

## ORIGINAL RESEARCH

# Smoking cessation process and quality of life

Hatzilia Despoina<sup>1</sup>, Malliarou Maria <sup>\*2</sup>, Korompeli Anna<sup>1</sup>, Tsoumakas Konstantinos<sup>1</sup>, Fildissis George<sup>1</sup>

<sup>1</sup>Faculty of Nursing, National and Kapodistrian University of Athens, Zografou, Attica, Greece

<sup>2</sup>Technological Educational Institute of Thessaly, Thessaly, Greece

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## ABSTRACT

**Background and objective:** Smoking habit cessation is undoubtedly a strenuous, extremely demanding and stressful process for smokers; therefore treatment should focus on timely cessation and relapse prevention. The aim of this study is to assess irritability, depression, anxiety and the health-related quality of life of patients visiting a smoking cessation clinic, during both all 3 phases of the treatment and 1 year after completion.

**Methods:** The participants of the study were 97 people who attended the smoking cessation department of a public tertiary hospital of the capital of Greece. The study consists of 4 phases that took place at intervals of 1, 3, and 12 months respectively. A specially designed questionnaire was used to collect demographic characteristics of the sample and of factors related to their smoking behavior as well as EuroQol (EQ-5D), Fagestrom scale and Snaith-IDA irritability scale.

**Results:** Results demonstrated positive outcomes both in terms of participation and smoking cessation. Calculations performed by using the Fagestrom Test of Nicotine Dependence showed that 36.2% highly dependent, showing that it was difficult for them to quit smoking permanently. EQ-5D questionnaire results imply that participants are faced with some problems walking, but not to the point of being unable to take care of themselves; however, they do seem to have some problems in carrying out usual activities. Forty-three percent of the sample admitted to moderate pain or indisposition in phase 1, whereas again in phase 1 (first month of the smoking cessation treatment), 78.9% showed signs of moderate anxiety or depression. Correlation of EQ-D5 VAS values between phases 2 and 3, shows that there is statistically significant correlation with a *p*-value at .001 revealing that the perceived level of quality of life of individuals in phase 2 (completion of smoking cessation program) is higher (70.43) than in phase 3 (one year after) (67.39).

**Conclusions:** The present study shows that the smoking cessation process affects positively quality of life in all its aspects, reduction of anxiety and depression symptoms.

**Key Words:** Smoking, Cessation, Quality of life

## 1. INTRODUCTION

The conviction that smoking is the primary extrinsic factor of morbidity and mortality in humans has long been established. World Health Organization (WHO) cites tobacco use as the second leading cause of death (9%), behind hypertensive heart disease (responsible for 13% of deaths), followed by high blood glucose (responsible for 6% of deaths).<sup>[1]</sup> It is estimated that one third of adult world population, i.e., 1.1

billion people are smokers and that tobacco causes 6 million deaths worldwide per year approximately. Smoking increases morbidity and mortality of populations from cardiovascular and respiratory diseases as well as the chances of neoplastic diseases, often leading to health and life threatening conditions (about 25). Smoking is a major risk factor in eight (8) out of sixteen (16) causes of death (i.e., 50%) of people aged 65 and over. Both direct and indirect treatment

\*Correspondence: Malliarou Maria; Email: [mmalliarou@gmail.com](mailto:mmalliarou@gmail.com); Address: Technological Educational Institute of Thessaly, Thessaly, Greece.

costs for tobacco-related diseases are borne by the health care system and state budget worldwide.

Addiction is the state of a person getting used to a substance present in their blood, without which that person is unable to have a normal life/perform everyday tasks. Nicotine is highly addictive, which explains the difficulty in quitting smoking. Addiction is a two-stage process: a) the body getting familiar with the substance, the person experiences unpleasant symptoms such as nausea and vomiting, and b) dependence.

A person is deemed to be nicotine-dependent when a chronic consumption background is present as follows: substance abuse, continuous self-administration despite all perceived adverse effects, high tolerance to such substance and withdrawal symptoms during a smoking cessation process. Addiction to nicotine is a multidimensional process, its main feature being the individual's desire to experience the pharmacological effects of nicotine and avoid possible manifestations of the withdrawal and dependence syndrome, either in a negative (absence of nicotine leading to distress) or a positive manner (psychoactive stimulation). In fact, the criteria adopted by WHO and used in the International Classification of Diseases, place tobacco dependence code F17 in "Mental and Behavioral Disorders due to use of tobacco".<sup>[2]</sup>

Absence of nicotine in smokers' body can cause withdrawal symptoms (within the first four to twelve hours from smoking cessation): irritability, tremor, hyperactivity, concentration problems, anxiety, distress or depression, hunger, sleep disorders, increased heart rate and arterial blood pressure, intense desire (craving) for nicotine intake, which is actually the biggest obstacle for those wishing to quit smoking. Other symptoms include fatigue, headache, insomnia and dizziness. Excessive amount of nicotine may cause dizziness, rise in body temperature, blisters, queasiness, sweat retention, anorexia, arrhythmia, tremor, nausea, intestine spasms, diarrhea and drop of arterial blood pressure.<sup>[3]</sup>

