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hereby submit this as part of the requirements for the degree of:

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ORAL HEALTH KNOWLEDGE, ATTITUDES, AND BEHAVIORS OF COLLEGE STUDENTS AT A MIDWESTERN UNIVERSITY

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by

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Abstract

AN ABSTRACT OF THE THESIS FOR THE MASTER OF EDUCATION DEGREE IN HEALTH PROMOTION AND EDUCATION, PRESENTED ON AUGUST 2, 2004 AT THE UNIVERSITY OF CINCINNATI, OHIO.

TITLE: Oral Health Knowledge, Attitudes and Behaviors of College Students at a Mid-Western University.

MASTERS COMMITTEE MEMBERS: Dr. Donald Wagner (Chair) and Dr. Keith King.

Oral health knowledge levels, attitudes, and behaviors needed to be assessed so that appropriate educational programs could be conducted. Studies have shown that if one practiced appropriate oral behaviors, the chance of developing oral diseases later in life is reduced.

The purpose of this study was to determine the oral heath knowledge, attitudes and behaviors of college students at a Midwestern Public University. In addition gender and socioeconomic background of the participants were examined as potential intervening variables in the participant's respective oral health knowledge, attitudes and behaviors. Further, this research explored the use of dental floss and the prevalence of smoking and use of spit tobacco by college age students.

This study surveyed 377 students between the ages of 18 to 24 from a Midwestern University. Results showed that the college students at this Midwestern University were very much knowledgeable about their oral health, they also had positive oral health attitudes; but their oral health behavior scores were not equally good. It was found that 18.1% of college students smoked cigarettes at least once a week while 6.6% of the college students smoked everyday. The results of this study also showed that 2.7% of the college students used smokeless tobacco at least once a week.

Results of this study indicated that there was no effect of gender on the college students' oral health knowledge, attitudes or behaviors.

It was also found that college students' higher knowledge about oral health or having a more positive attitude towards oral health did not have a significant effect on their use of dental floss. However when comparing the oral health knowledge, attitudes and behaviors of college students according to their socioeconomic condition, it was found that the students coming from a higher socioeconomic background had a higher oral health knowledge and had more positive oral health attitudes; but still there was no significant difference in their oral health behaviors as compared to students from low socioeconomic background.

The results of this study may help dental professionals and health educators to understand the dental behaviors of their college student patients and may also help them to plan appropriate interventions with college age students.

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Chapter One

The Problem

The majority of Americans (66 percent) visit the dentist each year, with more than 60 billion dollars spent on dental services annually. Despite this, many children and adults needlessly suffer from oral diseases that could have been prevented. In fact, 30,100 Americans were diagnosed with oral and pharyngeal cancers in the year 2003, resulting in nearly 7,800 deaths - many of which could have been prevented (Macek, 2003). With proper preventive care, such as regular check-ups, brushing, flossing, fluoridation, and dental sealants, the risk of dental disease could be greatly reduced (U.S. Department of Health and Human Services, 2002). According to the Surgeon General's Report, the burden of oral diseases and disorders is extensive, affecting Americans across the life span.The Surgeon Generals report on oral health in America highlighted a profound disparity in the oral health status of population groups classified by sex, income, age and race/ethnicity (U.S. D.H.H.S, 2000).

Ostberg, Halling & Lindblad, (1999) found that girls scored more favorably on knowledge and behaviors concerning oral health than boys. Girls showed more interest in oral health, and perceived their own oral health to be good to a higher degree than did boys.

Oral health knowledge is considered an essential prerequisite for health related behavior, although only a weak association seemed to exist between knowledge and behavior in cross-sectional studies. Nevertheless studies show that there is an association

between increased knowledge and better oral health. (Al-Ansari, Honkala E & Honakala S. 2003).

Oral health habits are behaviors people learned and practiced regularly in order to maintain good oral health and prevent oral disease. The most common oral diseases, dental caries and periodontal disease, are considered to be behavioral diseases because adoption of healthy oral habits is crucial in controlling them. Traditionally, good oral practice consists of continuous implementation of two broadly defined sets of behavior: self-care habits (like maintenance of dental hygiene, restriction of sugar products, use of fluoride products) and utilization of dental services like regular dental examinations, oral health education, and professionally applied preventive measures (Al-Ansari et al., 2003).

Many methods are available for maintaining optimal oral hygiene, among which tooth brushing is the most widely accepted method for the prevention and control of periodontal diseases. Most researchers recommend brushing teeth twice a day and agree that when performed with fluoridated toothpaste, it could reduce dental caries (Ainamo, 1980). However, a systemic review of the available evidence has shown that tooth brushing plays a limited role in caries prevention, because brushing alone is not sufficient in cleaning the proximal surfaces of teeth. As such, using mouth wash and dental floss is recommended in addition to brushing to further help in preventing both dental caries and periodontal disease (Al-Hussaini et al., 2002).

Limiting the consumption of sugar containing foods is also important in preventing periodontal disease and tooth decay. Added sugar (two thirds of which comes from confectionary), table sugar, and soft drinks, poses the greatest threat to dental health. Sucrose is the primary source of energy for certain bacteria and helps them

multiply, form plaque and produce acid that is harmful to tooth enamel and dentin. Tooth brushing, use of fluoride products, dietary practices and other behaviors relating to oral health depend on value and belief systems and vary from culture to culture. For instance, the desire to restrict sugar was more strongly related to body image and perceived overweight than to dental caries risk. (Al-Hussaini et al.,2002).

An important factor in understanding the determinants of dental care utilization is an individual's perception of his own dental condition. It was widely accepted among dental public health experts that examining the adults perceptions of their oral health status provided important information that would lead to improvements in the public's oral health (Department of Health and Human Services, National Health and Nutrition Examination Survey, 2004).

Statement of the Problem

The purpose of this study was to determine the oral heath knowledge, attitudes and behaviors of college students at a Midwestern Public University. In addition gender and socioeconomic background of the participants were examined as potential intervening variables in the participant's respective oral health knowledge, attitudes and behaviors. Further, this research explored the use of dental floss and the prevalence of smoking and use of spit tobacco by college age students. Although a few studies were done on the oral health knowledge, attitudes and behaviors of college students, none of them had been conducted in the state of Ohio. Al-Ansari et al (2003) conducted a study on the oral health knowledge and behavior among male health sciences college students in Kuwait. Rimondini, Zolfanelli, Bernardi & Bez (2001) conducted a study on the self-

preventive oral behavior in an Italian university student population. Al-Hussaini et al. (2002), studied the dental health knowledge, attitudes and behaviors among students at the Kuwait University Health Sciences Centre. Zhu, Petersen, Wang, & Zhang(2003) conducted a similar study on adolescents in China. Such a study on the oral health knowledge, attitudes and behaviors of college students in the United States was not found in the literature. Hence in order to compare the oral health knowledge, attitudes and behavior status of college students at a U.S University with those at other places, it was important to conduct this study. The results of this study may help health educators and dental professionals understand the dental behaviors of their college student patients and may also help them to plan appropriate interventions with college age students.

Research Questions

1) To what extent were University of Cincinnati students knowledgeable about their Oral Health?
2) What were University of Cincinnati Students' attitudes towards oral health?
3) To what extent did University of Cincinnati students practice behaviors associated with preventing oral diseases?
4) What relationships existed between gender and knowledge, attitudes, and behaviors related to oral health?
5) What relationship existed between socioeconomic status and knowledge, attitudes and behaviors related to oral health?

Hypotheses

Hypothesis # 1.

The oral health knowledge level of Female College Students will be higher than the oral health knowledge level of male college students.

Alternative Hypothesis # 1.

The oral health knowledge level of Female College Students will be lower than the oral health knowledge level of male college students.

Null Hypothesis # 1.

There will be no difference between the oral health knowledge level of female college students and the oral health knowledge level of male college students.

Hypotheis # 2.

The oral health attitudes of Female College Students will be more positive than the oral health attitudes of male college students.

Alternative Hypothesis # 2.

The oral health attitudes of Female College Students will be less positive than the oral health attitudes of male college students.

Null Hypothesis # 2.

There will be no difference between the oral health attitudes of female college students and the oral health attitudes of male college students.

Hypotheis # 3.

Female college students will practice more behaviors associated with maintaining oral Health than will male college students.

Alternative Hypothesis # 3.

Female college students will practice fewer behaviors associated with maintaining oral Health than will male college students.

Null Hypothesis # 3.

There will be no difference between the oral health behaviors of female college students and the oral health behaviors of male college students.

Hypotheis # 4.

College students that demonstrated higher oral health knowledge levels will use dental floss more frequently than college students that demonstrated lower oral health knowledge levels.

Alternative Hypothesis # 4.

College students that demonstrated higher oral health knowledge levels will use dental floss less frequently than college students that demonstrated lower oral health knowledge levels.

Null Hypothesis # 4.

There will be no difference in the use of dental floss between college students that demonstrated higher oral health knowledge levels and college students that demonstrated lower oral health knowledge levels.

Hypotheis # 5.

College students with more positive oral health attitudes will use dental floss more frequently than college students with less positive oral health attitude.

Alternative Hypothesis # 5.

College students with more positive oral health attitudes will use dental floss less frequently than college students with less positive oral health attitude.

Null Hypothesis # 5.

There will be no difference in the use of dental floss between college students with more positive oral health attitudes and college students with less positive oral health attitudes.

Hypotheis # 6.

College students from higher socioeconomic background will demonstrate higher oral health knowledge levels than will college students from lower socioeconomic backgrounds.

Alternative Hypothesis # 6.

