Oral Cancer Risk Factors Among Mexican American Hispanic Adolescents in South Texas

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ABSTRACT

Purpose: Tobacco use and alcohol consumption have been identified as the major risk factors for oral and pharyngeal cancers. This study aimed to assess the knowledge, attitudes and beliefs of adolescent high schoolers in South Texas regarding the risk factors and signs for oral cancer and to examine their prevalence of cigarette smoking, use of smokeless tobacco and alcohol consumption.

Method: The sample population was drawn from the public school system in Brownsville, Texas. A 39 item self administered questionnaire was completed by 1667 students in four of the five high schools. 95.6% of the students were of Mexican American Hispanic ethnicity.

Results: Modeling with multivariate logistic regression revealed that among current cigarette smokers, regular alcohol use was the strongest associated risk [OR=15.7; 95% CI=10.9-22.5] followed by use of smokeless tobacco [OR=2.4; 95% CI=1.4 4.1]. There was a significantly greater ($P<0.001$) use of cigarettes, smokeless tobacco and alcohol among the Mexican American males than females.

Conclusions: This study shows that the overall risk for oral cancer among the Mexican-American adolescent population is high especially among the males, and there is a great need for carefully planned health education and promotion programs for behavior change.

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Of more than 1 million Americans who become new smokers each year, or nearly 3,000 who start smoking each day, most are recruited from the ranks of children and adolescents.[1,2] Most adults who smoke began experimenting with cigarettes in middle school and became regular smokers before completing high school.[2] Approximately 90% of adult smokers started smoking before age 21.[3,4] Tobacco is typically the first drug used among adolescents, and the daily use of cigarettes is 9 times more widespread than any other drug.[5] Furthermore, studies have shown that smoking can lead to alcohol and marijuana use and is correlated with fighting, carrying weapons, attempting suicide, and engaging in high-risk behaviors.[5,6]

It is estimated that tobacco and alcohol use accounts for 33% of new cancers and cancer deaths in the United States.[1] Tobacco use and alcohol consumption have been identified in healthy people 2010 as priority areas for the prevention of cancer.[2] Eight of 10 smokers start smoking before the age of 18, and unsupervised alcohol consumption starts as early as age 12.[5,6] Tobacco use, the

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single most important and preventable cause of cancer mortality in the United States, is associated with cancer of the lung, lip, mouth, pharynx, larynx, and esophagus.[7] Excessive alcohol consumption also increases the risk of these cancers, particularly oral cancer in combination with tobacco smoking.

Annually, more than 30,000 Americans are diagnosed with oral cancers. Oral cancer alone is responsible for more than 8,000 deaths each year, more than cervical cancer or malignant melanoma.[8, 9] Primary risk factors for oral cancers in the United States include past and present use of tobacco and alcohol products. For lip cancer, the primary risk factor is exposure to the sun.[10-13] Compared with nonsmokers, smokers have a 2 to 18 times increased risk of developing oral cancer.[14] Tobacco and alcohol use accounts for 75% of all oropharyngeal cancers and has been implicated in the formation of multiple primary cancer sites frequently found in oropharyngeal cancer patients.[15] Heavy drinkers who smoke more than 1 pack of cigarettes per day are 24 times more likely to develop oral cancer than nonusers of alcohol and tobacco.[15] Low intake of food containing vitamin A, or its precursor beta-carotene, vitamin C, fresh fruit, green leafy vegetables, and other vegetables[17] is also associated with increased risk for oral cancer.

Several questions concerning oral cancer, however, were included in 2 recent national surveys: The National Health Interview Survey (NHIS) and the Health Promotion and Disease Prevention Supplement (HPDP) each included 4 questions about oral cancers.[18] These studies found that Americans were not well informed about oral cancer signs. Lack of knowledge and misinformation prevailed across all groups, regardless of age, race, or ethnicity.

The Department of Health and Human Services (DHHS) has designated South Texas as a "medically and dentally underserved" area. A recent report by the Texas Hispanic Information Initiative for Good Health[19] stated that south Texas residents have important barriers to health care, such as urban isolation, rural distances, poor public health, and low use of cancer screening services. One such area is Brownsville, which lies at the mouth of Rio Grande River on the Gulf of Mexico. Nearly 40% of Brownsville population lives below the federal poverty level. It is the most southerly city in the United States, with a highly mobile youthful population. There has been little research on the perception of high school children to oral cancer, and no baseline data exists on the risk factors of oral cancer among the Mexican American population.

The purposes of this study were to assess the knowledge, attitudes, and beliefs of adolescent high schoolers in South Texas regarding the risk factors and signs for oral cancer; and examine their prevalence of cigarette smoking, use of smokeless tobacco, and alcohol consumption.

