

Prevalence of Fatigue in Patients Post Covid-19

Shendy W¹, Madonna Maher Ezzat², Doaa Abdallah ELaidy, MD³, Abdelaziz Abdelaziz Elsherif¹

¹ Department of Physical Therapy for Neuromuscular disorders and its Surgery, Faculty of Physical Therapy, Cairo University, Cairo, Egypt

² Department of Physical Therapy for Neuromuscular disorders and its Surgery, Faculty of Physical Therapy, ELNahda University, Beni Suef, Egypt

³ Department of Neurology, Faculty of Medicine, Ain Shams University, Cairo, Egypt.

Abstract

Background: pandemic Covid-19 isn't a simple health-care problem that will go away and never come back. One of the most common symptoms of Post-acute covid-19 is fatigue. **Purpose of the study:** To determine the prevalence of fatigue in adult people post mild and moderate covid-19 cases and the relation between fatigue post covid-19 and several factors. **Material and methods:** Eighty-one post covid-19 patients from both genders were recruited from registry records of preventive medicine and surveillance of Ministry of Health and Population in the city of El Minya / Egypt. The study was conducted from 15st September 2020 till 15st December 2020. Demographic data were collected (age, sex, BMI), smoking status, Data about status of covid-19 if they hospitalized or not hospitalized and received treatment. Fatigue post covid-19 was evaluated by using Modified Fatigue Impact Scale (MFIS) and Shortness of breath (dyspnea) by Numerical rating scale of dyspnea. **Results:** fatigue in adult patients post mild and moderate covid-19 cases after three to five months from their recovery was prevalent 64.2% using the MFIS. There was no significant association between fatigue and age, sex, BMI, smoking, hospitalization and received treatment. The association between NRS and MFIS was moderately positive and significant. ($r = 0.39$, $p = 0.0001$). **Conclusion:** fatigue was prevalent among adult patients post covid-19 with 64.2% using the MFIS. Continuous monitoring and timely intervention prevent long-term symptoms from being chronic.

Keywords: Covid-19, Fatigue, Modified Fatigue Impact Scale, Numerical rating scale.

Introduction:

Pandemic Covid-19 isn't a simple health-care problem that will go away and never come back. ⁽¹⁾ COVID-19 is predicted to have a significant influence on the condition of physical, cognitive, mental and social health, including patients with mild illness. ⁽²⁾ Fatigue is a frequently recorded symptom of COVID-19 ⁽³⁾, and anecdotal evidence indicates that certain individuals

continue to when they recover from this infection, they experience extreme levels of prolonged fatigue. This is predicted, fatigue post-infection has been frequently found in a variety of situations in both viral and non-viral diseases. ^(4, 5) Davido et al. ⁽⁶⁾ and Migliset al. ⁽⁷⁾ discovered that group of people with COVID-19 may develop a chronic disease characterized by severe fatigue that lasts long after the onset of symptoms. In spite of months passing after the first COVID-19 case, scientists face long-term complications. ⁽⁸⁾ Also in young adults and others who have no or few chronic illnesses, nonhospitalized COVID-19 disease in addition to hospitalized can lead to prolonged illness and persistent symptoms. ⁽⁹⁾ The severe and persistent nature of fatigue in some post-acute covid-19 patients reflects chronic fatigue syndrome, which has been reported after other serious infections such as SARS, MERS, and community-acquired pneumonia. ^(10, 11, 12, 13) A prolonged burden of fatigue after infection can affect the quality of life. ⁽¹⁴⁾ covid-19 survivors should examination regularly for evaluation manifestations of post covid-19. ⁽¹⁵⁾ The prevalence of symptoms associated with fatigue following COVID-19 infection should be examined first. ⁽¹⁶⁾ We investigated the prevalence of fatigue in adult patients post mild and moderate covid-19, and the link between it and several factors.

