RESEARCH PAPER

Coronavirus 2019-like illness and public adherence to preventive measures, Sudan 2020

BARA'A HASSAN MOHAMMED IBRAHIM[1], MUNEER MAKKI MUSA NORI[1],
WAHEEBA SIDDIG ABDALLAH[1], SUAD MOHAMMED ALI[2]
[1] Faculty of Medicine, University of Khartoum, Khartoum city, Khartoum state, Sudan;
[2] Department of Community Medicine, University of Khartoum

Keywords

COVID-19 • Protective measures • Suspected • Screening

Summary

Introduction. *In December 2019, a novel corona virus disease was identified and was responsible for the new cases of respiratory tract infections in Wuhan, China. This virus was responsible for the pandemic with more than 84 million cases and 1.82 million deaths worldwide. In Sudan till now the reported cases exceed 23,000 with 1.400 deaths. This study aims to determine the prevalence of COVID-19 suspected cases, health seeking behavior and public adherence to protective measures.*

Methods. *Descriptive community based cross-sectional study using nonprobability snowball sampling technique, conducted in Khartoum state 2020. 3499 respondents with diverse socio-demographic backgrounds were finally enrolled in the study. Data was collected through Manitoba Coronavirus 2019 screening form which distributed through online anonymous Google forms. Data was entered and analyzed by Statistical Package of Social Sciences version 23.*

Results. *The study revealed that 26.5% of the respondents were clinically suspected with headache or fatigability being the most common symptom followed by pharyngitis and then dry cough. Asthma and chronic respiratory disease as the commonest comorbidities. Wearing facial masks and regular hand washing were found to be the most used protective measures with only 39.4% implicates social distancing in their daily life. Health seeking behavior was significantly different among suspected respondents the majority tend to use antibiotics than to isolate themselves or undergo testing.*

Conclusion. *COVID-19 suspected cases were prevalent among Sudanese population; screening capacity has to be increased with more strong policies for implications of personal protective measures in the daily life.*

Introduction

The World Health Organization (WHO) on March 11, 2020, has declared the novel coronavirus (COVID-19) outbreak a global pandemic [1].

At a news briefing, WHO Director-General, Dr. Tedros Adhanom Ghebreyesus, noted that over the past 2 weeks, the number of cases outside China increased 13-fold and the number of countries with cases increased threefold. Further increases are expected. He said that the WHO is "deeply concerned both by the alarming levels of spread and severity and by the alarming levels of inaction," and he called on countries to take action now to contain the virus. "We should double down," he said. "We should be more aggressive." Among the WHO's current recommendations, people with mild respiratory symptoms should be encouraged to isolate themselves, and social distancing is emphasized, and these recommendations apply even to countries with no reported cases [2].

Novel COVID-19 "can often present as a common cold-like illness," wrote Roman Wöelfel et al. [3]. They report data from a study concerning nine young- to middle-aged adults in Germany who developed COVID-19 after close contact with a known case. All had generally mild clinical courses; seven had upper respiratory tract disease, and two had limited involvement of the lower respiratory tract. Pharyngeal virus shedding was high during the first week of symptoms, peaking on day 4. Additionally, sputum viral shedding persisted after symptom resolution. The German researchers say the current case definition for COVID-19, which emphasizes lower respiratory tract disease, may need to be adjusted [3]. But they considered only young and "normal" subject whereas the story is different in frail comorbid older patients, in whom COVID-19 may precipitate an interstitial pneumonia, with severe respiratory failure and death [4].

High level of attention should be paid to comorbidities in the treatment of COVID-19. In the literature, COVID-19 is characterized by the symptoms of viral pneumonia such as fever, fatigue, dry cough, and lymphopenia. Many of the older patients who become severely ill have evidence of underlying illness such as cardiovascular disease, liver disease, kidney disease, or malignant tumors. These patients often die of their original comorbidities. They die "with COVID" but were extremely frail and we therefore need to accurately evaluate all original comorbidities.

