

# Συνδυαστική Μέθοδος Διακοπής του Καπνίσματος σε Εργαζόμενους Μεταλλευτικής Εταιρίας

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## A Combined Method of Smoking Cessation in Mining Company Workers

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Υποβλήθηκε: 19/02/2023

Επανυποβλήθηκε: 14/03/2024

Εγκρίθηκε: 30/07/2024

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**Εισαγωγή:** Τα κάπνισμα θεωρείται μία από τις πιο ανθυγιεινές συνήθειες. Η αλλαγή της καπνιστικής συμπεριφοράς είναι ένας δύσκολος στόχος και ο καπνιστής χρειάζεται πολύπλευρη υποστήριξη από ειδικούς ώστε να ολοκληρώσει με επιτυχία την προσπάθειά του.

**Σκοπός:** Ο σκοπός της παρούσας μελέτης ήταν να εφαρμόσει μία συνδυαστική μέθοδο για τη διακοπή του καπνίσματος η οποία εκτός από ειδικές συνεδρίες διακοπής του καπνίσματος συμπεριλάμβανε και συνεδρίες διατροφής και άσκησης.

**Υλικό και Μέθοδος:** Το δείγμα αποτέλεσαν 30 εργαζόμενοι μεταλλευτικής εταιρίας κατά μέσο όρο 45 ετών. Οι συμμετέχοντες παρακολούθησαν 12 εβδομαδιαίες ατομικές συνεδρίες από ειδικό για τη διακοπή του καπνίσματος, 6 εβδομαδιαίες ατομικές ή ομαδικές συνεδρίες για την άσκηση και 6 για τη διατροφή.

**Αποτελέσματα:** Τα κίνητρα συμμετοχής, τα εμπόδια που μπορεί να αποτρέψουν από την προσπάθεια διακοπής του καπνίσματος, η διατήρηση της καπνιστικής συμπεριφοράς αλλά και οι λόγοι αποχώρησης από το πρόγραμμα ήταν οι παράγοντες που περιέγραψαν τις στάσεις των συμμετεχόντων στη διακοπή του καπνίσματος. Το κίνητρό τους ήταν η υγεία σε αντίθεση με τον φόβο τους να μην βάλουν κιλά. Ο φόβος όμως μειώθηκε μετά τις συνεδρίες για την άσκηση και τη διατροφή. Επίσης το στρες και οι προσωπικοί λόγοι πιθανά να τους ανάγκαζαν να επιστρέψουν στο κάπνισμα.

**Συμπεράσματα:** Το πρόγραμμα διακοπής του καπνίσματος ήταν αποτελεσματικό και οι συνεδρίες άσκησης και διατροφής διαπιστώθηκε ότι ήταν εξαιρετικά βοηθητικές στο να διακόψουν το κάπνισμα.

**Λέξεις-ευρητήριο:** ανθυγιεινές συνήθειες, καπνιστές, άσκηση, διατροφή

**Introduction**

Smoking is the leading cause of preventable death worldwide, accounting for more than 8 million deaths and costing the global economy 1.4 trillion US dollars every year<sup>1</sup>. In Europe, approximately one out of four adults is a current smoker, including one out of three men and one out of five women. Furthermore, smoking prevalence shows large differences across European countries, being highest in Eastern Europe (28%) and lowest in Northern Europe (20%). More specifically, smoking prevalence is highest in Bulgaria (37%) and Greece (33.8%) and lowest in Italy (18.9%) and England (19.8%)<sup>2</sup>. Regarding Greece, the smoking prevalence for men ranges between 35.0% and for women between 32.6%, with men stating that they smoke an average of 21.1 cigarettes per day and women 12.9 cigarettes, respectively<sup>2</sup>.

Nowadays, the need to reduce smoking has become an important public health issue, due to the well-documented smoking-related diseases in our health. According to the American Cancer Society<sup>3</sup>, some of the chemicals that are found in tobacco smoke include nicotine, hydrogen cyanide, formaldehyde, lead, arsenic, ammonia, radioactive elements, polonium-210, benzene, carbon monoxide, tobacco-specific nitrosamines and polycyclic aromatic hydrocarbons, which at least 70 out of them have been associated with cancer, heart diseases, lung diseases and other serious health problems.

