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Differences in Head and Neck Cancer Risk Perception between Smoking and Nonsmoking NASCAR Attendees

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Abstract

Objective. Although research has documented a difference in cancer risk perception between smokers and nonsmokers, this has not been specifically documented for head and neck cancer. The aim of this study was to determine differences in risk perception for head and neck cancer between smokers and nonsmokers in an at-risk population.

Study Design. A cross-sectional survey was administered.

Setting. Community-based head and neck cancer screenings.

Subjects and Methods. Participants completed a 28-item questionnaire assessing sociodemographic information, smoking status, and risk perception of head and neck cancer.

Results. In total, 507 participants completed the questionnaire. Multivariate analysis of variance (MANCOVA) using dependent variables related to risk perception of head and neck cancer evidenced a significant main effect that smokers (mean [SD], 1.10 [0.07]) worried about head and neck cancer significantly more than nonsmokers (0.64 [0.06]), $F(1, 459) = 26.97$, $P < .001$, $\eta^2 = .06$, and nonsmokers (2.70 [0.05]) believed head and neck cancer was significantly more dangerous than did smokers (2.53 [0.06]), $F(1, 459) = 5.90$, $P = .015$, $\eta^2 = .01$.

Conclusion. Findings indicated differences in perception of risk for head and neck cancer between smokers and nonsmokers. By gaining a better understanding of the psychosocial factors related to perceived risk of head and neck cancer, otolaryngologists and health care providers may better tailor interventions aimed at increasing awareness of cancer risk and promoting cessation.

Keywords

adult, carcinoma, patient education, risk factors, health literacy

In 2010, cancers of the head and neck were the eighth most common cancer in men and in the top 15 most common cancers among women in the United States.[1] The lifetime risk of developing head and neck cancer is 1 out of 98, approximately 1%.[2] Literature has shown that both participants in office-based head and neck cancer screenings and health care providers are lacking knowledge about head and neck cancer risk factors, prevention, and early detection.[3,4] Despite advances in treatment for the disease, mortality from head and neck cancer has decreased by less than 2% in the past 30 years, largely because these cancers continue to be diagnosed at later stages in the disease when treatment is less effective.[1]

Human papillomavirus (HPV) has become a major cause of site-specific oropharyngeal cancer, with 50% to 87% of all oropharyngeal cancers testing positive for HPV-16 DNA.[5] However, tobacco use remains the greatest cause of all other sites of head and neck cancer, with an estimated 75% of all cases resulting from the use of tobacco products.[6] An estimated 20% of the population are current smokers.[7,8]

In studies examining the risk perception of smokers undergoing oral and lung cancer screenings, smokers believe that smoking is a high-risk behavior, but they do not feel that they are personally at higher risk of cancer.[9-11]

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Smokers who have never considered quitting have the lowest risk perceptions, and those who plan to quit in the next 30 days have the highest risk perceptions. In addition, smokers who have made quit attempts perceive their personal risk of cancer to be higher than do smokers without quit attempts, with 40% of smokers making at least 1 quit attempt each year.[3,12-14]

A population previously identified as being at risk of head and neck cancer because of high rates of tobacco consumption are fans of the National Association of Stock Car Racing (NASCAR). Earlier studies demonstrated a 31% incidence of tobacco use in NASCAR fans, compared with the national estimated prevalence of 20%.[4,15] These studies also found a higher incidence of concerning findings in smokers undergoing head and neck cancer screenings.

Therefore, the current study aimed to examine (1) differences in risk perception and knowledge of head and neck cancer between smokers and nonsmokers in NASCAR fans and (2) differences in risk perception of head and neck cancer between smokers who had made at least 1 quit attempt in the previous 12 months and those who had not made any quit attempts in the previous 12 months.

Methods

Emory University Institutional Review Board approval was obtained. This study was survey based, using convenience sampling to recruit the study sample from a community identified as at risk of developing head and neck cancer.

Participants

Participants were recruited for the study from NASCAR fans touring the midway before entry into the race venue at Atlanta Motor Speedway (AMS) in Hampton, Georgia, during a race weekend event.

