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ORIGINAL ARTICLE

Smoking and Chronic Pain Among People Aged 65 Years and Older

Ulf Jakobsson, PhD; Caroline Larsson, RPT, MSc

*Center for Primary Health Care Research, Faculty of Medicine,
Lund University, Malmö, Sweden*

■ Abstract

Objective: To study the relationship between smoking and chronic pain among people aged 65+ years.

Design: A cross-sectional study.

Sample: The study was carried out in 2011 and included a randomly selected ($N = 2000$, response rate 57%) sample of people aged 65 years and older, living in Sweden.

Measurement: A postal questionnaire with questions about demographic data, living conditions, tobacco use (both smoking and moist snuff), subjective health, and chronic pain (eg, intensity, duration, location). Chronic pain was defined as a pain lasting for 3 months or longer.

Results: In the total sample ($n = 1141$, aged 65 to 103 years), 53.6% were women, 38.5% reported chronic pain, and 9% were smokers. Among the smokers were 47.6% reporting chronic pain. When comparing smokers and nonsmokers, there was a significant difference only in pain intensity but not in prevalence. However, when the sample was divided by gender, significant differences were found in both prevalence and intensity among women, but only in intensity among men. No association was found between moist snuff and pain.

Conclusions: There was an association between smoking and chronic pain among older people, especially regarding pain intensity. This indicates that interventions to help

people cease smoking may be one way (among other methods) to ease pain intensity among older people. ■

Key Words: pain, smoking, tobacco, epidemiology, gender, aged, elderly

INTRODUCTION

Chronic pain seems to be related to tobacco use, especially smoking,¹ but the evidence is inconsistent. Several studies have shown that both pain prevalence and pain intensity are increased among smokers.^{2–5} However, some contradictory studies have shown that these variables are nonrelated^{6,7} and others have shown a wide range of findings from a weak to a stronger correlation.^{1,3–5,8–10} Furthermore, some studies revealed gender differences (ie, in general that women are more affected than men),^{2,5,11} which may be one explanation for the variation in the results. Thus, gender must be considered when studying this relationship.

Despite the fact that chronic pain has its highest prevalence among older people, only one study, by Shi et al.¹² has been found that focuses on the relationship between chronic pain and smoking in the elderly. All other studies have been carried out on middle-aged people. However, the study by Shi et al.¹² did not explicitly focus on the relationship between pain prevalence or pain intensity and smoking, only on ceasing smoking and its effects on pain, and the results of their study did not indicate any such relationship. As older people differ in various ways from younger and middle-aged people regarding nociception and how they are affected by pain in daily life, previous research findings

Address correspondence and reprint requests to: Ulf Jakobsson, Center for Primary Health Care Research, Faculty of Medicine, Lund University, Clinical Research Centre (CRC), building 28, floor 11, Jan Waldenströms gata 35, Skåne University Hospital, Malmö SE-205 02, Sweden. E-mail: Ulf.Jakobsson@med.lu.se.

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about pain relief methods or preventive interventions cannot be extrapolated directly to older people.^{13,14} Thus, the knowledge about how smoking affects chronic pain among older people is still very sparse and more studies are clearly needed.

AIM

To study the association of smoking with prevalence and intensity of nonspecific chronic pain among people aged 65 years and older. Furthermore, the aim was to identify possible gender differences regarding this association.

METHODS

Sample

This cross-sectional population study was carried out in 2011 and included a randomly selected ($N = 2000$ from the Swedish population register) sample of people aged 65 years and older, living in Sweden. Two reminders were sent out: the first one after 3 weeks and the second after 6 weeks (this also included a new copy of the questionnaire). Of the 2000 respondents, 12 (0.6%) could not be contacted as their address was unknown and 13 (0.7%) respondents had died, giving an overall response rate of 57%. Thus, 1141 completed questionnaires were returned and in usable form. Of the 834 nonrespondents, only 79 (9.5%) gave any reason for declining to participate, namely being too weak/sick ($n = 7$), suffering from dementia ($n = 16$), and unwilling to take part in the study ($n = 56$). The only variable available for analysis of the dropouts was gender, and no significant ($P = 0.322$) difference was found for gender among participants (53.2% women) and nonparticipants (55.8% women). The study was conducted in accordance with the basic ethical principles of medical research¹⁵ and was approved by the Lund Regional Ethical Review Board (Dnr 2010/683).

