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Short communication

Smokers' reports on receiving a doctor's advice to quit smoking; receiving the advice is more prevalent among smokers with Crohn's Disease relative to smokers with Ulcerative Colitis

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ABSTRACT

Receiving a doctor's advice to quit smoking is an important predictor for improving smokers' intentions to quit smoking and successful smoking cessation. We examined reports of smokers with Crohn's Disease (CD) and Ulcerative Colitis (UC) regarding receiving a doctor's advice to quit smoking in the past 12 months, and evaluated the differences in the rates of receiving the advice between the CD and UC patients. The data were retrospectively reported by CD and UC patients (n = 453) who self-identified as current smokers in online assessments conducted by IBD Partners in the period from 2011 to 2014 in the USA. Statistical methods included chi-square tests and a multiple logistic regression model for the logit of the probability of receiving the advice as a function of patient's characteristics and assessment year. Overall, about 77% of smokers reported receiving a doctor's advice to quit smoking. The percentage was significantly (p < 0.001) higher among smokers with CD (80%) than it was among smokers with UC (63%). While the specific differences by CD/UC depended on smoking initiation age, the overall effect of disease type on the odds of receiving the advice remained significant: the odds of receiving the advice were higher for smokers with CD relative to smokers with UC (OR = 3.6, p < 0.001). Although the majority of CD and UC patients report receiving a doctor's advice to quit smoking, the encountered difference associated with the disease type is concerning. Because long-term smoking increases cancer and mortality risks, doctors should address smoking cessation with all patients who smoke.

1. Introduction

While the scientific findings regarding the harmful effect of smoking on Crohn's Disease (CD) development and progression are consistent (Somerville et al., 1984), there is an ongoing debate regarding the relationship between smoking and Ulcerative Colitis (UC) (Berkowitz et al., 2018; Mahid et al., 2006). The debate began several decades ago when results from multiple published studies pointed to a possible protective effect of smoking on UC development and disease activity (Harries et al., 1982; Jick and Walker, 1983). Although epigenetic research has been conducted with the goal of explaining the pathways through which nicotine and its metabolites could influence UC, the relationship between smoking and UC is not yet well understood (Berkowitz et al., 2018). Nonetheless, there is evidence that smoking is associated with medication nonadherence, which can worsen the disease course among IBD patients, e.g., among patients with quiescent UC medication nonadherence is associated with increased risk of clinical recurrence of disease (Kane et al., 2003).

The current clinical practice guidelines on treating tobacco use in the U.S. state that all clinicians should recommend smoking cessation to their patients who smoke (Fiore et al., 2008). A recommendation to clinicians that smoking cessation should be an important part of IBD patient care has been mentioned in the scientific literature (Spence et al., 2017). The clinical guidelines on management of CD in adult patients state "Cigarette smoking exacerbates disease activity and accelerates disease recurrence and should be avoided. Active smoking cessation programs should be encouraged" and label this as a strong recommendation (but with a low level of evidence) (Lichtenstein et al., 2018). Smoking cessation is also recommended as part of postoperative care for CD patients (Lichtenstein et al., 2018). Similar recommendations are stated by the British Society for Gastroenterology (Lamb et al., 2019). However, our search for "smoking" in the American College of Gastroenterology clinical guideline on management of UC identified no specific recommendations related to smoking cessation; smoking

cessation was only mentioned in two statements: "Potential precipitants of UC may include recent smoking cessation…" and "Evaluation of UC during relapses should include assessment of the severity of symptoms and potential triggers, including … recent smoking cessation" (Rubin et al., 2019). The British Society for Gastroenterology states that "Ulcerative Colitis patients who continue to smoke cigarettes should be encouraged to stop" but labels this as a weak recommendation (with a very low level of evidence) (Lamb et al., 2019). Nonetheless, several scientific papers suggested that because health risks of smoking outweigh any potential benefits, doctors should recommend smoking cessation to UC patients who smoke (Bastida and Beltrán, 2011; Blackwell et al., 2019).

We believe that the ongoing debate regarding the relationship between smoking and UC and lack of explicit recommendations to clinicians to advise smokers with UC to quit smoking could be confusing to both patients and doctors. This confusion can affect doctor-patient communications about smoking cessation, causing doctors and patients to put aside these important discussions, which may "promote" harmful tobacco use among smokers with IBD. Moreover, while the percentage of receiving a doctor's advice to quit was addressed for patients with a chronic condition for a number of conditions, e.g., asthma, anxiety, coronary heart disease and depression (Keith et al., 2017), we could not locate any estimates for patients with CD and UC.

