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Epidemiological and Clinical Characteristics of Suspected COVID-19 Cases Received at the National Public Health Laboratory (Thies-Senegal)

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ABSTRACT

Introduction: In December 2019, the COVID-19 disease, caused by a new coronavirus (SARS-CoV-2), appeared in Wuhan, China, and quickly spread worldwide. Senegal recorded its first case on March 2, 2020.

The objective is to describe the epidemiological and clinical characteristics of suspected COVID-19 cases received at the LNSP of Thiès.

Materials and Methods: This was a descriptive cross-sectional study that included 883 suspected cases selected by a non-random convenience sampling method from January 1, 2022, to December 31, 2023, at the LNSP of Thiès.

Results: Among the 883 suspected cases included in the study, 164 tested positive, resulting in an overall positivity rate of 18.57%. The male sex predominated (sex ratio = 3.97). The average age was 43 years with a minimum of 4 years and a maximum of 78 years. The majority of confirmed positive suspected cases came from Thiès (78.7%). The most frequently reported clinical manifestations were fever (82%), cough (64%), dyspnea (54%), and nasal discharge (14%). No severe cases were observed, nor any deaths. Among asymptomatic individuals tested, 7.47% were reported positive for COVID-19.

Conclusion: A significant proportion of confirmed positive COVID-19 cases was noted. These cases were primarily adults, male, and symptomatic. The triad of fever-cough-dyspnea dominated the clinical manifestations.

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Introduction

In December 2019, a new coronavirus was identified in the city of Wuhan, Hubei province in China, in patients who presented with unexplained severe pneumonia [1]. In February 2020, the World Health Organization (WHO) named the disease caused by this virus COVID-19, which was initially called nCoV-2019, and later SARS-CoV-2 by the International Committee on Taxonomy of Viruses [2]. The most common symptoms of the disease were fever (94%), cough (81%), myalgia (32%), sputum production (39%), and headache (13%) [3]. In January 2020, the virus spread rapidly around the world. On January 30, 2020, the WHO declared it a public health emergency of international concern, and on March 11, 2020, the situation was classified as a global pandemic [4]. In Senegal, the first case of COVID-19 was recorded on March 2, 2020 [5]. According to information bulletin Number 93 on the coronavirus disease (COVID-19) pandemic dated 10/26/2021, 246,594,191 confirmed cases of coronavirus disease 2019 (COVID-19) including 4,998,784 deaths had been reported worldwide. In Africa, 8,472,405 cases of COVID-19 and 217,283 deaths had been recorded, and in Senegal, a total of 73,893 cases including 1,878 deaths had

been reported as of 10/26/2021 [6]. The speed and extent of the viral spread of SARS-CoV-2 around the world have led to numerous studies focusing on the epidemiological and clinical data specific to each continent and each country. However, in Senegal, there is relatively little research concerning the epidemiological and clinical aspects of this virus. While studying these characteristics allows us to distinguish the most exposed cases of the virus and the actual incidence of the disease on the Senegalese population according to sex, age groups, and origin. To contribute to improving the epidemiological, clinical, and evolutionary knowledge of the SARS-CoV-2 virus in Senegal and the country's preparedness for potential future pandemics, this study was conducted with the aim of describing the epidemiological and clinical characteristics of suspected COVID-19 cases who consulted at the LNSP in Thiès (Senegal).

Materials and Methods

Type of study, period, and setting of the study

It was a descriptive cross-sectional study and included 883 suspected cases selected by the non-random convenience

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sampling method from January 1, 2022, to December 31, 2023, at the LNSP of Thiès. In case of a positive result, their care was provided by the health district of 10th of Thiès. The suspected case of COVID-19 is defined as follows:

- **Suspect case**

- Patient presenting with acute respiratory infection: cough, difficulty breathing, fever with axillary temperature $\geq 37.5^{\circ}\text{C}$;
- Travel history to a country that had cases of COVID-19 in the 14 days preceding the onset of symptoms;
- Person who has been in contact with a confirmed COVID-19 case;
- Person who has worked or stayed in a hospital/isolation site where a case of COVID-19 infection has been confirmed;
- The absence of another diagnosis fully explaining the clinical presentation.

