



Perceptions of Population on COVID-19 in Lisala City (Mongala Province) and Perspective of Valorising Alternative Therapy in Democratic Republic of the Congo

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Authors' contributions

This work was carried out in collaboration among all authors. Authors CMF, PTM, VM and KNN designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors EML, CLI, NBB, CAM, WSL, MHR and RB managed the analyses of the study. Author CAM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To assess the population's knowledge of COVID-19 in order to guide future scientific research on the alternative management of this pandemic by Traditional Pharmacopoeia.

Place and Duration of Study: The study was undertaken in Lisala city (province of Mongala, Democratic Republic of the Congo), from 26 July to 10 August 2020.

Methodology: The surveys consisted in drafting a questionnaire beforehand to apprehend the knowledge of COVID-19 among the surrounding population. The interview was conducted in Lingala language using stratified proportional random sampling method.

Results: A total of 200 people were interviewed in Lisala city. The majority were men (63.0% vs. 37.0%). The majority of the respondents were aged between 26-45 years (51.5%). The majority of the respondents were Ngombe people (43.5%), followed by Budja (21.5%), Mongo (13.0%) and Lokele (7.0%) respectively. The best source of information on the pandemic in Lisala city was the radio (72.5%), followed by the multisectoral committee for the response to COVID-19 (17.5%), television (9.0%) and newspapers (1.5%). In the event of contamination, the therapeutic approach recommended by the population is modern medicine (76.5%) as opposed to 23.5% of respondents who prefer to resort to traditional medicine. The majority of respondents prefer health products other than vaccines (71.0% vs. 20.0%). The results of the present survey showed statistically significant difference (at the probability threshold of 0.05: $\chi^2 \geq 9.345$ and $p\text{-value} \leq 0.05$) and relationship (Cramer Pearson V value ≥ 0.216) between educational status of the respondents and variables like knowledge on the disease consequences, knowledge on the COVID-19 agent; remarks concerning communication strategy; the risk of infection from living with a COVID-19 infected people; the fear to be infected; the existence of COVID-19 support structures and the knowledge on barrier.

Conclusion and Suggestions: The population's dependence on Traditional Medicine is postulated as one of the protective factors for the population of sub-Saharan Africa against COVID-19. It is therefore desirable to develop a phytochemicals library and its virtual screening in order to partially validate the anti-corona-viral properties of medicinal plants. Computational chemistry and structural biology will thus help to develop sustainable alternative medicine using molecular modelling and dynamics as strategy for predicting bioactivity, pharmacokinetic and toxicological properties of natural products isolated from medicinal plants.

Keywords: Care, beta-coronavirus, COVID-19, traditional pharmacopoeia.

1. INTRODUCTION

Currently, the world is facing an unprecedented health crisis that could be described as a war against the invisible [1,2]. This is coronavirus disease 2019 (or COVID-19), which is an emerging infectious disease caused by a strain of coronavirus called SARS-CoV-2 [3]. SARS-CoV-2 is a virus strain that belongs to the beta coronavirus family and is genetically very similar to SARS-CoV-1, which was responsible for a pneumonia epidemic in November 2002 in Guangdong Province in China [3,4]. COVID-19 began in Wuhan in Hubei Province, People's Republic of China in December 2019 [4], and was declared a global pandemic by the World Health Organization (WHO) on 11 March [5], killing thousands of people worldwide to date. Thus, unlike other health crises of the same nature, the shock of COVID-19 has led to unprecedented social, economic and financial repercussions in the very short term on a global

scale in general and on individual countries in particular. As of 22 July 2020, the world has registered 15,250,804 confirmed cases and 623,897 deaths, with the African continent remaining the least affected part of the world compared to other continents, but the number of cases is still increasing [6]. Vulnerable and less developed countries, in particular, do not have the financial means to cope with the economic difficulties resulting from the crisis. Currently, published data on people's knowledge, attitudes and practices towards COVID-19 are limited in Africa and almost non-existent in the Democratic Republic of Congo (DRC) [7]. Therefore, it is important to conduct a survey to find out how care was provided in Lisala city where the COVID-19 cases have not yet reported before the present study in order to identify the factors that protected Africans from the SARS-CoV-2 virus. The objective of this study was to assess the knowledge and perceptions of COVID-19 by the population of the city of Lisala in Mongala

Province in order to guide future scientific research on this pandemic. Indeed, it is likely hypothesis that the population's dependence on Traditional Medicine [8,9] is one of factors that would have played a beneficial role in sub-Saharan Africa in the face of this pandemic.

