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COVID-19 vaccine hesitancy among haemodialysis patients in Burkina Faso: determinants and implications for future strategies

Patrice ZOEHINGA

zopatrice@gmail.com

Lédea Bernard Ouédraogo University

Yeremadé Juste BONZI

Joseph KI-ZERBO University

Oumar SOURABIE

Nazi Boni University

Dagnagnéwendé Dieudonné KABORE

Joseph KI-ZERBO University

Dramane OUEDRAOGO

Lédea Bernard Ouédraogo University

Siébou HIEN

Lédea Bernard Ouédraogo University

Moussa SOME

Yalgado Ouédraogo University Hospital

Larissa Axelle Grace BASSOLE

Saint Camille Medical Centre

Gérard COULIBALY

Joseph KI-ZERBO University

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Abstract

Background

Haemodialysis patients are highly vulnerable to infections, making vaccination vital. However, vaccine hesitancy hinders immunization campaigns. Evaluating COVID-19 vaccination experiences in this population helps measure hesitancy levels and provides key lessons to improve future vaccination strategies for better clinical outcomes and public health protection. The aim of this study was to estimate the prevalence of COVID-19 vaccine hesitancy and to identify its determinants among haemodialysis patients in Burkina Faso. The findings aim to guide future vaccination strategies for this vulnerable population.

Methods

A cross-sectional study was conducted from 13 to 19 July 2021 at the haemodialysis centre of the Yalgado Ouédraogo University Hospital. The determinants of vaccine hesitancy were explored using multiple logistic regression.

Results

A total of 142 patients took part in the study, with a median age of 42 years (IQR:32–52) and a sex ratio of 1.4. The prevalence of vaccine hesitancy was 55.6% (95%CI: 47–63.9). The determinants of vaccine hesitancy were female gender (aOR: 2.87;95%CI: 1.25–6.58); age < 60 years (aOR: 4.26; 95%CI: 1.18–15.31) and fear of vaccination (aOR: 4.76;95%CI:2.14–10.56).

Conclusion

Our study identified fear of vaccination as the main modifiable determinant of vaccine hesitancy among haemodialysis patients. Therefore, with a view to improving future vaccination campaigns for haemodialysis patients, the most effective interventions are likely to be those that incorporate communication strategies to alleviate fear of vaccination, involving healthcare teams.

1. Introduction

In recent years, the emergence and re-emergence of infectious diseases (SARS-CoV, Ebola, mpox, etc.) have highlighted the vulnerability of healthcare systems to infectious diseases. These events have placed vaccination back at the heart of strategies for prevention and preparedness for future health crises. Indeed, vaccination is one of the most effective public health interventions for reducing the burden of infectious diseases [1]. Patients with renal failure, particularly those undergoing haemodialysis, are at increased risk of infection. This susceptibility to infections is due, on the one hand,

to the immune deficiency caused by chronic kidney disease and its treatments, and, on the other hand, to premature immune ageing [2]. In light of this risk of infection, vaccination is important for this population in order to reduce the incidence of severe infections, hospitalisations and deaths [3]. Experience with the novel coronavirus (COVID-19) has shown high transmissibility amongst patients with renal failure [4, 5], with a high prevalence of severe cases and high case fatality rates [5, 6]. This pandemic has provided a context for evaluating vaccination strategies in this population. From the outset of the COVID-19 vaccination programme, patients with renal failure, including those on haemodialysis, were prioritised. However, this experience has shown that, beyond vaccine availability, vaccine hesitancy emerged as a major obstacle to the success of vaccination campaigns, both in the general population and in specific groups such as those on haemodialysis [8–11]. Vaccine hesitancy is defined by the World Health Organisation's (WHO) Strategic Advisory Group of Experts (SAGE) as a delay in accepting or a refusal of vaccination despite the availability of services [12]. It is a complex, dynamic and context-dependent phenomenon, considered by the WHO to be a priority threat to global health [13]

