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Sociodemographic and Clinical Characteristics Associated with Early Detection of COVID-19 in Kinshasa: Democratic Republic of Congo

Kakwaka Katombe Crispin[1], Atuba Mamenepi Pascal[1*], Kabali Hamuli Eugenie[1], Tshimungu Kandolo Felicien[1], Muamba Nkashama Leon[2]

[1]Higher Institute of Medical Techniques of Kinshasa, Democratic Republic of Congo
[2]University Clinics of Kinshasa, Democratic Republic of Congo

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***Corresponding Author:** Atuba Mamenepi Pascal
Higher Institute of Medical Techniques of Kinshasa, Democratic Republic of Congo

Abstract

Objective: COVID-19 is a disease that, as of 2020, has affected the whole world. Its spread being rapid, early detection would contribute to its control. This study aims to determine the sociodemographic and clinical characteristics associated with this detection fast in Kinshasa. ***Material and methods:*** A cross-sectional, descriptive study with an analytical aim is carried out on 713 people suspected of COVID-19 upon their admission to the Covid Treatment Center of the University Clinics of Kinshasa (CTC / CUK) between 2020 and 2021 through the exploitation of the database registering these patients. Data are analyzed using jamovi software version 2.3.18. Frequencies, Fisher's Exact test then logistic regression with $\alpha = 0.05$ are used. ***Results:*** In total, we recorded 713 cases, 459 or 64.4% tested positive at the first screening. The median age is 59.0 years. The sex ratio is 1.7 in favor of men. The following characteristics are associated with early detection of COVID-19: advanced age (OR = 2.9 *1.03 – 8.29+); arterial hypertension (OR = 1.7 *1.15 – 2.52]); diabetes mellitus (OR = 3.66 [1.92 – 6.98]); body aches (OR = 0.41 [0.20 – 0.83]) as well as signs of respiratory distress (OR = 2.4 [1.44 – 3.87]). ***Conclusion*:** This study shows that elderly patients, those with a history of hypertension, diabetes and signs of respiratory distress tested positive at the first screening upon arrival at the CTC/CUK, unlike those with body aches. These cases would therefore require special attention from all staff of the COVID-19 response team for appropriate care.

Keywords: Sociodemographic, clinical characteristics; early detection; COVID-19; Kinshasa.

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INTRODUCTION

Since December 2019, the world has been dealing with a disease known as COVID-19 due to a coronavirus called Sars-cov-2, originating from Wuhan City in China [1-3], which emerged in early 2020 [4-7] thus taking on the characteristics of a pandemic. Since its spread on all continents, it has disrupted the habits of billions of people around the world [8] and generated enormous challenges in all areas of life. That of public health [9, 10] was strongly affected, forcing service providers to adjust their daily practices according to the time allocated in the face of emergencies [11] particularly in the rheumatology department [4], in the maternity ward [12], in pediatrics [3, 7], internal medicine, geriatrics, surgery, to name a few those.

The economic, social [13], sporting [14] and political domains are not spared. Faced with Covid-19, some leaders felt at war against an invisible enemy [15] pushing them to impose a State of Health Emergency summarized in confinement which paralyzed all activities and similarly led to behavioral problems in couples with domestic violence, sleep disorders [8], etc. Despite these obstacles to life, these strategies made it possible to limit the spread of the virus, which spread again after the lifting of this measure [16] which, moreover, was unpopular.

Studies carried out on this subject show that knowledge on many important aspects concerning COVID-19 still remains preliminary, for example on transmission, symptoms, long-term effects and immunity [17]. Two years later, no strict cure for the virus is still available as was the case in 2020 [5, 18] year of its expansion. Hence, its eradication does not seem likely at the moment [19]. The management of the disease is hampered by several obstacles, including the

fear of family members and health care providers of being contaminated [20]. The latter being more exposed in the event of contact, then face an occupational disease or a new type of accident at work [21].