College students from higher socioeconomic backgrounds will demonstrate lower oral health knowledge levels than will college students from lower socioeconomic backgrounds.

Null Hypothesis # 6.

There will be no difference in oral health knowledge levels between college students from higher socioeconomic backgrounds and college students from a lower socioeconomic background.

Hypotheis # 7.

College students from higher socioeconomic backgrounds will demonstrate more positive oral health attitudes than will college students from lower socioeconomic backgrounds.

Alternative Hypothesis # 7.

College students from higher socioeconomic backgrounds will demonstrate less positive oral health attitudes than will college students from lower socioeconomic backgrounds.

Null Hypothesis # 7.

There will be no difference in oral health attitudes between college students from higher socioeconomic backgrounds and college students from lower socioeconomic backgrounds.

Hypotheis # 8.

College students from higher socioeconomic backgrounds will demonstrate more positive oral health behaviors than will college students from lower socioeconomic backgrounds.

Alternative Hypothesis # 8.

College students from higher socioeconomic backgrounds will demonstrate less positive oral health behavior than will college students from lower socioeconomic backgrounds.

Null Hypothesis # 8

There will be no difference in oral health behavior between college students from higher socioeconomic backgrounds and the college students from lower socioeconomic backgrounds.

Delimitations

This study was delimited to college students between the ages of 18 and 24 attending the main campus of a Midwestern Public University during spring quarter 2004.

Limitations

This study was limited by the extent to which students gave honest answers. Respondents may have provided inaccurate but socially acceptable information, which may have impacted study results. Measurement error due to misinterpretation of questions and memory errors were subject to occur.

Assumptions.

The following assumptions were made for the purpose of the study:

1. All survey responses were honest and accurate.
2. Survey respondents were capable of reading and completing the survey.
3. Enough time was allotted to complete the survey.

Operational Definitions

1. Oral Health Knowledge- score on the knowledge portion of the Oral Health survey instrument.
2. Oral Health Attitude- attitude toward using oral health preventive practices as measured by the attitude score on the oral health survey instrument.
3. Oral Health Behavior- the self reported behavior practiced to maintain oral health and prevent oral diseases as reported on the oral health survey instrument..
4. Socioeconomic background- for the purpose of this study was determined by the perceived financial income of the participants parents or the household they lived

while growing up as reported by them on the demographic section of the Oral Health survey instrument.

5. Oral Health: Oral health means much more than healthy teeth. It includes the overall health of the teeth, gingivae and their supporting tissues and bone, the hard and soft palate, the lining of the mouth the throat, the tongue the lips, the salivary glands the masticator muscles, the lower and upper jaws, and the temporo-mandibular joints.
6. Tooth Decay: Tooth decay is the commonly known term for dental caries, an infectious, transmissible, disease caused by bacteria. The damage done to teeth by this disease is commonly known as cavities. Tooth decay can cause pain and lead to infections in surrounding tissues and tooth loss if not treated properly.
7. Periodontal Diseases: Periodontal diseases include gingivitis and periodontitis. Both are inflammatory conditions of the gingival tissues (tissues around the teeth). In more severe forms, periodontitis includes loss of supporting bone tissue which can lead to tooth loss.
8. Dental Public Health: Dental public health is a concern for and activity directed toward the improvement and promotion of the dental health of the population as a whole, as well as individuals within that population.

9. Spit tobacco (a.k.a. smokeless tobacco, dip, snuff, chew, and chewing tobacco) contains ingredients that frequently cause serious health problems. Users can suffer from receding gums, cavities, and even oral cancer.

Chapter Two

Review of Literature

The purpose of this study was to determine the oral heath knowledge, attitudes and behaviors of college students at a Midwestern Public University. In addition gender and socioeconomic background of the participants were examined as potential intervening variables in the participant's respective oral health knowledge, attitudes and behaviors. Further, this research explored the use of dental floss and the prevalence of smoking and use of spit tobacco by college age students. Although a few studies were done on the oral health knowledge, attitudes and behaviors of college students, none of them had been conducted in the state of Ohio. Al-Ansari et al.(2003) conducted a study on the oral health knowledge and behaviors among male health sciences college students in Kuwait. Rimondini et al.(2001) conducted a study on the self- preventive oral behavior in an Italian university student population. Al-Hussaini et al. (2002) studied the dental health knowledge, attitudes and behavior among students at the Kuwait University Health Sciences Centre. Zhu et al. (2003) conducted a similar study on adolescents in China. Such a study on the oral health knowledge, attitudes and behaviors of college students in the United States was not found in the literature. Hence in order to compare the oral health knowledge, attitudes and behavior status of college students at a U.S University with those at other places, it was important to conduct this study. The results of this study may help health educators and dental professionals understand the dental behaviors of their college student patients and may also help them to plan appropriate interventions with college age students.

College students

Although studies on the oral health knowledge, attitudes and behaviors were conducted with college students in many other countries in the past, none could be found in the literature to have been conducted in the United States. Socially and economically, the early years of adulthood form a period of transition from dependence on parents to independence as grown-ups, a period of life which could be crucial to dental health. Such events as leaving home, accompanied by social instability and unsecured finances, were potential reasons for postponing dental examinations which could jeopardize oral health (Stenberg, Hakansson, & Akerman, 2000).

Despite the resources invested, little information was available about attitudes toward dental care among students during the college years. People's attitudes were defined by cognitive, affective and behavioral components. The cognitive component represented the person's beliefs and knowledge, the affective component the strength of their beliefs, and the behavioral component their readiness to act on a certain object or situation. Thus attitudes towards dental care could be defined, for example, by self-assessment of one's dental health (cognitive), concerns about one's dental health (affective) and the inclination to attend regular dental examination (behavioral) (Stenberg et al. 2000).

Historical Background

During the 1980's and 90's, evidence had accumulated in several Western industrialized countries documenting reductions in prevalence rates and severity of oral

disease conditions. Most Americans enjoyed major improvements in oral health each decade since the 1950's. More individuals preserved their natural teeth and maintained functional dentitions throughout life. The reasons for the decrease in oral disease conditions were complex, but involved, a more sensible approach to sugar consumption, improved oral hygiene habits, use of fluoridated toothpastes, establishment of community based preventive programs, and effective use of oral health services (Petersen, Aleksejuniene, Christensen, Eriksen & Kalo, 2000). Despite these general improvements, a profound disparity in oral health still existed among specific population groups classified by sex, income, age and race/ethnicity (U.S.D.H.H.S, 2000).

Over one third of the US population (100 million) had no access to community water fluoridation. Over 108 million children and adults lacked dental insurance, which was over 2.5 times the number who lacked medical insurance (U.S. Department of Health and Human Services, 2002). The underserved individuals and families who lived below the poverty level experienced more dental decay and were more likely to have untreated teeth than those who were economically better off (Haden et al.2003).

Oral diseases and conditions affected humans throughout their life span, and most Americans experienced dental caries. Orofacial problems greatly reduced quality of life, restricted major life functions and were a common symptom of diseases and conditions affecting the craniofacial complex. National and state data regarding many oral diseases and conditions were limited or non-existent (Macek, 2003).

Oral health habits were measures people learned and practiced regularly in order to maintain good oral health or prevent oral disease. The most common oral diseases,

dental caries and periodontal disease, were considered to be behavioral diseases because adoption of oral health habits was crucial in controlling them (Al-Hussaini et al. 2002).

Traditionally, good oral practice consisted of continuous implementation of two broadly defined sets of behavior: self-care habits (like maintenance of dental hygiene, restriction of sugar products, and use of fluoride products) and utilization of dental services (regular dental examinations, oral health education, and professionally applied preventive measures). Many methods are available for maintaining optimal oral hygiene, among which tooth brushing is the most widely accepted method for the prevention and control of periodontal diseases (Al-Hussaini et al. 2002).

Most researchers recommended tooth brushing twice a day and agreed that when performed with fluoridated toothpaste, it could reduce dental caries. However, a systematic review of the available evidence has shown that tooth brushing plays a limited role in caries prevention, because brushing alone is not sufficient in cleaning the proximal surfaces of teeth. As such, using dental floss is therefore also recommended to further help in preventing both dental caries and periodontal disease. Limiting the consumption of sugar containing foods is also important in preventing periodontal disease and tooth decay. Added sugar (two thirds of which comes from confectionary, table sugar, and soft drinks poses the greatest threat to dental health. Sucrose is the primary source of energy for certain bacteria and helps them multiply, form plaque and produce acid that is harmful to dental enamel and dentin. Tooth brushing, the use of fluoride products, dietary practices and other behaviors relating to oral health depend on value and belief systems and vary from culture to culture. For instance, the desire to restrict sugar is more strongly

related to body image and perceived overweight than to dental caries risk (Al-Hussaini et al. 2002).

Flossing and brushing

The American Dental Association recommends that to avoid oral diseases, individuals should brush and floss once a day. Cleaning between the teeth can be carried out by using dental floss or tape, a toothpick, a small brush that fits between the teeth, an oral irrigator, or other special device (Tilliss, Stach, Cross-Poline, Annan, Astroth et al.2003).

