The Use of Google Docs In The Context Of COVID 19 Pandemic For The Assessment of Prolonged Fatigue After Infection: A Survey Study

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Abstract

Background: Whilst the globe is facing the second wave of COVID-19 and fears of a potential third wave, patients who were previously infected and recovered from the infection were inadvertently overlooked. Fatigue is one of the most common recognized complaints associated with Coronavirus infection and it has lasted for a variable period after recovery. **Objective:** To assess the frequency of fatigue post-COVID-19 and whether the period after full recovery and the duration of symptoms affects the severity of fatigue. **Method**: The current study is a cross-sectional survey. Google form was constructed to build online questionnaires. It included sociodemographic data and the 10 questions of the Fatigue Assessment Scale. Participants were also asked about the duration of symptoms and recovery time. **Results**: The study enrolled 215 participants. The mean age of the participants was 38.4 ± 12.6 years, 150 females (69.8%) and 65 males (30.2%). The most presenting symptom was bony ache (74.0%). The mean fatigue score was 36.0 and ranged from (12-50). There was no significant association between sociodemographic data items and the fatigue assessment scale. A statistically significant negative association was found between the time after COVID-19 recovery and the Fatigue Assessment Scale. However, there was a statistically significant positive correlation between the duration of symptoms and the Fatigue Assessment Scale. **Conclusion:** Post-COVID-19 fatigue has been common after recovery from the novel coronavirus infection. The sociodemographic variables did not affect the fatigue score. Prolonged fatigue was associated with a longer duration of symptoms; however, it decreases over time after recovery.

Keywords: *Coronavirus, fatigue, time after recovery*.

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Introduction

Pneumonia caused by severe acute respiratory syndrome Coronavirus-2 (SARS-CoV-2), the causative virus of Coronavirus disease 2019 (COVID-19) was newly diagnosed at the beginning of 2019 and was characterized by acute and widespread respiratory syndrome.[1] By the end of May 2020, more than 5.5 million confirmed cases of COVID-19 and more than 353,000 deaths worldwide had been recorded. According to the average number of cases in August 2020, Egypt is one of the top 40 countries in the world.[2] The main manifestations of Coronavirus are dry cough, fever, fatigue, or bony ache and shortness of breath, or difficulty breathing.[3,4] Fatigue is recognized as one of the most common complaints of patients infected with SARS-CoV-2. Fatigue is a subjective and relatively nonspecific disabling symptom, characterized by an alleviated capacity for work and reduced efficiency of accomplishment, and is usually accompanied by a feeling of weariness and tiredness. Disabling fatigue can have a significant impact on patient's everyday activities, as well as on his professional

and social life, leading to lower life quality.[5,6]

In a report on the clinical features of the infected patients, 40.3% of them presented with fatigue.[7,8] The exact mechanism of what causes post-viral fatigue remains undetermined. Many theories have been proposed in an attempt to explain the association between fatigue and viral infection. The release of chemicals and cytokines by the body's immune system as a part of the immune response to viral infection is one of the theories demonstrating the cause of fatigue and lack of energy in individuals.[9]

The effect of quarantine on cases of COVID-19 infection can also lead to the development of post-COVID-19 depression, prolonged fatigue, and anxiety.[10]

Long-term COVID or post-COVID syndrome is defined by the National Institute for Health and Care Excellence as a wide range of signs and symptoms that occur during or after an infection associated with COVID -19 and persist for more than 3 months. In addition, it may be related to residual inflammation, organ injury, non-specific effects of social isolation, hospitalization, or an influence on pre-existing health conditions.[11,12]

The presentation of the post-COVID-19 syndrome varies significantly from nonspecific symptoms such as bony pain, insomnia, fatigue, cough, and breathlessness, to more specific organ-related symptoms, such as orthopnea, leg swelling, and exercise intolerance due to COVID-19 induced heart failure. Also, pulmonary embolism can cause chest pain and severe breathlessness. Palpitations with mild exertion, night sweats, and poor temperature regulation were all identified as autonomic symptoms.[13,14]

This survey aims to assess the frequency of fatigue post-COVID-19 and whether the period after full recovery and the duration of symptoms affect fatigue severity.

Method

This cross-sectional survey assessed the frequency of fatigue post-COVID-19 and whether the period after full recovery and the duration of symptoms affect fatigue severity. The study was conducted from the 4th of November to the 29th of November 2020.

A convenience sample of 215 COVID-19 patients included patients of both genders, aged 16-80 years, who can read and write to complete the scales after complete recovery from COVID-19 (negative PCR). The study excluded individuals with general medical conditions such as chronic diseases that could be manifested by fatigue (renal disease, diabetes, hepatic disease, heart disease, cancer and hypothyroidism) as well as patients who did not perform PCR test after recovery. The study population was recruited from those who had recovered and discharged from the 4 isolation hospitals. A list of recovering patients was obtained from 4 hospitals. Individuals were invited to respond to the survey via emails and social media platforms such as WhatsApp. They have been informed of the content of the questionnaire and that the link will be available online during November 2020.

