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PALATE REHABILITATION POST COVID-19

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Abstract: COVID-19, a virus of unknown origin which alarmed the world at a pandemic level, has led to numerous consequences, both social and physical-biological. In this context, the annulment of smell and taste is one of the most cited biological results in the face of this disease, germinating other harmful intercurrences. Thus, it was observed through a literature review that stimulating the taste buds helps to encourage taste, promoting a better perception of food. Thus, an oral gum called Gusmami was developed, which will contain a single-dose solid pharmaceutical form with one or more active principles, consisting of insoluble, sweet and tasty plastic material. It will have the properties of Umami (glutamate, 5'-inosinate and 5'-guanylate) which is considered as the fifth basic taste of taste and the gum will be used before meals, whose purpose is to rehabilitate both the consequences of COVID-19.
Keywords: ageusia; COVID-19; taste rehabilitation.

INTRODUCTION

Coronavirus (COVID-19) is an infectious disease, being represented by the etiological agent Coronavirus 2 of the Acute Respiratory Syndrome (SARS-CoV-2), it is a beta coronavirus belonging to the family: *Coronaviridae* and of subfamily *Orthicoronavirinae*, of origin *Nidovirale*. It is a positive-sense ribonucleic acid (RNA) virus, enveloped with 1273 amino acids, encapsulated by a membrane that on its external surface has a large number of prominences in the form of spicules, whose formation is called Protein Spike, Spike Protein or Protein S, which gives a characteristic crown-shaped appearance [42]. The S proteins have subdivisions, namely the S1 protein and the S2 protein, which play important roles in the cell invasion mechanism, as it recognizes the angiotensin 2 receptor (AEC2) and interacts with it. SARS-CoV-2 attacks the key cells of the nose such as goblet cells and cilia which have high levels of type II transmembrane serine protease proteins (TMPRSS2), angiotensin converting enzyme 2 (AEC2) [40] which are considered to be potent receptors that facilitate binding and replication for the novel coronavirus.

Loss of smell and taste are common symptoms in patients who have been exposed to the COVID-19 virus, since it is the Acute Respiratory Distress Syndrome (SARS), an infectious disease, being represented by the etiological agent SARS-CoV-2 and that can cause damage to the human body, such as: respiratory syndromes; systemic hypoxia; cytokine storm syndrome and atypical bilateral interstitial pneumonia [36].

Studies show that about 80% of patients infected with the coronavirus have ageusia, that is, a decrease in taste perception [36]. What has been observed in patients with COVID-19 is the loss of taste and smell without having a return after the other symptoms of the disease. There are reports of patients who have not recovered their taste and smell for more than four months, and studies explain anosmia and dysgeusia by the fact that most respiratory diseases compromise the peripheral nervous system [14].

Anosmia and ageusia can significantly compromise patients' quality of life. The lack of taste can cause food avulsion, which can lead the patient to lose weight, as well as the notion of whether or not the food is in good condition for consumption [29]. However, doctors indicate some appointments for olfactory and gustatory training to help the return of taste, such as the use of aromatic herbs in food preparation, diversifying foods with different flavors, ingesting zinc and copper supplementation or amifostine, the use of alpha-lipoic acid (ALA), lemon drops, ginkgo biloba and pilocarpine may also be helpful [11].

In order to stimulate the taste buds in patients with ageusia or dysgeusia, providing them with a better quality of life, an umami-based oral gum will be developed, thus leading to an improvement in the perception of food taste.

JUSTIFICATION

It is pertinent in the face of the pandemic scenario, studies that enable comfort and even reduction of signs and symptoms after SARS-Cov2 infection. However, ageusia can directly affect the individual who contracted the virus in terms of social and psychological aspects. Therefore, the inclusion of another drug as an alternative treatment is extremely relevant for a population that needs rehabilitation of the taste buds.

GOALS

Develop an oral gum that will be used before meals to stimulate the taste buds after SARS-Cov2 infection.

SPECIFIC OBJECTIVES:

- Identify the medications currently used to improve ageusia;
- Define which components are necessary for taste rehabilitation;
- Determine the quantity of components for manufacturing the oral gum;
- Make the oral gum to restore the taste.