METHODS

The sample population for this study was chosen from the Brownsville, Texas, public school system, which represents a cross section of different socioeconomic groups in the city. The study was approved by the Institutional Review Board at University of Texas Health Sciences Center at San Antonio. We employed a 2-stage cluster sample design to produce a simple convenience representative sample of ninth through 12th graders from Brownsville Independent School District (ISD). The first-stage sampling frame consisted of all public schools with ninth through 12th graders. Four out of the 5 high schools agreed to participate in the study. At the second sampling stage in each of the 4 schools, intact classes on a selected required subject or a selected period (eg, second period) were randomly selected. All students in the selected classes were eligible to participate in the survey. The procedure was slightly modified to comply with the administrative arrangements in one of the schools. In this way, each school's respondents were considered to be representative of that school and all the respondents representative of the Brownsville Independent School District (ISD) high school population.

The National Health Interview Survey on Teenage Attitudes and Practices and Youth Risk Behavior Surveillance System Questionnaire was used in this study. Survey procedures were designed to protect the student's privacy by way of anonymous and voluntary participation. Class teachers administered the survey, which took approximately 15 minutes to complete. Students recorded their responses in the classroom during a regular class period. A written parental consent was obtained prior to the study. A positive consent was also taken from all students who wished to participate in the survey.

DATA ANALYSIS

Statistical analyses were carried out using SPSS (Statistical Package for Social Science) 7.1.4 (SPSS Inc, Chicago, Ill). These statistical analyses included both descriptive and analytical tests. Descriptive statistics were used to compute the response frequency for all demographic items and all questions about beliefs, knowledge, and practices to risk factors of oral cancer. Data were further analyzed via chi-square to assess if the variables correlated with the binary response variable. Those variables that did, were then considered for entry into the logistic models. Multiple logistic regression models were built to examine and determine the combination of independent variables that could best predict the following dependent variables: current smoking status; use of smokeless tobacco; frequent alcohol use; and consumption of 3 or more servings of fruits and vegetables per day.

Hosmer and Lemeshow[18] statistics was used to assess the goodness-of-fit for these models. Composite values were constructed for self-esteem and knowledge about the risk factors for oral cancer (Tables 1 and 2).

Table 1. Logistic Regression Models for Self-esteem and Oral Cancer Knowledge

Self-esteem composite
I like school (score=1)
I hate school (score=2)
I get along with my family (score=0)
I never get along with my family (score=1)
Most of the time I feel happy (score=0)
Most of the time I feel sad (score=1)
In general, my life is good (score=0)
In general, my life is bad (score=1)
Knowledge composite (the scores were totaled and a combination score of 2 or more was defined as low knowledge on oral cancer)
Heard about oral cancer (score=0)
I've not heard about oral cancer (score=1)
Cigarettes are a risk factor for oral cancer (score=0)
Cigarettes are not a risk factor for oral cancer (score=1)
Smokeless tobacco is a risk factor for oral cancer (score=0)
Smokeless tobacco is not a risk factor for oral cancer (score=1)
Alcohol is a risk factor for oral cancer (score=0)
Alcohol is not a risk factor for oral cancer (score=1)
Sunlight is a risk factor for oral cancer (score=0)
Sunlight is not a risk factor for oral cancer (score=1)

Table 2. Study Variables

- Have you ever smoked cigarette? Have you ever tried smoking as few as 1 or 2 puffs?
- Regular cigarette smoker: Have you ever been a regular user, smoking at least 1 cigarette a day for 30 days?
- Current cigarette smoker: Current user, smoking a cigarette on 1 or more of the 30 days preceding the survey.
- Frequent cigarette smoker: Frequent user smoking cigarettes on 20 or more of the 30 days preceding the survey.
- Smokeless tobacco: Have you ever used chewing tobacco or snuff on 1 or more of the 30 days preceding the survey?
- Have you ever tried alcohol?
- Current alcohol use: Consumed at least 1 drink during the 30 days preceding the survey.
- Episodic heavy alcohol user: Consumed 5 or more drinks of alcohol on at least 1 occasion during the 30 days preceding the survey.
- 3 or more servings: Daily consumption of 3 or more servings of fruits and vegetables.
- Knowledge composite (recognition of the risk factors for oral cancer—low vs high).
- Self-esteem: Social dimensions of self-esteem (poor vs high).
- Ethnicityand sex: Interaction term between different ethnic groups and gender.
- Frequent alcohol use and knowledge composite: Interaction term between frequent use of alcohol and identification of risk factors for oral cancer.
- Age and sex: Interaction term between ages 14 and 18 with gender.