Smoking cessation has to do with the conditions which make a smoker maintain such behavior rather than with those that led him/her to start smoking. It took time for someone to start smoking and it undoubtedly take time for someone to learn to live without the smoke.<sup>[4,5]</sup>

In classical conditioning a specific behavior is associated with a neutral stimulus (external (in the environment) or internal stimuli). When it comes to smoking, neutral stimuli can be a pack of cigarettes, ash trays, the relaxing feeling after a meal, etc. Repetition of the sequence "stimulus-response" produces such association that a specific behavior-response (smoking) becomes a "conditioned" response paired with the specific stimulus. A smoker lights a cigarette under specific

conditions without being conscious of that fact; such conditions have now become conditioned stimuli. For example, a smoker may light a cigarette only because it is associated with the smell of coffee or the ringing of the phone. Most smokers light a cigarette without even realizing it. Smoking behavior is reinforced by the effect of the nicotine itself in the body. Nicotine is an agent with drug-dependence action and caused the body to become addicted to it. It takes less than 10 seconds after inhalation for the nicotine to reach the targeted areas of the brain. The nicotine effect itself is a reward for the smoker. It acts as a trigger to the sympathetic NS by subsequently releasing neurotransmitters, which play a determinant role in nicotine addiction and the emergence of withdrawal symptoms. Such neurotransmitters include: a) dopamine and norepinephrine, which may be associated with causing feelings of pleasure and anorexia; b) acetylcholine, which may improve memory, and c) beta-endorphin which might be associated with reducing anxiety and nervousness. Smokers are likely to repeat the action that produces such pleasant effect, hence generate a vicious circle of addiction. This is the point where physical and psychological addiction concur. The need for nicotine is the physical expression of addiction whereas satisfying such need is a pleasant effect that boosts psychological addiction to smoke. We can identify four aspects of smoking, by which smoking behavior is maintained, at the same time making cessation more difficult to achieve: a) Physical habit for nicotine intake (physical dependence), b) Smoking as an instinctive action under specific circumstances (psychological Dependence), c) The pleasant effects of smoking (psychological dependence), d) The beliefs regarding the pleasant effects that smokers anticipate from smoking behavior and the negative expectations regarding the effects of withdrawal (psychological dependence).

A smoking cessation treatment is more effective when all essential aspects of smoking dependence are taken into account, i.e., both physical dependence from nicotine and psychological Dependence evolving into a habit, pleasant effects and smoking-related beliefs. In order for a smoker to be considered a successful quitter, he must overcome both addictions.

Smoking habit cessation is undoubtedly a strenuous, extremely demanding and stressful process for smokers therefore treatment should focus on timely cessation and relapse prevention.

Smoking cessation-oriented treatments range from plain advice by the physician to special smoking cessation programs. The effectiveness of interventions-smoking cessation treatments ranges between 1% and 19%, compared to the rate of successful sustained cessation among self-quitters, which

reaches 7%.<sup>[6]</sup> It also seems that the occurrence rate of successful smoking cessation raises along with the intensity of the intervention. With each intervention lasting over 10 minutes, total duration of intervention exceeding 8 weeks and sessions ranging between 4 and 7 result in a highest successful cessation rate.<sup>[7]</sup>

Resuming smoking after a quit attempt is referred to as smoking relapse. Relapse rates reach up to 60%-90% within the first 12 months from cessation, with 50% in cases of surgically treated laryngeal cancer, 30% following myocardial infarction and 40% following laryngectomy.<sup>[8]</sup>

### **1.1 The relationship between irritability depression and quality of life among smokers during smoking cessation treatment**

According to a study examining the association between smoking cessation and depression, smokers were twice as likely to show symptoms of depression compared to those individuals who had never smoked or to ex-smokers.<sup>[9]</sup>

A study conducted in 2010 on 1,504 daily smokers (i.e., smokers of 9 cigarettes and above per day) motivated to stop smoking has concluded that smokers with anxiety symptoms reported higher rates in occurrence of withdrawal symptoms and lower possibility for them to continue to abstain from smoking for a period between 8 weeks and 6 months. Moreover, anxiety attacks were more associated to increased desire for smoking, high relapse rates and reduced response to medication.<sup>[10]</sup> Based on results using Fagerström Test for Nicotine Dependence, 569 patients showed reduced levels of anxiety during cessation treatment, which were found unchanged during the three month re-assessment. Increased levels of anxiety were found in women and patients receiving psychiatric medication. Patients who relapsed also showed levels of anxiety compared to those prior to relapse.<sup>[11]</sup>

In a 2014 study in Argentina, participating adult patients-smokers were treated with the Latin American Spanish version of Anxiety Sensitivity Reduction Program for Smoking Cessation. Results demonstrated that the treatment that involved follow-up visits in 1, 2, 4, 8 and 12 weeks' time showed positive results both in terms of participation and smoking cessation (5 out of 6 continued to abstain from smoking during the 12 follow-up weeks). Results regarding reduction of anxiety sensitivity among patients-smokers were even more important.<sup>[12]</sup>

