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ARTICLE

SELF-REPORT ON COVID-19: A SURVEY OF PARAGUAYAN DENTISTS.

Autorreporte acerca del contagio de COVID-19: Una encuesta a odontólogos paraguayos.

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ABSTRACT:

Aim: To determine the frequency of signs and/or symptoms compatible with COVID-19 in Paraguayan dentists, as well as the possible source of contagion.

Material and Methods: Online survey consisting of 13 questions, applied to all dentists in Paraguay from January 20 to February 15, 2021.

Results: A total of 433 dentists participated in the survey; 47.5% displayed symptoms compatible with COVID-19 and 13.39% indicated that they had contracted the disease, providing confirmation via a positive test result. Headache, loss of smell, loss of taste, cough, and fatigue were the most prevalent symptoms among COVID-19 positive cases. The main source of contagion was the family nucleus. Only one participant reported having contracted the disease while providing dental care.

Conclusion: Almost half of the dentists displayed symptoms compatible with COVID-19. Only 13.39% tested positive for COVID-19. Only one case of contagion was reported to have happened during the provision of dental care.

KEYWORDS:

Public health; Biohazard containment; SARS-CoV-2; Dentists; Surveys and questionnaires; Paraguay.

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RESUMEN:

Introducción: El objetivo de este estudio fue explorar la actividad eléctrica de los músculos superficiales de la masticación, necesarios para ejercer la máxima fuerza de mordida unilateral, en sujetos con diferente índice de masa corporal.

Material y Métodos: Se realizó un estudio observacional de corte transversal con una muestra de 13 participantes con una edad promedio de 22.9 ± 3.5 años, quienes fueron clasificados de acuerdo a su índice de masa corporal, formando tres grupos de estudio: peso normal (18,5-24,9), sobrepeso (25,0-29,9) y obesidad (≥30.0), con siete participantes cada uno. La electromiografía de superficie evaluó los músculos superficiales de la masticación durante la fuerza de mordida máxima derecha e izquierda.

Resultados: No se observaron diferencias estadísticamente significativas en la fuerza de mordida máxima entre los grupos de estudio. Los datos obtenidos del análisis electromiográfico de los músculos superficiales de la masticación demuestran una tendencia que indica que los sujetos con un índice de masa corporal normal activan de manera similar los músculos de cada lado cuando ejercen la fuerza de mordida máxima en un lado en particular. mientras que los sujetos con sobrepeso u obesos demostraron una activación significativamente mayor del músculo temporal asociado con el lado donde se realiza la fuerza máxima de mordida.

Conclusión: Nuestros hallazgos sugieren que la fuerza de mordida máxima no está influenciada por el índice de masa corporal y que durante la realización de una fuerza de mordida máxima los sujetos con índice de masa corporal aumentado presentan una mayor activación del músculo temporal asociado al lado donde se realizó la fuerza de mordida máxima.

PALABRAS CLAVE:

Fuerza de la mordida; Masticación; Electromiografía; Músculos masticadores; Músculo temporal; Índice de masa corporal .

INTRODUCTION.

In November 2019, a new coronavirus (SARS-CoV-2) was identified in China. The virus subsequently spread, causing a global pandemic. In symptomatic cases, it triggers an acute respiratory syndrome (COVID-19) characterized by the presence of one or more of the following symptoms: fever, cough, fatigue, shortness of breath, nasal congestion, headache, rhinorrhea, sore throat, diffuse pain, diarrhea, loss of smell, loss of taste, and conjunctivitis.[1]

In the worst cases, COVID-19 can lead to pneumonia and cause severe hypoxia, which will require invasive mechanical ventilation.[2] According to updated data from the World Health Organization (WHO), the worldwide mortality risk of COVID-19 is 9.4%.[3] Advanced age and comorbidities such as hypertension, diabetes mellitus, morbid obesity, chronic pulmonary disease, coronary artery disease, chronic kidney disease, and neoplasms,[4-6] active smoking,[4] and being male[6] are among the most important prognostic factors.