COVID AND ITS AFFECTS

COVID-19 is an Acute Respiratory Distress Syndrome (SARS) an infectious disease, being represented by the etiological agent SARS-CoV-2. Other epidemics have already been reported by similar etiological agents, such as SARS-CoV-1 and severe respiratory syndrome (SARS), however none of them with such magnitude. With regard to its pathogenesis, 70% to 80% of those infected are asymptomatic or have mild symptoms of the disease. Still without consensus in the literature, it is estimated that 20% will develop the most severe form of the disease in hospital care and it may reach 5%-10% in intensive care 1,5 [45]. The average period of convalescence is 19 days (from 2 to 5 days until the onset of symptoms and 14 days post-symptoms until recovery), but cases under intensive care take 3 to 6 weeks [15].

SARS-CoV-2 is a beta coronavirus belonging to the family: *Coronaviridae* and the subfamily: *Orthicoronavirinae*, of origin *Nidovirale*. It is a positive-sense ribonucleic acid (RNA) virus, enveloped with 1273 amino acids, encapsulated by a membrane that on its external surface has a large number of prominences in the form of spicules, whose formation is called Protein Spike, Spike Protein or Protein S, which gives a characteristic crown-shaped appearance [42]. The S proteins have subdivisions, namely the S1 protein and the S2 protein, which play important roles in the cell invasion mechanism, as it recognizes the AEC2 receptor and interacts with it.

A study by researchers at the Harvard Medical School in the USA identified that SARS-CoV-2 reaches the key cells of the nose, which are the goblet and ciliated cells that have high levels of serine protease type II transmembrane proteins (TMPRSS2), angiotensin-converting enzyme 2 (AEC2) [40] which are considered to be potent receptors that facilitate binding and replication for the novel coronavirus. On October 20, 2020, a scientific publication was made by Science addressing an alternative secondary receptor and facilitator for the entry of SARS-CoV-2 neuropilin-1 (NRP1) which also connects with protein S, so NRP1 transports the virus into the human cell without having any connection with the AEC2 receptor, also because AEC2 is not very thick in most cells, making the secondary receptor become important.

It was observed that COVID-19 has an

initial action related to AEC2 receptors, becoming a favorable inflammatory potential, with systemic changes and endothelial dysfunction, which are associated with other systemic changes. These patients have a clinical status similar to that of a flu-like illness, but a large percentage of atypical cases are related to their chronic diseases, which are considered risk factors for mortality. [15,10].

SYSTEMIC CHANGES AFFECTED BY COVID-19

COVID-19 is affected by SARS-CoV-2, it is a serious infectious disease that can affect several systems, becoming harmful to the human body, with a high possibility of developing SARS, systemic hypoxia [06], Storm syndrome cytokines and atypical bilateral interstitial pneumonia. Acute complications can lead to blood clots in the vessels located in the lung, being responsible for the involvement of the most severe form of the disease, since these thrombi can play a direct and significant role in gas exchange abnormalities and multisystemic organ dysfunction [08].

There are reports in the literature about the severe development of diseases that are related to the occurrence of comorbidities in the clinical history presented by the patient. The most common symptoms are high fever, dry cough and tiredness. Transmission occurs from contact with contaminated saliva droplets, and it is believed that asymptomatic patients are potential disseminators of the disease [09].

In view of this, it must be noted that all tissues that present invasion mechanisms that can be used by SARS-CoV-2 can be points of access for the virus to the interior of human cells. Type II alveolar cells are rich in ACE2, but numerous extrapulmonary manifestations are already being reported. Cardiac tissues and vascular system, has the most reported complications are acute heart injury, heart failure, myocarditis, vascular inflammation and cardiac arrhythmias, changes in the coagulation cascade and hematopoietic system, which may be associated with an increase in the values found in cardiac enzymes, a localized vascular inflammation in arterial plaque [09]. Studies point out that COVID-19 can increase the risk of developing disseminated intravascular coagulation; lack of oxygen and generalized inflammation can also acutely damage the kidneys, in patients infected with COVID-19 an increase in serum creatinine and a reduction in the glomerular filtration rate have been observed. SARS-CoV-2 infection can induce severe acute tubular necrosis and lymphocyte infiltration, causing further tubular damage through recruitment of macrophages to infiltrate the interstitial tubule; gastrointestinal, in the liver there was the identification of moderate microvascular steatosis and mild lobular and portal activity, but it is noteworthy that in addition to the infection mediated by SARS-CoV-2, hepatic impairment may be related to an induction promoted by polypharmacy; endocrinological; neurological impairments by COVID-19 can lead to neurological sequelae that can be devastating, especially as a result of respiratory viral infections, since at least two routes of entry into the central nervous system (CNS) are already known, the hematogenous pathway mediated by ACE2 receptors and by neuronal retrograde pathways, and consequent infection induced by neuropathic virus, which may explain the occurrence of a cerebrovascular accident (CVA) in patients infected with SARS-CoV-2; Ophthalmic nerves have been reported in the literature as potential points of SARS-CoV-2 invasion [33].

