

Typology and Correlates of Smokeless Tobacco Use

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The incidence, use patterns, and correlates of smokeless tobacco have become increasingly important as usage rates rise and harmful health effects become established. The present study assessed the incidence of smokeless tobacco use in a Southeastern U.S. sample and selected correlates of use. From the responses of 3725 high school students, 19.9% reported trying smokeless tobacco products (35.5% for males, 5.8% for females). Most agreed that tobacco use has harmful health consequences. Those disagreeing with these health beliefs were more likely to use smokeless tobacco. Cigarette smoking was strongly associated with initial use. Of those reporting any use of smokeless tobacco, most used it for less than an hour per day, but 18% reported 3 or more hours of use per day. Forty-four percent reported a first use of smokeless tobacco before 13 years of age. Early initial use was associated with greater frequency and duration of use. Early initial users also reported greater influence from family and advertisements. Encouragement from friends, however, appeared to be the major factor regardless of age at initial use. Of particular concern is that 8.4% of those having any experience with smokeless tobacco felt they were addicted to the substance. Finally, 27.9% reported swallowing the substance or spittle, suggesting the need for further research on the potential health implications of this behavior.

KEY WORDS:

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There has been a significant increase in the use of smokeless tobacco products by adolescents (1, 2).

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Gritz et al. reported a 56% increase in the sale of moist snuff between 1980 and 1984 (3). In 1975, only 3% of the population used smokeless tobacco (4). Recent survey data indicates that approximately 7% to 10% of male adolescents regularly use smokeless tobacco and that 19% of females and 60% of males have tried smokeless tobacco (5-7). In one study, daily use of smokeless tobacco by male adolescents was reported to be as high as 23% (8).

The increase in smokeless tobacco use among adolescents is of concern because numerous studies have linked smokeless tobacco use to various health consequences in later life (9). Smokeless tobacco use has been associated with cancers of the oral cavity (10), pharynx (11), esophagus (12), bladder (13), and pancreas (14). Smokeless tobacco use also has been associated with an increase in tooth caries, gingival recession, and other forms of periodontal disease in adolescents (15). In addition, an interdependence between smokeless tobacco use and cigarette use has been established (16).

Given the increased prevalence rates and potential health consequences of smokeless tobacco use, information on factors related to use, predictors of high-risk individuals, and typology of use are important in formulating intervention and prevention programs. Boyd and associates, in a compilation of survey data from grantees of the National Cancer Institute (5) and other surveys (17), have shown that smokeless tobacco use is predominantly a white male phenomenon. Ary and colleagues reported that only 19% of girls had tried smokeless tobacco and only 0.5% used it regularly. In comparison, over 60% of boys had tried smokeless tobacco, and 11% used it regularly (6). Based on the National Cancer Institute surveys, usage rates are higher in American Indian and white adolescents than in black adolescents (5).

A number of nondemographic factors also have been reported to be related to smokeless tobacco use.

Compared to cigarette use, the first use of smokeless tobacco appears to be at an earlier age (11–12-year-old range) (6, 7). First use also has been reported to be strongly related to peer influence, although this factor appears to be less significant in continued use (6). Other related factors include the use of other substances (16), risk-taking behavior (16), inaccurate perceptions of health risk (6, 7, 18), and overall lower perceptions of negative outcome and higher perceptions of general population use compared to non-users (19).

The present study further elucidates some of the factors related to smokeless tobacco use in adolescents. Of particular interest was an examination of the nature of use among those who have tried smokeless tobacco and are regular users, particularly those who feel that they are addicted. A second focus was to confirm the findings of other surveys in a Southeastern population. Although smokeless tobacco use appears highest in the South (5, 10), few studies have investigated a Southern sample. Of the 15 survey studies compiled by Boyd, only one was performed in the Southeast (5).

Methods

Questionnaires were sent to all homeroom classes of four high schools (grades 9–12) in the Richmond County School District. This is a diverse district that includes both urban and rural students with a wide range of socioeconomic background. Of the 5000 questionnaires distributed to the homeroom teachers, 3745 were returned, a participation rate of 74.9%. Questionnaires that were marked incorrectly or that had inconsistent responses (i.e., age first used smokeless tobacco was older than present age or age stopped using) were deleted from the sample, resulting in 3725 usable questionnaires.

