

Smokeless tobacco use by youth: a health concern

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Abstract

Smokeless tobacco use in the United States has increased over the last two decades largely due to increased consumption by young people. Rates of use are highest among teenage and young adult males, and the most popular form of smokeless tobacco is moist snuff. Peer pressure as well as use of other addictive substances such as cigarettes, drugs, and alcohol, seem to correlate with current use. Frequent users of smokeless tobacco have an increased risk of developing gingival recession, leukoplakia, and oral cancer at the placement site. Other health concerns are related to the cardiovascular effects and addictive nature of nicotine. Because the smokeless tobacco habit is difficult to break, public health efforts have been largely aimed at prevention. The dental professional also can play an important role in recognizing the smokeless tobacco user and facilitating cessation. (*Pediatr Dent* 15: 169-74, 1993)

Introduction

Increased public awareness of the harmful effects of cigarette smoking has resulted in a decline in the number of cigarette smokers in the United States in the last 20 years. At the same time however, smokeless tobacco (ST) use has been on the rise, largely due to increased consumption among children and adolescents. One survey of Midwestern teenagers indicated that the percentage of regular users nearly doubled from 1980 to 1984.¹ In the past, ST use was most prevalent in rural areas and among men older than 50.² However among youth today, "dipping" and "chewing" have become widespread and socially acceptable habits that project a "machismo" image.

Types of ST and use patterns

There are two major forms of ST products: chewing tobacco and snuff. Chewing tobacco consists of sweetened, coarsely ground tobacco leaves that can be loose-leaf or in the form of plugs or twists. It is used in the form of a "chew" or "quid" that is chewed or held in the cheek. Moist snuff is more popular and typically packaged loosely in cans but also is available in small sachets.³ The user places a small amount of snuff, referred to as a "dip" or "pinch" between the cheek and gum and holds it there for varying lengths of time. Total ST production increased by almost 40% between 1965 and 1980, but has remained relatively stable during the last decade. However, moist snuff production has increased almost 40% since 1980 (Fig 1). Conversely, both dry snuff and chewing tobacco production decreased.⁴

There are an estimated 10-12 million ST users in the United States.² The highest reported use of ST is in the South (8.3%), and the lowest use is in the Northeast (2.3%).⁵ In addition, ST is used more by blue-collar than white-collar workers. The habit appears to be more prevalent in rural areas, but high rates of use also have been reported in some metropolitan areas.² The greatest use is among ado-

lescent and young males.⁵

Although ST use usually begins during adolescence, in certain parts of the country regular use may start among preschoolers;⁶ data show 13% of third grade boys in Oklahoma use ST.⁷ The number of adolescent males "having

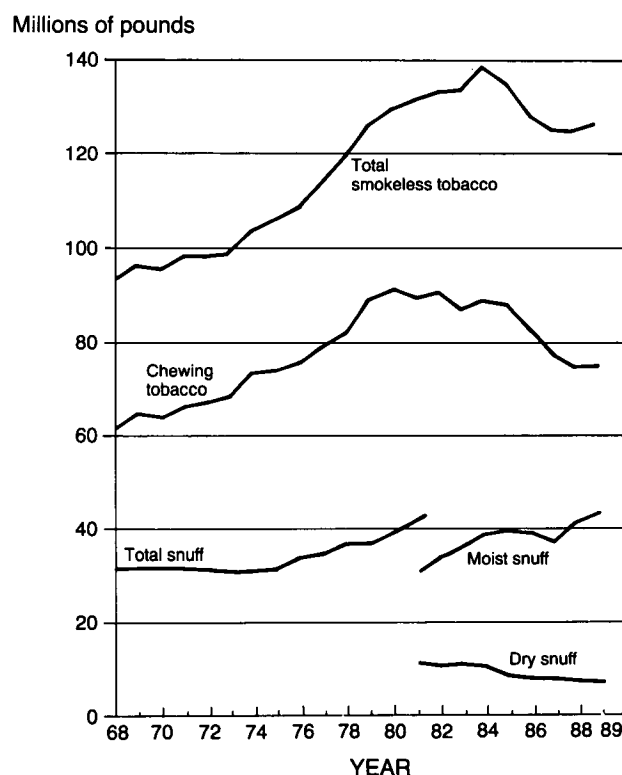


Fig 1. Smokeless tobacco production 1966-1989. Although ST production remained relatively constant during the 1980s, moist snuff production increased by approximately 40% (US Department of Agriculture, Tobacco Stocks).⁴

ever used" ST is consistently high, reaching more than 62% in most areas.³ A recent national school-based survey of 12,272 students across the United States reported that 19.2% of the males in grades 9–12 had used ST at least once in the month preceding the study.⁸