Several studies have explored vaccine hesitancy among haemodialysis patients in Europe, North America, the Maghreb, Southern Africa and Asia. These studies report varying proportions and determinants of vaccine hesitancy among haemodialysis patients [11, 14–18]. However, data from sub-Saharan Africa remain very limited [19]. Yet healthcare systems, the organisation of care, access to vaccines, socio-cultural determinants and perceptions of vaccination may differ depending on the context. Lessons learnt from vaccination campaigns among vulnerable populations, conducted in sub-Saharan African countries, are essential. These lessons will enable the development of vaccination strategies tailored to local realities and strengthen the resilience of healthcare systems in the face of future infectious threats. The COVID-19 vaccination campaign in Burkina Faso presents an opportunity to better understand the determinants of vaccine hesitancy among haemodialysis patients in the Sub-Saharan African context. Beyond assessing COVID-19 vaccine hesitancy, this study aims to identify the determinants of this hesitancy and to draw lessons that may guide future vaccination strategies for patients with chronic kidney disease, both in Burkina Faso and in other comparable contexts.

2. Patients and methods

2.1. Type, period and setting of the study

A cross-sectional study was conducted from 13 to 19 July 2021 at the haemodialysis centre of the Yalgado Ouédraogo University Hospital. This centre had 32 dialysis stations and treated approximately 50 per cent of the country's haemodialysis patients. Sessions took place from Monday to Sunday. The majority of patients underwent two dialysis sessions of four hours each per week. Haemodialysis patients infected with SARS-CoV-2 were isolated and treated together. The centre was systematically disinfected by the hospital's hygiene department after each session. Patients who had been on haemodialysis (HD) for more than three months and were aged 18 or over were included in our study. During the study period, in addition to the individual physical barrier measures, city lockdowns and the quarantine of cases that were already in place, the vaccination programme had begun in the country on 2

June 2021. Given the limited supply of vaccines procured, patients with kidney failure, whether on dialysis or not, had been designated as a priority group by the country's health authorities.

2.2. Data collection and analysis

The data for this study were drawn from a general survey of haemodialysis patients conducted during the pandemic. This survey assessed fear of COVID-19, adherence to protective measures against COVID-19, and vaccine hesitancy regarding COVID-19. Data were collected using a questionnaire administered face-to-face during haemodialysis sessions or immediately afterwards by Master II medical student. The dependent variable was vaccine hesitancy, defined in accordance with the 'Strategic Advisory Group of Experts (SAGE) Working Group on Vaccine Hesitancy' [12]. Each patient was asked the following question: 'Will you agree to be vaccinated against COVID-19?'. Those who answered 'Yes' were considered to accept vaccination, and those who answered 'No' were considered to be hesitant about COVID-19 vaccination. Due to the need for multiple doses to achieve robust immunity in haemodialysis patients, the questionnaire was also administered to those who had already been vaccinated. The independent variables collected related to the patients' socio- demographic and clinical characteristics. Fear of COVID-19 was assessed using the 'Fear COVID-19' scale [20]. This was a specific Likert-type scale comprising seven items with five response options. Responses were scored as 1, 2, 3, 4 and 5. A total score was calculated by adding the score for each item (ranging from 7 to 35). The higher the score, the greater the fear of COVID-19. The same scale was modified to assess fear of COVID-19 vaccination. Based on the scores, fear of COVID-19 and fear of vaccination were categorised into levels: level 1 for scores between 7 and 13, level 2 for scores between 14 and 20, level 3 for scores between 21 and 28, and level 4 for scores above 28. The data were analysed using Stata version 15. We presented descriptive statistics as medians and interquartile ranges (IQR) for quantitative variables and as absolute and relative frequencies for qualitative variables. A univariate analysis was carried out to identify factors associated with vaccine hesitancy. Variables with a p-value ≤ 0.20 and those with epidemiological relevance were included in a multiple logistic regression model. For all analyses, the threshold for statistical significance was set at 5 per cent.