A study that used Questionnaire of Life (QoL) as a tool to measure the quality of life, a randomized controlled trial where subjects received varenicline and bupropion concluded that both the change in health status and QoL self-assessment scored better among smokers receiving medication compared

to those receiving placebo treatments. The study has shown a significant positive association between length of continuous abstinence and improved health, self-control, anxiety and overall mental profile.<sup>[3]</sup>

### **1.2 Aim of the study**

The aim of this study is to assess irritability, depression, anxiety and the health-related quality of life of patients visiting the smoking cessation clinic. Recording and assessment of the results of the study helps to understand the pathogenesis of the specific mood swings observed in smokers-patients and to ensure that the latter are best and most effectively approached by health professionals. Additionally, knowing the specific characteristic of the smoking renders the methodology of a therapeutic approach an ongoing process and allows for the adoption of a comprehensive anti-smoking care plan by the scientific community by introducing special psychological interventions and support.

## **2. METHODOLOGY OF RESEARCH**

### **2.1 Phases of the study**

The study consists of 4 phases that took place at intervals of 1, 3, and 12 months respectively. The researcher handed out the same questionnaires at each phase. The participants of the study were 97 people who attended the smoking cessation department of a public tertiary hospital of the capital of Greece. During the first visit to the clinic (phase 0) the physician assessed the patient's decision to quit smoking and enroll in the program. Protocol entry is carried out during this phase. The date of smoking cessation was preferably set 15 days following first session and the help provided involved either counselling or medication depending on smokers' wish, needs and particularities. After the designing of the treatment pattern, follow-up visits were scheduled every other week for the first month of treatment (phase 1). Completion of the smoking cessation program and the medication treatment (Nicotine replacement therapy or Zyban or Champix) was set at 3 months (phase 2). Within the first 3 phases patients make an appointment with the special clinic for re-assessment, effort evaluation, counselling intervention and resolution of any issues or queries. Follow-up, evaluation and assessment, mainly focusing on the quality of life of patients was completed after one year of treatment (phase 3) –released from protocol. At the last phase, results are recorded either in the case of a face-to-face meeting or by phone, where patients did not wish to visit the clinic.

### **2.2 Measuring instrument**

A specially designed questionnaire was used to collect demographic characteristics of the sample and of factors related to their smoking behavior (smoking onset, number of

cigarettes per day, level of dependence to nicotine, medical history-concomitant diseases, medication, use of alcohol or psychotropic substances, previous quit attempts with or without treatment). Three questionnaires with 29 items in total were used at the study. The first questionnaire is EuroQol (EQ-5D). It is a reliable and valid tool used for assessing the quality of life in Greece as well.<sup>[13]</sup>

The EQ-5D consists of a self-classifier and a visual analogue scale (EQ-VAS). The self-classifier consists of a 5-item descriptive system and assesses health in the 5 dimensions of mobility, self-care, usual activities, pain/ discomfort and anxiety/depression. There are 3 responses for each dimension: no problems, some/moderate problems and extreme problems. The EQ-VAS is a vertical, graduated (0 to 100 points) 20-cm “thermometer”, with 100 representing “best imaginable health state” and 0 representing “worst imaginable health state”. Respondents classify and rate their health status on the day of the survey.

The second questionnaire used in the study is the Fagestrom test consisting of 6 items which help to assess the level of dependence to nicotine (low, moderate, high). The third questionnaire is the Snaith-IDA (Irritability Depression Anxiety) scale consisting of a total of 18 items, with good psychometric properties and is proved to be practical, easy to use and reliable instrument that helps clinicians assess symptoms of irritability and anxiety. The IDA has been validated in a general hospital setting.<sup>[14]</sup>

Fagerström Test for Nicotine Dependence<sup>[15]</sup> is designed to provide both YES/NO and multiple-choice items that is summed to a total score, which is a valuable tool for clinical practice. The higher the score, the more intense the nicotine dependence of that individual. A score up to four and higher, indicates the need for prescribing medication and signals that a more intense manifestation of withdrawal syndrome is imminent.

**2.3 Procedure**

The EQ-5D questionnaire was filled out in four different intervals: during the initial visit (phase 0), 1 month after initial visit (phase 1), 3 months later (phase 2), and 12 months later (phase 3), whereas Snaith-IDA irritability scale was filled out at three different intervals: during initial visit (phase 0), 1 month after initial visit (phase 1), 3 months after the beginning of the study (phase 2). The remaining questionnaires, the one consisting of socio - demographic data-related items, smoking habit, health profile, and Fagestrom Nicotine Dependence Test were filled out only at first contact with the smoking cessation clinic (phase 0).

**2.4 Statistical analysis**

The EQ-5D questionnaire in the Greek version was filled out during the scheduled visit at the smoking cessation clinic by way of interviews, in parallel with the special questionnaire consisting of social, demographic and anthropometric data. For comparisons against the two groups an independent t-test was used for the two independent samples while the paired t-test was used for dependent ones. For comparisons against the groups with more than two independent samples one way Anovas were used.