In addition to the risk of group transmission of an infectious disease, we should pay full attention to the treatment of the original comorbidities of the individual

while treating pneumonia, especially in older patients with serious comorbid conditions and poli-pharmacy. Not only capable of causing pneumonia, COVID-19 may also cause damage to other organs such as the heart, the liver, and the kidneys, as well as to organ systems such as the blood and the immune system. Patients die of multiple organ failure, shock, acute respiratory distress syndrome, heart failure, arrhythmias, and renal failure [3, 5].

As of March 1, 2020, 79,968 patients in China and 7,169 outside of China had tested positive for coronavirus disease 2019 (COVID-19). Among Chinese patients, 2873 deaths had occurred, equivalent to a mortality rate of 3.6% (95% CI 3.5-3.7), while 104 deaths from COVID-19 had been reported outside of China (1.5% [1.2-1.7]). However, these mortality rate estimates are based on the number of deaths relative to the number of confirmed cases of infection, which is not representative of the actual death rate; patients who die on any given day were infected much earlier, and thus the denominator of the mortality rate should be the total number of patients infected at the same time as those who died. Notably, the full denominator remains unknown because asymptomatic cases or patients with very mild symptoms might not be tested and will not be identified [6].

Regarding Sudan, the first case was reported on 13 March 2020, and up to 3 July 2020 there are 9,894 confirmed cases and 616 deaths. The case fatality rate was 6.23%. There is variation in case fatality rate, which in some cities (like Khartoum) was low (3.8%), but in others (like North Darfur) it was very high (31.7%) [7].

So, the novel corona virus pandemic constitutes a major health concern that need to be understood and controlled. COVID-19 pandemic is a catastrophic event affecting all aspects in life, and because of the low social awareness and ignorance toward the basic concepts of protection, symptoms and treatment believes, it is vital to assess all Sudanese population and even the small sector of them about the symptomatology and related aspects of COVID-19.

This study aims to determine the prevalence of COVID-19 suspected cases as well as public adherence to the protective measures and the association between these and the diverse socio-demographic backgrounds.

Methods

This was a descriptive community based cross-sectional study conducted in Khartoum state (November-December 2020), in which resides almost one quarter of the Sudanese population and most c of the cases of COVID-19.

The study population includes those aged 18 years and above of Sudanese nationality with exclusion of those unwilling or refused to participate.

Our aim was to recruit as much as possible sample size with diverse socio-demographic backgrounds. 3,499 respondents were finally included in the study. Data was collected using screening form adopted from Manitoba COVID-19 screening questionnaire [8].

The questionnaire was distributed through an online anonymous Google form. The form contains 21 items that emphasizes the socio-demographic characteristics, comorbidities, symptoms that might suggests COVID-19 or other viral infections,duration of the illness, health seeking behaviors along with adherence to the protective measures.

SCORING SYSTEM

The scoring system for suspected cases in this study was adopted from Sudanese federal ministry of health scoring system, marks were assigned as following:
- history of contact with suspected or confirmed case = 2;
- shortness of breath = 2;
- dry cough = 2;
- fever > 38 = 1;
- pharyngitis = 1;
- headache or fatigability = 1;
- anosmia or loss of taste sensation or both = 1;
- nausea/vomiting/diarrhea = 1.

The response score of 5 or more is considered as suspected cases, and scores of less than 5 is considered non suspected case.

The study was approved by local ethical committee, Department Community Medicine University of Khartoum. Written consent was taking from the participants prior to data collection.

The data was entered and analyzed using statistical package of social sciences (SPSS-25) version 25, categorical variables were presented as frequencies and percentages, and continuous variables as means and standard deviations, qi square test was used to test the difference between categorical variables and Pearson's correlation coefficient was used to determine the nature of the relationship between continuous variables, P-value < 0.05 was considered to be statistically significant.

Results

A total of 3,399 participants were finally enrolled in the study, 2,313 (68%) of them were females and 1,086 (32%) were males. most of the respondents (80.6%) were found to be within the age group of 18-32 year (Tab. I).