2. MATERIALS AND METHODS

A preliminary investigation was carried out from 15 to 25 July 2020 with 50 persons, while final investigation took place from 26 July to 10 August 2020. At the end of the pre-investigation, approximately 85% of the respondents had knowledge of COVID-19. Thus, by setting the margin of error at 5%, the sample size calculated according to Dagnelie's relationship as described by Ngbolua [10] was estimated to 200 people. The study was carried out in accordance with the principles laid out in the Declaration of Helsinki (free consent of respondents, etc.). The stratified probability sampling method (stratified proportional random sampling method) was used. It consists of dividing the study area (City of Lisala, Fig.1) into two strata or communes (Bolikango and Mongala) and involving the same

number of respondents. For this study, 100 people were randomly interviewed in each commune respecting thus proportionality for the two sites of interview [11]. The interview was conducted in Lingala, the most widely spoken national language in Lisala city, and the survey forms designed in French were used as the basis for the interviews. After obtaining verbal informed consent, the respondents shared information anonymously, covering aspects relating to socio-demographic characteristics (gender, age, level of education, socio-cultural group and profession) as well as knowledge about COVID-19, its prevention and care. For data processing, a data entry mask was first designed using Microsoft Excel software package. This tool made it possible to record the data collected in the field. Descriptive statistical analyses and figures were made using the computer software package IBM SPSS Statistics 20 and Origin 8.5 Pro. Chi-square test was used to test for association between independent variable (demographics like educational status) and outcome variables (knowledge, attitude, and perception) at a 95% confidence interval with significant variables ($p < 0.05$).