Smoking especially in the workplace has also been a major cause of concern over the years<sup>4,5</sup> with the mining industry to be considered as having the highest rates of the work environment of substance use<sup>6</sup>. This part could be explained by the fact that mining is physically demanding work, which steers workers to consume harmful substances, such as alcohol and tobacco, contributing by this way to the deterioration of both their physical and mental health<sup>7,8</sup>. What is more, it is an indisputable fact that miners who smoke are at a higher risk than the general population of developing respiratory disease, as smoking enhances the effect of dust on respiratory impairment<sup>9,10</sup>.

Despite the existence of effective treatments for smoking cessation, like behavioral support and therapies based on pharmacy, the proportion of people who successfully quit smoking remains disappointingly low<sup>11</sup>. However, physical activity has been proposed as an alternative non - pharmaceutical strategy for maintaining tobacco abstinence. In their

research<sup>12</sup>, explored smoking habits concerning exercise and sport participation. Participants were in total 291 individuals who completed a questionnaire about smoking and physical activity habits. The results revealed that a) the more people exercise the less they smoke, b) older individuals exercise less and smoke more than younger individuals, c) non-athletes smoke more than athletes and d) former athletes smoke less than people who had never exercised. These findings underline the prospect that exercise is related to the habit of smoking. In addition, it is mentioned in another research<sup>13</sup> significantly higher abstinence rates at a six-month follow-up for a combined exercise and smoking cessation program compared with brief smoking cessation advice. Similarly, the results of relative research suggest that the combination of exercise and a counseling intervention may lead to improving smoking abstinence in comparison to health education alone<sup>14</sup>.

Finally, regarding the environment where the health interventions should be implemented, it is believed that the workplace could be an appropriate context for assisting smoking cessation, as it a) enables access to a large and stable number of participants, b) has the potential for higher participation rates, c) encourages sustained peer group support and positive peer pressure and d) provides to the participants the opportunity to be under the supervision of health professionals<sup>15</sup>.

**Aim**

The purpose of the present study was to implement a smoking cessation method that included special smoking cessation sessions in combination with exercise and nutrition counseling.

**Material and Method****Sample**

Participation in the smoking cessation program was open to all the company's employees. To inform and raise the awareness of employees, hourly lectures were implemented by the members of the scientific team (physician/pulmonologist, psychologist/smoking cessation counselor, nutritionist and physical education teacher). After that 30 workers declared their desire to participate in the program (27 men and 3 women) with an average age of 45 years. Their selection criteria were neither the number of cigarettes per day nor the length of the period they had been smokers. Their desire to quit smoking alone enabled them to participate in the program. Also, before the beginning of the intervention,

the scientific group had their written consent for their voluntary participation in the sessions.

### Organization of the sessions

The method of smoking cessation implemented included: a) 12-hour individual smoking cessation counseling sessions (one per week) by a specialist psychologist with many years of experience in smoking cessation, b) 6 nutrition counseling sessions by a nutritionist (one in two weeks with the possibility of an intermediate hourly online update) and c) 6 exercise counseling sessions with three updates in between by a physical education teacher (one in two weeks with the possibility of an hourly online update). The inclusion of the above two experts (nutritionist and physical education teacher) was based on the opinion that smoking cessation leads to an increase in body weight<sup>16,17</sup>. In the international literature, some reports underline the contribution of exercise to smoking cessation. Moreover, except that exercise helping with weight loss, it also has an inhibitory effect on the smoker's bad mood due to the secretion of serotonin (because it goes through withdrawal). Additionally, the highest proportion of smokers delays lighting a cigarette after exercise, overcoming with this way "craving zone".

Regarding nutrition, the existing studies highlight the importance of nutrition interventions not only for avoiding weight gain but also for the fact that there are foods and drinks which inhibit the lighting of a cigarette as well as foods or drinks that predispose the person to smoke<sup>18,19</sup>.

For the smooth conduct of the sessions, three circles were conducted with a maximum number of ten participants. In-person sessions were held in a suitably configured space provided by the participants' company. As the sessions were held outside of working hours and the kilometer distance to the company was for the majority of the participants long, it was decided that most of the sessions (mainly those with the smoking cessation specialist and the nutritionist) would be implemented remotely (via Skype).

#### a) Counseling sessions for smoking cessation

The smoking cessation intervention consisted of 12 weekly 50-minute individual sessions. The first session was held remotely for the participants to meet the smoking cessation specialist. Remotely, were also carried the sixth and last session (12th) for strengthening the contact of the participant with the specialist, as well as for checking the maintenance of the goals achieved by

each participant after the completion of the sessions. In particular, the re-evaluation sessions for the relapse prevention of smoking were carried out a) during the first week from the date of cessation, after that b) every two weeks for the first two-three months and afterward c) monthly for six months.