Among those who have chronic diseases, more than half of them 325 (60.8%) are suffering from asthma and respiratory tract diseases, 100 (2.9%) were hypertensive, 85 (2.5%) were diabetics, 14 (0.4%) having cardiovascular diseases, while only 2 (0.1%) suffering from cancer. 1,168 (34.4%) were unemployed and 1,841 (54.2%) of the employed respondents have job requirements of direct contact with people.

In regard to the symptoms suggesting COVID-19 infection, 2075 (61%) have symptoms suggesting the disease, Fatigability or headache were found to be the most prevalent symptoms in 1,739 (51.2%) followed by pharyngitis 1,381 (40.6%) then comes dry cough 781 (23%, Tab. II).

Regarding the presentation with combined symptoms,

Tab. I. Socio-demographic characteristics of the respondents.

	Frequency (%)
Gender	
Male	1,086 (32%)
Female	2,313 (68%)
Age groups	
18-32	2,739 (80.6%)
33-47	443 (13%)
48-62	175 (5.1%)
More than 62 year	42 (1.2%)
Smoking and snuffing	
Yes	423 (12.4%)
No	2,976 (87.6%)
Chronic diseases	
Yes	550 (16.2%)
No	2,849 (83.8%)

Tab. II. Symptoms suggesting COVID-19 infection.

Symptom	Frequency (%)
Pharyngitis	1,381 (40.6%)
Shortness of breath	456 (13.4%)
Anosmia	664 (19.5%)
Nausea and vomiting/diarrhea	244 (7.2%)
Cough	781 (23%)
Fatigability or headache	1,739 (51.2%)
Fever	448 (13.2%)

185 (9%) are having pharyngitis and dry cough, followed by 115 (5.6%) having pharyngitis and anosmia.

More than half of the respondents 2,156 (63.4%) had a history of contact with a confirmed or suspected case. Other symptoms that might suggest viral infections are runny nose 1,478 (43.5%), rash 97 (2.9%) and red eyes 205 (6%).

Of total 2,468 (53.9%) have symptoms for less than one week, (18.8%) still having the symptoms while (15.4%) have the symptoms for 2 weeks. 1,348 (39.7%) have a family member suffering of similar symptoms.

Despite the fact of having symptoms suggesting COVID-19 infection in the middle of the second wave, the majority 827 (38.2%) took antibiotics and 500 (23.1%) underwent COVID-19 testing, only 129 (6%) isolated themselves for 14 days, 312 (14.4%) used traditional medicine (Tab. III).

Of total of 471 underwent COVID-19 diagnostic test with 100 (21.2%) were positive and 371 (78.7%) were negative.

More than two thirds of the participants 2,403 (70.7%)

Tab. III. Health seeking behavior.

	Frequency (%)
Traditional medicine	312 (14.4%)
Antibiotics	827 (38.2%)
COVID-19 diagnostic testing	500 (23.1%)
Isolation for 14 days	129 (6%)
Did noting	397 (18.3%)

did not attend social or religious activities within the last 2 weeks.

About personal protective measures, 17.3% found to be adherent to only one protective measure. 2,131 (62.7%) wear masks regularly outside home, and 1,779 (52.3%) were using antiseptics and 39.4% maintain social distancing.

About one quarter of the candidates 898 (26.4%) were clinically suspected for having COVID-19 infection with score of 5 or more with a mean of (2.997 ± 2.666). Suspicion score is significantly inversely correlated with the number of protective measures that a participant use (r = -0.4, p-value = 0.028).

Female were more frequently suspected than male, and this difference was found to be statistically significant with a p-value = 0.000). Asthma and respiratory tract diseases were significantly the most prevalent chronic diseases in clinically suspected cases (p-value = 0.006). Among those who underwent COVID-19 diagnostic test, positive results significantly present in clinically suspected cases (p-vaue = 0.000).