This data set reflects a convenience sample of 507 participants among an estimated 200,000 fans touring the midway during the weekend. All race attendees age 18 years and older were eligible to participate. Participants orally consented to complete the survey after receiving an information sheet regarding the study aims. Participants were then given a portable mini-fan, worth less than $2, in appreciation of their time.

Measures and Procedures

The questionnaire developed for this study was adapted from items on validated questionnaires that evaluated smokers' risk perceptions.[3,16,17] The wording of some items was changed so that the language was accessible to the wide range of literacy levels anticipated in the study population. The study questionnaire was piloted with 15 high school sophomores. Participants were asked if the questions were (1) confusing or (2) difficult to answer. The length of time it took to complete the questionnaire was also noted, and the questionnaire was revised based on these pilot results. Changes included item placement and formatting.

The final questionnaire was a 28-item survey that collected demographic information, smoking status, number of cigarettes smoked in the past 30 days, quit attempts, and perceptions of the lifetime risk and risk factors for head and neck cancer (see the Appendix, available at otojournal.org).

Smoking status. Participants were asked, ''In the past 30 days, on how many of those days did you smoke a cigarette (even a puff)?'' A nonsmoker was defined as no smoking in the past 30 days, whereas a current smoker was defined as any smoking in the past 30 days. This is in line with the American College Health Association's definition of current smoker, an association that has tracked trends in smoking over the past decade.[18,19] Participants were also asked, ''During the past 12 months, how many times have you stopped smoking for one day or longer because you were trying to quit smoking?''[20]

Risk perception. Questions regarding head and neck cancer risk perception were adapted from questions assessing lung cancer risk perception previously administered by Park et al.[3] Participants were asked, ''How much do you worry about head and neck cancer?'' ''How dangerous is head and neck cancer?'' and ''How much does quitting smoking lower your chances of getting mouth, tongue, or throat cancer?'' with response options of ''0 = not at all, 1 = a little, 2 = somewhat, or 3 = quite a lot.''[3] They were also asked, ''Out of 100 smokers, how many will get head and neck cancer?'' and ''Out of 100 non-smokers, how many will get head and neck cancer?''[3]

Data Analysis

Bivariate analyses examining differences between smokers and nonsmokers were conducted using Pearson χ^2 tests for categorical variables and independent sample t tests for continuous variables. Multivariate analysis of covariance (MANCOVA) analyses were used to test for group differences in the presence of multiple, related dependent variables. All tests were 2-tailed with $\alpha = .05$.

Results

Part I: Current Smokers vs Nonsmokers

Five hundred seven participants aged 18 to 73 years (mean [SD], 41.23 [12.78]) completed the questionnaire. Overall, 47% were men and 53% were women; 92% were white, 4% were black, 2% were Hispanic, and 2% were other. Fifty-one percent had achieved a high school diploma/GED or less, 27% had attended college, and 22% had a bachelor's degree or higher. Forty-two percent of the participants were current smokers. Smokers smoked an average of 24 of the past 30 days and smoked an average of 14 cigarettes per day.

Chi-square analyses indicated that the distribution of smokers was not significantly different between men (45%) and women (40%; $P > .05$). There was, however, a significant difference among the proportion of smokers with a high school diploma or less (50%), those who attended college (26%), and those with a bachelor's degree or greater (21%), χ^2 (2, n = 493) = 24.06, $P < .001$. An independent samples t test indicated that smokers (mean [SD], 38.27 [12.55]) were significantly younger than nonsmokers (43.37 [12.54]), $t(496) = 4.48$, $P < .001$, $d = 0.40$ (**Table 1**).

Table 1. Sociodemographic Characteristics: Smokers vs Nonsmokers

	Smokers (n = 214)	Nonsmokers (n = 293)
Sex, No. (%)		
Female	101 (50)	153 (56)
Male	100 (50)	121 (44)
Age, y, mean ± SD[a]	38.27 ± 12.55	43.37 ± 12.54
Education, No. (%)[a]		
High school diploma or less	127 (62)	127 (44)
Attended college	54 (26)	78 (27)
Bachelor's degree or higher	25 (12)	82 (29)

Thirteen respondents who classified themselves as a smoker did not specify a sex, 18 respondents who classified themselves as a nonsmoker did not specify a sex, 8 respondents who classified themselves as a smoker did not specify education, and 6 respondents who classified themselves as a nonsmoker did not specify education. Percentages adjusted for missing data points for each item.
[a]The difference between smokers and nonsmokers was significant at $P < .05$.

