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Detection of COVID-19 in diagnostic tests carried out on patients

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ABSTRACT

Diagnostic tests to detect the coronavirus allow the identification of the virus in addition to the antibodies generated by the body of the person who has previously been infected, so the objective of the research is to detect COVID-19 in diagnostic tests carried out in patients. It is a quantitative, descriptive experimental cross-sectional study, which was carried out with a total population of 560 patients from hospital centers. In its results, we observed that 83.4% (n=467) of patients were non-reactive to the Antigen Test and 66.8% (n=374) of patients were negative in the PCR test. In conclusion, the strengths of the COVID-19 detection tests should be complemented since it allows for an accurate and timely diagnosis of patients.

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1. Introduction

At the end of 2019, in China, cases of the disease that is currently called coronavirus or its acronym COVID-19 started to increase (Fragkou et al., 2022; Tang et al., 2020). From this time until the end of 2021 the drastic increase in cases of COVID-19 infection and the number of deaths from it has been considered by the World Health Organization (WHO) as one of the most latent diseases worldwide, comparing it with what happened in the year 1347 with the Black Death (Patterson et al., 2021).

Due to the conditions that caused the pandemic worldwide, many countries need to have diagnostic methods in which to determine the viral load disease (Elli et al., 2022; Parikh et al., 2020), will contribute to a timely diagnosis such a way can help classify false negative people (person who in the physical examination does not detect alteration but who actually presents a disease), which could spread the disease (Filchakova et al., 2022; Woloshin et al., 2020; West et al., 2020).

Various research institutes around the world were able to implement laboratory tests in the detection based on the polymerase chain reaction (PCR) (Peeling et al., 2021; Sarwar et al., 2022) and in turn, serological tests which are based on the detection of immunoglobulins that counteract the viral load in the person (Biswas et al., 2022; ECDC, 2020).

Although laboratory tests will be a priority in the determination for the diagnosis of COVID-19, although it is not relevant, a correct sample must be taken from the person, since the correct procedure will allow the obtaining of a good sample, increasing the reliability of the final diagnosis when seeing its results (Wu et al., 2021; Ogbebor et al., 2020), but that in this sense, errors in the diagnosis may be one of the consequences that occur in clinical laboratories, these can occur in any of the laboratory stages from the moment of requesting the test because the time of disease and according to it the type of sample to perform, it should be noted that under the current situation and pandemic, there was a high demand in the processing of samples and the pressure of results led to them being issued as soon as possible, concluding in errors in the transcription of the results and even in the system itself, where in many cases there is a risk of false negatives in the test; adding work pressure leading to increased rates of making mistakes (Adebisi et al., 2020).

At the national level, in Peru, according to the Ministerio de Salud (MINSA), for the detection of COVID-19, real-time polymerase chain reaction (PCR) laboratory tests, antigenic tests, and the Loop-Mediated Isothermal Amplification (LAMP) methodology are used serological, of which they allow obtaining both positive and negative results, and that this allows diagnosing people who present the disease (Aguilar Ramírez et al., 2020).

In this paper, a brief introduction is written on the design of various diagnostic techniques for

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COVID-19, so the research objective is to detect COVID-19 in diagnostic tests performed on patients.

2. Methodology

2.1. Research type and design

The research for its properties is quantitative, in terms of its methodology it is descriptive transversal and experimental (Sampieri et al., 2014).

2.2. Population and sample

The population is made up of 560 patients from hospitals.

2.3. Technique and instrument

For the present study, the instruments used to make the diagnoses were real-time PCR laboratory tests and antigen tests. This flowchart in Fig. 1, describes the protocols to be followed in the process of diagnosing COVID-19 through PCR tests and antigen tests.

For the PCR test during the process, the sample is taken through a swab in the nose and that only collects the respiratory secretion. The sample that was obtained is taken to a clinical laboratory for its diagnostic process, which takes 3 to 4 days. Once the results are obtained, the patient makes a medical consultation to find out if the test is positive or not. Note that PCR is a 100% effective test.