Of total 898 clinically suspected participants, 542 have a family member suffering the same symptoms (p-value = 0.000). Most of the suspected respondents have a significant combination of both pharyngitis and dry cough (p-value = 0.000).

Having a family member suffering from the similar symptoms was found to have significant association with the use of protective measures with those adherent to protective measures are less likely to have family member having symptoms (p-value = 0.000).

regarding the symptoms and COVID-19 diagnostic tests, those presented with pharyngitis, Anosmia or combination of anosmia and fever are more likely to have positive test results (p-value = 0.000) with those who suffered from the symptoms for less than a week duration are more likely to have positive results (p-value = 0.000).

Discussion

This was a descriptive community-based study which was conducted in Khartoum state (November-December 2020) to assess prevalence of COVID-19 like symptoms and about three thousand and half populations were involved.

More than half were females and almost more than two thirds were in the middle age group, which can be attributed to the use of social media mostly by this age group.

Most of them were nonsmokers nor snuffers with no co morbidities. The majority of those having comorbidities suffers from asthma and respiratory tract illnesses followed by diabetes mellitus, hypertension, chronic heart disease and cancer which is similar to the study conducted on China [9].

More than half of responds were employed with their job requires direct daily contact with people and is very important when we deal with a disease transmitted

through air droplets or contact. Regarding the symptoms suggesting COVID19 infection, almost more than half suffered from fatigability or headache as the main symptom followed by pharyngitis, then dry cough and a this contradicts study done on united states which came out with dry cough, muscle aches and nasal congestion as main presenting symptom [10]. Another study done in united states revealed that fever is not a main presenting symptom,present on small group of patient as a main compliant [11], and this in correspond to the results of our study.

Which also contradict what was found on a study conducted on UK that represent loss of taste and smell sensation as the main symptom [12], and that done in Germany which reported loss of taste sensation, nausea and diarrhea not a presenting symptom [13]. And a third one done in china that ranked the top symptoms of presentation of COVID-19 the as fever, cough [9]. Not far, in Saudi Arabia, the main top three presenting symptoms as said on self-reports were fever, headache and anosmia [14]. This variation in the presentation of symptoms can be attributed to the different geographical characteristics and genetic variation of the individuals in addition to the viral mutations!

In addition to that, ranking headache and fatigability as the most the presenting symptom in our community can lead to delayed identification of the active cases as those two presentations may be mistaken for other non-respiratory illness like malaria unlike the combined presentation of pharyngitis and dry cough or pharyngitis with anosmia which is more specific to the disease, so the situation in our community is critical!

Most of the suspected cases had positive history of contact with suspected or confirmed with the disease and this explains the positive test results in this group.

Finding other nonspecific viral infection symptoms like runny nose with high positive predictive value for positive COVID-19 screening testing is of great importance as these symptoms are not categorized under the COVID-19 screening questionnaire adopted by the Sudanese federal ministry of health and can be easily missed due to their presence in other viral diseases. Half of responders said that symptoms duration lasts for less than a week and about third of them have family member suffered from similar symptoms this important in regard to the spreading of these symptoms among family members as those individuals don't tend to use personal protective measures in the house.

In spite of being symptomatic at the middle of the second wave of the wave, the health seeking behavior was not appropriate as almost half of population used antibiotics or traditional medicine with only a small fraction isolated themselves for 14 days or underwent COVID-19 diagnostic testing These behaviors to some extend differ from that of a study done on Saudi Arabia where the concern of social distance and use of herbal medications show different results [15].

Of those who underwent COVID-19 testing, two third were found to be negative and small proportion found to be positive, and among those who underwent COVID-19 diagnostic test, positive results significantly present in clinically suspected cases.

This can be attributed to the finding that the majority of symptomatic individuals don't undergo the diagnostic testing and fall under the categorization of active suspected cases in the individuals.

As this study revealed a small proportion of symptomatic cases isolated themselves for 14 the majority did not as daily life requires being out of home for some time for work or obtaining daily needs.

