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TO INVESTIGATE THE EFFICACY OF SPIROMETRY AS A MOTIVATIONAL TOOL FOR QUITTING SMOKING

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Abstract

Background: The issue of tobacco usage is crucial to the field of general healthcare. Spirometry results might be shown to the smoker to show potential lung function degradation in order to improve smoking cessation guidance. The estimation of "lung age" may indicate a decline in lung function brought on by smoking. It has been suggested that using spirometry to demonstrate the harmful effects of smoking in people who smoke but are asymptomatic. Long-term smokers frequently find quitting to be very difficult, and both motivation and persistence are needed. Smokers must first make the decision that they wish to stop smoking in order to succeed. Nicotine replacement therapies, the administration of drugs that lessen cigarette cravings, joining stop-smoking support groups, and other approaches can all help smokers quit. This study's objective was to ascertain whether spirometry has an impact on the rates of smoking cessation.

Aim: The aim of the study is to study the effectiveness of spirometry as a motivational tool for smoking cessation.

Material and Method:

The Department of Respiratory Medicine oversaw the execution of this randomized controlled experiment. To determine the impact of including a spirometry intervention in our conventional smoking cessation program on the cessation rate, we conducted a randomized controlled study (RCT). Participants were divided into two groups, with the only difference being which group received an intervention that included a pulmonary function test (PFT) and a report of the results. Patients who came to the clinic for whatever reason were asked about their smoking habits, and they were offered to participate in the study after being informed about it. Participants were smoker adults (age>=18) selected among patients who attended the SCC. Spirometry was required of smokers who gave their permission. A computer generates the random number series.

Results: A total of 260 patients participated in the study. Before being randomly assigned to the groups, 10 were excluded due to failure to perform baseline spirometry despite repeated requests. The remaining 250 patients participated in the study; 130 were assigned to the control group and 120 to the study group. Participants were essentially men (88%). The majority of participants were active workers (60%), 12.8% unemployed, and a notable proportion of students (10.4%). When asked about having current familial and professional issues, 40% and 40% responded positively. There was no significant difference between study arms within any of the sociodemographic characteristics.

Conclusion: In addition to all that has already been mentioned, this calls for the medical corps to be driven to seek out and use whatever tool at their disposal that can aid in the fight against this scourge of global health. This supports conclusions that were made using spirometry as an independent variable in earlier investigations. In the studied Belgian general practice, the "minimal intervention strategy" for smoking cessation had a high success rate. The ability of doctors to provide smoking cessation advice in routine primary care was significantly improved by a brief training program.

Keywords: Smoking Cessation, Motivation, Spirometry and Screening

Introduction

In industrialized nations, smoking is the leading contributor to preventable morbidity and mortality. It is estimated that smoking causes up to 56,000 deaths each year in Spain.[1] It accelerates the physiological deterioration of the lung volume in susceptible smokers and is one of the primary risk factors for vascular, respiratory, and chronic obstructive pulmonary disorders (COPD).[2,3] Smoking is always linked to a significantly increased risk of disease, a lower quality of life, and an earlier death, even when done occasionally or in modest amounts.[4] Numerous healthcare systems provide smokers with professional counseling. Numerous approaches, including straightforward guidance, in-person therapy, and pro-active telephone counseling, have been shown to be successful. However, there is disagreement regarding the optimal way to approach counseling to get the best results.

Most public health programs prioritize quitting smoking as one of their main objectives.[5,6] The cost of smoking cigarettes is significant, in fact. COPD is one of the conditions that cigarette smoking is strongly linked to.[7] The intensity and duration of cigarette smoking generally have a positive link with the risk of developing COPD.[8] In the year 2000, COPD was the fourth-leading cause of death globally. As of right now, quitting smoking is the only treatment that can slow the course of COPD. [9,10]

Simple dynamic spirometry is a helpful medical tool to assess smokers' lung function and encourage them to give

up smoking. Spirometry results that indicate airway obstruction can be provided to the patient as proof of a decline in lung function if they show a decline in forced expiratory volume in one second (FEV1) or FEV1/forced vital capacity (FVC) or both. Additionally, the 'lung age' of the smoker can be determined, and a graphic representation of the progression of airway blockage with aging can be produced.[11]

