Factors associated with tobacco consumption in patients with depression

Factores asociados con consumo de tabaco en pacientes con depresión

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Abstract

Smoking and depression are related in a bidirectional way: smoking is the primary avoidable cause of illness and death in patients with depression, and depression is one of the most consistent risk factors for smoking. The main objective of this study is to investigate the relationship between smoking and depression, analyzing sociodemographic and clinical variables such as severity of symptoms, subtype of affective disorder, and its impact on suicidal behavior in the clinical population.

A sample of 201 patients, over 18 years of age [mean age (SD) = 53.76 (10.36) years; women = 132 (65.7%)], with a history of depressive episode (unipolar or bipolar) or dysthymia (ICD 10 criteria) was studied.

Current smoking prevalence was 43.2% and life-time prevalence 61.2%. No statistically significant differences in smoking prevalence between men and women were found (X^2 = 3.896, p = 0.143). The average age of onset was 17.81 (5.60) years. There was a tendency towards a linear association between number of cigarettes/day consumed and severity of depression according to the Hamilton Depression Scale (HDRS) in current smokers (Pearson's R = 0.298, p = 0.050). Multinomial logistic regression analysis showed that current tobacco consumption was associated with higher HDRS scores, with each additional point on the HDRS increasing the likelihood of smoking by 0.062 [p = 0.032; OR (95% CI) = 1.064 (1.005-1.125)].

Our results showed that depressed patients present higher prevalence of current smoking than the general population, also suggesting a relationship between severity of consumption and severity of depressive symptoms.

Key Words: depression; comorbidity; tobacco consumption; risk factor.

Resumen

Tabaquismo y depresión se relacionan de forma bidireccional: el tabaquismo es la primera causa evitable de enfermedad y muerte en pacientes con depresión, y la depresión constituye uno de los factores de riesgo de tabaquismo más consistentes. El principal objetivo del presente trabajo es profundizar en la relación entre tabaquismo y depresión, analizando variables socio-demográficas y clínicas como la gravedad de los síntomas, el subtipo de trastorno afectivo, y su impacto en las conductas suicidas en población clínica.

Se estudió una muestra de 201 pacientes, mayores de 18 años [edad media (SD) = 53,76 (10,36) años; mujeres = 132 (65,7%)], con historia de episodio depresivo (unipolar o bipolar) o distimia (criterios CIE 10).

La prevalencia de tabaquismo actual fue 43,2% y la prevalencia vida 61,2%, no existiendo diferencias estadísticamente significativas entre hombres y mujeres (X^2 = 3,896; p = 0,143). La edad media de inicio fue 17,81 (5,60) años. Se observó tendencia a asociación lineal entre número de cigarrillos/día consumidos y gravedad de la depresión según la Escala de Hamilton para la Depresión (HDRS) en los consumidores actuales de tabaco (R de Pearson = 0,298; p = 0,050). El análisis de regresión logística multinomial puso de manifiesto que el consumo actual de tabaco se asocia con puntuaciones más elevadas en la HDRS, de modo que cada incremento de un punto en dicha escala, la posibilidad de fumar aumenta en 0,062 [p = 0,032; OR (95% CI) = 1,064 (1,005-1,125)].

Nuestros resultados muestran que los pacientes deprimidos presentan mayor prevalencia de consumo actual de tabaco que la población general, sugiriendo además una relación entre gravedad de consumo y gravedad de los síntomas de depresión.

Palabras clave: depresión; comorbilidad; consumo de tabaco; factor de riesgo.

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Smoking is the main avoidable cause of illness, disability and death among people with mental disorders (Molina-Linde, 2011). It heightens the risk of certain types of cancer (lip, oral cavity, pharynx, larynx, esophageal, tracheal, bronchial, lung, urinary bladder, kidney, and cervical), as well as other pathologies of great morbidity and mortality, such as cardiovascular diseases, aortic aneurysm, and hypertension, besides playing an important role in respiratory diseases such as chronic bronchitis, and pulmonary emphysema (Becoña, 2004). Smoking is estimated to be responsible for around six million deaths per year (Britton, 2017).

A combination of biological, psychological and social factors, including sex and age, or cultural and economic level form the etiological basis for smoking, with the socio-cultural factors being those on which more emphasis has been placed in the design of smoking prevention campaigns (Higgins & Chilcoat, 2009).

