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# Distribution of Covid-19 in African, European, American and Asian ethnic groups resident in Port-Gentil, Gabon between April 2021 and March 2022

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## Abstract

**Introduction:** The pandemic caused by COVID-19 has upset the world and especially in Sub-Saharan Africa or most countries that do not have equipped laboratories, qualified human resources, tests available for tracking suspected cases, and large-scale testing of the population, making the response a daily challenge for the entire decision-making chain. In order to break the chain of transmission, Gabon has shown itself to be an example in the application and compliance with barrier measures and especially in the availability of RT-PCR tests in a very heterogeneous population characterized by significant dynamics. **Objective:** the objective of this work was to show the distribution of COVID-19 in a population made up of several ethnic groups (continental origins) in the city of Port-Gentil between April 2021 and March 2022. **Methodology:** We conducted a cross-sectional study at the 1st Medical Biology Laboratory for descriptive purposes. Participants of all ages from Africa, Europe, America, Asia, and Oceania, regardless of gender, were included in the study. A database was constructed, and the statistical analyses were carried out using Epi Info 7. The significance threshold was set at 0.05. **Results**: 20984 participants were enrolled with 78% of African origin, 14% of European origin, and 5% of Asian origin. The population's average age was 43.14±10 years, with six times more men than women. The prevalence in the population was 8.65%. The proportion of positive women was twice as high as that of men at 14% (P<0.00001). The proportion of positive people by continental origin was higher in Europe and America (white person) with 9.35% and 9.45%, respectively, compared to Africans and Asians with 8.74% and 6,60%, respectively.

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**Introduction**

It is in the province of Humans in China that the coronavirus disease 2019 (COVID-19) was born with the appearance of the first cases of patients with flu-like symptoms associated with respiratory disorders; it's very rapid spread led to the registration of 177 affected countries worldwide in March 2020 [1]. Indeed, after successive epidemics responsible for severe acute respiratory syndromes (SARS-COV) in 2002 affecting 29 countries with 8098 cases and 774 deaths, and the Middle East respiratory syndrome (MERS-COV) in 2012 affected 27 countries globally with 2494 cases and 858 deaths; which occurs in 2019, a new coronavirus responsible for severe acute respiratory syndrome called SARS-COV-2 [2]. Moreover, although the first case reported in Africa was in Egypt in February 2020, the pandemic has quickly spread to the continent [3]. This virus, also called coronavirus because of its structure showing a crown, has an RNA genome size of 26–32 kilobases and belongs to the beta-coronavirus family. According to the International Virus Classification Board (IVCC), the SARS-COV-2 virus has passed from pangolin to humans by manipulating the latter [4]. Knowledge of the genome led to the rapid development in January 2020 of tests based on polymerase chain reaction (RT-PCR) for diagnosis while avoiding cross-reactions; the target genes were mainly ORF1ab and N of viral RNA for some countries such as China and RdRp, E and N for others like Germany [5-6]. As transmission became essentially human-to-human, it was noticed that infected patients sneezed a lot producing droplets coming out of their airways [7].

While between 2020 and 2021, we recorded, in turn, outbreaks of the disease in Asia, in Europe and America with respectively 5556,999 cases and including 9854 deaths in Japan, about 3,949,517 cases in Italy with 119,021 deaths; 5473579 cases 102713 deaths in France and 32766119 cases and 585449 deaths in the United States, data in Africa were the lowest at the same time showing 2,763,421 cases and 65,602 deaths or a ratio of 3.4% [8-9]. Intending to control the disease and prevent severe forms, researchers and governments have embarked on promoting barrier measures and vaccination. The latter has encountered difficulties in Africa in implementation and thus making the response increasingly difficult [10]. Access to diagnostic tests and mainly the RT-PCR test is one of the significant difficulties that Sub-Saharan Africa has faced specifically throughout the pandemic, thus making data in some parts of the continent unavailable [11]. in particular, the respect for barrier measures and the obtaining of a negative

RT-PRC test for access to work and public places made it possible to collect a large sample size in order to show the distribution of Covid-19 in a dynamic, very heterogeneous population characterized by ethnic groups from Africa, Europe, Asia, and America.