When it emerged, COVID-19 (coronavirus) seemed to affect a specific group, particularly the elderly, in particular men, as suggested by the results of studies including these variables [19, 22, 23]. This trend has given rise to an inequality in the geographical distribution with a predominance in the developed countries compared to the southern regions where the population is young. However, in these regions, the victims face several difficulties in benefiting from appropriate care and they are stigmatized [13].

Globally, there were 276,436,619 confirmed cases of COVID-19 on December 23, 2021, including 5,374,744 deaths and Africa had 6,924,841 cases of this pandemic on the same date [24].

In the Democratic Republic of Congo, the first case of coronavirus was recorded in the month of March 2020 with A cumulation of 70,059 case of which 1 126 death representing a lethality by 1.6% as of December 23, 2021 [24]. Being one of the poor countries in the world, and thanks to its young population which is an important demographic characteristic in the development of the disease, it really did not experience outbreaks of cases like the rich countries especially during the first wave. Experts believe that populations are more exposed to other infections. Which can boost the immune system by creating immunological cross-reactions [25].

Due to its manifestation, multi-organ symptoms are being reported by an increasing number of Covid-19 patients. It includes cough, shortness of breath, fatigue, headache, palpitations, chest pain, joint pain, physical limitations, depression, insomnia, anorexia, etc [26].

In addition, the early detection of suspected cases is a major health issue. This can help health workers quickly use preventive measures and take specific precautions to reduce transmission, provide appropriate treatment and supportive care for sufferers. Early detection can also help differentiate COVID-19 from other diseases in a targeted context such as the City Province of Kinshasa, the epicenter of the disease in the DRC, which has a cumulative 44,032 cases as of December 25, 2021 according to the report of the Ministry of Health Public [25].

In view of the foregoing, considering the changes in the contamination trend, the present study is initiated with a view to describing the epidemiological and clinical profile of COVID-19 at the University Clinics of Kinshasa during the period from 2020 to 2021. It also seeks to establish a relationship between this profile and the early detection of the disease aimed at reducing the prevalence and lethality of coronavirus in Kinshasa.

MATERIAL AND METHODS

This study is quantitative – descriptive with an analytical aim, carried out during the period from March 24, 2020 to December 31, 2021 in order to explore the specificities of coronavirus disease in a hospital setting in Kinshasa.

All suspected cases of coronavirus admitted to the COVID-19 Treatment Center installed at the University Clinics of Kinshasa during the study period constitute our Target population.

Thus, the study is carried out with 713 people suspected of COVID-19 as soon as they are admitted to the CTC / CUK between 2020 and 2021 through the use of the database in which these patients are registered.

The dependent variable is the "*early detection of COVID-19*": it is obtained from the result of the first screening carried out after the patient's admission to the CTC/ CUK.

The independent variables are grouped into three categories including:

(i) *Socio-demographic characteristics*: age and gender.
(ii) *Medical history:* Arterial hypertension (HTA), diabetes mellitus, asthma, heart disease, HIV, TBC, pregnancy, obesity, etc
(iii) *Symptoms presented on admission :* coma, fever, asthenia, body aches, headache, cough, signs of respiratory distress, chest pain, dyspnoea, anorexia, sore throat, ageusia, anosmia, rhinorrhea, nausea, vomiting, diarrhea and colic abdominal.

Jamovi software version 2.3.18 for statistical analysis

The frequencies (qualitative variables) and the calculation of the median with the interquartile range (quantitative variables not following the normal distribution) are used for the description of the different characteristics of participants.

The relationships between these characteristics and the result of the first Covid-test after admission to the CTC/CUK are explored using Fisher's Exact test with a risk of error of 0.05.

In order to isolate the characteristics associated with early diagnosis by considering interaction effects, we used logistic regression at the same level of significance.

Ethical considerations: We have received authorization to use the CTC/CUK database through the

manager of this centre. Furthermore, anonymity and confidentiality were strict observances and no human manipulation took place.

RESULTS

1. Description of attendees

Demographic data

From Table I, it emerges that the median age of participants is 59 years with the interquartile range of 26 years of age. More than half, or 63.1%, are male, which represents a sex ratio of 1.7 men to women.

