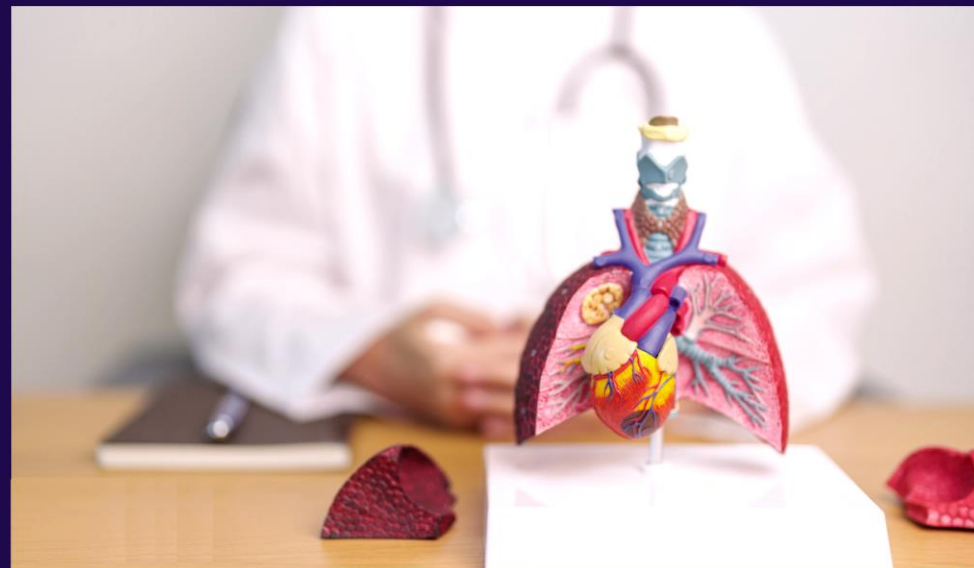


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Scientific and practical recommendations



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FERGANA MEDICAL INSTITUTE OF PUBLIC HEALTH

BOBOJONOV SARDORBЕК

**ORAL HYGIENE AND THE INTERRELATIONSHIP WITH
CARDIOVASCULAR DISEASES**

(Monograph)

2025

CONTENTS:

ABSTRACT	7
INTRODUCTION	9
CHAPTER I. GENERAL INFORMATION ABOUT ORAL HYGIENE	11
1.1 The concept and importance of oral hygiene.....	11
1.2. Oral hygiene and disease development factors	19
1.3. Improving oral hygiene with modern approaches	27
II CHAPTER. THE INTERRELATIONSHIP BETWEEN ORAL HYGIENE AND CARDIOVASCULAR DISEASES.....	36
2.1. Cardiovascular diseases and the factors affecting their development	36
2.2. Mechanisms of interaction between hygiene and cardiovascular diseases	48
2.3. Oral hygiene and methods for preventing heart disease in medicine	55
CHAPTER III. ORAL HYGIENE AND CARDIOVASCULAR DISEASES PREVENTION	67
3.1. Compliance with hygiene rules in disease prevention	67
3.2. Oral hygiene and heart health improvement strategies	72
3.3. Evaluation and improvement of the effectiveness of preventive programs	80
CONCLUSION	87
REFERENCES	89

ABSTRACT

This monograph is dedicated to the study of the relationship between oral hygiene and cardiovascular diseases. The monograph examines the general concepts of oral hygiene, its significance, and the factors contributing to the development of diseases. The effects of oral infections and inflammation on the cardiovascular system, as well as the mechanisms of interaction between these two systems, are discussed. The second chapter analyzes the factors influencing the development of cardiovascular diseases, including genetic and environmental factors, and explores the relationship between oral microbiota and inflammatory processes. The third chapter focuses on the role of oral hygiene in improving heart health, the effectiveness of preventive programs, and the potential for their enhancement.

The monograph offers scientific and practical recommendations for exploring innovations in the fields of medicine, hygiene, and cardiology, as well as developing new methods for disease prevention and implementing them in practice. The results of this study are of scientific and practical significance for medical professionals, hygienists, and general practitioners.

ANNOTATSIYA

Ushbu monografiya og‘iz bo‘shlig‘i gigiyenasi va yurak qon tomir kasalliklari o‘rtasidagi bog‘liqlikni o‘rganishga bag‘ishlangan. Monografiyada og‘iz bo‘shlig‘i gigiyenasining umumiy tushunchalari, uning ahamiyati va kasalliklarning rivojlanish omillari tahlil qilinadi. Og‘iz bo‘shlig‘idagi infeksiyalar va yallig‘lanish jarayonlarining yurak-qon tomir tizimiga ta‘siri, shuningdek, bu ikki tizim o‘rtasidagi o‘zaro aloqalar mexanizmlari ko‘rib chiqiladi. Monografiyaning ikkinchi bo‘limida yurak qon tomir kasalliklari rivojlanishiga ta‘sir etuvchi omillar, shu jumladan genetik va atrof-muhit faktorlar, hamda og‘iz bo‘shlig‘idagi mikrobiota va yallig‘lanish jarayonlarining o‘zaro aloqasi tahlil

qilinadi. Uchinchi bo‘limda og‘iz bo‘shlig‘i gigiyenasining yurak salomatligini yaxshilashdagi o‘rni, profilaktik dasturlar samaradorligi va ularni takomillashtirish imkoniyatlari ko‘rib chiqiladi.

Monografiya tibbiyot, gigiyena va kardiologiya sohalarida ilmiy-texnik yutuqlarni o‘rganish, kasalliklarni oldini olishda yangi usullarni ishlab chiqish va ularni amaliyotga joriy etish uchun tavsiyalar beradi. Ushbu tadqiqotning natijalari tibbiyot xodimlari, gigiyenistlar va umumiy amaliyotdagi mutaxassislar uchun ilmiy va amaliy ahamiyatga ega bo‘ladi.

АННОТАЦИЯ

Монография посвящена изучению взаимосвязи между оральной гигиеной и сердечно-сосудистыми заболеваниями. В монографии рассматриваются общие понятия оральной гигиены, её значение и факторы, способствующие развитию заболеваний. Анализируются последствия оральных инфекций и воспалений для сердечно-сосудистой системы, а также механизмы взаимодействия этих двух систем. Во второй главе рассматриваются факторы, влияющие на развитие сердечно-сосудистых заболеваний, включая генетические и экологические факторы, а также взаимосвязь между оральной микробиотой и воспалительными процессами. Третья глава посвящена роли оральной гигиены в улучшении здоровья сердца, эффективности профилактических программ и возможностям их совершенствования.

Монография предоставляет научные и практические рекомендации по изучению новшеств в области медицины, гигиены и кардиологии, а также разработке новых методов профилактики заболеваний и их внедрению в практику. Результаты данного исследования имеют научное и практическое значение для медицинских работников, гигиенистов и врачей общей практики.

INTRODUCTION

The link between oral hygiene and cardiovascular diseases has become an important research topic in recent years in the fields of medicine and hygiene. The interactions between these two systems are crucial in improving human health and preventing diseases. Oral health, particularly infections in the teeth and mouth, can directly impact the development of cardiovascular diseases. Research has shown that poor oral hygiene, such as tooth decay, gingivitis, and periodontitis, can increase the risk of heart diseases. Although the mechanisms behind this connection are not fully understood, factors such as bacteria, inflammation, and immune system reactions are known to play a significant role.

This monograph explores the relationship between oral hygiene and cardiovascular diseases. The first chapter examines the fundamental concepts of oral hygiene and its importance, as well as the factors influencing the development of oral diseases. Modern approaches to improving oral hygiene and their effects on overall health are also discussed in this section.

The second chapter analyzes the factors that influence the development of cardiovascular diseases, including genetic and environmental factors, physiological conditions, and inflammatory processes in the oral cavity. The mechanisms of the interaction between oral bacterial infections and cardiovascular diseases are studied through proposed theories and experimental data.

The third chapter focuses on analyzing preventive programs related to oral hygiene and heart health and evaluating their effectiveness. This chapter emphasizes the importance of adhering to hygiene practices in preventing cardiovascular diseases and provides strategies and practical recommendations for improving oral hygiene and heart health.

This monograph highlights scientific and technological advancements in the fields of medicine, hygiene, and cardiology, contributing to the development of

new methods for disease prevention. This research will be a valuable resource not only for specialists in the scientific community but also for general practitioners. The introduction of advanced methods in promoting a healthy lifestyle and preventing diseases is essential across all areas of medicine. The monograph will assist readers in better understanding the connection between oral hygiene and cardiovascular diseases.

CHAPTER I. GENERAL INFORMATION ABOUT ORAL HYGIENE

1.1 The concept and importance of oral hygiene

The concept of oral hygiene refers to a set of important medical and hygienic measures aimed at ensuring human health. These concepts are developed by considering the anatomical and physiological characteristics of the oral cavity, and their implementation is a key factor in maintaining the health of teeth and gums.

Dental hygiene refers to the regular removal of food residues, bacteria, and tartar from the tooth surface to prevent caries and other dental diseases. Proper and regular brushing of teeth is one of the main rules of this hygiene. The measures necessary to keep the gum tissues clean and healthy help prevent bleeding, inflammation, and gum diseases.

Tongue hygiene is an important part of maintaining a healthy oral microbiome by eliminating the accumulation of bacteria and food residues from the tongue surface. Correctly choosing and using hygienic tools, such as toothbrushes, toothpaste, dental floss, mouthwash solutions, and others, plays a significant role in this. Limiting the consumption of sweets and consuming foods rich in calcium, phosphorus, and vitamins are also important in strengthening tooth enamel.

It is essential to undergo regular dental check-ups and use preventive services aimed at preventing the development of diseases. The basic concepts of oral hygiene are an important part of ensuring personal and public health. Proper hygiene habits contribute to maintaining oral health, preventing diseases, and improving the overall quality of life.

Hygiene, as a science focused on ensuring personal and public health, plays a crucial role in shaping a healthy lifestyle. The primary goal of hygiene is to prevent diseases, improve the quality of life, and create a healthy environment. In

modern medicine, hygiene is one of the main directions for analyzing biological, social, and environmental factors affecting health and developing measures to address them.

The impact of hygiene on general health is realized through the following key factors:

Adhering to hygiene rules, particularly washing hands, properly storing and preparing food, and using personal hygiene products, significantly reduces the spread of infectious diseases. According to the World Health Organization (WHO), simple habits like hand washing can prevent dozens of contagious diseases. Hygiene plays a critical role in ensuring not only physical health but also mental and social well-being. By undergoing regular medical check-ups, adopting proper eating habits, and following hygiene standards, it is possible to increase life expectancy and prevent diseases.

Occupational hygiene helps preserve workers' labor capacity and improve productivity by ensuring the safety of working conditions. As industrial technologies advance, hygiene measures not only protect human health but also have a direct impact on economic efficiency. Adherence to hygiene standards is crucial for maintaining the physical development and health of children and adolescents. Hygiene habits developed at this age define the future health status of an individual. For example, creating hygienic conditions in schools and educating children about hygiene rules helps prevent various diseases.

In the context of global epidemiological threats, particularly during pandemics, hygiene measures—such as social distancing, wearing masks, and hand sanitizing—play a crucial role in limiting the spread of viruses and bacteria.

Hygiene measures are also an important part of ensuring environmental safety. Implementing actions like maintaining water and air cleanliness and properly disposing of waste protects not only the environment but also human health. Hygiene is a critical factor in promoting general health, and its

effectiveness depends on supporting a healthy lifestyle at personal, family, and community levels. Consistent and proper hygiene practices are essential not only for disease prevention but also for improving quality of life and ensuring sustainable development of society. Modern scientific research is further revealing the positive impact of hygiene on human health, and introducing new technologies in this area remains an important task.

Oral care tools are essential for maintaining the health of the teeth and gums, regulating the oral microbiota, and preserving general hygiene. Every individual's oral care should be tailored to their personal needs, using various tools. In modern medicine, oral care tools are developed based on scientific principles and are indispensable for promoting a healthy lifestyle. These tools include toothbrushes, toothpaste, dental floss, mouthwash solutions, tongue cleaners, and irrigators, each with unique functions and advantages. Therefore, choosing the right tool and using it correctly is crucial for maintaining health.

The toothbrush is the most important tool for oral care. Toothbrushes vary in shape, bristle stiffness, materials, and functions. Standard toothbrushes generally have stiff or medium-bristled bristles, which are effective for cleaning the tooth surface and gum lines. Electric toothbrushes, on the other hand, allow for more efficient cleaning and make the brushing process easier by automating it. The use of electric toothbrushes is especially beneficial for those who struggle to maintain proper hygiene practices. When choosing a toothbrush, individual needs such as tooth sensitivity or existing gum conditions should also be taken into account. Toothbrushes designed for children have smaller heads and softer bristles to help gently clean their teeth and gums.

Toothpaste is another important tool for oral care. Its composition mainly consists of antibacterial substances aimed at eliminating bacteria, and some toothpastes contain fluoride to strengthen tooth enamel or special components to reduce tooth sensitivity. Toothpaste serves various purposes depending on its specific composition: for example, preventing bacterial infections, whitening teeth,

or reducing inflammation in the gums. The effectiveness of toothpaste, through components such as fluoride, helps strengthen tooth enamel and prevent cavities. Some toothpastes contain antibiotics or other anti-inflammatory substances that assist in treating gum diseases.

Dental floss is an essential tool for cleaning areas that the toothbrush cannot reach in the oral cavity. Dental floss helps effectively remove food particles, plaque, and bacteria between the teeth. Using dental floss ensures that the teeth remain clean over an extended period and prevents the development of cavities and other oral diseases between the teeth. Regular use of dental floss reduces the number of bacteria in the oral cavity, helping improve overall oral hygiene.

Mouthwash solutions are used to reduce bacteria in the oral cavity, prevent gum inflammation, and eliminate bad breath. The composition of mouthwash solutions is often rich in antiseptic and antibacterial components. These solutions help maintain the necessary oral flora due to their strong antibacterial properties. Using mouthwash can reduce bacterial plaque buildup and freshen the breath.

Tongue cleaners serve to clean the tongue surface, an area where food particles and microorganisms accumulate in the oral cavity. Using tongue cleaners helps reduce unpleasant odors, eliminate bacteria, and maintain a clean oral microbiome. Cleaning the tongue reduces the risk of bacterial infections in the mouth and improves overall health.

Irrigators are used to clean food particles from between the teeth and around the gumline using a high-pressure stream of water. They are effective in removing food debris from special areas and ensuring the cleanliness of the teeth. Irrigators are particularly effective in preventing gum diseases and reducing bacterial growth in the oral cavity.

Additional tools include chewers and stimulators that help massage the gums and promote their active use. Special plates and retainers are used to protect teeth from damage, straighten them, or for other dental purposes. Special tools for

children, such as flavored toothpaste and customized toothbrushes, increase their interest in oral care and make the process more enjoyable.

Selecting the right oral care tools and using them regularly is crucial for maintaining a clean and healthy oral cavity. Each tool has its own specific function, and their effective use should be aligned with personal needs and dental care requirements. Regular and proper use improves the overall health of the oral cavity and prevents various diseases. Modern oral care tools not only ensure the health of teeth and gums but also support overall health.

Neglecting hygiene routines can have serious consequences for human health. Disregarding hygiene often leads to the development of various diseases, deterioration in health, and a decrease in the quality of life. This situation can result in medical, social, and economic problems.

