Medical Science

pISSN 2321–7359; eISSN 2321–7367

Knowledge of neurological symptom of covid-19 among general population in Al Qassim region: A cross-sectional study

Norah Alharbi[1*], **Basil Abdulrahman Alharbi**[2], **Turki Ibrahim Aloraini**[2], **Ali Saleh Alsughayyir**[2], **Naif Suliman Alaqil**[2]

To Cite:
Alharbi N, Alharbi BA, Aloraini TI, Alsughayyir AS, Alaqil NS. Knowledge of neurological symptom of covid-19 among general population in Al Qassim region: A cross-sectional study. Medical Science 2022; 26:ms332e2154.
doi: https://doi.org/10.54905/disssi/v26i126/ms332e2154

Authors' Affiliation:
[1]Clinical science department, College of Medicine, Princess Nourah Bint Abdulrahman University, Riyadh, Saudi Arabia
[2]Medical intern, Unaizah College of Medicine, Saudi Arabia

[*]**Corresponding Author**
Clinical science department, College of Medicine, Princess Nourah Bint Abdulrahman University,
Riyadh, Saudi Arabia

Peer-Review History
Received: 6 March 2022
Reviewed & Revised: 9/March/2022 to 29/July/2022
Accepted: 02 August 2022
Published: 08 August 2022

Peer-review Method
External peer-review was done through double-blind method.

URL: https://www.discoveryjournals.org/medicalscience

ABSTRACT

Background: The neurological involvement of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been reported in studies and its effect on the respiratory system. This study intended to assess the knowledge of neurological symptoms of COVID-19 among the Al'Qassim population, Saudi Arabia. *Methods:* This cross-sectional study was conducted on 529 Al'Qassim residents through an online survey. A COVID -19 online questionnaires was distributed via various messenger groups and social media. The questionnaire comprised of three sections to collect data regarding demographics, self-reported knowledge of neurologic symptoms, and neurological symptoms of COVID-19 for those who contracted COVID-19. For quantitative variables, mean and standard deviation were used, whereas for categorical variables, frequency and proportion were used. *Results:* Among the study population, the majority (35.34%) were aged between 18 to 24 years, and females (70.32%) outnumbered males (29.68%). The majority of the participants had acceptable (41.78%) knowledge of neurologic symptoms. The self-reported prevalence of COVID-19 among the respondents was 19.66%. *Conclusion:* Most respondents showed an acceptable to excellent knowledge of neurologic symptoms of COVID-19. However, this study found that females and younger age groups had better knowledge even though there was no statistical significance. Hence, health education intervention must be conducted targeting the vulnerable population to raise awareness of the disease's neurologic symptoms for early identification and prompt treatment.

Keywords: COVID -19, central nervous system, headache, knowledge, Saudi Arabia.

1. INTRODUCTION

The recent pandemic outbreak caused by the novel SARS-CoV2 virus in the Hubei region of Wuhan city, China, in December 2019 has led to severe public

health and economic crisis worldwide. The resultant disease COVID-19 has presented the following clinical characteristics: fever, dry cough, headache, fatigue, and myalgia, especially at the onset of the disease (Huang et al., 2020; Khan et al., 2020; Wang et al., 2020). Though COVID-19 is mainly known to affect the respiratory system, however, both direct and indirect neurological consequences have been reported (Mao et al., 2020). The neuroinvasion mechanism of SARS-CoV-2 has been considered via direct invasion, anterograde and retrograde transport along peripheral nerves and through blood vessels (Yavarpour-Bali & Ghasemi-Kasman, 2020).

Based on the neuroaxis involved, the neurological features can be classified as manifestations of the central nervous system (CNS) and peripheral nervous system (PNS) involvement, including skeletal muscle injury (Roy et al., 2021). It has been reported that around 25% of COVID -19 patients had CNS manifestations. CNS manifestations include significant non-specific symptoms such as headache, dizziness, and altered mental status, as well as several CNS syndromes such as cerebrovascular events, meningoencephalitis, seizures, and CNS neuro-immunological disorders (Mao et al., 2020). Several studies have identified a wide range of acute clinical neurological syndromes, including stroke, Guillain–Barré Syndrome (GBS) and variants, and meningoencephalitis. Apart from these manifestations, there are reports of neuropsychiatric manifestations (Calcagno et al., 2020; Pryce-Roberts et al., 2020). People with pre-existing neurological conditions like Parkinson's disease, Alzheimer's disease, and amyotrophic lateral sclerosis (ALS) could be at high risk. Likewise, autoimmune diseases like multiple sclerosis and myasthenia gravis may get exacerbated, and such patients are at high risk of severe COVID -19 (Calcagno et al., 2020).