CHANGES AFFECTED BY COVID-19 IN PALATE

According to Mehmet Hakan Ozdener, a cellular biologist, it appears that the olfactory receptors located in the olfactory sensory neurons (OSNs) play an important role in detecting food flavors that contribute to taste alteration [17]. The odor molecules, on the other hand, have the function of intensifying flavors, causing the perception of food. Thus, when consuming beverages and food, the resulting perception happens simultaneously through taste and smell [17]. As much as the sensation of taste occurs in the mouth, the smell actively participates in the taste, because during the chewing process there is a release of odor molecules, causing an intense sense of smell that adds important information to the taste contributing to the flavor characterization. In addition, taste sensation is more complex than simply defining whether a food tastes bitter, sweet, sour, salty and other things [40]. The flavor itself is not the result only of taste impulses, but also the combination of information obtained by both taste and smell, food appearance, sound emitted during mastication, texture and temperature [17]. Thus, the sensation becomes more detailed, bringing a nobler experience when you have the interaction of all the senses.

Due to the fact that smell and taste are connected, when SARS-CoV-2 enters the individual's body and connects to the cells that are located around the OSNs, causing an edema that may cause an obstruction, causing the olfactory particles to be prevented from going through their course to reach the places where they would trigger the taste and smell senses, reaching rates of 86% in symptoms of olfactory dysfunction and 88% in taste dysfunction in a European study, rates based on patient reports or also as a result of this inflammation of the nasal nerves, the first clinical symptoms presented are the loss of taste and smell that can last for weeks between 14 and 21 days [42]. According to a study carried out by ``Universidade de Nebraska`` published by the Center for Disease Control (CDC), it was found that the incubation period in the body for both the delta and omicron variants is approximately 3 days for the onset of symptoms [42]. There are cases in which the damage is directly affected in the OSNs, causing the patient to take months to regain consciousness.

In addition to anosmia, some patients report some other sensory distortions related to taste and smell, such as parosmia, which causes odor distortions, such as food with a bad odor (smell of rotten food); parageusia is the same as parosmia but the distortion happens with tastes; fantogeusia, causes the mouth to emit a sensation of a bitter taste; and hypogeusia, which is the decrease in taste sensitivity [42] in some cases for any type of food and for other cases only for some specific foods [36].

According to the European Rhinology Society, surveys were carried out in the United States, Iran, Germany, Great Britain and Italy, where individuals who were affected by COVID-19 at the beginning of the pandemic ranged from 20% to 60% [30]. Within this report, three studies were carried out, the first of which took place in a hospital in Milan, Italy, where 59 patients were studied, 34% of these patients had anosmia or hyposmia, ageusia and dysgeusia. In 15% of the patients, they had a smell or taste disorder, and about 18.6% of these patients were affected with a disorder of both senses [27]. The second study took place at the Schwabing Clinic in Munich, Germany, where 63 hospitalized patients were studied, 41% of these patients had anosmia and/or ageusia, 31% complained of committing rhinitis, apart from what was mentioned, no other diseases were found in these patients. that could cause changes in smell or taste [20]. The third study closely followed approximately 59 patients positive for COVID-19, where the occurrence of olfactory and gustatory disorders was observed in 68% to 71% of these patients, respectively. The main symptoms presented by them were fatigue, myalgia or arthralgia, augesia, anosmia, fever, diarrhea and nausea [27].