The first consequence of neglecting oral hygiene is the development of tooth and gum diseases, including cavities and periodontitis. Failing to regularly clean the teeth allows food debris and plaque to accumulate, which promotes the growth of bacteria that cause cavities. The mineralization of plaque forms tartar, which causes gum inflammation and the development of periodontitis. In severe cases, these diseases can lead to tooth loss.

Neglecting hygiene also negatively affects the functioning of internal organs. Bacteria and inflammation in the oral cavity can harm the entire body. For example, bacteria that enter the bloodstream through inflamed gums can cause cardiovascular diseases. Research shows that poor oral hygiene can lead to dangerous conditions such as coronary artery disease, endocarditis, and stroke.

In addition, neglecting hygiene disrupts the functioning of the gastrointestinal system. Oral bacteria can reach the stomach and intestines, leading to inflammatory diseases. Failing to clean teeth properly also hinders the chewing process, which impairs the function of digestive enzymes, leading to poor digestion.

Neglecting hygiene weakens the immune system. Chronic inflammatory processes in the oral cavity exhaust the body's defense system, making individuals more susceptible to infections. Oral infections can also spread to other organs, disrupting their functions.

Neglecting hygiene can cause psychological and social problems. Insufficient oral hygiene leads to bad breath, which diminishes self-confidence. Additionally, dental and gum diseases caused by poor hygiene result in pain, discomfort, and aesthetic issues, negatively affecting social engagement and overall well-being.

The social and economic consequences of neglecting hygiene are also significant. The increased need for medical attention and the costs of treating diseases place a financial burden on families and society. Additionally, the reduction in work capacity due to illness leads to decreased economic productivity.

Neglecting hygiene poses a serious health risk, leading to various diseases, psychological discomfort, and economic losses. To prevent these consequences, it is crucial to strictly follow hygiene guidelines, regularly care for the teeth, and establish a healthy lifestyle. Proper hygiene is essential not only for individual health but also for ensuring the overall well-being of society.

The preventive importance of oral hygiene plays a vital role in maintaining human health. This process ensures the health of the oral cavity and teeth while also preventing many common diseases. The primary goal of oral hygiene is to eliminate plaque and food residues, maintain strong tooth enamel, and keep the oral microbiome balanced. These objectives are essential for maintaining not only dental health but also overall well-being.

Tooth and gum diseases, particularly cavities and periodontitis, are among the most widespread diseases worldwide. According to the World Health Organization (WHO), cavities affect one in three children and the majority of adults. This highlights the critical importance of adhering to preventive oral

hygiene practices. If plaque and food residues are not regularly cleaned, harmful bacteria proliferate, starting the process of enamel erosion, which leads to cavities. Gum inflammation causes conditions such as gingivitis and periodontitis. Following preventive measures can help prevent these conditions.

Oral hygiene plays a significant role in the prevention of cardiovascular diseases. Studies show that the presence of inflammatory processes in the oral cavity can allow harmful bacteria to enter the bloodstream, increasing the risk of heart disease and myocardial infarction. Especially, neglecting the treatment of periodontitis directly affects the condition of the cardiovascular system. Therefore, paying attention to oral hygiene is crucial not only for maintaining the health of teeth and gums but also for ensuring the proper functioning of the heart.

Oral hygiene is also important for maintaining gastrointestinal health. Regular cleaning of teeth helps in proper mastication of food, making digestion easier and preventing gastrointestinal diseases. Poorly chewed food disrupts the function of stomach enzymes, which can lead to conditions like gastritis, colitis, and other digestive issues.

The social and psychological benefits of preventive measures are also immense. Healthy and clean teeth improve one's appearance, boost self-confidence, and facilitate communication in society. On the other hand, neglecting oral hygiene can lead to unpleasant breath (halitosis), which can cause psychological discomfort. This, in turn, negatively affects one's social interactions and quality of life.

The economic importance of oral hygiene cannot be overlooked. Neglecting hygiene requires spending on various treatments, placing an additional financial burden on both families and public budgets. Regular hygienic care is the most effective way to reduce the time and money spent on treating dental diseases. Moreover, maintaining good hygiene helps prevent a decline in work capacity, as healthy individuals can maintain their productivity for a longer period.

To raise awareness about the preventive importance of oral hygiene, extensive educational campaigns should be carried out. Organizing hygiene education lessons in schools, providing information on proper dental care through mass media, and expanding healthcare services can lead to positive outcomes in this regard.

The preventive importance of oral hygiene plays a major role in leading a healthy life, preventing diseases, and improving the quality of life. By adhering to hygiene practices, the burden on the healthcare system can be reduced, and the overall health of the population can be strengthened. Therefore, strict adherence to hygiene rules and regular implementation of preventive measures should be an inseparable part of every individual's daily routine.

1.2. Oral hygiene and disease development factors

Oral microflora is one of the complex and vital systems of the human body, comprising a collection of microorganisms living in the oral cavity. This microflora plays critical biological functions in human health and further emphasizes the importance of oral hygiene. It consists of various bacteria, fungi, and viruses, with most of them performing beneficial tasks in a balanced state.

In normal conditions, the oral microflora maintains a balance between various microorganisms. This balance helps protect the tooth enamel, prevent the proliferation of pathogenic microorganisms, and facilitate the initial digestion of food. The normal microflora controls the pH environment in the oral cavity, limiting the growth of harmful bacteria. Common microorganisms in the oral cavity include lactobacilli, streptococci, and actinomycetes, which play an important role in breaking down plaque and protecting the body from internal infections.

Among the biological characteristics of oral microflora, its ecological adaptability is particularly noteworthy. The microflora continuously adjusts to factors such as diet, oral hygiene practices, age, and other environmental influences. At the same time, the stability of the microflora is linked to the immune system and overall health. For instance, the long-term use of antibiotics or other medications can disrupt the balance of the microflora, leading to a condition known as dysbiosis. This can result in the proliferation of harmful bacteria, the onset of inflammation in the oral cavity, and even the development of additional infections.

Oral microflora can have both positive and negative effects on human health. Its beneficial functions include the following:

1. **Protective function:** The microflora protects the oral cavity from infections by suppressing harmful bacteria. This process is carried out through biochemical mechanisms.
2. **Fermentative function:** The microflora produces enzymes that break down food residues and ensure their complete digestion. Additionally, it helps minerals, especially calcium and phosphorus, reach the tooth enamel, thus contributing to enamel health.
3. **Support of immunity:** The microflora enhances the body's immune system and aids its proper functioning. Bacteria produce antigens that activate the immune response, providing a defense against infections.

However, when the balance of the microflora is disrupted, pathogenic bacteria may become dominant. This can lead to the development of diseases such as cavities, gingivitis, periodontitis, and stomatitis. Poor oral hygiene, harmful habits (e.g., smoking), an imbalanced diet, or stress can increase the number of harmful microorganisms in the microflora.

To maintain a healthy oral microflora, it is important to follow these guidelines:

1. **Regular hygiene:** Brushing teeth at least twice a day, using dental floss, and rinsing the mouth with mouthwash help maintain the healthy balance of the microflora.
2. **Proper nutrition:** Consuming foods rich in vitamins and minerals and limiting sugary foods can reduce plaque formation on the teeth.
3. **Preventive check-ups:** Regular visits to a dentist for check-ups and professional teeth cleaning support the healthy balance of the microflora.
4. **Boosting immunity:** Leading a healthy lifestyle and avoiding stress strengthens the body's natural defense system, which helps keep the microflora stable.

Oral microflora is a crucial factor for human health, and understanding its biological characteristics, alongside adhering to hygiene guidelines, can help prevent many diseases. The stability of the microflora plays a significant role in maintaining overall health and improving quality of life.

Eating habits directly impact both oral hygiene and overall health. Proper nutrition not only supports general health but is also essential for maintaining the health of teeth and gums. Improper diet can disrupt the balance in the oral cavity, leading to the development of various diseases. The composition of food products significantly influences the activity of the oral microflora and the strength of tooth enamel. For instance, foods high in sugar and refined carbohydrates promote plaque formation and accelerate the development of cavities. The acids produced during the breakdown of sugar erode tooth enamel and reduce the microflora's ability to fight harmful bacteria. Moreover, the regular consumption of sugary drinks can cause gum inflammation.

On the other hand, some foods have beneficial effects on tooth and gum health, such as:

1. **Fiber-rich foods:** Vegetables and fruits (such as apples, carrots, and celery) help naturally clean the teeth. The fiber content in these foods aids in removing plaque.
2. **Calcium- and phosphorus-rich products:** Dairy products (milk, yogurt, cheese), eggs, and fish strengthen tooth enamel and promote the mineralization of the teeth.
3. **Vitamin C sources:** Citrus fruits, berries, and leafy greens strengthen the gums and prevent inflammation.
4. **Water and tea:** Drinking enough water helps wash away food residues in the mouth. Green tea, with its antioxidant and antibacterial properties, combats tooth diseases.

Eating habits also affect adherence to dental hygiene practices. For example, brushing teeth immediately after meals or rinsing the mouth helps eliminate plaque and food residues. Conversely, neglecting hygiene rules leads to the accumulation of plaque, the activation of harmful bacteria, and the subsequent development of diseases such as cavities and gingivitis.

The timing and regularity of meals are also crucial factors affecting oral health. Continuous snacking, especially with sugary foods, harms teeth, as the pH level in the mouth decreases and acidity increases after each intake of sweet foods. This weakens tooth enamel and accelerates plaque formation. Therefore, it is recommended to leave sufficient time between meals and rinse the mouth with water after snacking. Poor nutrition not only affects oral hygiene but also has a negative impact on overall health. For instance, deficiencies in vitamins and minerals can lead to gum inflammation, tooth brittleness, and even early tooth loss. Additionally, harmful habits such as consuming carbonated drinks or excessive sugar disrupt the balance in the oral cavity and negatively affect overall health.

Eating habits and the composition of food products directly influence the state of oral hygiene and overall human health. Maintaining proper nutrition, limiting harmful products, and strictly adhering to hygiene rules are essential for preserving dental health. This is a critical factor not only for the oral cavity but also for maintaining general health.

Improper use of hygienic tools can seriously affect the health of the oral cavity. Choosing or applying them incorrectly can harm the teeth, gums, and the general state of the oral cavity, leading to various dental and other health issues.

For example, improper use of a toothbrush, such as brushing with excessive force, can damage and thin the tooth enamel. As a result, teeth become more sensitive, plaque accumulates more quickly, and the risk of cavities increases. Furthermore, using a hard toothbrush or incorrect technique can cause injuries and inflammation to the gums. Choosing the wrong toothpaste or using it in excessive amounts can also have negative consequences. For instance, overuse of fluoride

toothpaste can cause fluorosis in children. Additionally, aggressive components in toothpaste can damage enamel or irritate the gums.

Misuse of mouthwash, such as using it excessively or for long periods, disrupts the balance of oral microflora. Antiseptic mouthwashes containing alcohol can dry out the gums, making them sensitive, and long-term use increases the risk of gum inflammation. Overusing antiseptics also eliminates beneficial bacteria, leading to an overgrowth of pathogenic microorganisms.

Failing to replace hygienic tools on time is also hazardous to health. Using an old toothbrush encourages the growth of bacteria and reduces the effectiveness of the hygiene process. Moreover, failing to follow the recommended brushing schedules leads to the accumulation of plaque and food residues, resulting in the development of cavities and gingivitis.

Improper hygiene practices can lead to severe dental conditions, such as periodontitis and early tooth loss. In addition, infections developing in the oral cavity can have negative effects on the entire body. For example, inflammation processes could exacerbate cardiovascular diseases or respiratory infections.

When using hygienic tools, it is essential to follow the recommendations of dentists and choose quality products. Tools such as toothbrushes, toothpaste, and mouthwash should be selected based on personal needs, and the usage guidelines must be followed. Regular dental check-ups play a crucial role in preventing negative consequences. Proper use of hygienic tools ensures the healthy condition of the oral cavity and is an integral part of maintaining overall health.

Attention to hygiene varies according to age and gender, leading to significant differences in the approach to health and well-being. The changing hygienic needs related to age and gender are closely linked to a person's biological, psychological, and social characteristics. The specific hygienic needs of each age group and gender, along with their attitude toward them, stand out as important factors influencing health.

In children and adolescents, increased attention to hygiene directly impacts their physical and psychological development. Hygiene habits in children, especially, are shaped with the help of parents and educational institutions. Preschool children are introduced to simple but important hygiene habits such as oral hygiene, handwashing, and clean eating. At this age, specialized medical supervision and hygiene training are particularly important. This period shapes the child's approach to health, which influences their overall well-being in the future.

Adolescence, in turn, is characterized by physical and psychological changes. During this period, attention to hygiene increases as teenagers become more focused on their appearance and social acceptance. They begin to pay more attention to skincare, haircare, and dental health. Furthermore, as adolescents start engaging in sports, their physical activity increases, and hygiene habits accordingly evolve. At the same time, they begin to independently understand and develop their hygiene needs. In this stage, neglecting hygiene rules or a decrease in physical activity can negatively impact health, so proper guidance and education are necessary.

In adults, attention to hygiene is often linked to their lifestyle and social status. Physical and emotional burdens in work and family life, as well as increased focus on health during middle age and old age, may lead to a stronger emphasis on hygiene. Middle-aged individuals, particularly those looking to prevent cardiovascular diseases, diabetes, osteoporosis, and other chronic conditions, develop hygiene habits. For older adults, hygiene measures such as regular dental check-ups, monitoring protein and calcium intake, and maintaining an active lifestyle become even more important.

Gender differences also significantly influence attention to hygiene. Hygienic needs and the approach to hygiene between men and women are mainly driven by biological and cultural factors. For women, attention to hygiene changes according to their physiological state, such as menstruation, pregnancy, childbirth, and menopause. Intimate hygiene, skincare, hair care, and oral hygiene are

particularly important. Women often focus more on their health, as proper hygiene and infection prevention during these periods are critical.

Historically, men paid less attention to hygiene, but this is changing in recent years. Men increasingly focus on physical activity and healthy lifestyles. Many men prioritize dental and skin hygiene, especially when engaging in sports or improving their physical condition. Moreover, men's hygiene habits and attention to health are influenced by social factors, including cultural perspectives and family upbringing.

The attention to hygiene based on age and gender directly affects people's biological, psychological, and social characteristics. The specific hygienic needs for each age group and gender differ, and identifying these needs and addressing them properly plays a key role in maintaining health. Hygiene habits and attention to health vary between young people and adults, and gender differences shape attitudes toward hygiene. Therefore, addressing the diverse hygienic needs based on age and gender is an important component of promoting a healthy lifestyle and maintaining health.

Ecological factors have a significant impact on human health and hygiene. Various environmental factors, such as air, water, and soil pollution, and climate change, directly influence the overall health and hygiene status of individuals. The influence of ecological factors on human health increases the need for hygienic measures and calls for new approaches to ensuring a healthy lifestyle. Understanding the interconnection between ecological factors and hygiene, and managing them effectively, is an essential part of safeguarding health and protecting the environment.

Air pollution significantly affects human health. Harmful substances released from industry, transportation, and other sources spread into the air and harm the respiratory system. Polluted air also affects changing climate conditions, which in turn leads to a wide range of health problems, from dental issues to cardiovascular diseases. Strengthening hygiene measures, such as living in clean

air environments, plays an effective role in protecting the respiratory system and oral cavity. Additionally, the spread of bacteria and viruses in the air also impacts oral hygiene, potentially worsening dental health.