A better understanding of patients' neurological symptoms with COVID -19 helps in the better therapeutic management of the same (Guadarrama-Ortiz et al., 2020). Research has shown that the knowledge of the public plays an essential role in dealing with the pandemic (Chirwa, 2020; Chirwa et al., 2019). Raising public awareness about the neurological complications of COVID -19 is also critical, as it aids in prevention and the pursuit of better treatment. Furthermore, no previous research has looked into the Al'Qassim population's awareness of the neurological complications of COVID -19. Thus, the purpose of this study was to determine the level of expertise. Thus, the purpose of this study was to determine the knowledge of neurological complications of COVID -19 among the general population in the Al'Qassim region.

2. METHODOLOGY

Study population

This study was conducted on the Al'Qassim population Saudi Arabia

Study design

Cross-sectional study

Sample size and Sampling method

In this online survey, a single population proportion formula was used assuming that 50% of study participants were aware of COVID -19 with 4% absolute precision and 95% confidence interval to determine the study's sample size, which was calculated as 385. Another (30%) 116 cases were added to compensate for missing or incomplete data, and as per availability of cases, 529 were considered into the study. A snowball sampling technique was used to obtain the sample size. WhatsApp, emails, and other social media platforms were used to send the questionnaire link to the study participants, who were contacts of the investigators. The survey was spread out to as many people as possible. As a result, in addition to the initial point of contact, the link was forwarded to a large number of other people, and so on. Around 529 respondents falling under the inclusion criteria were selected for final analysis. The inclusion criteria were; participants aged more than 18 years, participants who understood both Arabic and English and those who were willing to provide informed consent were included. Participants who were residents of Al'Qassim.

Study duration

The data collection was done for a period of 3 months from March 2021 to May 2021.

Ethical considerations

The bioethics committee at Qassim Health Affairs # H-4-Q-001 granted ethical approval, and from Public Health Research and Health Statistics Saudi Centre for Disease Control and Prevention (SCDC)#20213041.

Data collection tools and clinical examination

An online semi-structured questionnaire with a consent form was created using Google Forms. The questionnaire link was distributed via WhatsApp, email, and other social media platforms to study participants who were contacts of the investigators. The survey was administered to as many people as possible. As a result, in addition to the initial point of contact, the link was forwarded to a large number of other people, and so on. After clicking the link, the participants were directed to the informed consent and study questionnaire automatically. Several questions appeared sequentially after the participants accepted to take the survey, which the participants were supposed to answer.

The following three sections related to demographic, self-reported knowledge about the neurological symptoms of COVID -19 and neurological symptoms of COVID-19 for those who contracted during the pandemic were included in the online self-reported questionnaire developed by the investigators. Questionnaires for COVID-19 knowledge and face validity have been developed and tested in this study. A panel of experts involving a clinical neurologist and an epidemiologist made face validation (content). On a four-point scale, experts' opinions on whether or not to include questions in the survey instrument were ranked on LIKERT scale and ranges from strongly agree 4, agree 3, disagree 2, and strongly disagree. Finally, the average of the scale level content validity index (S-CVI) for knowledge was determined. (0.9). S-CVI values of 0.8 or above were deemed the cut-off criterion for content acceptability in the survey questionnaire (Zamanzadeh et al., 2015).

Statistical methods

The major outcome variable was participants' self-reported knowledge of COVID -19 neurological symptoms. COVID-19 neurologic symptoms in patients who got the virus during the pandemic were considered a secondary outcome variable. Data entry was done in Microsoft excel and was analyzed on SPSS 23. Mean, standard deviation was calculated for quantitative variables whereas for categorical variables frequency and proportion were used. To compare categorical outcomes between study groups, the Chi-square test was applied. Statistical significance was defined as a P-value of less than 0.05.