Material and Methods

Participants:-

This study was conducted on eighty-one persons. Patients were selected from registry records of preventive medicine and surveillance of Ministry of Health and Population in the city of El Minya / Egypt after three to five months from their recovering and they were assessed by telephone questionnaire.

Inclusion Criteria: -

Patients have been diagnosed as mild and moderate Covid-19 cases; it is diagnosed by polymer chain reaction (PCR), computed tomography (CT) scan and blood tests. ⁽¹⁷⁾ (People were considered to have recovered from Covid-19, according to the Egyptian Ministry of Health and Population report) by another PCR or absence of the acute symptoms of covid-19 for several days in some cases. They were treated by the standard protocol of Ministry of health and population in Egypt.

Participants' age was between 25 and 40 years, from both genders. Persons had sufficient cognitive abilities that enable them to understand and follow instructions. (Mini-Mental State Examination (MMSE) scale >24)

Exclusion criteria:-

Patients were excluded if they had a history of chronic medical condition, psychiatric problem, and cognitive impairment or take medications that can cause fatigue.

Procedures:-

Firstly, medical history was taken from Subjects to detect excluded persons, then collected demographic data (age, sex, height, and weight), smoking status and information about covid-19 status if they hospitalized or not hospitalized (During the initial stages, of the first wave of Covid-19, any person was diagnosed with Covid-19, was hospitalized regardless of the severity

of infection), and if they used supportive treatment only while supportive treatment include antibiotics, antipyretics, trace elements, and vitamins⁽¹⁵⁾, or with oxygen supply (simple mask face)

Fatigue was evaluated by modified fatigue impact scale, which is widely used fatigue scale.⁽¹⁸⁾ The MFIS is a shortened edition of the FIM, consisting of 21 items instead of 40.⁽¹⁹⁾ It evaluates the perceived effect of fatigue over the last four weeks on the physical, cognitive and psychosocial functioning of subscales.⁽²⁰⁾ MFIS total score is between 0 and 84. The scoring ranges are as follows for each subscale: physical, 0 to 36; cognitive, 0 to 40; and psychosocial, 0 to 8.⁽²¹⁾ To distinguish between fatigued and non-fatigued individuals, some studies use a total score of 38 as a cutoff.^(22, 23) The score of 38 was built on a study correlating the MFIS with another inventory of fatigue and its specified fatigue and non-fatigue scores.⁽²⁴⁾

In comparison to their baseline before COVID-19, Participants were asked to answer these questions with specific reference to the previous month. Subjects were asked to answer each statement of the MFIS questionnaire and choose the number from 1 to 4. The scoring processes for each item were answered by a five-step likert scale format from zero to 4 where zero means never, 1 means rarely, 2 means sometimes, 3 means often and 4 means almost always.⁽¹⁸⁾

Breathlessness (dyspnea) severity was assessed using a numerical rating scale such as Breathlessness (dyspnea) numerical rating scale, (score of 0-10; with 0 being no Breathlessness, 1-4 being mild Breathlessness, 5-6 being moderate Breathlessness and 7-10 being severe dyspnea.⁽²⁵⁾

Patients were asked to rate their shortness of breath by choose a number from 0 to 10, 'How short of breath(SOB) do you feel on this scale, with 0 representing no SOB and 10 representing the worst SOB you can imagine?'⁽²⁶⁾.

Statistical analysis:

Descriptive statistics of mean, standard deviation, frequencies, percentages and confidence interval (CI) were utilized in presenting the subjects demographic and clinical data. Quantitative variables were summarized using mean and standard deviation while categorical variables were summarized using frequencies and percentage. Chi-square statistics was utilized to examine associations between fatigue subject characteristics. Pearson Correlation Coefficient was conducted to determine the correlation between dyspnea (NRS) and MFIS. The level of significance for all statistical tests was set at $p < 0.05$. All statistical measures were performed through the statistical package for social studies (SPSS) version 25 for windows.