Measurement

The questionnaire contained items about demographic data, living conditions, tobacco use (both smoking and moist snuff), worries about health, and chronic pain (eg, intensity, duration, location). Worries about health were measured with a single item "Are you worried about your health" (with the response alternatives: Never, Sometimes, Rather often, Often, Very often). Chronic pain was defined as suffering pain for

3 months or longer and was assessed using the question: "Have you been troubled by pain for 3 months or more?" (Yes/No). Thus, chronic pain in this study refers to any type of pain with the duration of 3 months or longer. Those who reported chronic pain were requested to answer other questions about pain intensity, and duration. To ensure that only people with pain for 3 months or more were included in the group "chronic pain" were those who responded "Yes" on the initial item (ie, been troubled by pain for 3 months or more) double-checked against the variable pain duration. Pain intensity was measured using one item from the "brief screening version" of the Swedish version of the Multidimensional Pain Inventory (MPI-S).^{16,17} This item was "Rate the average level of your pain during the last week" (numeric rating scale, range from "No pain" to "Very intense pain"). The score ranged from 0 to 6, where higher scores indicate more pain. Pain duration was measured with a single item "How long have you experienced pain? (state your answer in years and/or months)."

Tobacco use was measured using various questions about smoking habits, type of smoking, and use of moist snuff. The question about smoking habits had 4 response alternatives: "No, I have never smoked," "Yes, but have quit," "Yes, occasionally," and "Yes, daily." When comparing smokers and nonsmokers in the statistical analyses, the variable was dichotomized into smokers (ie, occasionally and daily) and nonsmokers (ie, never smoked and have quit). The questions about the use of moist snuff also had 4 response alternatives: "No, I have never used snuff," "Yes, but have quit," "Yes, occasionally," and "Yes, daily." Questions about the number of cigarettes smoked per day were also asked, but no information was available about previous consumption (eg, no. of cigarettes per day for 1 or 2 years ago) only about current consumption. No question was asked about the length of time since the respondent ceased to smoke or use snuff. Subjective health was measured by means of one question: "Are you worried about your health?"

Statistics

Comparisons were made both between men and women, and smokers and nonsmokers regarding demographic data, tobacco use, pain prevalence, pain intensity, pain duration, and subjective health. The

chi-square test and Cramer's *V*-test were used for comparisons of nominal data, while the Mann–Whitney *U*-test was employed for ordinal and skewed interval/ratio data. The Kruskal–Wallis one-way analysis of variance test was used to analyze differences in various variables (interval/ratio data) between the different types of tobacco users. The Mann–Whitney *U*-test was used as a post hoc test with the Kruskal–Wallis test, with a reduced value (Bonferroni method) of $P < 0.008$ to reduce the risk of mass significance.¹⁸ Missing data ranged between 0.0% and 5.1% and were not replaced using imputation, in any analysis.

Multiple regression analyses (using the “Enter method,” that is, all variables were entered at the same time) were carried out to identify variables related to pain prevalence (multiple logistic regression) and pain intensity (multiple linear regression), respectively.^{19,20} Age, smoking, and using snuff were included in the regression analysis as independent variables. Smoking and using snuff were made dummy variables with “No, I have never smoked” and “No, I have never used snuff” as references. The regression analyses were performed separately for men and women. A goodness-of-fit test of the logistic regression model was carried out using the Hosmer and Lemeshow goodness-of-fit test and Nagelkerke R^2 .²⁰ Collinearity tests (Tolerance, VIF) were conducted to probe for high inter-correlation in the linear regression analysis and revealed no such problems. An analysis of the residuals was made using the one-sample Kolmogorov–Smirnov test and histogram, and no significant differences ($P = 0.058$) were found compared with the normal distribution. Data were analyzed using PASW 20.0 (IBM Corporation, Armonk, NY, USA).