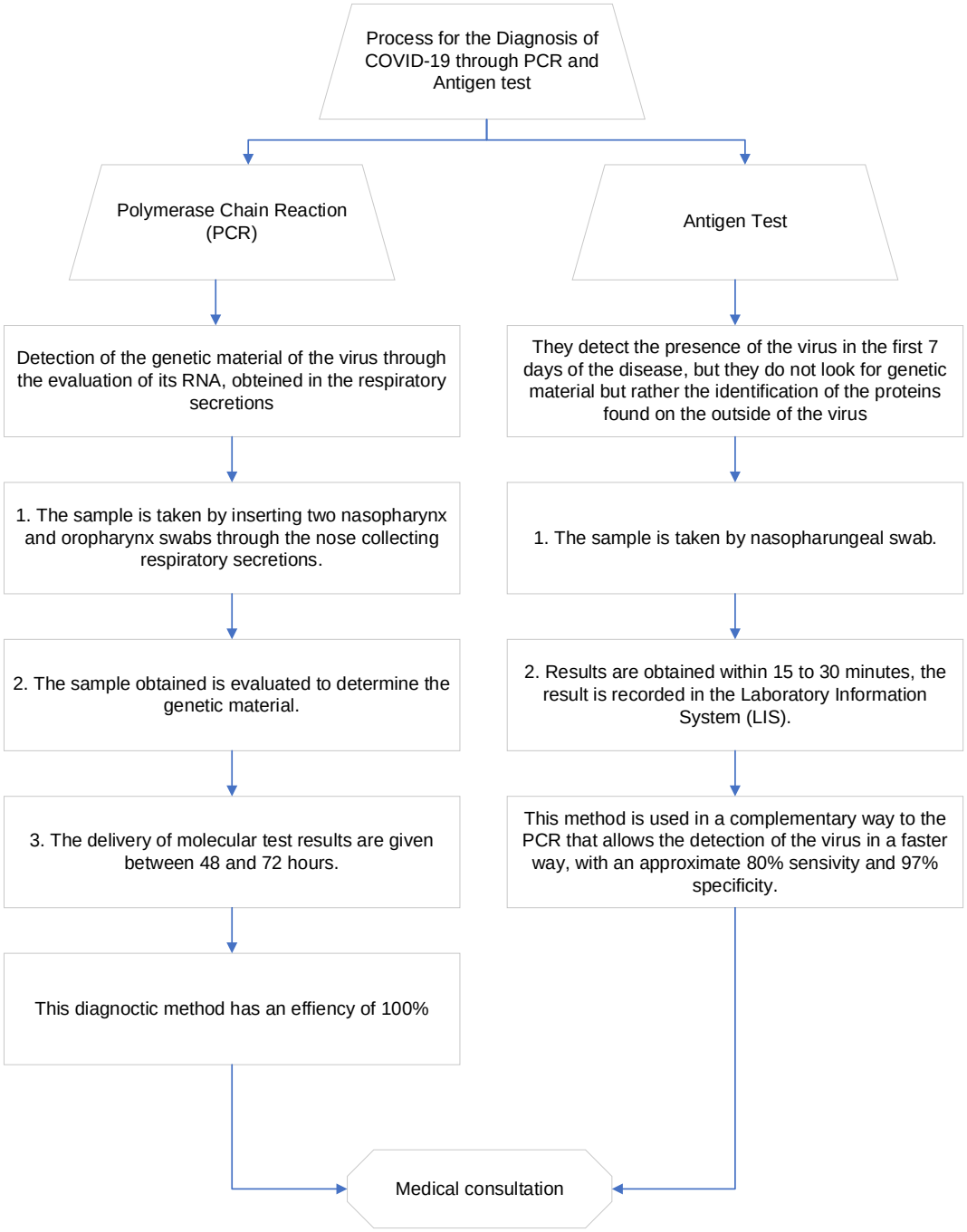

Fig. 1: Flowchart of the process for the diagnosis of COVID-19

For the antigen test, the sample is taken through a nasopharyngeal swab, which is an exam that allows organisms to be detected through the secretions of the upper part of the throat, once the sample is obtained, the procedure is faster than The PCR, although the efficacy is not the same, if both tests are carried out at the same time, the detection of COVID-19 is faster since the PCR is efficient and the antigenic test is sensitive and specific for the germ in the secretions.

To do this, before performing the tests, within the epidemiological profile a line is made specifying the onset of infection up to the limit of detection of COVID-19, which is detailed in Fig. 2.