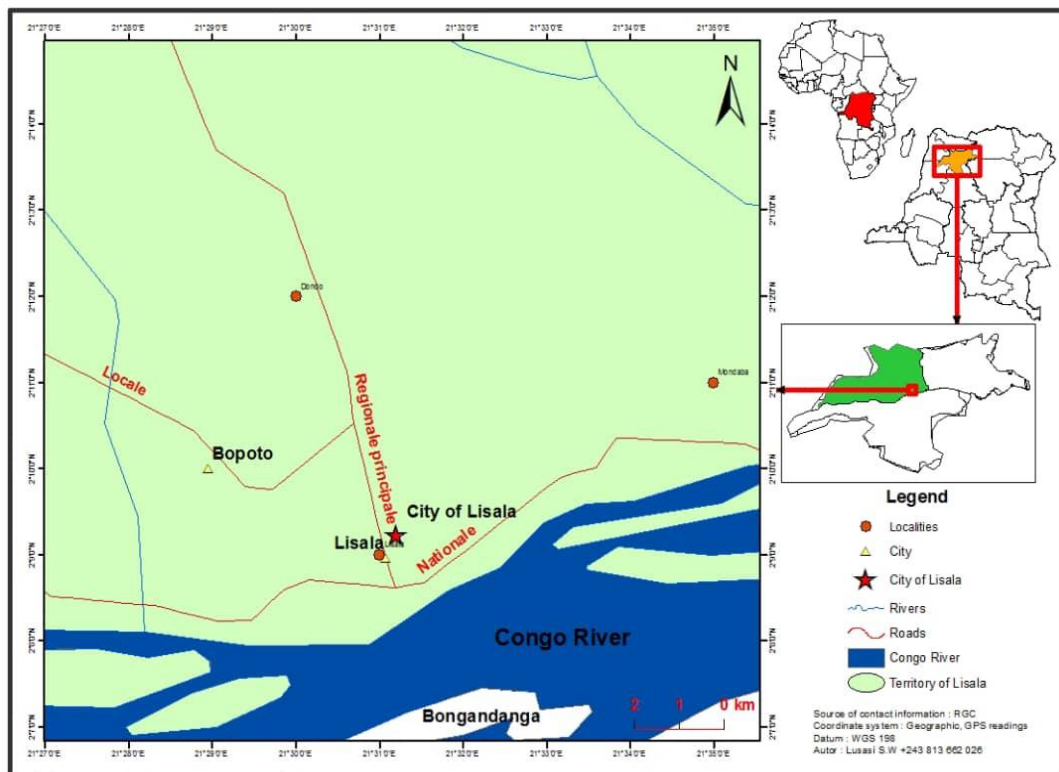


Fig.1. Localization of the survey site (Lisala city)

3. RESULTS AND DISCUSSION

The survey carried out in Lisala city in Mongala Province in Democratic Republic of the Congo involved 200 people, 126 of whom were men (63.0%) and 74 women (37.0%) (Results are presented in Table 1). It emerges from this table that the majority of respondents were aged between 26-45 years (or 51.5%), followed by those aged >45 years (or 20.0%), 18-25 years (or 17.0%) and <18 years (or 11.5%) respectively. Respondents with a university education represented 38.0%, followed respectively by those with secondary education (31.5%), primary education and illiterate (10.5% each). On the other hand, those with a medium level of education represented 9.5%. Students and pupils accounted for 30.0% of the respondents, followed by teachers (13.0%), farmers and traders (12.5% each) and medical personnel (11.0%), respectively, while the Ngombe were in the majority (43.5%), followed by the Budja (21.5%), Mongo (13.0%) and Lokele (7.0%), respectively. The other socio-cultural groups together represented 15.0% of all

respondents as presented in the Fig. 2. The high number of people with at least a state diploma i.e. literate (136 people or 69.5%) constitute an advantage permitting to validate the obtaining responses from respondents concerning knowledge about the disease and its prevention.

Table 2 shows the results of the knowledge, attitudes and perceptions of the population of lisala city regarding the covid-19 pandemic. It emerges from this table that almost the entire surveyed population has already heard of the disease (98 vs. 02%); 97.5% of respondents believe that COVID-19 has consequences on human health (compared to 3.5% of respondents who believe on the contrary that the disease has no effect). The majority of respondents believe that COVID-19 is a very serious disease (60.5%) caused by a cyto-pathogenic virus (87.5%). The best source of information about the pandemic in Lisala city was the radio (72.5%), followed respectively by sensitisation by the multisectoral committee for the response against COVID-19 (17.5%), television (9.0%) and finally newspapers (1.5%).

Table 1. Socio-demographic data of the respondents

Sociodemographic parameters	Staff	Frequency (%)
1. Sex		
Male	126	63.0
Female	74	37.0
Total	200	100.0
2. Age		
<18 yearold	23	11.5
18-25 yearold	34	17.0
26-45 yearold	103	51.5
> 45 yearold	40	20.0
Total	200	100.0
3. Education Level		
Primary	21	10.5
Medium	19	09.5
Secondary	63	31.5
Academic	76	38.0
Illiterate	21	10.5
Total	200	100.0
4. Occupation		
Farmers	25	12.5
Traders	25	12.5
Teachers	26	13.0
Pupils/Students	60	30.0
Medicalstaff	22	11.0
Others	42	21.0
Total	200	100.0

