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# Study of relationship between odontogenic infections and glycemia levels in diabetic and non-diabetic patients

*Estudio de la relación entre las infecciones odontogénicas y los niveles de glucemia en pacientes diabéticos y no diabéticos*

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## Keywords:

odontogenic infection, diabetes, glycemia, hospitalization.

## Palabras clave:

infección odontogénica, diabetes, glicemia, hospitalización.

## ABSTRACT

**Introduction:** the World Health Organization (WHO 2022) classifies diabetes as a global problem, being a chronic disease with a high mortality rate, while odontogenic infections represent the dissemination of pathogenic microorganisms to the surrounding tissues of the dental structures. The objective of the present study was to determine the relationship between odontogenic infections and blood glucose levels in diabetic and non-diabetic patients requiring hospitalization in the Dr. Enrique Tejera Hospital City in the period 2023-2024. **Material and methods:** a descriptive correlational study with a longitudinal non-experimental design was presented, where 30 diabetic and non-diabetic patients who presented odontogenic infections were taken. Observation was used as a data collection technique and an observation guide with the different indicators for each variable to be studied was used as an instrument. **Results:** the results showed that there is a prevalence of odontogenic infections and glycemic levels; females < 45 years of age had a greater number of compromised spaces. **Conclusions:** it is concluded that there is an incidence between odontogenic infections and blood glucose levels greater than 120 mg/dL in the absence and presence of diabetes.

## RESUMEN

**Introducción:** la Organización Mundial de la Salud (OMS 2022) cataloga la diabetes como un problema global siendo una enfermedad crónica con alto índice de mortalidad, mientras que las infecciones odontogénicas representan la diseminación de microorganismos patógenos hacia los tejidos circundantes de las estructuras dentales. El objetivo del presente estudio fue determinar la relación entre las infecciones odontogénicas y los niveles de glicemia en pacientes diabéticos y no diabéticos que ameriten hospitalización en la Ciudad Hospitalaria Dr. Enrique Tejera en el periodo 2022-2023. **Material y métodos:** se presenta un estudio de tipo descriptivo correlacional con diseño no experimental longitudinal, donde se tomaron 30 pacientes diabéticos y no diabéticos que presentaron infecciones odontogénicas. Se utilizó como técnica de recolección de datos la observación y como instrumento una guía de observación con los diferentes indicadores por cada variable a estudiar. **Resultados:** los resultados mostraron que existe prevalencia de infecciones odontogénicas y niveles de glicemia; del sexo femenino < 45 años tuvieron mayor cantidad de espacios comprometidos. **Conclusiones:** se concluyó que hay incidencia entre las infecciones odontogénicas y niveles de glicemia mayor a 120 mg/dL en ausencia y presencia de diabetes.

## INTRODUCTION

Dentistry as a science is not only responsible for studying the teeth, but also their neighboring structures and the diseases that may affect them, since dental treatments are requested not only by healthy people but also by patients who have different systemic commitments, which requires

the oral health professional to have extensive knowledge of a variety of medical conditions such as diabetes mellitus, high blood pressure, obesity, HIV, among many others to be able to offer high standards in their oral health service.

Orofacial infections are determined by the morphological complexity of the oral cavity and the function it represents; These infections are of great

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interest due to their symptoms, their high risk of dissemination and therefore the possibility of developing complications at a distance from their primary source of infection.

When an imbalance occurs between pathogenic agents and the body's defenses, infections result. In this study, odontogenic infections are described, polybacterial infections that originate from the tooth and/or its supporting tissues, the main cause of which is cavities, hence the importance of preventing this disease of multifactorial origin and thus avoiding its consequences.<sup>1</sup>

The clinical stages of this type of infection are cellulitis, defined as an infection of the adipose cellular tissue that manifests clinically as diffuse, painful, indurated and erythematous swellings. The abscess is the second stage and is characterized by the accumulation of purulent secretion constituted by a cavity with necrotic tissue; clinically it is painful, with defined edges, with hyperemia and hyperthermia.<sup>2</sup>