- **Confirmed case**

Suspected case tested positive in the laboratory by RT-PCR for SARS-CoV-2, irrespective of clinical signs and symptoms.

- **Case contact**

Any person who has been in contact with a case of COVID-19 according to at least one of the following criteria:

- Lived in the same household as the case;
- Had direct physical contact with the case during or in the days prior to their illness;
- Traveled with the patient in any type of transport;
- Provided direct care to COVID-19 patients;
- Shared the same environment as a patient with COVID-19.

Ethical considerations

The verbal consent was obtained from each participant before being enrolled and the anonymity of the information collected was ensured during the survey. The only criterion for non-inclusion was the patient's opposition to the collection and analysis of their data.

Collection, processing and analysis of data

Epidemiological data (age, sex and origin) and clinical data (symptoms) were recorded on a standardized data collection form. Samples for RT-PCR testing were obtained through nasopharyngeal swab procedures. Total nucleic acids (RNA) were extracted using the Da An Gene kit and amplified using the TaqPath kit mix and the Applied Biosystems™ 7500 Fast Dx Instrument, according to the recommendations of the LNSP.

Statistical analysis

The data obtained through the survey were entered into an Excel 2021 spreadsheet. All analyses were carried out using R software version 4.3.0 (The R Project for Statistical Computing, 2023). Quantitative variables are presented as mean, median, range, and interquartile range. Categorical variables are described based on the frequencies and counts of the different modalities. A univariate analysis is performed using Student's t-test for quantitative variables, or Pearson's χ^2 test for categorical variables. A p-value ≤ 0.05 is considered significant.

Results

Among the 883 suspected cases included in the study, 164 were

found positive by RT-PCR (viral targets with a Ct ≤ 35), giving an overall positivity rate of 18.57% (Table 1). The Ct values of the positive cases varied from 17 to 35. The average Ct obtained was 26.07. Among the 164 confirmed positive suspected cases, 131 were male (80%) and 33 were female (20%). The sex ratio was in favor of males (3.97) and the difference was significant (p-value ≤ 0.05) (Figure 1). The age of suspected cases with a positive RT-PCR result ranged from 4 to 78 years, with an average of 43 years. The most represented age group was that of 20 to 49 years (57.93%), followed by those over 50 years (36.58%). The difference between these two age groups was significant (p-value ≤ 0.05) and the χ^2 test = 5.81, df = 1). In contrast, individuals under 19 years old represented only 5.49% of the cases. The majority of confirmed positive suspected cases came from Thiès (78.7%), followed by Dakar (9.1%). The regions of Louga and Saint-Louis each had an identical rate of 6.1% (Table 2). The clinical signs and symptoms observed are presented in Figure 2. The average time between the onset of the first symptoms and the consultation (nasopharyngeal swab for RT-PCR) was 2 days. The most frequently reported clinical manifestations were fever (82%), cough (64%), dyspnea (54%), and runny nose (14%). No severe cases or deaths were reported. Among the asymptomatic individuals tested, 7.47% tested positive for COVID-19 (Table 3).

Table 1: Positivity rates of suspected cases according to real-time RT-PCR analysis.

Rate	Effective	Percentage (%)
Négative	719	81.43
Positive	164	18.57
Total	883	100

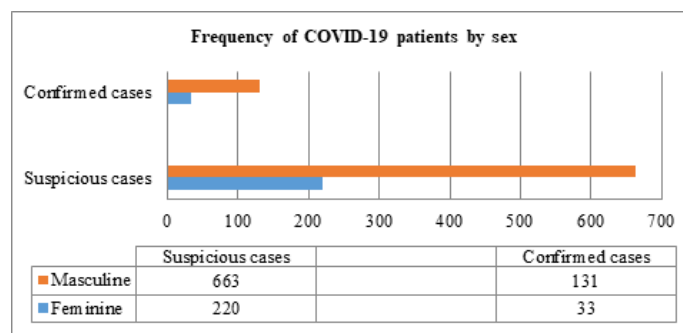


Figure 1: Frequency of COVID-19 patients by sex.

Table 2: Frequency of patients with COVID-19 by age and origin.

