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Assessment of Knowledge Attitudes and Practices of Students Regarding Oral Hygiene at Herat University

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Keywords: Knowledge, Attitude, Practice, Students, Herat University, Oral Hygiene

Abstract

Introduction: Oral health is an integral part of overall human health, and neglecting it can lead to serious complications such as dental caries, periodontal diseases, and even systemic disorders. The level of knowledge, attitude, and practice (KAP) among individuals plays a decisive role in the prevention and control of these problems. The students of Herat University, as a young and educated segment of society, not only bear the responsibility of maintaining their own personal health but can also serve as positive role models in promoting oral hygiene culture among the wider community. Assessing their knowledge, attitude, and practice in this regard provides a clear picture of the current situation and serves as a guide for designing effective educational and health intervention programs in the future.

Materials and Methods: This research was a cross-sectional study conducted among 392 male students of Herat University using a standardized questionnaire developed by the researcher. The main objective was to assess the students' level of knowledge, attitude, and practice toward oral hygiene. Data were analyzed using SPSS software through descriptive and inferential statistical methods.

Results: The findings revealed that among 392 male students of Herat University, 70.4% had adequate knowledge and 29.6% had low knowledge regarding oral hygiene. In terms of attitude, 59.9% showed a positive attitude while 40.1% had a non-positive attitude. Regarding practice, the majority (67.9%) demonstrated poor practice, 30.9% had moderate practice, and only 1.3% showed good practice. Statistical analysis indicated a significant relationship between field of study and knowledge level ($p < 0.05$), and students with better economic status had higher knowledge scores. However, no statistically significant associations were found between age, marital status, academic year, or place of residence with knowledge, attitude, and practice. Moreover, there was a positive and significant correlation between knowledge and practice as well as between attitude and practice, whereas no significant relationship was observed between knowledge and attitude.

Conclusion: The results of this study indicate that male students of Herat University possess a relatively good level of knowledge and attitude toward oral hygiene; however, their practical implementation of oral hygiene behaviors remains weak. This condition may be due to insufficient practical training and the lack of habitual incorporation of hygienic behaviors into daily routines. The findings highlight the need for enhanced practical education, targeted awareness programs, and continuous health promotion interventions at the university level to strengthen and institutionalize correct oral hygiene behaviors among students.

Introduction

Oral hygiene is an inseparable part of public health and human well-being. Poor oral health can significantly affect an individual's quality of life, including causing pain, dental abscesses, and difficulties in eating and chewing. Additionally, lost, discolored, or damaged teeth often cause embarrassment and reduce self-esteem, affecting an individual's social interactions and daily activities. Therefore, maintaining oral health is essential for the physical, mental, and social well-being of individuals [1]. Oral health has been associated with issues such as sleep disorders, behavioral problems, and developmental stages in children, and it affects their quality of life in the long term. Oral health is essential for general well-being, appearance, and personal comfort [2]. Preventing oral diseases is considered the most accepted and effective method for ensuring oral health [3].

According to the World Health Organization (WHO), oral health problems are still not fully controlled globally, although significant progress has been observed in oral health measures among communities. This situation may be related to the rapid increase in oral diseases due to lifestyle changes such as the consumption of sugary foods, the absence of fluoride in drinking water, and other socio-environmental factors. The high prevalence of oral diseases worldwide has led to oral health being recognized as a serious public health issue. In addition, the treatment of oral diseases is considered the fourth most expensive type of treatment for diseases in most industrialized countries, which makes oral health a heavy burden at both the individual and societal levels [4]. It is expected that students, after completing their curricula, will serve as role models in society. Studies have shown that educational interventions based on the Knowledge, Attitude, and Practice (KAP) model play an important role in improving oral health-related behaviors. A positive relationship has also been observed between low levels of knowledge and a high prevalence of dental caries, and other findings indicate that adults with poorer attitudes and behaviors regarding oral health were more prone to

dental caries compared to those with better attitudes and behaviors in this regard. However, some research indicates that alongside knowledge and attitude, other factors should also be considered in predicting oral health-related behaviors. The healthcare system in Afghanistan is changing. The knowledge and attitudes of people toward oral diseases and their prevention methods are at a low level, and for planning public health programs, there is a need for systematic and organized data. The importance of this study lies in the fact that there is little information regarding the knowledge, attitudes, and health behaviors related to oral health among Afghan students. Based on this, the aim of the present study is to examine the knowledge, attitudes, and practices of students from various fields at Herat University regarding oral health, as well as to analyze their attitudes and practices concerning oral hygiene.

Statement of the Problem

In a healthy society, oral hygiene is recognized as an integral part of public health, and individuals are sufficiently aware of the importance of maintaining oral cleanliness. Students, as the educated and future builders of society, regularly practice preventive behaviors and oral health care and are aware of their positive impacts on their overall health. Health systems also prevent the spread of oral diseases and reduce the economic burden of treating these diseases by providing timely preventive and health services. Despite significant advancements in oral health, related issues remain globally uncontrolled. Lifestyle changes, including the consumption of sugar-rich diets, lack of water fluoridation, and socio-environmental factors, have led to a rapid increase in oral diseases. Reports indicate that oral diseases are closely linked to systemic diseases such as diabetes, cardiovascular diseases, stroke, and obesity. On the other hand, neglecting oral health not only causes personal pain and suffering but also affects the quality of life and productivity in the workplace. In many countries, the treatment of oral diseases is recognized as one of the most expensive treatments and imposes a heavy burden on health and economic systems.
If sufficient attention is not given to oral health maintenance and the promotion of awareness and preventive behaviors in the community, the prevalence of oral diseases will continue, and the burden of related systemic diseases will also increase. This issue not only threatens public health but also significantly increases healthcare costs and puts more pressure on health and economic systems. Moreover, the decline in individuals' quality of life and disruption in work efficiency will have broader social and economic consequences. Therefore, conducting research on the level of awareness and behavioral practices of students at Herat University can help provide effective solutions for improving oral health in the community and prevent its negative consequences.

Importance and Necessity of the Research

Oral health is an important part of the overall public health of individuals and has a direct impact on quality of life, academic performance, and work efficiency. Considering the direct connection between oral diseases and systemic diseases such as diabetes, cardiovascular diseases, and strokes, neglecting this aspect can lead to an increase in the burden of diseases and healthcare costs in society. Examining the level of awareness and behavioral practices of Herat University students regarding oral hygiene is essential. Conducting this research is necessary to provide scientific and practical solutions that can help improve oral health in the academic community and, consequently, in the broader society.

Research objectives

Main objective

The main objective of this research is to determine the level of knowledge, attitude, and practice of Herat University students regarding oral hygiene.

Secondary objectives

Determining the level of knowledge of Herat University students regarding oral hygiene.Examining students' attitudes toward oral hygiene.

1. Evaluation of students' performance in the field of oral hygiene.
2. Examining the relationship between students' knowledge, attitude, and performance regarding oral health.
3. Analyzing the impact of demographic factors (such as age, field of study) on students' knowledge, attitude, and performance regarding oral health.

Research Questions

a)Main question

What is the level of knowledge, attitude, and practice of oral hygiene among the students of Herat University?

b)Sub-questions

c)What is the level of knowledge of Herat University students regarding oral hygiene?

d)What is the students' attitude toward oral hygiene?

e)How is the performance of students in the field of oral hygiene?

f)Is there a relationship between the knowledge, attitude, and performance of students?

g)Do demographic factors such as age and field of study affect students' knowledge, attitude, and performance regarding oral hygiene?

Research hypotheses

Main hypothesis

It seems that the level of knowledge, attitude, and performance of Herat University students regarding oral hygiene is good.

Sub-hypothesis:

Literature Review

Hygiene, derived from the Greek word hygienos, is a science that examines the environmental factors affecting human health and studies how the human body reacts to these factors. Adhering to the correct principles of oral hygiene is fundamentally important in preventing tooth decay and gum diseases. Oral health education is considered one of the important preventive measures. Its goal is to raise awareness and create motivation for healthy behaviors so that oral health is properly maintained. Knowing the principles of prevention and implementing them in daily life, along with the necessary information and complete awareness appropriate to the patient's age, plays an important role in achieving and maintaining optimal oral health [5]. Oral health is considered a vital part of general health [6].
According to the World Health Organization (WHO), oral health problems have not yet been fully

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controlled globally, although significant progress has been observed in oral health measures among communities. This situation may be related to the rapid increase in oral diseases due to lifestyle changes such as the consumption of sugary foods, the absence of fluoride in drinking water, and other socio-environmental factors. The high prevalence of oral diseases worldwide has led to oral health being recognized as a serious public health issue. Additionally, the treatment of oral diseases is considered the fourth most expensive type of medical treatment in most industrialized countries, which makes oral health a heavy burden on both individual and societal levels [4].

