

## Misconceptions and associated factors of COVID-19 infection among internally displaced persons in Sudan

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### Abstract

Coronavirus disease 2019 (COVID-19) is a global public health threat that has spread rapidly and caused morbidity and mortality worldwide. Reducing the myths about infectious diseases is vital for controlling transmission. This study explored the level of misconceptions and associated factors of COVID-19 among internally displaced persons in Sudan. This study is a cross-sectional, descriptive design and community-based study. We collected the data using a self-administered questionnaire via the convenience sampling technique among internally displaced persons in the camps of Zalingei town in the central Darfur region of Sudan. The total mean score of the respondents' misconception was 3.1725 ( $SD=0.59$ ) with 63.2%, indicating moderate misunderstanding of COVID-19. Multiple linear regression revealed the independent variables together had a signif-

icant impact on a misconception,  $F(14,116)=2.429$ ,  $p<0.005$ . The regression model explains 22.7% of the variance in misunderstanding. Analysis of the influence of single factors on the dependent variable showed that people aged 31–40 years had significantly higher levels of misconception, 0.381 ( $t=2.116$ ,  $p<0.037$ ), than those aged over 60 years, and university graduates had considerably lower levels of misunderstanding,  $-0.061$  ( $t=-2.091$ ,  $p<0.03$ ) than non-graduates. This study found a moderate level of misconception of COVID-19. Non-graduates had higher levels of misunderstanding than graduates. The results suggest that an education campaign should focus on people with low levels of education to correct their misconceptions regarding the prevention of COVID-19 infection.

### Introduction

Coronavirus disease 2019 (COVID-19) is a global public health threat that has spread rapidly and caused morbidity and mortality worldwide.<sup>1-3</sup> It emerged in late 2019 in Wuhan, Hubei province, China. The World Health Organization (WHO) officially declared a pandemic in March 11, 2020. Approximately 46 million COVID-19 cases and 1.2 million deaths have been reported globally.<sup>4,5</sup> In Sudan, the first COVID-19 case reported by the Federal Ministry of Health was in March 13, 2020. A 50-year-old man entered Sudan from the United Arab Emirates, after which new infection of the virus in Sudan started to increase.<sup>6</sup> Coronaviruses belong to a broad family of viruses that cause respiratory disease in humans, ranging from the mild common cold to fatal pneumonia.<sup>7,8</sup> COVID-19 is an infectious respiratory disease that enters the human body via the eyes, nose, and mouth and spreads by droplets from coughs and sneezes, close contact with an infected person, and touching contaminated surfaces.<sup>9</sup>

The common symptoms of COVID-19 include high temperature, dry coughing, shortness of breath, fatigue, diarrhea, headache, loss of smell and taste, and complicated acute respiratory disease leading to pneumonia, renal failure, coma, and death.<sup>10-12</sup> The risk factors of the severity of the illness include comorbid disorders such as diabetes mellitus, high blood pressure, cardiovascular disease, and chronic lung and kidney disease. Most people who contract the disease require hospital admission and invasive mechanical ventilation in an intensive care unit.<sup>13</sup> To date, there is no definite cure available for COVID-19.<sup>14</sup> The only recommended measures to pre-

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Ethics approval and consent to participate: Before data collection, we obtained ethical clearance from the Ethical Committee of the Faculty of Nursing Sciences, University of El Imam El Mahdi (FNS/2020-03). We also received consent from each participant after explaining the aim of the study.

Informed consent: The author received consent from each participant after explaining the aim of the study.

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vent the spread of COVID-19 infection involve hand hygiene, covering the mouth and nose when coughing or sneezing, and avoiding close contact with any person with symptoms of respiratory disease.<sup>15</sup>

Myths commonly reflect folklore-type stories that play a vital role in human lives. Myths related to infectious diseases have spread through social media platforms and can take a long to dispel. Moreover, these myths can be dangerous to public health and reduce work efficacy against infectious diseases. The WHO has listed common myths and debunked them with accurate information about COVID-19 infection to increase public awareness.<sup>16</sup> Reducing the myths about infectious diseases was vital for controlling transmission. A study conducted in Ghana reported that most participants possessed much misinformation related to the COVID-19 pandemic.<sup>17</sup> Another study carried out in South Africa showed false information and misconception related to COVID-19.<sup>18</sup>

Similarly, another study investigated misconceptions, myths, and beliefs related to the pandemic. The results showed that participants had misconceptions about the virus. They believed that it affects only the elderly, mosquito bites can spread the virus, antibiotics are effective treatments, and homemade remedies can cure the disease.<sup>19</sup> A study in Ethiopia revealed that regional townships showed significant variations in myths, false assurances, and information requirements.<sup>20</sup>

