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Research Article

Mindful Attention Awareness as a Predictor of Smoking Quitting in Nicotine Cessation Treatment: Preliminary Data from a Pilot Study

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Abstract

In tobacco abuse many psychological, neuro-biological and social factors are involved. Research on nicotine addiction has achieved rather than limited results in identifying useful variables as indicators of treatment outcomes for tobacco smoking cessation. The aim of our research is to analyze the relationships between the mindfulness construct and smoking abstinence in individuals subjected to pharmacological treatment and motivational counseling exploring if the mindful construct is associated with increased likelihood of smoking cessation. Preliminary data from a pilot study carried out in the northern of Italy with a sample of 25 smokers enrolled from a smoking cessation program were reported. Participants were evaluated with the Fagerström test, General Health Questionnaire, Mindful Attention Awareness Scale and were assigned a target-quit date of 24-hr which is the first day that they will attempt complete abstinence. Results indicated that mindful score appears as a salient factor for abstinence. Further studies are necessary to confirm our findings identifying ways to modify pre-quit characteristics that may help smokers to achieve the first smoking cessation milestone.

Keywords: *Nicotine Addiction; Tobacco Addiction; Smoking; Smoke Cessation Programs; Mindfulness*

Introduction

Cigarette smoking is considered the eight most dangerous drug in the world that produce tolerance, dependence and abstinence [1,2] and is the second leading cause of preventable death in the world [3]. Tobacco smoke kills one person every 6 seconds in a year and reduces life expectancy by an average of 15 years [4]. The main causes of death are smoking-related diseases; as an example, the 80% of lung cancers occur in smokers [5]. Stopping smoking substantially reduces these health risks. Nicotine stimulates the release of many neurotransmitters in the central nervous system, including dopamine, norepinephrine, serotonin, β endorphin, and GABA (γ aminobutyric acid) which induces pleasure, arousal, mood modulation, and a reduction in anxiety and tension. Sudden nicotine withdrawal is characterized by irritability, anxiety, attention troubles, depressed mood, insomnia, impaired performance, enhanced appetite, and cravings, experienced most acutely in the first 24 - 48 hours after quitting smoking. These symptoms typically resolve within two to four weeks after cessation. Nicotine dependence severity strongly predicts withdrawal severity and relapse. Current conceptualizations have emphasized the multidimensional nature of dependence which encompasses factors such as negative (e.g. smoking to alleviate negative affect) and positive (e.g., smoking to enhance mood) reinforcement, and automaticity (e.g., mechanically reaching for a cigarette after quitting and positioning of cigarettes). A strong relationship between cigarette smoking and poor mental health was showed [6]; quitting was associated with reductions in depression, anxiety, and stress and improved positive mood and quality of life [7].

Currently, in order to increase the success rates of nicotine cessation programs, the evidence-based guidelines recommend a multi-dimensional approach, based on pharmacotherapy and Cognitive Behavioural Therapy (CBT) [8]. CBT based counseling interventions aimed at the enhancement of personal potential resources through the promotion of individual responsibility [9]. Pharmacological therapy is the main pillar of the nicotine addiction treatment, particularly with varenicline and bupropione [10]. New molecules such as cytisine have recently been offered optimistic outcomes [8-11]. A multidimensional approach gives an increase in success rates of two to three times greater than placebo [12] while the efforts concentrated on "harm reduction" rendering cigarettes minimally addictive have produced strongly held views about the potential benefits and risks of e-cigarettes [13]. Lately, an excellent aid to multi-componential treatment went with the Mobile Health model which is oriented to the overall state of health of the patient, achieved with mobile devices including the world of mobile apps and text messages related to health and lifestyles [14].

Research has devoted an increasing attention to the investigation of the role of psychological and personality characteristics in influencing the possibility of quitting smoke. The focus of interest on the identification of some universal predictors of smoking cessation has produced conflicting results [15-17]. Age, mental health, sex, cigarette consumption, FTND score, motivation to quit, perceived depression, telephone counseling and pharmacological treatment resulted as effective predictors in subjects who completed their tobacco smoking cessation program [18].

