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Cigarette addiction and emotional awareness: exploring the link to alexithymia in 18-to-65-year-old adults

Uzależnienie od papierosów i świadomość emocjonalna: badanie związku z aleksytymią u dorosłych w wieku 18–65 lat

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Abstract

Introduction: In this study, we aimed to examine the relationship between smoking addiction and alexithymia in 18 to 65-year-old adults.

Material and methods: Our study was planned as cross-sectional. The study was conducted on a total of 160 subjects and applied a questionnaire on the sociodemographic characteristics of individuals, the Fagerström Test for Nicotine Dependence (FTND) and the Toronto Alexithymia Scale (TAS). Data SPSS 25.0 was used for the analysis of statistical. A *p*-value below 0.05 was considered statistically significant.

Results: The mean age of participants was 33.98 ± 10.56 and 43.8% were women. 55.6% of the participants were smokers. It was observed that 8.9% of smokers had high nicotine addiction. According

Streszczenie

Wprowadzenie: Celem niniejszego badania była analiza związku między uzależnieniem od palenia tytoniu a aleksytymią u osób dorosłych w wieku 18–65 lat.

Materiał i metody: W badaniu, zaplanowanym jako przekrojowe, wzięło udział 160 osób. Zastosowano kwestionariusz składający się z pytań dotyczących charakterystyki socjodemograficznej osób, Test Uzależnienia od Nikotyny Fagerströma (FTND) oraz Toronto Alexithymia Scale (TAS). Do analizy danych statystycznych użyto SPSS 25.0. Wartość $p < 0,05$ uznano za istotną statystycznie.

Wyniki: Średni wiek uczestników wynosił 33,98 ± 10,56 roku, a 43,8% stanowiły kobiety. Spośród respondentów 55,6% było palaczami. Zaobserwowano, że 8,9% palaczy było silnie uzależnionych

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to the total TAS-20 scores, 25% of the participants were alexithymic. No statistically significant correlation was found between participants' smoking status and total and subscale scores (TAS-1, TAS-2, TAS-3) obtained from the TAS-20 scale (p = 0.41, p = 0.33, p = 0.32, p = 0.98). A statistically significant relationship was found between the FTND score of the smoking participants and the presence of alexithymia. Alexithymic smokers had significantly higher FTND scores (p = 0.042).

Discussion: Some researches predicted that alexithymic smokers experience more severe tobacco cravings during nicotine withdrawal. Our finding that nicotine addiction is higher in alexithymic smokers supports this finding.

Conclusions: In our study, no direct relationship was found between smoking and alexithymia. However, a striking observation is that alexithymic smokers have higher nicotine addiction among smokers.

Keywords: Alexithymia, Tobacco Use Disorder, Emotional Disturbances, Nicotine Addiction.

od nikotyny. Zgodnie z całkowitymi wynikami TAS-20, 25% uczestników było aleksytymikami. Nie stwierdzono istotnej statystycznie korelacji między statusem palenia uczestników a wynikami całkowitymi i podskalami (TAS-1, TAS-2, TAS-3) uzyskanymi w skali TAS-20 (p = 0,41, p = 0,33, p = 0,32, p = 0,98). Stwierdzono istotny statystycznie związek między wynikiem FTND u osób palących a obecnością aleksytymii. Palacze aleksytymiczni mieli istotnie wyższe wyniki FTND (p = 0,042).

Omówienie: Niektórzy badacze przewidzieli, że palacze aleksytymiczni odczuwają silniejszy głód tytoniowy podczas odstawienia nikotyny. Nasze badania potwierdziły, że uzależnienie od nikotyny jest większe u palaczy aleksytymicznych.

Wnioski: W niniejszym badaniu nie stwierdzono bezpośredniego związku między paleniem a aleksytymią, jednak uderzającą obserwacją jest to, że wśród palaczy aleksytymiczni palacze są bardziej uzależnieni od nikotyny.

Słowa kluczowe: aleksytymia, zaburzenia związane z używaniem tytoniu, zaburzenia emocjonalne, uzależnienie od nikotyny.

