

Nurses' Knowledge, Attitude, and Practice Regarding Personal Protective Equipment for the Prevention of COVID-19 in Public Hospitals Khartoum State Sudan 2022

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Abstract

Since December 2019, there had been a series of unexplained cases of pneumonia reported in Wuhan, China, and on 12 January 2020, the World Health Organization (WHO) named this new virus as the 2019 novel coronavirus (2019-nCoV). The Novel Coronavirus disease (COVID-19) is an emerging, rapidly changing global health challenge affecting all sectors, including the health sector. This study aimed to investigate nurses' knowledge, attitudes, and practices regarding the prevention and control of COVID-19. Methods: This cross-sectional study was conducted among nurses in three public health hospitals in Khartoum state. A self-administered questionnaire was used. A total of 14 knowledge questions were adopted. There are 5 questions constructed for attitude. A total of 12 practice questions were used. Mean score of knowledge considers as follows when the mean more than 75% considers as good knowledge while this percent uses as good practice and poor practice respectively to analyze the mean score differences of knowledge, attitudes, and practices between the independent variables. Spearman correlation was used to assess the relationship between mean knowledge and attitude scores. Results: Of the 101 nurses approached, a total of 100 nurses responded (99.0% response rate). The mean age of the participants was 27.6 (SD 5.3) years, and the majority of the participants were male (293/434, 67.5%). The mean knowledge score was 1.01 (SD 0.100). The mean attitude score was 10.5 (SD 4.1), and 54.8% (238/434) of the participants had a good attitude toward COVID-19. The mean practice score was 1.4176 (SD 1.4176). There was a

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negative correlation between knowledge and attitude scores ($P < -0.014$) and between knowledge and practice scores ($P < -0.081$). Conclusions: The overall levels of knowledge and practice and attitude were good.

Keywords

COVID-19, Knowledge, Attitude, Practice, Nurses, Public Hospitals
Khartoum State Sudan

1. Introduction and Background

Since December 2019, there had been a series of unexplained cases of pneumonia reported in Wuhan, China, and on 12 January 2020, the World Health Organization (WHO) named this new virus as the 2019 novel coronavirus (2019-nCoV) [1]. SARS-CoV is a coronavirus which belongs to the β -coronavirus cluster, it is the third zoonotic coronavirus disease after SARS and the Middle East respiratory syndrome (MERS) [2]. Novel Coronavirus disease (COVID-19) is an emerging, rapidly changing global health challenge affecting all sectors, including the health sector [3]. COVID-19 is probably going to overwhelm an already-fragile health healthcare delivery system and reduce the provision of services for endemic health concerns, like malaria and diarrheal diseases including cholera [3].

It is an emerging respiratory virus that has caused a world pandemic, claiming its spot together of the deadliest pandemics within the 21st century. COVID-19 or SARS-CoV-2 was first diagnosed amid an endemic of respiratory disorder cases in Wuhan city, Hubei Province, China [4]. It had been initially reported to the WHO on New Year's Eve, 2019. In 2020, the WHO declared the outbreak a world health emergency. On March 11, 2020, the WHO declared COVID-19 a world pandemic, the primary designation since declaring H1N1 influenza an outbreak in 2009 [5].

The first case confirmed in Sudan in March 2020. The government of Sudan declared the state of emergency and took more measures to contain the spread of the disease. These measures include:

Closure of faculties: Complete lock down and state of curfew beside restriction on travel and public gatherings.

As a major ill health worldwide, with a particularly high infection rate and in lack of treatment, it absolutely was developed into pandemic. The mode of the transmission of SARS-CoV-2 is via respiratory droplets from the infected person after cough or sneezing; furthermore, the infection may occur via touching of the virus contaminated surfaces [6]. The clinical presentation of other COVID-19 patients ranges from mild symptoms like fatigue and general weakness to life threatening Pneumonia like illness that eventually led to death thanks to the complications and multi-organ failure [2].

