SALIVER EXAMINATION AS A MEANS OF DIAGNOSIS FOR DISEASES IN THE ORAL CAVITY

EXAME SALIVAR COMO MEIO DE DIAGNÓSTICO PARA DIABETES E DOENÇAS DA CAVIDADE ORAL[1]

EXAMEN SALIVAR COMO MEDIO DE DIAGNÓSTICO DE DIABETES Y ENFERMEDADES DE CAVIDAD ORAL

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ABSTRACT: According to the National Health Survey (2014), carried out by the Ministry of Health in partnership with the IBGE, it is estimated that Diabetes Mellitus affects nine million Brazilians. In order to facilitate the diagnosis within the scope of the research, the possibility arose of using saliva as a possible indicator for the diagnosis of diabetics and diseases of the oral cavity. The objective of this work was to screen individuals who attend a charity institution in Santana de Parnaíba, from December 2019 to December 2021, to investigate the presence of glucose and changes in the oral cavity. The methodology was semi-quantitative, in saliva samples, performed by reagent strip. 229 individuals (84.3%) with positive nitrite were screened; 86 (32%) leukocytes; 168 (62.6%) blood; 141 (52.6%) protein and glucose 2 (0.74%). The salivary examination demonstrated efficiency in the detection of elements indicating oral alterations. Based on the data, it is suggested as an alternative methodology for screening for oral diseases. However, this methodology did not present results that proved sensitivity for the detection of glucose by saliva.

KEYWORDS: Oral Cavity. Salivary exam. Periodontitis.

RESUMO: *Segundo a Pesquisa Nacional de Saúde (2014), realizada pelo Ministério da Saúde em parceria com o IBGE, estima-se que o Diabetes Mellitus atinge nove milhões de brasileiros. A fim de facilitar o diagnóstico no âmbito da pesquisa, surgiu a possibilidade de utilizar a saliva como possível indicador para diagnóstico de diabéticos e doenças da cavidade oral. O objetivo desse trabalho foi triar indivíduos que frequentam uma instituição beneficente em Santana de Parnaíba, no período de dezembro de 2019 a dezembro de 2021,*

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para investigar presença de glicose e alterações na cavidade oral. A metodologia foi semiquantitativa, em amostras de saliva, realizada por tira reagente. Foram triados 229 indivíduos (84,3%) com nitrito positivo; 86 (32%) leucócitos; 168 (62,6%) sangue; 141 (52,6%) proteína e glicose 2 (0,74 %). O exame salivar demonstrou eficiência na detecção de elementos indicadores de alterações orais. A partir dos dados, sugere-se como metodologia alternativa para triagem de doenças orais. No entanto, essa metodologia não apresentou resultados que comprovassem sensibilidade para a detecção de glicose pela saliva.

***PALAVRAS-CHAVE**: Cavidade Oral. Exame salivar. Periodontites.*

***RESUMEN**: Según la Encuesta Nacional de Salud (2014), realizada por el Ministerio de Salud en colaboración con el IBGE, se estima que la Diabetes Mellitus llega a nueve mil brasileños. Con el fin de facilitar el diagnóstico en el campo de la investigación, se planteó la posibilidad de utilizar la saliva como posible indicador para el diagnóstico de diabéticos y enfermedades de la cavidad bucal. El objetivo del trabajo fue identificar individuos que asisten a una institución de beneficencia en Santana de Parnaíba, en el período de diciembre de 2019 a diciembre de 2021, para investigar la presencia de glucosa y alteraciones en la cavidad bucal. La metodología fue semicuantitativa, en muestras de saliva, realizada mediante tira reactiva. Se examinó a 229 individuos (84,3%) con nitrito positivo; 86 (32%) leucocitos; 168 (62,6%) sangraron; 141 (52,6%) proteína y glucosa 2 (0,74%). La prueba salival demostró eficacia en la detección de elementos indicativos de alteraciones orales. A partir de los datos, se sugiere como metodología alternativa para el cribado de enfermidades orales. Sin embargo, esta metodología no presentó resultados que confirmaran la sensibilidad a la detección de glucosa salival.*