3. RESULTS

A total of 529 subjects were included in the final analysis majority (35.34%) were aged between 18 to 24 years, followed by 25 to 35 years (27.03%), and the majority were female with 70.32%. The majority of the participants were u university degree holders (78.82%), followed by 13.23% with high school education and 4.35% as postgraduates. Among the study participants, 33 (6.24%) had poor knowledge, 221 (41.78%) had acceptable knowledge about COVID -19, 193 (36.48%) had good, and 82 (15.50%) had excellent knowledge (Table 1)

Table 1 Summary of demographic parameter (N=529)

Parameter	Summary
Age group (in years)	
18 to 24 years	188(35.54%)
25 to 35 years	143(27.03%)
36 to 45 years	88(16.64%)
46 and above	110(20.79%)
Gender	
Male	157(29.68%)
Female	372(70.32%)
Educational level	
Elementary	3(0.57%)
Middle school	16(3.03%)
High school	70(13.23%)
University degree	417(78.82%)
Postgraduate	23(4.35%)
Self-reported knowledge about COVID -19	
Poor	33(6.24%)
Acceptable	221(41.78%)
Good	193(36.48%)
Excellent	82(15.50%)

Around 96% were aware that loss of taste and smell was a neurologic complication of COVID 19, followed by generalized weakness (93.95%), headache (91.5%), and muscle pain (90.17%). The respondents were also aware that the complications include dizziness (53.5%), imbalance (49.53%), confusion (36.86%), and weak hemisphere (27.6%) (Figure 1).

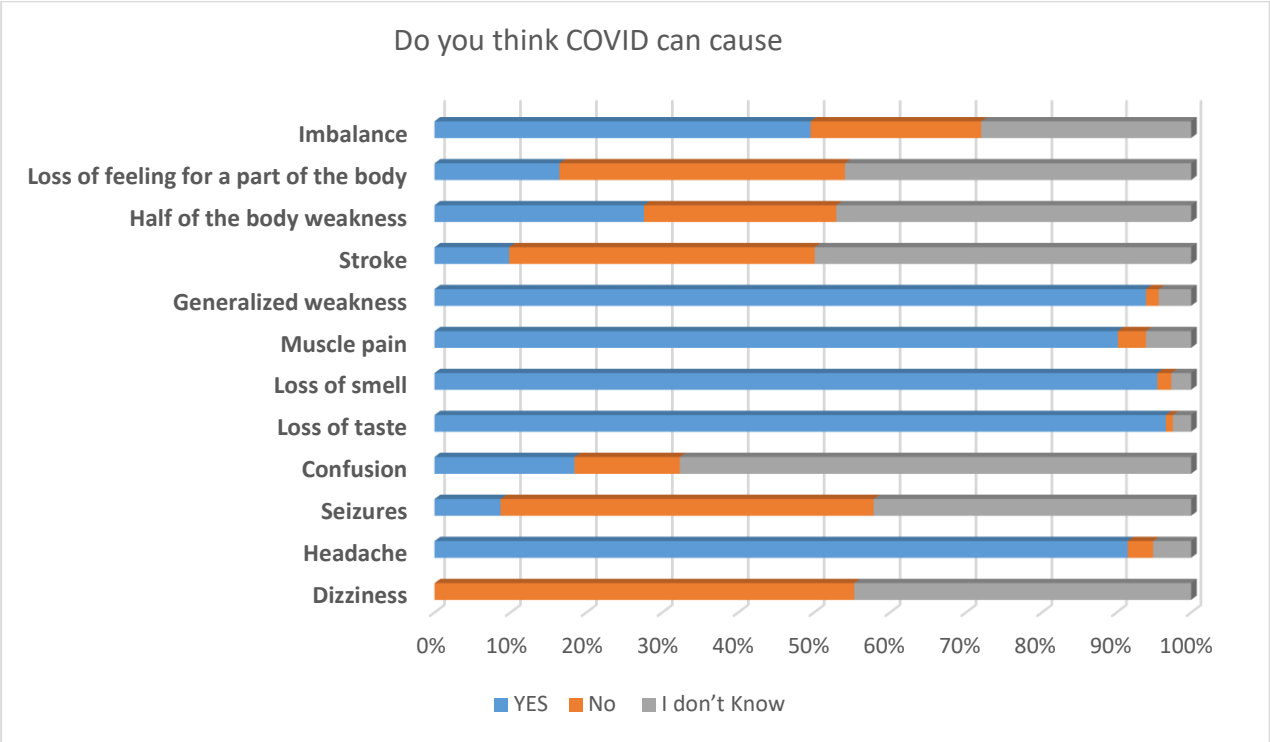

Figure 1 Summary of knowledge about the neurological complications of COVID -19 (N=529)

The self-reported prevalence of COVID -19 among the respondents was 19.66%. The common neurologic symptoms were loss of taste for 76 (73.07%) participants and loss of smell for 72 (69.23%) participants. Another 82 (78.85%) had headache, 44 (42.31%) had dizziness, 18 (17.31%) had confusion, 64 (61.54%) had muscle pain, 80 (76.92%) had a generalized weakness, and 26 (25%) had an imbalance. The majority of the participants (42.31%) who were infected with COVID -19 had symptoms for 7 days (Table 2).