For those adolescents with usable questionnaires, 47.2% were male and 52.8% were female. Percentages in each age group were as follows: 14 years or less, 7.0%; 15 years, 22.8%; 16 years, 28.0%; 17 years, 25.1%; and 18 years or more, 17.2%.

The questionnaire items were developed based on a review of other smokeless tobacco surveys. Item content included frequency of cigarette use, beliefs concerning the harmful effects of tobacco, age at first smokeless tobacco use, frequency and duration of use, perception of addiction, occurrence of swallowing the substance, and source of encouragement to use smokeless tobacco (family, friends, advertisements, trying to quit cigarettes). Response format was true–false or multiple choice. Students were in-

structed that participation was voluntary and that responses were confidential.

Results

Incidence and Correlates of Initial Use

Of the total sample of 3725, 19.9% reported having tried smokeless tobacco. Analyzed by gender, 35.5% of males reported trying smokeless tobacco compared to 5.8% of females.

When questioned about the health hazards of tobacco use, 97% of the sample agreed that smoking causes lung cancer, and 96.8% agreed that smokeless tobacco can be harmful to teeth and gums. Significantly fewer (90.2%, $\chi^2 = 13.36$, $p < 0.0001$) agreed that smokeless tobacco causes mouth cancer. Compared to nonusers, those trying smokeless tobacco were more likely to disagree that smoking causes lung cancer (95.4% vs. 97.4%; $\chi^2 = 7.97$, $p < 0.005$) and that smokeless tobacco can be harmful to teeth and gums (93.0% vs. 97.8%; $\chi^2 = 43.60$, $p < 0.0001$). No significant difference was found for the belief that smoking causes mouth cancer. No gender differences were found for health hazard beliefs or the relationship of these beliefs to trying smokeless tobacco.

A χ^2 analysis of the relationship of smoking to trying smokeless tobacco supported a strong relationship between more frequent cigarette use and a greater likelihood of trying smokeless tobacco ($\chi^2 = 136.32$, $p < 0.0001$). Only 17.0% of those who had never smoked reported trying smokeless tobacco; however, 29.8% of those smoking a few cigarettes per day, 36.7% of those smoking half a pack per day, 48.1% of those smoking a pack per day, and 64.3% of those smoking more than a pack per day reported trying smokeless tobacco.

To further assess the relative roles of demographic, health belief, and cigarette use variables on the potential for trying smokeless tobacco, a discriminant function analysis was performed with sex, age, cigarette use, and agreement with smokeless tobacco health hazards (mouth cancer, harm to teeth and gums) as the predictor variables. This procedure resulted in a canonical correlation coefficient of 0.421 and an overall classification rate of 65.4, with 60.2% of those not trying smokeless tobacco and 86.3% of those trying smokeless tobacco correctly classified. The standardized discriminant function coefficients showed sex to be the most important discriminating variable (-0.887), followed by cigarette use (0.442), disagreement concerning harm to teeth and gums

Table 1. Standardized Discriminant Function Coefficients for Initial Smokeless Tobacco Use by Gender

Variable	Male ^a	Female ^b
Age (yr)	-0.435	0.086
Frequency of cigarette use	0.858	0.805
Agree smoking causes lung cancer	-0.111	0.070
Agree smokeless tobacco causes		
Mouth cancer	-0.146	-0.102
Teeth and gum problems	0.398	0.489

^aWilks' lambda = 0.918, $p < 0.0001$.

^bWilks' lambda = 0.985, $p < 0.0001$.

(0.182), age (-0.170), and disagreement that smokeless tobacco causes mouth cancer (-0.051). These values suggest that being male and a regular cigarette user were the most predictive risk factors of initial smokeless tobacco use in this sample.

Because of the importance of gender in predicting initial smokeless tobacco use, separate discriminant functions by gender were computed. As shown in Table 1, level of cigarette use, age, and the belief that smokeless tobacco use harms teeth and gums were significant predictors of initial use in males. The direction of the standardized discriminant function coefficients indicated that younger adolescent males who smoke more and do not believe that smokeless tobacco harms teeth and gums were more likely to report trying smokeless tobacco. For females, a similar pattern of discriminant function coefficients was found except that age contributed little to the discriminant function.