Table I: Socio-demographic characteristics of participants

Features	Workforce (n = 713)	%	Median (IQR)
Age			59.0 (26) years
< 18 years old	17	2.4	
18 - 64 years old	449	63.0	
> 64 years old	247	34.6	
Sex			
Feminine	263	36.9	
Male	450	63.1	

Medical history

Chart 1 shows that high blood pressure (36%) and diabetes mellitus (16%) are the most dominant medical histories.

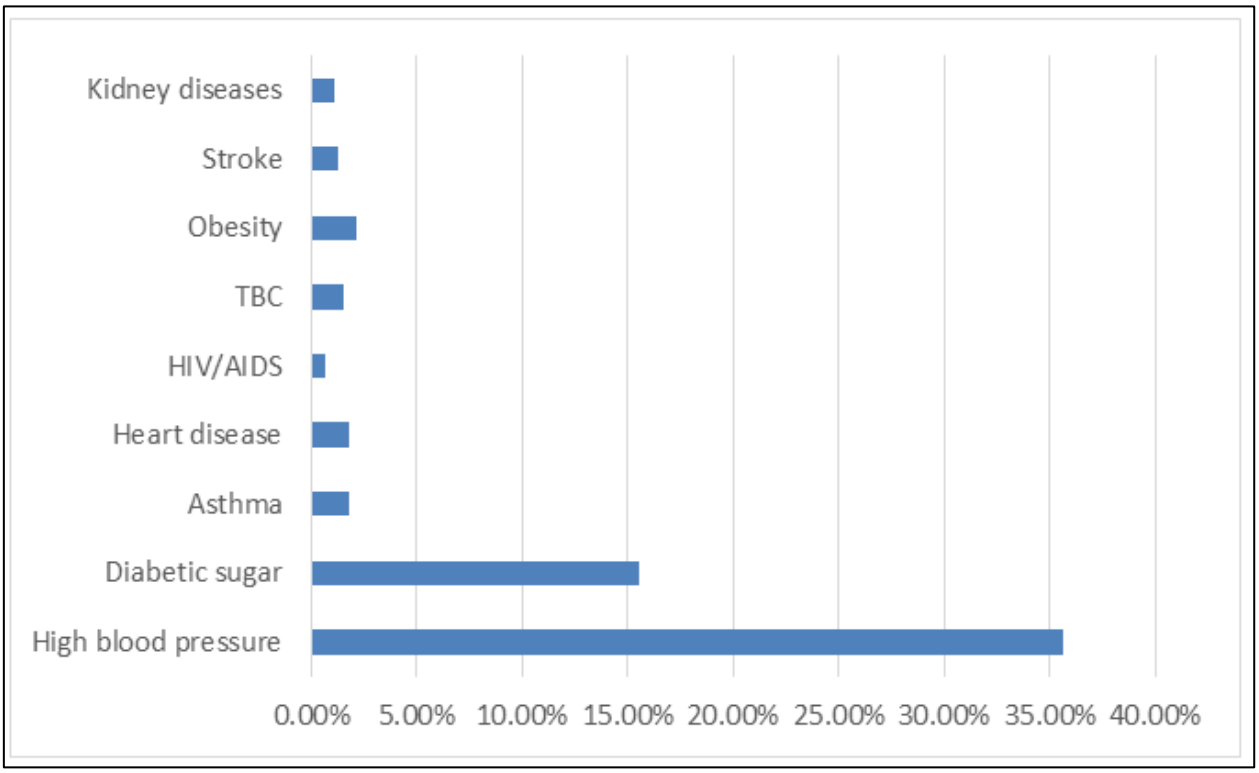

Chart 1: Breakdown of Participants by Medical History (n=713)

Symptoms presented at admission

It is noted that dyspnea (48%), fever (39%), cough (36%), physical asthenia (23%) and signs of respiratory distress (22%) are the symptoms most observed in study participants.