**Methodology**

This is a cross-sectional study with a descriptive aim that took place from April 2021 to March 2022 at the 1st Laboratory of Medical Biology in Port Gentil, Gabon. The study participants were symptomatic or non-PCR patients; they were mainly made up of workers on oil sites, office workers, and other people who needed to perform a PCR test to know its status.

**Data collection**

A data collection sheet was completed with each patient for 10 to 15 minutes, taking into account the interviewee's language skills. It included: sociodemographic data (gender, age, occupation, type of screening...), clinical signs (fever, cough, fatigue, headache, sore throat, diarrhea ...), the information on the sample and the sample (nasopharyngeal, oropharyngeal .....), and the analysis which was for the case an RT-PCR in real-time in the laboratory.

After collection, the sample is inactivated and extracted under a TYPE 2 MSP. Then the eluate is mixed in a solution of Master Mix previously prepared in the Enzymatic Mix zone. The PCR microplate is transported to the amplification room for deposition in the thermocycler. The results obtained are processed according to the recommendations of the kit and the recommendations of the tests evaluated in the laboratory. The results of positive tests are reported, and the Ct value characterizing the level of viral shedding is reported. The Bioer extractor and thermocycler were the devices used.

**Data analysis**

The data entered in the Microsoft Excel ® based database has been cleaned, and its consistency verified. The cleansed data was exported to EPI INFO 7 for further statistical analysis. Numbers and frequencies were calculated to assess the integrity of all variables. The outcome of the PCR was the main variable in this study. Statistical significance was set at the value of $p < 0.05$.

**Preliminary results**

This study focused on a heterogeneous population of 20984 patients coming from Africa, Europe, America, and Asia and having carried out an RT-PCR test at the 1st Medical Biology Laboratory.

Patients of all ages were included, and there were six times more men than women in the study population. The prevalence in the study population of SARS-COV-2 disease was 8.65%.

**Sociodemographic parameters**

1. **By geographical origin**

Populations of African descent accounted for nearly 80% (16395) of our population the study was followed by those from Europe with 2943 participants or 14.22%. (See **Figure 1**: Geographic Distribution of the Study Population)

2. **Age and gender distribution**

**Table 1:** Population Distribution by Age and Gender

The overall average age of the population was 43.14 years ± 10, with 42 years±9.7 for men and 39±13.3 for women, who represented only 14% of the study population.

| Variables | Male | Female |
|---|---|---|
| **Effective (%)** | 18131(86,40) | 2853(13,60) |
| **Average age (±SD)** | 42±9,7 | 39±13,3 |

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From this figure, it emerges that quarters 3 and 4 represented the periods with a high frequency of positivity with 37% for each of them. (See **Figure 2**: Distribution of the Covid-19 positive population by a quarter from April 2021 to March 2022).

**Table 2**: Distribution of the study population by gender, symptoms, and origin continental according to the RT-PCR result

This table shows that the percentage of women infected was twice as high as that of men, with 14% and 7%, respectively (P<0,0001). From this table, participants from Europe and America have the highest prevalence of positivity with 9.35% and 9.45%, respectively, compared to Africans and Asians with 8.74% and 6,60%, respectively.

| Variables | Modalities | RT-PCR+ n(%) | RT-PCR- n(%) | P-Value <0,05 |
|---|---|---|---|---|
| **Gender** | Male | 1404(7,74) | 16727(92,26) | **0,0001** |
| | Female | 411(14,41) | 2442(85,59) | |
| **Origins** | Africa | 1422(8,74) | 14848(91,26) | |
| | Europe | 287(9,35) | 2781(90,65) | |
| | Asia | 77(6,60) | 1090(93,40) | |
| | America | 31(9,45) | 297(90,55) | |
| | Oceania | 0 | 26(100) | |

***RT-PCR ;** reverse transcriptase Polymérase Chain Réaction

**Table 3**: Population distribution by symptoms and RT-PCR results

This table shows that nearly 73% of the positive population said they had no symptoms, while only 9.5% of the RT-PCR negative population had symptoms.

| Variables | RT-PCR + n(%) | RT-PCR – n(%) |
|---|---|---|
| **Asymptomatic** | 1317(72,6) | 17350(90,5) |
| **Symptomatic** | 498(27,4) | 1819(9,5) |
| **Total** | 1815(100) | 19169(100) |

***RT-PCR ;** reverse transcriptase Polymérase Chain Réaction

**Discussion**

The objective of this study was to assess the distribution of COVID-19 in the population of Port-Gentil in Gabon between April 2021 and March 2022.