During the re-evaluation, the specialized psychologist rewarded the participants for their effort and progress and reminded them that lighting a cigarette can lead to a definitive relapse. However, the consultant made clear that if this is going to happen (lighting a cigarette) the smoker has to face it like a "slip" and use this experience as a reason for avoiding a possible relapse in the future. As part of the evaluation process, a discussion was held about the barriers faced by the smoker, as well as his ways to deal with them. It was also useful in this phase to remind the smoker about the reasons why he considers quitting smoking important.

To motivate the individual to adopt and maintain beneficial health behaviors, motivational interviewing was used<sup>20</sup>. Motivational interviewing is a type of counseling intervention for smokers to assess their readiness and be facilitated in taking action both for smoking cessation and relapse prevention. This is achieved through the exploration of ambivalent feelings (the evaluation of the positive and negative signs of quitting) and through the investigation of the personal barriers that the individual may encounter in his effort to modify smoking behavior. It is a clinical strategy that aims to enhance the individual's motivation and can be effective in any phase of addiction treatment<sup>20</sup>.

Its main principles are: 1) "Express Empathy", 2) "Develop Discrepancy", 3) "Roll with Resistance" and 4) "Support Self-efficacy". The techniques used by the consultant, at each stage of changing the participant's behavior, were based on the transtheoretical model of Velicer<sup>21</sup> which contains the following stages: 1) "Precontemplation" (encouraging the individual to think and talk about his smoking behavior), 2) «Contemplation» (guiding the individual to take action to modify the problematic behavior), 3) "Preparation" (helping the individual develop a plan to change the behavior that he wishes to modify), 4) "Action" (confirmation of successful changes that the individual has made for achieving the behavior modification and support provision to successfully face the barriers that he encounters during his effort), 5. "Maintenance" (enhancing the individual's commitment and dedication to modified behavior and supporting him)<sup>22</sup>.

### b) Exercise and nutrition counseling sessions

The role of diet and exercise counseling was supportive and started after the fifth smoking cessation session. This happened after the smoking cessation expert's instructions that the participants should not simultaneously face three different habit changes such as smoking cessation, exercise and change in dietary habits. Therefore, each area of support should be included in their daily life gradually. Participants were informed that it was not mandatory to follow the exercise and diet sessions. However, they were also informed about the significant contribution of the above sessions to smoking cessation.

So initially, before the beginning of the exercise sessions, the participants were asked to present a medical certificate for proving that they are healthy and are allowed to exercise even in cases of some existing health restrictions, always under the supervision of their doctor. The meetings of each participant with the exercise specialist were weekly with an intermediate remote updating to solve questions that arose and to receive feedback (encouragement to continue the exercise, possible changes in training load or the type of exercise).

Thus, through the personal interview, was recorded the participants' engagement with exercise, the type of exercise which they preferred and their desire to exercise outdoors or indoors, individually or in groups. Then, depending on the type of exercise that each participant wanted to follow, they received the corresponding exercise content with appropriate instructions. For example, in cases where the participants preferred aerobic exercise (walking, running, cycling, swimming, etc.) they were given instructions regarding the duration of the exercise and the heart rate zones for making sure that exercise is not only pleasant but at the same time effective.

Furthermore, in cases where the participants preferred muscle strengthening, they received coaching regarding the correct implementation of the exercises, sets and repetitions. At this point it is necessary to be mentioned that were two participants who wanted to follow an exercise program in an organized gym, however, the sessions for these participants with the exercise specialist did not stop. The remote and in-person meetings were held with the aim of the weekly update, mainly for reasons of encouragement and for ensuring that participants would continue exercising and implement the smoking cessation program.

### Qualitative analysis

In the current study for the evaluation of the qualitative data, interviews were transcribed verbatim and analyzed using thematic analysis<sup>23</sup>. Data analysis was implemented as collaborative negotiations between the researchers. First, all researchers read the transcripts and the text of observations to get an overall impression. Then, they identified and coded units of meaning representing participants' experiences. After that, they grouped all the coded data under greater categories and compared them with the original. Afterward, they summarized the contents of each group to generalize the descriptions regarding the participants' experiences. Finally, all authors discussed the coded data and agreed on the themes<sup>23</sup>.

### Results

Before the beginning of the program, all smokers were assessed on the degree of physical dependence on smoking, by the Fagerstrom scale. Smokers who joined the program were rated moderate to heavy smokers.