The means of olfactory dysfunctions pertinent to SARS-CoV-2 infection, although not yet recognized, is eventually the sum of several patterns, such as swelling of the nasal mucosa, damage to the olfactory epithelium, both neural and non-neural epithelium, and even relationship of the central region olfactory pathways. It has been proven that the manifestation of ACE2, found in the basal layer of non-keratinized squamous epithelium in the nasal and oral mucosa and in the nasopharynx. Sungnak,2020, found that nasal epithelial cells, exclusively goblet cells that are secretory cells and hair cells, exhibit the highest manifestation of ACE2 among human respiratory and intestinal epithelial cells. They recommended that the nasal calyx and hair cells play a relevant role as initial viral targets and possible deposits of SARS-CoV-2 infection. This is in line with the findings of Zou, 2020, who obtained higher viral loads detected in the nose than in the throat shortly after the onset of symptoms and showed that ACE2 and TMPRSS2, an endothelial protein involved in COVID-19, did not have the found in mature olfactory sensory neurons, however they located several sustaining and olfactory stem cells in the human olfactory epithelium. They proposed that SARS-CoV-2 does not intimately contribute to olfactory sensory neurons, however it could target supporting olfactory epithelium and stem cells, stimulating cascading damage to the olfactory epithelium.

The coronavirus infection of subsets of sustaining cells is capable of being enough to determine an interruption of the olfactory obligation. However, several viruses, including coronaviruses, such as SARS-CoV-2, and normal viruses responsible for colds (HCoV-OC43), have been shown to be able to infect the olfactory bulb and downstream areas, such as the piriform cortex and brainstem, by through the nasal epithelium pathway, thus SARS-CoV-2 cannot be excluded from this pathway.

Fodoulian,2020, olfactory neurons are understood as an access facilitator for neuroinvasion by CoVs, which is able to be transferred to the central nervous system through a synapse-linked pathway. Although it is still unclear whether olfactory sensory neurons are directly involved in the pathogenesis of olfactory dysfunction in COVID-19 [30].

TASTE

Taste is a chemical sensation recognized by specific cells called taste buds, which are part of the taste system responsible for the perception of taste. Along with smell and the stimulation of the trigeminal nerve that registers texture, pain and temperature, taste determines the flavors of foods and other substances [20]. The taste buds are located within the papillae, which in turn are found mainly on the tongue, and can also be found on the palate, and in certain regions of the pharynx and lips. The receptors present in the taste buds detect the five tastes: salty, sweet, sour, bitter and umami [20,20]. Sweet, bitter, and umami tastes are perceived by molecules binding to G protein-coupled receptors on the cell membranes of the taste buds, and salty and sour are perceived when alkali metal or hydrogen ions enter the taste buds [28]. There are six types of taste buds, with different shapes and functions; fungiform papillae, foliaceous papillae, circumvallate papillae, filiform, circumvolaform and filiform papillae. Fungiform papillae resemble a mushroom, as their base is narrow and their top is more dilated. They have few taste buds and are located more at the tip of the tongue. The filiform papillae are the ones that are most present in the tongue, they are narrow and adopt a filament shape. They have a small amount of taste buds, but they help with food intake, as their shape facilitates their conduct [17,20,25]. The foliaceous papillae are leaf-shaped, located on the edges of the tongue and have several taste buds. Circumvallate papillae are valley-shaped and located at the bottom of the tongue, near the entrance to the esophagus [17,20,25]. The structure of these papillae is circular, with a flattened surface allowing ingested liquids to flow easily. The circumvolaform papillae are more elongated and with a greater proportion and the filiform papillae are keratinized and have a flattened and spherical shape. Although all taste buds can detect the four sensations, the taste buds on the back of the tongue react to bitter taste, those on the tip of the tongue react to sweet and salty, and those on the side to sour. The conduction of the sensation of taste to the brain is done through sensory impulses that move through the facial (VIII), glossopharyngeal (IX) and vagus (X) nerves to the gustatory cortex of the parietal lobe, which will make its interpretation [17,20]. Differentiation of flavors is very important in order to distinguish between safe and harmful foods. The bitter taste is usually unpleasant and the others provide pleasure and this can distinguish good foods from spoiled ones, excess salt or sugar. This taste perception begins to disappear around the age of fifty due to loss of tongue papillae and decreased salivary production [38].

ORAL GUM RESEARCH PROJECT

The loss of smell and taste are common symptoms in patients with cold and flu and with the emergence of COVID-19 these symptoms are frequent in patients. Studies show that about 80% of patients infected with the coronavirus have ageusia, that is, a decrease in taste perception [36]. What has been observed in patients with COVID-19 is the loss of taste and smell without having a return after the other symptoms of the disease, due to the fact that most respiratory diseases compromise the peripheral nervous system [14].