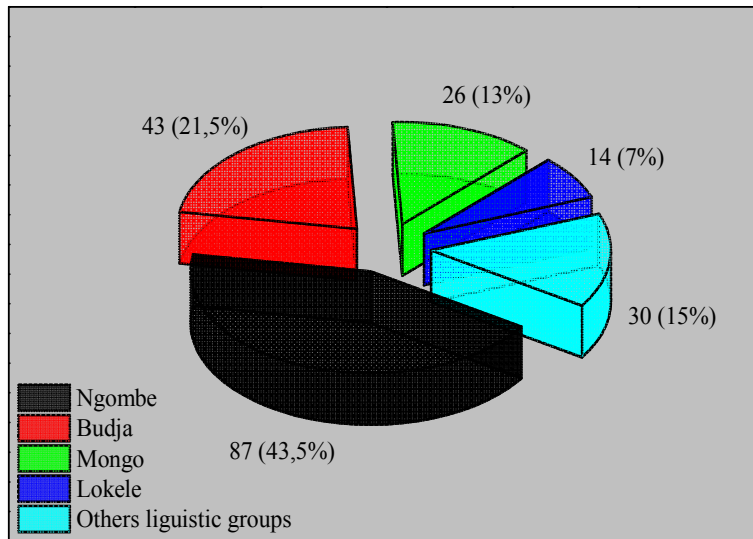


Fig. 2. Socio-cultural group

Table 2. Knowledge, attitudes and perceptions of the population of Lisala regarding the COVID-19 pandemic

No	Questions and answers	Frequency (%)
1.	Have you ever heard of Coronavirus or COVID -19? <input type="radio"/> Yes <input type="radio"/> No	196 (98) 04 (02)
2.	Does this disease have consequences? <input type="radio"/> Yes <input type="radio"/> No	195 (97.5) 05 (02.5)
3.	To which disease category do you classify COVID-19? <input type="radio"/> Very serious disease <input type="radio"/> Serious illness <input type="radio"/> Less serious disease	121 (60.5) 65 (32.5) 14 (07.0)
4.	According to your best knowledge, is COVID-19 responsible a Virus? <input type="radio"/> Yes <input type="radio"/> No	175 (87.5) 25 (12.5)
5.	How did you learn about the COVID-19 pandemic? <input type="radio"/> Radio <input type="radio"/> Television <input type="radio"/> Newspapers <input type="radio"/> Awareness-raising (multi-sectoral committee to respond to COVID-19)	145 (72.5) 18 (09.0) 3 (01.5) 34 (17.0)
6.	How do you appreciate the channel by which you were informed? <input type="radio"/> Very Good <input type="radio"/> Good <input type="radio"/> Fairly Good <input type="radio"/> Poor	103 (51.5) 50 (25.0) 13 (06.5) 34 (17.0)
7.	Is there a particular point to be made about this? <input type="radio"/> Yes <input type="radio"/> No	110 (55.0) 90 (45.0)
8.	According to your opinion, is this coronavirus pandemic deadly?	

No	Questions and answers	Frequency (%)
	○ Yes	193 (96.5)
	○ No	07 (03.5)
9.	Is there any risk of infection from living with a COVID-19 infected?	
	○ Yes	196 (98.0)
	○ No	04 (02.0)
10.	What risks are you aware of?	
	○ No risk	23 (11.5)
	○ Death	162 (81.0)
	○ Other risks	15 (07.5)
11.	Do you scared to be infected?	
	○ Yes	180 (90.0)
	○ No	20 (10.0)
12.	According to your knowledge, is there a COVID-19 treatment?	
	○ Yes	161 (80.5)
	○ No	39 (19.5)
13.	Are there structures in charge of raising awareness on prevention or protection methods?	
	○ Yes	173 (86.5)
	○ No	27 (13.5)
14.	Are these protection or prevention methods effective?	
	○ Yes	154 (77.0)
	○ No	46 (23.0)
15.	Do you know anything about barrier measures?	
	○ Yes	144 (72.0)
	○ No	56 (28.0)
16.	Have protective or preventive measures stopped the spread?	
	○ Yes	168 (84.0)
	○ No	32 (16)
17.	In the case of infection, what treatment do you recommend?	
	○ Traditional Medicine	47 (23.5)
	○ Modern Medicine	153 (76.5)
18.	If modern Medicine ?	
	○ Vaccine	58 (29.0)
	○ Other products (phyto-medicines, chloroquine and all derivatives, ACT)	142 (71.0)
19.	Are you convinced that this disease (pandemic) will be eradicated?	
	○ Yes	147 (73.5)
	○ No	53 (26.5)