RESULTS

Description of the Total Sample

In the total sample ($n = 1141$), 53.6% were women, and 439 (38.5% CI: 35.6 to 41.3) reported chronic pain (Table 1). The mean age was 74.8 (range: 65 to 103) and about 3% lived in special accommodation. Women were significantly more worried about their health compared with men. Both the pain prevalence and the pain intensity were higher among women than among men, but not the duration of the pain (Table 1). In the total sample, 9% were smokers (occasionally and daily), and there were significantly more smokers among men than among women, but no significant difference in the mean number of cigarettes smoked (Table 1).

Comparison of Tobacco Use Habits in Relation to Chronic Pain

The prevalence of pain was higher among smokers (47.6%) compared with those who had never smoked (38.5%) and among those who had quit (36.4%). However, the differences in pain prevalence were not significant (Table 2). Among those reporting chronic pain were smokers ($m = 3.7$, SD 1.1) reporting significantly ($P = 0.003$) higher pain intensity than nonsmokers ($m = 3.2$ SD 1.1). When comparing smokers with and without pain, there was no significant difference in the number of cigarettes per day ($m = 10.2$ for both groups). The use of moist snuff in the total sample was 4.2% and was significantly higher among men than among women. There was a significant difference in the use of moist snuff when smokers, former smokers, and nonsmokers were compared (Table 2). Occasional smokers used moist snuff more often, followed by former smokers and daily smokers. No significant difference was found regarding the respondents' worries about their health (Table 2), and there was no significant ($P = 0.125$) difference in the number of pain management methods used among the 4 groups.

There was a significant difference in pain intensity but not in pain prevalence when the 4 groups of daily smokers, occasional smokers, former smokers, and nonsmokers were compared (Table 2). The highest pain intensity was seen among smokers (daily and occasional smokers), and the significant difference was between daily smokers and nonsmokers/former smokers. Even when categorizing the respondents into smokers (daily and occasional smokers) and nonsmokers (former and nonsmokers), the significant difference obtained in the previous result remained (significant difference in pain intensity but not in prevalence; Table 3). However, when the sample was divided by gender, significant differences were found in both prevalence and intensity among women but only in intensity among men.

Association of Chronic Pain (Prevalence and Intensity) and Tobacco Use

The regression analyses with pain intensity as the dependent variable showed that higher age and smoking daily were associated with higher pain intensity among both men and women (Tables 4 and 5). Among women were smoking occasionally also associated with pain intensity (Table 5). No association was found between

Table 1. Description of the Demographic Data, Tobacco Use, and Pain Characteristics in the Total Sample and Comparison Between Genders

	Total Sample <i>N</i> = 1141	Men <i>n</i> = 530	Women <i>n</i> = 611	<i>P</i> -Value
Age, <i>m</i> (SD)*	74.8 (7.3)	74.5 (7.0)	74.9 (7.5)	0.485
Living conditions, % [†]				
Own home	97.3	98.1	96.7	0.141
Special accommodation	2.7	1.9	3.3	
Worried about health, %*				
Never	17.7	21.7	14.2	< 0.001
Sometimes	67.6	67.2	67.9	
Rather often	10.5	7.7	13.2	
Often	2.7	2.9	2.5	
Very often	1.5	0.6	2.2	
Smoking tobacco, % [†]				
No, I have never smoked	50.3	43.5	56.3	0.001
Yes, but have quit	40.5	48.7	33.4	
Yes, occasionally	2.1	2.5	1.8	
Yes, daily	7.0	5.4	8.4	
Number of cigarettes smoked per day, <i>m</i> (SD)*	10.1 (5.9)	10.0 (4.9)	10.2 (6.4)	0.895
Smoking pipe, <i>n</i> (%) ^{†,‡}	7 (1.2)	7 (2.3)	0 (0.0)	0.034
Smoking cigar, <i>n</i> (%) ^{†,‡}	10 (1.8)	7 (2.3)	3 (4.8)	0.277
Using moist snuff, %*				
No, have never used it	90.1	81.0	98.2	< 0.001
Yes, but have quit	5.6	11.0	0.9	
Yes, occasionally	0.7	1.6	0.0	
Yes, daily	3.5	6.5	0.9	
Pain prevalence, % [†]				
Chronic pain (> 3 months)	38.5	29.6	46.2	< 0.001
Pain intensity (last week), <i>m</i> (SD)**§	3.12 (1.11)	2.86 (1.00)	3.29 (1.13)	< 0.001
Pain duration (years), <i>m</i> (SD)*	10.1 (12.1)	9.6 (12.9)	10.4 (11.7)	0.532

Bold values denote significant *P*-value.*Mann-Whitney *U*-test.