In this study, we examined reports of smokers with CD and UC regarding receiving a doctor's advice to quit smoking in the past 12 months. The study aim was to determine if receiving a doctor's advice to quit smoking is associated with the IBD-related factors including disease type (CD, UC), having a primary care physician (PCP), having a gastroenterologist (GE), and ever having bowel surgery.

2. Materials and methods

2.1. Data and measures

In this study, we used a de-identified dataset provided by IBD Partners, formerly known as the Crohn's and Colitis Foundation of America Partners, which is one of the largest IBD research networks in the world (IBD, 2020). The network is supported by the Crohn's and Colitis Foundation and the University of North Carolina School of Medicine, and enables bringing together researchers and IBD patients. As of early 2019, the network comprised 15,680 IBD patients and more than 300 researchers. IBD patients who are the members of the network participate in online assessments twice a year. The assessments include items related to demographic characteristics, IBD and treatment (e.g., disease type, severity and activity, complications, and medications) (IBD, 2020). In this study, we used data from the baseline assessments conducted during the period from June 2011 to February 2014. We considered reports of only those patients (n = 453) who:

1. Reported initiating smoking more than a year prior to the assessment, i.e., the difference between the age at the assessment and smoking initiation age (in years) was more than one year;
2. Reported being a current smoker at the time of the assessment, i.e., answered "Yes" to both survey items: "Have you smoked at least 100 cigarettes in your life?" and "Do you currently smoke cigarettes?";
3. Responded either "Yes" or "No" to the survey item, "In the past year have you been advised by your doctor to quit smoking or has your doctor offered you cessation medications, methods or strategies to quit smoking?" We used "Yes" and "No" responses to this question to define the primary (binary) measure – receiving a doctor's advice to quit smoking;
4. Were diagnosed with CD or UC at least one year prior to the assessment; and
5. Completed all items related to study measures (see Table 1).

The explanatory measures included sociodemographic characteristics, smoking initiation age, IBD-related factors and assessment year (listed in Table 1).

2.2. Statistical analysis

The significance level was 5%. Significance of associations was assessed using chi-square (CS) tests and a multiple logistic regression model, where the logit of the probability of receiving a doctor's advice to quit was modeled as a function of all explanatory measures depicted in Table 1. Significance of all two-way interactions for factors with sufficient subgroup sizes was examined using backward elimination with 5% level for removal. Bonferroni adjustments for multiplicity were used to adjust the original p-values; p_a denotes the adjusted p-value. Statistical computing was performed using SAS®9.4 (SAS, 2016).

3. Results

About 76.6% (95%CI = 72.7% − 80.5%; n = 347) of smokers reported receiving a doctor's advice to quit smoking. Receiving this advice was significantly associated with the disease type (p < 0.001) and ever having bowel surgery (p = 0.026). The percentage of patients who reported receiving advice to quit was significantly higher among smokers with CD (80.2%) than among smokers with UC (62.8%). In addition, the percentage was significantly higher among smokers who have had a bowel surgery (81.5%) than those who have not (72.6%). Having a PCP (77.5% versus 67.5%) and having a GE (77.5% versus 66.7%) were associated with higher percentage of receiving advice to quit but not statistically significantly.

The model (Likelihood Ratio CS = 48.2, df = 20, p < 0.001; the percentage of concordant predicted and observed cases was 69.1%) included the interactions between disease type and smoking initiation age (p = 0.042), and age and sex (p = 0.006). Disease type (p < 0.001) and age (p = 0.026) were the only significant main effects in the model (see Table 1 for all main effects). After adjustments for multiplicity, only one comparison was significant that is, among patients who initiated smoking when they were 19 years old or older, the odds of receiving a doctor's advice to quit were significantly higher among CD relative to UC patients (OR = 7.4, p_a = 0.003, 97.5%CI = 1.8:30.5; p = 0.002, 95%CI = 2.1:22.5). Among patients who initiated smoking when they were 18 years old or younger, the odds of receiving a doctor's advice to quit were higher among CD relative to UC patients but the odds ratio was not significant (OR = 1.8, p_a = 0.166, 97.5%CI = 0.8:3.7; p = 0.083, 95%CI = 0.9:3.4). Fig. 1 presents the odds of receiving a doctor's advice to quit smoking for four subgroups of smokers (disease type × smoking initiation age) and illustrates the findings regarding the odds ratios discussed above. Fig. 1 shows that among four subgroups of patients, the highest odds (2.2) of receiving a doctor's advice to quit smoking corresponded to CD patients who started smoking at the age of 19 years or older and the lowest odds (0.3) corresponded to UC patients who started smoking at the age of 19 years or older. The overall effect of the disease type was consistent with the one based on a CS test: the odds of receiving a doctor's advice to quit were significantly higher among CD patients than they were among UC patients (OR = 3.6, 95%CI = 1.8:7.4, overall effect p < 0.001). One additional (secondary) finding was that among 18–30 year-old patients, the odds of receiving a doctor's advice to quit were significantly higher among women than they were among men (OR = 8.1, p_a = 0.011, 98.75%CI = 1.4:46.6; p = 0.003, 95%CI = 2.1:32.0); this finding is not further discussed.

