

Practice of Barrier Measures against COVID-19 Among Diabetic People Followed at Departmental University Hospital Center Ouémé-Plateau, Benin, in 2021

Yèssito Corine Nadège Houehanou¹, Armand Wanvoègbe², Akouodé Thomas Hounto¹, Luc Béhanzin¹, Maurice Agonnoudé¹, David Houéto¹, Thierry Adoukonou¹

¹National School of Public Health (ENATSE), University of Parakou, Parakou, Benin

²Department of Internal Medicine, University Departmental Hospital Ouéme-Plateau, Porto-Novo, Benin

Email: yessito_fr@yahoo.fr

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Abstract

Introduction: COVID-19 is a pandemic disease caused by the coronavirus SARS-COV2 appeared in China in 2019. The aim of the study was to evaluate the practice of barrier measures against COVID-19 and to identify associated factors among diabetics followed at Departmental University Hospital Center Ouémé-Plateau, Benin, in 2021. **Methods:** This was a cross-sectional study conducted from June to August 2021, including diabetics aged 18 and over, hospitalized or received for medical visits in the department of medicine at the target hospital. Data were collected during an interview with each participant thanks to a questionnaire. “Good practice” was defined as regular practice of at least two of three barrier measures: hand washing, physical distancing and mask-wearing. **Results:** A total of 110 diabetics were included with a female predominance (55.5%) and a mean age of 57 ± 11.3 years. Among them, 89.1% washed their hands, 41.8% respected physical distancing and 12.7% wore a mask. The proportion of good practice was 47.3%. Only 5 practiced the three barrier measures. Only age group was associated with good practice. **Conclusion:** The study showed a low proportion of good practice of barrier measures against COVID-19 among diabetic people surveyed. It is important to continue the action for COVID-19 prevention among diabetic people in the targeted hospital and in other hospitals in Benin.

Keywords

COVID-19, Barrier Measures, Practice, Diabetic People, Benin

1. Introduction

COVID-19 has become a pandemic and has been declared a public health emergency of international concern by the World Health Organization in 2020 [1]. In May 2021, 153 million cumulative cases of COVID-19 and 3.2 million deaths globally were recorded [2]. In Benin, around 7,900 cases and 100 deaths were recorded [3].

Most people infected with the virus are asymptomatic or have mild to moderate respiratory illness with spontaneous recovery or symptomatic treatment. However, some people can present severe forms of COVID-19 such as people aged over 65 and those suffering from cardiovascular disease, diabetes, chronic respiratory disease, or cancer [4]. Indeed, people with diabetes who contract COVID-19 are more likely to have complications and to die compared to those who do not have diabetes [5].

COVID-19 has been at the center of concern in almost all countries, particularly in Africa, and generated serious socio-economic consequences. Primary prevention was based initially on compliance with barrier measures then combined with vaccination. The main barrier measures are the hand washing with a hydroalcoholic product or with soap and water, the physical distancing of at least one meter and the correct wearing of a mask. These barrier measures have a capital importance in periods of outbreak or every time for people at risk of serious forms. The level of compliance to barrier measures varies because it depends on good information and awareness of the disease. A literature review that considered 28 African studies showed that 15 of them reported good practices regarding COVID-19 prevention [6]. The proportion of practice of barrier measures varied depending on the sample from 15.6% among traditional and religious leaders in Ethiopia [7] to 90.0% among people infected with HIV in Rwanda [8]. In people suffering from chronic conditions, the proportions found during studies in different regions of the world varied from 50% to 84% [9] [10] [11]. In Benin, studies had also shown a high proportion of practice of barrier measures against COVID-19 in general population [12] [13]. But there is not enough data among diabetics that can contribute to planning specific measures to improve prevention for this vulnerable target population.

The study was carried out to fill this need for information. The aim of the study was to evaluate the practice of barrier measures against COVID-19 and to identify associated factors among diabetics followed at Departmental University Hospital Ouémé-Plateau, Benin in 2021.

2. Methods

This was a cross-sectional study conducted in the medicine department of the Departmental University Hospital Center Ouémé-Plateau (CHUD-O/P). Diabetics admitted for consultation or hospitalization in the medicine department of the targeted hospital during the defined period and who gave their consent to

participate were included. People unable to answer the questions due to unavailability, physical or mental incapacity were not included.

A non-random convenience sampling technique was used. All diabetics meeting the inclusion criteria during the predefined data collection period were selected. This data collection took place from June 28 to August 24, 2021. An individual face-to-face interview between the investigator and each diabetic people took place using a questionnaire designed in electronic version with the application Kobo collect. Sociodemographic, sociocultural, socioeconomic, knowledge, attitudes, and practices information regarding COVID-19 was collected. Knowledge included the cause, mode of transmission, severity in people suffering from diabetes, symptoms and prevention. The attitudes concerned the belief in the existence of COVID-19, the appreciation of COVID-19 as an important health problem for the community, the appreciation of decision of compulsory mask wearing in public spaces, and the appreciation of the importance of hand washing for prevention. The practices focused on respecting barrier measures and vaccination against COVID-19. Regarding the practices of barrier measures, for each component, it was asking for participant to choose one of the responses following the frequency of the practice: “never, sometimes or regularly”.