The link between the harmful use of psychoactive substances and other serious health problems is a key aspect in national and international drug policies (Torrens, Mestre-Pintó, Montanari, Vicente & Domingo-Salvany, 2017). Despite the overall reduction in the prevalence of smoking in recent years, smoking rates among patients with mental disorder remain high, above those of the general population (Prochaska, Das & Young-Wolff, 2017 Smith et al., 2018). According to data from the United States, the United Kingdom and Australia, smoking is two to three times more prevalent among mental patients than in the general population (Lasser et al., 2000), and diagnoses show that this increase in prevalence is particularly noticeable among patients with schizophrenia, bipolar disorder, post-traumatic stress disorder and alcoholism. (De Leon & Diaz, 2005; Fu et al., 2007; McClave, McKnight-Eily, Davis & Dube, 2010). In the case of major depressive disorder, 40-50% of patients smoke, approximately twice that of the general population (Action on Smoking and Health, 2016). In the USA's National Comorbidity Survey, about 59% of respondents with a history of depression were smokers, or used to be, compared with less than 39% of those who did not have a history of affective disorder. (Lasser et al., 2000; Ziedonis et al., 2008). A reverse relationship between depression and smoking is also visible, given that the prevalence of depression is also twice as high among smokers compared with the general population (Goodwin et al., 2017; Klungsøyr, Nygård, Sørensen & Sandanger, 2006).

It is known that there is a prospective association between smoking and depression, but evidences regarding the direction of this association are inconsistent. (Fluharty, Taylor, Grabsky & Munafò, 2017).

It has been noted that depression is one of the most consistent risk factors for smoking. Longitudinal studies show that both depressive symptoms (McKenzie, Olsson, Jorm, Romaniuk & Patton, 2010) as well as the diagnosis of major depression (Breslau, Kilbey & Andreski, 1993; Dierker, Avenevoli, Merikangas, Flaherty & Stolar, 2001) are associated with an increased risk of developing nicotine addiction among adolescents (Fergusson, Linskey & Horwood, 1996) and adults (Breslau, Novak & Kessler, 2004), as well as with a lower probability of successfully quitting smoking (McClave et al., 2009).

Consequently, greater knowledge of the reasons underlying this co-occurrence of smoking and depression could help develop specific preventive strategies for this subgroup of the population. Some studies have revealed that the conditions share risk factors of both a genetic (Edwards & Kendler, 2012; Kendler et al., 1993; Lyons et al., 2008) and an environmental nature (Fergusson, Goodwin & Horwood, 2003). Other studies link the co-occurrence to the theory of self-medication (Naomi Breslau, Peterson, Schultz, Chilcoat & Andreski, 1998; Lerman et al., 1998), whereby certain depressive symptoms (for example, anhedonia) could prompt the need to smoke (Roys, Weed, Carrigan & MacKillop, 2016), or heighten the pleasurable effect of smoking (Leventhal & Zvolensky, 2015). It has been suggested that nicotine may normalize a dysfunction in cortico-striatal communication in patients who have major depressive disorder with anhedonia (Janes et al., 2018).

Conversely, smoking may exacerbate the risk of depression as a result of the toxic effect of nicotine on the brain (Swan & Lessov-Schlaggar, 2007) through oxidative stress (Vargas et al., 2013) or neurophysiological changes (Markou & Kenny, 2002).

The present study explores the relationship between smoking and depression, seeking clinical and sociodemographic variables that contribute to the risk of smoking among patients diagnosed with affective disorder.

Although there has been substantial research into the relationship between depression and smoking, it has mostly been focused on comorbidity in terms of prevalence, with very few studies taking into account psychopathological aspects such as clinical severity, or different types of depression (unipolar, bipolar and dysthymia). The results of these studies suggest that the severity of depressive symptoms is related to the number of cigarettes smoked per day (Almeida & Pfaff, 2005; Benjet, Wagner, Borges & Medina-Mora, 2004; Massak & Graham, 2008), especially among patients with nicotine dependence (Breslau, Kilbey & Andreski, 1991; Brown, Madden, Palenchar & Cooper-Patrick, 2000; Son, Markovitz & Smith, 1997; Jamal, Willem, Cuijpers & Penninx, 2012), and no such study has yet been carried out in the Spanish context.

The main objective of this study, then, is to deepen our understanding of the link between smoking and depression, analyzing sociodemographic variables and clinical variables such as symptom severity, affective disorder subtypes, as well as the possible impact on suicidal behavior in the clinical population.

