket of 36 to 60, diagnosed with COPD with spirometric evidence of chronic airflow limitation (FEV1/FVC, Post BD<0.70), patient must be able to walk without assistance, have maintained clinical stability for a minimum of three months, be literate enough to complete the questionnaires, have the cognitive capacity to follow spirometry instructions, be willing to engage in the research assessments, and provide their permission. after being informed.

Exclusion Criteria

Participants were removed from the study if any of the conditions specified before were found to be true. Myocardial infarction, COPD exacerbation within last three weeks, recent surgery to thorax, abdomen, head, eyes or ears, unaccountable hemoptysis, severe hypertension, recurrent angina within the previous six months, hospitalization within 3 months, a history of respiratory tract infection within one month of enrolment; a current or former smoker (smoking is a confounding variable); a resting heart rate greater than 120 bpm; a body mass index (BMI) greater than 35 kg/m2; participation in yoga rehabilitation programs; recently injured individuals or those with neuromuscular disorders that interfere with exercise testing; and finally.

DATA ANALYSIS

Spirometric Variables

The spirometric values at the beginning of the study were similar for both the yoga and control groups, as there was no statistically significant difference ($P > 0.05$). Figure 1 shows the pre- and post-IAYT values, in percentage terms, of FVC, FEV1, FEV1 /FVC, and FEF for patients in the yoga group and the control group. In contrast to the control group, which got just conventional treatment, the yoga group also got IAYT. After 12 weeks, the yoga group's FVC, FVC% predicted, FEV1, and FEV1% predicted values were significantly higher than their baseline values ($P < 0.001$). While improvements were generally positive, no FEV1/FVC showed statistically significant changes., FEV1/FVC% predicted, FEF, or FEF% predicted. The control group, on the other hand, showed no statistically significant changes in any lung function measure between baseline and intervention.

Table 1: Changes in pulmonary variables within yoga and control, and difference between groups with 95% CI

	YOGA (n=36)				CONTROL (n=36)				BETWEEN GROUPS		
	PRE		POST		PRE		POST				
Variables	MEAN ± SD	C.I. (LB to UB)	MEAN ± SD	C.I. (LB to UB)	MEAN ± SD	C.I. (LB to UB)	MEAN ± SD	C.I. (LB to UB)	PRE vs PRE	POST vs POST	Group *time
FVC (lit.)	2.52± 0.24	2.44 to 2.60	2.58± 0.23***	2.50 to 2.66	2.42± 0.21	2.34 to 2.49	2.40± 0.23	2.32 to 2.48	0.058	0.002	<.001
FVC % pred.	79.03± 6.33	76.86 to 81.21	81.21± 6.50***	78.98 to 83.45	78.9± 4.64	77.28 to 80.51	78.38± 5.13	76.59 to 80.17	0.920	0.049	<.001
FEV1 (lit.)	1.24± 0.21	1.17 to 1.31	1.30± 0.23***	1.22 to 1.38	1.16± 0.21	1.08 to 1.23	1.14± 0.22	1.07 to 1.22	0.105	0.005	<.001
FEV1 % pred.	49.05± 7.7	46.41 to 51.69	51.5± 8.36***	48.63 to 54.37	47.6± 6.73	45.26 to 49.95	47.2± 6.98	44.76 to 49.64	0.409	0.024	<.001
FEV1/FVC %	48.99± 5.11	47.24 to 50.75	50.17± 5.61	48.24 to 52.09	47.57± 5.32	45.71 to 49.42	47.49± 5.38	45.62 to 49.37	0.261	0.048	<.001
FEV1/FVC % pred.	61.61± 5.84	59.6 to 63.62	63.09± 6.46	60.87 to 65.31	59.91± 6.13	57.77 to 62.05	59.51± 6.60	57.20 to 61.81	0.242	0.026	<.001
FEF 25-75 (lit.)	1.06± 0.19	0.99 to 1.12	1.1± 0.21	1.03 to 1.17	1.02± 0.25	0.93 to 1.11	0.99± 0.21	0.91 to 1.06	0.462	0.033	<.004
FEF 25-75 % pred.	40.84± 4.49	39.29 to 42.38	41.94± 5.37	40.1 to 43.79	39.89± 4.39	38.35 to 41.42	39.18± 4.7	37.54 to 40.82	0.377	0.026	<.006

PEFR

Peak expiratory flow decreased A statistically significant improvement ($P < 0.001$) was seen in the yoga group between the pre- and post-test scores, in contrast to the control group. The evaluations obtained after yoga differed significantly ($P < 0.001$) from the control group, according to the findings of the independent t-test.