COVID-19 situation in Sudan Since first case of COVID-19 reported in Sudan

on 13 March 2020 and by 11 November 2020, there are 14,401 confirmed cases with 1116 deaths and 9535 recovered cases. The very best number of confirmed cases were reported in Khartoum State 10,393 (72.2%); followed by Gezira state 1214 (8.4%). Regarding the whole number of the death per the state; Khartoum state has contributed the foremost within the country total deaths associated with COVID-19 with 415 cases of death (37.18%); followed by Gezira state and North Darfur and therefore the least one was headstream state (0.08%) However, this can be mainly thanks to the proportionally high number of cases reported from Khartoum state to other areas of the country [7].

Several factors associated with the country socioeconomic and political situation have challenged the national lockdown as a prevention and control strategy that Sudan Federal Ministry of Health tried to implement a national. The main influential factors include poverty, in 2020, the rate in Sudan increased dramatically up to 212.3% (Sudan-Economic Indicators, <https://tradingeconomics.com/sudan/indicators>). This slump with mainly spurred by the supporters of former dictatorship regime, Omer Al Bashir, who was ousted last year after brutally ruling the country over the last three decades [8]. As Known preventive measures for private protective device like respiratory hygiene, cough etiquette (covering the nose and mouth when coughing), wearing a mask, frequent hand washing, cleaning and disinfection of surfaces, social distancing, avoiding social gatherings and handshaking, and refraining from touching the face, go simultaneously with the initiative, this proposal aim to search out Nurses Knowledge, Attitude, and Practice Regarding Personal Protective Equipment for the Prevention of COVID-19 publically hospitals Khartoum state Sudan as they represent back bone in hospitals thanks to their sort of work to be so close with patients specially who got the covid 19, after application the findings could also be useful in recommending any remedial measures and extra interventions within the study area to enhance awareness, attitudes, and practices among all health care workers beside nurses.

Also the planet Health Organization (WHO) issued guidelines on the employment of face masks in several settings, including within the community, in home-based care, and within the health care settings of COVID-19 [9]. During this guideline, HCWs are recommended to use face masks, like certified N95 respirator masks, when performing aerosol-generating procedures and to use medical masks when providing care to suspected or confirmed COVID-19 cases. However, these effective prevention and control practices rely on awareness and compliance among HCWs in any respect levels.

General objective:

1.1. General Objectives

To assess Nurses Knowledge, Attitude, and Practice Regarding Personal Protective Equipment for the Prevention of COVID-19 publicly hospitals Khartoum state Sudan 2022.

1.2. Specific Objectives

- 1) To assess nurses knowledge regarding precaution of COVID-19.
- 2) To assess nurses attitude regarding precaution of COVID-19.
- 3) To spot nurses's personnel practice regarding precaution for COVID-19.
- 4) To identify the factors that could be associated with high knowledge, optimistic attitude, and adequate use of protective measures. regarding COVID-19.

1.3. Problem Statement

Nurses by virtue of their profession can acquire COVID-19 infection from patients thanks to their closed contact with infected patients and also they can be the reason behind transmission of the disease.

1.4. Significance of Study

Strategies in health care facilities. Despite the supply of guidelines, attitude and practice towards infection control and prevention measures might vary due to the socioeconomic contexts, preparation of the healthcare system, and also the beliefs and motivation of the nurses of a rustic. It is reasonably assumed that good knowledge and a positive attitude regarding the utilization of non-public protective measures should result in the right practice of infection prevention and control (IPC). However, no study has assessed the KAP of PPE among health personnel to date. Therefore, the aim of the study was to assess the KAP regarding PPE among nurses who are at increased risk of exposure to covid19 thanks to involvement within the management of COVID-19 patients

1.5. Research Hypothesis

H1: there'll not be a rise in self-knowledge, attitude and care practice for the prevention of COVID-19.

H2: there'll be a rise in self-knowledge, attitude and care practice for the prevention of COVID-19.

2. Methods

2.1. Research Design

The research design selected for the study was descriptive hospital based study.

2.2. Study Setting

All units within the greater governmental hospitals (Omdurman-Khartoum North-Khartoum) in Khartoum state (104 nurses).