3. Results

.1. General characteristics of the study population

One hundred and forty-two (142) patients took part in the study. The median age was 42 years (IQR: 32–52). The sex ratio was 1.4. The characteristics of the study population are presented in Table 1.

Table 1: General characteristics of the study population

Variables	Number (n=142)	Percentage (%)
Level of education		
Not in education	38	26.8
Primary	24	16.9
Post-primary	22	15.5
Secondary	27	19
Superior	31	21.8
Occupation		
Unemployed	59	41.5
Informal sector	30	21.1
Students	4	2.8
Private sector worker	17	12.0
Public sector worker	32	22.5
Comorbidities		
Sickle cell disease	8	5.6
Hypertension	122	85.9
Diabetes	10	7
History of tuberculosis	3	2.1
Performing the COVID-19 test	129	90.8
Prior infection with COVID-19	13	9.2
Family history of COVID-19	7	4.9
Belief in the existence of COVID-19	100	70.4
Previous vaccination against COVID -19	9	6.3
Awareness of the increased risk of severe COVID-19 in hemodialysis patients	100	70.4
Fear of COVID-19	69	48.6

Abbreviation: COVID-19, Novel Coronavirus Disease

3.2. Fear of vaccination

The median score for the level of fear of vaccination was 13.5 (IQR: 9–18), with extremes of 7 and 29. Seventy patients (70), or 49.3% of haemodialysis patients, expressed a fear of COVID-19 vaccination (levels 2, 3 and 4). Figure 1 shows the distribution of patients according to their level of fear of COVID-19 vaccination.

Seventy-nine patients were hesitant to be vaccinated against COVID-19 at the time of our survey, representing a prevalence of vaccine hesitancy of 55.63 per cent (95 per cent CI: 47.31–63.65).

3.4. Factors associated with vaccine hesitancy

In univariate analysis, the factors associated with vaccine hesitancy were being under 60 years of age (OR: 5.35; 95% CI: 1.67–17.23), female gender (OR: 3.33;95%CI: 1.62–6.84), a history of COVID-19 vaccination (OR: 0.09; 95% CI: 0.01 – 0.72) and fear of COVID-19 vaccination (OR: 6.35;95%CI: 3.03 – 13.29) (Figure 2).

In the multivariate analysis, the determinants of vaccine hesitancy were female gender (aOR:

2.87;95%CI: 1.25–6.58); age < 60 years (aOR: 4.26; 95%CI: 1.18–15.31) and fear of vaccination (aOR: 4.76;95%CI: 2.14–10.56) (Figure 3).

4. Discussion

Our study aimed to assess the prevalence of vaccine hesitancy and to identify its determinants

among haemodialysis patients during the COVID-19 vaccination campaign in Burkina Faso. The aim of the study was to draw lessons that could inform future vaccination strategies within this population. Our study showed that more than half of haemodialysis patients were hesitant about vaccination. Fear of vaccination was the main modifiable determinant of this hesitancy. Certain socio-demographic factors, notably being under 60 years of age and being female, were also associated with vaccine hesitancy. We reported a high prevalence of vaccine hesitancy (55.6 per cent). This proportion is comparable to that reported by Rungkitwattanakul et al. in the United States in a single-centre study, which found 51 per cent vaccine hesitancy against COVID-19[21]. Similarly, in Egypt, Abdulaziz H et al. reported that 50.7 per cent of haemodialysis patients surveyed in their study were unwilling to receive a COVID-19 booster dose [22]. However, our results are higher than those of Samar Tharwat et al. in Egypt, Zaheera Cassimjee et al. in South Africa, Pablo Garcia et al. in the United States and Titus Andrian et al. in France, who reported rates of vaccine hesitancy of 41.7 per cent, 69 per cent, 27.7 per cent and 21 per cent respectively [16,18,23,24]. Although the reported proportions differ from one country to another, it is clear that vaccine hesitancy remained a reality amongst haemodialysis patients during the COVID-19 pandemic. However, the level of vaccine hesitancy varies considerably depending on the context. We found that one in two patients had a fear of vaccination. This fear of vaccination increased the risk of vaccine hesitancy by a factor of 4.76. The strong association observed between fear of vaccination and vaccine hesitancy highlights that the main barrier to vaccination uptake lies in the vaccines themselves. These findings are