We used Google docs as an online survey constructing tool. The main benefits of Google docs are that it is easy to use, widely available, saves time and money, and is safe to use in the context of the COVID-19 pandemic. To our knowledge, the use of Google docs as a method for studying fatigue after recovery from a COVID-19 infection has not been reported before. In these circumstances, the primary concern is the safety of the clinical researchers and the community they interact with because a face-to-face interview is quite risky. Google docs applications are certified by the Federal Information Security Management Act (FISMA), SAS 70 Type II certification, and US/EU Safe harbor certification.[15]

Table 1: Sociodemographic data among the studied group

Characteristic	Total (n= 215)
Age (years)	
Mean ± SD	38.4±12.6
Median (range)	37.0 (16-79)
Age groups	
< 30	51 (23.7%)
30-40	98 (45.6%)
>40	66 (30.7%)
Sex	
Female	150 (69.8%)
Male	65 (30.2%)
Marital status	
Single	48 (22.3%)
Married	154 (71.6%)
Widow	7 (3.3%)
Divorced	6 (2.8%)
Occupation	
Employed	137 (63.7%)
Not employed	65 (30.2%)
Students	13 (6.1%)
Type of employment (n=137)	
Doctor	45 (32.8%)
Teacher	22 (16.1%)
Engineer	12 (8.8%)
Manger	11 (8.1%)
Nurse	6 (4.4%)
Pharmacist	6 (4.4%)
Others*	35 (25.5%)

*Values are presented as mean ± SD, average (range), or number (%). *Other works include: seller, Tour guide, jeweller, and Chef.*

The online questionnaire included clarification of the purpose of the study, sociodemographic data, symptoms, and the ten questions of the Fatigue Assessment Scale. This scale was developed by Michielsen et al.[16] Each item on the scale is answered using a five-point, Likert-type scale ranging from 1 ("never") to 5 ("always"). Items 4 and 10 are reverse scored. Total scores can range from 10, indicating the lowest level of fatigue, to 50, which indicates the highest. Scores between 22 and 34 indicate mild to moderate fatigue, whereas scores of 35 as a minimum indicate severe fatigue.[17] Although there are several validated fatigue rating scales, a comprehensive review of 30 published scales provided by

Table 2: The severity and main presenting symptoms among the participants

	Total (n= 215)
Symptoms*	
Bone ache	159 (74.0%)
Cough	130 (60.5%)
Fever	121 (56.3%)
Shortness of breath	118 (54.9%)
Headache	94 (43.7%)
Gastrointestinal symptoms**	123 (57.2%)
Loss of taste and smell	80 (37.2%)
Others***	94 (43.7%)
Need ICU admission	43 (20.0%)
Duration of symptoms (days)	18 (7.0-40.0)
Duration after recovery (days)	40.0 (15.0- 180.0)
Exposure to reinfection	16.0 (7.4%)
Duration of reinfection (months)	4.0 (3.0-6.0)

*Values are presented as mean (range) or number (%), ICU: intensive care unit. *ONE person may have more than one symptom. **Gastrointestinal symptoms include (vomiting, diarrhea, and abdominal pain). *** Other symptoms include rash, chest pain, numbness, and sore throat.*

Dittner et al.[18], the Fatigue Assessment Scale was found to be the most promising fatigue indicator with high reliability and validity, and it has been proven to be unidimensional without sex bias in both healthy control and diseased population.[19-21] It is a simple self-report fatigue questionnaire, easy to complete and not time-consuming as it takes approximately two minutes to fill out. The digital version of the Fatigue Assessment Scale is available online in 20 languages, including the Arabic version.

Furthermore, participants were asked about the duration of symptoms and recovery time, negative PCR, and chronic disease. The duration of reinfection was calculated after complete recovery with a negative PCR test after the first attack to clinical recurrence of symptoms compatible with COVID-19, which was confirmed by a positive PCR test.

A pilot study was conducted on 15 participants to assess clarity, applicability, and responsiveness to the questionnaire. The tools have been

Table 3: Distribution of fatigue assessment scale points among participants:

		Never N (%)	Sometimes N (%)	Regularly N (%)	Often N (%)	Always N (%)
1	I am bothered by fatigue	21 (9.8)	63 (29.3)	13 (6.0)	14 (6.5)	104 (48.4)
2	I get tired very quickly	14 (6.5)	76 (35.3)	9 (4.2)	38 (17.7)	78 (36.3)
3	I don't do much during the day	19 (8.8)	63 (29.3)	13 (6.0)	41 (19.1)	79 (36.7)
4	I have enough energy for everyday life.	101 (47.0)	38 (17.7)	30 (14.0)	23 (10.7)	23 (10.7)
5	Physically, I feel exhausted.	4 (1.9)	60 (27.9)	12 (6.5)	61 (28.4)	78 (36.3)
6	I have problems to start things	27 (12.6)	69 (32.1)	5 (2.3)	48 (22.3)	66 (30.7)
7	I have problems to think clearly	44 (20.5)	62 (28.8)	12 (5.6)	45 (20.9)	52 (24.2)
8	I feel no desire to do anything.	20 (9.3)	68 (31.6)	12 (5.6)	63 (29.3)	52 (24.2)
9	Mentally, I feel exhausted	18 (8.4)	73 (34.0)	17 (7.9)	51 (23.7)	56 (26.0)
10	When I am doing something, I can concentrate quite well	98 (45.6)	25 (11.6)	30 (14.0)	36 (16.7)	26 (12.1)
Median (range) of Fatigue assessment scale				**36.0 (12.0-50.0)**		

examined to validate their content by a panel of three experts from the National Cancer Institute, Cairo University. The reliability of tools was tested using Cronbach's Alpha test, and the reliability of the tool was 0.881.

Sample size estimation

A previous study[22] reported a 52.3% frequency of fatigue post-Covid-19. Based on these results, a minimum sample size of 196 patients is required with a margin of error of 0.05 and a 95% confidence interval. To compensate for the moderate response rate and prevalence of chronic diseases, 300 individuals were initially invited to respond to the survey. The sample size was estimated using NQuery statistical package, version 7.0, Los Angeles, CA.

Statistical Methods

The Statistical Package of Social Sciences (SPSS) (version 26) was used to generate the results. The normality of the data was tested using the Kolmogorov-Smirnov single-sample test. Qualitative data are described as the number and percent. Numerical variables were presented as mean and standard deviation (SD) or median and (range). To compare the two groups, the Mann-whitney test was used, and the Kruskal-Wallis test was used to compare more than two groups. Spearman correlation was used to correlate continuous data. A $p \leq 0.05$ was considered significant.

Ethical Consideration

The approval of the Institutional Review Board of the National Cancer Institute was obtained. Data were collected anonymously, and after a full explanation of the aim of the study, participants were educated about the target and benefits of the analysis. Participation in the survey was voluntary. In addition, written consent (i.e., in the form of a question) was provided first. Respondents must agree and give their consent to proceed with the survey. The confidentiality of the data collected was ensured for the participants.

Results

The current study included 215 participants. The mean age of the

Table 4: Association between sociodemographic characteristics and fatigue assessment score

Characteristic	Fatigue Score	p-value
Total	36 (12-50)	
Age groups		
< 30	36 (14-49)	
30-40	37 (12-50)	
>40	36 (13-37)	0.437
Sex		
Female	37 (15-50)	
Male	35 (18-40)	0.363
Marital status		
Single	33.5 (14-48)	
Married	37 (12-50)	
Widow	32.5 (21-39)	
Divorced	37 (26-39)	0.506
Occupation		
Employed	35 (12-50)	
Not Employed	36 (16-50)	
Students	34.5 (17-48)	0.965
Need ICU admission		
Yes	39 (27-49)	
No	33 (11-50)	< 0.001

Values are presented as mean (range), ICU: intensive care unit. Statistical test used: Mann-whinny and Kruskal-Wallis test

Table 5: Correlation of fatigue scores with days after recovery from COVID-19, and duration of symptoms

	Duration of symptoms		Duration after recovery	
	Rs	p value	Rs	p value
Fatigue Score	0.960	<0.001	-0.720	<0.001

Rs: Spearman correlation coefficient.

participants was 38.4±12.6 years, 45.6% of the participants were between 30.0-40.0 years, 150 females (69.8%), and 65 males (30.2%). About three-quarters of the participants were married (71.6%), two-thirds (63.7%) were employed (Table 1).

The most presenting symptoms were bony ache (74.0%), two-thirds of the participants complained of cough (60.5%), 43.7% suffered from headache, 57.2% experienced gastrointestinal symptoms, and 20.0% of the participants required admission to the intensive care unit (ICU). The median duration after recovery from COVID-19 was 40.0 days ranged from 15.0 to 180.0 days. The median duration of symptoms 18 days ranged from 7.0 to 40.0 days. 16.0 participants (7.4 %) were exposed to reinfection. The median duration of reinfection was about four months (Table 2**).**

The mean fatigue score was 36.0 and ranged between (12.0-50.0). Nearly half of the participants (47.0%) complained about not having enough energy for everyday life, and 36.3% reported they always feel exhausted (table 3). There is no statistically significant association between sociodemographic data (age group, sex, marital status, and work) and the Fatigue Assessment Scale. Cases that needed ICU admission had a significantly greater average Fatigue Assessment Scale than those who did not require ICU admission (39.0 vs. 33.0; p-value < 0.001) (Table 4). A statistically significant negative association was found between the time after COVID-19 recovery and the fatigue assessment scale (r=-0.720, p<0.001); however, there was a positive statistically significant correlation between the duration of symptoms and the Fatigue Assessment Scale (r=0.960, p<0.001) (Table 5).