Water pollution also poses serious threats to health. Contaminated drinking water sources lead to the spread of infectious diseases, including gastrointestinal issues and abdominal infections. Drinking polluted water harms general health and worsens the condition of the teeth. Accessing clean water sources, especially maintaining the quality of drinking water, is crucial in supporting oral health and maintaining dental hygiene.

Soil pollution can lead to contamination of plants and food products. The excessive use of chemicals and pesticides in agriculture enters the food chain through plants and exposes humans to harmful substances. This, in turn, impacts dietary hygiene, as consuming contaminated food can worsen physical health. The hygienic control and proper decontamination of food products play an essential role in maintaining ecological hygiene.

Climate change and natural disasters also fall under ecological factors as they affect human health. Climate change, including droughts, floods, and the rapid spread of infections in hot climates, demands enhanced hygienic measures. In hot climates, microorganisms spread quickly, negatively impacting both oral health and overall well-being. People must take protective measures against natural disasters and focus on preventing environmental pollution.

Thus, the relationship between ecological factors and hygiene is crucial for maintaining the environment and ensuring human health. Preserving clean air, water, and soil resources, combating climate change, and preparing for natural disasters all play vital roles in shaping hygienic habits. Protecting ecological hygiene not only helps safeguard health but also supports the sustainability of the environment and improves people's well-being.

1.3. Improving oral hygiene with modern approaches

Modern hygienic tools play a significant role in maintaining health and preventing diseases. These tools not only support personal and social hygiene but also contribute to environmental protection and address ecological challenges. With the help of modern technologies and products, individuals have the opportunity to improve their health. These tools are vital to people's lives, providing substantial assistance in strengthening their overall well-being.

Personal hygiene tools are essential for maintaining health. For instance, soap and disinfectants play a crucial role in eliminating microorganisms and preventing their spread. Clean hands are an effective measure not only for preventing infectious diseases but also for improving overall health. Additionally, toothpaste and soaps are recognized as essential products for maintaining both oral and body hygiene. The antibacterial agents and fluorides in toothpaste help prevent cavities and ensure healthy teeth.

Modern face masks, particularly during the spread of infectious diseases, are critical for preventing the transmission of microorganisms and for environmental protection. For example, during the coronavirus pandemic, the use of masks helped limit the spread of microorganisms and ensured personal hygiene. These tools are important not only for preventing diseases but also for keeping the environment clean.

Social and ecological hygiene, supported by modern technologies, can enhance overall health. Air purification systems help clean the air of microorganisms, toxic gases, and pollutants. HEPA filters and ultraviolet light are among the most effective technologies for air purification. These tools help reduce harmful substances in the air, improve air quality, and ensure the health of the respiratory system.

Modern approaches to improving oral hygiene

Modern water purification systems are designed to improve the quality of drinking water and its impact on human health. Contaminants, microorganisms, and other toxic elements present in water are removed using water treatment tools. Osmosis systems, carbon filters, and ultraviolet light are used to purify water from harmful substances. This enhances the quality of drinking water and helps in disease prevention.

In addition, ecological hygiene tools contribute to protecting the environment from pollution. Eco-friendly products, such as hygiene tools made from recyclable materials, help reduce the use of plastic products. These tools serve to decrease environmental pollution, conserve resources, and protect nature. The use of recyclable materials allows for the creation of clean and safe products without harming the environment.

The ecological impact of modern hygiene products is directly related to the use of items that affect the environment. Eco-friendly products, such as reduced use of plastics and other waste, help ensure ecological safety and promote the efficient use of resources. These tools also embody qualities that protect nature and ensure its sustainability. Modern hygiene products are essential for maintaining health, preventing diseases, and protecting the environment. They are effective in preventing the spread of microorganisms, ensuring ecological safety, and improving overall health. Through modern technologies and eco-friendly products, it is possible to support a healthy lifestyle and maintain a clean environment.

Innovative technologies for monitoring oral hygiene have rapidly developed in recent years, playing a significant role in ensuring the health of teeth and the oral cavity. These technologies not only effectively monitor oral hygiene but also help in preventing dental diseases such as cavities, gingivitis, and other oral conditions. Innovations in oral hygiene monitoring create new possibilities and enhance the effectiveness of medical treatments.

First and foremost are devices created to automate the process of tooth cleaning and mouth washing. For example, modern electric toothbrushes, equipped

with advanced vibration and rotation technologies, offer thorough cleaning of both teeth and gums. These devices significantly increase the efficiency of the cleaning process. Some electric toothbrushes come with indicators that make it easier for users to monitor their oral hygiene, helping to make the process more intuitive and effective.

Additionally, innovative toothpaste formulations are gaining attention. These include antibacterial and fluoride-based ingredients that help prevent periodontal diseases and improve the appearance of teeth. Moreover, the inclusion of nanoparticles in toothpaste contributes to effectively eliminating bacteria and maintaining the balance of oral microbiota.

Another innovative technology for oral hygiene monitoring is the use of mobile apps and smart devices designed to track the health of teeth. These apps and devices allow users to monitor their oral health. For example, mobile apps linked to toothbrushes can show users how effectively they are cleaning their teeth, the time spent cleaning, and which areas need more attention. These technologies can be highly beneficial in improving oral hygiene.

In modern medicine, new technologies for microbiological monitoring of the oral cavity are also emerging. Microscopic and genetic analysis methods allow for the analysis of bacteria in the oral cavity and the identification of their diversity, leading to improved scientific approaches to oral health. These technologies enable the timely detection of oral bacteria and the implementation of necessary measures to eliminate them.

Additionally, laser technologies are widely used in oral hygiene and disease prevention. The use of lasers for teeth cleaning and care is becoming more effective. Laser treatments help to remove plaque and bacteria more efficiently, promoting better oral health. These advancements contribute to more precise and less invasive dental procedures, further enhancing the overall management of oral hygiene.



Pic 1: Lazer technologies

Laser devices allow for the early detection and treatment of cavities and other oral diseases. Laser technologies are also used in teeth whitening and the treatment of periodontal diseases. These advanced tools help identify dental issues at their onset, allowing for more effective and less invasive treatments.

Innovative technologies for monitoring oral hygiene play a crucial role in maintaining healthy teeth and ensuring oral cleanliness. They are also considered effective tools for disease prevention, improving oral microbiota, and supporting overall health. Modern technologies not only enhance oral hygiene but also contribute to the broader goal of maintaining good health, demonstrating their importance in both dental care and general well-being.

Medical check-ups and hygiene monitoring are crucial for maintaining health and preventing diseases. They play a significant role, particularly in early disease detection, the application of preventive measures, and ensuring compliance with social hygiene requirements. These practices are effective not only for individual health but also for safeguarding public health.

The primary aim of medical check-ups is to assess the health status of individuals and identify factors that may influence their well-being. Through these examinations, various conditions—such as cardiovascular diseases, endocrine disorders, lung and kidney diseases—can be detected at early stages. Early diagnosis allows for easier and more effective treatment, reducing the need for expensive and complex medical interventions.

Regular medical check-ups also facilitate timely access to healthcare services and create opportunities for disease prevention before they manifest. These check-ups include programs tailored for different age groups, such as children, adolescents, and the elderly. By planning check-ups according to the specific needs of each group, healthcare professionals can provide comprehensive health recommendations.

Hygiene monitoring focuses on the interaction between individuals and their environment, offering recommendations based on these relationships. Hygiene is not only about personal cleanliness but also involves maintaining the environment, living, and working conditions. Hygiene monitoring includes aspects such as food safety, water quality, air cleanliness, sanitation, and overall hygiene conditions. This type of monitoring is essential for ensuring ecological safety, preventing environmental pollution, and halting the spread of diseases.

An important aspect of medical check-ups and hygiene monitoring is that they help promote awareness and information about healthy living through the general public. Educating the public about the benefits of a healthy lifestyle, such as proper nutrition, regular physical activity, stress management, and other preventive measures, greatly contributes to improving health.

The significant advantage of medical check-ups and hygiene monitoring is that they are not only tools for detecting diseases but also effective means of ensuring a healthy lifestyle. They also provide the opportunity to address specific medical or hygienic issues in a timely manner, forming the basis for developing effective strategies for future prevention.

Thus, medical check-ups and hygiene monitoring play a vital role in ensuring health, preventing diseases, enhancing ecological safety, and supporting public health. These processes are fundamental components of the healthcare system, contributing to the creation and maintenance of a healthy lifestyle for the population.

Social campaigns are one of the important tools for initiating societal changes and addressing social issues. These campaigns are typically organized to influence public opinion, raise awareness about specific issues, or focus attention on social, environmental, or health-related concerns. Social campaigns are implemented not only by government bodies but also by civil society organizations, community groups, and even personal initiatives. They serve as effective tools in the fight against societal problems.

Firstly, social campaigns play a significant role in changing negative trends in society and preventing their adverse effects. For example, public health campaigns focus on reducing harmful habits such as smoking, excessive alcohol consumption, drug use, and unhealthy eating, rather than promoting them. These campaigns encourage people to reconsider their health and well-being, prompting them to abandon detrimental habits. Most health campaigns are aimed at young people and adolescents, helping them adopt healthier lifestyles and protect themselves from risky behaviors.

Secondly, social campaigns are also crucial in promoting social equality and restoring social justice within society. These campaigns often highlight issues such as gender equality, children's rights, discrimination, migration, domestic violence, and other societal challenges. For instance, campaigns aimed at promoting gender equality work to reduce inequalities between men and women, protect women's rights, and encourage their active participation in society. Such campaigns also support the rights of migrants and help them integrate into society.

Thirdly, social campaigns foster large-scale efforts to protect the environment, ensure ecological safety, and manage natural resources. Environmental campaigns focus on reducing pollution, promoting recycling, and encouraging energy conservation. For example, social campaigns are organized to raise awareness about protecting forests, conserving water, reducing air pollution, and efficiently managing natural resources. In this way, campaigns focused on

environmental protection and sustainability help shape ecological consciousness within the community and contribute to the improvement of living conditions.

Additionally, social campaigns are effective tools in enhancing mental and psychological well-being. Today, issues like stress, depression, and suicide are widespread. In such cases, social campaigns provide valuable information on supporting mental health and managing stress. These campaigns help the public recognize the importance of mental health and seek psychological support when needed. Mental health support campaigns also help strengthen the system of providing assistance to those facing psychological challenges in communities.

In addition, social campaigns are powerful tools for encouraging the public to maintain health and promote a healthy lifestyle. These campaigns often provide guidance on healthy eating, regular physical exercise, maintaining a proper sleep and rest routine, and avoiding harmful habits. Through social campaigns, the public is informed about the importance of a healthy lifestyle, and awareness about health issues is raised. This, in turn, helps prevent diseases, improve social life, and implement positive changes in society. Social campaigns, therefore, play a significant role in promoting positive societal changes, raising awareness of social issues, and improving public health. They are effective tools not only in the health sector but also in areas such as ecology, gender equality, social justice, and others. Social campaigns contribute to changing public consciousness, improving approaches to social issues, and enhancing overall well-being.

International experiences in oral hygiene include effective programs and initiatives implemented by different countries. These experiences offer a variety of approaches to improving oral and dental health, combating oral diseases, and disseminating modern hygienic knowledge to the public. In many countries, social and medical measures have been expanded in the field of oral hygiene, and large-scale programs have been developed to raise public awareness about this issue.

Firstly, effective methods of educating both youth and adults in the field of oral hygiene hold a special place in international experiences. For instance, in the

United States and other developed countries, there are educational programs for school-age children on oral hygiene. These programs emphasize the importance of correct brushing, flossing, and preventive measures. Additionally, numerous advertising campaigns, events broadcasted on television and radio channels, and online initiatives are conducted to raise awareness among the general population about oral hygiene.

In Scandinavian countries such as Sweden and Finland, oral hygiene is given special attention within the healthcare system. These countries offer specialized medical services for dental treatment and hygiene checks, and government-sponsored incentive programs are implemented to maintain oral health. For example, free dental treatments and preventive check-ups are offered. In these countries, the condition of the population's teeth is regularly monitored.

Globally, there have been several advancements in utilizing innovative technologies and products to improve oral hygiene. In Japan, for instance, effective research has been conducted on toothpaste and oral care products. Japanese companies have also developed special robots for cleaning teeth and automatic teeth brushing systems. These technologies help improve the level of oral hygiene, especially benefiting those who spend a lot of time at work.

In countries such as Brazil and Argentina in South America, oral hygiene issues are supported by numerous medical checkups and public assistance initiatives. These countries have implemented social programs aimed at improving the population's oral health. For example, they are intensifying activities focused on teaching proper tooth brushing, reducing poor nutrition, and promoting correct dental care. Countries like Germany and Canada also offer free dental checkups and preventive services to support dental health. These programs are particularly important for socially vulnerable groups, as subsidies are provided by the government to assist those in need of dental treatment and oral health maintenance. Additionally, state-driven initiatives aimed at raising public awareness about oral hygiene are more widely adopted.

In countries like Uzbekistan, Russia, and others, scientific research has provided important data on the interconnection between oral hygiene and cardiovascular diseases. Studies have shown that poor oral hygiene and dental diseases can be a risk factor for the cardiovascular system. To mitigate this risk, preventive measures and the need to improve dental care are emphasized.

International experiences demonstrate numerous innovative approaches to improving oral hygiene and dental health. These experiences help improve public health by placing special emphasis on oral hygiene within healthcare systems and promoting it. Social programs and innovative technologies also contribute significantly to the global improvement of oral and dental health.

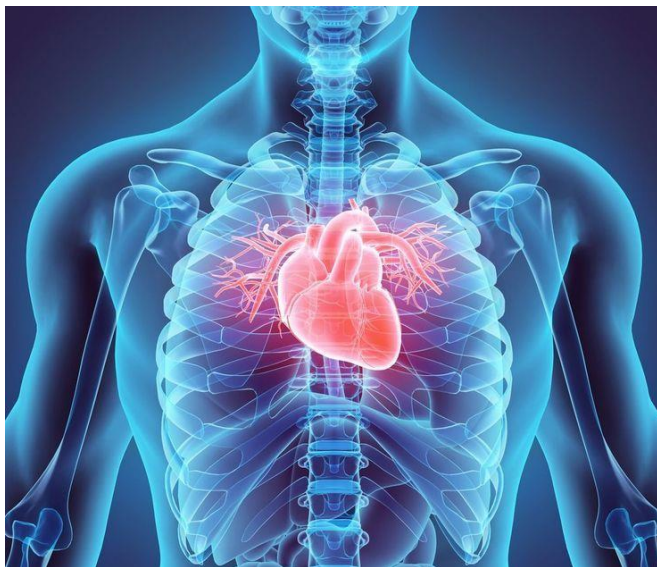
II CHAPTER. THE INTERRELATIONSHIP BETWEEN ORAL HYGIENE AND CARDIOVASCULAR DISEASES

2.1. Cardiovascular diseases and the factors affecting their development

Cardiovascular diseases (CVDs) are widespread and serious health issues that lead to significant health problems. The primary causes of these diseases are linked to genetic, environmental, lifestyle, and both internal and external factors. Cardiovascular diseases are often the result of high blood pressure, increased cholesterol levels, elevated blood fats, and unhealthy lifestyles. All of these negatively impact the efficient functioning of the heart and blood vessels (American Heart Association, 2020).