Lung age is defined as the typical age of a person with a patient's measured FEV1 as reference. The individual's chronological age can then be matched to this lung age. Reference values and linear regression equations have been used to generate formulae for calculating lung function and lung age.[12] The age at which the predicted FEV1 value is 100% is calculated using the patient's gender, height, and measured FEV1. Healthcare organizations place a great premium on helping people quit smoking. There is proof that receiving counsel and direction about quitting smoking from medical professionals is a beneficial intervention. Low-intensity advisory interventions are also successful, but there is no one advisory method that has been shown to be more helpful than the others.[13] Pulmonary Function Tests (PFT), also known as spirometry, were the first pulmonary explorations to be used as a smoking cessation motivator; a pilot study by Rose et Hamilton in 1978 used spirometry results as part of an overall score that served as a predictor of a major illness or death risk. Spirometry was extensively utilized in several other studies to increase smoking cessation rates in the 1980s and early 1990s.[14]

Material and Methods

The Department of Respiratory Medicine oversaw the execution of this randomized controlled experiment. To determine the impact of including a spirometry intervention in our conventional smoking cessation program on the cessation rate, we conducted a randomized controlled study (RCT). Participants were divided into two groups, with the only difference being which group received an intervention that included a pulmonary function test (PFT) and a report of the results. Patients who came to the clinic for whatever reason were asked about their smoking habits, and they were offered to participate in the study after being informed about it. Participants were smoker adults (age>=18) selected among patients who attended the SCC. Smokers who gave their consent were asked to perform spirometry. The sequence of random numbers is generated by a computer. All patients participating in our experiment were randomly assigned to the study group and the control group.

Inclusion Criteria

We included consultants who were cigarette smokers; aged 18 and above and accepted to take part in the survey.

Exclusion Criteria

We excluded patients with missing or incorrect contact information; patients who were unreachable after more than 3 call attempts on different occasions; lost to follow-up for any reason deceased or other; and in the intervention group, patients who were not eligible for performing spirometry test.

Sample Size:

A total of 260 patients participated in the study. Before being randomly assigned to the groups, 10 were excluded due to failure to perform baseline spirometry despite repeated requests. The remaining 250 patients participated in the study; 130 were assigned to the control group and 120 to the study group.

Interventions

The typical smoking cessation method The SCC rotation program includes a first appointment and weekly follow-up visits for up to 6 months. If necessary, all procedures and therapy are provided at no cost. Free medical care (counseling and therapy programs) were provided to SCC patients in Tunisia. The national campaign to combat tobacco consumption includes that step.

Initiation visit protocol

We gathered extensive information about cessation history, smoking profile and behavior, and demographic and biographic information using a standardized questionnaire. Anamnesis was used to reveal smoking-related comorbidities and symptoms that were personal and familial. Additionally, a fundamental physical examination was carried out, along with a screening for arterial hypertension and diabetes. All participants in both arms benefited from a teaching session that provided in-depth explanations of the mechanisms underlying tobacco addiction, the advantages of quitting, potential barriers to quitting, and the mechanism of action of nicotine replacement therapy, all presented with standardized speech and illustrations.

Intervention:

spirometry feedback In addition to usual care, participants assigned to the intervention group received standardized information about their spirometry during a dedicated session lasting approximately 30 minutes, where spirometry was performed, A brief summary of its results and their interpretation and functional implications were given.

Follow-up and outcomes

The outpatient follow-up period can be extended up to 6 months if necessary if not all patients were contacted by telephone 6 months after to determine whether they have stopped smoking, and if they have not, how many cigarettes they are smoking per day at the time and how long they have been abstinent. One year after the rotation a further

phone call was made to assess once more the patient's smoking status.

Statistical Analysis

Data analysis was carried out by using SPSS version 23.0. We used mainly means and standard deviation (SD) to describe continuous variables. Qualitative variables were expressed as effective and percentages. Comparison of continuous variables was assessed with the student's t-test if the data met the assumption of normality, and otherwise with the corresponding non-parametric test. For qualitative variables comparison we have made use of the Chi-squared test.

Result: -

A total of 260 patients participated in the study. Before being randomly assigned to the groups, 10 were excluded due to failure to perform baseline spirometry despite repeated requests. The remaining 250 patients participated in the study; 130 were assigned to the control group and 120 to the study group.