Whites and Hispanics are more likely to use ST than are blacks or Asians,² and the percentage of users is highest among Native Americans, who begin the habit at an early age. Use among female Native Americans (23–45%) approaches that of males (20–75%),⁹ which is in sharp contrast to white high school females, less than 2% of whom use ST.⁸

Social influences appear to be important factors in determining the onset of ST use; users are more likely than nonusers to have friends who use ST. Some studies have reported that parental influence also is a determinant of use.¹⁰ Children tend to accept the values and behavior of role models including parents, teachers, and sports coaches.¹¹ Schaefer and coworkers¹² reported that almost half of regular ST users believe that there are positive social benefits gained by taking up the habit. Personality characteristics, such as low self-esteem, dependency, and a history of being frequently rewarded for imitative behavior, may interact with social influences to encourage tobacco use.¹³ Several authors report that the use of other addictive substances, such as cigarettes, alcohol, marijuana, and other drugs, correlates with current ST use.^{14–16} An ST habit is also a risk factor for the future use of these substances.¹⁴

Innovative advertising by tobacco companies has played a major role in projecting ST use as a desirable habit to young males. Initially, prominent sports figures were used to promote ST, but this practice was discontinued in the mid-1980s because of public pressure. Current advertisements use masculine role models in activities such as fishing, hunting, rock climbing, and white-water rafting.¹⁷ These images provide a powerful incentive for adolescents to view ST use as a portal of entry into adulthood.

Adolescents also hold the erroneous view that ST use is less harmful than cigarette smoking. Snuff use is not as obvious as smoking — it can be used in situations where cigarettes are not permitted such as in the classroom or work place. These factors, combined with the ready availability of ST products, contribute to establishing the habit among youth.¹⁸

Oral effects of ST use

Frequent users of ST have an increased risk of developing gingival recession, mucosal lesions, and oral cancer.² Existing data are insufficient to support a statistically significant correlation between ST use and prevalence of gingivitis, periodontitis, or dental caries.

In one of the most comprehensive studies to date of the oral consequences of ST use, Grady and coworkers¹⁹ demonstrated a very strong association between ST use and leukoplakia in professional baseball players. This relationship was stronger for snuff than for chewing tobacco.

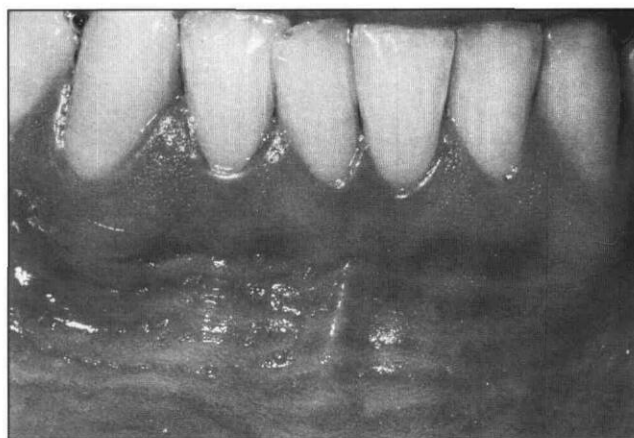


Fig 2. Leukoplakia appearing as fine, white surface corrugations of alveolar mucosa in a male teenager who had used ST approximately three years.

Among current ST users, 46.3% had leukoplakia at the placement site, which was usually in the anterior mandible. Teeth adjacent to these mucosal lesions showed significantly greater recession and attachment loss than sites not adjacent to lesions in users or similar sites in nonusers.²⁰ These data support the strong association between ST use and localized leukoplakia and gingival recession.

It is noteworthy that even relatively short-term ST use — approximately two to three years — has been commonly associated with leukoplakia and/or gingival recession.^{21–25} Studies of teenage ST users have described the presence of gingival recession in 26%, and mucosal lesions in 49–63%, of the users at the placement site.^{21,22} Most of the mucosal lesions showed the white, wrinkled clinical appearance of leukoplakia, with varying degrees of thickening (Fig 2). Those who used ST for an average of 205 min per day had clinically evident changes, whereas those who had an average exposure of 110 min a day showed no oral sequelae.²² Therefore, the length of daily exposure to ST seems to be related to lesion formation. Offenbacher and Weathers²³ found that adolescent male ST users with gingivitis were nine times more likely to have gingival recession than nonusers. The chance of the users having mucosal alterations was six times greater than nonusers.

