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ARTICLE REVIEW

Relación entre la Diabetes Mellitus tipo 2 y la enfermedad periodontal

Relationship between type 2 diabetes mellitus and the periodontal disease

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ABSTRACT

Introduction: Diabetes Mellitus results from the malfunctioning of pancreatic cells when they do not generate enough insulin and in response, glucose begins to be stored in the blood. There are three types of diabetes, diabetes mellitus type 1, type 2 and gestational diabetes.
Objective: to describe the relationship between periodontal disease and type 2 diabetes mellitus.
Methods: a narrative literature review was conducted that addressed the influence of type 2 Diabetes Mellitus on the general and oral health of individuals. A total of 12 articles related to the topic were included, all of them published in a period of up to five years prior to the review. Likewise, scientific databases such as: PubMed, Scielo and Redalyc were used, located through the Google Scholar search engine.
Development: there is a bidirectional relationship between periodontal disease and type 2 diabetes. Diabetes may increase the risk of developing periodontal disease and periodontal disease may worsen glycemic control in people with diabetes. Proper management of both conditions is essential to maintain good oral and overall health. People with type 2 diabetes should pay attention to their oral health, maintain proper oral hygiene, and seek regular dental treatment to prevent or control periodontal disease.
Conclusions: prevention and management play an important role in halting the progression of the pathological process.

Keywords: Diabetes Mellitus, Type 2; Periodontitis; Prevention; Oral Health.

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RESUMEN

Introducción: la Diabetes Mellitus resulta del mal funcionamiento en las células pancreáticas cuando no generan la insulina suficiente y como respuesta, la glucosa se empieza a almacenar en la sangre. Existen tres tipos de diabetes, la diabetes mellitus tipo 1, tipo 2 y diabetes gestacional.
Objetivo: describir la relación entre enfermedad periodontal y Diabetes Mellitus tipo 2.
Métodos: se llevó a cabo una revisión bibliográfica narrativa que abordó la influencia de la Diabetes Mellitus tipo 2 en la salud general y oral de las personas. Se incluyeron un total de 12 artículos relacionados con el tema, todos ellos publicados en un período de hasta cinco años previos a la realización de la revisión. Así mismo, se utilizaron bases de datos científicas como: PubMed, Scielo y Redalyc, localizadas a través del motor de búsqueda Google Scholar.
Desarrollo: existe una relación bidireccional entre la enfermedad periodontal y la diabetes tipo 2. La diabetes puede aumentar el riesgo de desarrollar enfermedad periodontal y la enfermedad periodontal puede empeorar el control glucémico en personas con diabetes. El manejo adecuado de ambas condiciones es esencial para mantener una buena salud oral y general. Las personas con diabetes tipo 2 deben prestar atención a su salud oral, mantener una higiene bucal adecuada y buscar tratamiento dental regular para prevenir o controlar la enfermedad periodontal.
Conclusiones: la prevención y el manejo desempeñan un papel importante en la detención de la progresión del proceso patológico.

Palabras clave: Diabetes Mellitus Tipo 2; Periodontitis; Prevención; Salud Oral.

INTRODUCTION

Diabetes and periodontal disease are two chronic health conditions that affect thousands of people. These two diseases are closely related, since diabetes can increase the risk of developing periodontal disease, and in turn, periodontal disease can make it difficult to control diabetes.

Diabetes is a metabolic disease characterized by high levels of glucose in the blood, due to the body's inability to produce or properly use insulin. This condition can have serious repercussions on general health, affecting multiple organs and systems, including the cardiovascular, renal and nervous systems. Additionally, people with diabetes have a higher risk of developing oral complications, with periodontal disease being one of the most common.

On the other hand, periodontal disease is a chronic inflammatory condition that affects the supporting tissues of the teeth, including the gums, alveolar bone and periodontal ligaments. This disease is characterized by the accumulation of bacterial plaque on the teeth and gums, which causes inflammation and progressive damage to the periodontal tissues. If not treated properly, periodontal disease can lead to tooth loss and have a negative impact on the quality of life of those affected.

Several scientific studies have shown a bidirectional association between diabetes and periodontal disease. On the one hand, poorly controlled diabetes can increase the risk of developing periodontal disease, since chronic hyperglycemia can weaken the immune system and hinder the body's response to bacterial infections.