1. Coronary Heart Disease (CHD)

Coronary heart disease (CHD) is related to issues within the heart's blood supply system and is mainly characterized by the narrowing or blockage of



coronary arteries due to atherosclerosis. When the blood flow to the heart, which carries oxygen and nutrients via the coronary arteries, becomes restricted, oxygen deprivation occurs in the heart muscle. This leads to the development of a heart attack or angina (Libby et al., 2011).

Pic 2: Heart Disease

Atherosclerosis (narrowing of blood vessels) results in the hardening of arteries and the loss of their elasticity, which increases the risk of heart attacks and strokes (Ross, 1999). The primary risk factors for atherosclerosis include high

blood pressure, high cholesterol, excess weight, lack of physical activity, and poor diet (World Health Organization, 2017).

Coronary heart disease (CHD) arises due to the narrowing or blockage of the coronary arteries that supply blood to the heart. Atherosclerosis, the accumulation of cholesterol and other fatty substances in the blood vessels, is the primary cause of CHD. This condition reduces the oxygen supply to the heart muscle, leading to serious conditions such as angina pectoris (chest pain) and heart attack (myocardial infarction).

The development of coronary heart disease is influenced by various factors, including genetic factors, high blood pressure, high cholesterol, smoking, lack of physical activity, excessive weight, and stress. Diagnostic methods for the disease include electrocardiography (ECG), echocardiography, and coronary angiography.

In treatment, medications (such as beta-blockers, statins, and anticoagulants) and lifestyle changes (such as proper diet, increased physical activity, and quitting smoking) play crucial roles. Early diagnosis and preventive measures (such as controlling blood pressure and cholesterol levels) are effective in preventing the disease.

2. Cardiac arrhythmias (Heart Rhythm Disorders)

Cardiac arrhythmias, or disturbances in the heart rhythm, are disorders related to the heart's electrical system. In these cases, the heart rate may increase beyond the normal range (tachycardia) or slow down (bradycardia). Additionally, irregular heartbeats, such as atrial fibrillation, impair the heart's effective functioning and hinder the proper circulation of blood (Zimetbaum, 2012). Atrial fibrillation (AF) is the most common arrhythmia and increases the risk of death and stroke. Atrial fibrillation is most prevalent in patients aged 65 and older (January et al., 2019).

Cardiac rhythm disorders are characterized by disruptions in the normal rhythm of the heart, meaning the heart rate or rhythm changes. This condition

arises from disturbances in the heart's electrical system and prevents the heart from functioning effectively. Arrhythmias typically manifest as either an increased heart rate (tachycardia) or a decreased one (bradycardia).

Arrhythmias can have many causes. These include heart diseases, high blood pressure, other mechanical or electrical disturbances in the heart, stress, alcohol consumption, excessive caffeine intake, medications, and genetic factors. Sometimes, arrhythmias show no symptoms, but they are often indicated by palpitations, shortness of breath, headaches, nausea, and a feeling of heaviness.

The primary diagnostic tool for arrhythmias is an electrocardiogram (ECG). An ECG analyzes the heart's electrical activity to measure its rhythm and identify disturbances. If the heart rate is too fast or too slow, it can pose a health risk to the patient.

There are several approaches to treating arrhythmias. In some cases, depending on the type of arrhythmia, medications (antiarrhythmic drugs, beta-blockers, calcium channel blockers) are used. If the arrhythmia is severe or life-threatening, electrophysiological treatment or electrical impulses (cardioversion) may be required to restore the heart's electrical system.

Preventive measures include regular heart check-ups, stress management, increasing physical activity, maintaining a proper diet, and limiting alcohol and caffeine intake. Early detection and treatment of arrhythmias, along with adopting a healthy lifestyle, are essential for effectively managing heart rhythm disorders.

3. Hypertension (High Blood Pressure)

Hypertension is characterized by persistently high pressure in the blood vessels. Prolonged hypertension can lead to various cardiovascular diseases, including heart attack, stroke, and kidney failure (Chrysafides et al., 2019). Hypertension often develops without symptoms, making it difficult to detect in its early stages. High blood pressure can result not only from excessive body weight but also from poor diet and the long-term effects of stress (Messerli et al., 2015).

Hypertension (High Blood Pressure) is a condition in which blood consistently exerts high pressure on the walls of the blood vessels. This condition disrupts the normal functioning of the heart and vascular system, potentially leading to serious health problems. Hypertension often develops without symptoms, which is why it is referred to as a "silent killer." Over time, this condition can significantly shorten a person's life, as undiagnosed hypertension can lead to heart attacks, strokes, kidney failure, and deterioration of the blood vessels.



Pic 3: Hypertension

Several factors influence the development of hypertension. Specifically, genetic factors, stress, poor nutrition, lack of physical activity, smoking, and alcohol consumption can all contribute to high blood pressure. Additionally, excess weight and age can also impact the development of this

disease. Hypertension is often asymptomatic, so early detection and treatment are crucial. Hypertension is typically diagnosed when blood pressure exceeds 140/90 mmHg. The higher number (systolic pressure) represents the pressure during heart contraction, while the lower number (diastolic pressure) reflects the pressure in the blood vessels when the heart is at rest. Hypertension can be categorized into mild, moderate, and severe forms based on its severity. Mild hypertension is when blood pressure ranges from 140/90 mmHg to 159/99 mmHg, moderate hypertension is from 160/100 mmHg to 179/109 mmHg, and severe hypertension is above 180/110 mmHg.

Depending on the severity and expected outcomes of the disease, there are various treatment methods for hypertension. Pharmacological approaches include diuretics, beta-blockers, ACE inhibitors, calcium channel blockers, and angiotensin receptor blockers. These medications help normalize blood pressure and prevent it

from rising too high. In addition, lifestyle changes play a vital role in the treatment of hypertension. A proper diet, increased physical activity, quitting smoking, and reducing alcohol intake are effective in restoring normal blood pressure. Managing stress is also beneficial in hypertension cases. Stress-reducing techniques such as meditation or yoga can help control blood pressure. Preventive measures, including maintaining a healthy lifestyle, normalizing weight, and regular medical check-ups, are effective in reducing the risk of hypertension. Early diagnosis and regular monitoring of blood pressure can help prevent the negative consequences associated with hypertension.

4. Heart Failure

Heart failure (HF) is a condition where the heart is unable to pump blood effectively, leading to reduced delivery of oxygen and nutrients to other organs in the body. This condition develops as a result of weakened heart muscles or a decreased ability of the heart to pump blood (McMurray et al., 2012). HF is often caused by heart attacks, high blood pressure, and other heart diseases. Globally, heart failure ranks as the third leading cause of death (World Health Organization, 2020).

Heart failure (HF) is when the heart cannot meet the body's demand for oxygen and nutrients. This disease results from a decrease in the heart's pumping ability or a weakening of the heart muscles. Heart failure is often associated with other heart diseases, such as heart attacks, high blood pressure, heart valve diseases, and diabetes.

Heart failure can develop in either the right or left side of the heart, or both. Left-sided heart failure typically reduces the pressure necessary for pumping blood from the heart to the aorta and the rest of the body, causing fluid buildup in the lung vessels (pulmonary edema) and difficulty breathing. Right-sided heart failure, on the other hand, results in an inability to pump blood to the lungs, leading to fluid accumulation in the legs, abdomen, and possibly other organs, depending on the severity of the condition.

There are many causes of heart failure. The most common factors include high blood pressure, heart attacks, heart valve diseases, arrhythmias, diabetes, kidney diseases, and stress. These conditions disrupt the normal functioning of the heart, weakening the heart muscles and making it difficult to deliver sufficient blood and oxygen to the body.

Diagnosis of heart failure involves clinical symptoms such as shortness of breath, swelling in the legs, fatigue, sleep disturbances, high blood pressure, and chest pain. Diagnostic tests like ECG, echocardiography, X-rays, and blood tests (e.g., BNP level measurement) are also helpful. The main approaches to treating heart failure include pharmacotherapy and lifestyle changes. Medications such as diuretics, ACE inhibitors, beta-blockers, angiotensin II receptor blockers (ARBs), aldosterone antagonists, and other heart-supporting drugs are used. These medications help improve the heart's efficiency, increase fluid elimination, and normalize blood pressure.

Preventive measures include regular heart check-ups, managing high blood pressure and diabetes, proper nutrition, increasing physical activity, reducing stress, and quitting smoking. Heart failure can be life-threatening, so early detection and treatment should not be overlooked. Regular monitoring and effective treatment play a critical role in maintaining the heart's normal function and improving the patient's quality of life.

5. Atherosclerosis and peripheral arterial disease

Atherosclerosis is characterized by the hardening and narrowing of blood vessels, which leads to a slowdown in blood circulation. Peripheral arterial disease (PAD) occurs due to the narrowing or blockage of arteries, causing problems in supplying oxygen to the legs. This results in pain, weakness, and reduced mobility in the legs (Fowkes et al., 2008). Peripheral arterial disease is often associated with atherosclerosis, which leads to the dilation of blood vessels over time and acute blockages.

Cardiovascular diseases are a global health problem that poses a significant risk to human health. Prevention, proper nutrition, physical activity, and regular medical check-ups are necessary to prevent and treat these diseases. Also, timely detection and the initiation of complex treatments for each type of disease not only help preserve life but also improve its quality.

The link between periodontitis and cardiovascular diseases has gained significant importance in medical and scientific research in recent years. Periodontitis, which is the inflammation of tissues around the teeth, negatively affects not only the oral cavity but also the entire body, including the cardiovascular system, especially when it is prolonged and untreated. Studying the inflammatory processes associated with periodontitis and their relationship with cardiovascular diseases helps deepen the understanding of the interconnection between these two systems.

Bacterial infections and inflammation processes are among the main causes of periodontitis. Bacteria such as *Porphyromonas gingivalis*, *Tannerella forsythia*, and *Aggregatibacter actinomycetemcomitans* not only damage the tissues of the oral cavity but also trigger inflammatory reactions that can affect other parts of the body, including the cardiovascular system. Inflammatory processes weaken the walls of blood vessels, leading to the development of atherosclerosis, which increases the risk of heart attacks, strokes, and other cardiovascular diseases.

The entry of bacteria into the inner walls of blood vessels and their ability to enhance inflammatory processes lead to the narrowing and hardening of arteries. This process causes the development of atherosclerosis. Atherosclerosis, in turn, is one of the main causes of heart diseases. The impact of inflammation caused by periodontitis on the cardiovascular system may not only be localized but also provoke general systemic responses. Research indicates that the persistence of periodontitis and the intensification of its inflammatory processes increase the levels of inflammation in the body, triggering the development of atherosclerosis (Beck et al., 2001; Preshaw et al., 2005).

Moreover, there is also a connection between periodontitis and high blood pressure (hypertension). The inflammation induced by periodontitis can raise blood pressure. As a result of inflammation, stress receptors in the body become active, leading to the narrowing of blood vessels and an increase in blood pressure (Loos et al., 2011). This condition can increase the risk of both periodontitis and cardiovascular diseases. Studying the link between periodontitis and high blood pressure emphasizes the necessity of treating both diseases in a comprehensive manner.

The relationship between periodontitis and heart attacks has also been scientifically proven. Research shows that the ongoing inflammation and infection processes in periodontitis exacerbate the atherosclerotic changes in blood vessels, leading to the development of heart attacks. Furthermore, severe forms of periodontitis, along with the intensification of inflammation, can lead to heart failure (Kiechl et al., 2001). The bacterial infection resulting from periodontitis may enter blood vessels through infected tissues, disrupting the normal blood flow to the heart.

The impact of periodontitis on the development of heart diseases is also related to the condition of the oral microbiota. Bacteria in the mouth can enter the bloodstream through blood vessels and intensify the inflammatory processes in the cardiovascular system. Over time, these processes lead to the development of atherosclerosis and similar cardiovascular diseases. Treating periodontitis not only improves oral health but also contributes to the health of the cardiovascular system (Beck et al., 2001). Early detection and effective treatment of periodontitis play a crucial role in preventing cardiovascular diseases. Treating periodontitis can reduce the level of inflammation in the body and improve the condition of blood vessels. This helps slow down or even prevent the development of heart diseases.

The relationship between periodontitis and heart diseases allows for a better understanding of the interconnections within the healthcare system and facilitates the development of strategies for the comprehensive treatment of these diseases.

Further investigation of the effects of periodontitis on the cardiovascular system will help improve medical approaches and develop effective strategies for treating these two diseases together.

In recent years, the impact of infections in the oral cavity and their effects on the circulatory system have been extensively studied through scientific research and clinical observations. Inflammatory processes in the oral cavity, particularly periodontitis, bacterial infection, and immune responses, negatively affect the entire body, including the heart and circulatory system. Understanding this relationship is important for creating new approaches to effectively control the oral cavity and prevent cardiovascular diseases. The bacteria involved in periodontitis, such as *Porphyromonas gingivalis*, *Tannerella forsythia*, and *Aggregatibacter actinomycetemcomitans*, contribute to the development of atherosclerosis and other cardiovascular diseases. Research shows that periodontitis and other inflammatory processes in the oral cavity, particularly the entry of bacteria into the bloodstream, cause inflammation in the walls of arteries. This, in turn, leads to the development of atherosclerosis, narrowing of blood vessels, and intensification of inflammation.

The passage outlines the connections between oral health, particularly periodontitis, and cardiovascular diseases. Periodontitis is an inflammatory condition of the tissues around the teeth, which, if untreated, can lead to widespread systemic effects, including negatively impacting the heart and vascular system.

Key points discussed are:

1. **Inflammation and systemic effects:** Bacteria in the mouth, particularly those involved in periodontitis, can enter the bloodstream, triggering systemic inflammation. This inflammation can damage the walls of arteries, leading to a loss of elasticity, which raises the risk of cardiovascular conditions like heart attacks, stroke, and hypertension.

2. **Oxidative stress:** Bacteria in the oral cavity can also promote oxidative processes, exacerbating the narrowing of blood vessels and accelerating the development of atherosclerosis, which further impairs cardiovascular function.
3. **Cholesterol metabolism:** The inflammation caused by oral infections, especially periodontitis, is linked to changes in cholesterol metabolism, increasing levels of LDL cholesterol. This contributes to the buildup of fatty plaques in arteries, leading to atherosclerosis and, consequently, cardiovascular diseases.
4. **Prevention through oral hygiene:** Maintaining good oral hygiene, regular tooth brushing, and treatment of periodontitis can reduce inflammation, prevent infections, and help manage cholesterol levels. This ultimately reduces the risk of developing cardiovascular diseases by preventing the systemic spread of oral bacteria and associated inflammation.

The importance of oral health in overall cardiovascular health highlights the need for comprehensive medical and dental care to manage and prevent the interconnected risks.

Regular oral hygiene and dental health care contribute to the prevention of periodontitis and the development of cardiovascular diseases. It is an effective tool for the early detection and treatment of periodontitis, the management of cholesterol levels, and the prevention of cardiovascular diseases. To normalize cholesterol levels and reduce the risk of cardiovascular disease, it is important to constantly monitor oral hygiene and dental health. Therefore, oral infections and inflammatory processes lead to an increase in systemic inflammation, an increase in cholesterol levels, and the development of atherosclerosis. Oral hygiene and dental health care help reduce the risk of cardiovascular disease, while also playing an important role in normalizing cholesterol levels. This, in turn, contributes to improving physical and mental health.

The significance of oral hygiene in heart disease has become better understood through scientific research conducted in recent years in the field of medicine. Bacterial infections and inflammatory processes in the oral cavity, particularly periodontitis, can accelerate it without hindering the development of cardiovascular diseases. The scientific basis of this connection is primarily linked to the exacerbation of systemic inflammation, atherosclerosis, and changes in cholesterol metabolism.