***PALABRAS CLAVE**: Cavidad oral. Examen de saliva. Periodontitis.*

Introduction

Saliva is a fluid secreted by salivary glands with multiple oral functions, including cleansing, mouth protection, antibacterial effects and digestion. It is currently seen as the innovation of biological markers, because steroids, antibodies, hormones and metabolic fluids are present in it, which can be measured easily and accurately (FEDERAL COUNCIL OF DENTISTRY, 2020). It is, therefore, an organic compound easily collected and preserved, so its use in tests makes them low cost, with high efficacy, and can replace over time the use of serum and urine in the diagnosis and prognosis of diseases (HYTETHESIO, 2015; MARSH *et al*., 2015; BRAZIL, 2017; TAKAHAMA *et al.,* 2008).

In the scope of the research, saliva was included as an important indicator for the monitoring of pre-existing diseases, and possible alterations resulting, such as Diabetes Mellitus, coronary heart diseases, periodontitis, gingivitis, caries, rheumatic arthritis,

candidiasis and halitosis (FERREIRA *et al.*, 2020; MARSH *et al.*, 2015; SALERNO *et al.*, 2011).

Nitrite is a component of oral fluid, produced by bacteria from the microbiota of the mouth that contributes to oral homeostasis and which, when present in large quantities, is suggestive of oral alterations, such as bacterial plaque formation, caries, gingivitis, tartar and periodontal diseases that rely on gingival retraction, formation of pus abscesses, tooth mobility and in severe cases loss of the dental element (FERREIRA, 2013; SEYMOUR *et al.*, 2002) . When periodontitis or other oral diseases are in an advanced stage or become chronic there is the presence of leukocytes, which are defense cells commonly present in infections. At the early stage of these diseases there may be no detection of leukocytes (BACHTIAR; PUTRI, 2010. BACHTIAR, 2019).

The presence of blood in saliva is not common, therefore, when present, it may indicate oral alterations related to pathologies (THOMAS *et al.*, 2008). In salivary examination by reagent strip, the blood does not appear alone, recounting the presence of other positive evaluation elements, with nitrite and leukocytes being the most common among them. When there is the presence of protein in the salivary examination, it is indicated that of lack of oral hygiene and poor brushing. Thus, the reagent strip is not positive alone, other elements are altered simultaneously (FERREIRA *et al.*, 2020; SPEZZIA, 2019).

Poor oral hygiene directly influences the oral health of individuals. Recent studies, such as those conducted by the Ministry of Health and The Council of Dentistry, have shown that there is a correlation between alterations found in saliva and oral health. Based on this, research was carried out in order to identify, treat and/or prevent complications resulting from periodontitis, gingivitis and underlying diseases related to oral health in caregivers of assisted care at a charity, located in Santana de Parnaíba - SP (DIAS *et al.,* 2010).

According to the caregiver's practical guide (BRASIL, 2017, p. 7, chapter 2), the definition of caregiver is "a person who is able to provide care individually to the other", however, there are not currently well-established policies that highlight health promotion for caregivers. Thus, what is perceived in practice is the scarcity of scientific publications on the use of saliva as a means for diagnosis. The following surveys are of paramount importance to support actions to promote the individual and collective health of caregivers who attend the institution.

Methodology

This is a cross-sectional study that was developed in the Cytogenetics/Genetics Laboratory of the Community of Love Peace Charity Association, located in Santana de Parnaíba - SP, which contributed to the extension project of the Biomedicine course at Paulista University - UNIP (Campus Alphaville) called "Community Extension Project: Bases of laboratory assistance in individuals with multiple disabilities".

The inclusion criteria in the study corresponded to the agreement to participate in the study and the ability to establish verbal communication at the time of possible interviews. After approval by the Ethics Committee, no. 20454919.1.0000.5512, which occurred in December 2019, 268 individuals participated in the study to date. All procedures and evaluations necessary for saliva collection and examination were presented, which took place under the supervision of a responsible teacher.

The patients were recruited in the health campaigns Women's Week (March), Health Task Force (May), Pink October and Blue November, carried out at the institution that had medical support from two professionals of the institution.