Discussion

The present study is a cross-sectional survey to assess the frequency of fatigue post-COVID-19 and whether the period after full recovery and the duration of symptoms affect fatigue severity. The average fatigue score was 36.0 and ranged between (12.0-50.0). A statistically significant negative association was found between the time after COVID-19 recovery and the fatigue assessment scale (r=-0.720, p<0.001), nonetheless, there was a statistically significant positive

correlation between the duration of symptoms and the fatigue assessment scale (r=0.960, p<0.001).

In this study, the mean age of the participants was 38.4 ± 12.6 years. Approximately 45.6% of the participants are between 30-40 years. About two-thirds of the sample (63.7%) are employees (mostly health care workers). In a study by El Sayed et al.,[23] the mean age of the respondents was 36.58 (SD ± 9.85) years. 103 (51.5%) of the sample were employed and 97 (48.5%) were unemployed. The high proportion of healthcare staff infected with COVID-19, not only in our cohort but globally, indicates that healthcare systems would be severely impacted.

Fatigue, dyspnea, cough, and fever are the most common clinical symptoms of COVID-19 patients as reported by Yang et al.[24]; however, in this study, bony pain and cough were the main presenting symptoms.

The current study found a high fatigue score, which is in agreement with Huang et al.[25], who noted that most patients experienced muscle ache, myalgia, and fatigue in the post-COVID-19 era. Many interventions used to combat the pandemic, such as social distancing, quarantining and isolation, have proven successful in slowing the spread of the virus that may have unintended consequences exacerbating fatigue in the COVID-19 recovery. These negative psychological consequences include anxiety, confusion, post-traumatic stress symptoms, depression, and anger. When taken into account, these consequences are thought to be a major contributor to fatigue.[26]

Concerning the early post-recovery period, high scores of fatigue were reported among the participants, and this finding is in agreement with Goyal et al.[27], who noted that patients perceived sadness, loss of appetite, lethargy, inability to sleep, and ease of fatigability two weeks after recovery from COVID-19. Moreover, Canadian researchers discovered that most survivors from SARS had a better physical improvement from their disease, but thirty-three percent registered a major decline in mental health.[28] Another study reported that muscle weakness or fatigue and anxiety or depression were common, even at six months after symptom onset.[29] Self-isolation, lockdown, and social isolation can have detrimental effects on the individual's physical and mental ability. Furthermore, feeling anxious and distressed about the pandemic while not participating in physical activity in the quarantine may lead to increased fatigue.[30]

In the current study, cases requiring ICU admission had a significantly higher fatigue score than those who did not (39.0 vs. 33.0; p-value < 0.001). This finding is inconsistent with Townsend et al.[22], who reported no association between COVID-19 severity (need for hospitalization or critical care admission) and fatigue following COVID-19. For many patients, COVID-19-related fatigue can simultaneously occur in an environment where stress, anxiety, depression, and fear are rampant.[26]

In this study, a statistically significant negative correlation between the time after recovery from COVID-19 and fatigue assessment scale was reported (r=-0.720, P<0.001), and this aligns with the findings of El Sayed et al.[23], who also revealed a statistically significant negative correlation between the fatigue assessment scale and the time after recovery from COVID-19. This inverse correlation could be attributed to the clearing up of the residual inflammation with the increase of the recovery period, and consequently, the psychological effect of isolation decreases.

In the current study, there was a statistically significant positive correlation between the duration of symptoms and the fatigue assessment scale (r=0.960, p<0.001), and this study

was unique regarding the correlation between the severity of the Fatigue Assessment Scale and the duration of symptoms.

Conclusion

Post-COVID-19 fatigue has been common after recovery from the novel coronavirus infection. The sociodemographic variables did not affect the fatigue score. Prolonged fatigue was associated with a longer duration of symptoms; however, it decreases over time after recovery. The use of Google docs for constructing, disseminating, and collecting data in a time of a pandemic is an appropriate and adequate tool that can be utilized worldwide. The creation of the questionnaire in Google format was simple, time-efficient, valid, and reliable.

Limitation: The response rate is lower in the online survey than the physical survey. The study requires a larger number of cases to obtain more solid data. Additionally, the assessment was done only once. It is a preliminary study that needs further research to detect the cause and mechanism of post-COVID-19 fatigue.

Abbreviations: (SARS-CoV-2): severe acute respiratory syndrome coronavirus-2; (COVID-19): Coronavirus disease 2019; ICU: Intensive care unit.

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