The accumulation of bacteria and their toxins in the oral cavity leads to the onset of inflammatory processes. Diseases such as periodontitis not only worsen oral health but also cause systemic inflammation of the body. Bacteria, passing through the oral cavity into the circulatory system, inflame the walls of the cardiovascular system. This process leads to the development of atherosclerosis, the accumulation of cholesterol and other lipids in the walls of arteries. Therefore, periodontitis increases the risk of cardiovascular disease by increasing cholesterol levels through the systemic action of bacteria in the oral cavity.

Studies show that exacerbation of systemic inflammation changes the lipid profile in the body, particularly an increase in LDL cholesterol is a risk factor for heart disease. Inflammatory processes decrease the elasticity of blood vessels and accelerate the development of atherosclerosis. Periodontitis and other oral infections trigger elevated LDL cholesterol levels and accelerate the formation of atheromatous plaques on the walls of the arteries. These processes, in turn, lead to narrowing of blood vessels and impaired blood circulation.

The influence of oral hygiene on heart disease is based on two interconnected key factors: systemic inflammation and cholesterol metabolism. Regular dental cleaning and hygienic cleaning of the oral cavity reduce the number of bacteria and prevent inflammation. This, in turn, plays an important role in the prevention of cardiovascular diseases. Treatment of oral infections and bacteria also reduces systemic inflammatory processes, normalizes cholesterol levels, and prevents the development of atherosclerosis. Furthermore, the systemic effects of

oral infections lead to increased inflammation in the body, which causes damage to the walls of blood vessels. Also, the bacteria that arise in periodontitis damage the inner layer of blood vessels and initiate inflammatory processes through them. As a result, the risk of atherosclerosis and other heart diseases in the walls of blood vessels increases.

Maintaining oral hygiene is crucial not only for oral health, but also for maintaining the health of the cardiovascular system. Regular dental cleaning and treatment of bacterial infections in the oral cavity significantly reduce the risk of heart disease, reducing systemic inflammatory processes. Tooth cleaning in the early stages of periodontitis and the reduction of bacteria in the oral cavity are an effective means of preventing cardiovascular diseases.

Oral hygiene plays a crucial role in the prevention of cardiovascular diseases. Periodontitis and oral infections exacerbate systemic inflammatory processes, increase cholesterol levels, and accelerate the development of atherosclerosis. Therefore, oral hygiene is of great importance not only for maintaining oral health, but also for maintaining the health of the cardiovascular system. Regular dental cleaning and treatment of inflammation in the oral cavity reduce the risk of cardiovascular disease.

2.2. Mechanisms of interaction between hygiene and cardiovascular diseases

Inflammatory processes in the oral cavity, especially periodontitis, can have a serious impact on the health of the cardiovascular system. The presence of bacteria and their toxins in the oral cavity exacerbates systemic inflammation. The passage of bacteria from the mouth into the circulatory system initiates inflammatory processes in the heart and blood vessels, leading to the development of atherosclerosis and other cardiac diseases.

In periodontitis, inflammation in the oral cavity leads to an exacerbation of systemic inflammation. Bacteria can accelerate atherosclerosis by injecting their toxins into the bloodstream. These processes lead to accumulations of cholesterol and other lipids in the walls of blood vessels. The intensification of inflammatory processes leads to narrowing and loss of elasticity in the arteries, which leads to impaired circulation. This also increases the risk of developing cardiovascular diseases, such as heart attacks and strokes.

Periodontitis and other oral infections exacerbate systemic inflammation and accelerate the process of atherosclerosis in blood vessels. Increased inflammation leads to an increase in LDL cholesterol levels, which further accelerates the development of atherosclerosis. Bacteria in the oral cavity increase the level of inflammatory markers (e.g., C-reactive protein) in the blood, thereby intensifying inflammatory processes in the walls of the arteries. This, in turn, leads to narrowing of the arteries and an increase in blood pressure.

Maintaining oral hygiene plays a crucial role in the prevention of cardiovascular diseases. Regular tooth cleaning reduces the level of systemic inflammation by reducing the number of bacteria in the oral cavity and preventing inflammation. This effectively helps to maintain not only oral health but also the health of the heart and blood vessels. Cleaning teeth and reducing the number of bacteria in the oral cavity slow down the development of atherosclerosis and

normalize cholesterol levels. Therefore, inflammatory processes in the oral cavity have a significant impact not only on oral health, but also on the state of the cardiovascular system. Periodontitis and other oral infections increase the risk of developing heart disease, exacerbating systemic inflammatory processes. Maintaining regular oral hygiene is of great importance in reducing inflammatory processes and improving the health of the cardiovascular system.

Inflammatory processes in the oral cavity, especially periodontitis, can have a significant impact on the state of the cardiovascular system. Inflammation arising in the oral cavity sends bacteria and their toxins into the blood vessels, which intensifies systemic inflammatory processes. This movement of bacteria contributes to the development of atherosclerosis in blood vessels. Atherosclerosis, on the other hand, leads to the accumulation of cholesterol and other lipids in the walls of the arteries, causing blood vessel narrowing, circulatory disorders, and high blood pressure.

Inflammatory processes in the oral cavity can also disrupt microcirculation, that is, blood circulation in small blood vessels. Disruption of microcirculation leads to a decrease in the supply of oxygen and nutrients necessary for organs and tissues. When bacteria in the oral cavity enter blood vessels, they may increase the level of inflammatory markers (such as C-reactive protein). These processes lead to accelerated growth and lipid accumulation in the walls of the arteries, resulting in the development of atherosclerosis.

There are numerous scientific studies that demonstrate the relationship between oral infections and systemic inflammation. Studies show that the development of periodontitis leads to the accumulation of cholesterol and other lipids in blood vessels and the appearance of arterial obstructions. All of this increases the risk of heart disease, stroke, and other vascular pathologies. These processes can also be reduced by improving oral hygiene. Regular tooth cleaning helps reduce the number of bacteria and prevent inflammation in the oral cavity,

reducing systemic inflammation. Regular oral hygiene is an effective method for preventing diseases such as periodontitis and maintaining cardiovascular health.

Understanding the relationship between inflammation in the oral cavity and heart disease contributes to the effective development of healthcare strategies. Reducing the number of bacteria in the oral cavity and preventing inflammation significantly reduces the risk of cardiovascular disease and is important in improving overall health. The relationship between infection and the body's immune response is important in medicine, helping to understand the complex processes involved in protecting the body from pathogens. Infection is usually caused by the entry and reproduction of microorganisms, such as bacteria, viruses, fungi, or parasites. This process causes activation of the immune system in the body, as the immune system activates defense mechanisms against pathogens.

The immune system is the body's self-defense mechanism, aimed at recognizing, neutralizing, and eliminating pathogens. The immune response is divided into two main components: natural (or general) immunity and acquired (or specific) immunity. Natural immunity involves innate defense mechanisms of the organism and provides a quick but indistinct response to infections. The obtained immunity creates a special response of the body to specific pathogens and usually provides long-term protection.

Natural immunity is a rapid and comprehensive defense mechanism of the body. Its main components are:

- **Phagocytosis:** Cells such as macrophages and neutrophils contain pathogens and destroy them.
- **Interferons:** Proteins that help fight viruses and protect nearby cells.
- **Complementary system:** A protein system that helps destroy bacteria and causes inflammation.

The acquired immunity, on the other hand, creates a clear and specific response to pathogens in the body after the first exposure to the microbe. This

response is primarily mediated by lymphocytes, i.e., T and B cells. B cells produce antibodies that neutralize pathogens, while T cells destroy infected cells.

When the immune system fights an infection, it goes through several stages:

1. *Recognition of the pathogen*: As soon as the pathogen enters the body, the immune system recognizes it and reacts against it. This process is regulated by the process of recognizing the antigen and displaying it through cells.

2. *Immune response activation*: Once the pathogen is identified, B cells begin to produce antibodies, while T cells carry out attack at the cellular level against infection.

3. *Inflammation*: The inflammatory process is the body's response to stopping and neutralizing an infection. This process is controlled by inflammatory mediators, such as prostaglandins and cytokines.

4. *Immune Memory*: The immune system, after first recognizing the pathogen, stores specific cells (memory lymphocytes) against it. This helps protect the body from future infections.

While the immune system plays a crucial role in eliminating infections, in some cases the immune response may be weakened or malfunctioning. For example, autoimmune diseases - the body's immune system recognizes its own cells as foreign and tries to destroy them. In such cases, infections and malfunctioning of the immune system can cause serious health problems.

The relationship between infection and the immune system is complex and interconnected, with a number of mechanisms and cells involved in creating the body's correct immune response and ensuring effective control of infections. The altered or weakened immune system can lead to the spread of infections and more severe consequences.

The mechanism by which bacteria pass through the blood to the heart and thereby cause heart disease is complex and depends on several factors. In the

process of infection, bacteria typically penetrate blood vessels and spread to different parts of the heart, taking advantage of the inflammatory conditions present in the body. To better understand this process, it is necessary to consider the mechanisms by which bacteria enter the heart through blood vessels and the development of infection in the heart. Once bacteria enter the body, they first enter the bloodstream and then into the heart. This process typically occurs through infections in the oral cavity or teeth that have been missed, inflammation in the intestines, or infections in other organs. Once the bacteria enter the bloodstream, there is more room for them to enter the heart. Bacteria that cause infection activate inflammation and weaken the walls of blood vessels, thereby allowing the bacteria to penetrate the inner layers of the heart or the valves of the heart. As a result, this can disrupt the proper functioning of the heart and worsen the processes of blood circulation.

By activating systemic inflammatory processes in the body, bacteria facilitate the passage of pathogens in blood vessels. Changes in the structure of blood vessels through inflammatory processes allow bacteria to penetrate. As a result of the transferred infections, the bacteria reach the heart and cause systemic inflammation of the heart. This process can lead to structural and functional changes in the heart and blood vessels, such as the formation of cholesterol plaques or the appearance of cases of thrombosis. In the heart, especially in the valves of the heart, bacteria can localize and develop inflammation. This can lead to endocarditis, which worsens the functioning of the heart. Bacteria accumulate in the valves of the heart, developing infections, which damage not only the valve, but also the blood vessels.

Diseases like sepsis play a major role in the transmission of bacteria through the blood to the heart. In sepsis, bacteria affect not only the heart, but the entire body, damaging the valves of the heart and blood vessels. In sepsis, a high level of bacterial spread damages all systems of the body, leading to the development of heart disease. Preventive measures are needed to prevent the transmission of

bacteria to the heart. Oral hygiene, regular tooth cleaning, inflammatory treatment, and infection prevention help control this process. Also, the use of antibiotics and other preparations against infections helps prevent the entry of bacteria into the heart. Timely detection and treatment of bacterial infections through medical examinations and preventive examinations play an important role in maintaining the health of the cardiovascular system.

Studying the relationship between blood pressure and oral hygiene is crucial for improving cardiovascular health and preventing diseases associated with this system. Studies show that oral health is not only a local problem, but also has a direct impact on overall health, including blood pressure. This relationship arises through the complex interaction of inflammatory processes, microbiological changes, and the vascular system.

Inflammatory processes in the oral cavity, particularly diseases such as periodontitis, are known as factors causing systemic inflammation. In periodontitis, pathogenic bacteria located in the oral cavity activate inflammatory mediators at the cellular level. Among them, substances such as interleukin-1 (IL-1), tumor necrosis factor alpha (TNF- α) play a significant role. These substances enter the blood and intensify inflammatory processes throughout the body. As a result, the inner layer of the vessel walls - the endothelium - is damaged, leading to narrowing of the vessels and a decrease in their elasticity. Such changes are considered factors that increase blood pressure. Also, bacteria present in the oral cavity and their toxins can enter the circulatory system. It has been established that they affect the condition of blood vessels and cause the development of atherosclerosis. During atherosclerosis, cholesterol plasma and inflammatory tissue accumulate on the inner surface of blood vessels, which increases resistance to blood flow and raises blood pressure.

Another important aspect of the relationship between blood pressure and oral hygiene is the impact of substances and habits taken through the oral cavity on the circulatory system. For example, inflammatory processes caused by food waste

and bacterial deposition, caused by non-compliance with hygiene rules, worsen the overall condition of the body and can lead to an increase in blood pressure. Inadequate oral hygiene exacerbates the impact on the cardiovascular system through periodontal diseases. Studies have shown that individuals with periodontal diseases are significantly more likely to experience high blood pressure than healthy individuals. At the same time, the degree of blood pressure rise increases depending on the stage of periodontal disease.

The importance of preventive measures deserves special attention. Adherence to oral hygiene, including regular tooth cleaning, the use of dental floss, and passing professional medical examinations, helps to control blood pressure. Studies show that periodontal treatment can reduce systemic inflammation and normalize blood pressure. It also has a positive impact on blood pressure through proper diet and a healthy lifestyle, including reducing smoking and alcohol consumption, improving oral health.

The relationship between oral hygiene and blood pressure is important in ensuring cardiovascular health. By identifying this relationship and developing preventive measures based on it, it is possible to reduce the risk of cardiovascular diseases and improve health. In modern medicine, the processes of studying and implementing this relationship in practice are ongoing, which means great prospects for science and the healthcare system.

2.3. Oral hygiene and methods for preventing heart disease in medicine

Monitoring oral hygiene is an important factor in the prevention of cardiovascular diseases. Studies show that inflammatory processes in the oral cavity are associated with systemic inflammation and metabolic disorders, leading to the development of heart disease. Therefore, medical recommendations are aimed at shaping hygienic habits and help reduce the risk of heart disease by maintaining oral health.

Brushing your teeth at least twice a day is a key measure in combating bacteria. Using high-quality toothpaste during this process helps reduce inflammation and prevents the proliferation of pathogenic bacteria. Additionally, the use of dental floss is essential for removing food particles between teeth, playing a significant role in preventing periodontal diseases. Mouthwashes, on the other hand, help restrict bacterial growth and maintain acid balance.

Regular dental check-ups are crucial for monitoring oral hygiene and detecting diseases at an early stage. Visiting a dentist at least twice a year allows for the identification of periodontal and other oral cavity diseases. Paying attention to diet, especially by limiting sweets and carbohydrate-rich foods, is also part of hygienic measures. This slows down the formation of harmful bacterial plaques on teeth and positively impacts cardiovascular health.

Following medical recommendations thoroughly can significantly reduce systemic inflammation and cardiovascular diseases. According to statistics, neglecting oral hygiene increases the risk of cardiovascular diseases by approximately 20–30%. Therefore, promoting hygienic habits among the population and teaching them how to practice these habits effectively is one of the most pressing priorities.

The relationship between oral cavity and vascular inflammatory factors is of great medical significance, and research on this topic shows a strong correlation

between oral hygiene and the development of cardiovascular diseases. In particular, periodontitis and other oral diseases can lead to the activation of vascular inflammatory factors. Pathogenic bacteria and their toxins play an important role in these processes, which spread from the oral cavity to other organs and systems through blood flow.

The entry of pathogenic bacteria into the bloodstream activates inflammatory processes, resulting in increased production of cytokines and other biologically active substances. These substances damage the walls of blood vessels and contribute to the development of atherosclerosis. At the same time, bacterial endotoxins can reduce vascular elasticity and lead to a chronic form of inflammation. Under these conditions, the risk of cardiovascular diseases, particularly myocardial infarction and stroke, increases.