Table 2: Changes in health status and peak expiratory flow within yoga and control, and difference between groups with 95% CI

	YOGA (n=36)				CONTROL (n=36)				BETWEEN GROUPS		
	PRE		POST		PRE		POST				
Variables	MEAN ± SD	C.I. (LB to UB)	MEAN ± SD	C.I. (LB to UB)	MEAN ± SD	C.I. (LB to UB)	MEAN ± SD	C.I. (LB to UB)	PRE vs PRE	POST vs POST	Group *time
CAT	20.69 ± 5.53	18.82 - 22.56	15.92 ± 6.51***	13.71 – 18.12	21.81 ± 5.48	19.95 – 23.66	22.36 ± 5.65	20.45 – 24.27	0.395	.001	<.001
PEFR	254.17 ±67.92	231.1 to 77.15	289.44 ± 88.22***	259.6 to 319.29	247.78 ±81.21	220.3 to 275.25	239.72 ± 91.45	208.78 to 270.66	0.718	.022	<.001

AUTONOMIC ASSESSMENTS

By the end of the twelve weeks of intervention, the yoga group had substantially lower levels of all

autonomic parameters (SBP, DBP, HR, and RR) (Decimal value < 0.001). The control group's post-test results were not significantly different from their pre-test values (P > 0.05). The results of the independent t-test showed that there was a notable disparity (P < 0.001) in the post-test scores between the two groups. Table 3 shows the pre- and post-test scores for both groups, together with a 95% confidence interval and all covariates.

Table 3: Changes in autonomic variables within yoga and control, and difference between groups with 95% CI

	YOGA (n=36)				CONTROL (n=36)				BETWEEN GROUPS		
	PRE		POST		PRE		POST				
Variables	MEAN ± SD	C.I. (LB to UB)	MEAN ± SD	C.I. (LB to UB)	MEAN ± SD	C.I. (LB to UB)	MEAN ± SD	C.I. (LB to UB)	PRE vs PRE	POST vs POST	Group *time
SBP	142.83 ± 13.00	138.43 to 147.23	136.11 ± 3.49***	131.55 to 140.67	143.67 ± 11.69	139.71 to 147.62	142.94 ±13.07	138.52 to 147.37	.776	.032	<.001
DBP	87.89 ± 6.43	85.71 to 90.06	83.61 ± 5.91***	81.61 to 85.61	88.33 ± 6.19	86.24 to 90.43	88.61 ±6.36	86.46 to 90.76	.766	.001	<.001
RR	20.17 ± 3.26	19.06 to 21.27	17.03 ± 2.89***	16.05 to 18.01	21.31 ±3.66	20.07 to 22.54	20.94 ±4.04	19.58 to 22.31	.168	.001	<.001
HR	86.28 ±8.37	83.45 to 89.11	81.81 ± 7.41***	79.30 to 84.31	85.08 ± 8.38	82.29 to 87.91	86.17 ±8.38	83.33 to 89.00	.547	.022	<.001

CONCLUSION

In a randomised controlled trial, the efficacy of an IAYT intervention lasting 12 weeks was assessed in coalminers who suffer from COPD, which may range from mild to severe. The participants' pulmonary, autonomic, physical, and mental health were assessed. Designed specifically for those with COPD, the 12-week intervention included 90-minute yoga therapy sessions six days a week. The yogic teachings and Indian scriptures provided the conceptual framework for IAYT, which included physical postures (asanas), breathing exercises (pranayama), cycle medicine, yogic counselling, and lectures. Evidence from this research suggests that the IAYT programme may improve pulmonary, autonomic, physiological, and psychological in those suffering from COPD.

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