#### Smoking cessation motivations

The majority of smokers expressed as main motivations for quitting smoking the following:

- protecting and maintaining good health,
- improving the appearance of the skin and teeth,
- enjoying the freedom that smoking addiction deprives,
- economic reasons,
- protect non-smokers from the dangers of second-hand smoke.

Participant's statements: *"I'm worried about my health, my father was a smoker and he died of pneumonia", "I want to maintain my fitness"*.

#### Maintenance of smoking behavior

The following were mentioned as the most important reasons for maintaining smoking behavior:

- they highly reported that they smoke because of friendship and being in the company reasons, while some women reported that they smoke for maintaining their weight,
- also, the majority of the participants had the belief that smoking reduces stress and anxiety.

Participant's statements: *"I find a way out", "if I quit (smoking) I will gain weight", "now that I am following the program I realized that I smoke more when I work on the computer"*.

### Barriers

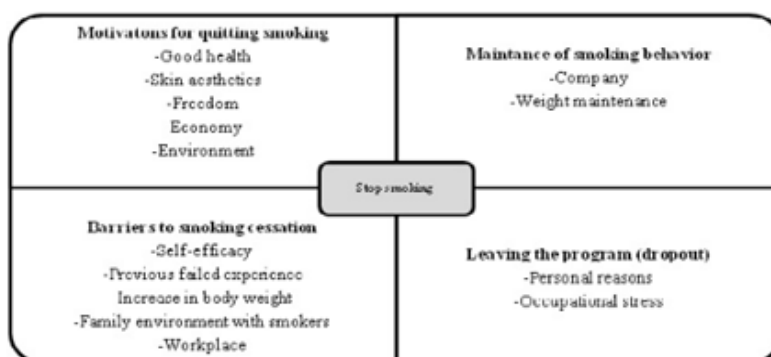
The following were noted as barriers to their adherence to the counseling program for smoking cessation:

- Some of the smokers appeared, upon joining the program, very cautious about the possible outcome of their participation and skeptical of their abilities to succeed to break the habit of smoking.
- The existence of previous attempts to stop smoking in past, with unsuccessful outcome, was an important reason for the low sense of self-efficacy of some of the participants. That element that was used in the counseling process for the proper planning of the new smoking cessation effort.

organized in shifts did not contribute positively to building a stable routine that would strengthen and encourage the process of gradual smoking cessation. The most frequent and basic reasons for leaving the program were the following:

- events in the personal lives of smokers which in some cases caused a permanent postponement of the achievement of the goal of smoking cessation,
- the experience of intense stress resulting from the conditions and the pace in their working environment (Figure 1).

Participant's statements: *"Financial problems may prevent me from quitting smoking"*.



**Figure 1.** Smoking cessation motivations, maintenance of smoking behavior, barriers and living the program (dropout)

During the smoking cessation program, smokers reported the most frequent and common withdrawal symptoms, due to their physical and psychological addiction:

- the strong desire to smoke,
- mood and sleep disorders.

During the cigarette independence period, inhibiting factors of their commitment and participation in the program were the following:

- weight gain,
- existence of smokers in the family environment,
- freedom to smoke in their workplace.

Participant's statements: *"By midday, I smoke most of the cigarettes, because at work I can smoke whenever I want"*.

### Leaving the program (dropout)

The fact that for some smokers their work was

### Exercise and Nutrition Sessions

It should be noted that all participants indicated their willingness to follow the exercise and nutrition sessions in addition to the smoking cessation sessions. According to the qualitative analysis, most of the participants were not currently exercising, but in the past had a relationship with exercise as amateur athletes (team sports). Few of them had no involvement in exercise and only one reported that he exercised regularly.

Participant's statements: *"I go by car even to the bakery of my neighborhood"; "...my obligations don't allow me to find time for exercise..."; "...I want to exercise but I don't know how..."*

They were also not facing any serious musculoskeletal problems (injury, problem in vertebrae, etc.) apart from some discomfort in the neck, a feeling of kyphosis when they were looking at themselves in the mirror, as well as a feeling of the shoulders leaning forward (a classic

problem of those working in office). Furthermore, they did not suffer from hypertension but when their blood pressure was measured they had relatively elevated pulses (probably due to them being smokers). What is more, during the program an awareness of the participants regarding physical activity was observed (increased transportation on foot and less by car, high-intensity outdoor walking, cycling and regular exercise). These habits were also found to be continued after the end of the program and were verified in the control period of maintenance of lifestyle change after smoking cessation. Moreover, participants felt that exercise significantly supported them in their effort to quit smoking (Figure 2).

increase their body weight, they mostly followed the guidelines for foods that prevent the urge to smoke and they didn't prefer to enter a special diet plan to maintain their weight. This was also found for the minority of participants who were already overweight. Nevertheless, after the end of the program, some of them eventually changed their eating habits and those who didn't (the majority of them) stated that they felt ready to change them (Figure 3).