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The relationship between diabetes and periodontal disease is complex and multifactorial. Both conditions are interconnected and can influence each other, highlighting the importance of a comprehensive approach to oral health care for people with diabetes. Prevention, early diagnosis and appropriate treatment of periodontal disease are essential to control risks and improve the quality of life of people living with diabetes. Likewise, adequate diabetes control can help reduce the prevalence and severity of periodontal disease.[1]

The treatment of periodontal disease is a complex process that requires an accurate diagnosis and active collaboration on the part of the patient. They are divided into two main categories: non-surgical treatments and surgical treatments. Non-surgical treatments, also known as basic periodontal treatments, such as scaling and prophylaxis, aim to remove the biofilm present both above and below the gum line. These treatments are useful in restoring tissue health and stopping the progression of periodontal disease. In diabetic patients, these treatments are also beneficial, although their effectiveness may be limited if applied in isolation.

Non-surgical treatments for periodontitis are beneficial in reducing glucose levels in diabetic patients. It is crucial to have the active collaboration of the patient. A study has shown that poor oral hygiene, lack of flossing and interdental brushing are associated with poor glycemic control, resulting in increased dental plaque accumulation. Therefore, it is important that the patient establish a routine and be taught proper hygiene techniques, such as the Bass technique. This technique, which involves brushing at a 45-degree angle and rocking movements without applying pressure, is very useful for both healthy patients and those with periodontal diseases.

Prevention plays an important role in stopping the progression of the pathological process. Another study has examined the effects of periodontal treatment in diabetic patients, following participants for three months. The results conclude that adequate control of periodontal disease leads to a decrease in HbA1c levels in patients with type 2 diabetes.

The management of periodontal disease is crucial to maintain the benefits of the treatments carried out, as it guarantees long-term stability. It is essential to schedule periodic reviews every three months. Furthermore, it is essential that the patient follows proper oral hygiene measures, while the dentist must carry out regular check-ups to detect and treat any new infections that may arise. In this way, optimal maintenance of periodontal health is ensured and recurrence of the disease is avoided.

Diabetes mellitus is a chronic disease that develops when the pancreatic cells do not produce enough insulin or when the body does not effectively use the insulin that is produced. Although this disease has been known for centuries, understanding of its origin, progression and prevalence was limited until the end of the last millennium.[2]

The American Diabetes Association (ADA) classifies Diabetes Mellitus into three main types: type 1 diabetes mellitus, which represents approximately 5 % of cases, is a disorder characterized by high blood glucose levels, which occurs due to the autoimmune destruction of the beta cells of the pancreas, Diabetes Mellitus type 2 which covers between 90 % and 95 % of cases and finally, gestational diabetes. These classifications allow a more precise approach to the diagnosis and treatment of the disease, providing personalized options for patients.

Periodontal diseases are chronic inflammatory conditions that originate and progress due to the presence of bacteria, and are largely influenced by the body's response to bacterial aggression. These diseases represent an alteration in the balance between the virulence factors of the microorganisms and the response capacity of the organism. One of the conditions that

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significantly affects periodontal tissue in its interaction with microorganisms is Diabetes Mellitus.[3]

Periodontitis and diabetes are closely related, such that, in people with diabetes, periodontal disease negatively affects the management of blood glucose levels, and those diabetic patients with poor control experience a more severe progression of periodontitis.

METHODS

A narrative literature review was carried out that addressed the influence of Type 2 Diabetes Mellitus on people's general and oral health. A total of 12 articles related to the topic were included, all of them published in a period of up to five years prior to the review. Likewise, scientific databases such as: PubMed, Scielo and Redalyc, located through the Google Scholar search engine, were used.

Pathophysiology in diabetes: vasculopathy and neuropathy

Diabetes mellitus (DM) is a chronic non-communicable disease characterized by metabolic abnormalities that result in elevated blood glucose levels, known as hyperglycemia. This condition is caused by a partial or total insulin deficiency or insulin resistance. The main symptoms of DM include excessive thirst (polydipsia), increased appetite (polyphagia), and excessive urine production (polyuria).