Oral health Problems and Quality of Life

Oral health means more than healthy teeth. Oral health means being free of diseases and conditions that affect the full complement of oral, dental and craniofacial tissues, collectively called as the craniofacial complex (Macek, 2003). The term oral, thus, refers to not only the teeth, gums and their supporting tissues like bone but also includes the hard and soft palate, the lining of the mouth, the throat, the tongue, the lips, the salivary glands, the masticatory muscles, the lower and upper jaws, and the temporomandibular joints (Block & Freed, 2003)

Oral health was associated with self-reported well-being and quality of life as measured along functional, psychosocial, and economic dimensions. Impaired oral health adversely affected diet, nutrition, sleep patterns, psychological status, social interactions, and school and work related activities among some individuals. Cultural values also influenced oral health and well being and played a role in oral health care utilization

behaviors and the perpetuation of acceptable oral health and esthetic norms. Oral and craniofacial diseases and their treatment placed a burden on the society in the form of lost productive work time among adults. Self reported effects of oral and craniofacial conditions on social functioning included limitations of verbal and non-verbal communication, social interaction and intimacy (Macek, 2003). Self reported effects of facial disfigurement include loss of self esteem, anxiety, depression and social stigma that in turn limited educational, career-related and marital opportunities, as well as other social interactions (Inglehart & Bangramian, 2002).

Etiology of Oral Diseases

Microbial infections were the primary cause of the most prevalent oral diseases. The etiology of diseases and conditions affecting the oro-facial complex was multifactorial, involving a complex interplay between genetic, environmental and behavioral factors. Several inherited and congenital conditions affected the craniofacial complex, and resultant disfigurement and impairment frequently affected other systems throughout the body. The oral cavity was also a route for tobacco, alcohol, and inappropriate diets that in turn contribute to diseases that affect tissues in the craniofacial complex and elsewhere. (Macek, 2003).

Types of Oral Diseases/problems

Tooth decay/dental caries: Tooth decay/dental caries was a bacterial disease. The bacteria principally involved were the streptococcus mutans and the lactobacilli. It was also described as a carbohydrate modified bacterial infectious disease, in which a

cariogenic diet selectively favored cariogenic bacteria. Dietary factors had a clear influence on caries development. The relation between the intake of refined carbohydrates, especially sugars and the prevalence and severity of dental caries was so strong that sugars were clearly a major etiologic factor in the causation of caries. Cooked starches could be easily broken down to low molecular weight carbohydrates by the salivary enzyme amylase and thus act as a substrate for cariogenic bacteria. In contrast to this, the large molecular weight carbohydrates in uncooked or lightly cooked vegetables were considered virtually non-cariogenic because little breakdown of these foods occurred in the mouth. Dental caries was also found to be a transmissible disease, usually passed along from mother to child by sharing of food and kissing (Burt & Eklund, 1999).

Periodontal diseases: Periodontal diseases include gingivitis and periodontitis, which were mostly caused by bacterial infections. They were characterized by bleeding gums and were caused by dental plaque, which contained the microorganisms. Gingivitis was defined as an inflammatory disease of the gingiva in which the junctional epithelium, although altered by the disease, remained attached to the tooth. Periodontitis was also an inflammatory condition of the gingival tissues, characterized by loss of attachment of the periodontal ligament and the bony support of the tooth, leading to development of pockets. Periodontitis was thought to develop as an extension of gingivitis and was an advanced condition of the disease, which if not treated resulted in mobility of tooth and eventually toothloss (Burt & Eklund, 1999).

Tooth Loss: Tooth loss especially total tooth loss or edentulism was the dental equivalent of death. Tooth loss diminished the quality of life, often substantially. If retaining the teeth was just a matter of preventing disease conditions then the issue would

have been reasonably straight forward, but it was more complicated than that. Although loss of teeth was an end product of oral disease, it was also a reflection of patient and dentist's attitudes, the dentist patient relationship, the availability and accessibility of care, and the prevailing philosophies of care (Burt & Eklund, 1999). The loss of teeth was age related, with the average number of retained teeth decreasing and the prevalence of edentulism increasing as age increased. Even so, U.S. adults retained more than 75% of their teeth as late as the seventh decade of life, and even the most elderly retained more than half of their teeth. The principal cause of tooth loss across all ages in the United States was caries, which was the same in other countries of the world. However, studies suggested that above the age of 45, periodontal disease also became an important cause of tooth loss, with some studies suggesting that this became the most common cause of tooth loss in that age group (Pendrys, 2002).

Oral Cancer & tobacco smoking/chewing: In the United States, 30,200 people were diagnosed with oral cancers, and 7800 deaths were attributed to these cancers in 2000. Oral cancers were more common than leukemia, melanoma and cancers of the brain , liver, kidney, stomach ovary or cervix (Kressen & DeSouza, 2002). Tobacco was described as a principal risk factor for causing oral cancer, with the degree of risk proportional to the extent of its use. A particularly worrisome form of tobacco use, because of its appeal to young people was the smokeless tobacco, also known as spit tobacco. This product was being heavily marketed everywhere (Burt & Eklund 1999). Use of spit tobacco caused a number of serious oral problems, including cancer of the mouth and gum, periodontitis and tooth loss. Scientific knowledge about the health effects of tobacco increased greatly since the first Surgeon General's report on tobacco

was released in 1964. Cigarette smoking caused heart disease, cancers of the lung, larynx, pharynx, mouth and bladder. Tobacco use among adolescents increased in the 1990s after decreasing in the 1970s and 1980s (U.S. Dept. of Health and Human Services, 2002). Heavy marketing of smokeless tobacco products principally targeted to adolescent and young males had coincided with the national decline in cigarette smoking. This marketing seemed to have been successful; consumption of smokeless tobacco products in the United States almost tripled. A 1995 survey found that 11.4% of high school students had used smokeless tobacco within the last 30 days, 19.4% males and 2.4% females. Smokeless tobacco use among white students was 14.5%, among African-American students 2.2% and among Hispanic students 4.4%. Among adults aged 45 or older, however smokeless tobacco use was more common among African American than among whites (Burt & Eklund, 1999). Smokeless tobacco was sold in several forms. The main concern came with snuff; a powdered tobacco product, which was used by placing a "dip" between the cheek and gum. Dry snuff contained high concentrations of N-nitrosamines, a group of compounds strongly implicated as carcinogens, especially for oral cancer. Local factors such as poor oral hygiene, sharp tooth and dentures have been suspected as being risk factors for oral cancer (Pendrys, 2002).

Importance of Knowledge in Prevention of Oral Health

An important factor in understanding the determinants of dental care utilization is an individual's perception of his own dental condition. It was widely accepted among dental public health experts that examining the adult's perceptions of their oral health status provided important information that lead to improvements in the

public's oral health (Department of Health and Human Services, National Health and Nutrition Examination Survey, 2004). Knowledge gaps' concerning a number of preventive procedures was found between researchers, practioners, and people (Burt & Eklund, 1999).

Poor knowledge of oral diseases was common in many countries including the United States, as shown by reports that many people did not associate existing signs, such as calculus deposits or bleeding gums, with periodontal disease. When incipient disease was not recognized by the patient, naturally, there was inadequate self care and disease progression (Burt & Eklund, 1999). Information on oral health, associated with adequate preventive procedures, was fundamental to promote self-preventive behavior (Ashley 1989). A more encouraging study in North Carolina found that patients of general practioners were generally knowledgeable about the signs, causes, prevention, and treatment of periodontal conditions. Few serious misconceptions were found in that study, although improvement on the significance of bleeding gums was needed (Burt & Eklund, 1999).This included many factors such as consistent modalities of oral health, appropriate diet and life styles, and compliance towards professional counseling and care. It was demonstrated that plaque was an important factor in the development of hard and soft tissue diseases and that the reduction of its accumulation decreased the prevalence of dental caries (Rimondini et al. 2001). Tooth brushing and flossing were reported to be fundamental to reduce the amount of bacterial plaque and its virulence potential and since they were easy, effective and low cost, they were considered the pillar of self prevention strategy. However, many factors such as frequency, duration, pressure, characteristics of toothbrush bristles or of the floss, use of toothpaste and tooth brushing or flossing

technique and training influence the effectiveness (Graves, Disney & Stamm,1989). Low level of knowledge regarding oral health was found in a study in Bhopal (Christensen, Petersen, Bhambal, 2003).

It was a basic precept that everyone had a right to the best knowledge for his or her own health. It was crucial to remember, however, that knowledge alone did not lead to action. Many health care workers assumed that when people had the knowledge about health care they acted on that knowledge. It was a rational assumption, but human behavior was more complicated than that, Knowledge dissemination was a fundamental part of the mission of health professionals, but health care workers had to accept that much of their effort went unheeded (Burt & Eklund, 1999). Both internal and external variables influenced on whether an individual or community complied with recommended disease prevention, health maintenance, or health promotion procedures (Kressen & DeSouza, 2002).

Previous studies in America

Bagramian, Narendran & Khavari, (1988) in their study on the Knowledge Attitude and behavior of the Amish population in southwest Michigan found inadequate oral health knowledge and barriers to dental care among the population. Still, there was a significantly lower level of oral diseases as compared to the national level, possibly due to their way of life and dietary patterns.

Lang, Woolfolk, Faja, (1989), surveyed teachers at elementary schools in both an urban and rural area of Michigan to determine their oral health scores and their knowledge and attitudes about dental disease and disease prevention. Four hundred and

four teachers participated in this study and more than 80% of respondents from both areas were females. For both groups, the most frequently cited sources of information about dental health were dentist's office (82%), followed by magazines and books (74%). The teachers considered preventing tooth decay as the most important reason for good oral hygiene. They were also knowledgeable regarding water fluoridation, pit and fissure sealants, and reducing intake of sugary foods and importance of regular dental visits.