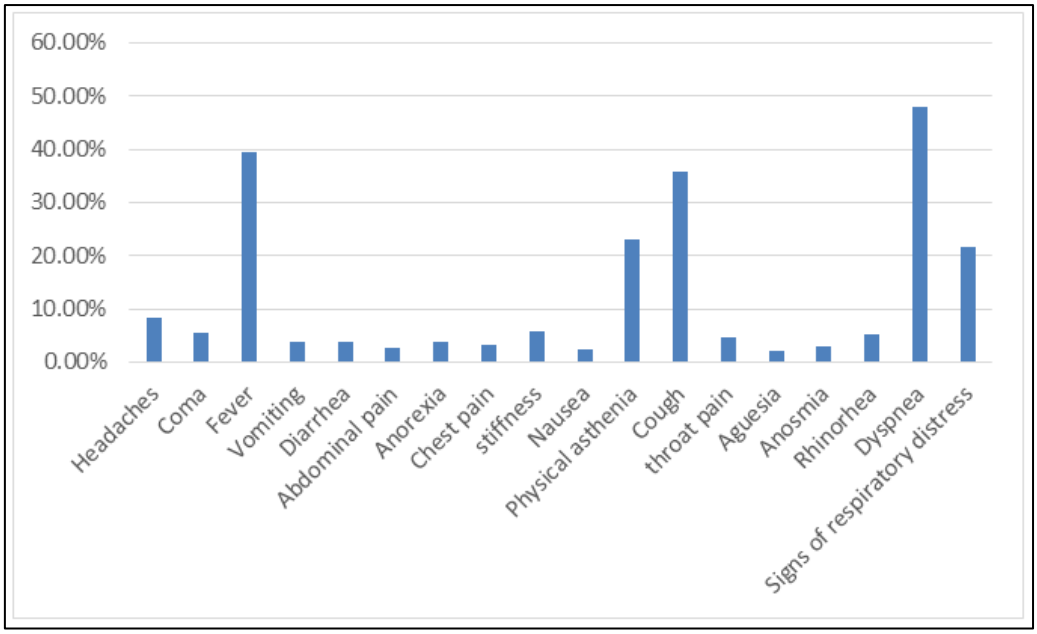

Chart 2: Symptoms Presented by Participants at Intake (n=713)

Result of the first test

We observe 64% of suspected cases tested positive at the first screening after admission to the CTC/CUK.

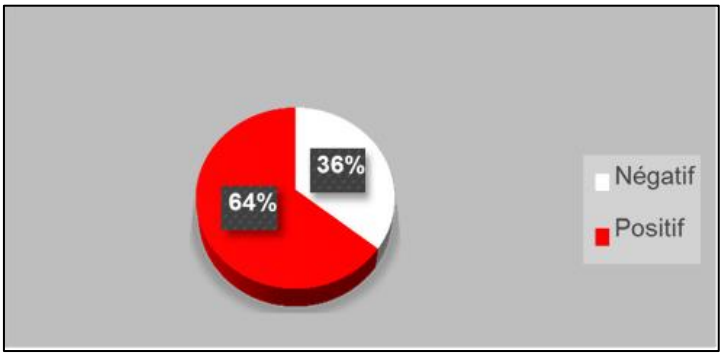

Chart 3: Result of the first test after admission to the CTC/CUK

2. Links between the independent variables and the dependent

Sociodemographic characteristic linked to early detection of covid-19

Table II shows a statistical link between age and early detection of COVID-19 (p = 0.020).

Table 2: Relationship between socio-demographic characteristics and COVID-19

Sociodemographic characteristics	Population	COVID-19	Prevalence	p-value
	713	**459**	**%**	
Age				
< 18 years old	17	8	47.1	Ref
18 - 64 years old	449	265	59.0	0.330
> 64 years old	***247***	***186***	***75.3***	***0.020****
Sex				
Feminine	263	166	63.1	0.627
Male	450	293	65.1	Ref

** significant difference at the 0.05 level*

Medical history related to early detection of COVID-19

Table III shows that there is a statistically significant link between hypertension (p < 0.001), diabetes mellitus (p < 0.001), heart disease (p = 0.039), obesity (p = 0.002) and the detection early Covid-19.