Introduction

Alexithymia can be defined as 'emotional blindness' in its simplest form. At first, it was associated with psychosomatic diseases, but later it became apparent that alexithymia is not only a condition specific to psychosomatic individuals but also occurs in healthy people. Sifneos used the concept of alexithymia at a conference in Europe in 1972 to describe people who have difficulty with recognising and expressing their emotions for the first time [1]. As a word, alexithymia is a concept formed by the combination of the Greek words a = no, lexis = word, and thymos = emotion. Alexithymic people have difficulty with perceiving the difference in bodily sensations. They cannot verbalise their feelings. Their imagination is limited. Empathising is difficult for them. They have an introverted style of thinking. They are far from abstract thinking [1]. Taylor thinks that alexithymic personality traits can be categorised under four main headings: 1) difficulty in recognising and defining emotions, 2) distinguishing between bodily sensations and emotions in emotional stimulation, 3) little imagination, limited imaginary processes, 4) extroverted cognitive style [2].

The fact that people have problems regulating their emotions is widely blamed for the aetiology of substance abuse and addiction. Many studies show that alexithymia is associated with substance and alcohol abuse [3, 4]. With the continuous use of the substance, changes occur in the functions of the brain cells over time. Changes of this kind occur due to the individual's continued substance use. Dependence develops as a result of the individual's interaction with the substance and adaptation to it [5].

Nicotine is the substance responsible for smoking addiction. Addiction, a complex and multifaceted condition, is characterised by the relentless use of a particular substance or engagement in certain behaviours. Over time, this pattern can transform into a chronic disease that profoundly impacts an individual's physical, mental and emotional well-being. While addiction can be treated, it remains a lifelong challenge, and those who receive addiction treatment may continue to grapple with vulnerability [6]. Nicotine passes into the brain

seconds after smoking. In addition to the nervous system, cigarettes also affect the cardiovascular and respiratory systems [7]. When a person stops smoking, he or she begins to suffer from withdrawal due to the decrease in nicotine in the body. Problems like restlessness, insomnia, anxiety, sometimes tendency to sleep, difficulty in concentration, anger, overreaction, depression, increased appetite and excessive desire to smoke can be experienced in nicotine withdrawal [8].

Some studies have investigated the effect of alexithymia on smoking addiction. However, the results are not satisfactory; when smokers were compared with non-smokers, there was evidence that smokers had higher levels of alexithymia [9]. On the other hand, there are also studies that found no significant difference when comparing alexithymia in smokers and non-smokers [10].

Cigarette smoking in Turkey is among the highest in the world [11]. In underdeveloped countries, the number of smokers tends to increase while the number tends to decrease in developed countries [12]. The sociocultural context for nicotine use in Muslim countries is complex and influenced by various factors like religiosity, cultural norms and socioeconomic status [13]. Studies have shown that tobacco use, including smoking cigarettes and waterpipes, is prevalent among Muslim populations in both Muslim-majority countries and Muslim minorities in Western countries [14]. However, the association between smoking and the Muslim religion becomes statistically insignificant when considering ethnic and socioeconomic factors [15].

The first Tobacco Control Law in Turkey was enacted in 1996. With this law, smoking is banned in health and education institutions, public transportation vehicles, sports and cultural services. In addition, the sale of cigarettes and tobacco advertisement to persons under the age of 18 were prohibited. In 2003, the World Health Organization Framework Convention on Tobacco Control was adopted and ratified in 2004. In 2004, the National Tobacco Control Program and Action Plan was prepared. In 2008, an effective programme was initiated by law to reduce the consumption of tobacco products in indoor public places and in 2009 in restaurants, coffee houses and establishments providing entertainment services. With the successive laws enacted on different dates, practices such as banning advertisements, placing pictorial warnings on packages indicating the harms of tobacco products, increasing taxes, and imposing fines on those who do not comply with the prohibitions were introduced [16]. Despite all these measures, demand for cigarettes has decreased, especially after 2009 [17].

Research has shown that the presence of alexithymia has been linked to various addictive behaviours, including smoking addiction [18]. Studies have shown that individuals with higher levels of alexithymia tend to have lower resting-state functional connectivity between specific brain regions, like the right anterior insula and the ventromedial prefrontal cortex, which are associated with craving following nicotine withdrawal [19-21]. Additionally, research has indicated that alexithymia may predict tobacco craving severity in smokers, particularly during withdrawal [22]. In Turkey, there is a limited number of studies examining the relationship between smoking addiction and alexithymia. In our study, we aimed to examine the relationship between smoking addiction and alexithymia in adults between 18 and 65.