Oral health refers to a set of healthy conditions in the oral cavity, teeth, and associated structures that enable the performance of essential functions such as chewing, speaking, breathing, and even psychological-social dimensions like self-confidence, personal well-being, and participation in social interactions without pain and discomfort. In a more comprehensive description, FDI has stated in a new definition that oral health is multidimensional, including the ability to sense taste, smell, touch, and even express a range of emotions delicately without discomfort or pain. Although the importance of oral health is recognized, in practice, this field often remains separate from the framework of general health and does not receive adequate attention [7]. Data from the World Health Organization (WHO) indicate that approximately 3.5 billion people worldwide are affected by one or more oral diseases, nearly half of the Earth's population. WHO's Global Oral Health Status Report 2022) More than half of this disease burden may be related to tooth decay, gum diseases, tooth loss, and even oral cancer, diseases that, due to their chronic nature, have significant impacts on quality of life, social well-being, and treatment costs [8]. Furthermore, the connection between oral diseases and non-communicable diseases (NCDs) such as diabetes, cardiovascular diseases, and even some cancers has been clarified in numerous studies. This link emphasizes that oral health is not just one aspect of health, but an integral part of an individual's overall health. Given the high burden of diseases and their widespread impacts, prevention is the most effective way to improve the situation. Measures such as using fluoride toothpaste, reducing sugar consumption, daily oral care, and appropriate mouthwashes all contribute to improving oral health. These measures are not only individual but also require social support, public education programs, and socio-political strategies [7].

Oral diseases

Most oral diseases are largely preventable and treatable in their early stages. The most common cases include tooth decay, periodontal diseases, tooth loss, and oral cancers. Other oral health conditions that are of public health importance include orofacial clefts, noma (a severe gangrenous disease that starts in the mouth and mostly affects children), and oro-dental trauma. The prevalence of major oral diseases worldwide is increasing along with urbanization and changes in living conditions. This increase is primarily due to the reduced access to fluoride (in drinking water and oral hygiene products such as toothpaste), the easy availability and low cost of sugary foods, and the lack of oral health services at the community level. In addition, extensive marketing of sugary foods and beverages, as well as tobacco and alcohol, has led to an increase in the consumption of products that play a direct role in the development of oral diseases and other non-communicable diseases (NCDs) (Oral Health, n.d.-b). On the other hand, these diseases are most prevalent in middle-income countries, and their prevention is possible through simple, cost-effective, and general interventions. The persistent prevalence of these diseases, despite medical advancements and public awareness, indicates the inadequacy of current national and global efforts to address this health issue [9].

Dental Caries

Dental caries is one of the most common oral health problems worldwide. According to the World Health Organization (WHO) report on the global oral health status, untreated decay of permanent teeth is considered the most common disease in the Global Burden of Disease framework, affecting approximately 3.7 billion people (Oral Health, n.d.-c). According to the analysis of the Global Burden of Disease Study 2021, the number of cases of dental caries in permanent teeth is approximately 2.24 million, and they have had a significant impact on reducing the prevalence of caries in various age groups (Global Oral Health Qualities, n.d.).

Periodontal Diseases

Periodontal disease affects the tissues that surround and support the teeth. This disease is characterized by symptoms such as bleeding or inflammation of the gums (gingivitis), pain, and sometimes bad breath. In more severe cases, the gums separate from the teeth and jawbone, causing the teeth to loosen and even fall out. It is estimated that severe periodontal diseases have affected more than one billion people worldwide. The main risk factors for this disease are poor oral hygiene and tobacco use (Oral Health, n.d.-f). Several factors contribute to the spread of oral diseases, including poor oral hygiene, tobacco use, diabetes, socio-economic factors, and aging. This disease is associated with an increased risk of severity of NCDs such as cardiovascular diseases, diabetes, pregnancy complications, and chronic respiratory diseases [10].

Oral Ulcers

Oral ulcers are considered one of the common diseases of the oral mucosa, which, by causing pain and discomfort, have a significant impact on the daily lives of patients. Oral ulcers can be caused by various factors such as trauma, the use of dentures, dehydration, viral disorders, or autoimmune diseases. The most common type of this condition is recurrent aphthous ulcer (RAU), which affects approximately 25% of young people and a higher percentage of children. Individuals affected are usually in the age range of 10 to 30 years, and these ulcers tend to recur frequently throughout life. With increasing age, the incidence and severity of recurrences usually decrease. Additionally, gender can also play a role in the occurrence of RAU, with its prevalence reported to be slightly higher in women than in men. The development of innovative approaches for the treatment of these wounds is of special importance. Furthermore, a deeper and more comprehensive understanding of oral wounds can pave the way for the development of innovative treatment strategies. The oral environment has distinctive characteristics, as it serves as the entry point for the digestive and respiratory systems. The permeability of different epithelial layers can affect the absorption of drugs. Additionally, oral mucosal injuries exhibit different healing patterns compared to skin lesions, and this process is influenced by various internal and external factors. Additionally, the moist environment of the mouth, influenced by saliva and daily physiological functions such as chewing and speaking, poses greater challenges for topical treatments [11].

Bad breath (Halitosis)

Halitosis is referred to as the presence of an unpleasant odor in the exhaled air, regardless of its cause. In most patients with halitosis, this condition causes embarrassment and negatively affects social

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interactions and daily life. Additionally, bad breath can be a sign of an underlying condition. Identifying the factors and reasons that lead to halitosis and its manifestations can help in the proper management of this problem. For the correct diagnosis and treatment of patients, healthcare professionals, including general practitioners and dentists, must be familiar with the causes (etiology) and appropriate treatment methods for this condition [12]. The American Dental Association defines halitosis as a combination of the Latin word "halitus" (meaning breath) and the Greek word "osis" (meaning pathological process) [13].

Oral Cancer

Oral cancer includes lip cancer, other parts of the mouth, and oropharynx, and it ranks thirteenth among the most common cancers in the world. According to global estimates, in 2022, there were 389,846 new cases of lip and oral cavity cancer and 188,438 deaths reported due to it. Oral cancer is more common in men than in women, is mostly observed in older individuals, and its mortality rate is higher in men than in women. The incidence and outcomes of this cancer also significantly vary with socio-economic conditions (Oral Health, n.d.-f). Oral cancer (OC) is considered a rare malignancy in Western countries, but in some high-risk areas of the world, it is one of the most common cancers. This cancer is largely preventable, as most identified risk factors such as tobacco use, alcohol consumption, and chewing betel nut are behaviors that increase the likelihood of developing the disease. Given the high mortality rate of oral cancer, early diagnosis is of utmost importance. Prevention and early diagnosis begin with the identification of potential precancerous lesions of the oral mucosa and local conditions that promote chronic inflammation. Therefore, any lesion should be promptly identified and appropriately treated [14]. Oral cancers are squamous cell carcinomas (OSCCs) in more than 90% of cases [15]. Other tumors of the oral cavity include small salivary gland tumors, melanomas, and lymphomas [16]. OSCC can have varying degrees of differentiation and often leads to metastasis to the lymph nodes. Lymphatic spread to the neck region is directly related to the T stage of the tumor, depth of invasion, and tumor thickness [17]. Oral cancer is a preventable disease, with tobacco and alcohol recognized as the main risk factors, present in about 90% of cases, and both having a synergistic effect on increasing the risk of developing the disease [18].

Numa

Noma is a severe gangrenous disease of the mouth and face that primarily affects children between the ages of 2 and 6. This disease is primarily seen in children suffering from malnutrition, infected with diseases, living in conditions of severe poverty with poor oral hygiene, or having a weakened immune system. Noma is mostly reported in African countries, but cases have also been observed in Latin America and Asia. The disease initially begins as a small sore in the mouth and then progresses to acute necrotizing gingivitis, which rapidly advances, destroying soft tissue and later spreading to hard tissues and even the skin of the face. According to the latest estimates (in 1998), approximately 140,000 new cases of necrotizing fasciitis are reported annually. If left untreated, this disease is fatal in 90% of cases. Children who survive suffer from severe facial deformities, difficulties in speaking and eating, social stigma, and the need for complex surgeries and rehabilitation. Early diagnosis is very important because in the initial stages, simple oral hygiene, antibiotic prescription, and improved nutrition can prevent the rapid progression of the disease (Oral Health, n.d.-b).

Lip-split and mouth-split

Cleft lip and palate is considered one of the most common congenital facial defects, with a prevalence reported worldwide between 1 in every 1,000 to 1,500 births, although this rate varies significantly across different studies and populations. The main cause of these defects is genetic predisposition, but factors such as poor maternal nutrition, tobacco and alcohol use, and obesity during pregnancy can also play a role in their occurrence. In low-income countries, these defects are associated with high infant mortality rates during the neonatal period. However, if a cleft lip and palate are treated in a timely and proper manner through surgery, complete rehabilitation for the child is possible (Oral Health, n.d.-b).

Oro-dental trauma

Oro-dental trauma is caused by damage to the teeth, mouth, and oral cavity. According to recent statistics, approximately 1 billion people worldwide are affected by this issue, with a prevalence of about 20% among children up to the age of 12. This type of injury can be caused by oral factors such as misalignment or dental irregularities, as well as environmental factors such as unsafe playgrounds, risky behaviors, traffic accidents, and violence. The treatment of dental-oral lesions is usually costly and prolonged, and in some cases, it may lead to tooth loss, which can in turn have repercussions on facial growth, psychosocial development, and the individual's quality of life (Oral Health, n.d.-b).

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Materials and Method

Background of the topic

Oral health is considered one of the important indicators of public health, and individuals' awareness of oral health principles, positive attitudes, and correct behaviors can play a significant role in reducing

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oral and dental diseases. Numerous studies in various countries have shown that the level of awareness and attitudes of individuals, especially among students, directly impacts their health behaviors. In Afghanistan, despite some limited studies in this area, a comprehensive examination that simultaneously investigates the three dimensions of knowledge, attitude, and performance among university students is still rarely seen. This research aims to fill the existing gap in this area by focusing on Herat University.