4. Conclusions

The majority of smokers with IBD (77%) reported receiving a doctor's advice to quit smoking in the past 12 months (prior to the assessment in 2011–2014). However, we observed lower percentages for smokers with CD (81%) and smokers with UC (65%) than the

Table 1

Patients' Characteristics of Adults Diagnosed with CD and UC, and Assessment Year (n = 453); Data Were Provided by IBD Partners (2011–2014, USA).

Characteristic	Group	CD Patients (n = 359)	UC Patients (n = 94)	Overall (N = 453)
Age	18–30 years old	15.0%	17.0%	15.5%
	31–45 years old	33.4%	38.3%	34.4%
	46–55 years old	29.0%	21.3%	27.4%
	56 + years old	22.6%	23.4%	22.7%
Sex	Male	22.3%	25.5%	23.0%
	Female	77.7%	74.5%	77.0%
Race/Ethnicity	Non-Hispanic white	93.0%	94.7%	93.4%
	Other[a]	7.0%	5.3%	6.6%
Educational Attainment	Lower educated (High school or below)	15.9%	10.6%	14.8%
	Higher educated (above High school)	84.1%	89.4%	85.2%
Region of Residence	Midwest	26.5%	19.2%	24.9%
	Northeast	26.5%	25.5%	26.3%
	South	31.5%	38.3%	32.9%
	West	15.6%	17.0%	15.9%
Smoking Initiation Age	≤18 years old	79.4%	80.9%	79.7%
	≥19 years old	20.6%	19.2%	20.3%
Having a Primary Care Physician	Yes	90.3%	94.7%	91.2%
	No	9.8%	5.3%	8.8%
Having a Gastroenterologist	Yes	93.0%	88.3%	92.1%
	No	7.0%	11.7%	7.9%
Ever Having a Bowel Surgery	Yes	55.4%	6.4%	45.3%
	No	44.6%	93.6%	54.8%
Assessment Year	2011	67.4%	64.9%	66.9%
	2012	25.9%	24.5%	25.6%
	2013–14[b]	6.7%	10.6%	7.5%

[a] The "other" racial/ethnic category includes 9 (2.0%) non-Hispanic (NH) Black/African American, 9 (2.0%) NH Multiracial, 8 (1.8%) NH other and 4 (0.8%) Hispanic patients.

[b] There were 31 (6.8%) patients who completed the assessment in 2013 and only 3 (0.7%) patients who completed the assessment in 2014.