Table III: Relationship between medical history and COVID-19

Comorbidities	Population	COVID-19	Prevalence	p-value
	713	**459**	**%**	
hypertension	***254***	***198***	***78.0***	***< 0.001******
Diabetic sugar	***111***	***98***	***88.3***	***< 0.001******
Asthma	13	11	84.6	0.152
heart disease	***13***	***12***	***92.3***	***0.039****
HIV/AIDS	5	3	60.0	1,000
TBC	11	8	72.7	0.755
Obesity	***15***	***15***	***100.0***	***0.002****
stroke	9	8	88.9	0.169
Kidney diseases	8	5	62.5	1,000

** significant difference at 0.05*
*** significant difference at 0.01*
**** significant difference at 0.001*

Symptoms related to early detection of COVID-19

From Table IV we observe that the symptoms presented by the participants on admission and associated with the early detection of COVID-19 are: coma (p = 0.016), fever (p = 0.016), diarrhea (p = 0.039), stiffness (p = 0.002) and signs of respiratory distress (p < 0.001).

Table IV: Relationship between symptoms presented on admission and COVID-19

Comorbidities	Population	COVID-19	Prevalence	p-value
	713	**459**	**%**	
Headaches	60	34	56.7	0.206
Coma	***40***	***33***	***82.5***	***0.016***
Fever	***281***	***196***	***69.8***	***0.016***
Vomiting	26	18	69.2	0.680
Diarrhea	***27***	***12***	***44.4***	***0.039***
Abdominal pain	18	10	55.6	0.460
Anorexia	26	15	57.7	0.533
Chest pain	22	13	59.1	0.653
Aches	***41***	***17***	***41.5***	***0.002***
Nausea	17	9	52.9	0.318
Physical asthenia	164	106	64.6	1,000
Cough	255	170	66.7	0.370
throat pain	33	23	69.7	0.580
Ageusia	15	8	53.3	0.417
Anosmia	20	12	60.0	0.645
Rhinorrhea	38	30	78.9	0.057
Dyspnea	342	227	66.4	0.309
Signs of respiratory distress	***155***	***130***	***83.9***	***< 0.001***

** Significant difference at 0.05*
*** significant difference at 0.01*
**** significant difference at 0.001*

3. Identification of sociodemographic and clinical characteristics associated with early detection of COVID-19

It emerges from the multivariate analysis, the results of which are presented in Table V, that the sociodemographic and clinical characteristics associated with the early detection of COVID-19 are: advanced age (OR = 2.9 [1.03 – 8.29]; p = 0.043); arterial hypertension (OR = 1.7 [1.15 – 2.52]; p = 0.008); diabetes mellitus (OR = 3.66 [1.92 – 6.98]; p < 0.001); body aches (OR = 0.41 [0.20 – 0.83]; p = 0.014) as well as signs of respiratory distress (OR = 2.4 [1.44 – 3.87]; p < 0.001).

Table V: Determining characteristics of the COVID-19

Model coefficients – Result1 = positive				
95% confidence interval				
Predictor	**GOLD**	**lower terminal**	**upper terminal**	**p-value**
Ordinate at the origin	0.563	0.205	1.541	0.263
Age :				
18 - 64 years old/< 18 years old	1.553	0.562	4.289	0.396
> 64 years old/< 18 years old	***2.929***	***1.034***	***8.297***	***0.043****
hypertension :				
Yes No	***1.701***	***1.147***	***2.522***	***0.008****
Diabetic sugar :				
Yes No	***3.664***	***1.923***	***6.980***	***< .001****
Cardiopathy:				
Yes No	1.775	0.191	16.460	0.614
Obesity :				
Yes No	3.58e+6	0.000	Lower	0.979
Coma:				
Yes No	1,840	0.759	4.462	0.177
Fever :				
Yes No	1.295	0.903	1.858	0.160
Diarrhea :				
Yes No	0.484	0.211	1.111	0.087
Aches :				
Yes No	***0.411***	***0.203***	***0.834***	***0.014****
Signs of respiratory distress:				
Yes No	***2.360***	***1.439***	***3.870***	***< .001****

Note. The estimate represents the log odds of "Outcome1 = Positive" vs. "Result1 = Negative "
** Significant difference at 0.05*
*** significant difference at 0.01*
**** significant difference at 0.001*

DISCUSSION

This study aims to describe the epidemiological and clinical profile of COVID-19 at the University Clinics of Kinshasa during the period from 2020 to 2021. It also seeks to establish a relationship between this profile and early diagnosis.