Anosmia and ageusia can significantly compromise patients' quality of life. The lack of taste can cause aversion to food, which can lead the patient to lose weight, as well as the notion of whether or not the food is in a good state of consumption [29].

The same can occur in cancer patients undergoing radiotherapy treatment, especially in the head and neck region. Neoplastic patients also deserve attention, especially those of intranasal location, such as nasal polyps, papilloma, squamous cell carcinoma, adenoma, esthesioneuroblastoma (rare neuro-olfactory tumor), as they block airflow to the olfactory cleft or by local destruction of the olfactory apparatus [38]. Patients who undergo radiotherapy and chemotherapy treatments end up losing their sense of taste due to radiation that is capable of producing deleterious effects on the oral mucosa, salivary glands, palate, dentition, periodontium, bone, muscles and joints [43]. In a study carried out by Conger, it was found that the loss of taste increases exponentially from doses of 30 Gy (three-week treatment), 2 Gy per fraction [34]. Stimulation of the taste buds in these patients helps in the recovery caused by the treatment, and the loss of taste is usually transient, with gradual recovery after the end of the treatment. Usually, taste disturbances in cancer patients are resolved after the end of chemotherapy and/or radiotherapy sessions, around two to four months, the return of taste and smell sensations is expected, however, in some cases, augesia and/or anosmia it may persist for longer months, and if there is any localized damage to the OSNs, the symptoms become permanent. Doctors indicate some consultations for olfactory and gustatory training to help the return of taste, such as the use of aromatic herbs in food preparation, diversifying foods with different flavors, ingesting zinc and copper supplementation or amifostine, the use of alpha lipoic acid (ALA), lemon drops, ginkgo biloba, and pilocarpine may also be helpful [11].

In order to stimulate the taste buds of patients with ageusia or dysgeusia, providing them with a better quality of life, a gum was developed that will be used before meals to stimulate the taste buds, causing a better perception of the taste of food.

GUSMAMI

Gusmami has its presentation in the form of an oral gum and in its composition the properties of Umami (glutamate, 5'-inosinate and 5'-guanylate) which is considered as the fifth basic flavor of the palate. Glutamate is based on taste stimulation. Umami, when applied to the tongue, causes impulses in the gustatory nerve fibers, unlike other tastes where there is not a single specific fiber. Thus, for the Umami substance, its flavor is independent of other flavors. An oral gum was developed because its size will make it easier for the patient to transport in their daily lives and its principle is to help in the recovery of taste perception, help in xerostomia (dry mouth sensation) having in its formula anti-inflammatory principles, providing comfort and well-being during the treatment.

METHODOLOGY

The research will be carried out in a laboratory. The Pharmacology and Chemistry laboratories of UniCesumar – Campus Curitiba were used in partnership with the Pharmacotechnical Laboratory of ``Universidade Federal do Paraná`` (UFPR). A bibliographic survey was carried out, based on the research platforms Scielo, Pubmed, Google Scholar, Lilacs. After the findings, the formulation and manufacture of the oral gum was carried out.

The dosages of the components followed the reports in the literature, the products available on the market and were carefully discussed.

MATERIALS AND METHODS

RAW MATERIALS AND REAGENTS

For the formulation of oral gums, raw materials of pharmacopeial grade and approved for use in the population, with a high safety profile, will be selected.

Raw material Functional category Description.

- Glycerin (Acofarma®) Plasticizer, humectant and sweetener. It is a clear, transparent, odorless, viscous, hygroscopic liquid. It is 0.6 times sweeter than sucrose. Pure glycerin does not oxidize under normal atmospheric conditions, but in the presence of heat it decomposes to acrolein, a toxic compound. Aqueous glycerin solutions are stable.
- Gelatin (Acofarma®) Gelling agent, suspending and viscosifying agent. It is a yellowish friable vitreous solid, practically odorless and tasteless. Aqueous solutions are subject to bacterial degradation [32]. At temperatures above about 50°C, they may undergo slow depolymerization and reduced gel strength. Depolymerization becomes faster at temperatures above 65ºC, and gel strength can be reduced by half when the solution is heated at 80ºC for 1 hour. The rate and extent of depolymerization depends on the

molecular weight of the gelatin, with a low molecular weight material decomposing more quickly.