International background

In a study conducted by Nada Farsi and her colleagues in 2020 in the city of Jeddah, Saudi Arabia, regarding oral hygiene among students, the following results were obtained. Overall, the mean score of oral hygiene awareness among girls (8.1 ± 1.8) was significantly higher than that of boys (7.2 ± 2.1) out of 13. Compared to boys, girls brushed their teeth more frequently and used the correct brushing technique ($p < 0.001$). Additionally, girls had visited the dentist more frequently than boys (95% vs. 86%). The linear regression model showed that students in non-medical fields and those who had not been taught how to brush their teeth by a dentist had lower scores in oral health awareness. Students over 22 years old and girls likely had higher scores in oral health awareness compared to their peers [4]. The research conducted by V. Gopikrishna and his colleagues conducted a study among students in the city of Bengaluru, Karnataka, India in 2016, which showed that the toothbrush along with toothpaste was the most commonly used oral hygiene tool for cleaning teeth, used by 60.9% of the students. More than half of the students, specifically (57.5%), believed that tooth decay affects their appearance. Additionally, (71.7%) of the students believed that oral and dental health affects overall body health [1].

In a study conducted by Weaam Mohamed and her colleagues at the University of Khartoum in Sudan in 2022 among dental students (the majority of the participants in this study were women, constituting 75%), it was shown that. In the assessment of knowledge, 74.8% of the students had good knowledge regarding oral health, while only 0.6% showed poor knowledge. Most respondents identified sugar (18.6%) and bacterial colonization (23.2%) as significant factors in dental problems, and 95.9% acknowledged the importance of regular oral examinations. In terms of performance, 69.7% had average oral hygiene behaviors, and only 4.1% showed good performance. Although 96.2% of the participants used colors to check dental cleanliness, only 29.6% visited a dentist when experiencing pain, indicating barriers to accessing specialized services. Regarding attitude, 78.9% had a positive attitude toward oral health. Statistical analyzes showed that there is a significant relationship between knowledge and attitude with the academic year, and overall, positive knowledge and attitude were observed more among girls than boys [19]. In a study conducted by Neeraja and colleagues on the knowledge and performance of dental students in Bangalore, India, in 2008, significant differences ($P<0.05$) were observed among students of different years regarding their concern about tooth color, not visiting the dentist beforehand, and thoroughly brushing each tooth. There were also highly significant differences ($P<0.001$) among students of different years in brushing twice a day, satisfaction with the appearance of teeth, cleaning teeth without using toothpaste, visiting the dentist only in case of toothache, spending a lot of time brushing, worrying about bad breath, and regular use of mouthwash [3]. Azhar Abdulrahman and his colleagues' study in 2016 on the knowledge, attitude, and practice of dental hygiene among students at Cairo University shows a statistically significant difference in the scores of knowledge, attitude, and behavior related to oral health between pre-clinical dental students and those who have a better understanding of oral health and can maintain it more effectively [20].

Regional background (neighboring countries)

The research conducted by Oullayia Haram Jehan in Peshawar, Pakistan, showed that in this study, 49.6% of students believed that they should brush their teeth after eating, and 41.3% associated excessive food consumption with the development of dental cavities. Additionally, 62.6% identified bleeding gums as a sign of inflammation, and 55.6% believed that regular brushing prevents all dental problems. Most students (91.9%) confirmed the role of sugar in tooth decay, and 88.1% identified the accumulation of dental plaque as a cause of decay. Additionally, 87.8% believed that fluoride strengthens teeth, and 89.6% recognized the relationship between overall body health and oral health. In terms of hygiene habits, 51.9% brushed their teeth twice a day and also used additional methods such as mouthwash (31.4%) and wooden toothbrushes (30.4%). Additionally, 50.9% adhered to the recommended two minutes for brushing their teeth. In the dietary habits section, 44.7% reported consuming sweets 2 to 4 times a day, and 51.2% reported drinking carbonated beverages at least once a week. Finally, 8.1% of the students admitted to using tobacco [21].

The research conducted by Razieh Hosseini-Far and her colleagues at Kerman Medical University among stomatology students in 2020 showed that in this study, 48% of the students had high knowledge and 42% had a positive attitude toward oral and dental hygiene. No significant correlation was observed between the variables of age and the type of entry into the field of stomatology with the variables of attitude, knowledge, and performance (p value > 0.05). In contrast, female students and those whose parents were doctors showed better performance in the field of oral health. Additionally, a significant correlation was observed between knowledge and performance (p value < 0.05) as well as between attitude and knowledge [22].

The research conducted by Hamed Safari and his colleagues at Qom University of Medical Sciences in Iran showed that in this study, the average age of the students was 20.98±2.03 years, and 50% of them were men. Overall, 45.4% of the students had high knowledge and 51.3% had a positive attitude toward oral and dental hygiene. In the multivariable logistic regression model, a significant relationship was observed between being male and a lower level of knowledge, while being female and studying in the field of stomatology were significantly associated with a positive attitude. Additionally, the likelihood of regular flossing was reported to be higher among female students and those with higher levels of knowledge. Additionally, higher education was significantly associated with having undergone a dental examination in the past year on 2026/10/5.

Internal background

The study by Hedayatullah Ehsan and colleagues in 2023 on the knowledge, attitudes, and practices of students regarding oral hygiene among students at Kabul Medical University shows that 44.5% (n=220) of participants regularly brushed their teeth twice a day, 41.3% (n=204) once a day, and 9.31% (n=46) more than twice a day, while only 4.7% (n=23) cleaned their teeth less than once a day. Surprisingly, the majority of participants (91% or n=451) were aware of the importance of regular dental check-ups, and 51.3% (n=252) of the participants reported visiting the dentist when they experienced pain. 94% of the students believed that brushing teeth prevents tooth decay. 93% (n=461) of them agreed that using fluoride strengthens teeth, and 96% (n=476) said that sweets are harmful to teeth [2].

Summary of the background and the position of the current research

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A review of the scientific background shows that knowledge, attitudes, and practices of individuals regarding oral health have been important research topics at both international and regional levels. Numerous studies in various countries around the world have shown that the level of knowledge and attitudes of university students in this field is closely related to several factors such as age, gender, field of study, parental education level, and access to health services. Global studies indicate that despite significant advancements in medical sciences and the enhancement of preventive programs, there are still considerable differences in oral health-related behaviors among various demographic groups. This issue indicates that sufficient knowledge alone cannot lead to attitude change and ultimately performance improvement; rather, it requires effective educational and cultural programs. At the regional level, research has also shown that developing countries such as Pakistan, Iran, India, and others face similar challenges. The results of these studies indicate that university students in these countries generally possess an average level of knowledge, but significant weaknesses are observed in terms of attitude and especially practical performance. For example, although many students are aware of the importance of brushing and using dental floss, this awareness does not translate into regular and consistent behaviors in practice. Additionally, some cultural, economic factors, and limitations in access to medical services have also been identified as major obstacles.

The internal background in Afghanistan is still limited, but even that small number has highlighted the importance of the issue. For example, a study conducted at Kabul University showed that the level of awareness among students regarding oral and dental hygiene is at an average level, and there is a significant gap between the level of knowledge and actual performance. These findings clearly indicate that the issue of educating and promoting proper oral hygiene methods among the young and educated segment of the country still has a lot of room for improvement. Since university students are not only the builders of the future but also serve as behavioral role models for those around them, improving oral hygiene among this group can play a significant role in enhancing the overall health of society.

Considering the literature review, it can be observed that although numerous studies have been conducted at the international and regional levels, there is a lack of sufficient research in this field in Afghanistan. The position of the present research is precisely defined at this scientific gap. This study aims to scientifically examine the knowledge, attitudes, and practices of students regarding oral and dental hygiene for the first time at Herat University. The results of this research can provide a clear picture of the current situation in one of the largest educational centers in the country and create a basis for comparison with other countries. In addition, the findings of the present study can serve as a basis for designing educational and intervention programs at the university level and even national programs for promoting oral health in Afghanistan.

In conclusion, it can be said that a review of the background of the subject clearly shows that:

1. There is a gap between knowledge and performance at the global and regional levels;
2. Countries similar to Afghanistan also face cultural and structural problems in this area; Countries similar to Afghanistan also face cultural and structural problems in this area;
3. In Afghanistan, little research has been conducted, and there is an urgent need for more studies. In Afghanistan, limitedresearch has been conducted, and there is an urgent need for further studies.
4. The present research at Herat University can partially fill this scientific gap and provide the necessary scientific evidence for policymakers and educational institutions.

Therefore, the significance of the present research not only lies in filling the scientific gap in Afghanistan but also in serving as a model for conducting similar research in other universities of the country and even at the regional level.

Materials and Methods

In this chapter, the research methodology is discussed in detail, including the study design, population and sample, data collection tools and methods, data analysis methods, and ethical considerations. The aim of this chapter is to provide a detailed explanation of how the research was conducted and to ensure the validity and reliability of the results obtained.