RESULTS

The sampling frame consisted of 2,600 children who were given consent forms and questionnaires. A total of 1,754 questionnaires were returned (response rate= 67%). One hundred thirty-seven questionnaires were incomplete, unanswered, and not considered for data analysis. Hispanics comprised 95% of the sample population. The sample was evenly distributed regarding gender, with 51% (N=856) males and 49% (N=811) females (Table 3). The overwhelming majority of Hispanics in Brownsville are Mexican Americans, and these terms are used interchangeably in this report.

CIGARETTE USE

Overall, 61% of the student population had tried smoking. Male students (68%) were significantly more likely than female students (53%) to have tried smoking. Caucasian students (76%) were significantly more likely than His-panic students (61%) to have ever tried cigarette smoking. More than one fourth (26%) of the student population had smoked cigarettes on 1 or more of the 30 days preceding the survey (ie, current cigarette use). Male students (36%) were significantly more likely than female students (16%) to report current cigarette use.

On logistic modeling for current smoking behavior (Table 4), it was found that current alcohol use stood out as an important predictor. A current alcohol drinker was approximately 16 times more likely to be currently using cigarettes than a nonuser of alcohol. Male students were approximately 2 times more likely than females to be current smokers. A student using smokeless tobacco was approximately 2 times more likely to be a current cigarette smoker. Thus, alcohol consumption and smokeless tobacco use in male students were strong predictors in determining the current smoking status of a high school student.

SMOKELESS TOBACCO USE

Overall prevalence of smokeless tobacco use was 8%. Prevalence of current smokeless tobacco use was significantly higher among male students (14%) than among female students (2%). Of those who used smokeless tobacco, 42% used more than half a can/pouch of chewing tobacco/snuff every day. Caucasian students and students of other non-Hispanic ethnic origins were significantly more likely than Hispanic students to use smokeless tobacco. Hispanic male students, however, were approximately 14 times more likely to be using smokeless tobacco than Hispanic female students (Table 5). The model also suggested that having a low self-esteem was a predictor for smokeless tobacco use. High schoolers with low

self-esteem were approximately 4 times more likely to use smokeless tobacco. An individual with a habit of frequent alcohol use and a low self knowledge about the risk factors for oral cancer was approximately 3 times more likely to use smokeless tobacco than others.

Table 3. Demographics of the Brownsville Oral Cancer Risk Behavior Survey

Characteristics	No.	%
Gender		
Female	811	49
Male	856	51
Grade		
9th grade	690	42
10th grade	421	25
11th grade	328	20
12th grade	213	13
Age (ys)		
14	100	6
15	379	23
16	517	31
17	379	23
≥18	287	17
Race or ethnicity		
Caucasian	41	3
African American	4	<1
Hispanic	1,585	95
Asian or Pacific Islander	4	<1
Native American	6	<1
Other	12	1
School		
A	524	31
B	376	23
C	416	25
D	351	21

Table 4. Logistic Modeling for Current Smoking Behavior

Variable	Parameter estimate± (SD)	Odds ratio
Age	0.24±0.09	1.27
Sex	0.87±0.16	2.38
Class	-0.34±0.10	0.71
Ethnic	-0.53±0.37	0.59
Smokeless tobacco	0.87±0.27	2.40
Current alcohol	2.75±0.18	15.68
≥3 servings	-0.44±0.17	0.64
Knowledge	-0.47±0.25	0.62

ALCOHOL USE

Of the students, 69% had at least 1 alcoholic drink during their lifetime. Male students (55%) were significantly more likely than female students (45%) to have done this. Overall, 12th graders (59%) were significantly more likely than ninth graders (45%) to have had at least 1 alcoholic drink in their lifetime. Caucasian students were significantly more likely than students of Hispanic and other ethnic origins to do so.

A current cigarette smoker was approximately 9 times more likely to be frequently using alcohol than someone who was not a smoker (Table 6). Likewise, a smokeless tobacco user was approximately 2 times more likely to frequently use alcohol. Furthermore, someone with a low self-esteem was approximately 3 times more likely to increase alcohol use.

DIETARY BEHAVIORS

Only 29% of students reported having eaten 3 or more servings of fruits and vegetables in a day with a higher percentage of male students (Table 7). A student who was a current cigarette smoker and had low self-esteem, and had a low self-knowledge of the risk factors for cancer was less likely to have 3 or more servings of fruits and vegetables (Table 4).