Level of Smokeless Tobacco Use

Of those indicating any use of smokeless tobacco ($n = 740$), most (59.7%) reported using smokeless tobacco once per day or less, 22.6% two or three times per day, and 17.7% four or more times per day. The majority of the sample reported using smokeless tobacco for less than 1 hour per day (62.6%), 19.5% 1-2 hours per day, and 18.0% 3 or more hours per day. Males reported a greater level of use than females, both for frequency ($\chi^2 = 18.89$, $p < 0.001$) and hours ($\chi^2 = 17.17$, $p < 0.001$) per day. Of the males, 45.7% reported using smokeless tobacco less than once per day compared to 68.8% of the females. Of the males, 29.0% reported using smokeless tobacco three or more times per day compared to 13.8% of the females.

Of those who reported trying smokeless tobacco, 44.1% reported first using smokeless to-

Table 2. Rate of Hours of Use per Day by Age at Initial Smokeless Tobacco Use

Age at Initial Use (yr)	Hours of use per day		
	less than 1	1-4	5 or more
10 or younger	50.0	27.4	22.6
11-12	55.8	40.0	1.2
13-14	69.7	25.3	4.9
15 or older	68.3	26.8	4.9

bacco before 13 years of age, with 18.9% reporting first use before 10 years of age. For the remainder of the sample, 36.4% reported first using smokeless tobacco between ages 13 and 14 years, and 19.6% at ages 15 years or older. Chi-square analyses of the age of initial use by frequency of use and hours of use per day revealed that greater use was reported by those reporting a younger age of initial use ($\chi^2 = 61.78$, $p < 0.0001$, and $\chi^2 = 72.85$, $p < 0.0001$, respectively). As shown in Table 2, 22.6% of those first using tobacco at or before age 10 years used smokeless tobacco 5 or more hours per day, while those beginning use at a later age reported less extensive use. Chi-square analyses revealed that males were more likely to first use smokeless tobacco at a later age than females ($\chi^2 = 25.39$, $p < 0.0001$). Of the females, 33.0% reported using smokeless tobacco at or before age 10 compared to 15.9% of males.

Beliefs concerning the health hazards of tobacco use were related to the frequency and hours of use per day. Those agreeing with or acknowledging the health risks of the use of tobacco products used smokeless tobacco less than those who disagreed with these health risks (χ^2 analyses all significant at $p < 0.05$). The level of cigarette use also was related to the frequency and hours of use per day ($\chi^2 = 85.07$, $p < 0.0001$, and $\chi^2 = 231.47$, $p < 0.0001$, respectively). A positive relationship was observed between smoking use and hours of smokeless tobacco use. Those smoking more than one pack per day were especially likely to use smokeless tobacco 5 or more hours per day. Of those who reported no cigarette use, only 4.2% used smokeless tobacco 5 or more hours per day. Of those smoking a pack or more per day, 35.7% used smokeless tobacco 5 or more hours per day.

Encouragement of Smokeless Tobacco Use

Of the subjects reporting any use of smokeless tobacco, 73.1% reported being encouraged by friends,

16.0% by family, and 4.8% by advertisements, while 6.1% reported using smokeless tobacco as a substitute for smoking cigarettes. A χ^2 analysis of frequency of use by type of encouragement indicated that those using three or more times per day were more likely to report being influenced by trying to quit cigarettes than were those using less than three times/day ($\chi^2 = 30.66, p < 0.005$). The same relationship was found between type of encouragement and hours of smokeless tobacco use per day ($\chi^2 = 46.22, p < 0.0001$).

Source of encouragement also was related to the reported age of first smokeless tobacco use ($\chi^2 = 63.92, p < 0.0001$). Although encouragement from friends was the major factor reported by those beginning use at age 11 years or older (76.1–86.7%), only 50.8% of those beginning use by age 10 years reported being influenced by friends. For those first using smokeless tobacco at age 10 years or younger, family and advertisements were reported to have a greater influence than for those first using smokeless tobacco after age 10 years.

Addiction to Smokeless Tobacco

Of those reporting any use of smokeless tobacco, 8.7% reported that they would have difficulty stopping such use, and 8.4% thought they were addicted to smokeless tobacco. Only 2.4% of those using smokeless tobacco less than 1 hour per day reported that they were addicted, while 10.7% of those using smokeless tobacco 1–2 hours per day and 25.0% of those using smokeless tobacco 3 or more hours per day reported being addicted. No gender differences were found for reported addiction to smokeless tobacco.