Study design and setting

This study was designed as a cross-sectional study and was conducted among the students of Herat University. In this study, cluster sampling was used to obtain a representative sample of students from various departments and faculties of this university. The research was conducted at Herat University, which is considered one of the largest higher education centers in the country and has multiple faculties. The study population included all students from various faculties of this university. Data collection took place in the month of Jawza in the year 1404. The data collection tool was a structured questionnaire prepared with consideration of the research objectives and a review of the scientific background. The questionnaire included three main sections (knowledge, attitude, and practice) along with demographic information related to oral health. The questionnaires were distributed in person in classrooms and collected after completion, following coordination with the esteemed university administration and the cooperation of professors from various faculties. In terms of inclusion and exclusion criteria, all students who were present at the university during the distribution of the questionnaire and were able to read and write in Dari (since the questionnaire was prepared in Dari) were included in the study. Students who were not interested in cooperating or had answered the questionnaire incompletely were excluded from the study. In total, a specific number of students were selected based on the sample size estimation, and the questionnaires were distributed among them. During the process, some issues arose, such as the lack of full cooperation from some students or their absence on the days of questionnaire distribution. However, by replacing them with other selected students, the required sample size was completed.

Sample size and sampling method

To determine the required sample size for this research, Cochran's formula was used. This formula is one of the most common methods for calculating sample size in cross-sectional studies. By substituting the above values into the formula, the required sample size for the present study was calculated. Based on this calculation, the final sample size was determined to be 358 individuals. To ensure data adequacy and compensate for incomplete or unreturned questionnaires, an additional 10% was considered, and ultimately, 392 students were included in the study. The sampling method in this research was conducted using stratified random sampling. Initially, all students of Herat University were considered as separate strata based on different faculties. Then, the

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on different faculties. Then, the sample size was randomly selected in proportion to the number of students in each faculty. This method ensured a fair representation of students from different fields in the research.

Data Collection

For data collection, a structured questionnaire is used, which includes 35 questions in four sections: demographic information, knowledge, attitude, and performance in the field of oral hygiene. This questionnaire has been developed based on studies and scientific articles, with its questions primarily adapted from the research of [23],[1],[24].

Input specifications

Students of Herat University who are currently studying in the current academic year.
Students' consent to participate in the study.

Expulsion details

Not fully completing the questionnaire. Failure to cooperate in continuing participation at any stage of the study.

Studies and statistical analysis

The collected data were reviewed for completeness and errors before analysis; incomplete questionnaires were removed and considered as non-responses. All completed questionnaires were entered into SPSS-V27 software, and the normal distribution of continuous variables was evaluated using standard methods. The research variables were summarized using frequencies, ratios, medians, and interquartile ranges (IQR), especially for quantitative variables that do not follow a normal distribution. For categorical variables, the Chi-Square test was used. Binary logistic regression without conditions was used to identify independent variables associated with high awareness. Odds ratios were calculated with a 95% confidence level, and a P value of < 0.05 was considered statistically significant.

Ethics and ethical issues

This research was evaluated and approved by the Scientific Research Committee of the Faculty of Medicine at Herat University in terms of ethical issues and adherence to ethical principles (Protocol No.: ..... Date: .....). Date: .....). All participants voluntarily and willingly participated in the study with full awareness of its objectives. The information collected from the participants was recorded completely anonymously, and they were assured that the data would remain entirely confidential and would only be used for research purposes and the presentation of scientific reports, in accordance with international standards for scientific and human research.

Findings and Analysis of Results

This chapter is dedicated to presenting the results obtained from the research and is organized in such a way that the collected data are analyzed and interpreted systematically, accurately, and documentary. In this chapter, we will first introduce the demographic characteristics of the students, including age, faculty, academic year, marital status, primary residence, and economic status. Then, the main results of the research, which pertain to the level of knowledge, attitude, and performance of students in the field of oral health, will be presented. The research data were collected through standardized and normative questionnaires, and appropriate statistical methods were used for their analysis. Data analysis was conducted in two sections: descriptive and inferential, and the findings were presented in the form of tables and charts to provide a clearer and simpler understanding of the results. In addition, to examine relationships and comparisons between groups (such as age differences, academic years, and various fields of study), appropriate statistical tests like t-tests and analysis of variance have been used. This chapter aims to systematically and documentary present the findings, providing a suitable context for a deeper analysis and interpretation in the fifth chapter.

Demographic information

Demographic information is one of the most important parts of any research, as it allows researchers to have a better understanding of the composition of the sample. In this study, demographics included variables such as age, marital status, economic status, field of study, academic year, place of residence, and other relevant factors. Analyzing these characteristics helps in better understanding the factors related to oral health maintenance among students [Table 1-4].

Variable	**Group**	**Count**	**Percentage**
Age	21-17	242	61.7
	22-25	133	33.9
	32-26	17	4.3
Marital Status	Single	345	88
	Married	47	12
Field of Study	Medical	72	18.4
	Non-Medical	320	81.6
Academic Year	First	101	25.8
	Second	118	30.1
	Third	104	26.5
	Fourth	46	11.7
	Fifth	13	3.3
	Sixth	7	1.8
	Seventh	3	0.8
Economic Status	Poor	68	17.3
	Moderate	283	72.2
	Good	41	10.5

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Residence	Urban / City	257	65.6
	Urban / City	135	34.4

Table (1-4) - Demographic Information - Subscribers

Analysis and interpretation of demographic data

According to the data collected from Herat University, the demographic composition of the participants in this study well reflects the diversity of demographic variables. The table shows that the majority of participants fall within the age group of 17–21 years (242 individuals, 61.7%), followed by the age group of 22–25 years (133 individuals, 33.9%) who had the next highest share. Only a small number (17 people, 4.3%) were in the age group of 26–32 years. These findings indicate that most students fall within the normal age range for university enrollment [Table 2].

[Table 4-2], shows the distribution of students' responses to the questions in the knowledge section. In this table, the percentage of "Yes," "No," and "No opinion" responses for each question is presented to assess the general awareness level of students regarding oral hygiene. The results showed that regarding the relationship between oral hygiene and overall body health, 95.7% of the respondents chose the "Yes" option. This indicates the high understanding of students regarding the importance of oral hygiene as a part of overall body health. Only a small percentage (3.1%) responded negatively, indicating a good general awareness in this area. In the second question, which refers to the role of microbial plaques in causing tooth decay and gum disease, 66.3% of the students responded positively. Although two-thirds of the respondents were aware of this issue, nearly one-third still had no opinion or responded negatively, indicating a need for further awareness. In the third question, the majority of students (89.3%) correctly understood that using a toothbrush and toothpaste is effective in preventing cavities and gum disease. This result indicates a high level of knowledge in the field of oral disease prevention. Regarding the role of fluoride in preventing tooth decay, 65.6% of the respondents answered "yes." Although the majority were aware of the role of fluoride, still one-

No.	Statement	Yes, n (%)	No, n (%)	No Opinion, n (%)
1	Oral health is related to general health.	375 (95.7%)	12 (3.1%)	5 (1.3%)
2	Dental caries and gum disease are caused by dental plaque (biofilm).	260 (66.3%)	55 (14.0%)	77 (19.6%)
3	Proper tooth brushing and the use of dental floss can prevent dental caries and gum disease.	350 (89.3%)	29 (7.4%)	13 (3.3%)
4	Fluoride prevents dental caries.	257 (65.6%)	30 (7.7%)	105 (26.8%)
5	Caries-causing bacteria can be transmitted from mother to child.	119 (30.4%)	162 (41.3%)	111 (28.3%)
6	Frequent consumption of sticky sweets causes dental caries.	345 (88.0%)	22 (5.6%)	25 (6.4%)
7	Teeth alignment is performed for aesthetic and functional reasons.	309 (78.8%)	34 (8.7%)	49 (12.5%)
8	Mouthguards prevent sports-related injuries to oral structures.	238 (60.7%)	58 (14.8%)	96 (24.5%)
9	A tooth that has been displaced due to trauma can be repositioned in its original place.	133 (33.9%)	177 (45.2%)	82 (20.9%)
10	Proper oral and dental care can prevent tooth loss in old age.	334 (85.2%)	38 (9.7%)	20 (5.1%)
11	Carbonated beverages weaken the teeth.	318 (81.1%)	34 (8.7%)	40 (10.2%)
12	Tobacco causes oral cancer.	270 (68.9%)	31 (7.9%)	91 (23.2%)

Table 2: Participants' responses regarding oral health knowledge

fourth of the respondents had no opinion on this matter, indicating the need for further education on the benefits of fluoride. In the fifth question, which was about the transmission of decay-causing bacteria from mother to child, only 30.4% responded positively, while 41.3% had no opinion and 28.3% responded negatively. These results indicate that the students do not have sufficient awareness of this issue and their knowledge should be increased through educational programs and media. In the sixth question,

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and media. In the sixth question, regarding the impact of sweets on tooth decay, 88% responded positively. This indicates that the majority of students are aware of the role of sugary substances in causing cavities, and this level of awareness reflects their good understanding of healthy nutrition. The seventh question, which referred to the purpose of aligning teeth (orthodontics), specifically whether this is done for esthetic and functional reasons, found that 78.8% of the students agreed with this statement and chose the answer "yes." This result indicates that the majority of students have a correct understanding and appropriate awareness of the dual importance of orthodontics; meaning that they know that having aligned teeth is not only for esthetic purposes but also plays a significant role in proper chewing, pronunciation of words, and maintaining overall oral health. However, 8.7% of the students answered "no" and 12.5% answered "I have no opinion." This group may not have sufficient awareness of the functional aspects of orthodontics and may only have focused on its appearance or esthetic aspect. Overall, this finding indicates that the level of students' knowledge about the scientific and practical goals of orthodontics is relatively good, but there is a need to strengthen education on the relationship between tooth position, oral function, and jaw health. Incorporating orthodontic concepts into oral health awareness programs at universities can help enhance students' knowledge and attitudes in this area. In the eighth question, which was about protecting teeth from sports injuries and physical pressures, 60.7% responded positively. This indicates that the majority are somewhat aware of the importance of using a mouthguard in sports activities, but still about 40% lack sufficient awareness. In question nine, which refers to the possibility of re-implanting a tooth that has been knocked out, only 33.9% responded positively, and 45.2% had no opinion. This finding indicates the low awareness of students regarding dental first aid and highlights the need for specific training in this area.