These results indicate that the multisectoral committee for the response against COVID-19 worked better in Lisala than in Gbado-Lite city [12]. Our results also indicate that the channel through which information on COVID-19 is delivered is very good (51.5%), however, 25.0% of respondents think it is good, 17.0% think it is poor and 6.5% think it is fairly good. 55.0% of respondents think that the province should have a 24-hours radio station. Almost all the people interviewed (96.5%) believe that this virus is fatal (81.0% of respondents), leading to a climate of fear and psychosis among 90.0% of

respondents. 80.52% of respondents said that there is an anti-COVID-19 remedy. In Lisala city, there are structures in charge of raising awareness on means of prevention or protection against COVID-19 (according to 86.5% of respondents). It should be noted, however, that unlike the city of Gbado-Lite in Nord Ubangi Province [12], the means used are more effective in Lisala city in Mongala Province (77.0%). In addition, better knowledge about barrier gestures was observed in Gbado-Lite city (84.5%) than in Lisala city (72.0%). In contrast to Gbado-Lite city where 54.0% of the population believe that

protective or preventive measures have not stopped the spread of the disease, 84.0% of respondents in Lisala city are confident. The population is convinced that the pandemic will soon be eradicated worldwide (73.5% vs. 26.5%). In the event of virus infection, the therapeutic approach advocated by the population is modern medicine (76.5%) as opposed to 23.5% of respondents who prefer to resort to Traditional Medicine. The majority of respondents prefer health products other than vaccines (71.0% vs. 20.0%). These are therefore synthetic medicines with known antimalarial properties. Indeed, recent studies have shown that chloroquine (a quinoline ring-based antimalarial drug), whose anticoronaviral effect had already been demonstrated on SARS-CoV-2, has aroused renewed interest based on the results of clinical studies carried out in China and France [13,14]. However, several drug agencies have warned of side effects related to the use of chloroquine and derivative in clinical use. Indeed, despite the fact that the short-term hydroxychloroquine treatment is safe, the addition of azithromycin may induce heart failure and cardiovascular mortality [15-17]. It is therefore necessary to develop new strategy consisting by the replacement of chloroquine-based antiCOVID-19 treatment regimen one by chloroquine-like plants in Africa, where more than 80% of the population depend on Traditional Medicine [8,9]. These are medicinal plants displaying both good antiplasmodial activity and high therapeutic index (no toxic plants species). The use of medicinal plants for managing COVID-19 may be an adapted strategy for developing countries particularly DRC rural zones who lack basic primary medical care like oxygen therapy and supports.

In addition, since the emergence of this disease (COVID-19), a low mortality rate has been observed in regions where malaria is endemic (particularly in Africa) and subject to the untimely use of antimalarial drugs of synthetic and/or natural origin [18,19]. This low incidence of COVID-19 observed to date in malaria endemic regions could be justified by the cross-immunity that the parasite *Plasmodium spp* would confer to indigenous population. Indeed, epidemiological studies indicate that the COVID-19 frequency is high in regions of the world where malaria is (or was) eradicated, but low in malaria-endemic regions. This negative correlation between COVID-19 and malaria is very strong between Africa and other continents, including Europe and North America [20].

However, cross-immunity alone cannot explain the low COVID-19 incidence in Africa, another important argument being the large-scale use of antimalarial drugs, which have anti-SARS-CoV-2 properties [21,22]. It seems that SARSCoV-2 (COVID-19 virus) behaves like HIV (human immuno-dependent virus) by attacking T-cells [23] and like *Plasmodium spp* by destroying haemoglobin, which causes hypoxia in the patient [24]. The disease is clinically characterised by coughing, dyspnoea or respiratory discomfort, etc. [24]. Thus, three criteria can be used to select medicinal plants of potential interest as a source of antiCOVID-19 agents. These include pharmacological activity against respiratory diseases (influenza, colds, pneumonia, bronchitis, asthma, etc.), antiplasmodial activity (chloroquine-like plants) and antiviral and/or immunostimulant activity. In addition to these three criteria, blind screening for secondary metabolites of plants is also performed. The potential role of medicinal plants in the inhibition of the COVID-19 virus has been demonstrated by the molecular docking technique [4]. Also, the antiviral and immunomodulatory activity of medicinal plants is well established [25-27]. This strategy can be used to screen plant biodiversity (via molecular modelling) for anti-coronaviral potential. To this end, the medicinal plants of the DRC constitute a research opportunity for the development of phyto-medicines for the alternative treatment of COVID-19 [28].