Method

This is an observational, descriptive and cross-sectional epidemiological study in which a sub-sample of a multi-center project financed by the Ministry of Health, Social Services and Equality through the Carlos III Health Institute is analyzed (Ref. PI14/02029).

Participants

The sample consists of 201 patients of Caucasian ethnicity over 18 years of age [mean age (SD) = 53.76 (10.36) years; women = 132 (65.7%)] from the Mental Health Center II (La Corredoria) catchment area in Oviedo (Health Area IV of Asturias). Participants were recruited voluntarily, not probabilistically, between September 2015 and June 2017.

All patients presented a history of a current or past episode of depressive (unipolar or bipolar) mood disorder, or dysthymia, according to the criteria of the Tenth Revision of the International Classification of Diseases - ICD 10 (World Health Organization, 1992).

We excluded all participants under 18 years of age, as well as those with comorbidity involving substance use disorders other than smoking, with mental impairment or any serious organic disease, those who do not meet the inclusion criteria or who did not sign the corresponding informed consent and, therefore, did not agree to participate in the study. It is worth pointing out that of those patients who were offered participation in the study only two patients rejected it.

Ethical considerations

This study was approved by the Research Ethics Committee of the Principality of Asturias (Ref. 61/14) and complies with current legislation on clinical research established in the Declaration of Helsinki of the World Medical Association (World Medical Association, 1989), with the Council of Europe Convention on human rights and biomedicine, with the UNESCO universal human rights declaration, and with all Spanish legislation on medical research, biomedicine, data protection and bioethics. All participants provided written informed consent prior to participation in the study.

Assessment protocol

Expert interviewers administered the assessment protocol, which lasted approximately 30 minutes and included the following questionnaires: 1) An ad hoc questionnaire to assess sociodemographic and clinical data, including data regarding the presence or otherwise of somatic disease and of substance use. With regard to smoking, the data collected reflects tobacco use at present (if affirmative, the number of cigarettes per day) and in the past, as well as the age of cessation where applicable. In all cases in which present or past tobacco use is observed, the age of smoking onset is recorded (García Nieto et al., 2012); 2) The Spanish version of the 17-item Hamilton Depression Scale (HDRS) (Bobes et al., 2003). This hetero-applied scale to determine the severity of the depressive symptoms provides a single score, obtained by adding the scores of each item. In the present study, we decided to use the cut points proposed in the clinical practice guidelines on the management of depression in adults: no depression (0-7 points), minor depression (8-13 points), moderate depression (14-18 points), severe depression (19-22 points) and very severe depression (≥ 23 points) (Ministerio de Sanidad, Servicios Sociales e Igualdad, 2014); 3) The Spanish version of the Barratt Impulsivity Scale (BIS-11) (Oquendo et al., 2001). This is a self-applied instrument designed to measure impulsivity which consists of 30 items scored using a four-point Likert scale of frequency (from rarely or never = 1 to always or almost always = 4) and grouped in three impulsiveness subscales: cognitive (BIS-11-Cognitive) with 8 items, motor (BIS-11-Motor) with 10 items and non-planning impulsivity (BIS-11-Non-planning) with 12 items. It provides a total score (sum of the scores in the three subscales) and scores in the three subscales described. No cut-off point is proposed - the higher the score, the higher the level of impulsivity; 4) The Spanish version of the Childhood Trauma Questionnaire - Short Form (CTQ-SF) (Hernández et al., 2013). This is a self-applied questionnaire designed to explore whether the patient has a history of childhood abuse. It consists of 28 items grouped in five different subscales (five possible forms of abuse), which in turn consist of five items each plus a sixth subscale consisting of three items checking validity to avoid false reports. The five subscales related to possible forms of abuse are as follows: emotional abuse (CTQ-Emotional), physical abuse (CTQ-Physical), sexual abuse (CTQ-Sexual), emotional neglect (CTQ-Emotional Neglect) and physical neglect (CTQ-Physical Neglect). Each item is scored using a five-point Likert scale of frequency (from never = 1 to almost always = 5). It provides a total score (sum of the five abuse and neglect subscales) and independent scores on the five subscales. No cut-off point is proposed - the higher the score, the greater the severity of abuse; 5) The Spanish version of Brugha's List of Threatening Events (LTE) (Motrico et al., 2013). This self-applied scale gathers data on the existence of stressful life events (SLEs) occurring in the six months prior to the assessment. It consists of a list of 12 SLE categories, with each item answered Yes (1 point) or No (0 points) and yields a global score consisting of the scores obtained in each of the 12 items. There is no cutoff point, the higher the score, the greater the number of SLEs suffered.