- 1) Omdurman teaching hospital (108).
- 2) Khartoum teaching hospital (288).
- 3) Khartoum North teaching hospital.

2.3. Target Population

All nurses from public hospital within the period of knowledge collections and

have inclusive criteria as follows:

2.3.1. Inclusion Criteria

Nurses who comply with participated in study:

Both sexes;

Nurses who have minimum six months of job experience.

2.3.2. Exclusion Criteria

Nurses refused to participate in study.

Nurses who are working in those hospitals which don't have direct patient care or services.

2.4. Sample Size

(*n*) Is calculated using the formula:

$$N = \left[z_{1-\alpha} + z_{1-\beta} \right]^2 / \Delta^2 + (z_{1-\alpha})^2 / 2$$

where

$z_{1-\alpha}$ could be a value from the conventional distribution associated with and representing the arrogance level.

$z_{1-\beta}$ may be a value from the conventional distribution associated with and representing the ability of the test.

Δ is that the effect size.

$\Delta = \delta / \sigma$.

$N =$ is that the sample size.

$N = 101$.

2.5. Sampling Techniques

Random sampling technique was accustomed select the sample.

2.6. Data Collection Tools

Tools are composed of three main tools:

Tool I: (face to face questionnaire sheet

Description of the Tool [1]

The interview schedule designed with two parts with a total number of 36 items. Consisted of (7) items pertaining to the demographic variables of the respondents such as age, sex, educational status, marital status, years of experience, work experience and Primary source of information and other questions for nurses knowledge regarding precaution coved19 which are (14) questions regard COVID-19.

Tool II: (Attitude Scale)

An attitude scale collected the information associated with attitude of nurses on coved19. A complete (12) items within the attitude scale which was divided into main content areas like Coved is preventable, Caring for patients with COVID-19 infection is also a threat to health care personnel the remainder within the ques-

tionnaire.

Tool III: practice of preventive measure:

This will use to gather the info associated with job practices of the nurses This tool are divided into (3) main content areas. avoid hand shaking, always wash my hands when touching any things, cough and sneeze in a very tissue and throw it in waste bin if I had close contact with confirmed case, I will be able to report my case and other use of non-public protective devices, also the remainder are within the questionnaire. There will be totally (12) items in questionnaire all of them closed ended question yes or no.

2.7. Statistical Analysis

Data collected, cleaned, entering, arranged, tabulated and analyzed in line with the sort of every data and entered into a database file. Pair test analysis is going to be performed by using the SPSS 25 computer software statistical package. Data are described by summary tables and results of data attitude and practice are tabulated and analyze using inferential statistics MS, SD and chi square p value 0.05 consider significantly.

Regard knowledge composed of true, false and I don't know giving 3 for true, 2 for false and 1 for I don't know, mean knowledge 75% consider as good knowledge below 75% modern knowledge.

Regard attitude researcher consider likert scale scoring (strongly agree, agree, neutral, strongly disagree and disagree) scoring 5 for strongly agree, 4 for agree, 3 for neutral, 2 for strongly disagree and 1 for disagree. 75% consider as good attitude below 75% modern attitude.

Regard practice composed of yes, no giving 2 for yes, and 1 for no, mean practice 75% consider as good practice below 75% poor practice.

2.8. Ethical Consideration

Verbal informed consent signed from all respondents to participate in the study. Names of respondents did not use in the report. The confidentiality of the information gather assured. Their right of refusal to participate in the study respected. Ethical approval will obtained from Management Committee of hospital for data collection.

3. Results

Table 1 Participants' characteristics in this, of the 101 nurses enrolled of this study, all of them completed the questionnaire. The socio demographic and other variables of the study participants are shown in **Table 1**. Of the study participants, 52 (51.5%) were female in gender, 49 (48.5%) their age between 21 - 30 which represent half of them 57 (56.4%) their mean age 1.8317 self-rated their academic achievements most of them are with diploma degree 90 (90.1), married 49 (48.5%).