According to the Multi-sectorial Committee for the Response to the Pandemic of the COVID-19 in Democratic Republic of the Congo (DRC), the epidemiological situation on 12th February 2021 shows that since the start of the epidemic declared on 10th March 2020 in the DRC, the cumulative number of cases is 24,240. In total there have been 693 deaths and 15,217 people cured. The city province of Kinshasa is the most affected with 18,859 cases, but no cases have been reported to date in Lisala city in the province of Mongala where the present study was carried out [29]. Others factors such as personal protective equipment (mask) and the level of access could also explain this situation. The results of the present survey showed statistically significant difference (at the probability threshold of 0.05) and relationship between educational status of the respondents and variables like knowledge on the disease consequences ($\chi^2=15.059$; dof=4; p-value=0.005 and Cramer Pearson V value: 0.274), knowledge on the COVID-19 agent ($\chi^2=37.262$; dof=4; p-

value=0.000 and Cramer Pearson V value: 0.432); remarks concerning communication strategy ($\chi^2=23.615$; dof=4; p-value=0.000 and Cramer Pearson V value: 0.344); the risk of infection from living with a COVID-19 infected people ($\chi^2=15.307$; dof=8; p-value=0.053 and Cramer Pearson V value: 0.277); the fear to be infected ($\chi^2=9.345$; dof=4; p-value=0.053 and Cramer Pearson V value: 0.216); the existence of COVID-19 support structures ($\chi^2=18.214$; dof=4; p-value=0.001 and Cramer Pearson V value: 0.302); the knowledge on barrier measures ($\chi^2=38.215$; dof=4; p-value=0.000 and Cramer Pearson V value: 0.437).

By comparing this study with that of Hager et al. (2020) [30] about knowledge, attitude, and perceptions of Egyptians and Nigerian towards the COVID-19 pandemic, it can be noted that in Lisala city, the population also showed good knowledge about the disease (COVID-19) undoubtedly because of its media coverage. This is not the case in the former province of Katanga (DRC) during a survey on the COVID-19 pandemic carried out in ten public markets in three main cities (Kolwezi, Likasi and Lubumbashi) [31]; This difference would be due to the fact that our respondents were predominantly literate. This trend was also observed in Gbado-Lite city in Nord-Ubangi Province [12], which also confirmed the possibility of using medicinal plants against COVID-19 when necessary. Indeed, it is well established that some medicinal plants have anti-malarial properties [8,9] and are therefore considered chloroquine like-plants in cross-treatment of COVID-19.

4. CONCLUSION

In this study, we conducted a survey to assess the level of knowledge of the population of the town of Lisala in the Democratic Republic of Congo about COVID-19. Almost the entire population surveyed had heard of the disease (98 vs. 02%); the best source of information about the pandemic in Lisala was the radio (72.5%), followed respectively by awareness rising by the multisectoral committee for the response against COVID-19. In the event of contamination, the therapeutic approach recommended by the population is modern medicine (76.5%) as opposed to 23.5% of respondents who prefer to resort to Traditional Medicine. The majority of respondents prefer health products other than vaccines (71.0% vs. 20.0%).

It should be noted that the dependence of the majority of the population on Traditional Medicine would be the protective factor for the population of sub-Saharan Africa with regard to COVID-19. It is therefore desirable to develop a phytochemical library and its virtual screening in order to partially validate the anti-corona-viral properties of medicinal plants.

5. SUGGESTIONS

Computational chemistry and structural biology will thus help to develop sustainable alternative medicine using molecular modelling and dynamics as strategy for predicting bioactivity, pharmacokinetic and toxicological properties of natural products isolated from medicinal plants.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

The study received approbation from institutional ethic committee (CIE) of the Gbado-Lite University (Ref. n° UNIGBA/CIE/0010). In addition to not exposing the participants, they did not gain any advantage from participating in the study, voluntarily.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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