Material and methods

Our study was planned as an observational, cross-sectional study and approval from the Republic of Turkiye, Health Science University, Prof. Dr. Cemil Tascioglu City Hospital dated 20.06.2022 and Ethics Committee approval numbered 48670771-514.99 was obtained. The study was conducted on a sample of 160 subjects. A face-to-face questionnaire was applied to those aged 18-65 who applied to the primary care outpatient clinic and agreed to participate in the study and a consent to participate obtained. People who were not between the ages of 18-65, who could not be communicated with, and who did not consent to participate in the study were excluded. Our questionnaire was created by scanning the literature and consists of questions about the sociodemographic characteristics of individuals. The Fagerström Test for Nicotine Dependence (FTND), which measures the level of smoking addiction together with the Toronto Alexithymia Scale (TAS) were also used.

Twenty-item Toronto Alexithymia Scale (TAS-20): it is a Likert-type self-assessment scale consisting of 20 items scored between 1-5. It has subscales of Difficulty in Recognising Emotions (TAS-1), Difficulty in Verbalising Emotions (TAS-2), and

Expressive Thinking (TAS-3). The subscale 'Difficulty in Recognising Emotions' refers to difficulty in identifying emotions and recognising bodily sensations accompanying emotional arousal. 'Difficulty in Verbalising Emotions' subscale is expressed as difficulty in communicating emotions to others. The 'Expressive Thinking' subscale measures an expressive cognitive structure, introverted thinking and limitation of imagination. For each item, the respondent is instructed to choose the most appropriate one from "never", "rarely", "sometimes", "frequently" and "always". High scores indicate a high alexithymic level. The TAS-20 scale was developed by Bagby *et al.* (1994) [23]. The Turkish version was adapted by Güleç *et al.* (2009) [24]. The total scale Cronbach's α value was 0.78 and the subscales were found to be between 0.57-0.80. According to the results of confirmatory factor analysis, it was shown that the alexithymia structure provided the existence of 3 factors. The scale developers recommend a score of 61 and above for the presence of alexithymia and a score of 51 and below for the absence of alexithymia. The intermediate section is labelled "borderline" [2].

Fagerström Test for Nicotine Dependence (FTND) was developed by Fagerström in 1989 to determine the level of physical dependence [25]. Uysal *et al.* [26] conducted in 2004 a Turkish reliability and validity study of the scale consisting of 6 questions. Scores from the scale are between 0 and 10. The higher the score, the higher the level of addiction to cigarettes – 0-2 points: low-level addiction, 3-7 points: moderate addiction, 8-10 points: high-level addiction. In our study, the Cronbach's α internal consistency coefficient for the FTND was 0.786, and the Cronbach's α internal consistency coefficient for TAS-20 was 0.745.

The study questionnaire included the FTND consisting of 6 items, the TAS-20 scale consisting of 20 items, and a total of 44 questions prepared by the researcher questioning the participants' age, education level, family type, income status, as well as chronic diseases, smoking status and practicing regular sport.

The sample size was calculated with the G-Power 3.1.9.4 program considering the hypothesis significance level and the size of effect. Based on the correlation coefficient ($r = 0.07$) between the smoking status of the participants and TAS-20 scores obtained by Peters [27], the effect size was found to be 0.26. To find a significant difference in the study, the α error was 0.05, the power of the test was 90% and the sample size was calculated as 142 in total.

Statistical analysis

In the data analysis, the suitability of the variables for normal distribution was examined using the Shapiro-Wilk test. Normally distributed continuous variables with mean and standard deviation while those that did not conform to the norm were reported with the median values (minimum-maximum values). When the numerical variables did not meet the normal distribution condition, independent two-group analyses were performed with the Mann Whitney *U* test, and three-group analyses were performed with the Kruskal-Wallis test. When they met the normal distribution condition, two-group analyses were performed with the Student *t*-test and three-group analyses were performed with the ANOVA test. For significance between groups, LSD analysis was performed when normal distribution conditions were met and post-hoc analysis was performed with Games-Howell when normality was not met. Since most of the numerical variables did not meet the parametric test conditions, the relationships were analysed by Spearman Correlation Analysis. SPSS 25.0 (IBM Statistical Package for Social Sciences for Windows, Version 25.0 for statistical analysis Armonk, NY: IBM Corp) was used. A *p*-value below 0.05 was considered statistically significant.