Testing the normality of the distribution was carried out using the Kolmogorov-Smirnov nonparametric test. The values of the Snaith-IDA irritability scale were used as continuous variables. Pearson’s correlation coefficient was used to check possible correlations. *p*-values referred to are based on two-way analysis and statistical significance was set at .05. Statistical analysis of the data was run with using SPSS 19.

**3. RESULTS**

**3.1 Demographic data results**

Table 1 displays the demographic data of the sample of the study. 56.7% of the sample are men, mainly self-employed (43.8%), whereas average age is 55.32 years.

**Table 1.** Frequency distribution (absolute & relative) of demographic data

	Frequency	%
<b>Gender</b>		
Men	55	56.7
Women	42	43.3
<b>Profession</b>		
Employee - public sector	29	30.2
Employee - private sector	7	7.3
Self-employed	42	43.8
Retired	15	15.6
Housekeeping	3	3.1
	<b>Mean</b>	<b>SD</b>
<b>Age</b>	55.32	+/-11.345

Table 2 outlines the smoking habits of the sample. It can be therefore inferred that the average age of participants in the study was 20 years whereas currently they smoke 25 cigarettes per day on average. They were asked to use a 10-Point Grading scale (1-10), where the minimum value is 1 and the maximum value is 10, to write down how important quitting smoke was for them, and based on the mean value of answers produced set significance at 8.34 while when a similar scale was used to measure the level of difficulty to quit smoking, the value was 8.58. 72.2% of them admitted

to previous quit attempts using different methods.

Comparing the methods used in previous quit attempts to the one the participants selected during the study, it can be inferred that there is a shift toward the use of Champix as it shows an increase from 17.5% to 32.5% among participants

in the study. Also worthy of note is the fact that although 21.6% among them had not sought any assistance in previous quit attempts, this is no longer the case. There also seems to be a considerable increase in the use of nicotine substitutes. 41.2% of the sample did quit smoking. 29.2% reported alcohol consumption.

**Table 2.** Frequency distribution (absolute & relative) of smoking habit among the sample

	Mean	SD
<b>Smoking habit</b>		
Smoking onset age (in years)	19.82	+/-3.587
Number of cigarettes smoked daily (cigarettes)	25	+/-11.983
How important is it for you to quit smoking? (min 1 - max 10)	8.34	+/-1.547
How difficult do you think will be for you to quit smoking (min 1 - max 10)	8.58	+/-1.695
	Frequency	%
<b>Previous quit attempts</b>		
No	27	27.8
Yes	70	72.2
<b>Previous quit attempt method</b>		
Gradual reduction of cigarettes smoked	19	19.6
Nicotine substitutes	20	20.6
Zyban	12	12.4
Champix	17	17.5
No assistance	21	21.6
Other	8	8.2
<b>Smoking cessation method at the beginning of the study</b>		
Gradual reduction of cigarettes smoked	2	5.0
Nicotine substitutes	11	27.5
Zyban	5	12.5
Champix	13	32.5
Other	9	22.5
<b>Quit smoking (after one year from first visit to the smoking cessation clinic)</b>		
Yes	41	41.2
No	57	58.8
<b>Alcohol consumption</b>		
No	68	70.8
Yes	28	29.2

Table 3 displays the answers in Fagerstrom Nikotine Dependence Test, where 41.7% report smoking between 11 and 20 cigarettes per day, 61.5% that they smoke more cigarettes in the morning than in the afternoon, 38.5% smoke the first cigarette of the day between 6 and 30 minutes after waking up, 16.7% within the first 5 minutes from wake up, whereas 18.8% smoke the first cigarette of the day one hour later. An extra note is that 66.7% find it hard not to smoke that first

cigarette. 59.4% report that they smoke even when they are in bed sick and 48.4% said that they find it hard not to smoke in areas where smoking is prohibited.

### 3.2 Fagerstrom nicotine dependence test

Dependence of respondents was calculated based on the Fagerstrom Nicotine Dependence Test; 21.3% showed low dependence, 42.6 moderate dependence and 36.2% high dependence (see Table 4).

**Table 3.** Frequency distribution (absolute & relative) of FAGESTROM Nicotine Dependence Test

	n	%
<b>How many cigarettes do you smoke in a day?</b>		
Less than 10	10	10.4
11-20	40	41.7
21-30	23	24.0
31 or more	23	24.0
<b>Do you smoke in the morning rather than in the afternoon?</b>		
No	37	38.5
Yes	59	61.5
<b>How soon after you wake up do you smoke the 1st cigarette of the day?</b>		
Within 5 minutes	16	16.7
6-30 minutes	37	38.5
31-60 minutes	25	26.0
After 60 minutes	18	18.8
<b>Which of the cigarettes you smoke in the day do you find most hard to go without?</b>		
First cigarette of the day	64	66.7
Any cigarette at any moment of the day	31	32.3
<b>Do you smoke even when you are in bed sick?</b>		
No	39	40.6
Yes	57	59.4
<b>Do you find it hard not to smoke in areas where smoking is prohibited?</b>		
No	49	51.6
Yes	46	48.4

The maximum mean value in these scales can be seen in phase 1 and 1 month after first contact with the smoking cessation clinic. Irritability (outward-inward), anxiety and depression reached the highest value at phase 1 of the study, i.e., in the first month of smoking cessation treatment, whereas the lowest value was seen at the phase of completion of the smoking cessation program, with the exception of anxiety which has remained more or less unchanged between introduction in the program and completion (see Table 5).