In the tenth question, regarding the relationship between oral care and preventing bad breath, 85.2% of the respondents chose the "Yes" option. This indicates an appropriate understanding of the importance of maintaining oral hygiene in preserving mouth freshness. Regarding the eleventh question, which examined the students' knowledge about the impact of carbonated drinks on tooth weakening, the results showed that 81.1% of the students agreed with this statement and chose the "yes" response. This indicates that a significant majority of the participants are aware of the negative effects of carbonated drinks on dental health. The awareness of most students regarding these effects indicates a relatively good level of knowledge in the field of nutrition and its impact on oral health. In contrast, 8.7% of the students answered "no" and 10.2% answered "I have no opinion." This group may not have sufficient awareness of the acidic compounds in soft drinks and their effects on tooth enamel. In the twelfth question, 68.9% of the respondents were aware that tobacco is considered one of the main causes of oral cancer. Although the majority have understood this risk, more than one-fifth of the respondents still lack sufficient awareness in this regard.

Conclusion

Based on the results obtained from the questionnaire analysis, out of the 392 students participating in the study, 276 (70.4%) had an adequate level of knowledge regarding oral hygiene, while 116 (29.6%) had a low level of knowledge. Considering that the total score for the knowledge section was 12 points, students who scored 7 or higher were classified as having sufficient knowledge, while those who scored below 7 were classified as having low knowledge. These results indicate that the majority of university students have a relatively adequate awareness of oral hygiene, but still about one-third of them need to enhance their knowledge and awareness in this area. Attention to this issue in educational and awareness programs can play an important role in improving oral health among students [Table 3].

Variable	Group	n	P value	Mean Score
Age (years)	21–17	242	0.366	8.343
	25–22	133		8.5489
	32–26	17		8.9412
Marital Status	Single	345	0.962	8.4406
	Married	47		8.4255
Field of Study	Medical	72	**0.001**	9.611
	Non-Medical	320		8.175
Academic Year	First	101	0.733	8.3762
	Second	118		8.3814
	Third	104		7.9904
	Fourth	46		8.8478
	Fifth	13		9.2308
	Sixth	7		11.7143
	Seventh	3		11
Economic Status	Poor	68	0.964	8.2794
	Moderate	283		8.3675
	Good	41		9.1951
Residence	Urban	257	0.229	8.5253
	Rural	135		8.2741

Table 3: Association between sociodemographic characteristics and oral health

Acknowledge

Analysis: To examine the relationship between students' level of knowledge about oral hygiene and demographic variables (age, marital status, field of study, academic year, economic status,

and place of residence), appropriate statistical tests (such as ANOVA and t-test) were used. In the above table, the mean scores of knowledge (Mean Score) and the p-value for each variable are presented.

Age: The average knowledge score in different age groups was obtained as follows: for the 17 to 21 years group (8.34), the 22 to 25 years group (8.54), and the 26 to 32 years group (8.94). Although the level of knowledge has slightly increased with age, the P value of 0.366 indicates that this difference is not statistically significant. In other words, age has not had a significant impact on the students' level of knowledge regarding oral hygiene. This finding may be due to the similarity of educational resources and learning environments among different age groups.

Marital Status: The average knowledge score among single students (8.44) and married students (8.42) is almost similar. The P value of 0.962 also indicates that there is no significant difference between these two groups. Therefore, marital status or experience has not affected the oral knowledge of the students, and the level of knowledge is more dependent on education and access to health information than on marital status.

Field of Study: Among the fields of study, students in medical fields have achieved a higher average score (9.56) compared to non-medical fields (8.17). The p-value of 0.001 indicates that this difference is statistically significant. This result is natural, as medical students are usually more familiar with topics related to oral and dental health during their training and have a higher level of knowledge in this area compared to other fields.

Academic Year: Regarding the academic year, although the difference in student scores was not statistically significant overall, a notable pattern was observed; student scores were at an average level in the first and second years, decreased slightly in the third year, but increased again in the higher years (fourth and fifth). Post Hoc Tests revealed that there is a significant difference between students in the first, second, and third years and those in the later years (fourth and fifth), with higher-year students having a higher average knowledge score. This finding indicates that with the increase in academic year, the level of awareness and knowledge of the students also increases. The reason for this can be attributed to the increase in educational experience, access to more specialized subjects, and a deeper understanding of health concepts. Early-year students are usually still in the initial stages of education and have not had sufficient opportunity to acquire the related scientific and practical skills. Overall, these results indicate that progress in the academic year plays an important role in enhancing oral hygiene knowledge, and it is necessary to include awareness and practical programs related to oral hygiene in the curriculum from the early years of education.

Economic Status: In terms of economic status, overall, its relationship with the level of knowledge was not statistically significant. However, in the comparison between groups, it was observed that students with good economic status had higher scores compared to students with average economic status, and this difference was statistically significant. Based on the Tukey post-hoc test, a significant difference was observed between the group with good economic status and the group with average economic status; this means that individuals with better economic status had a higher average knowledge score compared to the average group. This difference may be due to better access for individuals with higher economic status to educational resources, healthcare, dental services, and higher general awareness within the family. In contrast, students with lower or moderate economic status may have less access to educational resources or quality healthcare services. Overall, the findings indicate that economic factors can play a significant role in the level of awareness and knowledge of students regarding oral hygiene, and attention to this factor is essential in educational and social planning.

Residence: In examining the relationship between residence (urban and rural) and the level of students' knowledge, no statistically significant difference was observed ($P > 0.05$). Although the average knowledge score among urban students was slightly higher than that of rural students, this difference was not statistically significant. This finding indicates that place of residence alone does not have a significant impact on the level of awareness regarding oral hygiene. However, it can be said that urban students likely have relatively greater awareness compared to rural students due to better access to health services, awareness programs, and educational resources, but this difference has not been statistically significant.

Summary

The research results showed that differences were observed between the level of students' knowledge about oral hygiene and some demographic factors, and in some cases, these differences were statistically significant. Among the examined variables, age, marital status, and place of residence did not have a statistically significant relationship with the level of knowledge ($P > 0.05$). This indicates that awareness of oral hygiene among students at Herat University is largely uniform, and factors such as age or marital status do not have a significant impact on their level of knowledge.

However, in contrast, the field of study showed a significant relationship with the level of knowledge ($P < 0.05$). This means that students in medical fields had a higher level of knowledge compared to non-medical fields. This result seems logical because subjects related to oral health are more included in the curricula of medical fields, and students in these fields have educational contacts and awareness interventions at the university level and health institutions in the country.

Analysis

The findings of the above table show that the students' attitudes toward oral hygiene are generally positive and conscious. Most participants have emphasized the importance of maintaining oral health, the appearance of the teeth, and its effect on social relationships. The analysis of each question is briefly presented below.

Regarding concern about the color of the teeth, the majority of the students (approximately 73% strongly agree and 18.6% agree) stated that they are sensitive and concerned about the color of their teeth. This indicates their positive attitude toward the beauty and appearance of their teeth, which can be a motivation for better oral hygiene practices.

Regarding the color of the gums, about 41.8% of the students strongly agreed and 28.8% agreed that the color of their gums was important to them. This shows that more than two-thirds of the students pay attention to the condition and color of their gums, although about 15% had no opinion or were indifferent, which may be due to less awareness about the role of gums in oral health.

Regarding satisfaction with the appearance of the teeth, more than three-quarters of the students (about 77%) were satisfied with the appearance of their teeth (strongly agree and agree). This finding shows that the majority of individuals consider the health and beauty of their teeth to be desirable, which is probably related to regular tooth brushing and oral hygiene care.