Table 2 Summary of Prevalence of COVID -19 Infection and neurological symptoms (N=529)

Questions	Answer
	Yes
Have you been diagnosed with COVID -19	104(19.66%)
Neurological symptoms(N=104)	
Dizziness	44(42.31%)
Headache	82(78.85%)
Confusion	18(17.31%)
Seizures	0(0%)
Loss of taste	64(61.54%)
Loss of smell	75(72.12%)
Muscle pain	71(68.27%)
Generalized weakness	80(76.92%)
Half of the body weakness	4(3.85%)
Loss of feeling for a part of the body	3(2.88%)
Imbalance	26(25%)
Symptoms, how long did the symptoms last	
Less than a day	7(6.73%)

1 to 7 days	44(42.31%)
8 days to two weeks	32(30.77%)
15 days to a month	10(9.62%)
More than a month	11(10.57%)

There is no statistically significant difference between self-reported knowledge on the neurologic symptom of COVID 19 with age, gender, and education. But the percentage who self-reported their knowledge as poor was more in the age group of 46 and above (8.18%), and more males (7.64%) self-reported knowledge as poor compared to females but was not statistically significant (Table 3).

Table 3 Comparison of demographic parameter across overall knowledge about COVID -19 (N=529)

Demographic parameter	Overall knowledge about COVID -19				P-value
	Poor	Acceptable	Good	Excellent	
Age					
18 to 24 years (N=188)	10 (5.32%)	81 (43.09%)	66 (35.11%)	31 (16.49%)	0.323*
25 to 35 years (N=143)	7 (4.9%)	55 (38.46%)	51 (35.66%)	30 (20.98%)	
36 to 45 years (N=88)	7 (7.95%)	39 (44.32%)	30 (34.09%)	12 (13.64%)	
46 and above (N=110)	9 (8.18%)	46 (41.82%)	46 (41.82%)	9 (8.18%)	
Gender					
Male (N=157)	12 (7.64%)	60 (38.22%)	56 (35.67%)	29 (18.47%)	0.441*
Female (N=372)	21 (5.65%)	161 (43.28%)	137 (36.83%)	53 (14.25%)	
Education					
Elementary (N=3)	0 (0%)	0 (0%)	2 (66.67%)	1 (33.33%)	†
Middle School (N=16)	4 (25%)	6 (37.5%)	6 (37.5%)	0 (0%)	
High School (N=70)	7 (10%)	33 (47.14%)	20 (28.57%)	10 (14.29%)	
University Degree (N=417)	19 (4.56%)	176 (42.21%)	158 (37.89%)	64 (15.35%)	
Post Graduate (N=23)	3 (13.04%)	6 (26.09%)	7 (30.43%)	7 (30.43%)	

*-Chi-square test † -No statistical test was applied- due to 0 subjects in the cells

4. DISCUSSION

The current study included 529 participants, the vast majority of whom were females. The majority of them were between the ages of 18 and 24. The most of the participants were graduates with a sufficient understanding of COVID-19. The majority of them knew about the following symptoms: headache, loss of taste and smell, muscle pain, and generalized weakness. Around 19.66 % of participants were infected with COVID-19, of which the majority had headaches followed by generalized weakness and loss of smell (73.1%). Pandemics are a recurring phenomenon in which people face a variety of challenges. An unconcerned attitude is often the result of a lack of awareness, which may have an adverse effect on the infection control measures taken to overcome such challenges (Roy et al., 2020). In order to keep the disease from spreading and limiting the rate of infection, preventive steps are essential. Thus, it is necessary to raise awareness among the public to better prevent public adherence to control measures (Al-Hanawi et al., 2020).