**Table 4.** Frequency distribution (absolute & relative) of Fagerstrom Nicotine Dependence Test

Fagerstrom Nicotine Dependence Test	n	%
Low dependence	20	21.3
Moderate dependence	40	42.6
High dependence	34	36.2

Table 6 displays results of the correlation of IDA test (paired *t*-test) between phases 1 and 2, where mean value of the inward (mean value 1 = 3.62 – mean value 2 = 2.53) and outward irritability (mean value 1 = 4.53 - mean value 2 = 3.94), as well as depression (mean value 1= 6.46 - mean value 2 = 4.34) and anxiety (mean value 1 = 7.51 - mean

value 2 = 5.57) show the highest mean value during phase 1 compared to phase 2, which is found to be statistically significant; *p*-value = .000.

Mean values of EQ-D5 VAS in all phases of the study are displayed in Table 7. Therefore, in phase 0 mean value of EQ-D5 VAS is 65.36, in phase 1 mean value is 65.57, in phase 2 mean value is 70.52 and, in phase 3, mean value of EQ-D5 VAS is 67.39.

Table 8 displays results of paired *t*-test carried out to examine correlation of EQ-D5 VAS values between phases 2 and 3, which is statistically significant, with *p*-value at .001 and revealing that the perceived level of quality of life of individuals in phase 2 comes to 70.43 mean value whereas in phase 3 the value drops 67.39.

Table 9 displays the five dimensions of EQ-5D with the sum of the frequencies corresponding to levels 2 and 3, i.e., the ‘problematic ones’. Mean values of summary indexes are also displayed.

#### 4. DISCUSSION

Smoking is responsible for the deaths of millions of people worldwide every year<sup>[16-18]</sup> and, in particular, active and

passive smoking kills almost 6 million people according to the WHO May 2014 Fact Sheet.<sup>[19]</sup> In Europe, 700,000 people die every year as a result of smoking, whereas approximately 13 million suffer from smoking-related diseases, with devastating effects on economy, society and health care systems.<sup>[20]</sup>

**Table 5.** Measures of location and dispersion of scales inward irritability – outward irritability– anxiety - depression in 3 different phases of the study

	N	Min	Max	Mean	SD
<b>Phase 0 (first contact)</b>					
Inward irritability	96	.00	9.00	3.11	1.907
Outward irritability	96	1.00	9.00	4.20	1.582
Depression	96	.00	10.00	5.03	2.346
Anxiety	96	.00	13.00	5.44	2.474
<b>Phase 1 (month)</b>					
Inward irritability	94	.00	8.00	3.62	1.837
Outward irritability	94	2.00	9.00	4.51	1.564
Depression	95	1.00	11.00	6.46	2.457
Anxiety	95	.00	13.00	7.51	2.409
<b>Phase 2 (quarterly)</b>					
Inward irritability	95	.00	7.00	2.52	1.569
Outward irritability	95	1.00	10.00	3.95	1.479
Depression	95	.00	10.00	4.34	2.127
Anxiety	95	.00	11.00	5.57	2.214

**Table 6.** IDA test correlation with paired *t*-test between phases 1 and 2

		N	Mean	SD	<i>p</i> -value
Pair 1	inward irritability Phase 1	94	3.62	1.837	.000
	inward irritability Phase 2	94	2.53	1.577	
Pair 2	outward irritability Phase 1	94	4.51	1.564	.000
	outward irritability Phase 2	94	3.94	1.483	
Pair 3	depression phase 1	95	6.46	2.457	.000
	depression phase 2	95	4.34	2.127	
Pair 4	anxiety phase 1	95	7.51	2.409	.000
	anxiety phase 2	95	5.57	2.214	

**Table 7.** Mean value and SD of EQ-D5 VAS in all phases of the study

EQ-D5 VAS	N	Minimum	Maximum	Mean	SD
EQ-D5 VAS phase 0	96	30.00	100.00	65.36	14.349
EQ-D5 VAS phase 1	95	30.00	100.00	65.57	14.418
EQ-D5 VAS phase 2	95	30.00	100.00	70.52	13.398
EQ-D5 VAS phase 3	92	30.00	100.00	67.39	14.815

**Table 8.** EQ-D5 VAS correlation among participants between phases 2 and 3 of the study

EQ-D5 VAS	N	Mean	SD	<i>p</i>	
Pair 1	EQ-D5 VAS phase 2	92	70.43	13.417	.001
	EQ-D5 VAS phase 3	92	67.39	14.815	

Note. Paired *t*-test

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According to the OECD 2013 and Eurobarometer<sup>[21,22]</sup> Greece has the highest percentage of smokers among EU countries but also among OECD countries, with the prevalence of smoking reaching as high as 41% (45% in men and 38% in women).<sup>[23]</sup>