2012–2014 percentages estimated for a number of chronic conditions that ranged from 83% for smokers with substance abuse to 94% for smokers with heart disease (Keith et al., 2017). Moreover, the percentage of smokers reporting that they received the advice was considerably higher among smokers with CD relative to smokers with UC. While the magnitude of the difference depended on the patient's smoking initiation age, the overall effect was consistently significant in analyses that adjusted and did not adjust for other factors. There could be several potential reasons for the difference associated with disease type. First, smokers with UC could be less open about their smoking behaviors relative to CD patients. It has been shown that the percentage of patients who are aware of the adverse effect of smoking was much
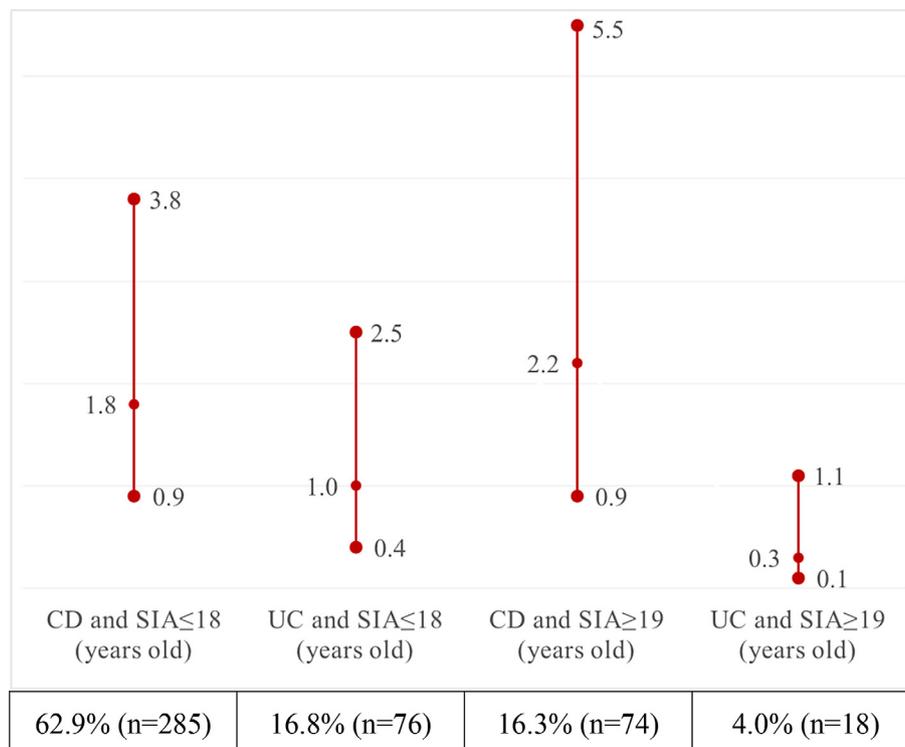

Fig. 1. Odds of Receiving a Doctor's Advice to Quit Smoking and 95% Wald Confidence Intervals by Disease Type and Smoking Initiation Age (SIA) Subgroups; Data Were Provided by IBD Partners (2011–2014, USA).

smaller among UC patients (13.0%) than CD patients (57.7%) (Ducharme-Bénard et al., 2016), therefore, UC patients who smoke might be more prone to not disclosing their smoking behaviors (relative to CD patients) during doctor-patient communication. Second, health-care professionals could be less enthusiastic about discussing smoking cessation with UC patients than CD patients because smoking cessation recommendations are labeled as "weak recommendations' for UC patients in the clinical guidelines (Lamb et al., 2019; Rubin et al., 2019). These two reasons (which could coincide) would be consistent with ongoing debates regarding the effects of smoking on UC and the lack of explicit clinical recommendations for smoking cessation among UC patients.

The key limitation of this study is that the data were collected via a convenience sample and thus the studied sample might be not representative (in terms of studied characteristics) of the target population – adult smokers with IBD in the U.S.—possibly affecting the results. Likewise, limiting to patients with complete information on all study measures could have introduced an additional bias if the missing information is not "missing completely at random". In addition, the Reviewers pointed that measures defined in a different way, e.g., smoking initiation age with split at 21 years of age instead of the considered split at 18 years of age, could result in different findings. Likewise, inclusion of other measures in the model, e.g., total number of years smoked (not available in this study), could potentially lead to other findings. An additional limitation pertains to small sample sizes for some time periods studied, prohibiting estimation of potential over-time changes. Moreover, because the vast majority of reports were made in 2011–2012 (92.5%), the results are expected to be more accurate for 2011–2012 (rather than 2010–2014). Finally, the data could be subject to response bias, e.g., due to respondent's lack of interest in the information requested or pain, that could result in inaccurate reports of smoking-related information (Tourangeau et al., 2000; Bright and Soulakova, 2015; Soulakova and Crockett, 2014).

Future research should incorporate both, medical records and patients' reports, to confirm that the patients' reports of receiving a doctor' advice in the past 12 months are accurate (overall), and assess the potential discrepancies in the rates of receiving a doctor's advice to quit for CD and UC patients. This knowledge will help advance doctor-patient communications with the primary goal of improving patient's quality of life and health-related outcomes.

Authors' contributions

Author Soulakova proposed the study aims, supervised all aspects of the study and statistical analyses, and prepared the first draft of the manuscript. Author Su provided medical expertise in gastroenterology, helped refine the study aims, and improve the study presentation. Author Crockett provided expertise in behavioral psychology, health-risk behaviors specifically, and helped improve the manuscript.

Conflict of interest

The authors declare no conflict of interest.

Data source

The de-identified dataset for this secondary analysis was prepared and provided by the Inflammatory Bowel Disease (IBD) Partners for a fee. The authors have no affiliation with the IBD Partners and did not participate in the IBD Partners' study design and/or data collection process.

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