Statistical analysis

The data were analyzed using version 20 of the Software Package for the Social Sciences for Windows (SPSS, Inc.,

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Chicago, IL, EE. UU.). Smoking was taken as the dependent variable of the study, with the sample divided into three groups on the following basis: a) those patients who have never smoked ("never smoked"), b) those who smoked in the past but did not do so at the time of the survey ("past smoker") and, c) those who smoke at the time of the survey ("current smoker").

A univariate analysis of sociodemographic, clinical and psychopathological data was performed. The continuous variables were expressed using the descriptive statistics of mean and standard deviation (SD), and the categorical variables in frequencies and percentages. The comparison between groups was carried out using chi-square statistics (γ2) on the categorical variables and one-way ANOVA with Duncan test for multiple comparisons on the continuous variables. The level of linear association between quantitative variables was determined by the Pearson correlation coefficient. The analysis of factors linked to the smoking habits of patients with depressive disorder was carried out using a multinomial logistic regression model (main effects model), which included as independent variables all those that were significant in the bivariate analysis, with the addition of sex (Plan Nacional sobre Drogas, 2017) and personal history of attempted suicide (Poorolajal & Darvishi, 2016) because they are considered relevant variables in previous studies (Moral Pélaez, 2006). "Current smoking" was the category of reference. Before carrying out the analysis, the possible existence of multicollinearity among the included variables was discarded by checking correlation coefficients between pairs of variables. The confidence level for statistical significance (α) was set at 95% (p <0.05)

Results

The total sample comprised 201 patients with current diagnosis of depression or dysthymia (ICD 10 criteria) [mean age (SD) = 53.76 (10.36) years; women = 132 (65.7%)]. The most common marital status was married/with partner [n = 131 (65.2%)], most had children [n = 159 (79.1%)] and lived with their own family, either with their partner [n = 84 (41.8%)], with their children [n = 66 (32.8%)] or both, and most had a primary education level [n = 95 (47.3%)] (Table 1).

At the moment of assessment, most of the sample had a concomitant somatic disease [n = 141 (70.1%)] and did not drink alcohol [n = 146 (72.6%)], with none of those who did meeting diagnostic criteria for alcohol use disorder since this was an exclusion criterion for participating in the study. The majority of the sample had no family history of suicide attempts (SA) [n = 160 (79.6%)], nor of completed suicide [n = 162 (80.6%)], although 86 patients (42.8%) had attempted suicide themselves. A majority of 105 patients (52.2%), presented a diagnosis of unipolar depression, with an average severity on the HDRS of 18.65

(5.99), signifying severe depression according to the criteria of the Clinical Practice Guide For Adult Depression Management (Ministerio de Sanidad, Servicios Sociales e Igualdad, 2014).

The mean scores on the other scales were as follows: CTQ-Total = 37.95 (13.06), LTE-Brugha = 2.84 (0.93), BIS-11 Total = 64.63 (11.59) (Table 2).

With regard to smoking, 123 (61.20%) patients had a history of tobacco use, with an average onset age of 17.81 (5.60) years. Of these patients, 38 (30.9%) had quit smoking at an average age (SD) of 45.34 (9.37), implying an average duration of the smoking habit of 27.00 (10.99) years. At assessment, 85 patients (69.1%) remained smokers [mean onset age (SD) = 17.73 (5.38) years; women = 54 (63.5%)], smoking on average (SD) of 16.68 (11.48) cigarettes per day. It is worth noting that there was a tendency towards a linear association between number of cigarettes smoked daily by current smokers and the severity of depression according to the HDRS (Pearson's R = 0.298, p = 0.050); this did not reach the level of statistical significance, however.

A bivariate analysis comparing patients by their smoking habit (current, past or never), showed that patients diagnosed with depression and currently smoking were significantly younger than ex-smokers [51.69 (9.13) vs. 55.82 (7.50) years; F = 3.070, p = 0.049] and suffered from greater depression severity according to HDRS than those who had never smoked [19.70 (5.29) vs. 17.23 (7.03); F = 3.788, p = 0.024]. Moreover, compared to those who had never smoked, past smokers registered statistically higher scores on the BIS-11 Cognitive [20.00 (3.97) vs. 17.75 (4.15); F = 4.169, p = 0.017] (Tables 1 and 2). For the remaining variables in which no statistically significant results were found, the reader is referred to Tables 1 and 2.