The prevalence of this pathology, in some cases, is aggravated by the presence of systemic diseases such as diabetes, which is a metabolic alteration characterized by the presence of chronic hyperglycemia that is accompanied, to a greater or lesser extent, by alterations in the metabolism of carbohydrates, proteins and lipids.<sup>3</sup>

In line with this, in the Dr. Enrique Tejera hospital city, it has been observed that patients with odontogenic infections with or without systemic involvement associated with diabetes mellitus attend consultation, this may be due to abnormal glucose metabolism and a deficient immune response. This can occur when there is no management of the infection in the early stage, with immunosuppressed patients being at greater risk; however, any odontogenic infection without early attention or inadequate dental treatment can lead to extension of the infection to deep facial spaces; and even generate distant infections such as Ludwig's angina, mediastinitis, among others.

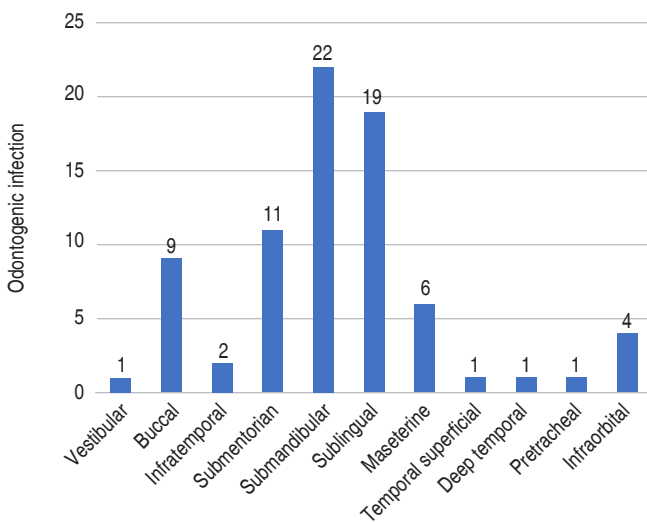


Figure 1: Distribution of facial spaces.

Consequently, specific and complete information regarding the variation of glycemic levels in the presence of odontogenic infections will help strengthen the clinician's experience, both theoretical and practical, and thus guarantee the best care for affected patients.

### General objective

Determine the relationship between odontogenic infections and blood glucose levels in diabetic and non-diabetic patients who require hospitalization in the Dr. Enrique Tejera Hospital City in the period 2022-2023.

### MATERIAL AND METHODS

A descriptive correlational study with a longitudinal non-experimental design was presented, where 30 diabetic and non-diabetic patients who presented odontogenic infections were taken. Observation was used as a data collection technique and an observation guide with the different indicators for each variable to be studied was used as an instrument. Taking the capillary glycemia levels at the time of hospital admission and finally, the information was emptied into the Excel data matrix, subsequently, the Spearman Rho coefficient was used in the correlation of the variables, and the data were represented in bar diagrams, characteristic of polytomous instruments and frequency tables.

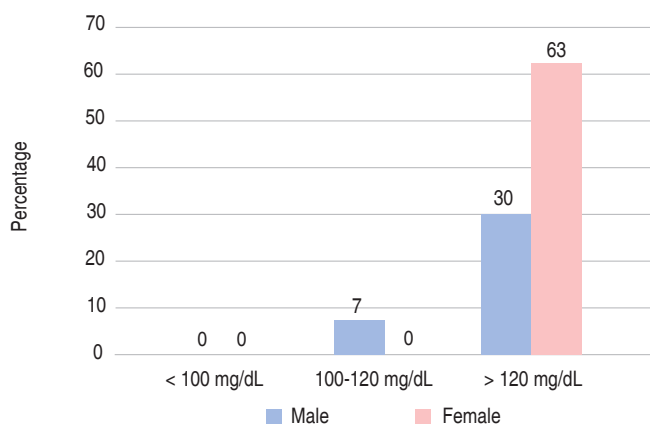
### RESULTS

In the 30 subjects studied, the various affected facial areas are distributed as follows, the facial space with the most incidence is the submandibular, with 22 affected. Followed by the sublingual space, with presence in 19 members. Thirdly, with manifestation in 11 cases, the submental space (Figure 1).

