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Mpox post COVID-19 pandemic: Worrying and vaccine acceptance among Meknes's population - Morocco

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ABSTRACT

Background: In May 2022, the world is experiencing the appearance of Monkey pox (Mpox) as another public health threat. **Aims:** The present study assessed the concerns of the population of the prefecture of the Meknes region about this disease and their acceptance of vaccines against Mpox. **Methods:** During the period between November and December 2022, we conducted an analytical and descriptive survey with 384 participants from the Meknes prefecture to ascertain the perception of Mpox risk in the population compared with COVID-19. A p-value of less than 0.05 indicated that the link was significant. Using SPSS software, the p-value and χ^2 (X^2) were calculated. **Results:** 76% of the respondents perceived the COVID-19 pandemic as more worrying than mpox and refused to vaccinate against it (69%). More than half of the respondents (60%) perceived Mpox as a dangerous and virulent disease, whereas the adherence of participants and their family members to Mpox precautions was rare (79%). **Conclusion:** These findings revealed that participants were less concerned about Mpox compared with COVID-19 and the vaccination acceptance is still lower than expected. However, vaccination remains an important approach to prevent infectious diseases such as Mpox.

Introduction

The emergence of Mpox in the post-COVID-19 context has raised concerns about this new threat [1,2] and has caused unprecedented global upheaval, leading to strict public health measures and massive mobilization for vaccination, creating significant anxiety and psychological impact on populations worldwide [3]. Mpox has generated additional concerns due to vivid memories of the previous health crisis, although it seems less intense [4].

In fact, Mpox is a zoonotic infection that has been endemic for several years in West and Central Africa [5,6]. The virus responsible for this epidemic is the Mpox virus (MPXV), which belongs to the poxviridae family and the orthopoxvirus genus. This genus also includes the human smallpox virus and the vaccinia virus (VACV or VV) used in human smallpox vaccination [7].

The symptoms of Mpox are similar to those of smallpox, although generally milder, and include fever, rashes, and swollen lymph nodes. Although the fatality rate of Mpox is significantly lower than that of smallpox, the potential for human-to-human transmission has raised public health concerns, particularly in regions previously unaffected by the virus [1,2].

In May 2022, a case of Mpox (MPX) was initially reported in the United Kingdom, demonstrating sustained human-to-human transmission outside Africa. The majority of confirmed cases have been reported in approximately 70 non-endemic countries, including European and North American countries. On May 11, 2023, the global smallpox emergency committee indicated that the multi-country outbreak no longer constitutes a public health emergency of international concern (PHEIC), given the sustained decline in cases. The WHO director-general accepted the committee's advice [8].

The COVID-19 pandemic has profoundly affected public perception of infectious diseases and vaccines. The global response to COVID-19, including the development and distribution of vaccines, has highlighted both the potential and the challenges of vaccination campaigns [9-12].

Previous studies have shown that concerns related to COVID-19 have led to higher acceptance of vaccines due to the perceived severity of the disease and the communication efforts of health authorities [13]. However, the perception of Mpox,

often considered less threatening, could influence the acceptance of vaccines specific to this disease. Research on vaccine acceptance in the Meknes population is essential to understand these dynamics.

Understanding public acceptance of Mpox vaccines is crucial for effective disease management and prevention strategies, particularly in regions like Meknes where public health infrastructure and awareness may differ from more heavily impacted areas.

Indeed, vaccination against infectious diseases like Mpox largely depends on the perceptions and concerns of the population. In this context, the present study aims to determine the perception of Mpox risk in the population compared to COVID-19. To our knowledge, no research has studied this question in Morocco.

1. Material and methods

We conducted a descriptive cross-sectional survey using an online questionnaire, during November and December 2022 among the population of the prefecture of Meknes in central Morocco. Participants were informed of the objectives and progress of the study and its confidential nature, as well as their right to withdraw at any time without any prejudice in this regard.

✓ Sampling

The total sample size was calculated using the Cochran's formula [14]:

$$n = \frac{t^2 \times p(1-p)}{m^2}$$

n = required sample size

t = 95% confidence level (standard value of 1.96)

p = estimated prevalence (in the absence of information as in this case, it is recommended to take P = 0.5)

✓ m = 5% margin of error (standard value of 0.05)

Data Collection:

To address the research questions, we conducted a descriptive cross-sectional survey during the months of November and December 2022, focusing on the willingness of the Meknes population to receive a vaccine against monkeypox. The survey was administered via a google forms.

The administered questionnaire targeted two areas:

- Group A: General data about the respondents, including gender, age, education level, COVID-19 vaccination status, and COVID-19 infection.

- Group B: Questions aimed at assessing respondents' perception and acceptance of receiving the monkeypox vaccine, including concerns and vaccine acceptance.

✓ **Statistical analysis**

The data were recorded in an excel spreadsheet (Excel 2010) and then presented graphically. To statistically analyze the results, we chose to use the chi-square test to assess the association between variables. A p-value less than 0.05 was considered significant. The calculation of chi-square (X^2) and the p-value was performed using SPSS software.