Studies outside America

Several studies were conducted in many foreign countries including China, Japan, UK, India, Kuwait, Lebanon, Sweden, Jordan, Indonesia, Saudi Arabia, and Pakistan. Zhu et al. (2003) conducted a study in China in which they studied the Oral health knowledge, attitudes and behaviors of about 8,800 participants. In this study 44.4% of the respondents reportedly brushed their teeth twice a day. Nearly one third of the participants also said that they would visit a dentist in signs of caries but only when in pain. In this study, no significant differences in tooth brushing behavior were found according to gender, it was also reported that half of the respondents had never visited a dentist and were never given professional oral hygiene instructions.

Kawamura & Iwamoto (1999) conducted a study on 77,845 employees of a large company in Japan. Seventy six percent of participants reported delaying a dental visit until they had a toothache. The majority of these did not regard decayed teeth as a disease and only a minority reported regular dental visits. About three quarters reported bleeding gums on brushing, more than half of them had never been taught professionally how to

clean their teeth and less than 5 % flossed daily. More than half believed that false teeth were inevitable in old age, and that their teeth were getting worse despite brushing daily.

Kassak, Dagher, & Doughan (1998), studied the knowledge, attitudes and behaviors of Lebanese college students. They used a structured questionnaire to investigate these issues in a sample of 954 new students at the University. The results indicated poor flossing habits and an unfavorable dietary habit among the group. Moreover, using logistic regression analysis, they found that variables such as gender, father's education, exercise and dietary habits were significantly correlated with how frequently the students brushed their teeth.

Al-Hussaini et al (2002) conducted a study on the knowledge, attitudes and behaviors of students at the Kuwait University Health Sciences center. Four hundred and ten students participated in the study. Of these 64.9% believed that the main cause of tooth decay was 'not brushing properly'. Only 19.3% of the students believed that sugar could cause dental decay. Half of the students did not know if sugar free drinks were harmful to their teeth, and 29.5% did not know about any measures to prevent gums from bleeding. Self-assessment questions showed that 84.5% of the students were satisfied with their dental health. A large majority of the students (94.5%) brushed their teeth at least once a day. Female students brushed their teeth more frequently than male students, as did those students who had visited a dentist in the past 6-12 months and those who reported their dental health to be very good. The main reason given for a dental visit was toothache (70%). Coffee was consumed daily by 68.9% of students, 76.6% of whom added sugar to their coffee.

Morgan, Wright, Matram, Sundoro, Chsters, (1992), conducted their study in Indonesia to ascertain the knowledge and health behavior of adolescents. Questionnaire data from this study revealed a high home use of fluoridated toothpaste by the subjects and a predominant use of dental services for pain relief.

Importance of Proper Attitudes in Prevention of Oral Health

People demonstrated a wide variety of attitudes toward teeth, dental care and dentists. These attitudes reflected their own experiences, cultural perceptions, familial beliefs, and other life situations; and all this strongly influenced their oral health behavior (Burt & Eklund, 1999). Professionals played a major role in oral health promotion. Practitioners and dental hygienists were competent to counsel on oral health or on the most suitable daily hygiene procedure. They could also induce or reinforce long term motivation for self-prevention behavior and provided primary and secondary preventive care including early diagnosis of oral diseases. Therefore, professional preventive examination compliance was considered essential for a self-preventive attitude (Rimondini et al. 2001). A study in Netherlands found that the majority of decisions for full mouth extractions were made by the patients themselves, rather than the dentist, and a Scottish study related tooth loss to negative attitudes about dental care and passivity about tooth loss (Burt & Eklund, 1999). Perception of oral health depended on the patients understanding of what normal oral health was and of the specific symptoms he may have experienced (Tubert, Riordan, Morel, Porcheray & Saby, 2003). In particular there was a strong indication that the adults increasingly wished to retain their natural

teeth and were prepared to undertake certain procedures recommended to them by their dental professionals (Bradnock, White, Nuttall, Morris, & Treasure, 2001).

Importance of Behavior in Prevention of Oral Health

Commitment to oral self care practices can help to prevent and/or control oral diseases. In addition to daily brushing, regular interdental cleaning is important in order to remove plaque from the critical interdental surfaces. Microbial plaque deposits remaining after brushing will facilitate the regrowth of plaque. Additionally it has been stated that efficient interdental cleaning will help decrease the extent and severity of periodontal disease and dental caries (Tilliss et al. 2003). Dental flossing and tooth brushing are the most commonly performed oral self-care behavior. A study in Michigan found that on average subjects reported brushing their teeth about twice a day. Around 90% of the population brushed at least once a day. Three quarter of the population reported making periodic dental visits at least once a year. Further, it was shown that females are more likely to brush daily, as are those individuals with more education and higher income. Historically, few individuals have practiced flossing but the use has slowly increased with women and the more educated. In some studies, nearly one-third of the of the adults reported flossing on a daily basis (Farsi, J, Farghaly & Farsi, N. 2004). Petersen (1986), in his study on the dental health behavior found that 83% of his sample population reported brushing teeth at least twice a day, and 86% reported regular dental visits. Regular use of toothpicks was reported by 45%, while dental floss was used by 22%. Petersen, Aleksejuniene, Christen, Eriksen, & Kalo, (2000) found that women

more often visited dental clinics than men. They also found that those who visited dentists frequently had a more positive attitude towards oral health.

Gender differences in Oral Health Knowledge, Attitude and behavior

A cross sectional study on adolescents was done in Sweden to determine gender differences in knowledge, attitude and behavior. Thirty one percent of the girls and 21% of the boys flossed regularly. Eleven percent reported daily candy consumption with no significant gender difference. Girls, however, more often than boys considered their own consumption to be too high. Oral health was regarded as important by a majority of the students (95%). Girls considered sound teeth to be more important than did boys. It was concluded that most adolescents had a positive dental attitude. Poorer knowledge and behaviors concerning oral health were demonstrated. Gender differences existed in most issues. Girls scored more favorably on behavioral measures, showed more interest in oral health, and perceived their own oral health to be good to a higher degree than did boys (Ostberg et al. 1999). In another study in China, no significant differences in tooth brushing behavior were found between males and females (Zhu et al. 2003).

Effect of Socioeconomic condition on Knowledge, Attitude and behavior towards Oral Health

Socioeconomic status (SES) was a broad measure of an individual's background in terms of such factors as education, income, occupation, and attitudes and values (Burt & Eklund, 1999). One of the enduring puzzles of public health is why some population was healthier than others. The answers to such apparently simple questions, although

complex to formulate, are crucial in understanding oral diseases. It was long taken for granted that people of lower SES have worse health than people of higher SES. Few studies have searched for the reasons beyond the obvious ones related to the living conditions of those in abject poverty and such explanations are inadequate to explain the differences in health between different socioeconomic groups within affluent countries. Attitudes towards health were often part of the set of values that followed from an individual's prestige in society and thus explained some of the observed differences in health between SES groups. Coronary heart disease and stroke, for example, were more common among those in lower socioeconomic groups and less common in the most affluent populations in the affluent countries. These were just two diseases that showed a SES related gradient of distribution within populations, there were many others (Burt & Eklund, 1999).

In their summary on 'Inequalities in Oral Health' an independent inquiry by Sheiham and Watt (2000), stated that

> The main causes of inequalities in oral health are differences in patterns of consumption of non-milk extrinsic sugars and fluoridated toothpastes. Improvements in oral health that have occurred after the 1970's were largely a result of fluoridated toothpastes and social, economic and environmental factors (p.402).

Oral self-care practices, attitudes, and knowledge varied across cultural groups. An important thing to recognize was that socioeconomic status was frequently intertwined with racial and cultural factors. In the United States, members of racial minority groups frequently had lower incomes and less education than whites do.

Although these socio economic differences were associated with different racial groups, it was important to understand that the effects of race were not the same as the effects of socioeconomic factors. For example, a recent study comparing oral self-care behaviors of African- American and whites found significant differences in the frequency of dental visits of the two racial groups, but when socioeconomic status was taken into account, these differences were reduced (Kressen & DeSouza, 2002). Oral health inequalities could only be reduced through the implementation of effective and appropriate oral health promotion policy. Treatment services never successfully tackle the underlying cause of oral disease (Hobdell et al. 2003). Lower socio-economic groups in the United States had higher levels of dental caries (Williams, Whittle, & Gatrell, 2002).

Summary

It was shown that oral and dental diseases affected everybody globally irrespective of age, gender, and socioeconomic conditions. There may only be differences in its severity based upon the above factors, but the disease is pandemic and has been considered as a silent epidemic occurring in the United States.

To maintain a good oral hygiene it was recommended to brush if possible after each meal or at least twice daily and to use dental floss to clean the interdental areas of teeth which are not cleaned by the use of toothbrush alone. Also it was recommended to visit a dentist at least every six months even though a person may be asymptomatic and without any problem.

It was found that individuals did not have the correct knowledge about the causes and prevention of oral diseases. In general it was also found at most of the places that

individuals who were educated, were from a higher socioeconomic condition and those living in the developed countries had a higher knowledge, more positive attitude and practiced better oral health behavior than those who were not educated, were from lower socioeconomic condition, and those who lived in undeveloped or developing countries. Also in general female students were more aware and concerned about dental health issues and engaged more in preventive dental behavior than males.