The virus is highly infectious and there is increasing evidence of its transmission via aerosols.[7] For this reason, the risk of infection is high in environments where there is easy and quick dispersion and aspiration of saliva droplets, a situation to which people are constantly exposed in the dental office environment.[8]

Therefore, the greatest challenge that dental professionals face is the risk of contracting the disease and becoming part of the chain of transmission.[9] The best way to prevent the contagion and spread of COVID-19 is through the proper use of face masks, social distancing, and hand washing.[10,11]

However, problems arise during dental care be-cause the patient cannot wear a mask while receiving care and treatment is provided at a distance of less than 1 meter. This means that strict compliance with infection prevention and control protocols,[12] as well as constant updates on the modes of transmission are crucial for dental care professionals to face the pandemic.

The SARS-CoV-2 infection rate among dentists has already been reported by some studies world-wide. In the United States, a study carried out on 2,195 dentists reported only 13 positive cases, with the source of transmission being outside of the dental practice for all of them.[13]

In Italy, from a sample size of 499 participants that took antibody tests, clinical staff tested positive for SARS-CoV-2 with the same frequency as administrative staff.[14] In Colombia, from a total of 5,370 respondents, self-reported COVID-19 infection was low (0.61%). On the other hand, among 358 oral health professionals in Argentina, the weighted prevalence of COVID-19 was 4%. To date, no study reporting the rate of contagion among dentists in Paraguay has been published. On March 9, 2020, the Presidency of the Republic of Paraguay, together with the Ministry of Public Health and Social Welfare, announced preventive actions due to the high risk of COVID-19 expansion throughout national territory. As a result, they developed the 2020 National Response Plan for Respiratory Viruses.[15] A state of emergency was declared shortly thereafter on March 19th,[16] and total quarantine a day later, limiting dental care to emergency care only.[17]

Subsequently, after a gradual lifting of restrictions, a biosafety dental care protocol was established for providing care during the pandemic.[18] This protocol has been progressively updated and still remains in effect, working towards a return to normalcy.[19] According to data from mid-January 2021,[20] the period in which this study was conducted, 121,648 positive cases and 2,496 deaths had already been confirmed in Paraguay, that is, a mortality rate of 33.9 per 100,000 inhabitants.

Considering the epidemiological situation in this period and the lack of contagion data among dental care professionals, the main objective of this study was to determine the frequency of dentists who until then had displayed signs and/or symptoms compatible with COVID-19, as well as the possible source of contagion.

MATERIALS AND METHODS.

This study has an observational and descriptive design with a cross-sectional approach.

The research protocol was approved by the Research Ethics Committee of the School of Dentistry at Universidad Nacional de Asunción (Protocol P013-2020). The study was aimed at dentists from the entire Paraguayan territory, of both genders, without age limit, and who gave their consent to participate. Dentists without internet access were excluded.

The measurement instrument employed was a questionnaire based on a previously published study conducted in Italian dentists.[21] The survey was translated from English and then adapted, adding specific questions that were a better fit to accomplish the objective of this study. The survey was created in Google Forms and sent through social networks (Facebook) and instant messaging applications (WhatsApp), from January 20 to February 15, 2021. Answers were confidential and were only used in this study.

The survey consisted of 13 closed questions divided into three sections: Four questions on sociodemographic data (age, gender, city where the profession is practiced, and dental practice environment); Four questions about dental procedures (knowledge about the risk of transmission, types of procedures performed in the practice, biosafety measures adopted, and preparations to treat positive COVID-19 patients); and five questions about overall health status in relation to COVID-19 (risk of suffering from severe COVID-19, risk conditions, whether they display signs and symptoms related to COVID-19, whether they have undergone viral testing, possible source of contagion). Of all

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the questions, only one (knowledge about the risk of transmission) had a correct/incorrect answer, a design based on the survey used as a model,[21] where the correct answer related to having the greatest risk of transmission corresponded to teeth scaling and root planing procedures.

Sample size calculation was carried out using a previous study[13] as reference, with a proportion of 82% of American dentists who were reported as asymptomatic. With a confidence level of 95% and a precision of 7%, a minimum of 116 participants was necessary. Considering a 15% loss of data, 134 respondents were required.

Results were presented in absolute frequencies, percentages, tables, and graphs. The proportion of symptoms of positive and negative COVID-19 patients was analyzed with the Z-test of proportions, with a confidence level of 95%. Version 4.0.3 of the R Project for Statistical Computing software was used.

RESULTS.