†Chi-square test.

‡Percent of those reporting smoking/former smoker.

§Pain intensity is measured on a scale ranging between 0 and 6, and higher score indicating higher intensity.

Table 2. Description and Comparison of Demographic Data and Pain Characteristics with Regard to Different Smoking Habits

	Smoking Habits				<i>P</i> -Value
	Nonsmoker (I) <i>n</i> = 571	Former Smoker (II) <i>n</i> = 460	Occasional Smoker (III) <i>n</i> = 24	Daily Smoker (IV) <i>n</i> = 80	
Age, <i>m</i> (SD)*	75.9 (7.4)	73.9 (7.0)	72.5 (6.6)	72.0 (6.3)	< 0.001 (A, C)*
Gender (men/women), %	40.0/60.0	55.7/44.3	54.2/45.8	35.4/64.6	< 0.001 (A, E)[†]
Using moist snuff, %					
No, have never used	95.8	83.1	91.3	89.7	< 0.001 (A, C)[‡]
Yes, but have quit	1.5	11.2	0.0	5.1	
Yes, occasionally	0.4	0.7	0.0	3.8	
Yes, daily	2.4	5.0	8.7	1.3	
Worried about health, %					
Never	17.0	18.9	12.5	17.5	0.069 [§]
Sometimes	65.7	71.1	62.5	62.5	
Rather often	12.5	7.0	20.8	13.8	
Often	3.4	2.0	0.0	2.5	
Very often	1.4	1.1	4.2	3.8	
Chronic (> 3 months) pain prevalence, %	38.5	36.4	37.5	50.6	0.123 [†]
Pain intensity (last week), <i>m</i> (SD) [§]	3.02 (1.08)	3.12 (1.10)	3.56 (1.33)	3.62 (1.06)	0.007 (C, E)*
Pain duration (years), <i>m</i> (SD)	9.9 (12.7)	9.9 (11.6)	8.0 (8.3)	12.6 (12.1)	0.645*

Bold values denote significant *P*-value.

Significant differences between: A = I–II, B = I–III, C = I–IV, D = II–III, E = II–IV, F = III–IV.

*Kruskal–Wallis test.

†Chi-square test.

‡Cramer's *V*-test.

§Pain intensity is measured on a scale ranging between 0 and 6, and higher score indicating higher intensity.

Table 3. Comparison Between Smokers and Nonsmokers Regarding Pain Prevalence and Intensity

	Total			Men			Women		
	Smokers <i>n</i> = 104	Nonsmokers <i>n</i> = 1031	<i>P</i> -Value	Smokers <i>n</i> = 42	Nonsmokers <i>n</i> = 485	<i>P</i> -Value	Smokers <i>n</i> = 62	Nonsmokers <i>n</i> = 546	<i>P</i> -Value
Pain prevalence, %*	47.6	37.5	0.046	31.7	29.2	0.738	57.4	44.9	0.045
Pain intensity, <i>m</i> (SD) ^{†,‡}	3.61 (1.10)	3.06 (1.09)	0.001	3.29 (1.01)	2.82 (0.83)	0.046	3.75 (1.80)	3.22 (1.11)	0.008

Bold values denote significant *P*-value.

Smokers, smoking daily and smoking occasionally; Nonsmoker, never smoked and former smoker.

*Chi-square test.

[†]Mann-Whitney *U*-test.

[‡]Single item "average level of pain during the last week," scale ranging between 0 and 6 and higher score indicating higher intensity.