**Table 9.** Sum of the frequencies corresponding to levels 2 and 3 of the five dimensions of EQ-5D and comparison against general population

EQ-D5	M	SC	UA	P/I	A/D
	N (%)	N (%)	N (%)	N (%)	N (%)
<b>GENERAL POPULATION</b>	21.4	5.0	18.7	33.4	43.5
PHASE 0	47 (48.5)	2 (2.1)	23 (24.0)	41 (42.7)	42 (43.7)
PHASE 1	43 (45.3)	3 (3.2)	28 (29.5)	41 (43.2)	79 (83.1)
PHASE 2	42 (44.3)	1 (1.1)	20 (21.1)	29 (30.5)	61 (64.2)
PHASE 3	45 (48.4)	3 (3.2)	24 (25.8)	36 (38.7)	56 (60.2)
<b>GENDER</b>					
MEN (PHASE 0)	28 (59.6)	2 (100.0)	13 (56.5)	21 (52.5)	19 (46.3)
WOMEN	19 (40.4)	0	10 (43.5)	22 (47.5)	23 (53.7)
MEN (PHASE 1)	25 (58.1)	3(100.0)	17 (60.7)	20 (48.8)	42 (54.7)
WOMEN	18 (41.9)	0	11 (39.3)	21 (51.2)	37 (45.3)
MEN (PHASE 2)	26 (61.0)	1(100.0)	12 (60.0)	16 (55.2)	27 (44.3)
WOMEN	16 (39.0)	0	8 (40.0)	13 (44.8)	34 (55.7)
MEN (PHASE 3)	25 (55.6)	3(100.0)	14 (56.5)	19 (52.8)	27 (49.1)
WOMEN	20 (44.4)	0	10 (43.5)	17 (47.2)	29 (50.9)
<b>CESSATION (PHASE 2)</b>					
YES	16 (36.6)	0	5 (25.0)	18 (62.1)	22 (36.1)
NO	26 (63.4)	1 (100.0)	15 (75.0)	11 (37.9)	39 (63.9)
<b>CESSATION (PHASE 3)</b>					
YES	17 (37.8)	1(33.3)	5 (17.4)	12(33.3)	18 (32.7)
NO	28 (62.2)	2(66.7)	19 (82.6)	24 (66.7)	38(67.3)
<b>BMI (PHASE 2)</b>					
<25	13 (31.7)	0	7 (35.0)	10 (34.5)	20 (32.8)
>25	29 (68.3)	1	13(65.0)	19 (65.5)	41(67.2)
<b>BMI (PHASE 3)</b>					
<25	15 (33.3)	2 (66.7)	8 (30.4)	14 (38.9)	20 (34.5)
>25	30 (66.7)	1 (33.3)	16 (69.6)	22 (61.1)	36 (65.5)
<b>Task phase 0</b>					
YES					29 (68.3)
NO					13 (31.7)

Note. M: Mobility, SC: self-care, U/A: usual activities, P/I: Pain or indisposition, A/D:Anxiety or depre.

Smoking has a harmful effect on human organism making effective interventions for smoking cessation and smoking prevalence reduction an imperative. Smokers lose at least 10 years of life expectancy, compared with those who have never smoked, whereas quitting before the age of 40 reduces death risk associated with use of tobacco by 90%.<sup>[24]</sup> Smoking is associated with a number of diseases, mainly with rapid lung function decline and increased mortality.

The severe effects of smoking on human organism are translated to diseases of the respiratory system. Smoking is the cause of 80%-90% of is the major cause of chronic obstructive pulmonary diseases (chronic bronchitis, asthma, emphy-

sema). Smoking kills up to 50% of smokers causes coronary artery disease with mortality rate of 30%-40%, and 90%-95% of lung cancer.<sup>[25]</sup> It is estimated that the majority of the 1.1 bn tobacco product users worldwide wish to quit smoking.<sup>[16]</sup>

Although countries do work on restricting smoking by implementing various anti-smoking measures, millions of people suffer from effects of smoking which not only reduces life expectancy but also causes the quality of life to deteriorate, given that the benefits to be drawn from smoking cessation are invaluable as they also constitute a major contribution to the improvement of public health.<sup>[16-18,26]</sup> In recent years, nicotine substitutes have been a successful smoking cessation

method, as has also been the case with medications that act on the receptors of the brain (bupropion, varenicline). First-line medications constitute the nicotine substitution treatment as they reduce the intensity of withdrawn symptoms and the desire for smoking, whereas second-line treatments are addressed to patients who do not respond to first-line ones.<sup>[27]</sup>