Sources of knowledge about COVID-19. When the study participate were asked to provide their sources of knowledge about COVID-19, 45 (44.6%) of the

participants indicated that they obtained information about COVID-19 through the Scientific journals, 42 (41.6%) obtained information about COVID-19 through Seminars and workshops response of their knowledge about COVID-19, all of them answer as true (100%). As shown in table [1].

In **Table 2(a)** the participants asked about The common symptoms of COVID-19 are fever, fatigue, and dry cough, The causative agent of COVID-19 is corona virus., incubation period, and the route of transmission all of participant showed 100% correct answers, the rest of questionnaire in **Table 2(a)**, **Table 2(b)**. Their means knowledge is good 100 (99%).

Table 1. Demographic data, n (101).

Variable	frequency	percent	Mean	SD
Age group by years				
21 - 30	57	56.4		
more 30 - less 40	6	5.9	1.8317	0.99065
40 - 50	36	35.6		
more than 50	2	2.0		
Sex				
Male	49	48.5	1.5149	0.50227
Female	52	51.5		
Marital status				
Single	21	20.8		
Married	49	48.5	2.1782	0.85318
Widowed	23	22.8		
Divorced	8	7.9		
Education level				
Bachelor	10	9.9	1.9010	0.30016
Diploma	91	90.1		
Work experience (years)				
1 - 3	59	58.4	1.4158	0.49532
above 3 years	42	41.6		
Work place				
Medical ward	5	5.0		
Surgical ward	90	89.1	2.0198	0.37364
Out patient	5	5.0		
Theatre room	1	1.0		
Primary source of information				
Social media	5	5.0		
News media	5	5.0		
Scientific journals	45	44.6	3.8020	1.28078
Seminars and workshops	42	41.6		
Internet	4	4.0		

Table 2. (a) Knowledge of participants regard COVID-19, n (101); (b) Knowledge of participants regard COVID-19, n (101).

(a)

Variable	Freq	%
The common symptoms of COVID-19 are fever, fatigue, and dry cough		
True	101	100
False	0	0
I don't know	0	0
The causative agent of COVID-19 is corona virus.		
True	101	100
False	0	0
I don't know	0	0
The incubation period of COVID-19 is 2 to 14 days.		
True	100	99.0
False	0	0
I don't know	1	1.0
Not all persons with COVID-19 will develop severe cases. Only those who are elderly and have chronic illnesses are likely to be severe cases		
True	100	99.0
False	1	1.0
I don't know	0	0
COVID-19 can be transmitted through direct contact of respiratory droplets when infected persons cough or sneeze		
True	101	100
False	0	0
I don't know	0	0
Training and observation of standard precautionary measures are required by care giving personnel in suspected and probable cases of COVID-19 infection		
True	101	100
False	0	0
I don't know	0	0
Visitors to patients with suspected, probable, and confirmed cases of COVID-19 infection should be limited, both in hospital and at home		
True	101	100
False	0	0
I don't know	0	0

(b)

Variable	freq	%
The disease can be spread by people touching a surface or object that has the virus on it and then touching their own mouth or nose or possibly their eyes		
True	101	100
False	0	0
I don't know	0	0
Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus		
True	97	96.0
False	4	4.0
I don't know	0	0
People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place. In general, the observation period is 14 days		
True	101	100
False	0	0
I don't know	0	0
A person with mild symptoms of COVID-19 must remain at home until resolution of clinical symptoms		
True	101	100
False	0	0
I don't know	0	0
Standard precautions should be followed by health care providers in dealing with suspected, probable, and confirmed cases of COVID-19 infection		
True	101	100
False	0	0
I don't know	0	0
Oxygen therapy should be given to all cases of severe COVID-19 with acute respiratory infection		
True	101	100
False	0	0
I don't know	0	0
Mean knowledge		
knowledge more than 75% (good knowledge)	100	99.0
knowledge less than 75% (moderate knowledge)	1	1.0

In **Table 3** Response of their attitude about COVID-19 if it is preventable 91 (90.1%) strongly agree that and hen participant were ask when care for coved patient may be a threat to health care personnel 95 (94.1%) strongly agree same percent when asked if It is important to report suspected cases to health authorities, 90 (89.1%) their mean attitude good which is more than 75%.