Table 4. Multiple Linear Regression Analysis Identifying Variables Associated with Pain Intensity Among Men

	Model	<i>B</i>	95% CI for <i>B</i>	<i>P</i> -Value
Pain intensity*	Age	0.012	−0.008 to 0.031	0.253
	Smoking			
	Have quit smoking	0.058	−0.254 to 0.371	0.712
	Smoking occasionally	−0.288	−1.444 to 0.867	0.065
	Daily smoking	0.772	0.132 to 1.411	0.018
	Moist snuff			
	Have quit using moist snuff	0.421	−0.072 to 0.914	0.094
	Occasionally use of moist snuff	0.722	−0.426 to 1.870	0.284
	Using moist snuff daily	0.408	−0.095 to 0.911	0.112

Bold values denote significant *P*-value.

Adjusted *R*² = 0.037.

*Single item "average level of pain during the preceding week," scale ranging between 0 and 6 and higher score indicating higher intensity.

Table 5. Multiple Linear Regression Analysis Identifying Variables Associated with Pain Intensity Among Women

	Model	<i>B</i>	95% CI for <i>B</i>	<i>P</i> -Value
Pain intensity*	Age	0.023	0.006 to 0.040	0.010
	Smoking			
	Have quit smoking	0.272	−0.021 to 0.566	0.069
	Smoking occasionally	1.046	0.137 to 1.955	0.024
	Daily smoking	0.586	0.133 to 1.040	0.011
	Moist snuff			
	Have quit using moist snuff	0.447	−0.056 to 0.839	0.583
	Occasionally use of moist snuff [†]	—	—	—
	Using moist snuff daily	−0.255	−1.541 to 1.032	0.697

Bold values denote significant *P*-value.

Adjusted *R*² = 0.057.

*Single item "average level of pain during the preceding week," scale ranging between 0 and 6 and higher score indicating higher intensity.

[†]None of the women responded "Occasionally use of moist snuff" (also see Table 1).

using moist snuff and pain intensity. When trying to find a regression model to identify any variables associated with pain prevalence, none of the chosen variables (age, gender, smoking habits, and use

of moist snuff) were found to be associated with prevalence.

DISCUSSION

In this cross-sectional population survey, an association between smoking and chronic pain was found among older people. However, distinct gender differences were detected. When comparing smokers and nonsmokers in the total sample, there was only a significant difference in pain intensity but not in prevalence, while when the sample was divided by gender, significant differences were found both in prevalence and in intensity among women, but only in intensity among men. No relationship was found between chronic pain and using moist snuff.

There seems to be strong evidence for the association between smoking and chronic pain, because several studies have shown a relation with both higher pain prevalence and greater intensity.^{1–5} Even passive smoking seems to increase the risk of pain among nonsmokers.²¹ This indicates that smoking cessation may be an additional way to reduce pain. Previous research has shown that ceasing to smoke has a positive effect on pain (ie, less pain was experienced),²² but this effect was not seen among older people in a previous study.¹² This may be somewhat surprising in light of the results from this present study where the association between smoking and chronic pain was clear (Tables 2–5). The difference in results be explained by various factors, for example the origin/context of the study (U.S.A. vs. Sweden), the study design (longitudinal vs. cross-sectional), and the age distribution among the respondents (the study by Shi et al.¹² seems to have a slightly younger sample than in the present study). The different results in this study and that of Shi et al.¹² cannot be explained by lack of power because the number of respondents in their study is several times larger than in this one. Thus, knowledge remains sparse regarding this topic among older people,

and as there are only a few studies that focus on older people clearly, more research is needed before a firm conclusion can be drawn regarding tobacco use and pain in this group.

Rather surprisingly, there was a significant difference in pain intensity but not in pain prevalence when smokers, former smoker, and nonsmokers were compared (Table 2). Previous research have shown association with smoking and prevalence^{2,6,10} as well as smoking and intensity,³⁻⁵ but no study was found focusing on both the impact on intensity and prevalence. When the variable was divided into smokers and nonsmokers, a significant difference was found in both prevalence and intensity (Table 3). Furthermore, when running the analyses divided by gender, the same results as in Table 2 were found for the men, but for the women both pain prevalence and intensity were significantly higher among smokers (Table 3). This indicates that the results must be analyzed and interpreted from a gender perspective as well as for the whole group. However, even if statistical significant differences were found, the magnitude was rather small and the clinical significance can be questioned. Thus, the results should be interpreted with caution before it can be implemented in clinical practice.