The methodology used in this study was semiquantitative in saliva samples. The biochemical examination followed a standard operational procedure (POP) of the laboratory (FARINHA, 2015).

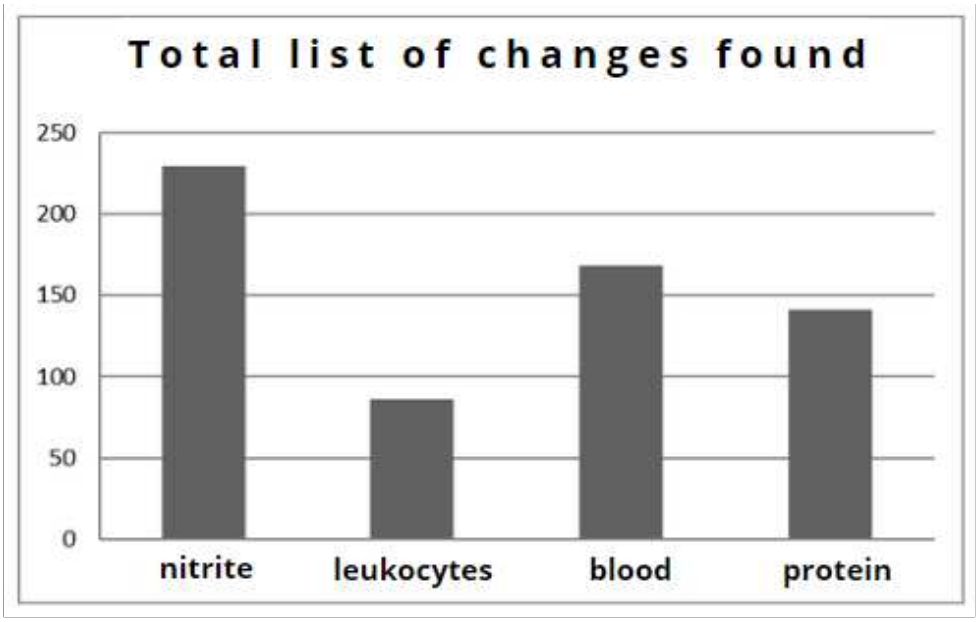
The salivary examination was performed by Labtest reagent strip - Uriquest Test 11 Parameters - 150 Tests, with greater emphasis on the following elements: glucose, nitrite, leukocytes, blood and protein. To stimulate saliva production, sterile garrote 2.0cm, zero sugar chewing gum and sterile beeswax (LABTEST, 2018) were used.

Results

The study included 268 caregivers, 242 female and 26 male.

Graph 1 below shows the list of patients treated and the alterations found in saliva. It was observed that there were significant presences of the elements evaluated by the reagent strip regarding nitrite, leukocytes, blood and protein. The numbers found were 229 (84.3%) caregivers with positive nitrite, among these 86 (32%) also had leukocytes, 168 (62.6%) presented blood along with nitrite and leukocytes and 141 (52.6%) presented positive protein along with the other three elements respectively. The presence of glucose in saliva was observed in only 2 (0.74%) caregivers, one of which presented nitrite and leukocytes together, while the other presented only nitrite.

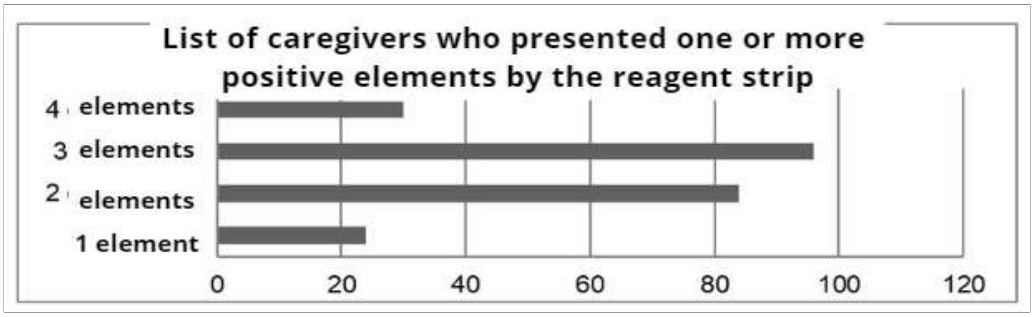
Graph 1 - Salivary test results of caregivers who showed changes in the presence of nitrite, leukocyte, blood and protein in saliva