Caractéristiques	Suspects n (%)	Confirmed n (%)
(Age in years)	N=883	N=164
<19	50 (5,69)	9 (5,49)
[20-49]	522 (59,45)	95 (57,93)
>50	311 (34,86)	60 (36,58)
Origin		
Thies	663 (75.1)	129 (78.7)
Dakar	106 (12.0)	15 (9.1)
Louga	70 (7.9)	10 (6.1)
Saint-Louis	44 (5.0)	10 (6.1)

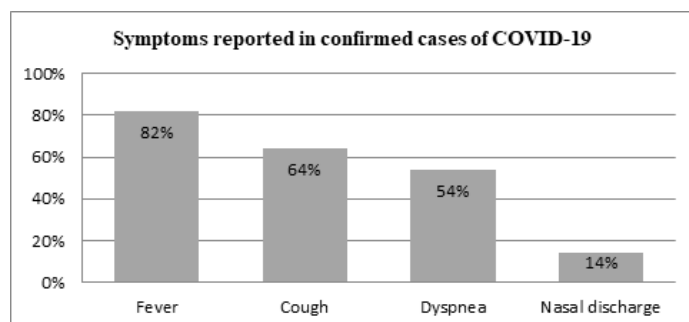


Figure 2: Symptoms reported in confirmed cases of COVID-19.

Table 3: Confirmed cases of COVID-19 among asymptomatic individuals.

Asymptomatic	RT-PCR test result %		
	Negative	Positive	Total
No	142 (16.08)	98 (11.13)	240 (100)
Yes	577 (65.34)	66 (7.47)	643 (100)
Total	719 (81.42)	164 (18.6)	883 (100)

Discussion

The study was conducted in order to analyze the epidemiological and clinical characteristics of suspected COVID-19 cases consulting at LNSP in Thiès (Senegal). Our results showed a moderate RT-PCR positivity rate of 18.57%. Our positivity rate is higher than the rates observed in Bamako (Mali), Mauritania, and Thailand. OB Togola and colleagues (2020) found a total of 848 suspects, with 126 confirmed cases of COVID-19, resulting in a positivity rate of 14.86% [7]. The study by Sidi Mohamed Laghdaf et al. (2021) in Mauritania showed a prevalence of 10.7% [8]. In Thailand, out of 454 respiratory samples, 60 (13.2%) tested positive by real-time RT-PCR [9]. Our positivity rate is lower than that observed in the study by Greffe and colleagues in France, where they found a positivity rate of 38% [10]. This moderate positivity rate observed could be explained by the targeted selection of suspected cases and by the epidemiological context marked by the fourth wave of COVID-19, dominated by the Omicron variant. This variant is known for its high transmissibility. Our results showed that the observed Ct values vary between 17 and 35 and the average Ct obtained is 26.07. Our rate is lower than that observed in Scotland (United Kingdom) by Rupert Waudby-West and colleagues who have an average Ct of 28.7 (23.9-33.4) [11]. However, our study did not find a significant correlation between Ct values and clinical signs. Our results corroborate with those of Javed and colleagues (2021), who also did not find a clinical correlation between Ct and viral load. However, they found a correlation between Ct and biochemical parameters (ALT, AST, LDH, CRP, and bilirubin) [12]. On the other hand, some studies suggest that viral load is associated with mortality and infectiousness [13,14]. It has also been shown in the literature that low Ct values (high viral load) were associated with the severity of the disease and death [15]. Several studies report a predominance of the male sex among confirmed COVID-19 cases. In our study, we found a male predominance (80%), which corroborates the results reported in other studies with varying proportions of 54.5% [16] and 50.7% [17]. Likewise, in the study by Joseph Donamou and colleagues (2021) concerning COVID-19 patients in Guinea, the male sex was predominant with a percentage of 79% [18]. This male predominance could reflect differences in social, economic, and cultural activities between the two sexes. Men are often led to