There were significantly more respondents who had never smoked among women than among men, but more daily smokers among women (Table 1). In addition, significantly higher pain prevalence and pain intensity was seen in women but only higher intensity among men (Table 3), the interpretation of which may be that women are more affected than men regarding the impact of smoking on their pain, but can also mean that the pain is most effected by daily smoking. Both hypotheses can actually be true because results from previous studies (focusing on younger people, eg, ref. 5) indicate support for the first assumption, while the results shown in Table 2 somewhat strengthen the latter assumption because significantly higher pain intensity was seen in daily smokers. The nonsignificant difference in pain prevalence among men in this study might due to low power in the statistical analysis. However, the descriptive data do not indicate a large difference in pain prevalence, while the difference among women was larger so the conclusion that women are more affected than men is probably true. Furthermore, previous research has shown that the pain tolerance seems to be higher among men, compared with women, among both smokers and nonsmokers.^{11,23} So the gender differences are probably due to differences in nociception (the reason for this is unclear but maybe hormone related, cf. 11). The

use of snuff was more common among the men, but was found to be unrelated to chronic pain (Tables 4 and 5).

Pain intensity was found to be significantly associated with higher age, being a woman, and smoking daily but not with using moist snuff (Tables 4 and 5). However, the coefficient of determination was rather low (adjusted $R^2 = 6.9\%$), which indicates that smoking is a minor part of the cause of chronic pain among older people, but even if it cannot be seen as a method of pain management it should still be viewed as a factor to be taken into consideration in the management of pain to alleviate the suffering caused by chronic pain. These results are in general in agreement with previous research on younger people.⁵

No significant difference was found regarding the respondents worries about their health (Table 2). This could otherwise be a confounding variable, that is, the reason people quit smoking. However, it can also be so that the smokers may be worried about their health but are still unable to quit. Another possible confounder is the use of pain management methods, but no significant difference was found among the 4 groups.

Study Limitations

Low response rate can generally be considered a threat to internal validity, especially if the attrition is systematic. However, the response rate in this study is comparable to those in similar studies in elderly people, and no differences in gender and the number of participants living in special housing were identified when comparing the sample to the dropout group. Thus, the sample regarding these variables is probably representative of the Swedish population. However, the findings should although be generalized with a little bit caution because the response rate was 57% and the dropout analysis was only base on one variable (ie, one cannot ensure that the dropout was not systematic).

The fact that the study deals with issues of addiction may cause problems because some persons may be ashamed of their addiction and do not want to deal with it or be reminded of it. Thus, the prevalence might be biased due to both internal and external missing, and the number of smokers as well as users of moist snuff may be underestimated. For example, the results from this study showed that 9.2% were smokers, but the prevalence of smokers in the total sample could theoretically lie between 5.2% (calculating with none of the nonrespondents are smokers) and 48.2% (ie, all nonrespondents are smokers). However, even if the results are underestimated, it is probably not severely biased.

The lack of information about additional variables such as education, social class, other diseases (diagnoses), physical exercise, and preceding work history is limiting the conclusion about the results in this study. With such information, confounders to the relationship between chronic pain and tobacco use could be better identified, and the results must be interpreted with this limitation in mind.

This study is cross-sectional in design, which limits the possibilities of drawing conclusions about causes or the direction of the associations. There could also be other factors not included in the analysis which could interfere with (unknown confounding factors) or explain the associations between chronic pain and smoking. A selection of demographic data and variables such as use of moist snuff and worried about their health have been taken in account, but there may still be more that were not measured in this study. Some difference between groups was also found in the descriptive data but was not statistically significant, probably due to lack of power because only 24 respondents reported smoking occasionally. No question was asked about the length of time that had passed because the former user had quit smoking/using snuff, and this may have influenced the result when comparing other groups to former users.

CONCLUSION

In the total sample, 9% were smokers (occasionally and daily) and among those 47.6% reported chronic pain. There was a clear association between smoking and chronic pain among older people, especially regarding pain intensity. However, the association between smoking and pain prevalence (identified in the total sample) seems to only exist among women and not among men. No relationship was found between chronic pain and using moist snuff. Thus, interventions to help people cease smoking among older people with chronic pain are not only a method to improve health but may also to prevent and ease pain.