■ Results

The sample was made up of 43.8% female participants, 56.3% male and the mean age was 33.98 ± 10.56 years. University graduates were 71.9% of the participants, 89% were married, 79.4% lived in a nuclear family, 42.52% had an income equal to their expenses and 50% did sports less than 3 days a week. The proportion of participants with chronic diseases was 36.3%, with the most common chronic diseases being mental disorders (36.2%), thyroid disease (17.2%), hypertension (12%) and diabetes mellitus (10.3%) (Table I).

The sample was made up of 55.6% of smokers (Table I). The mean FTND score of smokers was 3.15 ± 2.73 (Table II). When nicotine dependence was classified according to FTND scores, 8.9% of smokers reported high nicotine dependence, 39.3% moderate dependence and 51.6% had low dependence (Table III). The mean smoking history

Table I. Comparison of TAS-20 scale scores with sociodemographic data, history of chronic diseases and the participant's smoking status

Factor	*n*	%	TAS-20 score		
			Median (min-max)	*p*	Post-hoc
Gender					
Female	70	43.8	52 (28-82)	0.907	–
Male	90	56.3	52 (24-100)		
Education status					
Primary school	21	13.1	58 (38-82)	**0.044**	–
High school	24	15	48 (28-98)		
University	115	71.9	52 (24-100)		
Marital status					
Married	89	55.6	52 (24-98)	0.451	–
Single	71	44.4	52 (28-100)		
Family type					
Nuclear family	127	79.4	52 (28-100)	0.501	–
Extended family	15	9.4	56 (32-74)		
Lives alone	18	11.3	51 (24-84)		
Income status					
(1) My income is less than my expenses	39	24.4	52 (32-82)	0.892	–
(2) My income is equal to my expenses	68	42.5	52 (28-100)		
(3) My income is more than my expenditure	53	33.1	52 (24-86)		
Smoking status					
Smoker	89	55.6	52 (28-100)	0.410	–
Nonsmoker	71	44.4	52 (24-86)		
Doing sports					
I don't do any sport	46	28.7	51 (28-100)	0.723	–
Less than 3 days a week	80	50	53 (24-98)		
3-5 days a week	17	10.6	52 (32-76)		
5 days a week or more	17	10.6	52 (34-68)		
Having a chronic disease					
None	102	63.7	50 (24-100)	0.172	–
Yes	58	36.3	56 (28-80)		
Presence of mental disorder					
Yes	21	13.1	56 (34-80)	0.328	–
None	139	86.9	52 (24-100)		
Presence of thyroid disease					
Yes	10	6.3	56 (38-74)	0.582	–
None	150	93.8	52 (24-100)		
Alexithymia level					
No alexithymia (TAS-20 score ≤ 51)	74	46.3	42 (24-50)	**< 0.001**	–
Borderline (TAS-20 score 52-60)	46	28.7	56 (52-60)		
Alexithymic (TAS-20 score ≥ 61)	40	25	71 (62-100)		

Table II. Comparison of smokers' alexithymia status and FTND scores

Factor	Smoker (n = 89)		FTND score		
	n	%	Median (min-max)	Mean ± SD	p
Smoker	89	100	2 (0-10)	3.15 ± 2.73	–
The presence of alexithymia					
Non alexithymic (TAS-20 score < 61)	69	77.5	2 (0-10)	2.81 ± 2.61	**0.042**
Alexithymic (TAS-20 score ≥ 61)	20	22.4	5 (0-9)	4.35 ± 2.87	
Gender					
Female	24	27	2 (0-8)	2.16 ± 2.09	**0.049**
Male	65	73	3 (0-10)	3.52 ± 2.86	

Table III. Comparison of participants' age, TAS-20 total and subscale scores, nicotine dependence levels and smoking history