The significance of leukoplakia in ST users and its relationship to oral cancer is not clear. The risk of malignant transformation of leukoplakia (from all causes) is about 3–5%,²⁶ although studies of long-term snuff use in Sweden suggest a lower value.²⁷ This potential difference in transformation of the snuff-associated lesion together with the obvious cause has led some researchers to suggest that it should be termed a "tobacco-pouch keratosis" rather than a leukoplakia.²⁸ Nevertheless, even a low rate of malignant transformation is of concern considering the great numbers of ST users and the fact that overall five-year survival rates for cancer of the oral cavity and pharynx are only 54% for whites and 32% for blacks.²⁹

Epidemiological studies show snuff use is linked to oral cancer. The strongest evidence supporting this association is derived from a landmark study by Winn and coworkers³⁰ that found that female snuff dippers in North Carolina had a 4.2 times greater risk of developing oral cancer than individuals who did not use tobacco; long-term use (≥ 50 years) resulted in a 47.5-times-greater risk.

The mechanism of ST carcinogenesis is poorly understood. Unburned tobacco contains a number of potential carcinogens, including nitrosamines, polycyclic aromatic hydrocarbons, and polonium²¹⁰.² However, the most likely candidates, the nitrosamines, are weak carcinogens. Co-factors, such as alcohol use or viral infection, may also be necessary to bring about malignant transformation.³¹ Developing malignant lesions usually require exposure to carcinogens over a long period (Fig 3). Given the addictive nature of ST and the young age of many users, there may be an increase in oral cancer in the future.

Systemic effects of ST use

The addictive nature of tobacco products, including ST, is related to the psychoactive effects of nicotine. These effects include an improved sense of well-being, arousal or relaxation, and reduced anxiety.³² Blood levels of nicotine achieved by ST users are similar to those found in cigarette smokers (range 10–50 ng/ml).³³ Therefore, long-term ST use may produce adverse systemic effects similar to those found in cigarette smokers.

Nicotine has widespread actions throughout the human body that are largely related to stimulation of the sympathetic nervous system.³³ A major concern is the effect of nicotine on the cardiovascular system. Benowitz and others³² demonstrated that the increase in heart rate and blood pressure following cigarette smoking is similar to that following 30-min use of ST. One survey of college students indicated that habitual ST users had elevated blood pressure compared to nonusers.³⁴ On the other hand, a study of baseball players found no relationship between

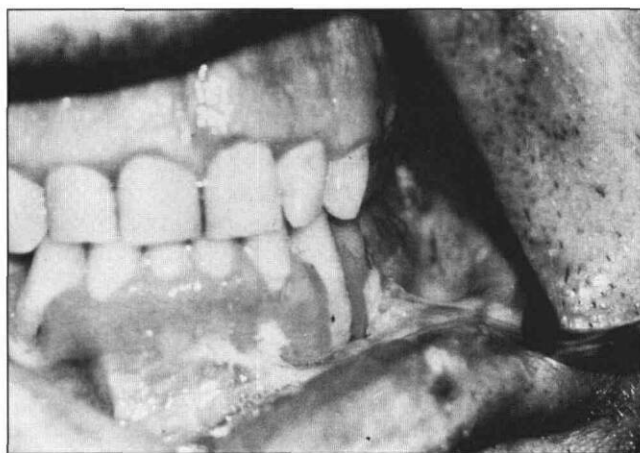


Fig 3. Oral changes in the mouth of a 70-year-old man who had used ST in excess of 40 years. There is severe gingival recession and squamous cell carcinoma was diagnosed in the exophytic lesion in the vestibule (Courtesy of Dr. S. Vincent).

ST use and blood pressure.³⁵ However, the authors pointed out that the exercise habits of professional baseball players might minimize adverse cardiovascular effects of nicotine.