Table 3. Attitude of participants regard COVID-19, n (101).

Variable	freq	%
Coved is preventable		
Strongly agree	91	90.1
Agree	3	3.0
Neutral	3	3.0
Disagree	4	4.0
Strongly disagree	0	0
Caring for patients with COVID-19 infection may be a threat to health care personnel		
Strongly agree	95	94.1
Agree	5	5.0
Neutral	0	0
Disagree	1	1.0
Strongly disagree	0	0
Public health agencies, &Public HealtInstitute, can control the outbreak of COVID-19		
Strongly agree	94	93.1
Agree	5	5.0
Neutral	2	2.0
Disagree	0	0
Strongly disagree	0	0
CO VID-19 can have a negative effect on the economies of the countries involved		
Strongly agree	93	92.1
Agree	6	5.9
Neutral	1	1.0
Disagree	1	1.0
Strongly disagree	0	0
It is important to report suspected cases to health authorities		
Strongly agree	95	94.1
Agree	3	3.0
Neutral	2	2.0
Disagree	1	1.0
Strongly disagree	0	0
Mean attitude		
attitude more than 75% (good attitude)	90	89.1
attitude less than 75% (moderate attitude)	11	10.9

Table 4(a), Table 4(b) Regarding the practice of PPE, (50.5%) avoid hand shaking, same percent always wash hands when touching any things 60.4% use

alcoholic hand rub, same percent cough and sneeze in a tissue and throw it in waste bin and wear a face mask while (52.5%) drink ginger with honey, and (44.6%) were eat garlic. Among the participants, (62.4) Have not you gone to any crowded places during the outbreak, and (66.3%) follow regular updates on the virus (68.3%) if had fever and dry cough I must go to the hospital and (50.5%) safely dispose of the used PPE items when I finish the service but their mean practice consider poor (39.6%).

Table 4. (a) practice of participants regard COVID-19, n (101); (b) Correlations between knowledge, attitude, and practice scores.

(a)

Variable	freq	%
I avoid hand shaking		
Yes	51	50.5
No	50	49.5
I always wash my hands when touching any things		
Yes	51	50.5
No	50	49.5
I use alcoholic hand rub		
Yes	61	60.4
No	40	39.6
I cough and sneeze in a tissue and throw it in waste bin		
Yes	61	60.4
No	40	39.6
I wear a face mask		
Yes	62	61.4
No	39	38.6
I drink ginger with honey		
Yes	53	52.5
No	48	47.5
Variable	Freq	%
I eat garlic		
Yes	45	44.6
No	56	55.4
Have you gone to any crowded places during the outbreak		
Yes	63	62.4
No	38	37.6

Continued

Do you follow regular updates on the virus			
	Yes	67	66.3
	No	34	33.7
if I had fever and dry cough I must go to the hospital			
	Yes	69	68.3
	No	32	31.7
if I had close contact with confirmed case, I will report my case			
	Yes	64	63.4
	No	37	36.6
I safely dispose of the used PPE items when I finish the service			
	Yes	51	50.5
	No	50	49.5
Mean practice			
	practice more than75% (good practice	40	39.6
	practice less than75%(moderate practice)	61	60.4
(b)			
Variable	Knowledge	Attitude P value	Practice P value
Knowledge	-	-0.014	-0.056
Attitude	-0.014	-	-0.095
Practice	-0.081	-0.095	-

Correlation between knowledge, attitude, and practice scores Spearman's correlations showed that there was a significant low positive correlation between knowledge scores and use of protective measures against COVID-19 (p value < -0.081). Similarly, there was a significant low positive correlation between attitude scores and use of protective measures against COVID-19 (p-value = -0.095). Details of the correlations between knowledge, attitude, and use of protective measures against COVID-19 are shown in **Table 4**.