Quitting smoking is a difficult task. In a typical smoking cessation intervention, participants choose or are assigned a target-quit date (TQD), which is the first day that they will attempt complete abstinence. Quit date abstinence and early treatment success have been found to improve the likelihood of longer term smoking abstinence. Achieving abstinence for 24-hr on the targeted quit date increased the odds of 6-month abstinence 10-fold [21], hence abstention to the first 24-hr is considered a milestone for the success of a smoking cessation treatment [22]. Thus, knowledge of pre-intervention factors that moderate a SQA during treatment could help clinicians target smokers who need a more intensive therapy during the initial induction of cessation.

The general goal of the present study is to explore factors associated with smokers' ability to achieve a targeted 24-hr quit aiming to understand if the mindfulness construct can be a predictor of quitting, specifically because so many smokers have great difficulty to achieving a successful quit attempt (SQA) i.e. 24-hr abstinence.

Factors selected for analysis were chosen because of both empirical and theoretical support for their relationship to smoking treatment outcome. Based on previous results indicating that smokers present lower levels of mindfulness than non-smokers levels [19-20], our study focuses on the predictive role of the mindfulness construct. Mindfulness, as the intrinsic human capability of intentionally directing own attention to thoughts, emotions, or physical sensations in an open-minded manner [23], can be improved and trained. Its enhancements had been related with better health and mood outcomes. Therefore, mindfulness, enhancing attentional control and emotional regulation, may have immediate relevancy and practical implications to cessation outcomes.

Materials and Methods

Participants

All the materials and methods that are used to complete the study should be mentioned. The recruitment of the participants for the present study started in May 2017 and ended in September 2017 at the Antismoking Assistance Integrated Center of the Department of Mental Health and Pathological Dependence AUSL of Parma (Italy) within the Italian Epidemiological Observatory on Tobacco, Alcohol and Drugs of abuse, centrally managed by the Istituto Superiore di Sanità (OssFAD, ISS). The OssFAD is the official organ settled by the Italian Ministry of Health for playing a key role in the achievement of the following national aims: the reduction of both exposure to environmental tobacco smoke and tobacco use initiation, and the increase of tobacco use cessation. From the population of smokers who went to the Antismoking Center for a nicotine cessation treatment, we selected participants who satisfied the following inclusion criteria: a) range age between 18 and 70 years; b) number of cigarettes smoked per day (CDP) > 10; c) daily smoking pattern (at least 10 cigarettes/day) lasting for almost 10 years without considering periods of momentary cessation; d) a score > or = 3 at the Fagerstrom Test of Nicotine Dependence (FTND).

From the study we excluded the smokers with: pregnancy, lactation, diagnosis of major psychosis, bipolar disorder, eating disorders, panic attacks, drug and alcohol abuse, bipolar disorder, schizophrenia, current liver or kidney disease, uncontrolled diabetes, Parkinson's disease, Alzheimer's disease, unstable thyroid disorder, active treatment for current depression or substance abuse, history of heart problems, recent history (<6 months) for significant cardio-vascular events or individuals who received a prescription pharmacology to support an attempt to stop smoking in the six months prior to the start of the program. The quit date was set usually approximately 2 weeks after the first visit and inclusion in the study. All participants were from Parma and its surrounding areas, in the North East of the Italy. They all signed informed consent forms.