consistent with the literature. Several studies have reported that concerns regarding the safety, efficacy and adverse effects of vaccines are major determinants of vaccine hesitancy. Indeed, in a study conducted in Italy and France, Blanchi S et al. noted that concerns about side effects and the efficacy of vaccines were associated with greater vaccine hesitancy among dialysis patients [11]. Similarly, in a national study in the United States, Gracia P et al. reported that 53 per cent of participants cited concerns about the side effects of vaccination as the reason for their hesitancy to be vaccinated. Furthermore, in this study, amongst those who were hesitant to be vaccinated, 12 per cent considered vaccines to be dangerous and 19 per cent doubted their effectiveness [18]. This fear of side effects was also reported as a reason for vaccine hesitancy by approximately 40 per cent of hesitant patients in African studies [19,23]. In a recently published Japanese study, doubts about the vaccine's efficacy, as well as concerns regarding its long-term adverse effects, were cited as reasons for not getting vaccinated by 27.8 per cent and 13 per cent of haemodialysis patients respectively [25]. We reported an association between age and vaccine hesitancy among haemodialysis patients. Patients aged under 60 were 4.26 times more likely to be hesitant about COVID-19 vaccination. Our findings are consistent with those of Gracia P et al. in the United States and Abdulaziz H et al. in Egypt, who also reported the same observations regarding age. In a multicentre study conducted in Egypt, Kenya and Cameroon and recently published on COVID-19 vaccine acceptance, the authors reported an association between age and vaccine hesitancy [19]. The lower level of hesitancy observed among older patients may reflect a greater perception of infection risk as well as increased trust in medical advice. We also reported greater vaccine hesitancy among women. Being female increased the risk of vaccine hesitancy by a factor of 2.87. In the studies by Gracia P and Abdulaziz H, the authors also reported this association between gender and vaccine hesitancy among haemodialysis patients [18,22]. However, other studies conducted in Europe (France and Italy), Japan and Egypt found no association between age, gender and vaccine hesitancy [11,23,25]. We also noted a lack of association, on the one hand, between awareness of the increased risk of severe disease in haemodialysis patients and vaccine hesitancy, and, on the other hand, between fear of the disease itself and vaccine hesitancy. This suggests that improving patients' medical knowledge, whilst necessary, is not sufficient to change the behaviour of haemodialysis patients with regard to vaccines. Furthermore, fear of a disease does not necessarily justify accepting vaccination against that disease. Vaccination decisions appear to be influenced more by emotional and psychological factors, particularly fear of the vaccination itself. One of the key contributions of our study lies in the lessons that can be learnt from the COVID-19 vaccination campaign to improve future vaccination strategies for haemodialysis patients. Our findings suggest that, among haemodialysis patients, barriers to vaccination appear to be more closely linked to perceptions and concerns regarding vaccination. Vaccination campaigns should not be limited to strategies aimed solely at informing patients about the disease and its severity. This may not be sufficient. Vaccination campaigns should address patients' concerns about vaccines in order to reduce their fear of vaccination. In this regard, communication-focused interventions designed to reassure patients about vaccines could be more effective. In particular, emphasis should be placed on safety, efficacy and transparency regarding adverse effects, with the involvement of nephrologists and dialysis teams to optimise the effectiveness of the interventions [26]. Haemodialysis units, which treat patients at least twice a week, should serve as

key venues for promoting vaccination. Consequently, during vaccination campaigns, nephrologists and nurses should be systematically involved in providing vaccination advice to patients. Healthcare teams are credible sources of information on vaccination. These teams must maintain ongoing communication about vaccination during campaigns in order to help promote vaccination among haemodialysis patients [3]. Strategies should therefore be tailored to local contexts, taking into account local realities: trust in the healthcare system, accessibility of the system, and appropriate communication regarding the efficacy, safety and side effects of vaccines.