The dependent variable was practice of barrier measures against COVID-19. It was assessed by practice of wearing a mask, washing hands and physical distancing of at least one meter. The regular practice of each measure was rated “1” and other response “0”. A maximal score was 3. Good practice of barrier measures was defined by a score greater than or equal to 2.

Knowledge and attitudes were considered as independent variables. Knowledge was assessed by 8 questions. The expected response was scored “1” and the opposite “0”. The level of knowledge was classified as “good” for a score greater than or equal to 6. Attitudes were assessed by 4 questions and classified as “good” for a score greater than or equal to 3.

Data analysis was carried out using R software. Quantitative variables were described by means \pm standard deviation and qualitative variables by proportions. The median and inter-quartile range were used for the description of quantitative variables that do not follow a normal distribution.

The factors associated with practice of barrier measures were identified using a multivariable binary logistic regression. We used a backward stepwise method. The independent variables associated with practice of barrier measures at the threshold of p-value less than 0.20 were introduced into the initial model. The significance threshold used for the comparisons was a p-value less than 0.05.

3. Results

A total of 115 diabetic were invited to participated. Among them 5 refused and 110 were included. The mean age was 57 ± 11.3 years with extremes of 23 and 75 years. The sociodemographic and socioeconomic characteristics of the sample

are presented in **Table 1**. The age group between 40 - 60 was the most represented (42.7%); A female predominance (55.5%) was noted. People aged 40 to 60 accounted for approximately half of the sample. The vast majority (92.7%) were married. More than a third (35.5%) had no level of official instruction. Traders and retailers were the most numerous (34.5%). Nearly half (49.1%) had a monthly income of less than 80 USD. The main sources of information about COVID-19 were social networks (51.8%). The vast majority (89.1%) lived in Porto-Novo. Overall, 84.5% had good knowledge and 47.3% good attitudes regarding COVID-19.

Table 1. Characteristics of the sample and practice of barrier measures (diabetic people, Ouémé Plateau Hospital, Benin in 2021).

	Number	Frequency %
Age range (years)		
<40	8	7.3
40 - 60	47	42.7
≥60	55	50.0
sex		
Men	49	44.5
Women	61	55.5
Marital Status		
Married	102	92.7
Other	8	7.3
Level of school education		
None	39	35.5
Primary	13	11.8
Secondary	22	20.0
University	36	32.7
Monthly income (USD)		
<80	54	49.1
80 - 160	35	31.8
≥160	21	19.1
Occupation		
Craftsman/laborer	33	30.0
Trader/retailer	38	34.5
State worker	8	7.3
Housewife	24	21.8
Retired/other	7	6.4
Area of residence		
Ouémé	98	89.1
Other	12	10.9
Source of information		
Relatives/other	33	30.0
Media	20	18.2
Social network	57	51.8
Knowledge regarding COVID-19		
Bad	17	15.5
Good	93	84.5

Continued

Attitude regarding COVID-19		
Bad	58	52.7
Good	52	47.3
Practice of barrier measures		
Bad	59	53.6
Good	51	46.4

Table 2. Detailed information on Knowledge, attitudes and practice of barrier measures (diabetic people, Ouémé Plateau Hospital, Benin in 2021).

	Number	Frequency (%)
Knowledge		
Life-threatening COVID-19	107	97.3
Severity of COVID-19 in diabetic people	96	87.3
Origin of COVID-19 (Coronavirus)	78	70.9
Main mode of transmission	109	99.1
Risk of contracting COVID-19 in hospital	96	87.3
Existence of asymptomatic cases	56	50.9
Barrier measures	110	100.0
Existence of vaccine	85	77.3
Attitudes		
Belief in the natural existence of the coronavirus	14	12.7
Appreciation of COVID-19 as an important health problem	63	57.3
Appreciation hand washing as important	110	100.0
Appreciation decision of compulsory mask wearing in public spaces as good	73	66.4
Barrier measures practice		
Physical distancing	46	41.8
Maskwearing	14	12.7
Hand washing	92	83.6

The detailed information on knowledge, attitude and practice of barrier measures is presented in **Table 2**. Almost all (97.3%) said that COVID-19 was a serious illness. The majority (87.3%) recognized that COVID-19 could be more serious in diabetic people. Most of them (70.9%) knew that it was caused by the coronavirus and almost all (99.3%) knew the main mode of COVID-19 transmission. The majority (87.3) knew that COVID-19 could be contracted at hospital. Approximately half (50.9%) knew that it can be asymptomatic. All diabetic people knew the barrier measures recommended for the prevention of COVID-19 and 77.3% were informed of the existence of vaccines.