Factor	Ort ± SD or n (%)		1	2	3	4	5	6
(1) Age	33.98 ± 10.56	r	–	–	–	–	–	–
		p	–	–	–	–	–	
(2) TAS-20 score	53.07 ± 14.17	r	–0.003	–	–	–	–	–
		p	0.973	–	–	–	–	–
(3) TAS-1	14.65 ± 4.32	r	–0.080	**0.883**	–	–	–	–
		p	0.317	**0.000**	–	–	–	–
(4) TAS-2	11.88 ± 3.71	r	0.061	**0.855**	**0.537**	–	–	–
		p	0.440	**0.000**	**0.000**	–	–	–
(5) TAS-3	21.94 ± 3.30	r	0.010	**0.167**	**0.140**	**0.141**	–	–
		p	0.904	**0.035**	**0.077**	**0.075**	–	–
(6) Nicotine dependence level according to FTND								
Low addiction	46 (51.6)	r	–0.108	0.114	0.059	0.138	**0.214**	–
Moderate addiction	35 (39.3)	p	0.314	0.288	0.586	0.197	**0.044**	–
High addiction	8 (8.9)							
(7) Smoking history (pack/year)	14.58 ± 11.86	r	**0.632**	0.139	0.018	**0.216**	0.192	**0.378**
		p	**0.000**	0.198	0.864	**0.043**	0.073	**0.000**

of the participants who smoked was 14.58 ± 11.86 packs/year (Table III). The smoking rate for men was statistically significantly higher than of women ($p < 0.001$). In addition, smoking dependence levels of males were statistically significantly higher than females ($p = 0.049$) (Table II).

The mean score of the participants on TAS-20 was 53.07 ± 14.17, mean TAS-1 (difficulty in recognising emotions) subscale score was 14.65 ± 4.32, TAS-2 (difficulty in expressing emotions) subscale score was 11.88 ± 3.71 and TAS-3 (expressive thinking) subscale score was 21.94 ± 3.30 (Table III). According to the total TAS-20 scores, 25% of the participants were alexithymic, 46.3% were non-alexithymic and 28.7% were borderline (Table I).

No statistically significant relationship was found between the TAS 20 scores of the participants and their gender, age, marital status, family type, income status, sporting status, chronic disease, mental disorder or thyroid disease ($p = 0.907$, $p = 0.973$, $p = 451$, $p = 0.501$, $p = 0.892$, $p = 0.723$, $p = 0.172$, $p = 0.328$, $p = 0.582$). A statistically significant difference was found between the TAS-20 scores of the participants and educational status ($p = 0.044$). However, no significance was found between the groups in the post-hoc analysis (Table I). No statistically significant correlation was found between the smoking status of the participants and the total and subscale scores (TAS-1, TAS-2, TAS-3) of the TAS-20 scale ($p = 0.410$, $p = 0.334$,

$p = 0.327$, $p = 0.985$). There was a statistically significant relationship between the FTND score of the smoking participants and the presence of alexithymia. Alexithymic smokers had significantly higher FTND scores ($p = 0.042$) (Table II).

According to the FTND scores of the participants, nicotine dependence levels and TAS-20 total and subscale scores were compared. As a result of correlation analysis, a positive and statistically significant correlation was found between the TAS-3 extroverted thinking subscale score and nicotine dependence level ($r = 0.214$, $p = 0.044$). Participants' smoking history and TAS-20 total and subscale scores were compared. Correlation analysis revealed a statistically significant positive correlation between TAS-2 difficulty in verbalising emotions subscale score and smoking history (pack/year). Furthermore, participants who smoked more cigarettes had more difficulty in verbalising emotions ($r = 0.216$, $p = 0.043$) (Table III).

■ Discussion

Alexithymia is a personality trait characterised by difficulties in the ability to identify and express emotions [1]. Some studies reveal a relationship between alexithymia and smoking [1, 18]. In this context, the effect of alexithymia on cigarette addiction and how it can be included in addiction treatment plans are among the issues that need to be discussed. While the rate of alexithymia was reported to vary between 6.7% and 18.8% in community-based studies, these rates were found to be higher in studies examining psychiatric patients [28, 29]. In a 2018 study conducted on high school students in Turkey, the prevalence of alexithymia was found to be 19% [30]. Meanwhile, in a study that investigated the occurrence of alexithymia within the general population, researchers employed the Toronto Alexithymia Scale (TAS) as a measurement tool. A total of 446 participants were included in the study, with 263 of them being university students and the remaining 183 categorised as non-students. The study revealed that alexithymia was present in 23% of the entire normal population under investigation. However, when focusing specifically on the student group, the prevalence of alexithymia was slightly lower at 17% [31]. In our study, 25% of the participants were evaluated as alexithymic. In addition, 36.2% of the participants had a history of mental disorders. This may have affected the higher rate of alexithymia in our study.