Table 1 Sociodemographic characteristics

Variable	Control group	Spirometry group
AGE: MEAN± SD	40.13 ± 11.24	41.15 ± 10.11
SEX RATIO	15.08	17.36
MALE: N (%)	105 (42)	115 (46)
FEMALE: N (%)	18 (7.2)	12 (4.8)
SCHOOLING LEVEL: N (%)		
UNSCHOOLED	1 (0.4)	5 (2)
PRIMARY SCHOOL	31 (12.4)	33 (13.2)
SECONDARY SCHOOL	40 (16.0)	45 (18.0)
HIGH SCHOOL	14 (5.6)	25 (10.0)
TWO YEARS OF HIGHER EDUCATION	11 (4.4)	18 (7.2)
HIGHER	12 (4.8)	15 (6.0)
PROFESSION: N (%)		
ACTIVE	70 (28.0)	80 (32.0)
UNEMPLOYED	17 (6.8)	15 (6.0)
STUDENT	16 (6.4)	10 (4.0)
RETIRED	18 (7.2)	23 (9.2)
WITH PHYSICAL DISABILITY	1 (0.4)	0 (0.0)
FAMILIAL ISSUES N (%)		
YES	50 (20.0)	50 (20.0)
NO	130 (52.0)	120 (48.0)
PROFESSIONAL ISSUES N (%)		
YES	43 (17.2)	57 (22.8)
NO	120 (48.0)	130 (52.0)

Participants were essentially men (88%). The majority of participants were active workers (60%), 12.8% unemployed, and a notable proportion of students (10.4%). When asked about having current familial and professional issues, 40% and 40% responded positively. There was no significant difference between study arms within any of the sociodemographic characteristics.

Table 2 Smoking profile variables description and between-arms comparison

CHARACTERISTICS	CONTROL GROUP	SPIROMETRY GROUP
FIRST CIGARETTE AGE: MEAN ± SD	15.10 ± 2.66	15.27 ± 2.68
REGULAR SMOKING AGE: MEAN ± SD	17.54 ± 4.10	18.55 ± 3.82
CIGARETTE/DAY: MEAN ± SD	28.10 ±13.38	26.15 ± 13.11
LIGHT SMOKER: N (%)	12 (4.8)	10 (4)
MODERATE SMOKER: N (%)	12 (4.8)	11 (4.4)
HEAVY SMOKER: N (%)	50 (20)	40 (16.0)
SUPER HEAVY SMOKER: N (%)	60 (24.0)	55 (22.0)
PACK-YEAR: MEAN ± SD	32.41 ± 21.36	34.60 ± 22.16
BUDGET FOR SMOKING: MEAN ± SD	35.5 ± 21.5	33.4 ± 24.1
FAGERSTROM SCORE: MEAN ± SD	5.36 ± 1.18	5.35 ± 1.16
HAD SCORE: MEAN ± SD	11.63 ± 5.01	11.14 ± 5.25
ANXIETY SCORE	5.33 ± 2.18	5.12 ± 2.10
DEPRESSION SCORE	4.22 ± 1.51	4.08 ± 1.22

Most of the clinic attendees are heavy (36 %) and super heavy (46 %) smokers, the mean cigarette intake was 32±12 cigarettes per day with a budget of 34±23. Fagerstrom Test for Nicotine Dependency was 5.0±1.0 at mean. The HAD score mean was 11.0±5.0 with the anxiety indicator being considerably higher than the depression indicator.

Table 3 Follow-up and outcomes: Between-arms comparison of 6th-month and 12th-month cessation rates

OUTCOME VARIABLE	CONTROL GROUP	SPIROMETRY GROUP
TREATMENT AVAILABILITY: N (%)	80.3%	81.9%
NUMBER OF VISITS: N (%)	2.01	4.66
SIX MONTHS—CESSATION RATE N (%)	60 (24.0)	95(38.0)
ONE YEAR—CESSATION RATE N (%)	30 (12.0)	40 (16.0)
SMOKING REDUCTION (CIGARETTES/DAY) MEAN	11.05	14.22

The smoking cessation rate at 6 months was significantly higher in the **SPIROMETRY** group (24.0% vs. 38.0% in the control group). At the one-year endpoint, cessation rates dropped in both arms, but the proportion of patients who remained abstinent was significantly higher in the **SPIROMETRY** group abstinent rate compared to the control group. A considerable reduction was observed in both groups within nonquitters with no statistically significant differences.