Regarding attitudes, 12.7% believed in the natural occurrence of coronavirus while the others believed that it was created in the laboratory. More than half (57.3%) agreed that COVID-19 is an important health problem for the commu-

nity. All diabetic people agreed that hand washing is important for prevention. Most of them (66.4%) thought that the compulsory mask wearing during the period of COVID-19 outbreaks was a good decision.

On the other hand, more than a third of them (33.6%) declared having contracted COVID-19 while less than a tenth (6.4%) was vaccinated.

Among the sample, less than half (46.4%) of diabetic people respected at least two barrier measures out of three and were classified in the category of “good practice” (Table 1). Only 5 diabetic people respected the three measures. The detailed information regarding practice of barrier measures is presented in Table 2. The vast majority (83.6%) regularly washed their hands with soap and water. Only 41.8% respected physical distancing and 12.7% wore a mask, regularly.

Only age group was significantly associated with the practice of the barrier measures (Table 3). Diabetic people aged 60 and over had a higher chance of good practices of barrier measures compared with those aged under 60 (aOR = 2.89, 95% CI [1.32 - 6.34]; $p = 0.008$). The levels of knowledge and attitudes were not significantly associated (Table 3).

Table 3. Link between characteristics of the sample and practice of barrier measures, univariable and multivariable analysis (diabetic people, Ouémé Plateau Hospital, Benin in 2021).

	Practice of barrier measures							
	Good	Bad	cOR	95%CI	p	aOR	95%CI	p
Age range (years)								
<60	18	37	1					
≥60	33	22	3.08	1.41 - 6.72	0.007	2.89	1.32 - 6.34	0.008
Sex								
Men	21	28	1			--	--	--
Women	30	31	1.29	0.61 - 2.75	0.509	--	--	--
Marital Status								
Married	48	54	1					
Other	3	5	1.48	0.34 - 6.53	0.602	--	--	--
Level of school education								
None	19	20	1	--	--	--	--	--
Primary	7	6	1.23	0.32 - 4.15	0.749			
Secondary	7	15	0.49	0.16 - 1.45	0.203			
University	18	18	1.18	0.48 - 2.91	0.725			
Monthly income (USD)								
<80	28	26	1			--	--	--
80 - 160	16	19	0.78	0.33 - 1.83	0.572	0.70	0.29 - 1.69	0.427
≥160	7	14	0.46	0.16 - 1.33	0.153	0.42	0.14 - 1.24	0.116
Occupation								
Craftsman/laborer								
Trader/retailer	14	19	1					
Trader/retailer	19	19	1.36	0.53 - 3.47	0.524	--	--	--
State worker	4	4	1.36	0.29 - 6.38	0.699	--	--	--
Housewife	10	14	0.97	0.33 - 2.81	0.954	--	--	--
Retired/Other	4	3	1.81	0.35 - 9.41	0.481	--	--	--
Source of information								
Relative/other	14	19	1					
Media	7	13	0.73	0.23 - 2.30	0.593	--	--	--

Continued

Social network	30	27	1.51	0.64 - 3.58	0.352	--	--	--
Knowledge regarding COVID-19								
Bad	6	11	1					
Good	45	48	1.72	0.59 - 5.03	0.323	--	--	--
Attitude regarding COVID-19								
Bad	26	32	1					
Good	25	27	1.14	0.54 - 2.42	0.733	--	--	--

cOR: crude Odd Ratio; aOR: adjusted Odd Ratio; 95%CI: 95% Confidence Interval.

4. Discussion

This study was carried out in a predominantly female sample with an average age of 57 years. The social networks were the main sources of information. The study showed that less than half of the diabetic people included in the Departmental University Hospital Center Ouémé-Plateau had good practice of barrier measures against COVID-19. Only age was associated with good the good practice. Neither knowledge nor attitudes were associated.

The average age was included in the range of average age between 45 and 58 years old, noted in other studies on the similar topics among diabetics [9] [11] [14] [15]. The female predominance varies according to the studies. This female predominance was previously noted in some previous studies [14] [15] while other studies have shown the opposite [9] [11].

The main source of information for people with diabetes on COVID-19 was the social networks (51.8%). This observation differs from that made by Ahmed *et al.* in Sudan in 2022. Ahmed *et al.* noted that the media (radio and/or television) was the main source of information among diabetic people in their sample (89.6%). These differences could be explained by the high frequency of social networks use in Benin by the population, including people with no instruction.