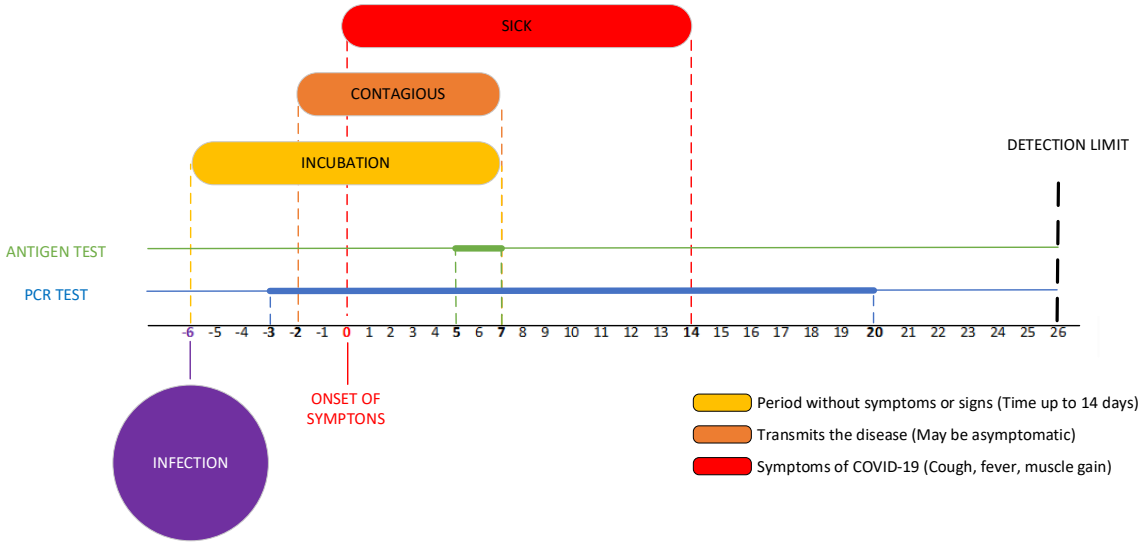

Fig. 2: COVID-19 detection period Antigen and PCR test

In Fig. 2, we can describe the beginning of the contagion by COVID-19 that is six days before presenting the symptoms, although the incubation period covers from the beginning of the contagion to fifteen days when the patient already suffers from the symptoms of COVID-19, remembering that the patient can already be contagious two days before presenting the symptoms and that he can continue one more week presenting the symptoms, in such a way that since I present the symptoms must be isolated for fourteen days to avoid more infections, for this in the detection of COVID-19, for the antigen test, the test will be performed between the fifth and seventh day from the beginning of the symptoms to make the appropriate detection, instead for the PCR test, it is performed three days before I present symptoms up to 20 days once symptoms are present, although the limit of detection covers twenty-six days since I present symptoms of the disease.

2.4. Place and application of the instrument

It was coordinated first with the management center of the hospital centers for the collection of data from which they were obtained in the CARPA COVID-19, Hospitalization, Emergency, Traumashock, and Outpatient services.

3. Results

In Table 1, we can see that in the results of the antigen test, 93 participants representing 16.6% in their results were reactive and 467 participants representing 83.4% came out in their non-reactive results.

Table 1: Results of the Antigen test performed on patients in a hospital

		Frequency	Percentage
Valid	Reagent	93	16.6
	Non-Reactive	467	83.4
	Total	560	100.0

In Table 2, in the results obtained for the PCR test, 186 participants representing 33.2% came out positive for the test and 374 participants representing 66.8% came out negative.

Table 2: Results of the PCR test performed on patients in a hospital

		Frequency	Percentage
Valid	Positive	186	33.2
	Negative	374	66.8
	Total	560	100.0

4. Discussions

The exposure of patients around patients infected by COVID-19, made them undergo diagnostic tests to detect if they come out positive or negative for the disease since they are in the first line of care for patients positive for COVID-19.

At the epidemiological level, patients are at high risk of contagion of COVID-19 because they are present in the first line of care, so the diagnostic test that has mostly been used is PCR although it is also important to consider other diagnostic tests with high sensitivity and specificity of which can be used to a large extent.

In Peru, the diagnostic tests that are usually used most often are PCR and antigen test, because both complement each other to be able to get a good result in the sampling since PCR has a high effectiveness for the detection of COVID-19 and the

antigen test has a high sensitivity and specificity, it is in this way that both tests complement each other to reach a specific result so that a result is obtained and know if the patient is infected.

Likewise, in our results of the research work, we see evidence that the diagnostic tests carried out were mostly negative, so we can interpret that most of the study population carried out the biosecurity measures correctly so as not to be infected with the virus. disease, in turn, as a fundamental part of protection against COVID-19 is vaccination, although this, when the second wave was going through, could spread, even when the person had already been vaccinated against the disease.

5. Conclusion

It is concluded that the strengths of COVID-19 detection tests must be complemented since it allows an accurate and timely diagnosis of patients. Safety protocols must be considered during the collection of the sample, its transfer, handling, and use so that accurate results can be provided and interpreted.

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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