The immune response to oral infections also has a direct impact on vascular inflammation. Immune cells and chemical mediators produced in the fight against infection can cause inflammation and damage to the walls of blood vessels. At the same time, chronic inflammatory processes in the oral cavity overactivate the immune system, which negatively affects the functioning of the heart and blood vessels. Studies show that people with periodontitis have a 25-30% higher risk of developing cardiovascular diseases than healthy individuals. Therefore, maintaining oral hygiene is important not only for dental and gingival health, but also for overall health, particularly for the prevention of cardiovascular diseases. Medical professionals emphasize that paying attention to oral hygiene can reduce the risk of cardiovascular diseases. In this sense, regular dental examinations, the formation of hygienic habits, and the promotion of a healthy lifestyle are one of the effective methods for controlling systemic inflammatory processes.

When an infection enters the body, the immune system triggers defense mechanisms against this risk. This process occurs when various microorganisms - bacteria, viruses, fungi, or parasites - enter the body and damage cells and tissues. The immune response involves a complex set of mechanisms aimed at eliminating

infection and restoring damaged tissues. This process is carried out through natural (innate) and acquired (adaptive) immune mechanisms.

The natural immune response is the first defense against infection. At this stage, the immune system recognizes the infection and initiates inflammatory processes. Phagocytic cells - macrophages and neutrophils - actively participate in this process, absorbing microorganisms and destroying them. At the same time, natural immunity produces interferons and cytokines, which protect other cells from infection and regulate the inflammatory process. The acquired immune response develops in the next stage of the natural immune response and allows for a more accurate targeting of the infection. T-lymphocytes and B-lymphocytes play a key role in this process. T-lymphocytes either destroy infected cells or activate other immune cells, while B-lymphocytes produce antibodies. These antibodies neutralize microorganisms that cause infection and accelerate the phagocytosis process.

An important aspect of the immune response lies in its balance. Excessive activation of the immune system can damage the body. For example, some infections may trigger a strong inflammatory response, leading to tissue damage or autoimmune reactions. Therefore, the process of regulating the immune response is important. Cortisol and other immune suppressor mechanisms limit excessive inflammation, which helps protect healthy tissues. The relationship between infections and immune responses is complex and depends on many factors. The type of infection, its intensity and location, as well as the body's immune status, influence the effectiveness of the response. Weakened immunity can lead to widespread infection and chronic inflammatory processes. Therefore, effective preventive measures are crucial for strengthening immunity and combating infections. Focusing on hygiene in areas prone to infection, such as the oral cavity, leading a healthy lifestyle that supports the immune system, and undergoing regular medical examinations are key tools for preventing infections and enhancing the body's defense capabilities.

The mechanisms through which bacteria enter the heart via the bloodstream are complex biological processes. These microorganisms and their derivatives infiltrate the circulatory system through various pathways and eventually reach heart tissues. This process is often associated with oral infections, such as periodontitis and gingivitis, which trigger inflammation and damage to blood vessel walls. One primary route for bacteria to enter the bloodstream is through the easy disruption of inflamed tissues. Bacteria in the oral cavity induce inflammation in the gums and periodontal tissues, weakening the walls of capillaries in blood vessels. During activities like tooth brushing, chewing, or dental procedures, these bacteria can enter the bloodstream from these inflamed areas.

Once in the bloodstream, bacteria activate the immune system using various cell surface structures, such as lipopolysaccharides or lipopeptides. This activation triggers intense inflammatory processes within the body. These processes lead to excessive production of cytokines, interleukins, and other mediators, facilitating the bacteria's spread to distant tissues. The damage to endothelial cells plays a key role in bacteria's migration to heart tissues. The endothelium, the inner lining of blood vessels, serves as a protective barrier that restricts bacteria from passing between cells. However, bacterial toxins and immune mediators weaken or damage endothelial cells, allowing bacteria to reach heart valves or myocardial tissues.

Once in the heart, bacteria can cause a condition known as infective endocarditis. In this state, bacteria adhere to heart valves and form biofilms. These biofilms protect the bacteria from the immune system and antibiotics, complicating the treatment of the infection. This can disrupt the function of heart valves and increase the risk of heart failure.

From a medical perspective, preventing this process involves maintaining proper oral hygiene, undergoing regular dental check-ups, and promptly treating conditions like periodontitis. Additionally, individuals at high risk (e.g., those with prosthetic heart valves or chronic heart conditions) are advised to take prophylactic antibiotics before dental procedures. These measures are effective in preventing the

transfer of bacteria to the heart via the bloodstream and reducing complications related to cardiovascular diseases.

Blood pressure and oral hygiene are closely interconnected. Elevated blood pressure, or hypertension, significantly affects not only the cardiovascular system but also the health of other organs, including the oral cavity. This relationship manifests through various factors, leading to diverse changes in the body. High blood pressure often causes serious health issues that affect overall well-being. Symptoms such as headaches, nausea, sleep disturbances, and persistent fatigue are common, reflecting the body's overexertion or internal imbalance. Problems in the circulatory system, in turn, negatively impact the condition of blood vessels and tissues in the oral cavity, slowing down recovery processes.

Oral hygiene plays a critical role in maintaining overall health. Poor or neglected oral care can lead to inflammation, bacterial infections, and the development of dental diseases. These conditions are more pronounced in individuals with hypertension, as inflammation in the body can contribute to increased blood pressure.

Stress levels also play a crucial role in this process. Chronic stress not only raises blood pressure but also promotes bacterial growth and inflammation in the oral cavity. Therefore, reducing stress, maintaining a healthy lifestyle, and undergoing timely medical check-ups are essential for managing blood pressure and maintaining oral hygiene.

A balanced diet is a key factor in ensuring the stable functioning of both systems. Proper nutrition helps control blood pressure and strengthens teeth and gums. Additionally, adhering to regular oral hygiene practices and consulting specialists when necessary are vital.

By recognizing the connection between blood pressure and oral hygiene, health can be significantly improved. Monitoring the state of these systems, managing stress, eating a balanced diet, and maintaining good hygiene are integral

to a healthy lifestyle. These efforts not only help maintain normal blood pressure but also promote oral health.

The link between oral hygiene and heart disease has become a critical topic in recent years. Research indicates that inflammation in the oral cavity, particularly periodontitis and gingivitis, can contribute to the development of heart disease. Thus, maintaining and monitoring oral hygiene plays a vital role in protecting cardiovascular health.

The following recommendations for oral hygiene are scientifically grounded: brushing teeth at least twice a day and using dental floss. These simple practices are effective in reducing bacteria in the mouth and preventing inflammation. The fluoride content in toothpaste strengthens tooth enamel and helps prevent cavities. Additionally, regular visits to a dentist are advised to effectively control bacteria in the oral cavity. Early detection and treatment of oral infections are crucial for heart health. Diseases such as gingivitis or periodontitis are often linked to cardiovascular conditions. Treating oral inflammation promptly is essential to preventing heart diseases like endocarditis. Typically, these conditions are treated with antibiotics and antiseptic agents, but strictly adhering to the treatment plan prescribed by a dentist is vital.

Diet also plays a significant role in maintaining a healthy lifestyle. Scientific studies show a connection between consuming high-fat and sugary foods and the development of heart diseases. Therefore, a diet rich in vegetables, fruits, and healthy fats is an important factor in protecting the heart. Omega-3 fatty acids, such as those found in fish oil, support the healthy functioning of the cardiovascular system. Smoking and alcohol consumption exacerbate inflammation in the oral cavity, posing risks to heart health. Consequently, quitting these harmful habits is recommended.

Scientific research confirms that smoking contributes to heart disease, intensifies oral infections, and triggers inflammatory processes within the heart. Moreover, the mechanisms by which oral bacteria enter the cardiovascular system

are being extensively studied. Conditions like periodontitis can transport bacteria that accumulate in the oral cavity over time to the heart (e.g., heart chambers), potentially leading to infections and negatively affecting cardiac function.

Maintaining proper oral hygiene and addressing inflammation early are essential steps in reducing these risks. These practices, combined with a balanced diet, regular dental care, and avoiding harmful habits, can significantly contribute to better heart and overall health.

Regular oral hygiene, timely treatment of inflammation, healthy eating habits, and avoiding harmful habits are effective strategies for preventing heart diseases. Additionally, following evidence-based medical recommendations not only promotes oral health but also contributes to the overall well-being of the body.

Medications play a critical role in preventing infections by acting as both prophylactic and therapeutic agents. Their proper use helps inhibit or reduce the spread of microorganisms in the body, making them essential in infection prevention. Each type of medication contributes to infection control through specific mechanisms.

Antibiotics are the most commonly used drugs for treating bacterial infections. They work by either halting the growth of microorganisms or destroying them, thereby reducing infections. Antibiotics can also be used prophylactically, such as before surgical procedures or in situations with a high risk of infection. However, antibiotics are effective only against bacterial infections and should be used strictly under a doctor's guidance. Misuse of antimicrobial drugs can lead to the development of antibiotic-resistant bacteria, posing a significant public health challenge.

Antiseptics and disinfectants are used to cleanse the skin and mucous membranes of microorganisms. These agents are applied to treat wounds, cuts, and burns to prevent infection. By eliminating bacteria and other harmful

microorganisms, antiseptics ensure that the skin remains clean and healthy. Commonly used antiseptics include chlorhexidine and iodine-based preparations.

Antiviral medications target viruses, slowing or halting their growth, thereby helping the body overcome infections. These drugs are effective for preventing and treating illnesses like the flu and other viral infections. For high-risk viral diseases, such as influenza, **vaccines** are also widely used as a preventive measure. Vaccines work by introducing the virus (in a weakened or inactive form) into the body to enhance the immune response, protecting against future infections. Maintaining oral hygiene, adhering to healthy lifestyle habits, and using medications responsibly are fundamental for preventing infections and supporting overall health. Timely medical interventions and preventive measures, such as vaccinations, are also critical components of a holistic health strategy.

Antifungal drugs are used to treat and prevent infections caused by fungi. They stop the spread of the infection by destroying colonies of fungi. Antifungal drugs, such as fluconazole or ketokonazole, effectively treat fungal diseases and are also used as a prophylactic agent. Immunostimulants and immunomodulators play an important role in preventing infections by boosting or helping the body's immune system. These drugs improve the body's protection from external influences, while also allowing for faster disease control. Interferon and other immunostimulants are used to create a strong defense system against viral and bacterial infections.

Probiotics, in turn, play an important role in improving the intestinal microflora and preventing gastrointestinal infections. They increase the number of beneficial bacteria in the intestine, suppressing harmful microorganisms, which helps prevent intestinal infections. Probiotics are also effective in preventing intestinal dysbiosis after antibiotic treatment. Overall, the effective use of medications should be carried out based on medical recommendations and control. In the prevention of infections, it is necessary not only to use medications, but also to lead a healthy lifestyle, adhere to hygiene rules, and undergo regular medical

examinations. Such a comprehensive approach is effective in preventing infections and contributes to improving the overall health of the body.

The relationship between cardiovascular disease and oral health has been studied in numerous scientific studies in recent years. Inflammatories in the oral cavity, such as periodontitis and gingivitis, can contribute to the development of heart disease. Therefore, it is very important to develop and maintain a oral hygiene regime to reduce the risk of cardiovascular diseases.

There are several important recommendations for improving the oral hygiene. First, the place of dental cleaning is of particular importance. Teeth should be cleaned twice a day, in the morning and evening, with fluoride toothpaste. Tooth cleanliness not only ensures their health, but also reduces the number of bacteria in the oral cavity and prevents inflammation. The use of dental floss is also very important. The tooth thread effectively cleans the unpurified areas between the teeth, which helps to reduce the number of bacteria and prevents inflammation in the mouth. It is recommended to use dental floss once a day. The use of mouth masks is also effective in preventing infections. Antiseptic mouth masks eliminate harmful microorganisms in the oral cavity and keep the mouth clean. To prevent inflammation, it is recommended to use mouth masks regularly. Regular dental examinations are also very important. It is necessary to regularly consult a dentist for early diagnosis of tooth condition and inflammation in the oral cavity. Through dental examinations, if necessary, treatment courses can be established and oral inflammation can be prevented.

Healthy nutrition also plays a significant role in maintaining oral and heart health. Healthy foods like fresh fruits, vegetables, and omega-3 fatty acids help protect the heart, as well as keep the oral cavity healthy. In addition, consuming a small amount of salt and sugar also helps to improve heart health. Developing and following a mouth hygiene regime in the prevention of cardiovascular diseases helps reduce inflammation in the oral cavity, eliminate bacteria, and strengthen heart health. Therefore, taking into account the relationship between oral hygiene

and cardiovascular diseases, a healthy lifestyle, regular dental care, and healthy eating contribute to improved cardiac health.

Medical approaches to the course and treatment of diseases are shaped by the integration of traditional methods with modern medicine. The course of each disease varies depending on the patient's overall condition, the type of disease, the stage of its course, and the existing conditions. Therefore, medical approaches are chosen individually and in accordance with the situation. The approaches used in medicine in treating diseases are mainly divided into preventive, therapeutic, rehabilitative, and integrative treatment. Preventive approaches focus on disease prevention and include vaccination, promoting a healthy lifestyle, reducing stress, proper nutrition, and increasing physical activity. At the same time, early diagnosis and the promotion of a healthy lifestyle can prevent the development of diseases.

In therapeutic treatment, medications, physiotherapy, surgical interventions, and other medical methods are used. Such approaches are chosen depending on the patient's condition and the type of disease. For example, antibiotics and antiviral drugs are used to treat infectious diseases, while medications that lower blood pressure and lower lipids are used to treat heart disease. Each drug has its own specific mechanism and side effects, and their use requires caution and medical supervision.

Rehabilitation approaches include the post-treatment process and are aimed at restoring the patient's body. Rehabilitation methods such as physiotherapy, psychotherapy, exercise, and diet therapy are used to fully restore the body and restore its functions after illness or surgery. Rehabilitation is the final stage of treatment aimed at improving the patient's overall condition and restoring their activity in society.

In integrated medicine, treatment is carried out based on a combination of traditional and alternative medicine methods. In this approach, alternative methods such as acupuncture, phytotherapy, osteopathy can be used in conjunction with traditional medications. Integrative approaches are effective in treating many

diseases and contribute to improving their course. In addition, the role of psychosomatic approaches is also important in the course of diseases. Mental state, stress level, and emotional stability have a significant impact on the development of diseases. Methods such as psychological support, stress management, and meditation are used to strengthen mental and physical health. These approaches are especially necessary for chronic diseases and diseases requiring long-term treatment.

In the course and treatment of diseases, medical approaches should be used in a complementary way. The success of treating the disease also depends on the integration of approaches in the treatment process and adaptation to individual needs. Therefore, it will be possible to successfully treat diseases by combining medical approaches and maximizing their impact on the patient's body. Hygienic education and health programs are important in strengthening public health and disease prevention. These programs have a broad social impact by promoting a healthy lifestyle among the population, developing hygiene habits, and disseminating health-related knowledge. Providing people with the knowledge and skills necessary for adopting and implementing a healthy lifestyle increases the effectiveness of the healthcare system.

The programs are primarily aimed at preventing diseases and increasing people's responsibility for their health. Promoting key elements of a healthy lifestyle, such as proper nutrition, physical activity, living in a clean environment, and ensuring mental stability, will help improve people's health in the short term. In this regard, as part of hygiene education, it is important to teach practical skills such as simple but effective hygiene habits - hand washing, keeping the environment clean, and observing personal hygiene. Such programs can prevent the spread of diseases, especially infectious diseases. Health programmes also incorporate important approaches across a wide range of social healthcare sectors.