Chapter Three

Methods

The purpose of this study was to determine the oral heath knowledge, attitudes and behaviors of college students at a Midwestern Public University. In addition gender and socioeconomic background of the participants were examined as potential intervening variables in the participant's respective oral health knowledge, attitudes and behaviors. Further, this research explored the use of dental floss and the prevalence of smoking and use of spit tobacco by college age students. Although a few studies were done on the oral health knowledge, attitudes and behaviors of college students, none of them had been conducted in the state of Ohio. Al-Ansari et al.(2003) conducted a study on the oral health knowledge and behaviors among male health sciences college students in Kuwait. Rimondini et al.(2001) conducted a study on the self- preventive oral behavior in an Italian university student population. Al-Hussaini et al. (2002) studied the dental health knowledge, attitudes and behavior among students at the Kuwait University Health Sciences Centre. Zhu et al. (2003) conducted a similar study on adolescents in China. Such a study on the oral health knowledge, attitudes and behaviors of college students in the United States was not found in the literature. Hence in order to compare the oral health knowledge, attitudes and behavior status of college students at a U.S University with those at other places, it was important to conduct this study. The results of this study may help health educators and dental professionals understand the dental behaviors of their college student patients and may also help them to plan appropriate interventions with college age students.

Subjects

This study was directed at undergraduate students between the ages of 18 to 24 enrolled at the main campus of the University of Cincinnati. All students were registered for the spring quarter, 2004. The classes selected for this study were the General Physical Education classes. The specific reason for selecting those classes was that they were open for all the undergraduate students in the University, and so they attracted students from all departments irrespective of their major. In this way we got a good cross section of the students, which was thus representative of the student population at the university. The classes, which were included in this general category of Physical Education Classes, were Physical Conditioning, Racquetball, Yoga, Group Fitness, Weight Control, Stress Management, Personal Health Behavior, and Community Health. These classes were conducted through the department of Health Promotion and Education. The coordinator of this program was contacted and a list of professors teaching these courses during the spring quarter 2004 was generated. An appropriate number of these classes were randomly selected from the list that was generated. A total of 377 students were needed to complete the survey. The number was necessary to have a representative sample of the approximately 20,000students in the target group (95% confidence level)

Instrumentation

The instrument used in this study 'Oral Health Survey Instrument (OHSI)' was developed by Dr.Anjum Memon and Dr.Sasi Honkala for a similar study in Kuwait in 2003. Dr.Memon gave the permission for modifications and further use of their instrument (Appendix D). The researcher used the instrument after few modifications to

suit the requirements of this study (Appendix A). The questionnaire contained 23 questions to evaluate the participant's knowledge, attitudes, and behaviors towards oral health and five demographic questions at the end. All the questions in the questionnaire were close ended. The questions focused on the participant's knowledge, attitudes and their behavior towards oral diseases, its causes and the measures required to prevent them.

The first ten questions of the questionnaire pertained to the oral health knowledge level of the participants. Questions 1 to 9 were multiple-choice questions, and had only one correct answer. The participant received a score of 1 for a correct answer and 0 for an incorrect answer. The tenth question had five responses to be checked at and the participant received 1 point for checking at each of the responses. So a participant got 5 points on the tenth question if he checked on all the responses. The total of the scores obtained on the first ten questions served as the score on the knowledge section of the instrument. Potential scores ranged from 0 to 14, with a high score denoting a high oral health knowledge level.

The attitude section comprised of question number 11 to 15 that were on the Likert scale, with their responses ranging from strongly disagree to strongly agree. Scores for each question on the Likert scale ranged from one to five. Questions number 14 and 15 pertained to a negative attitude; hence their scoring was reversed so that most appropriate responses always scored five points and inappropriate responses one point. The total attitude score of the participant was calculated by adding all the scores on the Likert scale and potential score on the attitude section ranged from 5 to 25. A high score denoted a good attitude towards oral health.

The behavior section contained six questions beginning from question number 16 to 21. These questions related to the participant's oral health promotion and disease prevention behavior. In the behavior section the first table asked about the participant's oral hygiene habits and requested them to check about their behavior in the appropriate boxes. The boxes were for the frequency of the participants brushing, flossing and use of mouthwash and were scored from 5 to 1 depending upon the frequency of performing this behavior and where a higher score indicated a positive behavior. The total score on this table ranged from 3 to 15. The second table had boxes denoting the frequency of other oral habits like smoking, use of tobacco and sugar-free soft drinks. The last question on this table pertained to a positive oral health behavior whereas the first two were negative oral behaviors; hence the first two questions of this table were reverse coded so that appropriate behaviors always received a higher score. Each question was scored on the basis of the answers given by the study subject as 4, 3, 2 or 1 in accordance to particular behaviors, where a higher score denoted positive oral behavior. So, the scores on this table ranged from 3 to 12. The total behavior scores were calculated by adding the scores received on the two tables. Possible scores on this behavior section ranged from 6 to 27, with a high score denoting a good oral health behavior.

Question number 22 and 23 were multiple-choice questions and asked about the medical and dental insurance of the participants and were considered separately.

The last section on the questionnaire was the demographic section and it had five questions and asked about the participant's age, sex, year of study, race, and socioeconomic background.

The OHSI was specifically geared to determine the Oral health knowledge, attitudes and behaviors of undergraduate students at a Midwestern Public University in the United States. Content validity of the survey was ensured by consensual validity. A panel of experts was used to judge if the instrument actually measured what it was intended to measure. The Director of Dental Public Health of the Cincinnati Health Department who was a public health dentist and two professors of Health Promotion and Education were selected to review and evaluate the instrument. The panel was instructed to evaluate the survey and each made corrective comments or suggestions regarding the items on the research tool and those were implemented.

Stability and reliability of the OHSI was established using the test–retest procedure. Test–retest reliability measured the degree of association between sets of measurements collected at two different points in time. The tests were given to the same 15 University of Cincinnati college students one week apart in randomly chosen personal health class. Each student was asked to place the last four digits of their phone number on their test so that the first tests could be correlated with the second test. Pearson correlation coefficients were calculated to establish the reliability score for each subscale of knowledge, attitudes, and behavior. The subscale for knowledge questions averaged 0.625. The subscale for attitude questions averaged 0.69 and the subscale for behavior questions averaged 0.962.The overall average for the whole questionnaire was 0.71, which was significant.

Procedures

Human subject's approval was requested from the Institutional Review Board of the University of Cincinnati during the spring quarter of 2004. The classes selected for this study were the General Physical Education classes. These classes were conducted through the department of Health Promotion and Education. The coordinator of this program was contacted and a list of professors teaching these courses during the spring quarter 2004 was generated. Professors from these classes were contacted via telephone or email for permission to administer the survey during one of their classes and to schedule the dates and times to do so.

Each survey included a cover letter (Appendix C). The detailed cover letter explained the study, the amount of time to complete the questions, assured anonymity, assured voluntary participation and thanked the students for their participation. While administering the survey, the researcher introduced himself and gave a brief introduction about the survey to the class. Approximately 10-15 minutes were given to complete the survey. Verbal directions were given to the class. The directions included "Please read over the cover letter which contains information about why this study is being done. The first section contains demographic information, and the other three are pertaining to your oral health knowledge, attitudes and behaviors. Please answer each question to the best of your ability and follow the directions listed on the side of each question. Please answer these questions as honestly as possible. When finished with the survey turn the survey face down on your desk and the administrator will collect it himself. If there are any questions, please raise your hand." Survey completion implied consent to participate in the research study by the participant. After all students were finished with the survey, the

researcher collected each survey from the desks and concluded with thanks to the professor and the students for their time. In addition the researcher volunteered to answer any related questions about oral health.

Data Analysis

Data from the surveys were entered into the computer based on a coding system developed by the researcher. Frequencies were determined for all questions and sections of the survey using the statistical package for the social sciences (SPSS) on 'A Open Computer' in the Graduate Assistants Office at the College of Education, Criminal Justice & Human Services, University of Cincinnati. In addition the SPSS computer program was used to calculate Pearson correlation coefficients for the test-retest and Analysis of variance to determine differences in knowledge, attitudes, and behaviors by gender, socioeconomic conditions and use of dental floss. An alpha level of .05 was utilized to determine significance for all comparisons in this study.

Chapter Four

Results and Discussion

The purpose of this study was to determine the oral heath knowledge, attitudes and behaviors of college students at a Midwestern Public University. In addition gender and socioeconomic background of the participants were examined as potential intervening variables in the participant's respective oral health knowledge, attitudes and behaviors. Further, this research explored the use of dental floss and the prevalence of smoking and use of spit tobacco by college age students. Although a few studies were done on the oral health knowledge, attitudes and behaviors of college students, none of them had been conducted in the state of Ohio. Al-Ansari et al.(2003) conducted a study on the oral health knowledge and behaviors among male health sciences college students in Kuwait. Rimondini et al.(2001) conducted a study on the self- preventive oral behavior in an Italian university student population. Al-Hussaini et al. (2002) studied the dental health knowledge, attitudes and behavior among students at the Kuwait University Health Sciences Centre. Zhu et al. (2003) conducted a similar study on adolescents in China. Such a study on the oral health knowledge, attitudes and behaviors of college students in the United States was not found in the literature. Hence in order to compare the oral health knowledge, attitudes and behavior status of college students at a U.S University with those at other places, it was important to conduct this study. The results of this study may help health educators and dental professionals understand the dental behaviors of their college student patients and may also help them to plan appropriate interventions with college age students.

Chapter one addressed the problem, purpose, research questions, hypotheses, delimitations, limitations, assumptions, and operational definitions. Chapter two reviewed the professional literature exploring the various studies conducted on oral health knowledge, attitudes and behaviors, particularly among college students. Chapter three discusses the participants, instrumentation, procedures, and data analysis in the present study. Chapter four addresses the results of this study.

Response Rate

Survey instruments were distributed to students (N=400) in 8 physical activity and health promotion and education classes at a Midwestern University. A total of 377 surveys were completed, resulting in an overall response rate of 94.25%. All of the completed surveys were included in the final data analysis.