Vasculopathy and neuropathy are two chronic complications that can develop in people with type 2 diabetes. Both conditions are closely related to poor control of blood sugar levels over a prolonged period. Below, we name the description of each of them:

Vasculopathy of type 2 diabetes

Vasculopathy refers to the involvement of the blood vessels that supply blood to different parts of the body. In the case of type 2 diabetes, chronic damage caused by high blood sugar levels can affect the blood vessels of several body systems, including the cardiovascular system. This can lead to different complications, such as coronary artery disease, peripheral vascular disease (affecting the extremities), and cerebrovascular disease.

Neuropathy of type 2 diabetes

One of the main chronic complications is diabetic neuropathy, which manifests itself with various clinical patterns, with diabetic polyneuropathy (DNP) being the most common form of presentation. Neuropathy refers to damage to the nerves in the body. In type 2 diabetes, high blood sugar can damage the small blood vessels that nourish the nerves, resulting in nerve damage.[4]

Diabetic neuropathy can affect different types of nerves in the body, including peripheral nerves, autonomic nerves, and cranial nerves. The symptoms of diabetic neuropathy can vary and affect different areas of the body, such as the feet and legs, hands and arms, digestive system, urinary system, heart, and blood vessels. Symptoms may include pain, tingling sensations, numbness, muscle weakness, and organ dysfunction.

It is important to highlight that adequate control of blood sugar levels, adoption of a healthy lifestyle and regular medical follow-up are essential to prevent or delay the onset and progression of these complications in people with type 2 diabetes.

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Immune system of people with type 2 diabetes
In people with type 2 diabetes, the immune system may be compromised, which can increase the risk of infections caused by various pathogens.[5] Some of the pathogens that may be prevalent in people with type 2 diabetes and a compromised immune system include:

Bacteria: Bacterial infections are common in people with type 2 diabetes and a compromised immune system. Some of the most common bacteria include Staphylococcus aureus, Streptococcus pneumoniae, Escherichia coli, and Pseudomonas aeruginosa. These infections can affect different parts of the body, such as the skin, urinary tract, lungs, and wounds.

Fungus: Fungi, especially the genus Candida, can cause infections in people with type 2 diabetes and a weakened immune system. Oral candidiasis (mouth fungal infection), vaginal candidiasis (vaginal yeast infection), and skin fungal infections are common examples of fungal infections in people with diabetes.

Virus: Some viruses can affect people with type 2 diabetes and a compromised immune system. These include the flu virus (influenza), the herpes zoster virus (which causes shingles), the herpes simplex virus (which can cause cold sores and genital sores), and the human papillomavirus (HPV), which can cause genital warts.

When the immune system is compromised, the body has difficulty fighting infections efficiently, which can lead to increased severity of infectious diseases. Infections can spread more quickly, cause more serious complications, and require longer treatment. Additionally, people with type 2 diabetes and a compromised immune system may have more difficulty controlling their blood sugar levels during an infection, which can worsen diabetes control.

Blood pH condition in diabetes
It is critical that people with type 2 diabetes and a compromised immune system take extra precautions to prevent infection, such as practicing good personal hygiene, getting vaccinated as recommended, maintaining proper control of blood sugar levels, and seeking early medical care. if signs of infection occur. Regular follow-up with a doctor is essential for proper diabetes management and to evaluate and treat any complications or infections that may arise.[6]

Type 2 diabetes can affect the blood in several ways. Here are some of the blood-related conditions that may be associated with type 2 diabetes:

High blood glucose levels
In type 2 diabetes, the body does not use insulin effectively or does not produce enough of it. As a result, blood glucose levels may rise, known as hyperglycemia. High levels of glucose can affect blood cell function and alter blood viscosity.

Changes in blood lipids
People with type 2 diabetes often have changes in blood lipid levels. They may have high levels of triglycerides and low levels of high-density lipoprotein (HDL), also known as "good" cholesterol. These changes increase the risk of cardiovascular disease.

Clotting problems
Type 2 diabetes can increase the risk of developing blood clotting problems. High blood glucose levels can affect platelet function, which can increase the tendency for blood clots to form or hinder the ability to stop bleeding.

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Peripheral vascular disease
Type 2 diabetes can damage blood vessels, especially in the lower extremities. This can lead to decreased blood flow in the legs and feet, increasing the risk of developing peripheral vascular disease. This condition is characterized by narrowing or blockage of blood vessels and can cause serious complications, such as foot ulcers and infections.

diabetic retinopathy
Type 2 diabetes can affect the small blood vessels in the retina, the light-sensitive tissue at the back of the eye. This can lead to diabetic retinopathy, an eye complication that can cause blurred vision, vision loss and even blindness if not treated properly.