For example, explaining the role and importance of physical activity, encouraging people to lead an active lifestyle, as well as providing information on

proper nutrition, plays an important role in the prevention of chronic diseases. Such programs are an effective means of achieving a healthy lifestyle among the population, self-management, and disease control.

In addition, health programs raise public awareness about healthcare. People should approach the healthcare system not only from the perspective of treatment, but also from the perspective of health prevention. This approach is crucial for disease prevention, early detection, and effective treatment. Health programs also contribute to the formation of a healthy society by informing people about risk factors for various diseases and showing how to prevent them. The knowledge and skills provided through hygienic education and health programs provide a comprehensive approach aimed at strengthening health, on the one hand, and disease prevention, on the other. Therefore, these programs remain important as a necessary tool for a society striving for a healthy and happy life.

CHAPTER III. ORAL HYGIENE AND CARDIOVASCULAR DISEASES PREVENTION

3.1. Compliance with hygiene rules in disease prevention

It plays an important role in shaping proper hygiene habits, improving human health, and preventing diseases. Hygienic habits consist of a number of practical rules, ranging from personal hygiene to maintaining a clean environment, which are the main factor in creating a healthy lifestyle. The formation of proper hygiene habits is an integral part of modern medical approaches for societies and healthcare systems that are of particular importance.

First, it is very important to develop a proper handwashing habit. Handwashing is an effective means of preventing the spread of diseases. It plays an important role in explaining the importance of handwashing among people, especially in preventing the spread of infectious diseases and acute respiratory viruses. Every person should be taught the correct technique of hand washing: it is necessary to wash their hands thoroughly and correctly using water, soap and sanitary means, making this process a habit.

Secondly, adherence to personal hygiene rules, such as keeping the oral cavity clean, regularly brushing teeth, and disinfecting the mouth, are important in preventing diseases. The formation of a proper tooth brushing habit has a positive impact not only on oral hygiene, but also on overall health. Keeping your skin clean, keeping your hair properly, and keeping your clothes clean are also important hygienic habits.

Third, maintaining a clean environment should also be part of the formation of proper hygiene habits. Disease prevention can be achieved by improving the hygienic condition of housing, workplaces, and public spaces, reducing environmental pollution, and training in proper waste disposal. In addition, it is

necessary to encourage people to be careful of dangerous chemicals and contaminated water.

It is especially important to start early in shaping the right hygiene habits, especially among children and young people. Introducing them to hygienic habits, developing their interest in a healthy lifestyle and being the right model for them will contribute to the formation of a healthy society in the future. It is necessary to provide hygiene education in schools and kindergartens, to teach students important skills related to proper washing, nutrition and lifestyle. The formation of proper hygiene habits should not be limited to the development of individual consciousness, but should also be supported by the healthcare system and the state. Medical and social programs supporting a healthy lifestyle, widespread promotion of hygiene education, and the creation of an infrastructure that ensures personal hygiene, contribute to the formation of healthy habits in society.

Therefore, the formation of proper hygiene habits contributes not only to improving individual health, but also to preventing diseases on a large scale and creating a healthy society. This process requires collaboration between medical professionals, educators, government agencies, and public organizations.

Attention to hygiene during childhood is of great importance, as hygienic habits formed during this period form the basis of a healthy lifestyle in the future. Proper hygiene habits for children play an important role not only in healthy development, but also in disease prevention and physical and mental health. The formation of hygiene habits in childhood not only ensures individual health, but also has a positive impact on the overall health of society.

First, since children's bodies are more vulnerable than adults, adherence to hygiene rules is important in maintaining their health. Proper hand washing, regular tooth brushing, and simple hygiene habits such as keeping the oral cavity clean can help prevent various infections and diseases in children. Regular hand washing in childhood is an effective tool, especially in the prevention of viral and bacterial diseases. At the same time, paying attention to oral and dental hygiene

reduces the spread of infections in the oral cavity and ensures healthy dental growth. Secondly, children should learn to control their health in accordance with their age. Their responsibility for health and their attitude towards hygiene habits should be taught in kindergartens and schools. Teaching such knowledge helps them maintain a healthy lifestyle in the future. Hygienic habits for children develop not only physical health, but also self-confidence and mental health. Thirdly, teaching hygiene habits in childhood helps to create a hygienic environment in families and public places. Parents and educational institutions play an important role in organizing hygienic education for children. Children learn to follow hygiene rules in school or at home and apply these habits to everyday life. This serves not only individual health, but also to reduce the spread of diseases in society.

Proper hygiene habits are formed in childhood and guide children towards a healthy and happy future. At the same time, teaching children basic health principles provides the most effective way to combat diseases. Through the collaboration of medical professionals, educators, and parents, it is possible to create a healthy society in the future by forming the right hygienic habits for children.

Preventive examinations and diagnostic procedures play an important role in early detection and prevention of diseases in healthcare. They serve not only to prevent the development of diseases, but also to preserve the general health of patients. Prophylactic examinations are also an effective tool for improving individual health and ensuring public health. The role of diagnostic processes in the prevention of diseases such as inflammation should be highly valued.

Preventive examinations are medical examinations conducted to identify diseases at an early stage and ensure the possibility of their effective treatment. They include general blood tests, examinations of teeth, internal organs, skin, physical examinations, and other diagnostic procedures. Preventive examinations are especially helpful in the prevention of chronic diseases, such as early detection

of cardiovascular diseases, diabetes, cancer, and infections. Examinations should be conducted regularly, as many diseases, especially inflammation, can be asymptomatic in the early stages.

Diagnostic processes are important in identifying diseases and developing a correct treatment plan. Inflammatories, bacterial and viral infections, as well as chronic inflammation, often develop in different parts of the body, and the symptoms are rarely pronounced. Therefore, diagnostic procedures, including laboratory tests, X-ray and ultrasound examinations, tomography, and other specialized methods, are an important tool for diagnosing the disease. When inflammation is detected early, it can be effectively treated and prevented from developing.

Inflammation prevention measures are primarily aimed at maintaining a healthy lifestyle, proper nutrition, increasing physical activity, reducing stress, and ensuring good sleep. In addition, inflammation can be associated with various infections, including bacterial and viral diseases, therefore it is necessary to follow hygienic habits, wash hands, reduce contact with dangerous substances, and at the same time strengthen the immune system. By adhering to a healthy lifestyle, the body's defense system is strengthened and inflammation can be prevented. Timely preventive examinations and diagnostic procedures serve as an important tool in the prevention of diseases and the treatment of inflammation. Implementing these regularly increases the effectiveness of the healthcare system, helps to prevent diseases, and contributes to improving the overall public health.

Community hygiene programs play an important role in improving health and disease prevention. These programs are aimed at improving overall health by keeping the environment clean, ensuring social hygiene, and reducing the spread of diseases in public places. Community hygiene programs are also designed to teach healthy lifestyles to different segments of society, prevent diseases, and promote healthy lifestyles.

First, collective hygiene programs help create important sanitation facilities. Among them, attention will be paid to key infrastructure such as drinking water supply, sewerage systems, waste disposal systems, and social services. Clean drinking water and a high-quality sewage system are essential for preventing the spread of infections among people. Most inflammatory diseases, especially intestinal infections, can spread in a lack of clean water or contaminated environment, so adherence to collective hygiene rules is essential for public health. Secondly, collective hygiene programs promote a healthy lifestyle and help improve overall health by teaching people how to prevent diseases. The implementation of these programs teaches people the basic principles of a healthy lifestyle, such as proper hygienic habits, nutrition, physical activity, and stress management. It also increases the effectiveness of the healthcare system by taking measures to prevent and prevent diseases. Thirdly, collective hygiene programs help create an environmentally friendly and safe environment. In public places, attention will be paid to issues such as preventing environmental pollution, proper waste management, careful use of pesticides and chemicals. An environmentally friendly environment, in turn, improves people's health and helps prevent diseases.

Community hygiene programs also require collaboration between government and community organizations. They unite healthcare, education, ecology, and the economy, affecting all segments of society. Well-organized collective hygiene programs reduce the spread of infections, improve overall health, and contribute to the creation of a healthy lifestyle in society. Therefore, collective hygiene programs play an important role in improving public health, disease prevention, and ensuring environmental sustainability. Their effective implementation contributes not only to individual health, but also to making the entire society healthy and happy.

3.2. Oral hygiene and heart health improvement strategies

Developing local prevention programs is of great importance in disease prevention and improving healthcare systems. These programs are tailored to the specific needs of the population in a particular area, taking into account local geographic and social conditions. Local prevention programs include many aspects, such as community hygiene, protecting ecosystems, promoting a healthy lifestyle, early disease detection and prevention, as well as expanding and ensuring access to medical care.

When developing a local prevention program, it is essential to analyze the social-economic conditions of the region and the health problems prevalent among the population. The process of preparing these programs must take into account the population structure, prevalent diseases, issues, and regional resources. For example, certain areas may have a high prevalence of cardiovascular diseases or infectious diseases, so the program will include preventive measures aimed at reducing these illnesses. Local prevention programs should focus on promoting a healthy lifestyle and increasing hygienic awareness among the population. Promoting proper nutrition, physical activity, stress management, regulating sleep, and avoiding harmful habits such as smoking and alcohol consumption are crucial. Implementing these measures requires collaboration with local educational institutions, medical centers, community organizations, and social media platforms.

When developing a prevention program, it is important to consider the expansion of medical services and their accessibility to the population. Carrying out preventive screenings and diagnostic tests at local clinics and healthcare facilities, especially for early detection of chronic and infectious diseases, will be effective. In this process, it is necessary to enhance the qualifications of medical specialists, nursing services, and other healthcare workers, and engage the population in comprehensive preventive measures. Local prevention programs

should also focus on community hygiene and environmental protection. Monitoring the quality of water resources, proper waste management, reducing air pollution, and implementing measures to keep the environment clean play a vital role in disease prevention. At the same time, raising public awareness and strengthening preparedness efforts to prevent natural disasters and mitigate their negative consequences are necessary.

When developing local prevention programs, collaboration and integration are also crucial. In implementing these programs, local government authorities, healthcare organizations, educational institutions, community organizations, and social services must work together. Each entity and organization has its own specific responsibilities, and together they contribute to improving community health. Thus, developing and implementing local prevention programs enhances the efficiency of the healthcare system, aids in disease prevention, and contributes to improving the health of the population. Well-designed and effective programs in practice help create a healthy and sustainable society.

Promoting family and community hygiene habits is essential for improving public health and preventing diseases. Family hygiene habits primarily include maintaining cleanliness in the home, creating sanitary conditions, and promoting a healthy lifestyle. Such habits not only help prevent diseases but also improve the overall health of family members. For instance, hand washing, proper nutrition, brushing teeth, healthy sleep, and regular physical activity should be developed as part of family hygiene habits.

Community hygiene habits, on the other hand, cover a broader scope—maintaining hygiene in public places and when using shared resources. These habits help ensure community health, prevent the spread of infections, and improve overall sanitary conditions. For example, maintaining cleanliness in public transport, schools, workplaces, and healthcare facilities, properly disposing of waste, and protecting the environment from pollution are essential hygiene practices that need to be developed.

Promoting family and community hygiene habits involves increasing education and awareness, as well as helping to create positive changes within society. It is necessary to conduct special training sessions, lectures, and information campaigns to teach family members and the public hygienic skills, prevent diseases, and promote a healthy lifestyle. In this process, healthcare workers, teachers, and community leaders play a vital role by focusing on social and hygienic issues and providing information about family and community hygiene practices. Promoting a healthy lifestyle not only improves individual health but also creates opportunities for disease prevention and nurturing a healthy generation across the entire society.

Innovations in the production of hygiene products accelerate industry development and create new opportunities for improving health. Today, hygiene products must not only be effective but also eco-friendly, convenient, and innovative. Hygiene tools being developed through new technologies and scientific research help in disease prevention and improving healthcare. The ecological aspects of hygiene products are an important innovation direction. Developing products made from biodegradable materials that do not pollute the environment is one of the main trends in the modern hygiene industry. For example, eco-friendly papers, biomaterials replacing plastics, recyclable packaging materials, and the use of natural ingredients enhance the quality of hygiene products and ensure environmentally friendly production.

Technological innovations play a major role in the production of hygiene products. Nanotechnologies, for instance, are helping to develop materials with antibacterial properties, such as those containing bacteria. These materials are widely used in toothpaste, soaps, and other hygiene products. With nanotechnologies, using microbial core systems can increase the effectiveness of products and ensure their long-term impact. Additionally, the new generation of medical and hygiene products integrates mobile technologies. For example, smartphone apps allow for teeth cleaning, tracking a healthy lifestyle, and

analyzing hygiene habits. Such apps encourage users to regularly take hygiene measures and maintain a healthy lifestyle. Moreover, smart toothbrushes and monitoring systems allow users to track how to clean their teeth and establish optimal hygiene habits.

Another important innovation direction is the customization of hygiene products to individual needs. Face cleansing products, creams and gels, allergy-fighting products, and tools supporting a healthy lifestyle are being developed according to personal needs and skin types. These products also contain ingredients that align with ecological or vegan approaches, ensuring they are harmless to both human health and the environment. Furthermore, innovations in hygiene product manufacturing support the development of healthcare systems. For instance, new-generation disinfectants are being developed to prevent pandemics and reduce the spread of inflammatory diseases. These products not only eliminate microorganisms quickly and effectively but also provide long-term protection.

Expanding and developing innovations enhances the effectiveness and usability of hygiene products. This, in turn, helps in disease prevention, improving healthcare, and protecting the environment. Innovations in the production of hygiene products create new opportunities for the industry and play a crucial role in maintaining and improving people's health.

Improving the quality of medical services is crucial for enhancing community health and ensuring the efficiency of the healthcare system. To implement these initiatives, a series of measures and innovations need to be introduced. The key areas for improving the quality of medical services can be defined as follows:

1. **Enhancing the qualifications of medical staff:** Continuously updating the knowledge and skills of medical professionals helps improve the quality of medical services. This process also involves applying new scientific and technological advancements in medicine, introducing professional

development programs for doctors and nurses, and organizing training courses for skill enhancement. Constantly studying innovations in medicine increases the opportunities for effective patient treatment.

2. **Introducing new technologies and medical equipment:** The introduction of innovative technologies and the updating of diagnostic and treatment equipment enhance the quality of medical services. New-generation medical technologies, such as high-precision medical imaging devices, robotics, and artificial intelligence systems, enable rapid and accurate assessment of a patient's condition. These technologies reduce diagnostic errors and assist in managing treatment processes effectively.
3. **Improving healthcare system management:** Effective management systems play a key role in improving medical service quality. Optimizing resource allocation in healthcare institutions, ensuring correct patient scheduling, and planning treatments properly are crucial. Developing quality management systems, streamlining service delivery processes for patients, and monitoring activities within the organization contribute to improved service quality.
4. **Improving communication with patients:** Establishing effective communication between patients and medical staff helps better understand patients' needs. During the service delivery process, empathy, a friendly approach, and trust are essential. Listening to patients' opinions and problems, providing clear and complete information, and encouraging participation in the treatment process improve the quality of medical services.
5. **Ensuring patient safety:** Special attention must be paid to ensuring patient safety in order to improve the quality of medical services. Preventing diseases and injuries, reducing the risk of infections, preventing medical errors, and ensuring patient safety during treatment are essential. Creating a

safe environment, analyzing risks, and implementing safety monitoring systems are necessary for patient safety.