Regarding the practice of barrier measures, the proportion of diabetic people regularly wearing a mask in public was very low (12.7%). Most of the diabetic people probably did not wear masks outside in situation of promiscuity apart from where wearing a mask was compulsory such as healthcare services. Negligence, breathing difficulties, stock shortages in pharmacies or bad attitudes could explain the failure to wear a mask regularly. It should be noted that according to a literature review in Africa, the proportion of mask wearing in the general population in sub-Saharan Africa during outbreaks of COVID-19 was significantly higher [6]. Among diabetic people, higher proportions were also reported in Sudan in 2022 (89.6%) and Kuwait in 2023 (70.9%) [11] [14].

Less than half of diabetic people practiced the physical distancing. These results are contrary to that would be expected taking into account the government measures in 2020 and 2021 in Benin. Authorities recommend to avoid gatherings or greetings with hand contact, and encourage physical distancing. Other authors have reported higher proportions of the practice of the physical distancing in diabetic people or in people suffering from chronic diseases as ex-

pected. In Ethiopia Addis *et al.* had reported in 2021 a proportion of 81.6% and in Kuwait, Alsaleh *et al.* reported in 2023 a proportion of 70.2% [11] [16]. The poor practice of physical distancing could be partially explained by cultural factors in Benin such as customary hand greetings and closeness between people. It could also be related to poor perception of the disease, although this perception was not statistically associated with “good practices” in this study.

Hand washing with soap and water was practiced by the vast majority. This observation is consistent with the results in the general population in Africa [6] and in studies in diabetic people [11] [14]. This could be explained by the fact that hand washing was already promoted for hygiene before the pandemic.

Globally, less than half of diabetic people in our study had a “good practice” of barrier measures. This proportion is low compared to previous results in other studies carried out in diabetics [11] [14].

Only age group was associated with good practice of barrier measures in this study probably due to the small sample size which may lead to a lack of power during comparisons. Other studies have identified associated factors. Addis *et al.* reported in 2022, in Ethiopia, found an association between male gender and compliance with the three barrier measures in people with chronic diseases [16]. The level of education and health literacy regarding COVID-19 should theoretically influence the practice of barrier measures. Saeed *et al.* noted in their sample of people suffering from chronic illnesses, India in 2021 that the level of education was positively associated with the practice of the barrier measures [10]. In a study conducted in 2020 in Senegal in the general population, Leye *et al.* noted that the level of knowledge was positively associated with the practice of the barrier measures [17]. Melesie *et al.* made the same observation in 2020 [9]. The media was the source of information associated with the practice of the barrier measures according to Ahmed *et al.*, who conducted a similar study among diabetic people in 2022 in Sudan [14]. This association was not found in our study probably because of the small sample size.

The low proportion of good practices of barrier measures against COVID-19 in this study highlights that diabetics must be made more aware of the prevention of COVID-19. Indeed, the prevention of COVID-19 remains relevant even if the incidence and the severity of symptomatic cases have decreased. Empirically, we see a gradual reduction of compliance with the barrier measures. Even though COVID-19 is no longer a public health emergency of international concern, it is appropriate to continue the communication activities for the prevention of COVID-19 among the population, particularly among people with comorbidities and vulnerable to COVID-19 as diabetic people. For diabetic people, COVID-19 prevention can be integrated into therapeutic education content during outbreaks.

Regarding the limitations of the study, a selection bias could be discussed. Few cases of refusal to participate in the survey were noted. As this is a sensitive and current subject, refusals linked to the poor practices could lead to an underestimate the poor practices. However, this underestimate would be unlikely because

most of the cases of refusal recorded were for physical reasons (bed rest) or unavailability. It is important to note that we used a non-random convenience sampling technique affecting the generalizability of the findings. We cannot generalize the findings for all diabetic people followed in the targeted hospital nor for diabetic people living in Porto-Novo in Benin.

Information bias could be introduced due to erroneous declarations or errors in reporting information by investigators. To minimize these information biases, interviewers were trained and the questionnaire was administered in the local language for diabetic people who did not understand French. Also, during collection, the database was subject to a consistency check. The study's cross-sectional design, would have limited its ability to establish causality if associated factors had been identified.

No associated factor was found in this probably due to lack of statistical power related to the small sample size.

Regarding the strengths of the study, to our knowledge, this is the first study in Benin on the practices of barrier measures against COVID-19 in diabetic people. We report data which could contribute to implement actions to prevent COVID-19 among diabetic people followed at the targeted hospital and among other diabetic people with similar characteristics in Benin.

5. Conclusion

This study shows that only half of the diabetic people who participated at the Ouémé-Plateau departmental hospital had good compliance with barrier measures. Only Age was statistically associated with good adherence. It is appropriate to continue communication actions for the prevention of COVID-19 towards the population, in particular people with diabetes, which can be integrated into their therapeutic education content during outbreaks. It would be interesting to conduct specific studies with large size and analytical design to identify associated factors to adherence of barrier measures against COVID-19 among diabetic people.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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