engage in professional activities involving more travel and social interactions. This increased mobility heightens their likelihood of exposure to SARS-CoV-2. This constant has been confirmed in the study by Jingyi Liao and collaborators (2023) in China, where men frequently represented the 'imported' cases within households [19]. The age of confirmed cases ranges from 4 to 78 years. COVID-19 does not exclude any age category. This observation was documented in the study by (OB Togola et al., 2020) [7]. In our study, the median age of confirmed COVID-19 cases was 43 years. Our results were lower than those of Guan et al., who found a median value of 47 years [20]. Our median age was also lower than that found in the studies by Wei et al. and Acar et al. They found average values of 49 years and 51.6 years, respectively [21,22]. The most represented age group in our study is that of 20 to 49 years (57.93%), followed by those of patients over 50 years (36.58%). Our findings are in agreement with those of the study by Monod et al., which found that the majority of SARS-CoV-2 infections came from patients aged 20–49 years [23]. The study by Jakhmola et al. also showed that population groups aged 20 to 49 years and 50 years and older were very vulnerable to infection [24]. This high rate noted among adults in our study could be explained by the fact that this population is more active both professionally and socially. Our population is also primarily composed of young individuals, which naturally increases their representation among confirmed cases of COVID-19. However, most studies and reports on the entire population support that age is an important risk factor for SARS-CoV-2 disease. An age over 50 years was found to be strongly associated with the occurrence of SARS-CoV-2 according to Plaçais and colleagues (2020) [25]. In our study, the proportion of individuals under 19 years among the confirmed COVID-19 cases recorded is very low (5.49%). This rate observed in our study is consistent with published data in Spain (6%) [26]. This proves that children are much less infected. Indeed, children have a faster and more active innate immune response than adults, particularly in the nasal and respiratory mucosa, thus limiting viral replication even before the infection sets in [27]. The city where the majority of our positive patients lived was Thiès (78.7%). We can hypothesize that this is due to the ease of access to information and the availability of COVID-19 testing services by RT-PCR. Furthermore, Thiès is a railway and commercial hub with a high population concentration. According to data from the EpiCov survey, people living in cramped or even overcrowded housing are 2.5 times more likely to test positive for COVID-19. In our study, the triad of fever-cough-dyspnea (82% - 64% - 54%) dominated the clinical manifestations observed. Our results are comparable to those of Savadogo and colleagues (2021) in Burkina Faso [28] and Lai et al. in China [29]. Indeed, COVID-19 primarily affects the respiratory pathways. In the study by Chen and colleagues, the symptoms manifested were primarily fever (82%) associated with cough (81%) and dyspnea (31%), but also myalgias (11%), headaches (8%), and digestive symptoms (3%) such as diarrhea, nausea, abdominal pain [30]. Recent data on the infection seem to indicate that 10% of patients express digestive symptoms. The digestive disorders reported in the literature [31], have not been found in our patients. This situation may be due to the small size of our sample. From a clinical point of view, only 7.47% of our patients who tested positive are asymptomatic. Our results were lower than those found by Hu et al., who found

that 29.2% of patients showed no symptoms in a study of 24 patients [32]. The epidemiological impact of these asymptomatic forms is still unclear, but several cases of contamination during the incubation period or from asymptomatic patients have been reported [33]. It has been reported that asymptomatic patients had a longer duration of recovery compared to symptomatic cases [34].

Limitations of Our Study

The RT-PCR on the nasopharyngeal sample is the reference test for diagnosing a SARS-CoV-2 infection with a sensitivity of 95%. There is certainly an underestimation of COVID-19 cases among the suspected cases that came for consultation. Conducting serological tests for COVID-19 in symptomatic suspected cases that have a negative PCR would be interesting to rectify a number of diagnoses. Another limitation was the absence of detection of other respiratory viruses by multiplex RT-PCR. Some cases did not report their symptoms. We faced deficiencies in filling out files that led to the impossibility of exploiting certain information related to the evolution of the disease and the epidemiological links of tested individuals with other confirmed cases.

Conclusion

At the end of our work, the results obtained showed a moderate proportion of COVID-19 patients among the suspected cases tested by real-time RT-PCR in Senegal. These patients are primarily adults and elderly people, mostly residing in the Thiès region, predominantly male and symptomatic. The symptoms are dominated by the triad of fever-cough-dyspnea. There are no severe cases or deaths. Moreover, the results obtained open avenues for understanding the risk of COVID-19 infection in the presence of comorbidities and for describing new manifestations during COVID-19.

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