Results**Subjects characteristics**

Eighty-one subjects (55 (68%) females and 26 (32%) males) with post Covid-19 participated in this study. Their mean \pm SD age and BMI of the study group was 34.03 ± 4.9 years and 29.62 ± 5.42 kg/m² respectively. Subject characteristics presented in table 1.

Prevalence of fatigue:

The prevalence of fatigue in subjects with post Covid-19 of the study group was 64.2% with 95% CI of 53.33- 73.77%. The mean values of physical, cognitive, psychosocial domains and total score of MFIS of the study group is presented in table 1. The scores of MFIS revealed that 52 (64.2%) subjects were fatigued and 29 (35.8%) were non-fatigued. (table 2).

- Association between fatigue and subject characteristics:

There was no significant difference in the prevalence of fatigue between 21-36 years and 37- 40 years groups ($p > 0.05$); and there was no significant association between fatigue and BMI classes, sex, smoking status, received treatment and hospitalization ($p > 0.05$). While there was a significant association between dyspnea level and fatigue ($p = 0.04$). There was a significant increase in the fatigue prevalence in moderate (76.2%) and severe dyspnea (82.4%). (table 3).

- Relationship between Numerical Rating Scale for Dyspnea (NRS) and MFIS:

The correlation between NRS and MFIS was moderate positive significant correlation with physical domains ($r = 0.44$, $p = 0.0001$), moderate positive significant correlation with cognitive domain ($r = 0.31$, $p = 0.005$). weak positive significant correlation with psychosocial domain ($r = 0.27$, $p = 0.01$) and moderate positive significant correlation with total score ($r = 0.39$, $p = 0.0001$). (table 4)

Table 1. Participants' characteristics

	<i>N</i>	<i>%</i>
Age		
21-36 years	46	56.8%
37- 40 years	35	43.2%
BMI		
Normal weight (18.5–24.9 kg/m ²)	17	21%
Overweight (25.0–29.9 kg/m ²)	29	29%
Obese (≥ 30 kg/m ²)	35	35%
Sex		

Females	55	68%
Males	26	26%
Smoking behavior		
Smokers	6	7.4%
Non-smokers	75	92.6%
Received treatment		
Supportive	61	75.3%
Supportive with O2 therapy	20	24.7%
Hospitalization		
Hospitalized	11	13.6%
Not hospitalized	70	86.4%
Dyspnea level		
No dyspnea (0 score)	21	25.9
Mild (1-4 score)	22	27.2
Moderate (5-6 score)	21	25.9
Sever (7-10 sever)	17	21

Table 2. Prevalence of fatigue and mean MFIS in the study group.

	Prevalence	95% CI		
Fatigue	31 (62%)	48.15- 74.13%		
Mean MFIS in the study group				
MFIS	$\bar{X} \pm SD$	Minimum	Maximum	Range
Physical	20.86 ± 10.07	0	36	36
Cognitive	17.68 ± 9.6	0	35	35
Psychosocial	3.76 ± 2.7	0	8	8
Total Score	42.33 ± 20.67	0	76	76

CI, Confidence interval

Table 3. The frequency distribution of fatigue and association between fatigue and subject characteristics:

	Prevalence of fatigue		χ^2 value	p-value
	Fatigued	Not fatigued		
Age classes				
21-36 years	29 (63%)	17 (37%)	0.06	0.8
37- 40 years	23 (65.7%)	12 (34.3%)		
BMI classes				
Normal weight (18.5–24.9 kg/m ²)	12 (70.6%)	5 (29.4%)	1.62	0.44
Overweight (25.0–29.9 kg/m ²)	16 (55.2%)	13 (44.8%)		
Obese (≥ 30 kg/m ²)	24 (68.6%)	11 (31.4%)		
Sex				
Females	37 (67.3%)	18 (32.7%)	0.7	0.4
Males	15 (57.7%)	11 (42.3%)		
Smoking status				
Smokers	4 (66.7%)	2 (33.3%)	0.01	0.89
Non-smokers	48 (64%)	27 (36%)		
Received treatment				
Supportive	38 (62.3%)	23 (37.7%)	0.38	0.53
Supportive with O2 therapy	14 (70%)	6 (30%)		
Hospitalization				
Hospitalized	8 (72.7%)	3 (27.3%)	0.4	0.52
Not hospitalized	44 (62.9%)	26 (37.1%)		
Dyspnea level				
No dyspnea (0 score)	9 (42.9%)	12 (57.1%)	7.87	0.04
Mild (1-4 score)	13 (59.1%)	9 (40.9%)		
Moderate (5-6 score)	16 (76.2%)	5 (23.8%)		
Sever (7-10 sever)	14 (82.4%)	3 (17.6%)		

χ^2 , Chi squared value; p value, Probability value**Table 4. Correlation between NRS and MFIS:**

Dyspnea	MFIS	r value	p value
NRS	Physical	0.44	0.0001
	Cognitive	0.31	0.005
	Psychosocial	0.27	0.01
	Total Score	0.39	0.0001

r value, Pearson correlation coefficient; p value, Probability value

Discussion:-

In this study we concerned with examination of the prevalence fatigue post covid-19 in post mild and moderate cases by adult people with age between 25 and 40 years. This fatigue is characterized as reduction in physical and mental output as a result of changes in central, psychological, and peripheral factors caused by COVID-19 disease. ⁽²⁷⁾ This was to attract attention to these adult people who need early monitoring and timely intervention to prevent these long-term symptoms from being chronic. Our results proved that the fatigue is prevalent among adult people post mild and moderate covid-19 cases after 3-5 months following recovery from acute covid-19 by 64.2% using the MFIS. According to the current findings, there was no statistically significant difference in the prevalence of fatigue between 21-36 years and 37- 40 years' groups, there was also no significant association between fatigue and sex, BMI, smoking, hospitalization and received treatment .There was a significant correlation between MFIS and NRS.

The results of the current study were in line with Goertz et al., 2020 ⁽²⁸⁾ who reported that fatigue is still high in hospitalised and nonhospitalised patients including mild cases after three months from the onset of symptoms of covid-19. Kamal et al. ⁽¹⁵⁾, Carfi et al. ⁽²⁸⁾, Hapin et al. ⁽³⁰⁾, Townsend et al. ⁽¹⁴⁾ and Garrigues et al. ⁽³¹⁾ also reported fatigue post covid-19 during various periods 20 days after recovery-60 day after the onset of covid-19 symptoms-(4-8) weeks post recovery- a median of 10 weeks following the onset of symptoms with COVID-19 and 110 days after discharge respectively.

Participants' age was between 25 and 40 years to avoid fatigue related to aging. ⁽³²⁾ The current findings reported that there was no significant different in fatigue prevalence between 21-36 years and 37- 40 years groups. Results about fatigue post covid-19 in Townsend et al. study ⁽¹⁴⁾ were independent of the ageing effects Although Participants' age of their sample was 35 until 65. Sex has no effect on fatigue post covid-19 By contrast Female highly development of fatigue in Townsend et al. ⁽¹⁴⁾ in which participants with severe fatigue group were A large

number of women, as well as a higher number of women with a history of anxiety and depression, that play a role in fatigue development. ⁽²⁷⁾

The current study's findings showed that there was no statistically significant association between fatigue and BMI classes that was agreed with Kamal et al., ⁽¹⁵⁾ which reported that Obesity had no effect on the severity grade or form of symptoms following COVID-19. Increased COVID-19 symptom incidence is significantly associated with active smoking and a history of smoking ⁽³³⁾, but there was no significant correlation between fatigue post covid-19 and smoking in mild and moderate cases in the study sample in which all females were non-smokers and only 7.4% of males were smokers. We recommended future studies with large sample of smoking peoples to discuss effect of smoking on fatigue post covid-19.