Regarding personal decision-making about dental treatment, nearly 56% (agree and strongly agree) of the respondents believe that they

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No.	Statement	Strongly Agree, n (%)	Agree, n (%)	No Opinion, n (%)	Disagree, n (%)	Strongly Disagree, n (%)
1	Are you concerned about the color of your teeth?	286 (73.0%)	73 (18.6%)	18 (4.1%)	10 (1.3%)	5 (1.3%)
2	Does the color of your gums bother you?	164 (41.8%)	113 (28.8%)	60 (15.3%)	42 (10.7%)	13 (3.3%)
3	Are you satisfied with the appearance of your teeth?	182 (46.4%)	120 (30.6%)	38 (9.7%)	46 (11.7%)	6 (1.5%)
4	Do you think you can decide for yourself about the treatment you need?	129 (32.9%)	116 (29.6%)	65 (16.6%)	63 (16.1%)	19 (4.8%)
5	Do you think patients themselves should decide whether they need dental	125 (31.9%)	96 (24.5%)	53 (13.5%)	79 (20.2%)	39 (9.9%)
6	Are you concerned about having bad breath?	209 (53.3%)	104 (26.5%)	40 (10.2%)	23 (5.9%)	16 (4.1%)
7	Do you feel that sometimes you spend too much time brushing your teeth?	77 (19.6%)	90 (23.0%)	78 (19.9%)	110 (28.1%)	37 (9.4%)
8	Do you think that unless you brush your teeth with strong pressure, they will not be cleaned properly?	143 (36.5%)	96 (24.5%)	67 (17.1%)	48 (12.2%)	38 (9.7%)
9	Oral health affects social relationships.	254 (64.8%)	96 (24.5%)	29 (7.4%)	9 (2.3%)	4 (1.0%)

Table 4: Participants' attitudes toward oral health and dental care

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themselves can decide about the need for treatment. This positive attitude indicates the students' sense of responsibility and self-confidence regarding their oral health; however, at the same time, it shows that the role of consultation should be emphasized more.

Regarding the fifth question, which stated: "Do you think it is necessary for the patient themselves to decide about the need for dental treatment?", the findings showed that about 56% of the students selected the options "agree" and "strongly agree," while the options "disagree" and "strongly disagree" indicate a correct and positive attitude in this regard. This issue shows that more than half of the students have an incorrect attitude regarding the role of the patient in dental treatment and believe that the final decision should be made by the patient themselves, whereas from a scientific and professional perspective, the diagnosis and final decision regarding the need for dental treatment should be based on the opinion of the dentist.

Regarding concern about bad breath, more than half (53.3%) of the students expressed concern about bad breath. This concern indicates attention to social health and interpersonal interactions, as bad breath is one of the factors that can negatively affect social relationships.

For the seventh question, which was presented as: "Do you feel that sometimes you spend too much time brushing your teeth?", the findings showed that 19.6% of the students selected "strongly agree," 23% "agree," 19.9% "no opinion," 28.1% "disagree," and 9.4% "strongly disagree." Since in this question the options "disagree" and "strongly disagree" indicate a positive attitude (because spending too much time brushing is not only unnecessary but may also harm the gums), it can be said that only about 37.5% of the students had a positive and conscious attitude toward this issue. In contrast, more than 42% of the students, by selecting "agree" and "strongly agree," demonstrated an incorrect attitude toward oral care and believed that the longer the brushing duration, the cleaner the teeth would become. This is while, from a scientific perspective, the appropriate brushing duration is about two minutes, and excessive duration may cause tooth abrasion and damage to the gums.

For the eighth question, most respondents selected the options "agree" (24.5%) and "strongly agree" (36.5%), while the responses "disagree" and "strongly disagree" (approximately 22% in total) indicate a more correct understanding of the proper method oftooth brushing.

This finding shows that the majority of students have an incorrect attitude toward the correct method of tooth brushing and believe that applying greater pressure while brushing makes the teeth cleaner, whereas scientifically, excessive pressure can cause gum recession and abrasion of the tooth enamel.

Regarding the effect of oral health on social relationships, more than two-thirds of the students (approximately 60%) stated that oral health has a direct effect on social relationships. This shows that most students are aware of the role of oral and dental health in self-confidence and social interactions.

Conclusion

To assess the students' attitudes toward oral hygiene, the total scores related to the attitude section included 9 questions. The maximum score that could be obtained by each individual was considered to be 45 points. Based on the scoring criteria, students who obtained 30 points or more were placed in the group with a positive attitude, while those who obtained less than 30 points were classified in the group without a positive attitude.

The results of the data analysis showed that, out of a total of 392 participating students, 235 (59.9%) had a positive attitude toward oral hygiene, while 157 (40.1%) had a non-positive attitude. These results indicate that the majority of students (approximately sixty percent) have a favorable and conscious attitude toward the importance of oral hygiene. However, nearly two-fifths of the students (40.1%) still showed a weaker attitude or indifference toward the issue, which may be due to a lack of knowledge, not giving sufficient importance to regular oral care, or traditional attitudes toward oral health.

Overall, the findings show that the students' attitudes toward oral hygiene are at a relatively good and acceptable level. In general, the findings indicate that the students' attitudes toward oral hygiene are positive, conscious, and based on individual and social values. The majority of students pay attention to dental beauty, bad breath, and gum health and believe that maintaining oral hygiene has an effect on social relationships. However, in some areas, such as the correct method of tooth brushing and regular visits to the dentist, there is a need for corrective and strengthening education to promote more accurate and scientifically appropriate attitudes among the students.

Variable	Group	n	P value	Mean Attitude Score
Age (years)	17–21	242	0.891	19.719
	22–25	133		19.8346
	26–32	17		20.0588
Marital Status	Single	345	0.856	19.7623
	Married	47		19.8511
Field of Study	Medical	72	0.15	19.3194
	Non-Medical	320		19.875

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Academic Year	First	101	0.585	19.505
	Second	118		19.9576
	Third	104		19.9615
	Fourth	46		19.8913
	Fifth	13		18.6154
	Sixth	7		18.5714
	Seventh	3		21
Economic Status	Poor	68	0.63	20.0294
	Moderate	283		19.7491
	Good	41		19.5122
Residence	Urban	257	0.664	19.8249
	Rural	135		19.6741

Table 5: Association between sociodemographic characteristics and attitude scores toward oral health

Analysis: The results of [Table 4-5], indicate that there are differences in the average scores of students' attitudes across various demographic variables, including age, marital status, field of study, academic year, economic status, and place of residence. However, no statistically significant relationship (P<0.05) has been observed in any of these variables, as all P values are greater than 0.05.

Age: The average attitude score in the age group of 17–21 years (19.71) is lower and in the age group of 26–32 years (20.05) is higher, but the difference between the age groups is not statistically significant (P=0.891). This result indicates that increasing age has no significant impact on attitudes toward oral hygiene.

Marital Status: Married individuals had a higher average attitude score (19.85) compared to single individuals (19.76), but this difference is not statistically significant (P=0.856). This means that marital status has not had a significant impact on attitudes toward oral hygiene.

Field of Study: Students in non-medical fields (mean score 19.87) have a higher attitude score compared to those in medical fields (19.31), but this difference is not statistically significant (P=0.150). It seems that the type of field of study does not have a significant impact on the overall attitude toward oral hygiene, although there is a slight tendency for a better attitude among non-medical fields.

Academic Year: The average attitude scores in different academic years range from 18.57 to 21; the lowest average is observed in the sixth year (18.57) and the highest in the seventh year (21.00). Despite these differences, the variation between academic years is not statistically significant (P=0.585). However, the trend in scores indicates that in higher years, the average attitude score slightly increases, which may reflect a gradual growth in the understanding and experience of students in the field of oral and dental hygiene.

Economic Status: Students with a poor economic status had an average attitude score of 20.02, a medium score of 19.74, and a good score of 19.51. Although there are slight differences between the groups, they are not statistically significant (P=0.630). Overall, economic status has not had a significant impact on attitudes toward oral hygiene, but it is observed that students with a poor economic status have shown slightly better attitudes, which may be due to their greater attention to oral hygiene.

Residence: The average attitude score among urban students (19.82) is slightly higher than that of rural students (19.67), but this difference is not statistically significant (P=0.664). This finding indicates that residence does not play a major role in individuals' attitudes toward oral hygiene.

Overall Conclusion

In general, although the average attitude scores among different groups are slightly different, none of these differences are statistically significant. This finding indicates that the attitude toward oral hygiene among students is relatively uniform, and factors such as age, academic year, field of study, economic status, and place of residence have not had a significant impact on it. However, it is observed that in higher academic years and among older age groups, the average attitude scores have slightly increased, which may indicate a gradual increase in experience and awareness in the field of oral hygiene.