In smokers, nicotine has been implicated in increased cholesterol and decreased high density lipoprotein (HDL) cholesterol, a condition associated with increased risk for cardiovascular disease.³⁶ Some data suggest that ST users also exhibit higher cholesterol and lower HDL cholesterol levels than nonusers,³⁷ although Ernster and coworkers³⁵ did not confirm this pattern in professional baseball players. It should be noted that these baseball players were intermittent users of ST, and that longer-term, continual use might lead to different outcomes. The baseball players also exhibited an inverse relationship between blood levels of a nicotine metabolite, cotinine, and HDL cholesterol levels.³⁵

Other adverse effects that have been linked to nicotine use include delayed wound healing, stroke, reproductive or perinatal disorders (low birth weight, prematurity, spontaneous abortion), esophageal reflux, and peptic ulcer disease.³³ Clearly, there is less information regarding the relationship between ST use and systemic disease than exists for smoking. However, the similarity of nicotine blood levels in smokers and ST users raises serious concerns regarding the development of comparable health problems in habitual ST users.

Public health implications and prevention

The increased consumption of ST products among youth raises significant long-term public health concerns. The early initiation of the habit, coupled with the strong addictive nature of nicotine and the association between prolonged use and increased oral cancer risk, set the stage for what could be a greatly increased incidence of malignant oral disease in the future. Spurred by such concerns, federal legislation was enacted in 1986 banning radio and television advertising of ST products, and warning labels were required on ST packages. At the state level, a number of preventive and regulative measures have been enforced including: prohibiting ST sales to minors; imposing additional sales taxes; and banning the free distribution of ST.³⁸ School-based health education programs have been shown to limit the increase in ST use during the adolescent years.³⁹ Students, as well as sports coaches and teachers, need to be made aware of the adverse health effects of ST products. Currently, a tobacco use prevention program implemented by the National Cancer Institute is being evaluated in a large population of Little League players. This project includes a prevention program based on the psychosocial/behavioral processes involved in ST use among young people and applies strategies that have been used in smoking prevention to adolescents.¹³ An important consideration in adolescent preventive education programs is that young people may not respond to the same cues as adults. For example, because young people are oriented to the present rather than to the future,

programs that emphasize only long-term consequences of tobacco use may not be as effective.¹³

ST cessation

Interventive measures have involved applying smoking cessation techniques to ST users and employing dentists and physicians in office-based interventions. Currently, there are few published studies on ST cessation, and the existing research involves relatively small sample sizes.⁴⁰ In the first published report on ST cessation, Glover⁴¹ adapted the American Cancer Society's FreshStart Adult Smoking Cessation Program for 41 adult ST users. He reported a six-month abstinence rate of only 2.3%, while in smoking cessation clinics it had been 38%. This disappointing figure may be related to the fact that the subjects were nonvoluntary students who had been found in violation of college rules regarding use of tobacco products.⁴⁰ Among 25 adolescent daily ST users, Eakin and coworkers⁴² reported a cessation rate of 12% six months following an intervention program using behavioral treatment that included small group meetings and other support methods. Subjects who did not quit reduced their daily ST use by 45%. DiLorenzo and colleagues⁴³ reported a much higher success rate (67%) among nine adult males nine months after a behavioral ST cessation program. This treatment included eight one-hour sessions over a six-week period and stressed eliminating cues, setting a target date for quitting, using a buddy system, and preventing relapse.

Other studies are currently in progress, some of which make use of nicotine polacrifex gum as part of a nicotine reduction and behavioral program in adult users. Future strategies undoubtedly will use the nicotine transdermal patch as part of nicotine reduction therapy in ST users. Nicotine gum has the advantage of providing an oral substitute for the "pinch" of tobacco, whereas the patch more closely simulates nicotine blood levels of ST users by providing steady nicotine delivery. Although nicotine gum and nicotine patches have been used in tobacco cessation programs for adults, the safety of these products has not been evaluated in adolescents. A tobaccoless ground mint leaf product has also been proposed for use as a snuff substitute in cessation programs.⁴⁰

Role of the dentist

Dental professionals can play an important role in early detection of ST use and in patient education. However, recent data indicate that dentists have been underutilized in reducing tobacco use.⁴⁴ Educating dental professionals about tobacco effects and cessation counseling can increase their confidence and effectiveness as tobacco cessation counselors. There has been an increased number of continuing education courses dealing with intervention for health professionals, and such training has been recommended for the professional curriculum.⁴⁵

Dentists should inquire about the use of all forms of tobacco, including the quantity and duration of use, in

health history questionnaires.⁴⁶ Although hypertension is uncommon before the age of 20, blood pressure readings are recommended for young tobacco users or suspected users, as well as for adults. Repeated elevated readings necessitate referral to the patient's physician.