Table 2. Comparing Knowledge and Risk Factors of Head and Neck Cancer between Smokers and Nonsmokers

	Smokers (n = 214)	Nonsmokers (n = 293)	*P* Value	Effect Size
Out of 100 smokers, how many will get head and neck cancer?	43.80 ± 1.76	45.76 ± 1.47	.40	0.002
Out of 100 nonsmokers, how many will get head and neck cancer?	31.08 ± 1.78	29.33 ± 1.49	.46	0.001
How much do you worry about head and neck cancer?	1.10 ± 0.07	0.64 ± 0.06	<.001	0.056
How dangerous is head and neck cancer?	2.53 ± 0.06	2.70 ± 0.05	.015	0.013

Values presented as mean ± SD. For worry and danger, item rating scale is as follows: 0 = not at all, 1 = a little, 2 = somewhat, and 3 = quite a lot.

A MANCOVA analysis was performed to test for group differences between smokers and nonsmokers on the following risk perception dependent variables: how much do you worry about head and neck cancer; how dangerous is head and neck cancer; out of 100 smokers, how many will get head and neck cancer; and out of 100 nonsmokers, how many will get head and neck cancer (**Table 2**). Because age and education were found to differ significantly between smokers and nonsmokers, they were included as covariates. Analyses indicated a significant main effect of smoking status for the dependent variable of head and neck cancer worry, $F(1, 459) = 26.97$, $P < .001$, $\eta^2 = .06$. Smokers (mean [SD], 1.10 [0.07]) worried about head and neck cancer significantly more than did nonsmokers (0.64 [0.06]). In addition, a significant main effect of smoking status was found for the dependent variable of danger of head and neck cancer, $F(1, 459) = 5.90$, $P = .015$, $\eta^2 = .01$, such that nonsmokers (mean [SD], 2.70 [0.05]) believed head and neck cancer was significantly more dangerous than did smokers (2.53 [0.06]). No other significant main effects were found for the other dependent variables ($P > .05$).

Part II: Current Smokers Attempting to Quit in the Past Year vs Not

Of the 200 participants reporting smoking in the past 30 days, 50.0% were men and 50.0% were women. Thirty-eight percent of current smokers had made a quit attempt in the previous 12 months. The average (SD) number of quit attempts for this group was 5.9 (7.19) per year. Chi-square analysis indicated that the proportion of men (47%) and women (53%) who had made quit attempts was not significantly different from those who had not (52%, and 48%, respectively; $P > .05$).

An independent samples *t* test was performed to determine whether significant mean differences existed between those smokers who made at least 1 quit attempt in the past 12 months and those who did not. Analyses demonstrated that there were no significant differences in those who had made quit attempts and those who had not for the variables of age, level of education, or number of cigarettes smoked per day ($P > .05$). Furthermore, analyses indicated that there was not a significant difference in the belief of how much quitting smoking lowers the chances of getting head and neck cancer between those who had made quit attempts and those who had not ($P > .05$) (Table 3).

Discussion

This study was designed to examine differences in head and neck cancer risk perceptions between smokers and nonsmokers and between smokers who had made quit attempts and those who had not in an at-risk community sample. Results indicated that, despite current smokers worrying more about getting head and neck cancer, they perceived head and neck cancers to be less dangerous. Neither smokers with quit attempts nor those without perceived a benefit of quitting smoking in reducing the risk of head and neck cancer.