Discussion

Numerous cessation intervention options have emerged as a result of the widespread adoption of tobacco control initiatives. The most effective quitting techniques include pharmacologic medications and cognitive-behavioral therapies.[15, 16] Tobacco use, however, continues to be a tough habit to break for persons with low motivation and among unique populations. Those strategies, however, may be useful for people who are already motivated to quit.[17] The biggest obstacle to quitting smoking is motivation, so medical organizations and teams have created a number of tools to help patients become more motivated to stop, primarily by highlighting the negative effects of smoking in comparison to the positive effects of quitting and providing support while quitting.[18]

Takagi et al.2017[19], the Japanese standard cessation program was used as usual care which is a rotation of 5 visits with detailed smoking cessation advice, physical examination and behavioral therapy (cessation rate 69%). **Parkes et al.2008**[20] found that by presenting spirometry results in terms of "lung age" there was a greater decrease in smoking than in a control group who had presented the results in the usual way. Nevertheless, this study does not fully clarify the role of spirometry as testing was performed for both groups.

Several authors state that the use of spirometry can probably enhance the success rate of smoking cessation.[21,22] This opinion is sustained by the study of **Risser and Belcher1990**[23] Between a group that received instant feedback about the smoker's exhaled carbon monoxide levels, spirometry results, and pulmonary symptoms on the one hand, and a group that received merely education on the other, this author saw a significant difference in the success rate. 90 smokers were included, which was a rather small amount. In contrast, **Sippel et al.1999**[24] found no improvement in the quitting rate with additional education with spirometry and carbon monoxide measurements. Another randomized trial of smoking cessation interventions by **Segnan et al.1991**[25] compared the minimal intervention to three other arms with repeated

counseling, one of them combined with spirometry. No significantly different outcome was measured.

Segnan et al.1991[25] repeated the intervention, as we did, at 6, and 9 months, and found no differences between the groups. The discrepancies in our findings may be related to their study's poor reinforcement session attendance rates. In contrast to most trials, ours repeated the intervention at follow-up points of 6, and 12 months, which may have contributed to our intervention's ability to raise and maintain cessation rates.

The **Ojedokun et al.2013**[26] study used a simple handheld spirometer, COPD-6TM, which is user-friendly and less resource-intensive than conventional spirometry. The Swedish National Board of Health and Welfare's 2015 National Guidelines for Asthma and COPD highly prioritize this type of FEV1/FEV6 measurement in the initial workup of pulmonary obstructive disease in patients who smoke or have smoked, where COPD is suspected.[27]

This study is thought to meet the criteria of the primary systemic reviews on the topic, where a significant amount of methodological variability between studies was observed. Furthermore, there is now solid evidence that a smoker's success or failure in trying to quit smoking is predicted by variables including past attempts and psycho-mental health. Based on these data, we advise incorporating pharmacological support in a multimodal strategy together with communication about lung health for a higher efficacy of our cessation program. Spirometry equipment should be available at SCC and general practitioners' offices for patients' benefit. It might influence the attitudes of non-motivated smokers toward quitting, inspire smokers who want to quit, and screen this at-risk population for COPD.[28,29] Reorganizing the clinic's medical records in the direction of a risk stratification model is also advised in order to identify and anticipate patients who are more likely to withdraw from the program, as well as to tailor their rotations to increase their chances of success. Last but not least, despite the development of numerous cessation techniques, quitting smoking is still a difficult process with a significant risk of relapse. In addition to all that has already been mentioned, this calls for the medical corps to be driven to seek out and use whatever tool at their disposal that can aid in the fight against this scourge of global health.

However, our internal data show that patients' primary care medical records typically provide quite reliable documentation of their smoking habits. Further, a double-blind study design cannot be used due to the sort of intervention that will be implemented. A second nurse will evaluate the smoking status after a year, and the person analyzing the results will be blinded to the grouping of the patients in order to avoid this problem. Doctors and nurses participating in the study will also receive special training to ensure that the messages they convey and their attitudes and behaviors are similar to those of the two groups.

Conclusion:

Last but not least, despite the development of numerous cessation techniques, quitting smoking is still a difficult process with a significant risk of relapse. In addition to all that has already been mentioned, this calls for the medical corps to be driven to seek out and use whatever tool at their disposal that can aid in the fight against this scourge of global health. This supports conclusions that were made using spirometry as an independent variable in earlier investigations. In the studied Belgian general practice, the "minimal intervention strategy" for smoking cessation had a high success rate. The ability of doctors to provide smoking cessation advice in routine primary care was significantly improved by a brief training program. This study supports earlier results that primary care physicians can be trained in smoking cessation advice at a very low cost.

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