In the multinomial regression analysis, the variables that were statistically significant in the bivariate analysis were taken into account (age, severity of depression according to HRDS and BIS-11 Cognitive), with the addition of other variables considered possible risk factors in the literature (sex and personal history of attempted suicide). This analysis shows that there are no differences in any of the parameters included between current and ex-smokers, while current smoking is associated with higher scores on the HDRS to the extent that each one-point increment on the scale increases the likelihood of smoking by 0.059 [β = 0.062, p = 0.037; OR (95% CI) = 1.060 (1.004-1.121)] (Table 3).

Discussion

There are not many studies on smoking in clinical populations with affective disorders in our environment. The most significant findings include a prevalence of current smoking of 42.3% and a life of our study prevalence

Table 1. *Sociodemographic characteristics of the sample*

	Total n = 201	Current smoker n = 85	Past smoker n = 38	Never smoked n = 78	X² (gl) / F (gl)*	p
Sex [n (%)]						
Men	69 (34.3%)	31 (44.9%)	17 (24.6%)	21 (30.4%)	3.896 (2)	0.143
Women	132 (65.7%)	54 (40.9%)	21 (15.9%)	57 (43.2%)		
Age [Mean (DE)]	53.76 (10.36)	51.69 (9.13)[1]	55.82 (7.50)[1]	55.01 (12.34)	3.070 (200) *	0.049
Marital status [n (%)]						
Single	18 (9.0%)	7 (38.9%)	3 (16.7%)	8 (44.4%)	9.190 (6)	0.163
Married / with partner	131 (65.2%)	53 (40.5%)	29 (22.1%)	49 (37.4%)		
Separate / Divorced	38 (18.9%)	22 (57.9%)	4 (10.5%)	12 (31.6%)		
Widower/Widowed	14 (7.0%)	3 (21.4%)	2 (14.3%)	9 (64.3%)		
Children [n (%)]						
Yes	159 (79.1%)	64 (40.3%)	31 (19.5%)	64 (40.3%)	1.297 (2)	0.523
No	42 (20.9%)	21 (50.0%)	7 (16.7%)	14 (33.3%)		
Living with [n (%)]						
Parents	19 (9.5%)	8 (42.1%)	0 (0.0%)	11 (57.9%)	7.184 (8)	0.517
Children	66 (32.8%)	27 (40.9%)	13 (19.7%)	26 (39.4%)		
Partner	84 (41.8%)	38 (45.2%)	18 (21.4%)	28 (33.3%)		
Alone	28 (13.9%)	11 (39.3%)	6 (21.4%)	11 (39.3%)		
Other	4 (2.0%)	1 (25.0%)	1 (25.0%)	2 (50.0%)		
Educational level [n (%)]						
Primary school	95 (47.3%)	34 (35.8%)	23 (24.2%)	38 (40.0%)	5.334 (4)	0.255
Secondary/higher secondary	77 (38.3%)	36 (46.8%)	10 (13.0%)	31 (40.3%)		
University	29 (14.4%)	15 (51.7%)	5 (17.2%)	9 (31.0%)		

Note. [1]: Groups with statistically significant differences (Duncan's test for multiple comparisons); SD: Standard deviation

of 61.2%, with no difference in prevalence between men and women. There are hardly any differences between the variables studied and smoking status, so that smokers and ex-smokers only differ in age (51.69 years vs. 55.01 years respectively), while smokers and non-smokers present other differences, for example in depression severity or impulsivity level. The inclusion of the differential variables in the logistic regression analysis shows that there are no differences between smokers and ex-smokers, while the group of active smokers is differentiated from those who have never smoked by depression severity as measured by the HDRS.