During the initial stages of Covid-19's first wave, any person was diagnosed as Covid-19, was hospitalized regardless of the infection's severity, after rising number of cases in Egypt, and Keeping in mind the strain they put on hospital infrastructure, mild cases and most of moderate cases of covid-19 were isolated at home and follow up for them instead of hospital admission. Fatigue was found in mild and moderate cases whatever they hospitalization or at home isolation. Fatigue was independent of received treatment if it supportive treatment only or with oxygen supply.

We also found a strong correlation between NRS and MFIS that's where Fatigue is a multidimensional health issue that overlaps with dyspnea ⁽³⁰⁾. this was Compatible with Goërtz et al. ⁽²⁸⁾, Carfi et al. ⁽²⁹⁾, Hapin et al. ⁽³⁰⁾ and Garrigues et al. ⁽³¹⁾ which reported that dyspnea (breathlessness) is most common symptoms post covid-19 with fatigue.

Management of fatigue states requires multidisciplinary intervention. ⁽¹⁴⁾ Finally early intervention for post viral fatigue is very important to prevent more serious complications.

Conclusion:

It was concluded that fatigue was prevalent among adult patients post mild and moderate cases of covid-19. Fatigue Post covid-19 not associated with Age, Sex, BMI, smoking status, hospitalization and received treatment, it had a moderate positive significant correlation to Shortness of breath (dyspnea). We recommend that all patients recovery from acute symptoms of covid-19 should be followed up regularly. Early intervention for post viral fatigue and other manifestation is very important to prevent more serious complications.

Acknowledgment

We would like to express our appreciation to all of the patients who shared in our study as well as our family members who supported us and anyone who assisted in this work.

Ethical Clearance:

All procedures were in accordance with the Declaration of Helsinki and were approved by the Cairo University faculty of physical therapy Research Ethical Committee with registration number (P.T.REC/012/0029345).

References: -

- 1- O'Connor, Christopher M. "COVID-19 fatigue: not so fast " *JACC Journals* 8.7 (2020): 592-594.
- 2- Simpson, Robert, and Larry Robinson. "Rehabilitation after critical illness in people with COVID-19 infection." *American journal of physical medicine & rehabilitation* 99.6 (2020): 470-474.
- 3- Del Rio, Carlos, and Preeti N. Malani. "COVID-19—new insights on a rapidly changing epidemic." *Jama* 323.14 (2020): 1339-1340.
- 4- Hickie, Ian, et al. "Post-infective and chronic fatigue syndromes precipitated by viral and non-viral pathogens: prospective cohort study." *Bmj* 333.7568 (2006): 575.
- 5- Moldofsky, Harvey, and John Patcai. "Chronic widespread musculoskeletal pain, fatigue, depression and disordered sleep in chronic post-SARS syndrome; a case-controlled study." *BMC neurology* 11.1 (2011): 1-7.
- 6- Davido, Benjamin, et al. "Post–COVID-19 chronic symptoms: a postinfectious entity?." *Clinical Microbiology and Infection* 26.11 (2020): 1448-1449.
- 7- Miglis, Mitchell G., et al. "Re: 'Post-COVID-19 chronic symptoms' by Davido et al." *Clinical Microbiology and Infection* 27.3 (2020):494
- 8- Mardani, Masoud. "Post COVID syndrome." *Arch. Clin. Infect. Dis* 15 (2020): e108819.
- 9- Tenforde, Mark W., et al. "Symptom duration and risk factors for delayed return to usual health among outpatients with COVID-19 in a multistate health care systems network—United States, March–June 2020." *Morbidity and Mortality Weekly Report* 69.30 (2020): 993-998.
- 10- Hui, David SC, et al. "Long-term sequelae of SARS: physical, neuropsychiatric, and quality-of-life assessment." *Hong Kong medical journal= Xianggang yi xue za zhi* 15 (2009): 21-23.
- 11- Lam, Marco Ho-Bun, et al. "Mental morbidities and chronic fatigue in severe acute respiratory syndrome survivors: long-term follow-up." *Archives of internal medicine* 169.22 (2009): 2142-2147.
- 12- Moldofsky, Harvey, and John Patcai. "Chronic widespread musculoskeletal pain, fatigue, depression and disordered sleep in chronic post-SARS syndrome; a case-controlled study." *BMC neurology* 11.1 (2011): 1-7.
- 13- Dasgupta, Arundhati, Atul Kalhan, and Sanjay Kalra. "Long term complications and rehabilitation of COVID-19 patients." *J Pak Med Assoc* 70 (2020): S131-5.