2. Results

✓ **General information on survey participants**

A total of 384 participants were interviewed, and the results are displayed in Table 1. It is obvious that females represented the highest percentage (59%) of participants, while 41% of the interviewed persons were men. The treatment of the collected findings revealed that the majority of participants were over 35 years old, with only 3% being between the ages of 20 and 25 (Table 1). The majority of respondents attended the university with a proportion of 66%, 28% attended the high school level, and 6% of all respondents attended the primary level.

Figure 1 displays the distribution of COVID-19 infections and vaccination recipients.

✓ **COVID-19 infection and vaccination status among respondents**

The analysis of the results revealed that 74% of the respondents were infected by COVID-19, whereas 26% of the participants claimed to be uninfected. In addition, 55% of all respondents were vaccinated against COVID-19, whereas 45% of participants declared that they had not received the viral vaccination.

✓ **Perception of Mpox and its vaccine**

Table 2 illustrates the findings of the determination of Mpox's perception. The analysis of results revealed that the majority of the respondents (76%) perceived the COVID-19 pandemic as more worrisome than Mpox, whereas only 24% indicated that they were more worried about Mpox.

However, 60% of the respondents believed that Mpox was a serious and virulent disease, while a study of participants' and family members' adherence to smallpox measures found that 79% of respondents took precautions occasionally, moderately used (18%), and always taken (3%).

Concerning the acceptability of Mpox immunization, 69% of respondents refused the vaccination, whereas 31% expressed a willingness to receive the vaccine against Mpox (Table 2).

Relationship between the variables studied and vaccine acceptance

The potential acceptance of the COVID-19 Mpox vaccine was affected by respondents' perceptions of the danger of COVID-19 compared to monkeypox. The statistical analysis shows a significant correlation between the acceptance of the monkeypox vaccine and respondents who had already been infected with COVID-19 and agreed that COVID-19 is more contagious than monkeypox.

Indeed, respondents who perceived Mpox to be less worrisome than COVID-19 were less likely to support vaccination against this viral disease, while those who considered smallpox to be more dangerous were more likely to support vaccination ($P < 0.05$).

In addition, respondents who perceived Mpox to be a less dangerous disease were less likely to support vaccination against this viral disease, while those who considered monkey pox to be dangerous were more likely to support vaccination ($P < 0.05$).

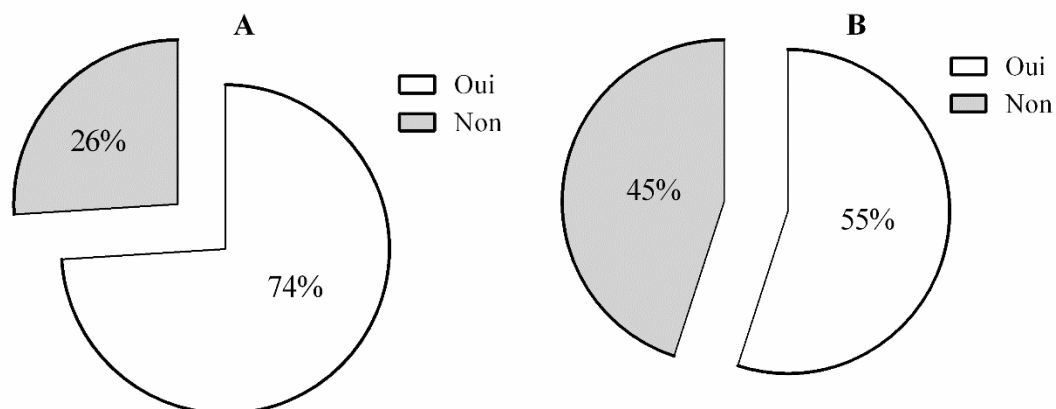
It should also be noted that there is no significant relationship between the acceptance of the Mpox vaccine and age, gender, or even education level.

Table 1. General information on survey participants

Characteristics	Number	Percentage
Gender of respondents		
Female	210	59%
Male	166	41%
Age		
20-25	13	3 %
25-30	96	25%
30-35	110	29%
More than 35	165	43%%
Level of education		
Primary level	21	6 %
High school level	109	28%
University level	254	66%

Table 2. Perception of respondent about monkey pox

	Number	Percentage
Precaution against Mpox		
Always committed	10	3%
Moderately committed	68	18%
Low commitment	306	79%
Mpox is more dangerous than COVID-19		
Yes	93	24%
No	291	76%
Mpox is a dangerous disease		
Yes	234	61%
No	150	39 %
Do you agree to be vaccinated against Mpox?		
Yes	120	31%
No	264	69%

Figure 1. Distribution of participants infected with COVID-19 (A) and participants vaccinated against COVID-19 (B).