Our results agree with those published in the literature regarding the higher prevalence of current smoking among patients with depression compared to the general population. In terms of lifetime prevalence, while the 61.2% rate found in our sample is similar to that observed in the US in the National Comorbidity Survey (Ziedonis et al., 2008), it is lower than that in Spain's general population, where 72.5% has smoked at some time in their lives (Plan Nacional sobre Drogas, 2017). Turning to current active smoking, patients with depression present a prevalence of 42.3%, considerably higher than the 30.8% found in the Spanish population, according to data from the National Plan On Drugs ((Plan Nacional sobre Drogas, 2017). Nevertheless, these data must be read with caution given the age factor, since the Spanish population is on average younger (42.98 years) than our sample (53.76 years).

There is some controversy concerning sex differences relation to smoking, both at the epidemiological and the clinical level involving patients in cessation (Marqueta, Nerín, Gargallo & Beamonte, 2017). In our sample of depressive patients, there is no sex difference in current smoking prevalence, which contrasts with the higher prevalence among men found in the general population for all age groups (Plan Nacional sobre Drogas, 2017). These results suggest that patients with depression differ from the general population with regard to smoking, not only because of the increase in the prevalence of current smoking in the clinical population studied, but also given the similarity in smoking rates between men and women, so that the disease could be responsible for these differences in the smoking habit of patients with depression.

Explanations of such an influence of depressive symptoms on smoking have been approached using biological models, looking at common genetic risk factors between smoking and affective disorders (Edwards et al., 2012; Kendler et al., 1993; Lyons et al., 2008), or the theory of self-medication, where tobacco functions to alleviate certain symptoms, especially anhedonia (Roys et al., 2016). Recently, a psychological model to explain comorbidity between smoking and depression based on learning theories has been proposed, highlighting the role of positive affect, negative affect, and cognitive deficit as engines of addiction maintenance (Mathew, Hogarth, Leventhal, Cook & Hitsman, 2017).

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Table 2. *Clinical characteristics of the sample*

	Total n = 201	Current smoker n = 85	Past smoker n = 38	Never smoked n = 78	X2 (gl) / F (gl)*	p
Somatic disease [n (%)]						
Yes	141 (70.1%)	54 (38.3%)	29 (20.6%)	58 (41.1%)	3.129 (2)	0.209
No	60 (29.9%)	31 (51.7%)	9 (15.0%)	20 (33.3%)		
Alcohol use [n (%)]						
Yes	55 (27.4%)	27 (49.1%)	10 (18.2%)	18 (32.7%)	1.570 (2)	0.456
No	146 (72.6%)	58 (39.7%)	28 (19.2%)	60 (41.1%)		
FH Attempted suicide [n (%)]						
Yes	41 (20.4%)	21 (51.2%)	8 (19.5%)	12 (29.3%)	2.189 (2)	0.335
No	160 (79.6%)	64 (40.0%)	30 (18.8%)	66 (41.3%)		
FH Completed suicide [n (%)]						
Yes	39 (19.4%)	16 (41.0%)	7 (17.9%)	16 (41.0%)	0.103 (2)	0.950
No	162 (80.6%)	69 (42.6%)	31 (19.1%)	62 (38.3%)		
Curent diagnosis (CIE-10) [n (%)]						
Bipolar depression	16 (8.0%)	5 (31.3%)	2 (12.5%)	9 (56.3%)	10.168 (6)	0.118
Unipolar depression	105 (52.2%)	52 (49.5%)	21 (20.0%)	32 (30.5%)		
Recurrent unipolar depression	47 (23.4%)	20 (42.6%)	8 (17.0%)	19 (40.4%)		
Dysthymia	33 (16.4%)	8 (24.2%)	7 (21.2%)	18 (54.5%)		
HDRS [Mean (DE)]	18.65 (5.99)	19.70 (5.29)1	19.23 (4.52)	17.23 (7.03)1	3.788 (200) *	0.024
HDRS-Cut points						
No depression (0-7)	9 (4.5%)	1 (11.1%)	0 (0%)	8 (88.9%)		
Minor depression (8-13)	24 (11.9%)	8 (33.3%)	4 (16.7%)	12 (50.0%)		
Moderate depression (14-18)	55 (27.4%)	21 (38.2%)	12 (21.8%)	22 (40.0%)	14.217 (2)	0.076
Severe depression (19-22)	61 (30.3%)	31 (50.8%)	12 (19.7%)	18 (50.8%)		
Very severe depression (≥ 23)	52 (25.9%)	24 (46.2%)	10 (19.2%)	18 (34.6%)		
Lifetime attempted suicide [n (%)]						
Yes	86 (42.8%)	43 (50.0%)	12 (14.0%)	31 (36.0%)	4.358 (2)	0.113
No	115 (57.2%)	42 (36.5%)	26 (22.6%)	47 (40.9%)		
CTQ Total [Mean (DE)]	37.95 (13.06)	38.38 (13.27)	39.60 (14.60)	36.67 (12.07)	0.719 (200) *	0.488
CTQ-Emotional	7.78 (3.99)	8.14 (4.41)	7.92 (4.03)	7.33 (3.46)	0.856 (200) *	0.426
CTQ-Physical	6.33 (2.57)	6.10 (2.47)	6.78 (2.63)	6.37 (2.64)	0.936 (200) *	0.394
CTQ-Sexual	5.85 (2.85)	5.80 (2.64)	5.97 (2.81)	5.84 (3.11)	0.048 (200) *	0.953
CTQ-Emotional neglect	10.19 (5.11)	10.47 (5.38)	10.84 (5.62)	9.57 (4.53)	0.996 (200) *	0.371
CTQ- Physical neglec	7.78 (2.90)	7.87 (3.11)	8.07 (3.38)	7.55 (2.40)	0.480 (200) *	0.619
LTE Brugha [Mean (DE)]	2.84 (0.93)	2.97 (0.99)	2.89 (0.89)	2.67 (0.87)	2.123 (200) *	0.122
BIS-11 Total [Mean (DE)]	64.63 (11.59)	65.25 (10.96)	67.78 (12.07)1	62.41 (11.73)1	3.025 (200) *	0.051
BIS-11-Cognitive	18.67 (4.13)	18.92 (4.03)	20.00 (3.97)1	17.75 (4.15)1	4.169 (200) *	0.017
BIS-11-Motor	21.92 (5.26)	22.44 (5.27)	22.86 (5.32)	20.89 (5.11)	2.557 (200) *	0.080
BIS-11-Non-planning	24.02 (5.60)	23.88 (5.25)	24.92 (6.28)	23.75 (5.65)	0.601 (200) *	0.549