The sample was made up of 433 dentists; 84.30% were female, 14.7% male, and 0.92% preferred not to declare their gender.

The mean age of all participants was 35.6 years (SD = 14.8); 35.4 years old (SD = 14.9) for women, and 37.4 years old (SD = 13.5) for men.

Regarding location, 52.19% of participants were from Asunción, 30.25% from Central, and 17.56% from the interior of the country. Regarding their professional practices, 79.49% provided their services in a private dental practice, 24.19% worked in public practices, 18.20% dedicated themselves to teaching, 11.29% worked in dental insurance, 7.83% were inactive due to the pandemic, and 0.92% preferred not to declare. From the total sample, 85.91% answered correctly that ultrasonic teeth scaling and root planing are the dental procedures with the highest risk of spreading SARS-CoV-2 in the dental office; 69.98% performed all types of treatments with strict adherence to the biosafety protocol; 88.91% began to space their appointments as a prevention measure (Table 1); and 60.74% felt prepared (sufficiently, well prepared, and very well prepared) to treat a positive COVID-19 patient (Figure 1).

The majority (54.27%) of the dentists surveyed did not consider themselves to be at an increased risk of suffering complications in case they contracted COVID-19. However, 20.79% of dentists who declared themselves at risk cited chronic diseases (lung, kidney, or liver), followed by immunosuppression and diabetes as the most frequent risk conditions (Table 2).

Figure 1. Distribution of dentists according to how prepared they feel to treat a positive COVID-19 patient (n=433).

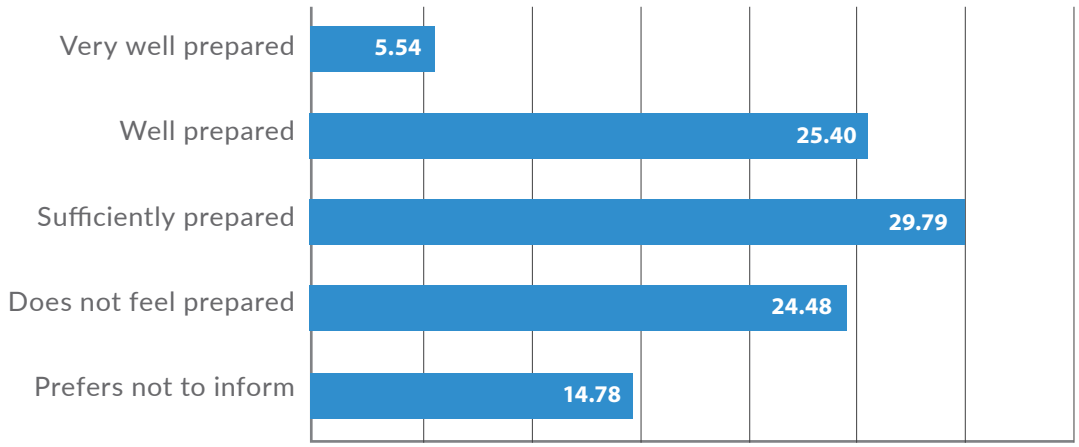

Figure 2. Possible contagion environment of dentists with a positive COVID-19 test (n=58).