ORAL CANCER PERCEPTIONS

Tobacco use was identified by a majority of the respondents as the most common risk factor for oral cancer; 53% did not think alcohol was a risk factor. Only 11% correctly responded that sunlight could be a risk factor for lip cancer. Approximately 25% of the study population incorrectly mentioned drinking coffee as a risk factor for oral cancer, and 42% thought poor oral hygiene was a risk factor for oral cancer. Nearly 80% of the students mentioned gums as a common risk site for oral cancer; which, in fact, is one of the least common sites. The most common type of precancerous lesions in the United States occurs along the tongue or under the tongue as a red or white patch and/or nonhealing ulcer. About 50% of the respondents did not mention tongue (or under the tongue) as a risk site for oral cancer. Nearly two thirds of the students thought a white or red patch in the mouth was not an early sign for oral cancer. Approximately 55% of the respondents reported that a nonhealing ulcer in the mouth is not a risk sign for oral cancer.

DISCUSSION

There were some limitations to this study that must be considered before conclusions can be drawn. This study was limited to a school-based sample, and the findings may not be generalizable to adolescents who are not in school. The sample had a preponderance of Hispanic subjects (95%), reflecting the Brownsville high school students' community. It is representative of the Brownsville high school population and has implications for the Mexican American adolescent population in general.

This study's results suggest that the high school students are ill-informed about risk factors and signs of oral cancer. Except tobacco use, a high percentage of students did not recognize the risk factors, risk sites, or early signs for oral cancer. Across all groups, there was a higher level of knowledge about tobacco use as a risk factor. For decades, it has been known that the use of tobacco products and excessive alcohol is detrimental to health. The use of tobacco products, especially cigarettes, is harmful and a major contributing factor to mortality vis-à-vis heart disease, emphysema, lung cancer, and low birth-weight babies.

A variety of educational and informational campaigns have urged tobacco users to stop. Rarely do available educational materials also include information on the use of tobacco products as risk factor for oral cancer. Similarly, there have been major educational efforts regarding alcohol use as a risk factor for cirrhosis of the liver, liver cancer, and fetal alcohol syndrome. But these educational messages seldom identify alcohol use as a risk factor for oral cancers. This study found that most high schoolers know that tobacco is detrimental to health. This suggests that some educational messages have successfully imparted correct information. The respondents were reasonably knowledgeable about the link between tobacco products and oral cancer. This survey demonstrates, however, that, because of the general lack of education about the relation of alcohol to oral cancers, there is a corresponding lack of knowledge.

Tobacco use has been identified as a major public health problem and the most preventable cause of premature death in the United States. Because tobacco in all forms is a known major cause of cancer and other disease, abstinence from tobacco can prevent cancer. Although efforts have been made to reduce the smoking prevalence in the general population, few efforts have been made to prevent initiation of cigarette smoking among ethnically diverse groups such as Hispanic youth—who smoke at a rate comparable to other ethnic or racial groups. The same holds true for alcohol use.

This study found that, among Hispanic students, males were more likely than females to adopt and practice risky health behaviors. The 1995 Youth Risk Behavior found that the use of smokeless tobacco was highest (25%) among the Caucasian male students. There is widespread erroneous belief that the use of smokeless tobacco is very low to nonexistent among the Mexican American population. Of the Hispanic male students in the present study, 13% were currently using smokeless tobacco. This shows that the Hispanic male population is at a higher risk for use of smokeless tobacco and relatively little attention has been given to educating them about the harmful effects of chewing tobacco and snuff.

Although African American males are at the highest risk for oral cancer, the marketing of various tobacco and alcohol products to Hispanic youth has grown in intensity. [23] Teenagers seem to be responsive to advertisements and promotional activities, such as the sponsorship of sporting events and public entertainment, point-of-sale displays, and distribution of specialty items (including T-shirts, caps, sunglasses, key chains, and sporting goods). Recent increases in the use of smokeless tobacco among adolescents may be due to marketing strategy by tobacco companies. [23] The sponsorship of sporting and cultural events, use of athletes promoting smokeless tobacco, and the distribution of free samples at various sporting events have been very effective at introducing youth to a risk for nicotine addiction and an increased risk for oral, pharyngeal, and other cancers. In South Texas, rodeos have become a major venue for smokeless tobacco promotion.