Discussion

In the context of emerging infectious diseases, risk perception plays a crucial role in public health behaviors. As the world continues to recover from the devastating effects of the COVID-19 pandemic, the emergence of Mpox has raised concerns about its danger. This situation brings up important questions about how past experiences influence current perceptions of health threats. While COVID-19 has increased global awareness of infectious diseases, it is essential to understand if this awareness translates into a similar perception of the danger posed by Mpox.

Indeed, the perception of the danger of infectious diseases is often influenced by the epidemic context in which they emerge. In this context, it is interesting to note that 60% of respondents consider Mpox to be a dangerous and virulent disease, reflecting increased awareness following the COVID-19 pandemic. This perception could be explained by the temporal proximity between the emergence of Mpox and the global health crisis caused by COVID-19, a situation that profoundly affected public health behaviors, and also by the alarming media coverage that followed the first recorded case of Mpox [15].

However, despite this perception of danger, it is concerning to note that 79% of participants report that precautions against Mpox are rarely observed. This phenomenon can be interpreted as a relaxation of preventive behaviors, often seen after major health crises, where pandemic fatigue leads to a decrease in adherence to preventive measures. The study by Bavel et al. (2020) showed that pandemic fatigue results in decreased motivation and adherence to preventive measures, despite their proven effectiveness, due to a sense of weariness, relaxation of social norms, and the psychological costs of isolation [11].

Even though the COVID-19 pandemic caused significant disruptions for humans, and several efforts were organized to effectively rebuild national and international systems, the revelation of the re-emergence of Mpox after the COVID-19 pandemic could potentially have a negative impact on societies in terms of concerns and anxiety [3].

In our study, the majority of respondents (76%) perceived the COVID-19 pandemic as more concerning than Mpox, which could be explained by the notable decrease in Mpox cases worldwide and in Morocco, and also because they had survived the

COVID-19 pandemic and the infection itself; this led to lower levels of concern [16].

It is important to note that the perception of disease severity is often influenced by their impact on public health and mortality rates. COVID-19, with its high transmission rate and severe health consequences, caused considerable concern. In contrast, while Mpox is a serious disease, its transmission rate is generally low, which may explain why respondents consider it less concerning [17].

Additionally, the fear that Mpox might become a pandemic has been described in the literature, both before and after the onset of the pandemic [18]. A cross-sectional study conducted in North and Northeast China found that most university students had relatively insufficient knowledge of Mpox and showed a positive attitude toward receiving the Mpox vaccine [19]. The same authors reported that less than half of the participants expressed concern about the Mpox outbreak [19]. In reality, Mpox vaccination is not recommended for the general public but is recommended for at-risk individuals, including laboratory technicians and healthcare workers [20]. Mpox is not easily transmitted from person to person, and there are already treatments and vaccines. This disease is caused by a virus from the same family as smallpox, although it is much less severe, and experts say the risk of infection is low. Thus, while scientists worldwide are concerned about this new viral behavior, they are not panicked [21].

Although vaccination is an essential approach to develop effective vaccines and strengthen the immune system against viruses, and one of the most effective public health interventions that have significantly reduced the morbidity and mortality of infectious diseases [22, 23], the acceptance by the population to receive the vaccine is a determining factor [22]. Several predictors of Mpox vaccine uptake have been reported, including sociodemographic profile, Mpox knowledge, social status, COVID-19 vaccine, and influenza [24]. Other factors may influence people's perception and readiness to accept Mpox vaccination, including cultural, religious, misinformation, and vaccine side effects, as observed during the COVID-19 pandemic [25 -27]. Our results show that most respondents refused vaccination against Mpox despite having already received the COVID-19 vaccine. This could be explained by fear of negative effects,

misinformation and its impact, or distrust of medical staff or the health system [28, 29]. Numerous factors can influence people's perception of vaccine acceptance, as well as misinformation, as was the case during the COVID-19 pandemic [30, 31]. However, our research showed that there is no relationship between gender and education level and the acceptance of the Mpox vaccine. Comparing some reviews on the acceptance of COVID-19 and Mpox vaccines, we notice that the percentage was low [32, 33].

Additionally, Mpox vaccine acceptance could also be influenced by the collective experience of COVID-19 vaccination. While this experience may have reinforced trust in vaccines, it could also lead to hesitations, particularly due to perceived side effects or concerns about the speed of vaccine development. This raises crucial questions about how vaccination campaigns should be conducted to maximize public acceptance and adherence.

3. Conclusion

Risk perception plays a crucial role in public health behaviors. Although the COVID-19 pandemic has increased awareness of infectious diseases, this study shows that Mpox is perceived as less concerning, with low adoption of preventive measures. Acceptance of the Mpox vaccine is influenced by various factors, including misinformation and past experiences. It is essential to improve public health communication and strengthen trust in the healthcare system to promote vaccination approach.

Data Availability

Data used to support the findings of this study are included in the article.

Conflict of interest

We declare that we have no conflict of interest.

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Authors' contribution

All authors made significant contributions to the work presented, including study design, data collection, analysis, and interpretation. They also contributed to the article's writing, revising, or critical evaluation, gave final approval for the version to be published.

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