In the study conducted by Carton [9] in 2008, the alexithymia scores of smokers were found to be higher than that of non-smokers. Lumley *et al.* [10] examined the relationship between alexithymia and smoking, smoking cessation and nicotine dependence in 1994. Of the participants in the study, 166 were male and 271 were female. Toronto Alexithymia Scale (TAS) was used in this study and in three other studies. In the first study, no difference was found between the TAS-20 scale scores of 67 young people who smoke and 370 young people who have never smoked. In the second study, the relationship between smoking addiction determined by serum cotinine level and alexithymia in 99 chronic smokers was examined and no significant results were found. In the third study, the mental and behavioural therapy method was applied to smoking students. The findings showed that alexithymic characteristics may harm tobacco addiction recovery programmes. In a study by Grabowska *et al.* [32] in which 46 people from Warsaw and its surroundings participated, those who had never smoked and current smokers were divided into two groups evaluated with the TAS-20 scale. The alexithymia score was found to be higher in smokers and this difference was significant. When we look at the alexithymia sub-dimension scores, difficulty in verbalising emotions and difficulty in recognising emotions were significantly higher in smokers. No significant difference was found in extroverted thinking sub-dimension scores. The relationship between smoking addiction and alexithymia is not clear in the literature. In our study, similar to Lumley *et al.* study [10], no statistically significant relationship was found between smoking status and alexithymia.

According to the World Health Organization's Turkey Report published in 2017, 31.6% of the adult population i.e., 19.2 million people, use tobacco products. The rate of tobacco use varies by gender: this rate is 43.16% for men and 19.7% for women [33, 34]. According to Turkey Statistical Institute's Turkey health survey report for 2022, the proportion of individuals aged 15 years and over who use tobacco products every day was 28.0% in 2019 and 28.3% in 2022. This rate was found to be 41.3% in men and 15.5% in women in 2022. The smoking rate in our study was 55.6-72% of men and 34% of women were smokers. The smoking rate of men

was significantly higher than that of women. In our study, the smoking rate was found to be higher, which may be due to the higher proportion of men in our sample and the fact that the region where the study was conducted is a lower socioeconomic region. In a study conducted by Acar *et al.* [35] on 197 men and 150 women who were smokers, non-smokers, and who had received smoking cessation treatment, the nicotine dependence level of the participants was evaluated. The level of addiction is very low in 12 people (3%), low in 66 people (19%), moderate in 24 (7%), high in 80 (23%) and very high in 33. In our study, 8.9% of smokers showed high, 39.3% had moderate and 51.6% had low nicotine dependence.

In recent years, human imaging research has increasingly focused on the insula, investigating its underlying neural mechanisms implicated in nicotine addiction. The reduced resting-state functional connectivity of the insula, dorsal anterior cingulate cortex and striatum is correlated with increasing nicotine addiction severity as indicated by higher Fagerström Test for Nicotine Dependence scores [36]. In this respect, structural imaging has indicated that smokers have an increased left insular cortex gray matter density compared to non-smokers and that this increased density is correlated with a higher score on the Toronto Alexithymia Scale (TAS-20) [37]. In addition, Sutherland *et al.* [22] predicted that alexithymic smokers had more severe tobacco cravings during nicotine withdrawal. Although we did not find a significant relationship between smoking status and the presence of alexithymia in our study, we found that alexithymic smokers had higher nicotine addiction, which was in line with the literature. However, it was determined that those who smoked more had more difficulty in verbalising their emotions.

Our study contributes to a topic that is rarely addressed in the literature. However, its limitations are the small sample size and single centre. Future research should examine this relationship in more detail using larger sample sizes and more comprehensive assessments.

■ Conclusions

No direct relationship was found between smoking and alexithymia in our study. However, a remarkable observation is that alexithymic smokers have higher levels of nicotine addiction. On the other hand, it was determined that the participants who smoked more had more difficulty putting their emotions into words. These results suggest that nicotine addiction is in a complex relationship with psychological factors and alexithymia may be a factor in this relationship. In addition, these findings show that alexithymia may be a factor to be considered in individuals participating in smoking cessation programmes and provide important clues for clinical applications.

Conflict of interest/Konflikt interesów

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Ethics/Etyka

The work described in this article has been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) on medical research involving human subjects, Uniform Requirements for manuscripts submitted to biomedical journals and the ethical principles defined in the Farmington Consensus of 1997.

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