Measures and instruments

The study included an initial screening using a structured self-administered questionnaire used to collect the following information: socio-demographic variables: age, gender, marital status, and education. The degree of nicotine dependence was assessed at baseline with the Fagerström Test of Nicotine Dependence (FTND) consisting of six questions designed to measure tobacco dependence, which predicts smoking cessation [24] and includes components of cigarette consumption and its typology. Typology has been constructed to describe smokers according to when and why they smoke and their capability to refrain from smoking. The FTND score can range from 0 to 10 point with a score of 0-2 indicate minimum nicotine dependence whereas a score of 8-10 indicate very high dependence. The mindfulness construct was measured through the Mindful Attention Awareness Scale (MAAS). The most particular aspect of the scale is that it measures the absence of mindfulness and not its presence [25]. The tool consists of 15 items, designed to capture, with a unifactorial structure, the aspects of attention and awareness intended at the current moment. The original version consisted of a 6-point Likert scale but we used the Italian version, consisting of a 7-point Likert scale. Many studies have now investigated the psychometric properties and validity of this tool [25-27]. The scale always shows Cronbach's high Alpha ratings and good test-retest reliability. The degree of general well-being was investigated through the General Health Questionnaire (GHQ) in the 12-item Italian version [28]. The GHQ is a measure designed to assess current mental wellbeing by assessing normal, healthy, functioning and the appearance of new, distressing symptoms. There are several ways of scoring this measure. The two most common methods are binary, GHQ scoring (0-0-1-1), which yields a possible score range of 0-12, and Likert scoring (0-1-2-3), which gives a possible score range of 0-36. Likert scoring was selected for use in the current study as this method has been shown to produce a superior score distribution to assess severity, if psychiatric disorders are considered as dimensions rather than categories. The GHQ-12 includes six questions that are positively worded (for example, "Have you recently been able to enjoy your normal day to day activities?" and six that are negatively worded (for example, "Have you recently been thinking of yourself as a worthless person?"). The wording of the response scale is reversed for the two types of question so that the responses for the positively worded questions run from zero = "More so than usual" to 3 = "Much less than usual" and the responses for the negatively worded questions run from zero = "Not at all" to 3 = "Much more than usual". The GHQ-12 scores included between 19 and 36 indicate greater levels of general psychiatric distress.

Successful Quit Attempt (SQA)

Participants in the antismoking intervention program were asked to set a quit date and to be successfully quit for 24-hr before coming to their quit week appointment. Participants were considered to have a SQA if they were able to successfully complete a 24-hr quit within the two-week treatment program. Successful 24-hr quit was based on self-report of no smoking. Clients who were not able to be followed up or absent at the second visit were considered to have not quitted (relapses).

Procedure

Participants who appeared to be eligible were invited to attend a more comprehensive baseline assessment, during which they provided consent and completed a diagnostic interview and a physical exam with the study physician to confirm eligibility. The first access to treatment involved a first medical examination, during which the medical history was collected, and an objective clinical examination was carried out. On this occasion, questionnaires were self-administered and illiterate clients were given help as appropriate. The counsellors validated completed forms.

All clients received counselling, as described in a previous study [10], and pharmacotherapy (varenicline, trade name Champix® Pfizer Italy, from 0.5 mg daily to 1 mg twice daily for 11 weeks) was prescribed if the client agreed. Furthermore, the date of the appointment following two weeks after the stop-day was fixed with the subject. Consent was obtained and confidentiality was assured. The control visit coincided with the expiration of the first twenty-four hours of total abstinence from smoking, and included a clinical interview that assessed the possible side effects of the pharmacological treatment, a progress report general treatment and verification of complete abstention from smoking in the previous twenty-four hours. The meeting ended with indications on the continuation of the pharmacological treatment, a motivational reinforcement and some practical advice aimed at consolidating the determination in the continuation of the path undertaken.

Data analysis

Data management and analysis was performed using software R from the Statistical Package for the Social Sciences (Windows version 22.0; SPSS Inc., Chicago [IL], US). Descriptive statistics were used to describe participants' demographic and smoking history characteristics. Univariate logistic regression was used for all studied predictors. All predictors with a reported p value of < 0.10 were then included in multiple logistic regression analysis. Backward elimination was used in the multivariate analysis to identify independent predictors of abstinence as well as to calculate the Adjusted Odds Ratio (AOR) and 95% confidence interval. All statistical analyses were two-tailed tests, and a p value of < 0.05 was considered statistically significant.