Note. [1]: Groups with statistically significant differences (Duncan's test for multiple comparisons); FH: Family Background; BIS-11: Barratt Impulsivity Scale; CTQ: Childhood Trauma Questionnaire; SD: Standard Deviation; HDRS: Hamilton Depression Scale; LTE: List of threatening events.

Table 3. *Variables associated with current smoking compared to past smoking or never smoked*

	B	SE	Wald	df	p	OR	CI 95%
Never smoked							
Intersection	-0.176	1.427	0.015	1	0.902	1.026	0.993 – 1.060
Age	0.026	0.017	2.360	1	0.125	1.647	0.821 – 3.307
Sex (Woman)	0.499	0.356	1.971	1	0.160	1.306	0.677 – 2.522
Lifetime attempted suicide (No)	0.267	0.336	0.634	1	0.426	0.943	0.892 – 0.996
HDRS score	-0.059	0.028	4.362	1	0.037	0.964	0.888 – 1.046
BIS-11 Cognitive	-0.037	0.042	0.767	1	0.381		
Past smoking							
Intersection	-4.519	1.812	6.218	1	0.013	1.039	0.996 – 1.083
Age	0.038	0.021	3.186	1	0.074	0.890	0.396 – 2.000
Sex (Woman)	-0.117	0.413	0.080	1	0.777	1.860	0.803 – 4.309
Lifetime attempted suicide (No)	0.621	0.429	2.096	1	0.148	0.988	0.919 – 1.063
HDRS score	-0.012	0.037	0.100	1	0.752	1.086	0.982 – 1.201
BIS-11 Cognitive	0.082	0.051	2.585	1	0.108		

Note. BIS-11: Barratt Impulsivity Scale; df: Degrees of freedom; HDRS: Hamilton Depression Scale; CI: Confidence interval; OR: Odds ratio; SE = Standard error

Thus, the analyses carried out at a symptomatic level have shown that a combination of high levels of negative affect and low levels of positive affect are independently associated with the severity of nicotine dependence (Leventhal, Kahler, Ray & Zimmerman, 2009; Mickens et al., 2011) or the number of cigarettes smoked (Leventhal, Zvolensky & Schmidt, 2011).