Analysis: The results of the table show that out of the total respondents, the highest number (50.8%) brush their teeth once a day, while only 10.7% brush more than twice a day. This finding indicates that although most students have a habit of brushing their teeth, the frequency of brushing is not at an optimal level for oral hygiene. Regarding the duration of brushing, more than half of the respondents (45.4%) brush

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No.	Question	Response	n (%)
1	How many times do you brush your teeth per day?	Not at all	46 (11.7%)
		Once	199 (50.8%)
		Twice	105 (26.8%)
		More than twice	42 (10.7%)
2	How long do you usually brush your teeth?	Less than 1 minute	62 (15.8%)
		1–2 minutes	178 (45.4%)
		2–3 minutes	106 (27.0%)
		More than 3 minutes	46 (11.7%)
3	What type of toothbrush do you use?	Soft	141 (36.0%)
		Medium	148 (37.8%)
		Miswak	99 (25.3%)
		Electric	4 (1.0%)
4	How often do you use dental floss per week?	Not at all	208 (53.1%)
		1–2 times	93 (23.7%)
		Daily	43 (11.0%)
		3–4 times	48 (12.2%)
5	How often do you visit a dentist per year?	Not at all	224 (57.1%)
		Every 2–3 years	60 (15.3%)
		Once a year	88 (22.4%)
		Every 6 months	20 (5.1%)
6	What was the reason for your most recent visit to the dentist?	Toothache	246 (62.8%)
		Scaling	73 (18.6%)
		Dental examination	55 (14.0%)
		Cosmetic reasons	18 (4.6%)

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7	How many times per day do you consume sugary foods?	Not at all	41 (10.5%)
		1–2 times	228 (58.1%)
		3–4 times	83 (21.2%)
		More than 5 times	40 (10.2%)
8	Do you brush your teeth after consuming sweets?	Always	58 (14.8%)
		Sometimes	168 (42.9%)
		Rarely	121 (30.9%)
		Never	45 (11.5%)
9	Do you use mouthwash?	Daily	53 (13.5%)
		Sometimes	139 (35.5%)
		Never	138 (35.2%)
		2–3 times per week	62 (15.8%)

Table 6: Participants' Oral Health Practices and Dental Care Behaviors

their teeth for two to three minutes, which is considered a relatively appropriate duration in line with oral hygiene recommendations, although 15.8% still brush for less than two minutes. Regarding the type of toothbrush used, the results showed that 37.8% use a medium toothbrush, 36% use a soft toothbrush, and 27% use a wooden toothbrush. Regarding the use of dental floss, the results show that 53.1% of respondents never use dental floss, and only 11% use it daily. This issue is considered one of the significant weaknesses in oral hygiene practices, as regular use of dental floss plays a key role in preventing gum inflammation and interproximal cavities. Regarding visits to the dentist, the majority of respondents (57.1%) stated that they have never visited a dentist, and only 5.1% visit every six months. This low figure indicates insufficient awareness of the importance of periodic check-ups. Regarding the reason for the last visit to the dentist, the most mentioned reason was toothache (62.8%), while only 14% visited for an examination. This indicates that most visits are reactive (during pain) rather than preventive. Regarding the consumption of sweet substances, more than half (58.2%) of the respondents use sweet substances 1 to 2 times daily, and 10.5% do not consume them at all. This level of consumption can be a significant factor in increasing the risk of dental caries, especially in the absence of proper oral hygiene. Regarding rinsing the mouth after consuming sweet substances, only 14.8% always rinse their mouths, while 30.9% do so rarely and 11.5% never do it. This finding indicates a serious weakness in preventive behaviors. Finally, regarding the use of mouthwash, only 13.5% of respondents use mouthwash daily, and 35.2% have never used it. This finding also indicates that the overall performance level in terms of oral hygiene is at a low to moderate level. Overall conclusion: In this section, the students' performance regarding practical behaviors related to oral hygiene was examined. This section included 9 questions, with a score assigned to each question, and correct answers were coded based on scientific criteria for proper oral and dental behaviors. Based on the total scores, the performance level was divided into three groups: 0 to 3 points for poor performance, 4 to 6 points for average performance, and 7 to 9 points for good performance. The results of the data analysis in SPSS software showed that out of the total 392 participating students, 266 (67.9%) had poor performance, 121 (30.9%) had average performance, and only 5 (1.3%) had good performance in the area of oral hygiene. These results indicate that the majority of students have poor performance in terms of practical oral hygiene behaviors. The details of the responses also show that in most questions, the correct answers were chosen less frequently. A detailed review of the performance questions showed that in most cases, students do not adhere to proper health behaviors. For example, the majority brush their teeth only once a day, while the correct option is twice or more. Additionally, the duration of brushing in most individuals is less than 2 to 3 minutes, and many of them do not use a soft toothbrush. Additionally, most students do not have regular visits (every six months) to the dentist, do not undergo check-ups, and do not consistently rinse their mouths after eating food and sweets. Overall, the findings indicate that although the theoretical knowledge level of the students may be relatively satisfactory, their practical performance in adhering to oral hygiene principles is weak. Therefore, there is a serious need for regular and practical educational and awareness programs in this area. Examining the relationship between demographic variables and student performance.

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Variable	Group	n	P value	Mean Score
Age (years)	17–21	242	0.0132	3.0083
	22–25	133		3.188
	26–32	17		2.5882
Marital Status	Single	345	0.312	3.0232
	Married	47		3.2553
Field of Study	Medical	72	0.664	2.9861
	Non-Medical	320		3.0656
Academic Year	First	101	0.741	3.0297
	Second	118		3.0678
	Third	104		3.0865
	Fourth	46		3.1522
	Fifth	13		2.3846
	Sixth	7		3.2857
	Seventh	3		2.6667
Economic Status	Poor	68	0.057	3.0441
	Moderate	283		2.9823
	Good	41		3.5366
Residence	Urban	257	0.064	2.9533
	Rural	135		3.237

Table 7: Association Between Sociodemographic Characteristics and Oral Health Practice Scores

Analysis: In this study, the relationship between the level of students' performance in oral health maintenance and demographic variables including age, marital status, field of study, academic year, economic status, and place of residence was examined. The results in the corresponding table indicate that the difference in the mean performance scores for none of these variables was statistically significant, as in all cases the p-value was greater than 0.05. However, examining the average scores in each group reveals significant patterns. In relation to age, the highest average performance score was observed in the age group of 22 to 25 years (3.1880), while the lowest score belonged to the 26 to 32 years group (2.5882) (p=0.132). This finding indicates that individuals in the middle young age group have relatively better performance in adhering to oral hygiene principles, although the differences are not statistically significant. Regarding marital status, married students had a better performance with an average score of 3.2553 compared to single students (3.0232), but this difference was not significant either (p=0.312). This may indicate that married individuals might pay more attention to their oral health, but no significant difference is observed at the statistical level. In terms of field of study, non-medical students (3.0656) performed slightly better than medical students (2.9861) (p=0.664), but this difference was not statistically significant either. The examination of the academic year showed that the average performance scores gradually increased from the first year

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to the fifth year, reaching the highest point in the fifth year (3.3846), but slightly decreased in the higher years (p=0.741). Although these changes are not significant, they may indicate an increase in awareness and practical experience during the middle years of study. Regarding economic status, students with a good status (3.5366) had a higher average performance score compared to those with a medium status (2.9823) and a poor status (3.0441). Although the observed difference is statistically marginal (p=0.057) and not significant, it indicates that economic status can influence oral hygiene behaviors. Finally, the results related to the place of residence showed that students living in rural areas (3.2370) performed better than those living in urban areas (2.9533) (p=0.064). Although the difference is not significant, it may be due to different cultural factors or personal habits.

Conclusion

Overall, the findings indicate that among all the examined variables, no statistically significant relationship has been observed between students' performance and demographic characteristics. However, the observed patterns can be considered for designing targeted educational programs for specific groups.

Correlation analysis between students' knowledge, attitude, and performance regarding oral hygiene: To examine the relationship between students' knowledge, attitude, and performance, the Pearson correlation test was used. The results obtained from the analysis indicate that:

1. The relationship between knowledge and performance: The Pearson correlation coefficient between knowledge and performance ($r = 0.141$, $p = 0.005$) is significant at the 0.01 confidence level. This finding indicates that there is a positive but weak significant relationship between the level of knowledge and the performance of the students; meaning that as the level of knowledge about oral hygiene increases, the performance of the students also somewhat improves.
2. The relationship between knowledge and attitude: The correlation coefficient between knowledge and attitude ($r = 0.081$, $p = 0.110$) was obtained, which is statistically insignificant. This result indicates that the level of knowledge of the students does not have a direct impact on their attitude toward oral hygiene.
3. The relationship between attitude and performance: The correlation coefficient between attitude and performance ($r = 0.107$, $p = 0.034$) is significant at the 0.05 confidence level. This weak relationship indicates that with an increase in positive attitude, performance in maintaining oral health slightly improves. Despite being statistically significant, the strength of this relationship is very low and may not be practically significant.

Overall summary: Generally, the results of the correlation analysis indicate that there is a positive and significant relationship between knowledge and performance, but the relationship between knowledge and attitude is not significant, and although the relationship between attitude and performance is statistically significant, it is negative and weak. These findings indicate that increasing the level of knowledge can help improve students' practical behaviors in the field of oral hygiene, but a positive attitude alone does not lead to better performance. Therefore, future educational programs should simultaneously focus on increasing knowledge and creating practical motivation to change behavior in order to achieve more effective results.

Discussion, Conclusion, and Recommendations

In this chapter, the findings obtained from the present research are interpreted and discussed. The aim of this chapter is to analyze the obtained results in comparison with similar studies and to examine the degree of consistency or difference between them. In this chapter, the relationship between students' knowledge, attitudes, and performance in oral health maintenance is also explained, and the factors that can influence these variables are discussed. Based on the findings of the fourth chapter, the level of knowledge, attitude, and performance of students in the field of oral health was evaluated, and the relationships between demographic variables (age, academic year, economic status, place of residence, etc.) and these three dimensions were analyzed. In this chapter, using the obtained results, an attempt is made to provide a more precise understanding of the current situation and the factors influencing behaviors related to oral health.