Findings from several studies suggest that people were knowledgeable about COVID-19, especially the preventive measures to be followed, general clinical symptoms like fever, myalgia, dry cough, shortness of breath and fatigue, and the mode of spread of disease (Yousaf et al., 2020; Zhong et al., 2020). Similar level of knowledge on general COVID-19 symptoms was observed in research conducted in Saudi Arabia (Alhazmi et al., 2020; Yousaf et al., 2020). A thorough search of the relevant literature did not yield any related article. Hence, we assume that this is the first study to assess knowledge on neurological symptoms of COVID-19, especially in the Al Qassim region.

The present study explored the study participants' knowledge of the major neurological symptoms of COVID-19 and found out that the majority (41.8%) had acceptable knowledge followed by good knowledge. Most of the participants were aware of the major neurological symptoms like headache (91.5%), loss of taste (96.6%) and smell (95.5%), muscle pain (90.2%), and generalized weakness (94%) in the present study. Some studies reported headache as the predominant neurological symptom (Gupta et al., 2020; Nanshan et al., 2020). While other studies reported olfactory and gustatory dysfunction as the most common neurologic

manifestations in COVD-19 patients, they found its prevalence in patients with mild-to-moderate infection (Lechien et al., 2020; Nanshan et al., 2020). An incidence of 6 to 13% has been reported for headache, 5.6% to 88.5% for anosmia, 5.1% to 88% for ageusia, 7.5% for impaired consciousness, 5.7% for cerebrovascular events, 0.5% for stroke and 10.7% for skeletal muscle damage (Lechien et al., 2020; Mao et al., 2020; Nanshan et al., 2020). In the present study, of the 19.7% of participants infected with COVID 19, the majority had headaches followed by generalized weakness and loss of smell.

There is no statistically significant difference between self-reported knowledge on the neurologic symptom of COVID 19 with age, gender, and education. Age, gender, educational level, and income level, on the other hand, were all significant predictors of participant knowledge in various COVID-19 studies (Al-Mohrej et al., 2016; Bawazir et al., 2018; Beier & Ackerman, 2003). Majority of the participants were in younger age group. This may be partially due to easier access to social media platforms, WhatsApp, and emails than the elderly. Although the majority had acceptable knowledge of neurological symptoms of COVID-19, a minor group had poor knowledge. Hence, it necessitates increasing awareness among the individuals with low education, older age, and males, who had poor knowledge of the COVID-19 pandemic.

Several awareness programs were conducted by the Saudi Arabian Ministry of Health (MOH), like campaigns, advertisements on social media, and produced a guide that provides facts and precautionary messages on COVID-19 in more than 10 languages. This could explain the high level of knowledge among the study participants. Raising awareness about the neurological complications of COVID-19 is critical for prevention and general public health.

5. CONCLUSION

From what the authors know, this is the first study conducted in the Saudi Arabian population on the knowledge of neurological symptoms of COVID-19. The results showed that most participants self-rated their knowledge as acceptable on neurologic symptoms of COVID-19. Almost all participants were aware that loss of taste and smell is the neurologic complication of COVID-19. Knowing the neurological symptoms at the earliest increases the likelihood of an individual and community seeking treatment earlier, thereby reducing the spread and the complications associated with the disease.

Limitations

The present study has few limitations. Firstly, since this is an online survey, individuals from internet access deprived or restricted areas and the economically backward group without android phones or access to social media were not captured as samples, resulting in selection bias. Secondly, non-random sampling technique might have affected the result. Also the overall knowledge and prevalence were self-reported, which can cause potential bias in this online survey.

Abbreviation

COVID-19- Corono virus Disease 2019
SARS-CoV2-Severe acute respiratory syndrome coronavirus 2
CNS- central Nervous system
PNS- Peripheral Nervous system
GBS- Guillean Barre Syndrome
S-CVI- scale level content validity index

Ethics approval

The committee of bioethics at Qassim Health Affairs # H-4-Q-001 granted ethical approval, and from Public Health Research and Health Statistics Saudi Centre for Disease Control and Prevention (SCDC)#20213041.

Authors' contributions

Conceptualization: NA. Data curation: BA, TA, AA, NA; Formal analysis: NA. Funding acquisition: Norah Alharbi; Investigation: Ali S Alsughayyir, Naif S Alaqil. Methodology: NA, Software: BA, TA, NA. Validation: Norah Alharbi. Visualization: NA. Writing - NA: Writing - review & editing: BA, TA, AA.

Acknowledgements

The authors thank the participants of this study.

Funding

This study has not received any external funding.

Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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