Participant's statements regarding "Behavior/habit": "I'm very stressed because I don't want to gain weight", "I don't like dairy and sweets", "I drink 1-2 glasses of water per day", "I have a strong desire to smoke before and after meals".

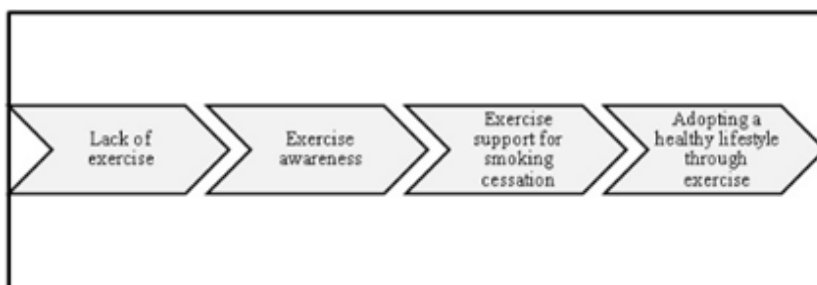


Figure 2. Exercise sessions' progression

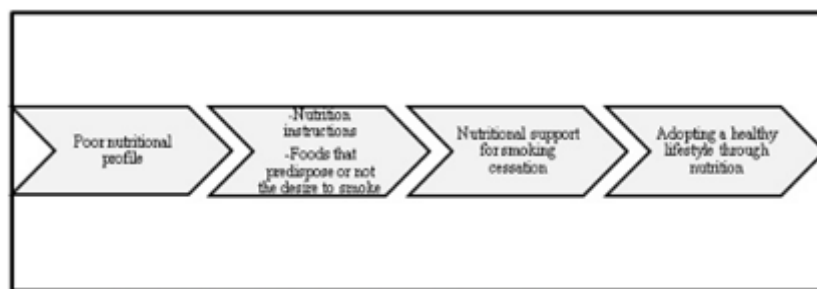


Figure 3. Nutrition sessions' progression

Participant's statements: "...after exercise, I didn't have the urge to smoke..."; "...many times when I had the urge to smoke I was leaving the house and riding my bike...".

Regarding nutrition, it was found that the majority of the participants, although they did not have proper eating behavior, they were not overweight but at the same time they did not present ideal weight either. Even though they thought that quitting smoking might

Instructions: Increase water intake to 4 glasses per day, 1 at work, 1 after lunch, 1 in the afternoon (when she wants to drink coffee) and 1 after dinner. Split meals at work into more, for example, not both fruits together, but one at 10 o'clock and the other at 11:30 (to prevent her from smoking). Consume chewing gum and sugar-free candy and drink water after main meals. Replace coffee with tea (she doesn't like it very much), sour juice or cocoa in the

*afternoon. In the evening, eat a salad with vinegar before smoking and drink water before going to bed.*

Over the progress of the sessions, the majority of smokers felt increasingly confident in their ability to succeed. Furthermore, they appeared willing to overcome the barriers they encountered during the cessation process and focus on the overall improvement of their quality of life (exercise and nutrition). Therefore, emphasis was placed on building a balance of decision-making (negatives and positives of quitting) and the benefits of quitting, enhancing motivation and self-efficacy to change and overcoming any resistance for modifying smoking behavior.

Also, those who completed the program demonstrated excellent cooperation and very intelligently assimilated all the information and instructions given to them, in the context of the counseling process, regarding the management of conditions in their daily lives. For those who had successfully quit smoking, their image as a non-smoker, the improvement of their quality of life through the adoption of non-smoking behavior, healthy eating and regular physical activity were considered very important for them and were a priority in their life.

A significant percentage of the participants has today progressed to a definitive cessation and has completed the cycle of both physical and psychological addiction treatment. The success of the program regarding participation-completion of sessions by smokers is in agreement with the international literature which states that out of 100% of people who initially express interest in participating in smoking cessation sessions, approximately 30% continue. From the 3rd session onwards, there was a gradual decrease in participation of the order of 10%.