5. Limitations of our study

The cross-sectional nature of our study does not allow us to establish a causal relationship between the identified determinants and vaccine hesitancy. Further studies, particularly qualitative ones, will be necessary to provide a detailed explanation of the reasons for vaccine hesitancy. Although the haemodialysis centre at Yalgado Ouédraogo University Hospital alone accounted for more than 50 per cent of the country's patients, the results cannot be generalised to the whole country. Furthermore, the data on perceptions of severe forms of the disease, fear and attitudes towards vaccination were based on self-reports. These may be influenced by biases, notably social desirability bias. Finally, the fact that the study began almost at the same time as the start of the vaccination campaign may lead to an overestimation of the prevalence of vaccine hesitancy. Perceptions of vaccination may evolve during the pandemic depending on the course of the epidemic waves.

6. Conclusion

Our study reported a high prevalence of vaccine hesitancy among haemodialysis patients, with fear of vaccination identified as the primary modifiable determinant. Looking beyond the COVID-19 pandemic, these findings highlight key areas for improvement in future vaccination campaigns for this vulnerable group. Amidst emerging and re-emerging infectious diseases, our results suggest that future interventions will be most effective when they combine transparent, reassuring communication to alleviate fear, rather than focusing predominantly on disease severity. Adopting this approach could help sustainably increase vaccine uptake among haemodialysis patients.

Abbreviations

- aOR: Ajusted Odds Ratio
- cOR: Crude Odds Ratio
- COVID-19: Novel Coronavirus Disease
- HD: haemodialysis
- IQR: Interquartile Ranges

- WHO: World Health Organisation’s
- SAGE: Strategic Advisory Group of Experts
- SARS-CoV-2: severe acute respiratory syndrome coronavirus 2

Declarations

8.1. Ethical approval and consent to participate

Study was conducted in accordance with ethical guidelines and best practice in epidemiology. All participants signed an informed consent form. Data anonymity and confidentiality were maintained. The study was approved by the Ethics Committee for Health Research (CERS) of Burkina Faso under decision no. 2021-04-108.

8.2. Consent for publication:

No applicable

8.3. Availability of data and materials

The raw data used for this publication are not publicly available. However, anonymised data relating to vaccine hesitancy may be obtained from the corresponding author upon reasonable request.

8.4. Competing interests

The authors declare no competing interests

data collection, and the study participants for their cooperation

8.5. Funding

This work no received no funding

8.6. Authors’ contributions

PZ, YJB and OS designed and conducted the study and drafted the initial version of the manuscript. PZ and DDK analysed the data. DO prepared figure 1-3. DDK, DO, SH, MS, and LAGB revised the initial draft of the manuscript. GC critically reviewed the manuscript. All authors have read and agreed to the final version of the manuscript.