Table 3. Demographic Characteristics and Risk Perceptions Comparing Smokers Who Have Made Quit Attempts with Those Who Have Not

	Quit Attempts (n = 77)	No Quit Attempts (n = 126)
Sex, No. (%)[a]		
Female	43 (53)	58 (48)
Male	38 (47)	62 (52)
Age, y, mean ± SD[a]	38.28 ± 13.00	38.27 ± 12.27
Education, mean ± SD[a]	1.35 ± 0.83	1.49 ± 0.94
Number of cigarettes smoked/d, mean ± SD[a]	12.73 ± 8.53	14.70 ± 11.95
How much does quitting smoking decrease the chances of head and neck cancer? mean ± SD	2.15 ± 0.90	2.01 ± 0.91

Six respondents who had made quit attempts and 6 who had not made quit attempts did not specify a sex. Percentages adjusted for missing data points for each item. For education, item rating scale is as follows: 0 = attended high school, 1 = high school diploma/GED, 2 = attended college, 3 = bachelor's degree, and 4 = graduate degree. For "quitting smoking decreases chances," item rating scale is as follows: 0 = not at all, 1 = a little, 2 = somewhat, and 3 = quite a lot.

[a]All comparisons between those who had made quit attempts and those who had not were nonsignificant, with $P > .05$.

The sociodemographic details of the current sample of NASCAR attendees are not representative of the US population, with a greater proportion of this sample being white (92% vs 65% nationally[21]) and achieving a high school diploma or less (52% vs 43% nationally[22]). In addition, this sample comprised a smaller proportion of men (47% vs 60%) and a greater proportion of whites (92% vs 83%) than NASCAR reported demographics.[23] It is unclear why the study population differed from NASCAR attendees; however, within the study population, both smokers and nonsmokers were demographically similar. Therefore, these factors likely did not complicate the comparisons between the 2 study groups. In addition, the findings of this study indicate a smoking prevalence of 42% in this sample, supporting previously published research that NASCAR race attendees smoke at a rate higher than the general public.[4]

In this sample, smokers were, on average, 5 years younger than nonsmokers, supporting national data trends.[14] Smokers tend to have lower academic achievement than the general population, with only 16.7% of smokers obtaining a bachelor's degree or greater.[24] Study results supported this trend with only 21% of smokers obtaining a bachelor's degree or greater. Moreover, similar to previous studies indicating that 40% of smokers make at least 1 quit attempt each year, 38% of this study population attempted to quit at least once in the past 12 months. In this sample, smokers made an average of 5.9 quit attempts. Literature has shown that on average, former smokers make an average of 4 quit attempts before they achieve sustained abstinence.[25]

In terms of worry about head and neck cancer, on average nonsmokers worried ''not at all'' and smokers worried ''a little.'' Regarding perceived danger of head and neck cancer, smokers generally responded that head and neck cancer was ''somewhat'' dangerous, and nonsmokers responded that it was ''quite'' dangerous. Although there was a significant difference between groups, neither group worried much about head and neck cancer, although they perceived it to be very dangerous.

Both smokers and nonsmokers estimated that approximately 45% of smokers and 30% of nonsmokers would get head and neck cancer. The actual lifetime risk of developing head and neck cancer is approximately 1%.[2] Both groups greatly overestimated the lifetime risk of head and neck cancer in both smokers and nonsmokers, not unlike findings from other cancer risk perception studies whereby people often overestimate the risk of cancer.[3]

There was no difference in the response of how much quitting smoking lowers the risk of head and neck cancer in smokers who had made quit attempts and those who had not, with both groups responding ''a little'' on average. This differs from previous research of office-based screenings that demonstrated a difference in perceived risk between those who had made quit attempts and those who had not.[3] These differences could be due to limited awareness regarding head and neck cancer or the population accessed for community-based vs office-based screenings.

Numerous factors influence readiness to quit smoking: a concrete understanding of the risks and belief that one is at risk, that the threat is dangerous, and that the consequences of continuing the behavior outweigh the benefits.[26] The study population had little worry about their risk of head and neck cancer and limited knowledge of their personal risk of developing head and neck cancer despite a high prevalence of at-risk behaviors. An earlier study demonstrated that smoking cessation education during community-based head and neck cancer screenings affected tobacco consumption at 6 months' follow-up.[15] This study supports that there is a need for education regarding the risks for head and neck cancer both in smokers and nonsmokers.