Demographic and Background Characteristics

More than half of the students were female (57.3%) and Caucasian (67.5%). One in four students was African American (25.8%). There was a fairly even distribution among freshmen (29.6%), sophomores (23.5%), juniors (14.7%), and seniors (31.7%). The overall mean age of the college students was 20.70 years (SD=1.68) with an age range of 18 to 24 years.

Table 4.1 Demographic and Background Characteristics

Characteristic	Number	Percent
Sex		
Female	215	57.0
Male	160	42.4
Race		
Caucasian	251	67.5
African American	96	25.8
Hispanic	5	1.3
Asian	11	3.0
Other	9	2.4
Year of College		
Freshman	111	29.6
Sophomore	88	23.5
Junior	55	14.7
Senior	119	31.7
Graduate	2	.5
Status of health Insurance		
Covered by parents	285	75.6
Have own health insurance	71	18.5
Do not have health insurance	21	5.6
Status of dental Insurance		
Yes	284	75.3
No	64	17.0
Not sure	29	7.7

N=377, Missing values excluded from analyses

Results: Oral Health Knowledge

The Oral health knowledge of college students was measured using the OHSI. The potential scores possible on the OHSI were from 0 to 14.Results from this study indicated that the knowledge scores of the college students on the OHSI was 10.43 (SD=1.92), which was very high. It means the college students were very knowledgeable about their oral health.

Attitudes towards Oral Health

The attitudes of the college students towards oral health were measured using the OHSI. The question numbers 11 to 15 on the OHSI were attitude questions. The first three questions measured positive oral health attitudes whereas the question number 14 and 15 measured negative oral health attitudes and hence they were reverse coded so that appropriate oral health attitudes always scored higher. The potential scores on this attitude scale varied from 5 to 25. Results from this study indicated that the average attitude score of the college students was 18.46 (SD=2.95).

Table 4.2. Oral Health Attitudes

Students' Attitudes towards Oral Health	**Mean**	**S.D**
Feel their dental health to be excellent	3.75	.91
Are satisfied with their dental health	3.72	.98
Are satisfied with the appearance of their teeth	3.60	1.09
* Feel their dentist is responsible for the health of their teeth	2.72	1.13
* Are afraid to go to a dentist	1.88	1.15

N=377, means based on a 5 point scale (1=strongly disagree, 5= strongly agree).
* Reverse coded on SPSS.

Oral health Behavior

The Oral health behaviors of college students were measured using OHSI. The question numbers 16 to 21 of the OHSI measured the college student's oral health behaviors. The potential score on this section was between 6 and 27. The following criterion was used to determine a student's oral health behavior: 1) The number of times they brushed their teeth; 2) The number of times they flossed their teeth; 3) The number of times they used mouthwash; 4) If they used cigarettes; 5) If they used smokeless

tobacco/spit tobacco; 6) Whether they used sugar free/diet soft drinks. All these questions, except the last one, were reverse coded so that appropriate oral health behaviors always received a higher score. Results from this study indicated that the average score of the college students on the behavior section was 19.11 (SD=2.92).

Table 4.3 a. Behavior table 1.

Positive Oral Behaviors	Mean	S.D
* How often do you brush your teeth?	4.68	.557
* How often do you use dental floss?	2.45	1.23
* How often do you use a mouth wash?	2.75	1.48

N=377, means based on a 5 point scale (1=Never, 5=More than once a day).
* Reverse coded on SPSS.

Table 4.3 b. Behavior table 2.

Other Oral Behaviors	Mean	S.D
* How often do you smoke cigarettes?	1.36	.85
* How often do you use smokeless tobacco/chewing tobacco?	1.04	.26
Do you choose diet soft drinks if available instead of those containing sugar?	1.65	1.05

N=377, means based on a 4 point scale (1=7 days a week, 5=Never).
* Reverse coded on SPSS.

Smoking and use of Spit-tobacco by college age students.

This study showed that 18.1% of college students smoked cigarette at least once a week. It was also found that 6.6% of the college students smoked everyday. The results of this study also showed that 2.7% of the college students used smokeless tobacco at least once a week whereas 0.3% students used smokeless tobacco everyday.

Hypothesis Testing

*Null Hypothesis 1.*There will be no difference between the oral health knowledge level of female college students and the oral health knowledge level of male college students.

A one way analysis of variance (ANOVA) was conducted to examine the difference in oral health knowledge level between male and female college students. Results showed no significant difference in the knowledge levels between male (M=10.28, SD=2.07) and female (M=10.56, SD=1.78) college students regarding their oral health knowledge, F (1,373) =1.984, p=.160. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that the oral health knowledge of college students was not affected by gender.

Null Hypothesis 2. There will be no difference between the oral health attitudes of female college students and the oral health attitudes of male college students.

An ANOVA was conducted to examine the difference in oral health attitudes between male and female college students. Results showed no significant difference between male (M=18.28, SD=2.65) and female (M=18.22, SD=3.13) college students regarding their oral health attitudes, F (1,367) =3.455, p=.064. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that the oral health attitude of college students was not affected by gender.

*Null Hypothesis 3.*There will be no difference between the oral health behaviors of female college students and the oral health behaviors of male college students.

An ANOVA was conducted to examine the difference in oral health behaviors between male and female college students. Results showed no significant difference between male (M=18.79, SD=2.78) and female (M=19.34, SD=3.02) college students regarding their oral health behaviors, F (1,356) =3.189, p=.075. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that the oral health behaviors of college students was not affected by gender.

*Null Hypothesis 4.*There will be no difference in the use of dental floss between college students that demonstrated higher oral health knowledge levels and college students that demonstrated lower oral health knowledge levels.

An ANOVA was conducted to examine the difference in use of dental floss between college students that demonstrated higher oral health knowledge levels (10 and above) and college students that demonstrated lower oral health knowledge levels (less than 10). Results showed no significant difference in use of dental floss between college students with higher oral health knowledge level (M=2.49, SD=1.21) and college students with lower oral health knowledge level (M=2.35, SD=1.27) regarding their use of dental floss, F (1,369) =.921, p=.338. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that the oral health knowledge level of students had no effect on their use of dental floss.

Null Hypothesis 5.There will be no difference in the use of dental floss between college students with more positive oral health attitudes and college students with less positive oral health attitudes.

An ANOVA was conducted to examine the difference in use of dental floss between college students that demonstrated more positive oral health attitudes (18 and above) and college students that demonstrated lower oral health knowledge levels (less than 18). Results showed no significant difference in use of dental floss between college students with more positive oral health attitudes (M=2.52, SD=1.26) and college students with less positive oral health knowledge attitudes (M=2.34, SD=1.18) regarding their use of dental floss, F (1,363) =1.772, p=.184. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that the oral health attitudes of students had no effect on their use of dental floss.

Null Hypothesis 6.There will be no difference in oral health knowledge levels between college students from higher socioeconomic backgrounds and college students from a lower socioeconomic background.

An ANOVA was conducted to examine the difference in oral health knowledge level of college students from higher socioeconomic backgrounds (Above 90,00/year) and college students from lower socioeconomic background (Less than 40,000/year). Results showed a significant difference between college students from higher socioeconomic backgrounds (M=10.60, SD=1.61) and college students from a lower socioeconomic background (M=9.91, SD=1.98) in their oral health knowledge levels, F (1,161) =6.075, p=.015. Therefore, the null hypothesis was rejected. It was therefore concluded that students from a higher socioeconomic background had a higher oral health knowledge level than those students coming from a lower socioeconomic background.

Null Hypothesis 7.There will be no difference in oral health attitudes between college students from higher socioeconomic backgrounds and college students from lower socioeconomic backgrounds.

An ANOVA was conducted to examine the difference in oral health attitudes of college students from higher socioeconomic backgrounds (Above 90,000/year) and college students from lower socioeconomic background (Less than 40,000/year).Results showed a significant difference in college students from higher socioeconomic backgrounds (M=19.29, SD=3.00) and college students from a lower socioeconomic background (M=17.89, SD=3.13) regarding their oral health attitudes, F (1,158) =8.196, p=.005. Therefore, the null hypothesis was rejected. It was therefore concluded that students from a higher socioeconomic background had a more positive attitude towards their oral health than those students coming from a lower socioeconomic background.

*Null Hypothesis 8. T*here will be no difference in oral health behavior between college students from higher socioeconomic backgrounds and the college students from lower socioeconomic backgrounds.

An ANOVA was conducted to examine the difference in oral health behaviors of college students from higher socioeconomic backgrounds (Above 90,000/year) and college students from lower socioeconomic background (Less than 40,000/year).Results showed no significant difference in college students from higher socioeconomic backgrounds (M=19.19, SD=2.83) and college students from a lower socioeconomic background (M=19.38, SD=2.82) regarding their oral health behavior, F (1,153) =.173,

p=.678. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that socioeconomic background had no effect on the oral health behaviors of college students.

Discussion

A total of 400 college students were surveyed regarding their oral health knowledge, attitudes and behaviors. Out of these 377 surveys were completed, resulting in an overall response rate of 94.25%. All of the completed surveys were included in the final data analysis. Participants in this study were college students at a Midwestern university. More than half of the students were female and white.

Results showed that the college students at this Midwestern University were very much knowledgeable about oral health and had a mean score of 10.43 (SD=1.92) on a scale of 14 which was very good. They also had positive oral health attitudes (M=18.46, SD=2.95) on a scale of 25; but their oral health behavior scores were not equally good (M=19.11, SD=2.92) on a scale of 27. It was also found that 18.1% of college students smoked cigarette at least once a week while 6.6% of the college students smoked everyday. The results of this study also showed that 2.7% of the college students used smokeless tobacco at least once a week and 0.3% students used it daily.