It is important to note that many of these conditions are the result of poorly controlled type 2 diabetes over time. Maintaining proper control of blood glucose levels, as well as adopting a healthy lifestyle that includes a balanced diet, regular physical activity, and medication as directed by your doctor, can help prevent or reduce the impact of these conditions on people. the blood If you have type 2 diabetes, it is essential to work closely with your medical team for optimal management of the disease.

Process of the pancreas after diabetes.
In type 2 diabetes, the pancreas plays a fundamental role. The pancreas is an organ located behind the stomach that produces insulin, a hormone necessary to regulate blood sugar levels.[7]

In type 2 diabetes, there are two main factors that affect the pancreas:

insulin resistance
In this type of diabetes, the body's cells become less sensitive to the insulin produced by the pancreas. As a result, cells do not respond properly to insulin and cannot absorb glucose (sugar) from the blood efficiently. To compensate for this insulin resistance, the pancreas produces more insulin.

Decreased insulin production
Over time, the pancreas's ability to produce insulin may be compromised in people with type 2 diabetes. As the disease progresses, the beta cells in the pancreas, responsible for producing insulin, may become less functional or exhausted. This can lead to a decrease in the amount of insulin produced by the pancreas.

These two factors contribute to increased blood sugar levels in people with type 2 diabetes. Insulin resistance prevents glucose from entering cells efficiently, and decreased insulin production limits the ability of the body to regulate blood sugar levels.

It is important to highlight that type 2 diabetes is a complex and multifactorial disease in which genetic, environmental and lifestyle factors intervene. If you have concerns or suspect you have type 2 diabetes, I recommend that you see a doctor for proper evaluation and diagnosis.[8]

Relationship between diabetes and periodontal disease
Currently, the concept of bidirectionality in the relationship between diabetes and periodontitis has been adopted. Recent studies have concluded that periodontitis is positioned as the sixth most common complication associated with diabetes. This chronic disease, when not properly controlled, can lead to the loss of dental structures. Additionally, it has been observed that people with diabetes are three times more likely to develop periodontitis compared to those without diabetes.

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Research carried out in the Hispanic-Latino population with uncontrolled diabetes has revealed that there is a greater risk of tooth loss, especially due to the presence of periodontitis. These findings highlight the importance of dentists paying special attention when treating Hispanic-Latino patients, evaluating their metabolic glucose control and ordering tests to measure blood glucose levels. In this way, an early diagnosis of diabetes could be achieved, which would allow timely treatment of the disease and, consequently, prevent more serious complications in the future.[9]

In other words, it is recognized that the relationship between diabetes and periodontitis is bidirectional. Periodontitis presents as a significant complication in patients with diabetes, which highlights the importance of dentists being attentive to evaluating glycemic control in Hispanic-Latino patients. Early diagnosis of diabetes and appropriate treatment can help prevent more serious complications associated with this disease in the future.

Diabetes evolution time for conditions to exist

Type 2 Diabetes Mellitus affects adults over 40 years of age, mainly if they are obese or overweight. This disease is characterized by a partial lack of insulin that is expressed by alterations in the normal functioning of glucose present in the body. This pathology is distinguished by being a chronic-degenerative disease that reduces a person's quality of life and, therefore, the loss of years of productive life.

Diabetes not only causes conditions to the internal organs of the body, but it can also be the cause of different oral diseases such as periodontitis, dental cavities, candidiasis and burning mouth syndrome. For this reason, it is of utmost importance that patients diagnosed with type 2 diabetes mellitus maintain adequate dental treatment and, at the same time, the metabolic controls corresponding to diabetes.

However, in many cases the symptoms of diabetes tend to occur suddenly, especially in Type 2 Diabetes Mellitus, the symptoms may be inconspicuous and usually take many years to be noticed. In general, people experience weight loss for no apparent reason. blurred vision and tiredness. It is possible that the diagnosis of this pathology is made when complications have appeared, that is, the evolution time of diabetes in each person will be different according to the lifestyle they have.

Do the medications you use have any effect?