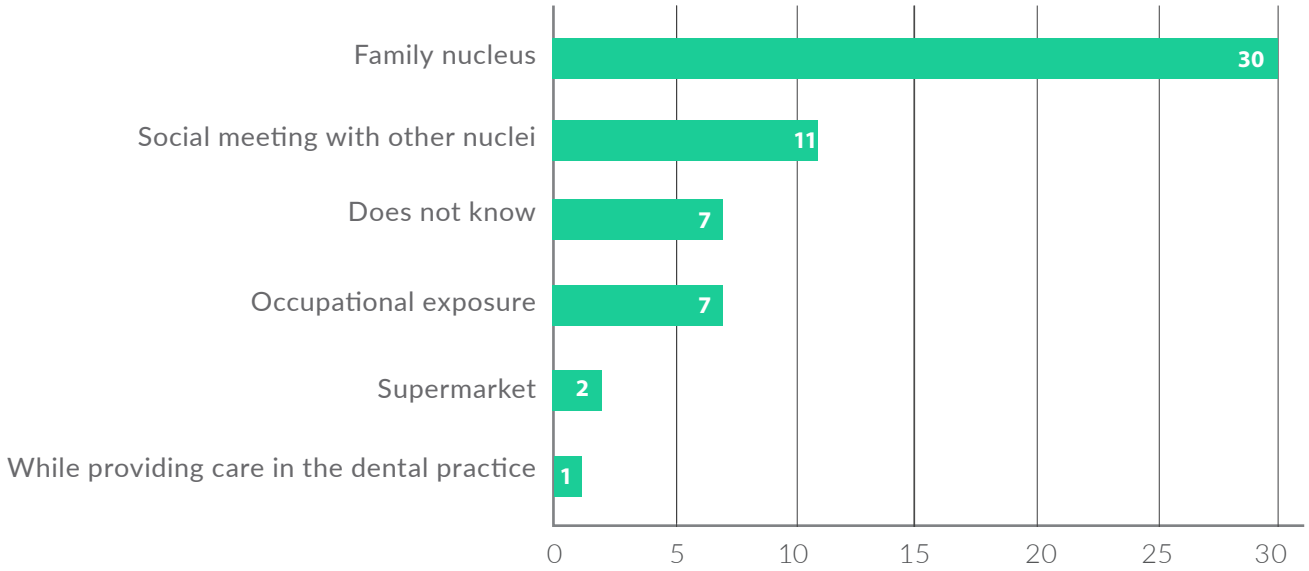

Table 1. Questions regarding dental procedures (n=433).

Procedures and risk of transmission	Frequency	Percentage (%)
Ultrasonic tooth scaling and root planing.	372	85.91
Caries removal with low rotation.	33	7.62
Does not know.	12	2.77
Simple tooth extraction.	9	2.08
Prefers not to inform.	6	1.39
Orthodontic treatment.	1	0.23
Types of procedures performed in the office		
All types of treatments with strict adherence to biosafety protocols.	303	69.98
Only emergency treatments or those that can lead to urgency with strict adherence to biosafety protocols.	82	18.94
None of the above.	36	8.31
Prefers not to inform.	8	1.85
Not taking appointments until further notice.	4	0.92
Biosafety measures adopted in the office		
Spacing appointments .	385	88.91
Telephone triage.	237	54.73
Measuring patient's body temperature.	201	46.42
Postponing treatments of vulnerable patients .	185	42.73
Asking patients to wash their hands before entering.	164	37.88
Social distancing of at least one meter between patients in the waiting room.	30	6.93
Face mask for patients in the waiting room.	18	4.16
None of the above.	10	2.31
Prefers not to inform.	9	2.08

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Table 2. Distribution of dentists who considered themselves to be at risk of serious complications in case of contracting COVID-19 (n=90).

Risk condition	Frequency	Percentage (%)
Chronic heart, pulmonary, kidney or liver disease	25	27.78
Immunosuppression	17	18.89
Diabetes	14	15.56
Over 60 years old	11	12.22
Prefers not to inform	10	11.11
Obesity/overweight	7	7.78
Pregnancy	5	5.56
Hypertension	4	4.44
Asthma/Respiratory Allergy	3	3.33
Thyroid disease	3	3.33
Autoimmune disease (E.g., Lupus)	2	2.22
Cancer	2	2.22
Chronic tonsillitis	1	1.11

Table 3. Proportion of symptoms for positive and negative COVID-19 patients (n=139).complications in case of contracting COVID-19 (n=90).

SYMPTOM	COVID-19 POSITIVE (n = 58)		COVID-19 NEGATIVE (n = 81)		TOTAL		*p*-value
Headache	41	70.7	42	51.9	83	59.7	0.033
Loss of smell	38	65.5	4	4.9	42	30.2	<0.001
Fatigue	37	63.8	11	13.6	48	34.5	<0.001
Nasal congestion	33	56.9	36	44.4	69	49.6	0.140
Loss of taste	32	55.2	0	0.0	32	23.0	<0.001
Cough	30	51.7	17	21.0	47	33.8	<0.001
Sore throat	28	48.3	32	39.5	60	43.2	0.235
Fever	25	43.1	8	9.9	33	23.7	<0.001
Diarrhea	24	41.4	6	7.4	30	21.6	<0.001
Rhinorrhea	16	27.6	11	13.6	27	19.4	<0.001
Difficulty breathing	6	10.3	3	3.7	9	6.5	0.117
Diffuse pain	6	10.3	0	0.0	6	4.3	0.005
Conjunctivitis	3	5.2	1	1.2	4	2.9	0.156
No signs or symptoms	3	5.2	21	25.9	24	17.3	<0.001