A series of one-way analysis of variance (ANOVA) were conducted to test eight different hypotheses. More specifically, these ANOVA examined whether there was an effect of gender on the oral health knowledge, attitudes and behaviors of college students. Results indicated that there was no effect of gender on the college students' oral health knowledge, attitudes and behaviors. It was also noted that college students' higher

knowledge about oral health or having a more positive attitude towards oral health did not have a significant effect on their use of dental floss. However when comparing the oral health knowledge, attitudes and behaviors of college students according to their socioeconomic condition, it was found that the students coming from a higher socioeconomic background had a higher oral health knowledge and had more positive oral health attitudes; still there was no significant difference in their oral health behavior as compared to students from low socioeconomic background.

Chapter Five

Conclusions and Recommendations

The purpose of this study was to determine the oral heath knowledge, attitudes and behaviors of college students at a Midwestern Public University. In addition gender and socioeconomic background of the participants were examined as potential intervening variables in the participant's respective oral health knowledge, attitudes and behaviors. Further, this research explored the use of dental floss and the prevalence of smoking and use of spit tobacco by college age students. Although a few studies were done on the oral health knowledge, attitudes and behaviors of college students, none of them had been conducted in the state of Ohio. Al-Ansari et al.(2003) conducted a study on the oral health knowledge and behaviors among male health sciences college students in Kuwait. Rimondini et al.(2001) conducted a study on the self- preventive oral behavior in an Italian university student population. Al-Hussaini et al. (2002) studied the dental health knowledge, attitudes and behavior among students at the Kuwait University Health Sciences Centre. Zhu et al. (2003) conducted a similar study on adolescents in China. Such a study on the oral health knowledge, attitudes and behaviors of college students in the United States was not found in the literature. Hence in order to compare the oral health knowledge, attitudes and behavior status of college students at a U.S University with those at other places, it was important to conduct this study. The results of this study may help health educators and dental professionals understand the dental behaviors of their college student patients and may also help them to plan appropriate interventions with college age students.

Conclusions

The present study found that the oral health knowledge scores of the college students in this survey were high and had an overall mean score of 10.43 out of a possible maximum score of 14. When the participants were asked about the main cause of tooth decay, 53.8% answered that 'not brushing properly' was the main cause; whereas only 25.5% answered that 'eating/drinking sugary foods/drinks too often' was the main cause. Except for this question, they answered correctly on most of the other questions. It was concluded that the participants were very knowledgeable about their oral health. Still, it underscored the need for further efforts to educate them, regarding oral health and remove their misconceptions.

The oral health attitude scores on the survey were positive with an overall mean attitude score of 18.46. The maximum attitude score possible on the survey was 25. This demonstrated that the majority of participants had a positive attitude towards their oral health. The behavior scores on the survey were low, as compared to the participant's knowledge and attitude scores. The overall mean behavior score on the survey was 19.11 out of a possible maximum score of 27. The study concluded that although these students were knowledgeable about their oral health, had a positive attitude towards oral health, still they did not practice sufficient oral health behaviors. Though most of the students reported brushing their teeth more than once everyday, still they did not practice flossing and use of mouthwash adequately. They had an overall mean score of 2.45 for flossing and 2.75 for use of mouthwash out of a possible maximum of 5. This study found that 18.1% of college students smoked cigarette at least once a week and 6.6% of the college students smoked everyday. It was also found that 2.7% of the college students used

smokeless tobacco at least once a week while 0.3% students used smokeless tobacco everyday. The study concluded that most participants, despite possessing adequate knowledge, and also having a positive attitude towards oral health, did not practice adequate healthy oral health behaviors.

This study demonstrated that there was no significant difference between male and female college students regarding their oral health knowledge, attitudes and behaviors. Results of this study indicated that there was no effect of gender on the college students' oral health knowledge, attitudes or behaviors. It was also noted that college students' higher knowledge about oral health or having a more positive attitude towards oral health did not have a significant effect on their use of dental floss. It is important to note that, when comparing the oral health knowledge, attitudes and behaviors of college students according to their socioeconomic condition, it was found that the students coming from a higher socioeconomic background had a higher oral health knowledge and had more positive oral health attitudes; still there was no significant difference in their oral health behavior as compared to students from low socioeconomic background.

Discussion

Previous studies conducted by Ostberg et al. (1999) on adolescents in Sweden had reported that girls had a more positive attitude towards oral health, scored more favorably on behavioral measures, showed more interest in oral health, and perceived their oral health to be good to a higher degree than boys. Such a correlation was not found in the present study.

The present study found that 70.8 % of the students brushed their teeth twice daily. Zhu et al. (2003) in a similar study in China had reported that only 44.4% of the participants brushed their teeth twice daily. Al-Hussaini et al. (2002) had reported brushing habits on the 'at least once daily' criteria and had found it to be 94.5%. When the brushing habits of the students in the present study was calculated on the 'at least once daily' criteria, it was found that 97.1% of the college students brushed at least once daily. In congruity with this study, the study by Zhu et al. (2003) in China had not found any significant difference in brushing habits between males and females.

Comparing the use of dental floss, it was found from the present study that 22.3 % of the students flossed daily. The study conducted by Kawamura & Iwamoto (1999) in Japan had found that less than five percent of the participants flossed daily. Kassak, Dagher & Doughan (1998) had also reported poor flossing habits in their survey of Lebanese college students but they had reported a significant relationship between gender and brushing habits. The present study contradicted the findings of Ostberg et al. (1999), which had reported a higher frequency of use of dental floss (31%) by females than males (21%).

Burt & Eklund (1999) had reported from a survey conducted in 1995, that 11.4% of high schools students used smokeless tobacco. The present study found that about 2.7% percent of college students used smokeless tobacco at least once a week. This reduction might indicate the success of the programs to discourage consumption of smokeless tobacco amongst the athletes and youths. It may also be possible that since the survey reported by Burt & Eklund (1999) was conducted amongst the high school students whereas the present study was conducted amongst college students; it indicates

either the high school students may have discontinued using the smokeless tobacco once they started going to college or it may have happened that they never went to college. It can also be due to a different geographic location where the two studies were conducted.

There is an underlying concern apparent in the data demonstrating that those who have greater oral health needs and those from the more deprived households are still lagging behind in terms of their oral health knowledge and attitudes. This is consistent with the findings of Williams, Whittle & Gatrell (2002) who had studied the relationship between socio-demographic characteristics and dental health knowledge and attitudes. This was also consistent with the findings of Hobdell et al. (2003). Hence it was not surprising, but it continues to disappoint those who have worked towards equity in oral health. It was reported in the U.S Surgeon Generals Report on Oral Health in America (2000) that there existed a disparity in the Oral Health amongst various socioeconomic and racial groups. The present study also found a significant difference in the knowledge and attitudes of students coming from the higher socioeconomic background as compared to those coming from lower socioeconomic backgrounds. Increased knowledge of oral health may be related to advice from the dentist, to advertisements in glossy magazines or to availability of oral health materials in the higher priced supermarkets and high street pharmacies which were not equally accessible to students from the lower socioeconomic background. It was most likely a combination of these factors and it remains a major issue that one group of the population was not experiencing similar benefits as others. It might be concluded that adult oral health continues to be a measure of social exclusion and as such this must be remedied.

Oral diseases and disorders affect health and well-being throughout life. The burden of oral problems is extensive and may be particularly severe in vulnerable populations. Many of these conditions and their treatments may undermine self-image and self-esteem, discourage normal social interaction, and lead to chronic stress and depression as well as incur great financial cost. They may also interfere with vital functions such as breathing, eating, swallowing, and speaking and with activities of daily living such as work, college, and social interactions.

Achieving and maintaining oral health requires individual action, complemented by professional care as well as community-based activities. Individuals can take actions, for themselves and for persons under their care, to prevent disease and maintain health. Primary prevention of many oral, dental, and craniofacial diseases and conditions is possible with appropriate diet, nutrition, oral hygiene, and health-promoting behaviors, including the appropriate use of professional services. All primary care providers and health educators can contribute to improved oral health of the community. Health care providers and health educators can successfully deliver tobacco cessation and other health promotion programs in their offices, contributing to both overall health and oral health.

Safe and effective measures exist to prevent the most common dental diseases-dental caries and periodontal diseases. Professional and individual measures include the use of fluoride mouth rinses, gels, toothpastes, and dietary supplements and the application of dental sealants are additional means of preventing dental caries. Gingivitis

can be prevented by good personal oral hygiene practices, including brushing and flossing

Lifestyle behaviors that affect general health such as tobacco use, excessive alcohol use, and poor dietary choices affect oral and craniofacial health as well. These individual behaviors are associated with increased risk for craniofacial birth defects, oral and pharyngeal cancers, periodontal disease, dental caries, and candidiasis, among other oral health problems. Opportunities exist to expand the oral disease prevention and health promotion knowledge and practices of the public through community programs and in health care settings. All health care providers and health educators can play a role in promoting healthy lifestyles by incorporating tobacco cessation programs, nutritional counseling, and other health-promotion efforts into their practices.

The Surgeon Generals report on oral health had identified profound and consequential oral health disparities within the US population. Disparities for various oral conditions related to income, age, sex, race or ethnicity, or medical status. This was congruent with the results of the present study which showed that students from the lower socioeconomic background had lower level of knowledge and less positive attitudes towards their oral health. Although common dental diseases are preventable, not all members of society are informed about or able to avail themselves of appropriate oral health-promoting measures. Similarly, not all health providers may be aware of the services needed to improve oral health. Reducing disparities requires wide-ranging approaches that target populations at highest risk for specific oral diseases and involves improving access to existing care. One approach includes making dental insurance more

available. The present study found that 17% of the college students did not have dental insurance and 7.7% were not sure if they had dental insurance.