Testing here is another challenging entity because of financial issues first and the fact that people on the remote areas and countryside have no access to it. Personal protective measures such as hand hygiene and face mask use are included in public health guidelines for pandemic preparedness. Hand hygiene effectively reduces the transmission of respiratory infections through indirect contact in the community setting, and it should be practiced by all individuals and the larger population to limit the risk of transmission through fomite [16]. Most coronaviruses, including severe acute respiratory syndrome coronavirus 2, are inactivated by alcohol-based hand sanitizers and disinfectants such as bleach. Environmental disinfection with appropriate sanitizers is also recommended [16]. The efficacy of face masks among healthy individuals is unclear, but masks may protect others, particularly healthcare workers, from actively symptomatic individuals with COVID-19. However, the combination of masks and hand hygiene has been shown to reduce transmission of respiratory viruses and serves to highlight that layering of NPIs (Non-Pharmaceutical Interventions) is more effective at reducing disease transmission than any NPI alone [16].

On the field of protective measures; almost half or more of the participants documented the of wearing face mask,washing hands followed by the use of antiseptics and the social distance being the least one, and this lies in parallel with the study done on Japan in regard to hand hygiene but show contradictions on the area of using face mask and isolation [17] also these results show some similarities to results of study done on Saudi Arabia [18], and contradicts another one in regard of social contact and isolation [19].

This could be explained by the different population level of awareness and daily life requirements and socioeconomic classes.

All personal issues can be achieved but the big entity of social distancing may be a challenge and needs more efforts from community to commit and government policies to set more forced regulations.

Suspicion score was found to be significantly associated with the use of personal protective measures. As those suspected tend to use protective measures less often than those non-suspected and this can be explained by the protection effect of these measures, being less adherent being more susceptible to have the disease.

Female were more frequently suspected than male, and this is important on that most of homes and houses cared by females as mothers, grandmother and so and this may increase the infection rate through contacts. Here also to

put on regard if they are caring children and elderly as they may contact infection easily.

Asthma and respiratory tract diseases were significantly the most prevalent chronic diseases in clinically suspected cases. This result is different largely from what is said on this study, and also different from results of that done on United States which found that diabetes is the most prevalent [20]. Also a study done on Wuhan, china showed different results [21]. This may be of significance because respiratory tract is the main target of the virus and this comorbidity may give synergistic effect to the viral action increasing the rates of respiratory failure and deaths. Those categorized as suspected have positive history of a family member being symptomatic and this can be explained by the less use of indoor protective measure.

Females of the age group (33-52), postgraduates were found to be more adherent to protective measures than others, this can be explained by the fact that education is an important factor in the awareness of the disease and self-protection People with comorbidities, and those having a job that necessitates direct contact with people were also found to be more adherent than others this can be explained by the awareness of these individuals of being more at risk than others to catch up the disease.

It was found that those who attending social activities (parties, religious occasion…) with no consideration to the social distance were found to be less adherent to protective measures also there is association between adherence to protective measures and submitting COVID-19 test. This can be explained by the background knowledge about the disease process.

Regarding the symptoms and COVID-19 diagnostic test, those presented with pharyngitis, Anosmia or combination of anosmia and fever are more likely to have positive test results, with duration of symptoms for less than a week this can be added to the epidemiology of the disease in the community.

Conclusions

In conclusion COVID-19 like illness is quiet common in our community with many suspected cases, personal protective measures use is adequate with social distancing not being implicated as optimal, health seeking behavior if the community toward COVID-19 like illness and action toward undergoing diagnostic testing is suboptimal.

RECOMMENDATION

1. Federal ministry of health has to increase the capacity of screening COVID-19 In the community.
2. More restricted actions should be taken by the ministry of health toward the implication of personal protective measures whenever gathering is suspected.
3. Community awareness about the disease must be increased.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

BHMI provide the concept of the study. BHMI, MMMN, WSA contribute in writing the manuscript. BHMI and MMMN analyzed and interpret respondent's data. SMA supervise all the steps. All authors read and approved the final manuscript.

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