Further, an analysis of the clinical variables reveals that smoking varies significantly depending on the type of depression in question. For example, the current rate of smoking among patients diagnosed with unipolar or recurrent major depression is 47.4%, higher than that observed with depression in bipolar disorder (31.2%) and with dysthymia (24.2%), the latter even being lower than the rate observed in the general population (30.8%), although the corresponding statistical analyses show that the distribution of prevalence among the three smoking conditions is not statistically significant.

Nevertheless, these results would be consistent with those obtained by applying logistic regression since in the model obtained, current smoking is not associated with the diagnosis of depression type, but rather with the severity of the depressive symptoms presented by the patient. Thus, it is expected that patients with dysthymia, a disorder of lower symptomatic intensity than major depressive disorder, will have lower current smoking rates.

In addition, it is important to note that although the possible linear association between severity of depression measured by HDRS and the number of cigarettes consumed by active smokers in the sample is not of statistical significance, the differences in the observed scores between the groups by smoking status (19.70 vs. 17.23) have a significant impact from a clinical point of view. Depression severity among smoking patients falls in the severe depression category (19-22) while non-smoker scores are equivalent to moderate depression (14-18), according to the Clinical Practice Guidelines on the Management of Depression in Adults (Ministerio de Sanidad, Servicios Sociales e Igualdad, 2014).

The relationship between the severity of symptoms and the observed smoking habit coincides with that published in the literature (Almeida et al., 2005; Benjet et al., 2004; Jamal et al., 2012; Massak et al., 2008), although given the cross-sectional nature of the study, it is not possible to establish the direction of the relationship. Thus it cannot clarify whether the severity of the symptoms leads the patient to smoke more, or whether it is smoking which contributes to exacerbated symptoms, although the differences observed in our study depending on the type of depression would point towards the former. Recent studies support this association by demonstrating how depressive symptoms improve when patients managed to quit tobacco in smoking cessation programs (Almadana et al., 2017).

A recent meta-analysis has revealed the link between current and past smoking (ex-smokers) and an increased risk of suicidal behavior, whether it be suicidal ideation, planning, attempted suicide, or suicide (Berlin, Hakes, Hu & Covey, 2015; Evins, Korhonen, Kinnunen & Kaprio, 2017; López-Castroman et al., 2016; Poorolajal et al., 2016). The three most accepted hypotheses for this relationship connect the increase in suicidality with: the presence of psychopathology associated with a pre-existing suicide risk in smokers; medical illnesses caused by long-term smoking (COPD, cancer) potentially leading to suicide; or the impact of smoking on certain neurotransmission systems, such as the reduction of serotonin and monoamine oxidase levels, linked to an increased risk of suicidality (Berlin et al., 2017; Hughes, 2008).

Our results suggest a higher proportion of patients with a history of suicide attempts in the group of active smokers (50.6%) compared to ex-smokers (31.6%) and non-smokers (39.7%), but the differences are not statistically significant, so that it cannot be said that there is an association between smoking and suicide attempts. It is possible that potential pro-suicidal effects attributable to tobacco are masked by working with a sample of patients with depression, a pathology associated with an increased risk of suicide; a larger sample would be necessary to be able to achieve sufficient statistical power.

This has also been pointed out in a previous study of patients who had completed suicide which investigated the modification of suicide risk attributable to smoking among patients with mental disorders, including affective disorders. The study found a statistically significant difference only in the group of patients with substance use disorders, and therefore recommended using larger clinical population samples (Schneider et al., 2009).

One of the conclusions reached by the present study is that it shows the difficulty involved in investigating the risk factors of bio-psycho-social etiology phenomena such as smoking. The interrelations between some of the variables traditionally associated with smoking can be confounding factors if studied together. This may be seen in our study when applying logistic regression techniques: age or level of impulsivity, which are variables initially showing differences depending on smoking status, finally disappear from the regression model due to a confounding effect.

The present study has certain strengths and limitations. Among the former, we highlight the homogeneity of the sample, as well as the inclusion of patients with different types of affective disorder. The main limitations would be sample size and working exclusively with a clinical population without a healthy control group. Additionally, since it is not a prospective study, a causal relationship cannot be established regarding the observed association. Similarly, a more comprehensive analysis of concomitant somatic diseases might have been useful. Finally, another limitation lies in the fact that specific scales of addiction severity were not used.

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In conclusion, this study demonstrates the relationship between smoking and depression, with depressed patients smoking more than the general population, and the possibility that smoking is directly related to the depression severity.

Acknowledgments

Conflict of interests

The authors declare no conflicts of interest regarding this study

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