According to the United Nations, Internally Displaced Persons (IDPs) are the groups of persons who leave their homes by force due to armed conflict and have not crossed a border of the home country.<sup>21</sup> Globally displaced people and refugees live in highly populated camps that lack basic sanitation, social distancing, and hand washing or maintaining personal hygiene, making them at the most incredible significant risk of COVID-19 infection.<sup>22</sup> Darfur is the western region in the Sudan where the conflict broke out in 2003. However, the war peaked in 2004, which has ended over 300,000 lives, left around 3 million Internally Displaced Persons (IDPs) from their homes, and suffered from poor health care services.<sup>23</sup> Moreover, their limiting access to health services may prevent them from diagnostics and medical management in the event of an outbreak and make them at the highest risk of COVID-19 infection. To date, however, little is known about COVID-19 myths among the IDPs in Sudan. This study explored the level of misconceptions and associated factors of COVID-19 infection among internally displaced persons (IDPs) in Sudan.

## Materials and methods

### Study design

This descriptive study used a cross-sectional design.

### Study setting

The Darfur region is in Western Sudan and covers approximately 493,180 km<sup>2</sup>. It comprises the states of North, West, South, East, and Central Darfur. The area has a population of nearly six million. Approximately 140,000, however, are IDP, about 60% of whom are children living in camps due to war.<sup>24</sup> The town of Zalingei is in the center of Darfur and is surrounded by three camps of IDP, Hesaheha, Al Hamedia, and Teyba, as the result of war.<sup>25</sup> The study was carried out from April to May 2020 in two camps around Zalingei: Hesaheha and Al Hamedia-Camp.

### Study subjects

The study involved IDPs who resided in the camps.

### Inclusion criteria

We included IDPs who were available and willing to take part in the study.

### Exclusion criteria

We excluded IDPs who were not present in the data-gathering period and those who disagreed with the survey.

### Sampling technique and size

Using the convenience sampling method, we collected the data manually by a self-administered questionnaire after explaining the purpose of the study and maintaining protective measures of COVID-19, such as maintaining social distance and wearing a face mask during data collection. We trained two data collectors to assist in the questionnaire administration and in receiving the responses. A total of 131 eligible participants completed the questionnaires in the survey.

### Study variables

#### Independent variable

The independent variables were various sociodemographic characteristics of the respondents: gender, age, educational level, previous disease, and source of information.

#### Dependent variable

The dependent variable was a misconception about COVID-19.

### Instrument of data collection

The self-administered questionnaire of

this study aimed to assess the level of misconception toward COVID-19 prevention. The authors developed this questionnaire after critically reviewing the literature and WHO guidelines that listed the most common myths and clarified them with accurate information about COVID-19 infection to raise public awareness.<sup>22,26-29</sup> We discussed the contents relevant with experts for the validity and tested the reliability of this instrument after making modifications according to the experts' feedback. We then used the validated questionnaire in the pilot test involving 15 randomly selected respondents. The purpose of the pilot test was to estimate the time required to complete the questionnaire and ensure that every participant understood the questions. We excluded those who took part in the pilot study from the main study. The result of the reliability test computed by Cronbach's alpha was 0.82, which showed acceptability.

The instrument consisted of two sections. In the first section, five demographic characteristics included: gender, age, education level, previous disease, and source of information. The second section comprised ten questions to measure the level of misconception about the transmission, prevention, and treatment of COVID-19. Each question had five options based on a 5-point Likert-type scale: strongly agree (5 points), agree (4 points), neutral (3 points), disagree (2 points), and strongly disagree (1 point).

### Data analysis

We analyzed the data using the Statistical Package for Social Sciences version 25. We performed specific statistical tests according to the research objective. We adopted descriptive statistics to describe the sociodemographic variables as frequencies, percentages, mean and standard deviation. However, in the inferential statistics, we run multiple linear regression to explore the dependent variable's associated factors (independent variables). We fixed the significance level at <0.05 for all analyses.

## Results

### Demographic characteristics

A total of 131 respondents completed the survey questionnaire. As shown in Table 1, most (69, 52.7%) of the respondents were female; 46 (35.1%) were 50–60 years old; more than half (77, 58.8%) were non-graduates; most (114, 87%) did not have a comorbid disease; and nearly half (55, 42%) had heard about COVID-19 from their families and friends.