Recommendations

Recommendations for practice. The results of this study, as well as of prior studies demonstrated that their existed a great disparity between the students coming from different socioeconomic background regarding oral health. The following measures are recommended to reduce this disparity and improve oral health for all Americans.

Change peoples' perceptions regarding oral health and disease so that oral health becomes an accepted component of general health. Many people consider oral signs and symptoms to be less important than indications of general illness. As a result, they may avoid or postpone needed care, thus exacerbating the problem. If we are to improve the nation's oral health and reduce health disparities, we need to enhance the public's understanding of the meaning of oral health and the relationship of the mouth to the rest of the body. Hence it would be required to not only improve their knowledge and attitudes but also improving their behaviors. These messages should take into account the multiple languages and cultural traditions that characterize America's diversity.

Change policymakers' perceptions. Informed policymakers at the local, state, and federal levels are critical in ensuring the inclusion of oral health services in health promotion and disease prevention programs. Raising awareness of oral health among legislators and public officials at all levels of government is essential in creating effective public policy to improve America's oral health. Every conceivable avenue should be used to inform policymakers, informally through their organizations and affiliations and formally through their governmental offices.

Change health providers' perceptions. Too little time is devoted to oral health and disease topics in the education of non-dental health professionals. Yet all health care providers can and should contribute to enhancing oral health. This can be accomplished in several ways, such as including an oral examination as part of a general medical examination, advising patients in matters of diet and tobacco cessation, and referring patients to oral health practitioners for care prior to medical or surgical treatments .

Recommendations for improving the research. This study included a total of 377 students who had participated voluntarily and who had completed the survey. The survey was administered in the 8 physical education and health promotion classes. These physical education classes were open to all the students in the University. Since all these participants were in physical education classes, it may be possible that they were more health conscious and hence they registered for these classes. So this may have attributed to their higher knowledge and positive attitudes towards oral health and it may not be the same for the whole University.

Recommendations for future research. Further research should modify the survey instrument as it was complicated to code the data for analysis with the SPSS software. Efforts should be made to modify the survey questions so as to simplify the data analysis. This was particularly true with the attitude and behavior section of the questionnaire since they had a few positive attitudes/behaviors and a few negative attitudes/behaviors in the same table and hence it was required to recode them again, which was time

consuming and confusing. Hence during future research, the question number 14 to 20 should be reworded so as to eliminate recoding during data analysis.

It was also found in this study that students from a higher socioeconomic background had a higher knowledge and more positive attitudes towards oral health than students from a lower socioeconomic background; but still there was no difference in their behaviors. Future research should attempt to clarify why there was no difference in behavior despite the students coming from a higher socioeconomic background had higher knowledge and more positive attitudes towards oral health.

The present study only included students at one Midwestern university, which limits the generalizability of these results; hence further research should be conducted at other universities in the United States. The work of this study should be expanded to compare different Universities in other parts of the country. Researchers could compare the knowledge, attitudes and behaviors of students attending the eastern states, and western states with this study in the Midwestern University.

Future research should also pay attention to college-age youth who do not attend college. For this group, researchers may need to cooperate with communities where they live and places where they work. The Oral health knowledge, attitudes and behavior of this group may differ from those of college students and should be determined. Ascertaining the knowledge, attitudes and behaviors of teachers, parents and policy makers towards oral health would also be an important next step in studying the oral health knowledge, attitudes and behaviors in the community. Oral health education can not be implemented successfully unless it is supported by these important groups.

Future research should also examine the percentage of college students who have University health insurance. This would help in recommending the University to also start offering dental insurance along with the general health insurance.

An additional demographic question that could be included is the students' college major. It would be interesting to determine if health related majors such as health education, nursing, dentistry or pre-med had any differences in their knowledge, attitudes and behaviors towards oral health.

It would be beneficial to experiment with different strategies to reach different target populations with information and find out their relative success rate in changing the oral health behaviors. Studies need to be done to determine the effectiveness of such strategies.

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Appendix A

Oral Health Survey Instrument (OHSI)
College Student Survey

Directions: Please answer each question. All responses will be kept anonymous and confidential.

Please circle the letter for each answer to the following questions.

1. What is the main cause of tooth decay? *(Circle one only)*
   a) Not brushing properly
   b) Eating too much sugar
   c) Not going to a dentist
   d) Eating/drinking sugary foods/drinks too often
   e) Weak Enamel

2. Which of the following would prevent your gums from bleeding? *(Circle one only)*
   a) Brushing & flossing teeth
   b) Going to the dentist regularly for checkup
   c) Both of the above
   d) Eating less sugar
   e) Using toothpaste containing Fluoride

3. How often should you visit your dentist? *(Check one only)*
   a) At least once every six months
   b) At least once a year
   c) At least once in every two years
   d) When there is a real need
   e) Never.

4. Can diet soft drinks damage teeth? *(Circle one only)*
   a) Yes
   b) No

5. Is bleeding of gums during brushing normal? *(Circle one only)*
   a) Yes
   b) No

6. Advanced Periodontal diseases can lead to heart disease? *(Circle one only)*
   a) Yes
   b) No

7. If one takes proper care of his teeth they can last for a lifetime? *(Circle one only)*
   a) Yes
   b) No

8. Is it normal to loose teeth, as one gets older? *(Circle one only)*
   a) Yes
   b) No

9. Is use of chewing tobacco/smokeless tobacco harmless ? *(Circle one only)*
   a) Yes
   b) No

10. What should you go to the dentist for? *(Check all responses that are appropriate))*
   _____ Check up
   _____ When a tooth hurts
   _____ When my teeth needs cleaning
   _____ For straightening of mal-aligned teeth
   _____ For any other problem in my mouth

Please check strongly you agree or disagree with each of the following statements:	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11.My dental health is excellent.					
12. I am satisfied with my dental health.					
13. I am satisfied with the appearance of my teeth.					
14. My dentist is responsible for the health of my teeth.					
15. I am afraid to go to a dentist.					

Please check the appropriate box for you.	More than once a day	Once a Day	More than once a week	Once a week	Never
16. How often do you brush your teeth?					
17. How often do you use dental floss?					
18. How often do you use a mouth wash?					

Please check the appropriate box for you.	Never	One day a week	2 -6 days a week	7 days a week
19. How often do you smoke cigarettes?				
20. How often do you use smokeless tobacco/chewing tobacco?				
21. I choose diet soft drinks if available, instead of those containing sugar				

22- Are you covered by your parents' health insurance or you have your own? *(Check one only)*

____ Covered by parents' insurance
____ Have my separate health insurance
____ Don't have insurance

23- Do you have dental Insurance?

____ Yes
____ No
____ Not sure

Demographic Information: All information will be kept anonymous and confidential.

Age : ___years

Sex: ___Male ___Female

Year of Study: ___Freshman ___Sophomore ___Junior ___Senior ___Graduate Student

Race: ___Caucasian ___African American ___ Hispanic ___ Asian ___Other

Parents/Household's Annual Income Last Year (before taxes):

____ Less than $30,000
____ 30,000 - to - 39,999
____ 40,000 - to - 49,999
____ 50,000 - to - 59,999
____ 60,000 - to 69,999
____ 70,000 - to - 79,999
____ 80,000 - to - 89,999
____ 90,000 or more

THANK YOU ☺

Appendix B

Dr. Donald Wagner, HSD
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Appendix C

Yunus Langha
432, Riddle Road,
Apt # 2B,
Cincinnati, OH 45220.
513-281-3106

Dear Student,

Hello, my name is Yunus Langha and I am a graduate student at the University of Cincinnati pursuing my Masters' Degree in Health Promotion and Education. I am conducting a study to determine the oral health knowledge, attitudes, and behaviors of college students.

I need your input to get a representative picture of the students at the University of Cincinnati. The results will help support the formulation of effective prevention strategies related to oral health. Your responses are very important to me.

Your participation is voluntary and consent to participate in this study is assumed by completion of the survey. This survey will take approximately 10-15 minutes of your time to compete. All answers of this survey will be kept anonymous, so do not write your name anywhere on the survey. Answer each question as honestly as possible. Kindly follow the directions given after each question. When you have finished the questionnaire, please forward it to the appropriate individual.

If you have any questions about the survey, please contact me at 513-281-3106 or Dr.Donald Wagner at 513-556-3857 or Dr.Keith King at 513-556-3859. Thank you for your time and efforts.

Sincerely,

Yunus Langha.

Appendix D

From:	"Anjum Memon" <am529@medschl.cam.ac.uk> Add to Address Book
To:	"'Yunus Langha'" <yunus@langha.com>
Subject:	RE: Hello Sir.
Date:	Mon, 5 Apr 2004 13:00:40 +0100

Dear Dr Yunus,

Thank you for your interest in our study. This study was indeed conducted by our medical students as part of their training in Public Health. I personally have no objection to your using our questionnaire. Here is the reference to the study published in the journal MPP. Please note that first four authors are the students. So, please acknowledge all the authors in your report.

Al-Hussaini R, Al-Kandari M, Hamadi T, Al-Mutawa A, Honkala S, Memon A.
Dental health knowledge, attitudes and behaviour among students at the Kuwait University Health Sciences Centre. Med Princ Pract. 2003,Oct-Dec;12(4):260-5.

Best wishes.

Anjum Memon