6. **Transparency and reporting in the medical services system:** Transparency and openness in the healthcare system lead to increased trust from patients and the community. Independent reporting and evaluation systems should be developed to assess the quality and value of medical services for patients. To improve service quality, patient feedback should be collected, analyzed, and used to enhance services.
7. **Implementing healthcare programs:** Programs aimed at improving healthcare, such as preventive screenings, preventing inflammatory diseases, and fighting chronic illnesses, increase the quality of medical services. Additionally, developing innovative medical service programs that help with early detection of inflammation and chronic diseases is necessary.
8. **Improving the efficiency of resources and services:** To improve the quality of medical services, it is necessary to efficiently manage existing resources and services. Strengthening cooperation between healthcare organizations and institutions, optimizing staff performance, and effectively utilizing resources enhance the quality of medical services.

In general, improving the quality of medical services is achieved through effective management, the introduction of new technologies, the enhancement of medical staff qualifications, ensuring patient safety, and continuous monitoring of service delivery processes. These measures increase the reliability and efficiency of the healthcare system, resulting in the provision of high-quality medical care for patients.

The economic effectiveness of prevention programs is highly significant in the healthcare sector, as they not only improve health outcomes but also bring economic benefits to the state and society. Preventive measures, by preventing

diseases, enhancing the efficiency of the healthcare system, and saving economic resources, provide long-term positive results.

Firstly, prevention programs help reduce the costs incurred by the healthcare system. Programs aimed at early diagnosis and disease prevention prevent the progression of illnesses, thus reducing the costs associated with their treatment. This, in turn, reduces the risk of chronic diseases becoming more complex and requiring expensive treatments. For example, programs aimed at preventing cardiovascular diseases, cancer, and other chronic conditions help save long-term costs, as these diseases require more extensive treatment and rehabilitation in their advanced stages.

Secondly, prevention programs improve labor productivity. A healthy population engages in productive economic activities. Diseases, particularly chronic and inflammatory conditions, degrade the health of the workforce, reducing their ability to work. By implementing prevention programs, for instance, the number of sick leave days related to illness can be reduced, leading to increased work productivity. This, in turn, helps enhance overall production efficiency.

Preventive measures not only improve physical health but also enhance psychological and social well-being. Disseminating health information, preventing stress and depression, and promoting a healthy lifestyle reduce social issues and improve human resource productivity. Moreover, the successful implementation of preventive programs increases the reliability of the healthcare system, ensuring effective allocation of savings and investments in both the public and private sectors.

Furthermore, health-related actions through prevention programs bring long-term socio-economic benefits. For instance, vaccination and preventive measures against infections prevent the spread of diseases and reduce their economic impact on society. These programs help minimize the costs of fighting diseases, allowing for more efficient use of state resources. Additionally, the data obtained from

prevention programs can aid in developing successful health preservation methods and the most effective strategies for disease prevention.

In summary, prevention programs provide significant economic benefits by reducing healthcare costs, improving workforce productivity, and promoting overall well-being. These programs are essential for a more sustainable, healthier, and economically efficient society.

The economic effectiveness of prevention programs can be measured by assessing the economic benefits gained, the costs saved through disease prevention, improvements in labor productivity, and the overall enhancement of public health. Both short-term and long-term opportunities for increasing economic efficiency through prevention exist, which in turn drive the successful development of the healthcare system.

Additionally, to ensure the economic effectiveness of prevention programs, they need to be continuously evaluated. Before implementation, it is necessary to measure their potential impact, analyze the results, and make necessary adjustments based on the findings. This iterative process ensures that the programs remain effective and cost-efficient over time. Proper and timely execution of preventive measures guarantees the cost-effective and efficient use of public resources.

As a result, the economic effectiveness of prevention programs not only improves public health but also significantly contributes to the sustainable development of society. This approach not only boosts the economic efficiency of the healthcare system but also allows for the saving of essential resources required for the well-being of the population.

3.3. Evaluation and improvement of the effectiveness of preventive programs

Methods for monitoring hygiene programs are crucial for evaluating their effectiveness and making the necessary changes. The monitoring system allows for the identification of problems arising during the development and implementation of programs, monitoring the use of resources, and defining directions aimed at improving efficiency. The main methods for monitoring hygiene programs are as follows:

1. **Statistical analysis and data collection.** Statistical analysis plays a significant role in monitoring hygiene programs. For this purpose, data on population groups participating in the program and their health status will be collected. The program's effectiveness is measured using inspections, tests, and surveys conducted by state statistics agencies. Using this information, the success of the program's implementation and the need for reprocessing can be identified.

2. **Collecting feedback from patients and the public.** Collecting feedback from patients and the public is an important factor in evaluating the effectiveness of hygienic programs. Surveys, interviews, and focus groups can be used to gather the opinions of program participants. By obtaining the opinions of patients or citizens, the shortcomings of the program can be identified, and the opportunity to fix them is created.

3. **Internal audits of healthcare institutions.** Internal audits within healthcare institutions are important when monitoring hygienic programs. In this process, institutions analyze their operations, sanitary-hygiene conditions, staff training levels, and the quality of services provided. The results of the audit help in developing recommendations to improve the program's effectiveness.

4. **Independent evaluation in the healthcare system.** Independent evaluation methods, such as external audits and monitoring conducted by independent experts, help identify shortcomings in the program and provide

recommendations. This method may include applying methodologies promoted by international organizations or other countries. Such evaluations assess the global effectiveness of the program and its benefits for all layers of society.

5. Monitoring hygienic indicators. When monitoring hygienic programs, it is necessary to track key health-related indicators. These indicators include infection rates, the spread of diseases, vaccination and prevention results, and hygienic conditions. Regular monitoring of these indicators helps determine the effectiveness of the program.

6.Data analysis using automated systems. In monitoring hygienic programs, using new technologies and automated systems to collect and analyze data leads to effective results. Through electronic medical records, mobile applications, and online systems, it is possible to quickly gather and analyze data about program participants. These systems allow for the rapid measurement of program results and the implementation of necessary changes.

7. Reevaluation and continuous improvement. In monitoring hygienic programs, it is necessary to continuously conduct reevaluation and improvement processes. Program results should be regularly assessed and updated based on new knowledge and innovations. Also, taking into account the feedback and needs of the population groups involved in the program, new programs can be developed.

The methods for monitoring hygienic programs are primarily focused on measuring program effectiveness, identifying shortcomings, optimizing resources, and improving public health. By implementing these methods, hygienic programs can become more effective and successful.

When evaluating the impact of programs on health, measurements are carried out based on several criteria. These criteria help to assess the effectiveness of the program and implement necessary changes in the future. The following aspects are crucial when evaluating programs aimed at improving health:

Firstly, the reduction in the spread of diseases is one of the key indicators in evaluating the effectiveness of programs. The decrease in diseases or success in preventing them reflects the program's outcomes. Changes in the level of diseases, including the reduction of infections or chronic conditions, are used as indicators.

Improvement in health reflects changes in the health status achieved through the program. This indicator helps measure blood pressure, cholesterol levels, physical activity, or overall well-being. If the program is effective, improvements in health indicators should be observed. Reducing the burden on the healthcare system is also essential when evaluating program effectiveness. Preventive programs should reduce the burden on the healthcare system. Preventing diseases helps to reduce treatment costs and ensures the efficient allocation of medical resources.

Evaluating the social and economic impact is crucial for making programs effective. The economic impact of disease prevention, including a reduction in treatment costs and an increase in labor productivity, enhances the program's effectiveness. The program plays a significant role in improving the economic and social status of society. An increase in knowledge about health preservation among the population is another indicator of program success. The rise in awareness of healthy lifestyles and the practical application of this knowledge among the population demonstrates the program's effectiveness.

Table 1: *The indicators used to evaluate the impact of programs on health can be presented as follows:*

Evaluation Criteria	Comparison Indicators	Result	Comments
Reduction in the spread of diseases	Changes in disease status, infection rates	Decreased / Unchanged	Changes in disease levels, most common

Evaluation Criteria	Comparison Indicators	Result	Comments
			diseases are included.
Improvement in health	Health indicators (blood pressure, cholesterol levels, etc.)	Improved / Unchanged	Results of medical examinations conducted by the population.
Reducing the burden on the healthcare system	Resources spent on diseases, treatment costs	Decreased / Unchanged	Decrease in short- and long-term costs through disease prevention.
Social and economic impact	Economic impact of diseases, labor productivity	Positive / Negative	Identifying the reduction in diseases or their impact on society.
Increase in knowledge about health preservation	Level of adoption of a healthy lifestyle among the population	Increased / Unchanged	Knowledge of healthy lifestyles and the degree of adherence.

Evaluating programs based on these criteria and monitoring the results helps to improve effectiveness and implement necessary changes.

Using local and international experiences plays a crucial role in the effective development of hygiene and health preservation programs. Each region has its own social, economic, and cultural conditions, and local experiences help account for these changes when developing programs. Local experience allows for a deep understanding of the existing healthcare system and the factors that influence

health in the region. This, in turn, helps in creating effective programs tailored to the needs of the population. Furthermore, using international experiences provides an opportunity to learn from global successes and best practices. Programs supported by international organizations, such as those by the World Health Organization or large health programs backed by the European Union, have achieved significant success in health preservation and disease prevention. Using these experiences and adapting them to local conditions creates an opportunity to introduce advanced methods.

The integration and mutual complementarity of local and international experiences play a vital role in making programs more effective. At the same time, local systems, considering their social and economic peculiarities, can achieve high efficiency by developing solutions that integrate international experiences. These experiences are essential for improving health and preventing diseases.

Successfully applying the knowledge gained from international experiences in local contexts helps enhance the effectiveness of health programs and improve overall health. Such integration leads to beneficial results in implementing innovative approaches and introducing changes. It also creates opportunities to apply advanced technologies and knowledge in reducing disease levels and improving health.

The connection between oral hygiene and cardiovascular diseases is one of the key areas in the healthcare system. Research shows that inflammatory processes and bacterial infections in the oral cavity can negatively affect the cardiovascular system. Therefore, maintaining oral hygiene and improving health in this area plays a significant role in preventing and managing cardiovascular diseases.

The hygienic condition of the oral cavity is mainly related to the condition of the teeth and gingivitis (inflammation of the gums). Inflammations help bacteria in the mouth enter the cardiovascular system. Particularly, diseases like gingivitis and periodontitis can trigger the development of cardiovascular diseases. Some

scientific studies indicate that bacteria from the oral cavity can enter the bloodstream and worsen atherosclerosis (hardening of the arteries). This, in turn, can lead to heart attacks, strokes, and other cardiovascular diseases.

Oral cavity bacteria can exacerbate inflammation in the cardiovascular system and narrow arteries through this process. The narrowing of arteries leads to blood circulation disorders, creating strong pressure and hardening in the heart. Research also emphasizes that these processes are related to diabetes and other chronic diseases, as these conditions also pose risks to the cardiovascular system. Oral hygiene is an effective means of preventing cardiovascular diseases. Regularly brushing teeth, cleaning the mouth, and offering medical advice to prevent conditions like periodontitis help reduce the connection between the two systems. Paying attention to oral hygiene not only improves the health of the oral cavity but also enhances the condition of the cardiovascular system.

Identifying risk groups and developing preventive measures tailored to them is crucial. Regular oral hygiene and medical checkups are essential tools in preventing cardiovascular diseases. Additionally, promoting a healthy lifestyle focused on quitting smoking, proper nutrition, and physical activity is necessary.

By studying the interconnection between oral hygiene and the cardiovascular system, we can improve the effectiveness of preventive measures in this area. This, in turn, will help prevent diseases and reduce the development of cardiovascular diseases. Expanding activities aimed at maintaining oral hygiene in the community, improving medical approaches, and implementing preventive measures will not only help prevent cardiovascular diseases but also contribute to overall health improvement.

Applying advanced practices brings significant innovations to the healthcare system and helps increase their effectiveness. In relation to the topic of this monograph, the results of applying advanced practices in the interconnection between oral hygiene and cardiovascular diseases serve to improve health, prevent diseases, and increase the effectiveness of the treatment system. By better

understanding the connection between oral hygiene and cardiovascular diseases and applying advanced practices based on this, new opportunities for early disease detection and effective treatment have been created. Specifically, timely identification and treatment of bacterial infections in the oral cavity have proven to be an effective method for reducing cardiovascular diseases.

One of the advanced practices is the regular monitoring of oral hygiene. Through this method, checking the oral health of patients, determining necessary treatment measures, and preventing cardiovascular diseases based on this has resulted in positive outcomes. Additionally, this approach enhances the effectiveness of cardiovascular disease treatment and improves patients' overall health.

In the prevention of cardiovascular diseases, regular medical checkups and preventive measures based on advanced practices have been implemented. This methodology also helps in the early detection of cardiovascular diseases, allowing for effective management of the treatment process. Furthermore, advanced practices include applying medical advice and individualized approaches to improve the condition of the cardiovascular system. Each patient is offered treatment and prevention plans tailored to their health. Through these approaches, patients' health levels have significantly improved, which helps prevent diseases and increases treatment effectiveness. Advanced practices have also been effective in promoting a healthy lifestyle. Programs that include healthy eating, physical activity, and oral hygiene can reduce the risk of cardiovascular diseases. These approaches also provide an opportunity to encourage the community to adopt a healthy lifestyle. Overall, the results of applying advanced practices contribute to improving the effectiveness of the healthcare system, reducing cardiovascular diseases, and promoting the importance of oral hygiene. Through these approaches, health improvement in the community can be achieved.

CONCLUSION

This monograph is dedicated to a deep analysis of the interconnection between oral hygiene and cardiovascular diseases, based on the results of numerous scientific studies. During the research, the impact of inflammatory processes, bacterial infections, gum disease, and other conditions in the oral cavity on the cardiovascular system was identified. The deterioration of the hygienic condition of the oral cavity, in particular, negatively affects the cardiovascular system, potentially leading to the development of cardiovascular diseases. The scientific analysis of this connection emphasizes the importance of developing necessary hygiene measures to improve the oral cavity and link them to maintaining heart health.

The second section of the study analyzes several factors that influence the development of cardiovascular diseases, including genetic, environmental, and socio-economic factors. Additionally, changes in the oral microbiota and its role in increasing the risk of heart disease were shown as one of the key contributing factors. Furthermore, the importance of oral hygiene in maintaining heart health was widely studied. Preventive measures, timely diagnostics, and effective medical assistance present opportunities to reduce this connection and prevent diseases.

In the third section, the importance of oral hygiene and its role in improving heart health are demonstrated. The introduction of medical approaches and preventive programs, along with their evaluation, can take significant steps toward improving public health. The application of the studied methods in practice leads to positive outcomes in disease prevention and the preservation of patients' health.

Additionally, the monograph has achieved a deeper understanding of the connection between oral health and cardiovascular health by utilizing modern medical achievements and advanced methods. This scientific work is of particular significance for specialists dealing with cardiovascular diseases, cardiologists,

hygienists, as well as healthcare professionals in general practice, and is useful in developing new preventive and therapeutic methods.

The monograph fully reveals the connections between oral hygiene and cardiovascular diseases with its scientific and analytical approach. The research results can serve as an effective tool in developing programs aimed at promoting a healthy lifestyle, preventing diseases, and overall improving public health. In the future, broader research in this area is necessary, and the introduction of new approaches and innovative methods will be of great importance.

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