Its main limitations are firstly, the fact of pulling the data into a secondary database. Second, we were only interested in exploring the links between epidemio-clinical characteristics and early detection of COVID-19 without experimenting the impact of each identified factor.

The results obtained after multivariate analysis based on the logistic regression model highlight five characteristics associated with the early detection of coronavirus disease.

They show that people aged at least sixty-five are almost three times more likely to test positive for COVID-19 on the first test after admission to the CTC compared to minors. We note that the median age of participants is fifty-nine. This corroborates the most recent results which show that age is a major risk factor for this disease [27-29]. The study by Liu *et al*., (2020), carried out in China, reveals that patients in the severe group were significantly older than those in the mild group [30].

In the present study, two antecedents are significantly associated with the early detection of COVID-19. These include arterial hypertension (OR = 1.7 [1.15 – 2.52]; p = 0.008) and diabetes mellitus (OR = 3.7 [1.92 – 6.98]; p < 0.001). Signs of respiratory distress on admission (OR = 2.4 [1.44–3.87]; p < 0.001) are also associated with this early detection of COVID-19.

In 2021, 68% of coronaviruses detected in Algeria had at least one related comorbidity where diabetes and hypertension were the most incriminated [29]. Similarly, the research of De Flines *et al.*, (2020), at the CHU Liège indicated that the reasons for a poorer prognosis of COVID-19 are multiple: the alteration of ventilatory mechanics, the frequent presence of comorbidities such as diabetes, hypertension or obstructive sleep apnea [31].

The result of this study conducted at the CTC/CUK, which differs from those of other studies going in the same direction, is the fact that body aches are revealed as a protective factor in the early detection of COVID-19 (OR = 0.41 [0.20 – 0.83]; p = 0.014). Indeed, the prevalence of this disease was 41.5% in

patients who presented this symptom. If among the minor signs of COVID-19, we also find body aches [32, 33], their appearance as a protector can likewise be justified in the particular context of Kinshasa as an area endemic to parasitic diseases, in particular malaria.

In a study carried out in Libreville, the authors concluded that the malaria-COVID-19 co-infection did not give rise to serious clinical forms [34]. Along the same lines, the study leads th on the benefit of ivermectin, which is a broad-spectrum antiparasitic, showed that it could have a protective role (since suggested in the US study) against COVID-19, confronted with the virological study [27]. This means that the fact of suffering from malaria obliges patients to take remedies generally consisting of antiparasitics. This would mean that the aches observed would be one of the manifestations of malaria for which the patient would already be taking an antimalarial before being taken to the Covid-19 treatment center. Furthermore, the study carried out by Hardy and Flori in 2021 demonstrates the uniqueness of the African situation in the face of COVID-19 [35].

CONCLUSION

This study shows that elderly patients, those with a history of hypertension, diabetes and signs of respiratory distress tested positive at the first screening as soon as they arrived at the CTC/CUK, unlike those with body aches. These cases would therefore require special attention from all staff of the COVID-19 response team for appropriate care.

What we already know about this topic

COVID-19 is a fast-spreading pandemic that has affected thousands of people around the world.

What this study adds

Certain features can help caregivers take precautions to reduce the spread of disease. Body aches, one of the major signs of malaria, is one of the signs that reduces the chance of early detection of COVID-19.

Protection of the rights of human and animal subjects

The authors declare that the work described did not involve experimentation on patients, subjects or animals.

Data Privacy

The authors declare that the article does not contain any personal data that could identify the participants in the study.

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Contribution and responsibility of the authors

All the authors contributed to the conduct of this research work and to the drafting of the manuscript. They all read and approved the final version.

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Declaration of conflict of interest: The authors declare that they have no conflict of interest.

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