8.7. Acknowledgements

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Figures

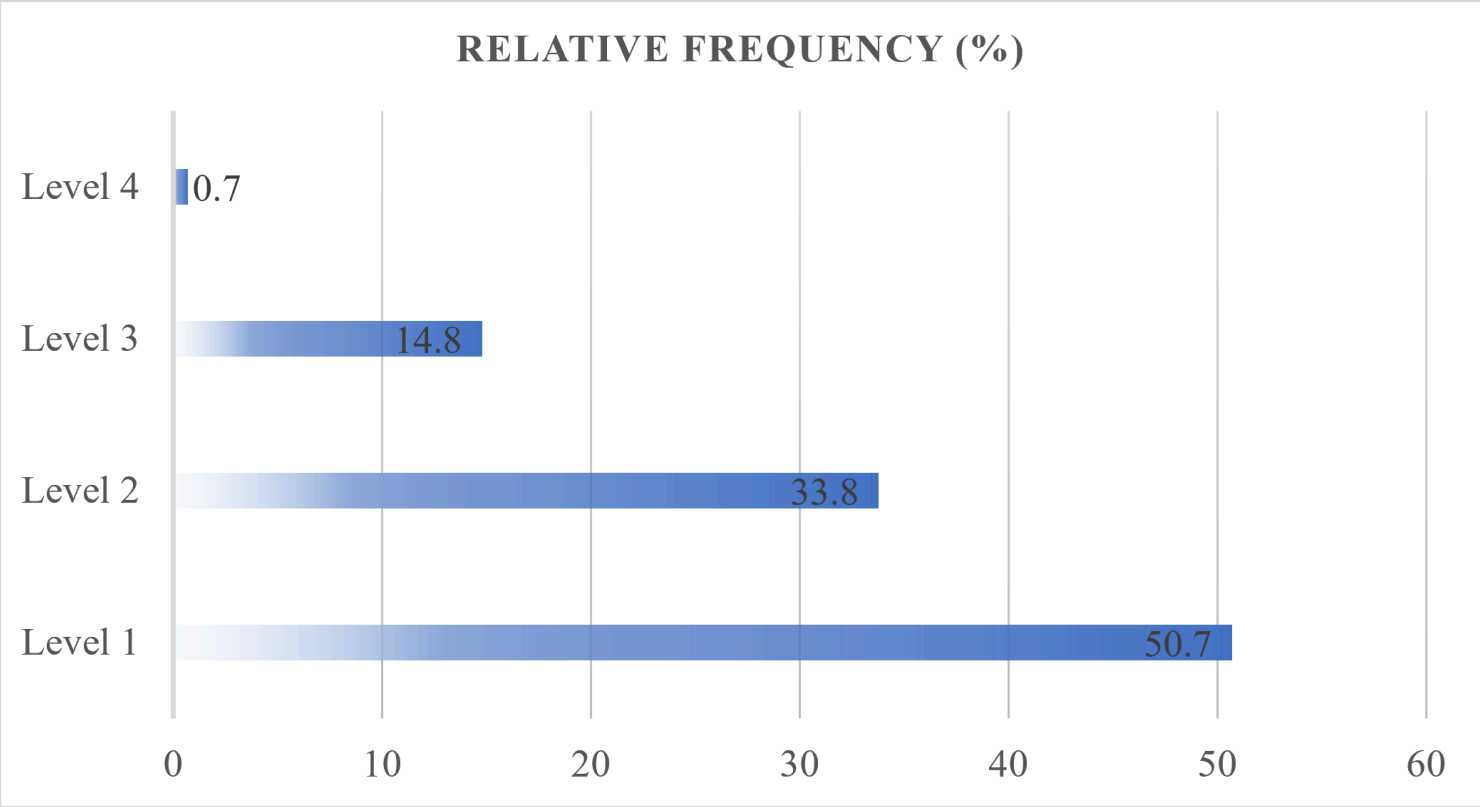


Figure 1

Distribution of patients by level of fear of COVID-19 vaccination3.3. Prevalence of vaccine hesitancy