Substance and Spit Elimination

Of those reporting any use of smokeless tobacco, 27.9% reported that they had swallowed the substance or spit. The greater the frequency of use, the greater the likelihood that the spit or substance had been swallowed ($\chi^2 = 55.45, p < 0.0001$). Only 18.4% of those using smokeless tobacco less than once per day reported swallowing the substance or spit compared to 21.9% of those using smokeless tobacco once per day, 33.7% of those using twice per day, 34.4% of those using three times per day, and 53.4% of those using four or more times per day.

Discussion

Nineteen percent of the high school students in this sample reported having tried smokeless tobacco products. Of those who had tried, more than half reported experimental usage patterns; however, approximately 18% of those who had tried smokeless tobacco reported heavy use (i.e., 3 or more hours per day). Almost 9% of those trying smokeless tobacco believed that they were addicted or would have difficulty stopping. These results suggest that most adolescents do not try smokeless tobacco or engage in experimental use only. A significant subset of those who try smokeless tobacco, however, report a level of use sufficient to justify health concerns and/or develop addiction.

The incidence of initial use in this sample was lower than found by others, particularly for males (5–8). The lower incidence rate may reflect some unique aspect of this sample that resulted in this rate. Most of the sample lived in an area in which hospitals and the medical profession are the predominant employers, possibly increasing the knowledge of the harmful effects of smokeless tobacco use.

Consistent with this hypothesis, nearly all of the sample agreed with the harmful effects of tobacco products, although agreement that smokeless tobacco causes mouth cancer was slightly lower than for the other harmful health beliefs. As expected, those disagreeing with the harmful effects of tobacco use were more likely to try smokeless tobacco and to use greater amounts than those agreeing to the harmful effects of tobacco. It is unclear, however, if less knowledge results in greater smokeless tobacco use or if greater use results in an increased denial of its harmful effects. Education intervention studies targeting the small proportion of adolescents who are unaware of these facts may aid in understanding the causal link between knowledge and use.

Many of the findings in this sample of adolescents from the Southeast are consistent with other survey studies of smokeless tobacco use (5–8, 16). Males in this sample were approximately five times more likely to try smokeless tobacco than females and engaged in more extensive use than females. Another consistent finding was that initial use occurred at an early age in this sample, with nearly 45% reporting first use before age 13 years. Although females represent a minority of the adolescents who use smokeless tobacco, their initial use was more likely to occur at an earlier age than males. Early initial smokeless tobacco use also was associated with greater levels of use. These findings suggest that prevention pro-

grams for smokeless tobacco use need to be instituted in middle or elementary school.

Most of the adolescents trying smokeless tobacco reported being influenced by friends. Those first using smokeless tobacco at a young age when few peers engage in smokeless tobacco behavior, however, were more likely to report being influenced by family and advertisements than those first using smokeless tobacco at an older age. These results suggest that although prevention programs should teach children how to respond to peer pressure, programs directed at younger children also should address how to respond to influences from family and advertisements. Involving parents in prevention programs may be particularly effective with this younger age group.

The data also confirm a strong relationship between cigarette use and smokeless tobacco use. Smoking was related both to the probability of initial use and to the frequency and hours of use per day. It is likely that the use of one substance predisposes use of the other substance by physiologic addiction or the association of both behaviors to other factors such as general risk-taking behavior. Approximately 6% of those trying smokeless tobacco reported doing so as a means to stop smoking, adding support to the concern that those who stop smoking may start smokeless tobacco use as a supposedly safer alternative.

An unique finding from this survey was the significant percentage (27.9%) of users who had swallowed the substance or the spittle. Further research is needed to assess the frequency and intentionality of this behavior. The surprising percentage of those reporting at least some occurrence indicates that greater concern may need to be given to the ingestion of smokeless tobacco carcinogens. Future studies of the relationship between smokeless tobacco and cancer should assess the extent of smokeless tobacco swallowing behavior.

Further research, particularly longitudinal, on smokeless tobacco use should aid in clarifying the factors involved in the development of such use. With this information, high-risk groups could be targeted more accurately and treatment techniques can be instituted that address the causal precursors of smokeless tobacco use. The results of this study suggest that primary prevention programs should be targeted at elementary and middle school age males, especially as these young initial users appear to be the most likely to develop into regular smokeless tobacco users. Although education concerning health consequences is an important part of such

programs, most adolescents in this sample were aware of the potential harm of tobacco use. Prevention programs should include strategies for handling pressure from both friends and family to use smokeless tobacco. Parent education may be an important component of prevention programs aimed at young children.

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