Of the total number of dentists surveyed, 206 (47.5%) reported having displayed symptoms compatible with COVID-19 since the beginning of the pandemic; 13.39% confirmed having contracted the disease with a positive COVID-19 test, of which 3 cases required hospitalization; 18.71% had a negative test; 4.39% suspected having had COVID-19 but did not take the test; 9.24% were diagnosed with another pathology, and 1.85% preferred not to inform.

Table 3 presents the symptoms stratified by positive and negative COVID-19 patients (considering only those who underwent the test). Among positives, the most common symptoms were headaches (70.7%), loss of smell (65.5%), and fatigue (63.8%). The most common symptoms among COVID-19 negatives were headaches (51.9%), nasal congestion (44.4%), and sore throat (39.5%). Loss of smell, loss of taste, cough, and fatigue were significantly more common ($p<0.001$) among COVID-19 positives.

No significant differences were found between the proportions of nasal congestion, sore throat, shortness of breath, and conjunctivitis.

Of the total number of respondents who presented a positive COVID-19 test (n=58), 30 believed that contagion occurred in the family environment and only 1 reported having been infected while carrying out dental care in the office (Figure 2).

DISCUSSION.

The aim of this research was to determine the frequency of dentists who, until the date of execution of this study, had displayed signs or symptoms compatible with COVID-19, as well as the possible source of contagion. It was found that 47.58% reported having had symptoms; however, only 67.5% of them were tested for COVID-19.

Regarding reported symptoms, an important finding was that loss of smell, loss of taste, cough, and fatigue were much more common ($p<0.001$) among COVID-19 positives, with headaches being the most frequent symptom ($p=0.033$), followed by loss of smell. A study conducted in Denmark[22] among patients who called an emergency medical service found that among positive COVID-19 cases, 64.4% had a fever, 63.5% suffered from cough, and 38.8% had difficulty breathing; while in this study it was found that only 43.1% had a fever, 51.7% presented cough, and 10.3% had difficulty breathing.

Besides the inherent difference between the populations studied, it should also be mentioned that, in the study carried out in Denmark, the data corresponded to people who called the emergency system, so it can be assumed that the calls were made by people with severe symptoms. Regarding this aspect, the current study surveyed the population in a more heterogeneous manner. Loss of smell and/or taste was self-reported by 64.6% of people in an English population and 67% in an American population,[23] a similar proportion (65.5%) to the results found in this study.

Of the 433 dentists surveyed, 13.39% reported having had a positive COVID-19 test. The family nucleus was the most frequent contagion environment in 51.72% of the cases. Only one participant reported that he/she contracted the disease in the dental office while treating a patient. Some similar studies show even more encouraging data.[13,14,24] In January 2020, in the United States, 2,195 dentists participated in an online survey with questions about symptoms associated with COVID-19 and SARS-CoV-2 infection, where only 13 (0.59%) of the cases were positive, and in none of them the source of transmission was the dental practice.[13]

In Italy, between May and September 2020, a team of researchers quantified the prevalence of COVID-19 in dentists and hygienists through the determination of the SARS-CoV-2 antibody. Of the 499 participants who had a valid antibody test taken, 54 (10.8%) had a positive SARS-CoV-2 test. However, the frequency in which clinical staff tested positive for SARS-CoV-2 was not higher than the frequency of positiveness among administrative staff.[14]

On the other hand, in Argentina, from March to October 2020, a cross-sectional study was conducted involving 358 oral health professionals,

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including dentists, dental assistants, and non-clinical staff from a university. These professionals underwent diagnostic tests for COVID-19 (rapid test, ELISA, and PCR), showing a weighted prevalence of COVID-19 of 4%.[24]

Nevertheless, as in the previous study, no significant differences were found between clinical staff and non-clinical staff, thus showing that carrying out dental care procedures was not a factor that posed a higher risk of contagion. To date, literature confirms the low rate of infection among dentists, with frequencies of infection ranging between 0.89-1.9% of the total number of participants.[21,25,26]