## Assessing the level of misconception of COVID-19

To the question of whether COVID-19 could only spread in cold areas, most (65.7%) of the participants responded neutrally. More than half (52.4%) were neutral about whether cold weather and snow could kill the virus, and 52.4% reported believing that regular washing with saline solution helps prevent COVID-19 infection. Nearly half (40.6%) of the participants responded neutrally to the idea that bathing with hot water prevents COVID-19; 45.5% believed falsely that mosquito bites could transmit the disease; 42.7% misbelieved that spraying the body with alcohol or chlorine helps eliminate the virus, and 45.5% believed falsely that regular washing with saline solution helps prevent infection. More than a quarter of respondents (28.7%) strongly agreed that eating garlic helps prevent the disease. The total mean score of the respondents' misconception was 3.1725 (SD=0.59), with a percentage of 63.2% ( $3.16/5 \times 100$ ), which indicates a moderate level of misbelief toward COVID-19 (Table 2).

## Factors associated with misconception of COVID-19

To determine the factors affecting misconceptions of COVID-19, we performed multiple regression analyses. All categorical variables were transformed into dummy variables coded between 1 and 0, converted to dichotomous variables, and treated as continuous variables. Then we included the k-1 dummy variables method in the regression equation, where k stands for the total number of categories, whether the variable is ordinal or nominal. The category that we removed from the equation is called the reference category. All the parameters of the dummy variables included denoting the difference or deviation from this reference cat-

egory.<sup>30,31</sup> The coded dummy variables (1 or 0) entered into the regression model as independent variables included gender, age, educational level, and source of information. These independent variables have sub-categories as gender variable was dummy coded, the female became the reference category (female=0; male=1). For age groups were dummy coded variable and the last age group belonged to 50-60 years was selected as the reference group. Furthermore, we used people with no formal education as the reference group, and other education levels (*i.e.*, primary, secondary, and graduate) were dummy coded and compared to the reference.

The results of the multiple regression

analysis revealed that all the independent variables collectively have a significant impact on misconception according to the ANOVA statistics,  $F(14,116)=2.429$ ,  $p<0.005$ . The regression model with all five predictors explains 22.7% of the variance in misconception. The results for the unique independent variable showed that participants aged 31-40 years had significantly higher levels of misconceptions, 381 ( $t=2.116$ ,  $p<0.037$ ), than those aged over 60 years, while controlling for the influence of the other predictors in the model (gender, different age groups, education, and source of information). Similarly, graduates had significantly lower levels of misconception  $-0.061$  ( $t=-2.091$ ,  $p<0.03$ ) than uneducated

**Table 1. Distribution of demographic characteristics of the participants (N=131).**

Variable	N (%)
Gender	
Male	62 (47.3)
Female	69 (52.7)
Age	
<20	6 (4.6)
21-30	19 (14.5)
31-40	18 (13.7)
50-60	46 (35.1)
<60 years	42 (32.1)
Education level	
Uneducated	77 (58.8)
Primary	34 (26.0)
Secondary	14 (10.7)
Graduate	6 (4.6)
Do you have a comorbid disease like asthma, diabetes, heart disease?	
Yes	17 (13.0)
No	114 (87.0)
Source of information	
Radio	23 (17.6)
Television	7 (5.3)
Health workers	13 (9.9)
Humanitarian aids workers	7 (5.3)
Relatives and friends	55 (42.0)
Mosque	20 (15.3)
Social Media, Facebook, Whatsapp	6 (4.6)

**Table 2. Frequency distribution of misconception responses towards COVID-19 (n=131).**

Misconception scale 10-items	Strongly agree, N (%)	Agree, N (%)	Neutral, N (%)	Disagree, N (%)	Strongly Disagree
Does the Coronavirus spread only in cold areas?	4 (3.1)	22 (16.8)	90 (68.7)	15 (11.5)	0 (0.0)
Can cold weather and snow kill the new Coronavirus?	4 (3.1)	24 (18.3)	73 (55.7)	23 (17.6)	7 (5.3)
Would hot bathing prevent the new Coronavirus?	8 (6.1)	50 (38.2)	53 (40.5)	14 (10.7)	6 (4.6)
Can the Coronavirus spread via mosquito bites?	6 (4.6)	23 (17.6)	63 (48.1)	23 (17.6)	16 (12.2)
Spraying your body with alcohol or chlorine will help eliminate the new Coronavirus?	9 (6.9)	40 (30.5)	59 (45.0)	15 (11.5)	8 (6.1)
Do you think vaccines for anti-pneumonia will protect against the new Coronavirus?	6 (4.6)	25 (19.1)	69 (52.7)	25 (19.1)	6 (4.6)
Regularly washing with saline solution may prevent Coronavirus infection?	8 (6.1)	43 (32.8)	62 (47.3)	11 (8.4)	7 (5.3)
Eating garlic helps prevent infection of Coronavirus?	41 (31.3)	33 (25.2)	30 (22.9)	19 (14.5)	8 (6.1)
Applying sesame oil on your skin may prevent penetrating from the Coronavirus?	34 (26.0)	26 (19.8)	36 (27.5)	26 (19.8)	9 (6.9)
Are young people not infected with the Coronavirus?	17 (13.0)	25 (19.1)	46 (35.1)	32 (24.4)	11 (8.4)
Total mean score of misconception	3.1725 (SD=±0.59)				63.45

Note: mean score range = 1-5, Std. Dev.= Standard Deviation.