Since the adverse effects of smoking were first seen in smokers and treatments of smoking cessation ensued, many researchers conducted research with an aim to assess anxiety and quality of life of smokers as an additional mean that would help them understand the pathogenesis of mood swings of smokers-patients during smoking cessation treatment. In the present study 56.7% of the sample is men, primarily self-employed, of an average age of 55.32, smoking onset age 20 years on average, smoking 25 cigarettes per day on average. The health profile of participants in the study shows that 1/3 among them suffer from hypertension, diabetes mellitus, about 1/4 among suffer from thyroid disease, while a percentage below 20% suffer from COPD and receive treatment. In a 2014 study in Argentina, participating adult patients-smokers were treated with the Latin American Spanish version of Anxiety Sensitivity Reduction Program for Smoking Cessation. Results demonstrated that the treatment that involved follow-up visits in 1, 2, 4, 8 and 12 weeks' time showed positive outcomes both in terms of participation and smoking cessation (5 out of 6 continued to abstain from smoking during the 12 follow-up weeks). Results in reduction of anxiety sensitivity among patients-smokers were even more important.<sup>[12]</sup>

Participants in the study responded that quitting smoking is significant, scoring 8.34 on a 10-Point Grading scale, and that they found it difficult to do so, producing a 8.58 score. About 2/3 admitted to previous quit attempts using different methods. Comparing the methods used in previous quit attempts to the one the participants selected during the study, it can be inferred that there is a shift toward the use of champix as now twice as many participants chose this specific treatment. Also worthy of note is the fact that although they had not sought any assistance in previous quit attempts, this is no longer the case. There also seems to be a considerable increase in the use of nicotine substitutes. Less than half of the sample managed to quit smoking.

Calculations performed by using the Fagestrom Test of Nicotine Dependence showed that 42.6%, was moderately dependent on smoking and 36.2% highly dependent, showing that it was difficult for them to quit smoking permanently. As demonstrated in another research conducted in 2010 on 1,504 daily smokers (i.e. smokers of 9 cigarettes and above per day) motivated to quit smoking, smokers with anxiety

symptoms reported higher rates in occurrence of withdrawal symptoms and lower possibility for them to continue to abstain from smoking for a period between 8 weeks and 6 months. Moreover, anxiety disorder attacks were more associated to increased desire for smoking, high relapse rates and reduced response to medication.<sup>[10]</sup> Results obtained from this study show that irritability (outward – inward), anxiety and depression reached the highest value at phase 1 of the study, i.e., in the first month of smoking cessation treatment, whereas the lowest value was seen at the phase of completion of the smoking cessation program. These findings, though, are in contrast to those from a recent study which concluded that smoking cessation is positively associated with improvement of irritability and anxiety symptoms; more specifically, the severity of anxiety attacks among smokers who had enrolled in a smoking cessation program reduced as early as one week after joining the program. Those smokers who remained smoke-free for one month experienced less and reduced severity anxiety symptoms compared to those in relapse.<sup>[28]</sup> Based on results from yet another research where the Fagerström Test for Nicotine Dependence was used, 569 participants who smoked 23 cigarettes per day showed reduced levels of anxiety during cessation treatment, which were found unchanged during the three month re-assessment.<sup>[11]</sup>

In the present research no statistically significant association was found between the gender sub-scales; this is opposed to the findings of a study published in 2015 where it was argued that the impact of depression on smoking was more severe among women, which means that this has to be taken into account during selection of treatment.<sup>[29]</sup> In yet another research that used data from 3,010 smokers, there was a clear association between women smokers and quality of life, with women scoring lower in QoL assessment, compared to men smokers. These results reflect the need to classify women participating in smoking cessation programs as a separate study group.<sup>[30]</sup>

Comparing smokers who eventually managed to quit to those who did not succeed in doing so, it can be seen that in phase 1, i.e., in the first month of the smoking cessation treatment, smokers who did not eventually quit showed higher inward irritability than those who eventually managed to quit. As regards anxiety, those who quit smoking scored a lower mean value in the grading scale, compared to those who did not, i.e. there was more anxiety among smokers. Based on results from yet another study where the Fagerström Test for Nicotine Dependence was used, 569 participants who smoked 23 cigarettes per day showed reduced levels of anxiety during cessation treatment, which remained unchanged during the three-month re-assessment. Increased levels of anxiety were

found on women and patients receiving psychiatric medication. Patients who relapsed also showed higher levels of anxiety compared to those prior to relapse.<sup>[11]</sup>

Findings in the present study relating to depression during completion of the program for both smokers and nonsmokers seem to be consistent with those in other studies such as the one conducted on 1,725 psychiatric patients which demonstrated a correlation between smoking and severity of depression and anxiety symptoms, but also between smoking and slow progress of recovery of nicotine-dependent smokers.<sup>[31]</sup> In the present study it was found that in phase 2, which is practically the phase of completion of the program, the mean value of depression among smokers was higher than in those who managed to quit smoking.