- Sorbitol (Acofarma®) Plasticizer, humectant, sweetener and stabilizing agent. It is a hygroscopic, crystalline, white, odorless solid. It has 50-60% of the sweetness of sucrose. It is chemically inert and compatible with most excipients, and is stable to atmospheric conditions and will not darken or decompose at elevated temperatures. It is used as a gelatin plasticizer in the preparation of soft capsules.
- Xanthan gum (Acofarma®) gelling, stabilizing, suspending and viscosifying agent. It is a white/yellow cream powder with no odor. Aqueous solutions are stable over a wide range of pH 3-12 and temperature, maintaining the same stabilizing and suspending agent properties.
- Umami, Monosodium Glutamate. Glutamate is based on taste stimulation. Umami, providing amino acids/peptides for animal growth, represents one of the main attractive flavor modalities. The biochemical and umami properties of the peptide are important for scientific research and the food industry. The umami flavor is an intensifier of other pre-established flavors such as: sweet, sour, bitter and salty.

Umami's proposal in this research is to stimulate the taste buds intensifying flavors so that there is unblocking affected in their receptor cells, thus the main factors under study such as the threshold for a given stimulus to be perceived, the characterization of each of the four types of fundamental gustatory sensations (SG) (acid, sour, sweet, salty and bitter) and the overall hedonic impression of the stimulus, leading to the gustatory rehabilitation of the patient, returning the taste.

EQUIPMENTS

For the preparation of the precise oral gums, specific equipment was used: analytical balance, propeller stirrer, a texturometer, a thermostatic bath, a disaggregation device, among other equipment arranged in the laboratories of Unicesumar and UFPR.

PREPARATION OF ORAL GUMS

The development of oral gum formulations was designed to take your perspective on laboratory-level preparation as well as compounded medicine. Therefore, the focus is not only on the function of the selected excipients, but also as a facilitator and cost of the substances impregnated in the formula and method of preparation, with emphasis on the literature, so that its effectiveness is [01].

The preparation method for the formulation of oral gums based on umami followed the criteria described in the literature [01,41].

DISCUSSION

According to Borges, 2019, the acceptability of oral gummies may vary from individual to individual, but in general, oral gummies are well accepted by many people due to their pleasant taste and chewy texture. However, there are some considerations to be taken into account regarding the acceptability of oral gums, such as taste, texture, ingredients and prolonged use. Flavor is an essential factor in receptivity, and it can vary according to the type of gum and the brand. Some people may prefer a sweeter or more acidic taste, while others may prefer a milder taste. A can also affect acceptability, and some people may prefer a softer or firmer texture. The ingredients, such as artificial sweeteners or coloring, may affect acceptability for some people. Prolonged use may cause jaw muscle fatigue or headaches in some people, which may affect long-term acceptability. [04]

It was with this in mind that the composition of Gusmani gum is based on Catarina Ramos' professional experience in community pharmacy, the gum-based medicine maintains extra privileges for COVID-19 patients, corroborating the attribute when compared to other means of drugs considered more common. (RAMOS et al., 2017). At first the use of the mentioned materials, as well as: glycerin; gelatin; sorbitol; Arabic gum; Xanthan gum and Umami are essential substances to aid in the rehabilitation of taste due to their properties.

Glycerin is a clear, odorless, colorless liquid, also known as glycerol or glycerin. It is a sweet tasting alcohol that is used in a variety of applications in the pharmaceutical, cosmetic and food industries. In the pharmaceutical industry, glycerin is used as a solvent, preservative and sweetener in medicines and syrups. It can also be used as an ingredient in suppositories and as a lubricant for medical equipment (MELGOZA et al.,1998). Overall, glycerin is a versatile ingredient that has a wide range of applications across multiple industries.

Gelatin is a translucent, colorless, tasteless substance derived from collagen, a protein found in animal skin, bones and connective tissue. In the pharmaceutical industry, gelatine is used as a coating for capsules and tablets. It is also used as a binder and thickener in syrups and ointments (BORGES et al., 2019).

Da Silva Gomes, sorbitol is a sugar alcohol commonly used as a sweetener, humectant and thickener in various industries. It is a colorless, odorless, non-volatile liquid that tastes sweet and is often used as a substitute for sugar.