Frequently, the only manifestations of ST use are oral changes such as recession and leukoplakia. The oral examination should include a periodontal evaluation that examines the location of the gingival margin. If gingival recession is present, the severity of attachment loss should be documented in the dental record by recording the distance from the cemento-enamel junction to the gingival margin and the probing depth. ST-induced gingival recession is considered irreversible, but can be treated with soft tissue grafting once the cause has been eliminated.

The location, size, color, and severity of oral mucosal lesions should be defined. Patients presenting with ulcerative or exophytic mucosal lesions should be referred immediately to a specialist for evaluation and possible biopsy.⁴⁶ Leukoplakic lesions usually will disappear within two to three weeks of discontinuing of the tobacco habit, but if they persist for longer than a few weeks, a biopsy should be performed.^{47, 48}

The presence of oral changes should be explained to the patient and used to provide direct evidence of a physical problem related to ST use. ST users should be counseled about the long-term effects of their habit and advised to discontinue ST use. Although adolescents may not view ST use as a serious threat to their health, they may respond to signs of tobacco-related changes in their own mouths. Our experience has indicated that a high percentage of adult users would like to quit the habit, and these patients can benefit from the support of health professionals. The addictive nature of ST may necessitate continued counseling or referral to a tobacco cessation program.

Summary

The increased use of moist snuff among young males in this country is related to several factors, including peer pressure and the perception of ST use as a masculine, adult activity. The most obvious and immediate health consequences of ST use are noted in the oral cavity in the form of leukoplakia and gingival recession. Longer-range concerns include potential nicotine-related health problems, including cardiovascular effects. Nicotine blood levels, which account for the highly addictive nature of tobacco products, are similar in smokers and ST users. Because it is so difficult to quit the ST habit, public health efforts have been directed mainly toward preventing the habit among young people. Ongoing research also is exploring the adaptation of smoking intervention programs for ST users. The most serious implication of ST use is the probability of significant increase of oral cancer resulting from long-term use by young males.

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Use of coronary artery bypass surgery greater in the U.S. than Canada

Canada's single-payer health care system results in lower overall rates of coronary artery bypass surgery (CABS) than in the United States, particularly among the elderly, according to a study published in this week's *Journal of the American Medical Association*.

Geoffrey M. Anderson, MD, PhD, of the Institute for Clinical Evaluative Sciences and the University of Toronto; and Kevin Grumbach, MD, of the University of California, San Francisco, with colleagues, used computerized hospital discharge records to compare overall rates of CABS in nonfederal hospitals in New York, California, Ontario, Manitoba, and British Columbia between 1983 and 1989.

They found that between 1983 and 1989, the CABS rates were consistently highest in California and lowest in the Canadian jurisdictions. In 1989, the age-adjusted rate of CABS in California (112.5/100,000 adults) was 27% higher than in New York (88.4/100,000) and 80% higher than in the three Canadian provinces combined (62.4/100,000).

The CABS rates increased for those aged 65 years and older and decreased for those aged 20 to 54 years in all five jurisdictions during the study period.

In 1989, CABS rates were three times higher in California than in Canada for those aged 75 years and older. The higher rate for those aged 65 years and older accounted for 75% of the overall difference between California and Canada. In Canada, CABS rates for the nonelderly varied little by income of area of residence, but in New York and California, rates increased steadily according to the income of area of residence.

In Canada, both the number of hospitals performing CABS and the number of procedures performed are controlled by provincial governments. In New York, the number of hospitals performing CABS, but not the number of procedures, is controlled. Essentially, California has no controls over either the number of hospitals offering CABS or the number of procedures performed.

The study says: "The single-payer system in Canada is associated with lower overall rates of CABS, and in particular, lower rates of CABS for the elderly, than found in the United States. Within the United States, CABS rates are lower in regulated New York than in unregulated California."

"In terms of quality of care, the differences in use in these different jurisdictions raise the important question of whether the control of the resources for CABS results in a rationing of care that denies access to needed medical services, or whether a lack of centralized control of resources in a fee-for-service system results in the overuse of CABS."

The researchers conclude that more studies are needed to determine the reasons for the differences.