Perceived risk of head and neck cancer is greatly overestimated among both smokers and nonsmokers. This is similar to research findings in lung cancer.[3,9-11] In this study

population, smokers believed that 45% of smokers would develop head and neck cancer and that it is quite dangerous, but they were personally not very worried about it. This population's knowledge about the link between smoking and head and neck cancer is unrealistic; therefore, they are also likely to be unrealistic about the reality of the disease and its treatment. This study is congruent with prior studies demonstrating that there is a lack of knowledge regarding the signs, symptoms, and risks for head and neck cancer. It also amplifies the need for the otolaryngologist to educate the public regarding this disease, as well as its risks and consequences.

This study sets the stage for intervention research aiming to increase awareness among NASCAR attendees regarding the dangers of head and neck cancer. Specifically, this research has changed the authors' campaign messages targeting increased awareness of the severity of disease outcomes, the importance of self-screening to prevent late-stage disease, and the role of tobacco cessation to decrease the risk of developing head and neck cancer among NASCAR attendees. Second, this study highlights one group who is at high risk for head and neck cancer. Other high-risk groups may also be targeted in future research.

Most patients who are seen by an otolaryngologist have been treated by midlevel and/or primary care providers, and unfortunately, it has been shown that these providers are lacking in knowledge about head and neck cancer risk factors, prevention, and early detection.[3,4] The problem remains that otolaryngologists are rarely frontline providers caring for patients when head and neck cancer presents in its earliest stages. Rather, otolaryngologists receive referrals from frontline providers who may see patients at high risk for head and neck cancer or may see early head and neck cancers. These frontline providers are poised to educate their patients on risks for head and neck cancer and to identify these lesions at the earliest of stages when morbidity and mortality are lower.

Limitations

The questionnaire did not have a specific measure for successful quit attempts. Therefore, there was no way of separating nonsmokers from past smokers in the study population. Having a third category might have affected risk perception data. In addition, the questionnaire, although made up of items from validated tools, was not itself validated. The wording of a number of these items was changed in an attempt to make the language accessible to the wide range of literacy levels anticipated in this population.

The study sample was a convenience sample recruited from a NASCAR event in the Southeast; thus, this sample may not be representative of all NASCAR attendees or the population in general. This population was specifically chosen because of the increased rate of smoking as compared with the general population. However, as this was a community sample and not a treatment-seeking population, the authors feel that the opinions may be generalizable to the population at large.

A final limitation is that HPV has surpassed tobacco as the leading cause of cancer of the oropharynx, and there were no questions assessing the knowledge of HPV as a risk factor of oropharyngeal cancer. The goal of this study was to address tobacco risk perception, and a future survey has been performed to address HPV awareness within this population.

Conclusion

Although treatments for head and neck cancer continue to advance, little impact on morbidity and mortality has resulted because of the continued trend of later stage diagnosis of head and neck cancer. The findings of this study support previous research that the general population is unaware of the risk factors and serious consequences of head and neck cancer. Although otolaryngologists should be aware of this lack of understanding and make an effort to educate all patients in the clinic setting, the use of community-based events for head and neck cancer education should be further explored, as should education of other health care professionals. The reality is that few people see the otolaryngologist without referral from other health care professionals, and often this presents a significant lapse in time and the opportunity for early diagnosis of head and neck cancer. Education campaigns about head and neck cancer offer the opportunity to educate the public and health care workers on the signs, symptoms, and risks of this disease.

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Author Contributions

Laura J. White, substantial contributions to conception and design, acquisition of data, drafting of the article, and final approval; **Anthony L. Chin-Quee**, substantial contributions to conception and design, acquisition of data, drafting of the article, and final approval; **Carla J. Berg**, substantial contributions to conception and design, acquisition of data, revising the article critically, and final approval; **Justin C. Wise**, substantial contributions to conception and design, acquisition of data, analysis and interpretation of data, revising the draft critically, and final approval; **Edie R. Hapner**, substantial contributions to conception and design, acquisition of data, drafting of the article, and final approval.

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Supplemental Material

Additional supporting information may be found at http://oto.sagepub.com/content/by/supplemental-data

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