Comparing the results upon patient admission, it is observed that 93% of the sample have blood glucose levels above 120 mg/dL (Figure 2).

With a p value of 0.437, greater than the established alpha value of 0.05 ( $0.437 > 0.05$ ), the null hypothesis is accepted and the research hypothesis is rejected, which allows us to assert with 95% confidence in the results that the variables Degree of severity of the odontogenic infection and blood glucose levels upon hospital admission are not linearly related to the sample studied.

With a calculated p value of 0.019, less than the alpha value 0.01 ( $0.019 < 0.01$ ), the null hypothesis is rejected with 99% confidence and the research hypothesis is accepted, that is, the number of spaces affected by the infection. odontogenic is linearly related to the level of blood glucose presented by patients when admitted to the hospital. On the other hand, Spearman's Rho coefficient is 0.424, indicating that the correlation is direct and moderate between both variables.



**Figure 2:** Distribution of patients with odontogenic infection and value of glycemic.

## DISCUSSION

Odontogenic infections spread to the facial spaces of the face and neck, with the risk of compromising the respiratory tract, and may even spread to the brain.<sup>4</sup> Their rapid progression increases with the presence of diabetes, exhibiting a diminished immune response. There are various oral manifestations, associated with the intensity of diabetic complications, these being proportional to the degree and duration of hyperglycemia.<sup>5</sup>

The general objective of this research was to determine the relationship between odontogenic infections and blood glucose levels in diabetic and non-diabetic patients requiring hospitalization. From the sample evaluated, it was determined that there is a prevalence of the presence of infection in female patients with 63%, which represents 19 cases of the sample, which are present in an age range of less than 45 years.

The anatomical space affected with the highest incidence is the submandibular with a total of 22 affected out of 30 studied, followed by the sublingual with 19 affected and 11 cases in the submental space; The compromise of these spaces can lead to the development of Ludwig's angina, which can compromise the patient's airway and lead to life-threatening risk. As we have said before, these results converge according to the data obtained from the research carried out by Rahul et al, based on the anatomical space affected, the submandibular being the one with the highest incidence.<sup>6</sup>

According to the glycemia levels of diabetic and non-diabetic patients, it was determined that, comparing the glycemia levels during the patients' admission, alarming figures above 120 mg/dL were evident, highlighting that 83% of study patients are not diabetic. As we will see below, the aforementioned results are related to the study carried out by Rahimi and collaborators,<sup>7</sup> based on the maximum blood sugar count and the abnormal fasting blood sugar count, increasing the severity of the odontogenic infection. Continuing with this reasoning, a

study carried out by Simarroa establishes that the presence of infections is a common risk factor in hyperglycemic alteration due to the increase in catabolism and counterregulatory hormones (cortisol, adrenaline, glucagon) causing transient insulin resistance. Thus increasing insulin levels above 240 mg/dL in diabetic patients.<sup>8</sup> Now, it should be encouraged, according to the high levels of glycemia that occurred in the patients studied, who were not diabetic, to maintain evaluation and follow-up to study the possible suffering of diabetes mellitus.

Finally, the relationship between glycemic levels in diabetic and non-diabetic patients requiring hospitalization was established. According to the analysis of the relationship between the severity of the infection and glycemic levels, it is shown that there is no relationship between these variables. Unlike the correlation between blood glucose levels and the number of spaces affected by odontogenic infection, in which a direct and moderate relationship was demonstrated between the study variables. As already mentioned, the study presented by Rahul et al. converges in the results in the study of diabetic and non-diabetic patients who presented Odontogenic infection and the incidence of the anatomical spaces commonly affected.<sup>6</sup> Therefore, it is recommended to implement greater academic instruction on odontogenic infections, their outpatient or in-hospital management, consequences and complications thereof; due to the limited information available at the national and international level.

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