Source: Research data - Prepared by the authors

Graph 2 below describes the list of caregivers who presented more than one of the positive evaluated elements. Four positive elements are represented, most commonly together: leukocyte, nitrite, protein and blood. The highest detection rate was three positive elements simultaneously: nitrite, leukocyte and blood. In the detection of two positive elements, the highest index was for leukocytes and nitrite. Caregivers positive only for nitrite was 8.9%.

Graph 2 - List of caregivers who presented one or more positive elements by the reagent strip



Source: Research data - Prepared by the authors

Discussion

It was observed in the study that the 268 participants presented some oral alteration, representing 100% of the total number of patients. This number drew attention to some points that should be highlighted such as: the high prevalence of nitrite, leukocytes and blood in the saliva of these individuals that are indicative of inflammatory and infectious processes, which are related to caries, gingivitis, periodontitis and other diseases in the oral cavity (HORTENSIO, 2015; ANTUNES *et al.*, 2016).

The initial purpose of the study was to detect the presence of glucose in saliva to use it as an analytical substrate for screening diabetic individuals and/or those with suspected diabetes. However, during the study, the results obtained showed that there was a high prevalence of chemical elements (nitrite, leukocytes, protein and blood) indicators of diseases that can affect the oral cavity, thus directing the work to the research of these elements in saliva (AMERICAN DIABETES ASSOCIATION, 2010).

It is known that pathologies that affect metabolism can be directly related to oral health, one example is Diabetes Mellitus, which is a risk factor for periodontitis and other oral diseases, since it leads to a hyperinflammatory response of the oral cavity, which may cause lesions in the mouth and gums that trigger infectious processes. Another pathology that has a bidirectional relationship to periodontitis is coronary heart disease, in which oral disorder, when it becomes chronic, generates an exacerbated infectious process leading to a worsening of coronary heart disease (FERREIRA, 2013; SEYMOUR *et al.*, 2002).

After obtaining these results, it was necessary to search for scientific papers that were based on the subject. However, a literary scarcity was observed about the use of saliva as an analytical substrate and its importance as a means of diagnosis.

At the end of the research, when an epidemiological survey was conducted on the percentage of individuals who presented alterations, attention was focused on why a high prevalence of cases was conducted. One of the reasons highlighted was how scarce is the guidance on oral health and its care (RONCALLI; CÔRTES; PERES, 2012). Similar results were also observed by Afonso and Wagner (2013), in which they highlight that the lack of access to basic information and precarious essential care directly affect the life and health of these individuals (AFONSO; WAGNER, 2013).

Early detection of a disease plays a key role in formulating a correct treatment and prognosis plan. It is known that these changes can lead to other metabolic and systemic dysfunctions that have significant consequences on the quality of life and well-being of

individuals. Thus, we emphasize the need for a discussion about how diseases related to the oral cavity are a public health problem and that it is not only the lack of hygiene that interferes in this process, but also the nutritional deficiency directly affects the health of these individuals that is aggravated due to the socioeconomic situation in which they are (TEIXEIRA ESSENFELDER *et al.*, 2021).

Salivary examination performed in the present study demonstrated efficiency in detecting oral alterations. Due to the ease of collection, practical and fast performance, low cost is suggested as an alternative methodology for screening and monitoring possible alterations that oral diseases may cause. The results of this study made this research an important literary source with information about the findings in salivary examinations and the relationship it has with the aforementioned diseases (ZHANG *et al.*, 2016).

Final considerations

The salivary examination performed in the present study demonstrated efficiency in the detection of indicator elements of oral alterations, ease of collection, rapid performance as well as, its low cost allows suggesting as an alternative methodology for screening and monitoring possible oral diseases. However, this methodology did not present results that proved its sensitivity for glucose detection by saliva.

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