When a person has a certain treatment to control diabetes, they will always wonder if these medications will have side effects on their body. At the general level of the body, the patient may experience nausea, vomiting or diarrhea after medication. On the other hand, a study carried out states that as far as research could show, the side effects of antidiabetic drugs with respect to oral health are few.[10]

However, xerostomia "dry mouth" or the feeling of "dry mouth" is considered to be one of the relatively most common oral disorders in diabetic patients and it is believed that one of its causes may be the use of antidiabetic medications, but , there are no more studies that corroborate this information, for this reason, it is important to expand research on the side effects that antidiabetic drugs can have on the patient's oral health.

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There is a bidirectional association between periodontal disease and type 2 diabetes. On the one hand, type 2 diabetes increases the risk of developing periodontal diseases, such as gingivitis and periodontitis. The presence of chronic high blood glucose levels in diabetic patients creates an environment conducive to the overgrowth of bacteria in the mouth, leading to inflammation of the gums and deterioration of periodontal tissue.

On the other hand, periodontal disease can have a negative impact on the control of type 2 diabetes. The chronic inflammation caused by periodontal diseases can affect the response to insulin and make it difficult to control blood glucose levels. Furthermore, the presence of periodontal infections can increase insulin resistance, further worsening glycemic control in diabetic patients.

Regarding prevention and management strategies, the systematic review highlights the importance of adequate periodontal care in patients with type 2 diabetes. Prevention strategies, such as oral hygiene education and the promotion of self-care, are revealed to be essential to control the disease. accumulation of bacterial plaque and reduce the risk of developing periodontal diseases. Education programs provide relevant information about the relationship between diabetes and oral health, and teach proper brushing, flossing, and mouthwash techniques.

Regarding periodontal management strategies, the results indicate that periodontal treatments are effective in controlling periodontal diseases in diabetic patients. Scaling and root planing, periodontal surgery, and antimicrobial therapy have been shown to significantly improve periodontal status and reduce inflammation in these patients.

Furthermore, the systematic review highlights the importance of adequate glycemic control in the management of periodontal disease in patients with type 2 diabetes. Good control of blood glucose levels not only improves the response to periodontal treatment, but also reduces the risk of periodontal complications.

In summary, the results of the systematic review confirm the close relationship between periodontal disease and type 2 diabetes, and support the importance of periodontal care in diabetic patients. Proper prevention and management of periodontal diseases, combined with optimal glycemic control, are essential to improve the oral and general health of patients with type 2 diabetes.

Soler YM et al.,[11] in Cuba, diabetes is evident in the majority of patients who lack a healthy life due to the absence of a diet, physical activity, lack of metabolic control, abuse of the ingestion of psychotropic substances and lack of knowledge about the disease. Therefore, researchers seek to promote knowledge about this disease to detail the level of knowledge about diabetes and self-care that type 2 diabetic patients need.

According to Ramos-Perfecto D et al.,[12] that type 2 teeth mellitus is a metabolic disease. It supports that diabetes is a high risk factor for developing periodontitis and this disease is three times more common in patients.

Gomis GC and Servat OS.,[10] clarify that periodontal disease is a chronic infectious and inflammatory pathology limited to the supporting tissues of the teeth, which destroys the tissues and causes tooth loss. Because of this, diabetes is a risk factor for the development of periodontitis. Periodontitis being a high risk for diabetic patients. Because of this, periodontitis is more serious and with a greater risk of alveolar bone loss.

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CONCLUSIONS

Type 2 diabetes can weaken the immune system and increase susceptibility to infections, including periodontal disease. In addition, chronic hyperglycemia, that is, high levels of glucose in the blood, provides a favorable environment for the growth of bacteria and makes tissue healing difficult. On the other hand, periodontal disease can also affect glycemic control in people with type 2 diabetes. The chronic inflammation associated with periodontal disease can increase insulin resistance and worsen blood glucose control. Additionally, oral infections can trigger systemic inflammatory responses that can negatively affect overall health and glucose metabolism.

Conflicts of interest

The authors declare that there are no conflicts of interest.

Authorship contribution

MAAA: original idea, conceptualization, drafting of the article, final review and approval of the final report.
ENPC: conceptualization, drafting of the article and approval of the final report.
VMVM: conceptualization, drafting of the article and approval of the final report.
RMB: writing the article, final revision

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