Regarding findings of the present study on the level of quality of life, drawn from the EQ-5D questionnaire, they imply that participants are faced with some problems walking, but not to the point of being unable to take care of them; however, they do seem to have some problems in carrying out usual activities. About 43.2% of the sample admitted to moderate pain or indisposition in phase 1, whereas again in phase 1 (first month of the smoking cessation treatment), 78.9% showed signs of moderate anxiety or depression. This is the highest rate, compared to those in all other phases. Anxiety/depression has been the most frequently reported dimension that was found to cause problems. Our findings match those of another which examined the correlation between smoking cessation and depression and smokers were found twice as likely to show symptoms of depression compared to those individuals who had never smoked or to ex-smokers.<sup>[9]</sup> Another study conducted on 1,725 psychiatric patients showed that at the beginning of the smoking cessation process, they had symptoms of depression and anxiety. Even symptoms of agoraphobia were more severe among addicted smokers, compared to nonsmokers or non-addicted smokers, and symptoms of depression and anxiety were slower to improve. It can therefore be inferred that there is a correlation between smoking and severity of depression and anxiety symptoms, but also between smoking and slow progress of recovery of nicotine-dependent smokers.<sup>[31]</sup>

A study on smoking that involved administration of bupropion together with the use of a nicotine substitute showed that self-reported quality of life was higher among ex-smokers compared to those who had not quit. The research used the Assessment of Health Status using SF-36 where after 12 months from smoking cessation, scoring for physical factor but principally mental factor was higher among smokers, which means that abstinence from smoking is associated with better quality of life, especially in mental health-related

issues.<sup>[32]</sup> A study conducted to define the quality of life using 5,234 participants, of which 2,639 were nonsmokers, 1,419 ex-smokers, and 1,048 were smokers within a time period of 4 years (2000-2006)—showed that smokers had a lower score in general health status, social functioning as well as emotional and mental health whereas, those who had quit around the time of the research demonstrated significant improvement in emotional and mental health, compared smokers who continued smoking or those who started smoking. The general conclusion drawn from this research is that it appears to be a clear correlation between smoking and reduced score in the overall quality of life, but mostly in mental health, while it also appears that smoking-related changes have significant effect on health.<sup>[33]</sup>

A randomized controlled trial, that used QoL as a tool to measure quality of life and subjects received varenicline and bupropion, concluded that both the change in health status and QoL self-assessment scored better among smokers receiving medication compared to those receiving placebo treatment. The study has shown a significant positive association between length of continuous abstinence and improved health, self-control, anxiety and overall mental profile.<sup>[3]</sup> Another study conducted in 2012 that used the same QoL tool to define the quality of life, among 1,504 participants those who had been successful in stopping smoking reported an improvement in their quality of life, a fact that had a positive impact on those who continued to smoke.<sup>[34]</sup> A 2014 study showed that QoL Questionnaire seemed to be of help to smokers in order for them to cope better with side effects of smoking cessation, thereby enhancing their motivation to quit and, subsequently, improving cessation rates and the positive results of the treatment.<sup>[35]</sup>

## 5. CONCLUSIONS

Smoking is a pathological addiction. Today, the medical community and health care authorities see people addicted to smoke as patients. This is why international guidelines on smoking addiction strongly recommend that, today, a health care policy should embrace and thus incorporate both special smoking cessation programs and medications, which would work to the benefit of the people.

Smoking cessation constitutes a major step toward reduction of health risks for smokers as smoking is the biggest health risk, the most typical example of a selected unhealthy behavior, and the leading preventable cause of morbidity and mortality.<sup>[19]</sup> Absence of nicotine can cause withdrawal symptoms (within the first four to twelve hours from smoking cessation): irritability, tremor, hyperactivity, concentration problems, anxiety, distress or depression, hunger, sleep disorders, increased heart rate and arterial blood pressure, intense

desire (craving) for nicotine intake, which is actually the biggest obstacle for those wishing to quit smoking. As already mentioned, the main problem caused by abstinence from nicotine is withdrawal symptoms, both physical/organic and psychological ones. This explains the high relapse rate of each smoking cessation attempt.

Relapse is an especially disappointing fact but constitutes an “inescapable” event in the process of discontinuing the consumption of tobacco products permanently. Relapse is a common and early finding among ex-smokers as the vast majority of smokers who join Smoking Cessation Programs say they had a history of cessation attempts. There are plenty of studies exploring the relationship between anxiety depression and quality of life among smokers, nonsmokers and ex-smokers. Most of these studies demonstrate there is an improvement in quality of life, in all its aspects, reduction of anxiety and depression symptoms, or the possibility to address such medical conditions offered to both nonsmokers and quitters.

The present study shows that during smoking cessation process, the individual undergoing treatment, regardless of

whether the outcome is positive or negative, experiences high levels of anxiety, inward irritability, and depression. Furthermore, during completion of the program, those who continued to smoke and did not manage to quit showed higher levels of depression, compared to those who managed to quit. Age and gender did not show any statistically significant association with inward and outward irritability, depression and anxiety in any of the phases of the study. The level of importance and difficulty in quitting smoking did not show any statistically significant association with inward and outward irritability, depression and anxiety in any of the phases of the study.

Co-morbidity seems to affect the quality of life, which means that individuals suffering from hypertension, treated for diabetes mellitus, but also alcohol drinkers assess their quality of life to be at a lower level on a per cent scale. According to the Fagerstrom Test for Nicotine Dependence, the level of dependence does not show any statistically significant association with the level of quality of life.

## CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest.

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