The results of this study were based on a heterogeneous population of 20984 patients from Africa, Europe, America, Asia, and Oceania, having performed an RT-PCR test at the 1st

Medical laboratory.

Patients of all ages were included, and there were six times more men than women in the study population, with a mean age of 43 ± ten years. As the oil companies in the city of Port-Gentil are predominantly male, this gender disparity could explain the high number of tests in favor of men. African populations represented nearly 80% (16395) of the study population, followed by European populations with 2943 participants or 14.22%, and 1167 participants from Asia.

The study found that 76% of the infected patients were male, but with six times as many men in the study. This gender disparity can be explained by the fact that, Port Gentil is the economical capital with oil industries. Men represent the biggest part of the industry heavy duty workforce. Close to 100% of people working in oil drilling sites are men. Theses Men had to be tested frequently to be able to work on sites. Data on 28853 women were collected with an average age of 39±13.3 years, and the percentage of positive cases in this population was 14%, twice that of men ($P<0.05$); Although these results are different from those of Amadine Mveang et al. In 2020 in Gabon which showed a masculinization (57%) of SARS-COV-2 infection [12], recent studies suggest that women may be at greater risk of contracting COVID-19. For example, the Korean Infectious Diseases Society collected data on 4,212 patients with COVID-19, which showed that 62.3% were women [13]. The authors suggest that the difference may reflect differences in social activities in different countries. In addition, contact tracing of the COVID-19 epidemic in South Korea suggested that female practitioners of the Daegu religious sect might have contributed to the COVID-19 epidemic. Therefore, gender disparities in COVID-19 may reflect social and cultural differences between different countries [13]. In a similar study in Qingdao City, China, an examination of 44 COVID-19 patients showed that 66% were female. The female predominance reported in this study was probably due to the small sample size during the early stages of the COVID-19 epidemic [14].

Although many studies contrast with these data, the causes of gender disparities are now the goal of several studies that emphasize that they are multi-sectorial and where sex hormones play an essential role, especially in the immune response [15].

The October-November-December 2021 and January-February-March 2022 quarters represent the periods of high prevalence with 37% each. These results could be explained by the appearance of new variants, including Delta and Omicron highly contagious expatriate workers and holidaymakers would have imported during this period [16]. Numerous studies have shown that the proportion of SARS-CoV-2 positive people who are asymptomatic throughout infection has been estimated in all study settings, at 20% (95% CI 17%-25%, 79 studies), with a prediction interval of 3% –67%. A meta-analysis reported an estimated 31% of asymptomatic people based on seven screened populations studies [17-18]. In our study, 73% of patients who reported being asymptomatic had

an RT-PCR result + this could be explained by the fact that in public opinion, people believed that reporting a symptom could impact the nature of the result. Participants from Europe and America recorded the highest positivity percentages with 9.35% and 9.45%, respectively, which contrasts with the results of a study (meta-analysis) including 18,728,893 patients from 50 studies, of which; 26 peers were evaluated; 42 were from the United States of America and eight from the United Kingdom. People of black and Asian ethnicity had a higher risk of COVID-19 infection than white people [19]. These results could be explained because the black subjects in these studies, being either African-Americans or Europeans residing for several years or born on these continents, would not benefit from the same environment and immunological heritage as the black subjects from Africa. Also, this difference could be explained by the fact that the populations of ethnic groups of America and Europe would be quite dynamic and which, in most cases, returned from countries with a high prevalence of Covid-19.

From these results we first observed that, women are the population most at risk of Covid-19 contamination and secondly, that the African ethnic group despite the large sample size had a low positivity rate compared to Americans and Europeans (white race), which could also explain the low rate of deaths of African populations during the pandemic. These results support the hypothesis of the implications of pre-existing humoral cross-reactive immunity in African populations against SARS-CoV-2 highlighted in a study conducted in Gabon in 2020; where sera from 32 subjects (out of 135 [23.7%]) were observed to be reactive to SARS-CoV-2 antigen N [20]. Therefore, determining the incidence of the disease and assessing the duration of positivity by RT-PCR according to the level of viral shedding in this population according to gender and different ethnic groups will highlight the different factors associated with differences in these groups.

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