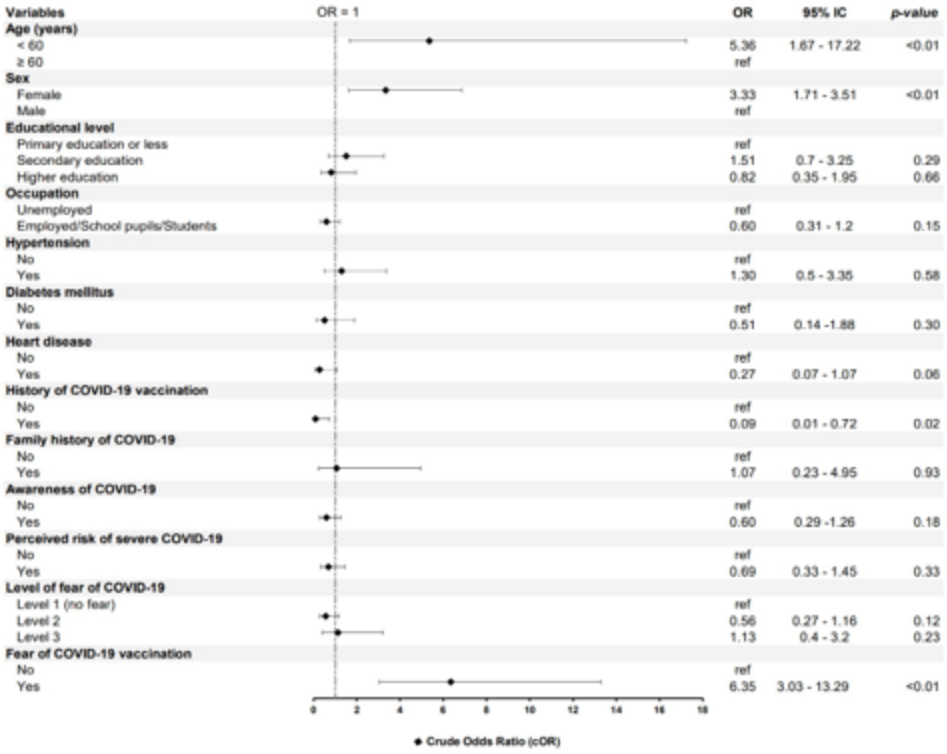


Figure 2

Factors associated with vaccine hesitancy in univariate analysis among hemodialysis patients at the Yalgado Ouedraogo University Hospital (n = 142)

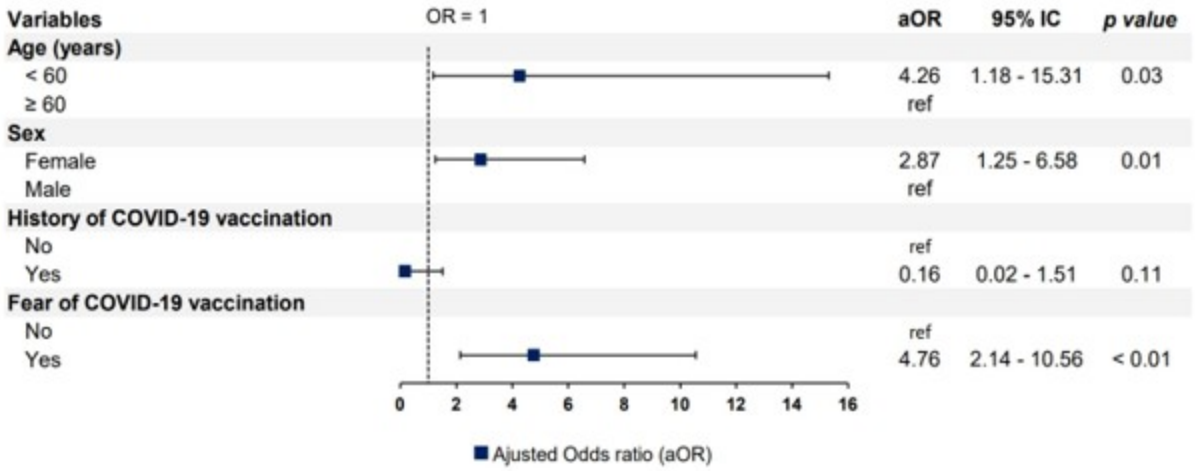


Figure 3

Factors associated with vaccine hesitancy in multivariate analysis among hemodialysis patients at the Yalgado Ouedraogo University Hospital (n = 142)