### Discussion

As it was mentioned above, in the present study was implemented a combined method for smoking cessation which apart from special smoking cessation sessions also included nutrition and exercise sessions. The role of exercise and nutrition counseling was supportive and was implemented, approximately, after the fifth special smoking cessation session. This tactic (combining the sessions with different objects) seemed to be correct because it gradually led the participants to change habits (stop smoking, exercise, changes in nutrition). Since smoking is considered one of the most difficult habits to change, the experts of the program did not want to pressure the participants nor make

them feel that they are forced to change habits<sup>24</sup>.

Participants' attitudes towards smoking cessation were expressed by four factors. These factors were the motivations for participation, the barriers that may stop them from trying to quit smoking, the maintenance of smoking behavior, as well as the reasons for leaving the program. As expected, health was the main motivation for quitting smoking<sup>25</sup> and the greatest barrier was that they did not feel able to do it or were frustrated by a previous failed attempt. Nevertheless, their health motive contradicts with their fear to gain weight<sup>26</sup>. Regarding the reasons that would force them to leave the program, these were mainly personal reasons, but also the stress at work<sup>27</sup>.

Regarding the exercise and nutrition sessions, it was found that the participants did not have a good relationship with exercise and did not eat properly. Of course, the goal of the above specialties (exercise and nutrition) it was not the weight loss. The main aim was to support their attempt to stop smoking by occupying their minds through frequent physical activity and "tricking" their taste by suggesting foods that prevent or not the desire to smoke<sup>28</sup>. The above procedure attracted the interest of the participants because the perceived benefits were many.

Regarding exercise most people considered it as a way to overcome urge to smoke and others stated that they were satisfied with their reduced desire to smoke after exercise. Regarding nutrition, combined with exercise, it appeared to reduce their fear of gaining weight and make them to have the belief that "smart foods" (foods that prevent smoking) helped them more than they expected. Here it should be mentioned that, during sessions, several workers requested more information from the nutritionist in order to change their eating behavior in general. Thus, the smokers in the context of the sessions held, demonstrated high consistency in terms of treatment, in weekly treatment goals but also in goals related to exercise and diet.

### Limitations

It is important to note that, coincidentally, the smokers who participated in the program they did not have a good nutritional profile and no particular relation to exercise. So, taking the above into consideration, we would like to refer that we do not know how this combined smoking cessation program would result in smokers who have proper eating behavior and a good relationship with exercise.

### Conclusions – Suggestions

In conclusion, the implementation of special smoking cessation sessions with supportive tools the exercise and diet sessions was effective in smoking cessation. Specifically, it was found to be very important, a) the gradual strengthening of the sense of self-efficacy through the achievement of small and realistic goals for smoking cessation, b) the gradual introduction of supportive sessions for exercise and nutrition, c) the reward and successful management of barriers which presented during the process. All of the above, built a

successful effort and led some of them to the definitive cessation and prevention of smoking relapse. These “ex-smokers” were increasingly confident about maintaining their smoking quitting, because as it was revealed they were enjoying their new conditions of life as “non-smokers”.

*All our life, so far as it has definite form, is but a mass of habits - practical, emotional, and intellectual - systematically organized for our weal or woe, and bearing us irresistibly toward our destiny, whatever the latter may be.” - William James<sup>1928</sup>*

### ABSTRACT

#### A Combined Method of Smoking Cessation in Mining Company Workers

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**Introduction:** Smoking is considered to be one of the unhealthiest habits. Changing smoking behavior is a difficult goal and the smoker needs multifaceted support from experts to successfully complete his effort.

**Purpose:** The purpose of the present study was to implement a combined method for smoking cessation which apart from special smoking cessation sessions also included nutrition and exercise sessions.

**Material and Method:** The sample consisted of 30 employees of a mining company with an average age of 45 years. The participants attended 12 weekly individual sessions, which were carried out by a smoking cessation specialist, 6 weekly individual or group sessions for exercise and 6 nutrition sessions.

**Results:** The motivations for participation, the barriers that may stop them from trying to quit smoking, the maintenance of smoking behavior, as well as the reasons for leaving the program, were the factors that described the participants' attitudes towards smoking cessation. Their motivation was to be healthy, while a barrier for them was the fear of weight gaining. However the fear was reduced after the exercise and diet sessions. What is more, stress and personal reasons may have forced them to return to smoking.

**Conclusions:** The smoking cessation program was effective and the exercise and diet sessions were found to be extremely beneficial in helping people quit smoking.

**Key words:** unhealthy habits, smokers, exercise, nutrition

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