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REFERENCES

1. Weingarten TN, Shi Y, Mantilla CB, Hooten WM, Warner DO. Smoking and chronic pain: a real-puzzling relationship. *Minn Med*. 2011;94:35–37.
2. Goldberg MS, Scott SC, Mayo NE. A review of the association between cigarette smoking and the development of non-specific back pain and related outcomes. *Spine*. 2000;25:995–1014.
3. Eriksen WB, Brage S, Bruusgaard D. Does smoking aggravate musculoskeletal pain? *Scand J Rheumatol*. 1997;26:49–54.
4. John U, Hanke M, Meyer C, Völzke H, Baumeister SE, Alte D. Tobacco smoking in relation to pain in a national general population survey. *Prev Med*. 2006;43:477–481.
5. Jakobsson U. Tobacco use in relation to chronic pain: results from a Swedish population survey. *Pain Med*. 2008;9:1091–1097.
6. Leboeuf-Yde C. Smoking and low back pain. A systematic literature review of 41 journal articles reporting 47 epidemiologic studies. *Spine*. 1999;24:1463–1470.
7. Hooten WM, Shi Y, Gazelka HM, Warner DO. The effects of depression and smoking on pain severity and opioid use in patients with chronic pain. *Pain*. 2011;152:223–229.
8. Leboeuf-Yde C, Yashin A. Does smoking cause low back pain? Results from a population-based study. *J Manipulative Physiol Ther*. 1996;19:99–108.
9. Reily JL, Tomar SL, Gilbert GH. Smoking and smokeless tobacco: increased risk for oral pain. *J Pain*. 2004;5:218–225.
10. Shiri R, Karppinen J, Leino-Arjas P, Solovieva S, Viikari-Juntura E. The association between smoking and low back pain: a meta-analysis. *Am J Med*. 2010;123:87.e7–87.e35.
11. Girdler SS, Maixner W, Naftel HA, Stewart PW, Moretz RL, Light KC. Cigarette smoking, stress-induced analgesia and pain perception in men and women. *Pain*. 2005;114:372–385.
12. Shi Y, Hooten WM, Warner DO. Effects of smoking cessation on pain in older adults. *Nicotine Tob Res*. 2011;10:919–925.
13. Gibson SJ, Helme RD. Age-related differences in pain perception and report. *Clin Geriatr Med*. 2001;17:433–456.
14. Gibson SJ, Farrell M. A review of age differences in the neurophysiology of nociception and the perceptual experience of pain. *Clin J Pain*. 2004;20:227–239.
15. MRC. *Riktlinjer för etisk värdering av medicinsk humanforskning*. [Guidelines for ethical evaluation of medical research involving human subjects] MRC-report 2 (revised version). Stockholm: Swedish Medical Research Council; 2000.

16. Von Korff M. Epidemiological and survey methods: chronic pain assessment. In: Turk DC, Melzack R, eds. *Handbook of Pain Assessment*. New York, NY: The Guildford Press; 1992:391–408.
17. Jakobsson U, Horstmann V. Psychometric evaluation of multidimensional pain inventory (Swedish version) in a sample of elderly people. *Eur J Pain*. 2006;10:645–651.
18. Bland JM, Altman DG. Multiple significance tests: the Bonferroni method. *BMJ*. 1995;310:170.
19. Kutner MH, Nachtsheim CJ, Neter J, Li W. *Applied Linear Statistical Models*. 5th ed. New York, NY: McGraw-Hill; 2005.
20. Hosmer DW, Lemeshow S. *Applied Logistic Regression*. 2nd ed. New York: Wiley; 2000.
21. Pisinger C, Aadahl M, Toft U, Birke H, Zytphen-Adeler J, Jorgensen T. The association between active and passive smoking and frequent pain in a general population. *Eur J Pain*. 2011;15:77–83.
22. Kaye AD, Prbhakar AP, Fitzmaurice ME, Kaye RJ. Smoking cessation in pain patients. *Ochsner J*. 2012;12: 17–20.
23. Jamner LD, Girdler SS, Shapiro D, Jarvik ME. Pain inhibition, nicotine and gender. *Exp Clin Psychopharmacol*. 1998;6:96–106.