Differences in knowledge, attitude, and use of protective measures against COVID-19 among the nurses **Table 5** shows differences in knowledge, attitude, and use of protective measures against COVID-19 among the participants. In this study, knowledge scores were significantly lower for their age p value 0.886, and regard correlation with education also low significant p value is 0.739 and regard marital status also low significant p value is 0.278, shown in **Table 5**.

Attitude scores were significantly lower for nurses for their age p value -0.069

And their academic achievements with their Attitude are significant low about COVID-19 as shown in (**Table 5**). Use of protective measures scores were significantly lower for nurses with their academic achievements p value is 0.518.

Their attitude compared with sociodemographic data is low.

And regard age also low in relation to their practice p value is 0.018. The other relation is shown in **Table 5**.

Table 5. Relation between demographic variable and knowledge, attitude and practice.

KAP	Demographic variables	P value
Knowledge	Age	0.886
	Education	0.739
	Marital status	0.278
Attitude	Age	-0.069
	Education	0.932
	Marital status	-0.186
Practice	Age	0.015
	Education	0.518
	Marital status	0.018

4. Discussion

In the present study, knowledge, attitude, and use of protective measures against COVID-19 among nurses practicing in governmental hospitals Khartoum state were assessed. The study highlighted some high awareness areas, moderately optimistic attitude, and some adequate use of protective measures against COVID-19 among nurses. Nurses play a pivotal role in COVID-19 management as front-liners. They are the first point of contact with COVID-19 patients in hospitals. Hence, they are at high risk for severe acute respiratory syndrome from SARS-COV-2 infection [10]. The best way for nurses to prevent this infection is through practice and demonstrated competency in donning, doffing, and proper use of personal protective equipment (PPE) [11].

Additionally, predictors of high knowledge, positive attitude, and appropriate use of protective measures against COVID-19 were also identified. The results of this study might shed light on the current behavior of nurses during this pandemic issue. Findings of this study are informative to decision makers in healthcare authorities and professional groups for designing measures and appropriate interventions to increase knowledge, positive attitude, and promote adequate use of protective measures against COVID-19 that might protect nurses from contracting COVID-19 during the ongoing global pandemic and other future viral pandemics. Findings of this study might indicate that knowledge about COVID19 among the majority of the nurses was top optimal. In this study, the nurses obtained their information on COVID-19 from different sources, notably, the internet/social media and scientific journals. Previous studies reported that healthcare providers including nurses were high users of different social media networks [12].

Our results also found that good knowledge was significantly associated with positive attitudes p value is -0.014. This is in line with several studies that found an association between the COVID-19 knowledge level of HCWs and their attitudes [13]. Knowledge of HCWs is a very important prerequisite for positive attitudes and for promoting positive practices. Attitudes toward COVID-19 were

also better among nurses who got information from scientific journals,. This is not came in line with a study that showed that social media exposure to COVID-19 information influences the adoption of preventive attitudes and behaviors through shaping risk perception [14].

Use of protective measures against COVID-19 positively correlated with knowledge and attitude scores, p value are -0.014 - -0.081 respectively. Taken together, these results might at least in part indicate that good knowledge supported by positive attitude might promote adequate use of protective measures against COVID-19 among nurses.

5. Conclusions and Recommendations

Findings of this study suggested that nurses had adequate knowledge, relatively optimistic attitude, and appropriately used protective measures against COVID-19 during the ongoing pandemic. Knowledge, attitude, and use of protective measures against COVID19 among nurses should continuously be updated as information unfolds during the ongoing pandemic. More efforts are still needed to ensure protection of healthcare providers including nurses from contracting COVID-19.

Probably, appropriately designed educational interventions (increasing knowledge regard personal protective equipment and to update knowledge on prevention and control measures) might be helpful in improving awareness of nurses on COVID-19 and similar viruses, increasing positive attitude toward containment approaches, and promoting adequate use of protective measures against COVID-19. Additionally, improving financial and social life conditions of nurses could also improve knowledge, attitude, and use of adequate protective measures against COVID-19 and similar viruses.

Conflicts of Interest

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

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