Gum arabic is a natural gum obtained from the sap of several species of the acacia tree. It is a complex mixture of polysaccharides and glycoproteins. In the pharmaceutical industry, gum arabic is used as a binder and emulsifier in tablets, capsules and syrups. It can also be used as a suspending agent for insoluble drugs (RAMOS et al., 2017).

According to (BORGES et al., 2008), xanthan gum is a polysaccharide, a type of sugar molecule, commonly used as a food additive to thicken and stabilize products. It is produced by bacteria: *Xanthomonas campestris* through fermentation of carbohydrates. This matter is often used in a variety of foods such as salad dressings, sauces, baked goods, dairy and beverages. It is also used in non-food products such as cosmetics and pharmaceuticals. It can also be used as a gluten substitute in gluten-free products as it helps to mimic the texture of gluten. (BORGES et al., 2008). However, it's important to note that some people may have an allergic reaction to xanthan gum, and excessive consumption can lead to digestive issues such as bloating and diarrhea. As with any food additive, it is important to consume xanthan gum in moderation and as part of a balanced diet [03].

Umami Monosodium Glutamate (MSG) is a food additive that is used to enhance the umami flavor of foods. The umami taste is described as a pleasant, salty taste that is common in protein-rich foods such as meat, fish, cheese and mushrooms. MSG is a sodium salt of glutamic acid, an amino acid that is found naturally in many foods. It is produced from the fermentation of carbohydrates by specific bacteria and is widely used in the food industry as a flavor enhancer. Despite being considered safe for consumption by most regulatory agencies, some people may be sensitive to MSG and experience symptoms such as headaches, sweating and palpitations after consumption. (MALULY et al., 2021).

(Coelho et al., 2021), addresses the issue of rehabilitation of Covid-19 symptoms through photobiomodulation. Photobiomodulation, also known as low-intensity light therapy or low-level laser therapy, is a treatment that uses light of specific wavelengths to stimulate cellular processes and promote tissue regeneration [12]. This therapy is performed using low-intensity light devices, which emit light in specific wavelengths such as red, infrared, and blue. This light is absorbed by the cells of the body, stimulating the production of cellular energy (ATP) and promoting tissue regeneration and repair (COSTA et al., 2021).

For, (Bagnato et al., 2021) photobiomodulation is used in several areas of medicine, including dermatology, physiotherapy, dentistry, ophthalmology and neurology. It is a non-invasive and painless treatment that can be used to treat a variety of conditions, such as musculoskeletal injuries, chronic pain, wound healing, dermatological diseases, anxiety disorders and depression [02].

Although photobiomodulation has been shown to be effective in some clinical studies, more research is needed to determine its effectiveness in different conditions and establish the best doses and treatment protocols (OLIVEIRA et al., 2021).

(Magalhães et al., 2021) in turn, addresses that good treatment must be based on good nutrition, rich in nutrients. Which makes you think about the flavors chosen for Goma Gusmani. Some nutrients that can help strengthen the immune system include:

- Vitamin C: present in citrus fruits, kiwi, strawberry, pineapple, mango, tomato, bell pepper and broccoli;
- Vitamin D: present in fatty fish, eggs, mushrooms and fortified milk;
- Zinc: present in meat, seafood, seeds and nuts;
- Selenium: present in Brazil nuts, seafood and meat.

Thus, for the execution of the gum, flavors such as Kiwi, strawberry and mango are chosen, since they are important in the immune system [21].

(Brito et al., 2020) addressed the use of mouthwash during dental practice, since the use of antimicrobial mouthwashes can reduce microorganisms in the oral cavity, but Chlorhexidine, which is commonly used in Dentistry, may not be able to prevent contagion to the Covid-19 [05].

Therefore, in this work, the gum was chosen, since two advantages and effective properties have already been reported for a given factor addressed.

CONCLUSION

In light of the arguments analyzed, it is concluded that:

- Goma Gusmani will become a reference when it comes to means of rehabilitating the palate caused by COVID-19.
- Tests and formulations in a prepared laboratory are desired.
- Help with other illnesses in addition to COVID-19 must be deepened and addressed.
- It is suggested that more studies and research be carried out, as well as an IN VIVO test.
- Oral gum still in laboratory process.

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