Analysis of variance (AN.O.VA.) was used to compare continuous baseline characteristics (age, years of education, and FTND, MAAS and GHQ-12 scores) between those who had a SQA and those who had no successful quit. Chi-squared analysis was employed for dichotomous variables (gender, occupation, and group). Sociodemographic variables (age, gender, occupation, education), smoker status (FTND) were analyzed and included as predictors in each analysis. The relationship between the outcomes at the first 24 hours, the scores obtained at MAAS, and GHQ-12 were estimated with a logistic regression. Differences between the groups were evaluated with the Student's test for independent samples.

Results

Results and discussion must illustrate and interpret the reliable results of the study. In table 1 means scores and standard deviations of the analyzed variables collapsed by gender (male vs. female individuals) and by group (abstinent vs. relapses) are reported. In figure 1 the interaction between MAAS scores and groups (abstinent/non-abstinent) is depicted. The resulting sample was composed of 26 individuals, with a notable gender disparity, such that the male subjects are in greater numbers (76% males). The age of the subjects is between 34 and 68 years (average: 50.12 ± 10.70 years), and the mean years of education completed was 5 years. 42.3 percent were married or cohabitating with a significant other, 84.6% were employed. The average score for the FTND within the sample is 6.1 (± 2.5) indicating a high dependency.

The abstinence rate at the 24-hr SQA was 64% (16/9). At the Fagerstrom test, no significant difference was found between the groups, [$F(1, 23) = 0.00015$, $p > 0.05$], the marital status [$F(1, 23) = 0.70$, $p > 0.05$], and the schooling [$F(1, 23) = 0.92$, $p > 0.05$]. The average score found at the GHQ-12 is 15.92 (± 3.7) indicating that most of participants report problems in their general well-being and, therefore, required a psychological support. In addition, the GHQ-12 score is not significantly different for the group [$F(1, 23) = 0.21$, $p > 0.05$], for the civil status variable [$F(1, 23) = 0.92$, $p > 0.05$], and for schooling [$F(1, 23) = 0.3$, $p > 0.05$]. The average score of the MAAS for the total sample is 3.1 (± 1.6). As for previous scales, no significant differences can be attributed to the marital status [$F(1, 23=) 0.45$, $p > 0.05$] and to education [$F(1, 23) = 0.08$, $p > 0.05$]. Finally, as hypothesized, the MAAS showed a difference between groups [$F(1, 23) = 15.7$ $p < 0.05$], indicating that the abstinents' group scored significantly higher than the relapses' group.

	Total	M (n = 19)	F (n = 6)	Abstinents (n = 16)	Relapses (n = 9)
Age	50.1 (10.7)	41.1 (11.7)	53.3 (6.1)	50.7 (9.4)	49.0 (13.1)
FTND	6.1 (2.5)	6.3 (2.5)	5.5 (2.7)	6.1 (2.4)	6.1 (2.9)
MAAS	3.2 (1.6)	3.0 (1.6)	3.6 (1.8)	3.9 (1.5)	1.7 (0.3)
GHQ-12	15.9 (3.7)	15.0 (3.0)	18.8 (4.5)	16.1 (4.4)	15.4 (2.4)

Table 1: *Means (standard deviations in parentheses) of the analyzed variables collapsed by gender (male vs. female individuals) and group (abstinent vs. relapses).*

In logistic regression, the associations between group (abstinent/non-abstinent) and scores obtained at MAAS and GHQ-12 were calculated. Data showed that the score of mindful as assessed by the MAAS score was negatively associated with the ability to remain abstinent at the first 24-hr. In fact, for every point gained at the MAAS the probability of being non-abstinent decreases (p = 0.0001; OR = 6.8; 95% CI, 0.019 - 2.6). Finally, the GHQ-12 score, once inserted among the predictors, did not indicated any predictive effect on short-term outcome (p = 0.7; OR = 0.9; 95% CI, 0.05 - 1.48).