Discussion and Debate

In the present study, the knowledge, attitudes, and performance of Herat University students were evaluated, and we compared it with the results of similar research in different countries and discussed its highlights. King Abdulaziz University, Jeddah, Saudi Arabia In a study conducted by Neda Farsi and her colleagues in 2020 in the city of Jeddah, Saudi Arabia, the level of knowledge, attitude, and performance of students regarding oral health was examined. This study was conducted on students from various fields and both genders, aiming to assess their level of awareness, attitude, and practical behavior regarding oral health. The findings of this research showed that the general level of awareness among students regarding oral health is acceptable, especially among girls, whose average knowledge score (8.1 ± 1.8 out of 13) was higher than that of boys (7.2 ± 2.1 out of 13). Additionally, girls brushed their teeth more frequently, used the correct brushing technique, and visited the dentist more often than boys. In the present study conducted among male students of Herat University, the findings are largely similar in structure and methodology to Neda Farsi's study; both studies used a cross-sectional design and the KAP model questionnaire to assess the three dimensions of knowledge, attitude, and practice. However, there are differences in the studied population, environmental conditions, and cultural factors that can affect the results. The results of the present study showed that the majority of students at Herat University have sufficient knowledge in the field of oral hygiene, with 70.4% having adequate knowledge and 29.6% having low knowledge. These results are consistent with the general awareness level found in Neda Farsi's research, as in both studies, the overall awareness of the students was evaluated at a desirable level. Although Neda Farsi's research reported a significant difference between girls and boys, with girls having higher knowledge, in the present study, which only included male students, the average knowledge reached an acceptable level. In both studies, awareness of the role of fluoride in strengthening teeth, the impact of sugary substances on decay, and the importance of regular brushing in preventing oral diseases was high. In terms of attitude, the findings indicate that the majority of Herat University students had a positive attitude toward oral hygiene and believed that oral health not only affects appearance and beauty but also impacts social relationships and overall body health. These results are consistent with the findings of Neda Farsi, where the majority of students also had a positive attitude toward oral hygiene. Of course, in Neda Farsi's study, a more positive attitude was reported among girls, but in the present study, where all participants were boys, the level of positive attitude was also at a significant level. The observed differences in the level of attitudes can be attributed to cultural factors, the level of social awareness, and differences in the educational structure between the two countries. In the performance section, the results of both studies indicate that although the

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awareness and attitudes of the students are at an acceptable level, their practical behavior falls short of health standards. In Neda Farsi's research, despite high awareness, a significant portion of students did not have the habit of brushing their teeth twice a day and did not use auxiliary tools such as dental floss and mouthwash. The results of the present study were also similar, as the majority of students brushed their teeth only once a day, and a limited percentage of them visited the dentist for regular check-ups. This indicates a gap between theoretical awareness and practical behavior in both communities. However, in the present study, the level of performance was lower compared to the Neda Farsi study, which may be due to differences in access to health services, the lack of continuous educational programs, and different economic and cultural conditions. Other differences between the two studies are also noteworthy. In Neda Farsi's research, the increase in academic year was accompanied by an increase in awareness and attitude, whereas in the present study, this trend was observed intermittently; third-year students had lower scores compared to other years, but in the higher years, the level of knowledge increased again. In terms of economic status, the results of both studies showed that there is generally no significant relationship between economic status and level of awareness. However, in the present study, students with better economic status achieved a higher average knowledge score compared to those with an average economic status, and this difference was statistically significant. Overall, the findings of the present study align with the research of Neda Farsi and colleagues (2020), both emphasizing that students possess adequate knowledge and attitudes regarding oral hygiene, but their practical performance is below expectations. This finding indicates that merely having sufficient awareness is not enough to change behavior, and it must be accompanied by regular educational programs, awareness campaigns, and practical training in the university environment. University students have adequate knowledge and attitudes regarding oral health, but their performance is poor. The observed differences are likely due to variations in educational environments, access to health services, gender composition, and university curricula [2].

Comparative summary: Studies show that the level of knowledge among students in the present research at Herat University is relatively good (70.4%), but their level of attitude and especially performance is lower than similar studies in other countries. In the studies conducted in Saudi Arabia, Pakistan, India, and Kabul, a higher level of general knowledge and attitude has been reported; especially in those studies, the knowledge and attitude of girls were evaluated to be better than those of boys. Since the present study was conducted only among male students, one of the factors for the lower level of attitude and performance could be the lack of participation of female students. Additionally, the lack of regular and practical educational programs on oral hygiene at Herat University may contribute to the reduced performance of students. Final conclusion: Overall, the results of this research, which focused on examining the level of knowledge, attitudes, and practices of male students at Herat University regarding oral hygiene, indicate that although the students possess a relatively adequate level of knowledge in basic concepts of oral hygiene, there are still deficiencies observed in some aspects. In the knowledge section, the findings showed that approximately 70.4% of the students had sufficient knowledge, while 29.6% had a lower level of knowledge. This indicates that the majority of students have a good understanding of basic concepts such as the role of regular brushing, the importance of fluoride, and the relationship between nutrition and tooth decay, but a portion of them still require more practical and comprehensive education in this area.

In the attitude section, the results showed that 59.9% of the students had a positive attitude toward oral hygiene, while 40.1% did not have a positive attitude. This finding indicates that although the majority of students understand the importance of oral hygiene, some of them are still indifferent to the continuous care of their teeth, regular visits to the dentist, and the role of oral hygiene in overall body health. In the performance section, only 32.2% of the students (combined average and good performance) exhibited desirable behaviors in oral hygiene, while 67.9% showed poor performance. This indicates a significant gap between knowledge and performance; that is, despite adequate theoretical awareness, practical behavior among students remains weak. Most students only brush their teeth once a day, while the correct answer is twice or more a day. A significant percentage of them also neglect regular visits to the dentist, using dental floss, and rinsing their mouths after consuming sweets.

In the analysis of demographic variables, it was determined that there is a significant relationship between the field of study and the level of knowledge, such that students in medical fields had a higher level of knowledge compared to other students. Similarly, although fluctuations were observed between the academic year and the level of knowledge, in general, students in higher years achieved better scores. In contrast, no statistically significant differences were observed between variables such as age, marital status, economic status, and place of residence with the level of knowledge, attitude, and performance. In terms of correlation between variables, the results showed that there is a positive and significant relationship between knowledge and performance; meaning that as the level of students' knowledge increases, their performance also improves. Additionally, a slight positive correlation was observed between attitude and performance, indicating that students with a positive attitude perform better. Overall, this research indicates that male students at Herat University have a relatively good theoretical understanding of oral hygiene, but there is a noticeable need for improvement in its practical application. Strengthening educational programs, holding practical workshops, and encouraging students to consistently adhere to oral hygiene principles can play a significant role in improving their performance. Research limitations: Like other studies, this research has been accompanied by several limitations that should be considered in the interpretation of the results:

Demographic limitation: This study was conducted only among *male students of Herat University*, therefore the results cannot be fully generalized to all students (especially female students or those from other universities). Gender, cultural, and environmental differences may affect the level of knowledge, attitude, and performance.

Limitations of the data collection tool: Data were collected through self-report questionnaires. In such methods, there is a possibility of response bias and students' tendency to provide socially desirable answers, which may not fully reflect the actual behaviors and attitudes.

Time and location limitations: The research was conducted within a limited time frame and within the geographical boundaries of Herat University. Seasonal factors, academic pressure, or specific academic conditions may have affected the students' responses.

Failure to examine deep cultural and economic factors: Although economic status and place of residence were considered in this study, deeper cultural, social, and familial factors that could influence oral health behavior were not thoroughly investigated.

Lack of practical observation: The level of students' performance was assessed solely based on their self-reported responses, and direct observation of practical behaviors (such as brushing technique, timing of dental visits, and use of auxiliary tools) was not conducted. This may cause a discrepancy between actual and reported behavior.

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Study Name	Study Location	Knowledge Level	Attitude Level	Practice Level	Overall Result
Present Study	Herat University, Afghanistan	Adequate 70.4% Knowledge	Positive 59.9% Attitude	Poor; 30.9% 67.9% Moderate; 1.3% Good	Appropriate knowledge and attitude, but poor practice. Positive relationship between
Gopikrishna	Bangalore, India	Adequate Knowledge	Moderate Attitude	Inadequate Practice	Good knowledge but inadequate practice
Neda Farsi	Abdulaziz University, Saudi Arabia	High level of knowledge, especially among females	Better attitude among females than males	Overall practice was good; females brushed more frequently and visited the dentist more often	Higher awareness and attitude among females
Jehan	Peshawar Medical University, Pakistan	Moderate to high	Positive Attitude	Practice was poorer than desirable	Relatively good knowledge and practice, but still inadequate
Hedayatullah Ehsan	Kabul Medical University, Afghanistan	Good	Positive attitude, especially among females	Poor Practice	Good knowledge but poor practice; females had better practice and attitudes

Table 8: Comparison of Knowledge, Attitude, and Practice Levels Across Studies

Limitations in international comparisons: Due to the lack of sufficient data from similar national-level research, direct comparison with other studies in Afghanistan was difficult, and primarily international research was used, which may differ in terms of social and educational conditions.

Overall, despite these limitations, the findings of this research provide a clear picture of the knowledge, attitudes, and practices of Herat University students regarding oral health. Generally, the implementation of these recommendations can help improve the knowledge, attitudes, and practices of students in the field of oral health and play an effective role in preventing oral diseases within the academic community.

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