**Table 3. Factors associated with the misconception of IDPs toward COVID-19.**

Predictors		B	Std. Error	Beta	t	p
Gender	Constant	2.995	0.333		9.002	0.000
	Female (Ref)					
	Male	0.009	0.118	0.008	0.078	0.938
Age	<60 years (Ref)					
	20 years	0.085	0.326	0.030	0.261	0.794
	21-30 years	-0.015	0.223	-0.009	-0.068	0.946
	31-40 years	0.381	0.180	0.222	2.116	0.037
	50-60 years	0.124	0.130	0.100	0.950	0.344
Education level	No formal education (Ref)					
	Primary	-0.212	0.158	-0.157	-1.340	0.183
	Secondary	-0.240	0.246	-0.126	-0.978	0.330
	Graduate	-1.172	0.288	-0.415	-4.075	0.000
Source of information	Relatives and friends (Ref)					
	Radio	0.245	0.157	0.158	1.563	0.121
	Television	0.434	0.266	0.165	1.632	0.105
	health workers	-0.051	0.221	-0.026	-0.233	0.816
	Humanitarian aids workers	0.209	0.253	0.080	0.827	0.410
	Mosque	0.140	0.159	0.085	0.882	0.380
	Social Media ( Facebook, what's up)	-0.122	0.308	-0.043	-0.397	0.692
R2	0.227					
F(14,16)	2.429					0.005*

Note: Ref= reference, a. Dependent Variable: overall mean score of misconception, \*p 0.05.

people. However, we found no statistically significant association between the dependent variable (misconception) and other predictors such as gender and source of information (Table 3).

## Discussion

COVID-19 is a global public health threat that has spread rapidly and caused morbidity and mortality worldwide.<sup>1-3</sup> Since the WHO has listed common myths to increase public awareness about COVID-19 infection.<sup>16</sup> Disease-related myths are dangerous to public health and diminish the effect of work against infectious diseases. Reducing the myths about the contagious virus is vital for controlling transmission. This study investigated the level of misconceptions and associated factors of COVID-19 infection among IDP in Sudan. The results showed that most respondents acquired information about COVID-19 from their relatives and friends. These findings could be due to a lack of sources such as television, radio, social media, and other internet services in conflict areas. These findings are consistent with a study conducted in the Democratic Republic of the Congo that showed that IDPs have less access to information through media and the internet than the comparison group.<sup>32</sup> Another study indicated that even employment status influences some misconceptions about COVID-19 infection.<sup>19</sup>

The present study revealed that the total mean score of the respondents indicated a moderate misconception of COVID-19. These results may be because most people in rural areas still get their information from unofficial sources. These results are consistent with a study conducted by Schmidt *et al.* (2020) that revealed that false information spread on social media and stigmatized people's responses to COVID-19.<sup>18</sup> The WHO has posted correct information on its official site to advise the public to fight against myth-busters toward COVID-19.<sup>28</sup> The public should be encouraged to understand myths and facts related to the condition.<sup>33</sup> The multiple linear regression analysis revealed a significant association between misconception and demographic variables. The results of this study are consistent with a survey that showed a significant association between myths and lower levels of education, older people, and women.<sup>30</sup> Furthermore, participants aged 31–40 years had significantly higher levels of a misconception than those over 60 years, and graduates had considerably lower levels of misbelief than non-graduates, which indicates that every increase in education level reduces the effect of misinformation and vice versa. We suggest an urgent education campaign focusing on IDP with lower levels of education to correct misinformation and increase their awareness of COVID-19 infection through official social media channels.

## Strengths and limitations

This study has some limitations. Firstly, we conducted this work in the central Darfur region of Sudan among the IDP in the town of Zalingei. Secondly, we used a convenience sampling method in the data collection. Thus, the findings of this study might not be representative of the whole Darfur region. COVID-19 is a global public health threat that spreads rapidly and causes morbidity, and the mortality rate continues to increase worldwide.

## Conclusions

This study found evidence of a moderate level of misconception about COVID-19 among IDP in Sudan. This level of misunderstanding, if not corrected, may affect individuals' perception of the transmission and treatment of the disease. Furthermore, uneducated individuals have a higher level of a misconception than graduates. Thus, we recommend an education campaign focusing on the individual with a low level of education people to correct any misconceptions they may have regarding the prevention of COVID-19 infection. The findings of this study may help health authorities and policymakers design appropriate awareness programs to fight against misconceptions of COVID-19 among IDPs in Sudan.

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