This proportion could be further reduced in areas of dentistry where the use of a rubber dam is possible. Some studies,[25,27] have reported that a dental practice that employs isolation devices was associated with a reduced chance of contracting infections from contamination and inhalation of aerosols, as the use of a rubber dam could drastically reduce the amount of saliva in aerosols generated by instruments (the reduction ranging from 70 to 100% depending on the distance).[28]

Unlike procedures where isolation is possible, in procedures such as ultrasonic prophylaxis, where the use of a rubber dam is unfeasible, the risk of contagion due to aerosol production could, in theory, be much higher. In this regard, 85.91% of respondents correctly answered that, among the options, ultrasonic tooth scaling and root planing were the procedures with the highest risk of spreading the virus due to their high degree of aerosol generation. This result is similar to the findings of a study conducted in Syria,[23] where 95% answered correctly.

COVID-19 has brought new challenges and responsibilities for dental professionals, which is why a better understanding of aerosol transmission and its implication in the dental practice can be useful to identify and improve its management in daily procedures during dental care.[30,31] Most of the respondents (69.98%) answered that they were carrying out all types of treatments while complying with biosafety protocols. This result was different from what was reported in another study,[29] where 77% of respondents indicated having only performed infection control and emergency treatment during the pandemic. It is also important to take into consideration that a large percentage of professionals (48%) are dedicated exclusively to the private practice of dentistry, and this may be the reason as to why the majority declared that they performed all types of treatment.

Regarding prevention protocols, spacing appointments and telephone triage were among the most frequent. Of the total dental care professionals surveyed, 60.74% considered themselves prepared to treat a positive COVID-19 patient, and 54.27% did not consider themselves to be at an increased risk of suffering complications in case they contracted COVID-19.

An important limitation that must be considered is that access to diagnostic tests for COVID-19 was limited at the beginning of the pandemic, since sampling was only carried out at strategic points in the country and was only available when provided by the Ministry of Public Health and Social Welfare. At the time of the survey, there was still a limited amount of reagent, and not all laboratories had the capacity to process it. Sampling was not prioritized for the health workers at any moment. The few authorized private laboratories charged a high fee for COVID-19 testing, which made it inaccessible for most of the population.

The combination of these events could have prevented dentists who presented symptoms from undergoing testing. It was reported that 4.39% of participants who suspected having had COVID-19 did not take diagnostic tests. Among other limitations of the study, it should be mentioned that antibody tests to detect COVID-19 were not carried out as part of the research. Instead, dentists had these tests taken individually, consequently, estimates could be inaccurate. The type of diagnostic test used was also not asked or considered, which could directly influence its specificity and sensitivity.[32]

Although participants were mostly located in Asunción and Central, these are the areas with the highest presence of dental professionals[33] and with

the highest prevalence of COVID-1934.

However, only a small sample of dentists was included in the study, so it would not be advisable to extrapolate results to country level. It is recommended to update this study in the future because, just weeks after its execution, the beginning of the second wave of COVID-19 cases was declared in Paraguay,[35] according to statements made by the Ministry of Health.

As another recommendation, it would also be useful to conduct this research in a larger population and to address the economic impact that the pandemic could have had on dentists in the country.

CONCLUSION.

Almost half of the dentists surveyed reported having displayed symptoms compatible with COVID-19 since the beginning of the pandemic. However, only 13.39% confirmed having contracted the disease by means of a positive COVID-19 test.

Only 1 case of contagion was reported to have happened during dental care. It is absolutely necessary to continue imple-menting the biosafety measures recommended by the Ministry of Public Health and Social Welfare in the care protocols adopted during the pandemic.

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Conflict of interests:

The authors declare that there is no conflict of interest.

Ethics approval:

The research protocol was approved by the Research Ethics Committee of the School of Dentistry at Universidad Nacional de Asunción (Protocol P013-2020).

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Authors' contributions:

Díaz-Reissner C: Conceptualization, Data Curation, Research, Methodology, Project Management, Visualization; Writing – original draft

Jara Pinto C: Data Curation, Research, Project Management, Visualization, Writing – proofreading and editing

Cataldi L: Data Curation, Research

Adorno CG: Formal analysis, Research, Visualization, Writing – revision and edition.

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