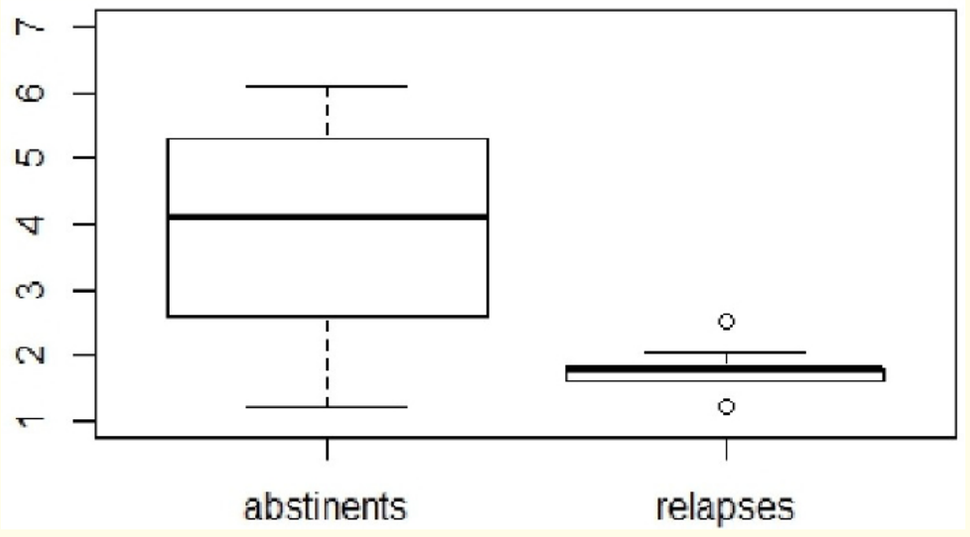

Figure 1: *Mindful Attention Awareness Scale (MAAS) scores in abstinent/non-abstinent groups.*

The current findings provide evidence that the mindfulness strongly predict abstinence among smokers enrolled in a cessation trial. Consistent with hypothesis, smokers reporting a higher degree of mindful were successful abstinent at 24-hr GHQ. Successful quitters were more likely to report high scores at the MAAS. Thus, the results suggest that the degree of mindfulness may be a chief predictor of vulnerability to relapse among smokers preparing to quit. A counterintuitive finding was that the general well-being, as assessed by the GHQ-12, was not consistently associated with quitting.

Discussion and Conclusion

Several limitations should be acknowledged. A first limit consists in the very small and non-homogeneous participants' number, particularly with regard to the gender. The imbalance between genders is notable. This is a significant fact, given that literature suggests that there are often differences in terms of outcomes in the pathways of discontinuation between female and male individuals [16]. This study is founded on self-report questionnaires, and the answers may have been influenced by social desirability or by the cognitive effect of nicotine on the system of the respondents. We are currently conducting a larger controlled trial aimed to clarify the relationship between the score obtained at the MAAS and nicotine abstinence [29], comparing in a larger sample the characteristics of those who successfully quit during the treatment phase with those who were abstinent at the long-term follow-up.

Despite these limitations, the present investigation offers a contribution to the growing empirical research aimed to examine factors related to quitting smoking. Findings from the current study suggest that smoking cessation interventions are likely to be more successful among individuals who have lower mindfulness levels. Future research is warranted that take advantage of the methodologies and results of this investigation to help identify additional clinical characteristics or process mechanisms that are associated with quitting smoking. Mindfulness intervention may be provided to smokers to help them manage smoking triggers, perceptions, stress, and negative emotions without smoking. In addition, levels of mindfulness may be valuable in matching smokers with optimal treatments. It may be that smokers who are naturally more "mindful" have an easier time quitting and may require less intensive treatments. On the other hand, smokers that are more "mindful" may respond better to mindfulness-based interventions.

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