Table 5. Logistic Modeling for Current Use of Smokeless Tobacco

Variable	Parameter estimate±(SD)	Odds ratio
*Ethnicity and sex**		
Non-Hispanic	0.24±0.79	1.27
Hispanic	2.61±0.43	13.61
Ever smoked in life	-0.56±0.33	0.57
Current smoker	0.95±0.28	2.59
Self-esteem composite	1.29±0.42	3.63
Frequent alcohol use and knowledge composite†		
Not an alcohol drinker (low vs high)	-0.40±0.39	0.67
Frequent alcohol drinker (low vs high)	1.21±0.12	3.35

** Ethnicity and Sex: Interaction term between different ethnic groups and gender.*
† Frequent alcohol use and knowledge composite: Interaction term between frequent use of alcohol and identification of risk factors for oral cancer.

Table 6. Logistic Modeling for Frequent Alcohol Use

Variable	Parameter estimate±(SD)	Odds ratio
Gender		
Female	0.04±0.09	1.04
Male	0.30±0.08	1.35
Age (ys) (male vs female)		
14	0.09±0.29	1.09
15	0.35±0.20	1.43
16	0.62±0.14	1.86
17	0.89±0.16	2.43
≥18	1.15±0.24	3.17
Current smoker	2.19±0.14	8.90
Smokeless tobacco user	0.83±0.24	2.30
Self-esteem composite	1.23±0.36	3.41

Table 7. Logistic Modeling for Consumption of ≥3 Servings of Fruits and Vegetables

Variable	Parameter estimate±(SD)	Odds ratio
Age	0.08±0.05	1.08
Gender	0.35±0.13	1.43
Current smoker	-0.31±0.14	0.74
Knowledge composite	-0.39±0.22	0.68
Self-esteem composite	-0.67±0.42	0.51

One objective in the Healthy People 2010 initiative is to reduce mortality from oral cancers.[2] Without accurate and appropriate information, people can neither make nor be expected to make informed, intelligent decisions about their own health.[20] Many people do not practice preventive behaviors—not by informed choice, but because they have never been taught about them, do not have skills to seek such information, lack access to the information. Individuals need to know the risk factors for and signs and symptoms of oral cancers, and how to obtain a thorough oral examination.[21] According to the Texas Oral Cancer Risk Behavior Survey,[22] 33% of Texan adults reported at least 1 risk behavior for oral cancer (tobacco use and risky alcohol behaviors). Public awareness and education efforts should be increased, with emphasis on the oral cancer risks associated with tobacco and alcohol use.

Scientific evidence suggests that as many as one third of the 500,000 cancer deaths that occur in the United States each year is related to dietary factors. [9] Another third is attributable to smoking. For Americans who never used or have successfully quit using tobacco, modifying dietary and physical activity habits becomes the most relevant route for reducing cancer risk. According to the American Cancer Society and the US Department of Agriculture, an individual should have at least 5 daily servings of fruits and vegetables. [22]

The Youth Risk Behavior Survey (YRBS) national sample found that 28% of high school students ate 5 or more servings of fruits and vegetables the day preceding the survey. Among the states and localities participating in the 1995 YRBS, the percentage of students who consumed at least 5 servings of fruits and vegetables was 23% in San Antonio, 22% in Dallas, and 27% in Houston. The present survey found, however, that only 7% of high school students in Brownsville had eaten 5 or more daily servings of fruits and vegetables. This is an alarming statistic that requires immediate attention.

CONCLUSIONS

This survey indicated that Brownsville high school students engaged in relatively high levels of risk behaviors and their knowledge base was limited. Many of them hold misconceptions about oral cancer risk factors, signs, and sites that can have an impact on preventive behaviors. There is a great need for more information about oral cancer and cancer prevention in schools.[23] Relatively few oral cancer public educational materials have been produced. This observation is particularly noteworthy, especially for dental professionals, when compared with the plethora of materials that have been developed on tooth-brushing, flossing, and the need for dental visits. Studies are lacking that determine what educational materials are available and that assess their content in terms of accuracy, comprehensiveness, reading level, and cultural acceptability.

A review of health education textbooks for kindergarten through 12th grade students found that oral cancer coverage was uneven, misleading, and sometimes incorrect, but most often omitted altogether.[24] A lack of and incorrect content in health education textbooks may contribute to the public's overall lack of knowledge about oral cancers. There is a great need for cancer prevention in the school curriculum. Many of the behaviors recommended to reduce cancer risks require healthy decisions to be made early, reinforced, and reaffirmed repeatedly throughout life. Students rely on a wide variety of sources for health information, and school represents only one part of the student's educational experiences. Collaboration with other agencies and influences on the student's social environment are required to promote healthy choices in such complex social behaviors as smoking, drinking, and eating habits.

In conclusion, oral cancer prevention programs targeting the adolescent high school population should emphasize providing factual information about cancer, its risk factors, and screening. The programs should also counter the deceptive emotional appeals and peer pressures generated in alcohol and tobacco advertising.

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