- 14- Townsend, Liam, et al. "Persistent fatigue following SARS-CoV-2 infection is common and independent of severity of initial infection." *Plos one* 15.11 (2020): e0240784.
- 15- Kamal, Marwa, et al. "Assessment and characterisation of post-COVID-19 manifestations." *International Journal of Clinical Practice* 75.3 (2021): e13746.
- 16- Perrin, Ray, et al. "Into the looking glass: Post-viral syndrome post COVID-19." *Medical hypotheses* 144 (2020): 110055.
- 17- Udugama, Buddhisha, et al. "Diagnosing COVID-19: the disease and tools for detection." *ACS nano* 14.4 (2020): 3822-3835.
- 18- Lundgren-Nilsson, Åsa, et al. "Validation of Fatigue Impact Scale with various item sets—a Rasch analysis." *Disability and rehabilitation* 41.7 (2019): 840-846.
- 19- Fisk, John D., et al. "The impact of fatigue on patients with multiple sclerosis." *Canadian Journal of Neurological Sciences* 21.1 (1994): 9-14.
- 20- Rietberg, MB1, E. E. H. Van Wegen, and G. Kwakkel. "Measuring fatigue in patients with multiple sclerosis: reproducibility, responsiveness and concurrent validity of three Dutch self-report questionnaires." *Disability and rehabilitation* 32.22 (2010): 1870-1876.
- 21- Larson, Rebecca D. "Psychometric properties of the modified fatigue impact scale." *International journal of MS care* 15.1 (2013): 15-20.
- 22- Kos, Daphne, et al. "Evaluation of the Modified Fatigue Impact Scale in four different European countries." *Multiple Sclerosis Journal* 11.1 (2005): 76-80.
- 23- Téllez, Nieves, et al. "Does the Modified Fatigue Impact Scale offer a more comprehensive assessment of fatigue in MS?." *Multiple Sclerosis Journal* 11.2 (2005): 198-202.
- 24- Flachenecker, Peter, et al. "Fatigue in multiple sclerosis: a comparison of different rating scales and correlation to clinical parameters." *Multiple Sclerosis Journal* 8.6 (2002): 523-526.
- 25- Atreya, Shrikant, Raman Kumar, and Naveen Salins. "Community-based palliative care during the COVID 19 pandemic." *Journal of family medicine and primary care* 9.7 (2020): 3169- 3175.
- 26- Saracino, Amanda. "Review of dyspnoea quantification in the emergency department: is a rating scale for breathlessness suitable for use as an admission prediction tool?." *Emergency Medicine Australasia* 19.5 (2007): 394-404.
- 27- Rudroff, Thorsten, et al. "Post-COVID-19 Fatigue: Potential Contributing Factors." *Brain Sciences* 10.12 (2020): 1012.
- 28- Goërtz, Yvonne MJ, et al. "Persistent symptoms 3 months after a SARS-CoV-2 infection: the post-COVID-19 syndrome?." *ERJ open research* 6.4 (2020).
- 29- Carfi, Angelo, Roberto Bernabei, and Francesco Landi. "Persistent symptoms in patients after acute COVID-19." *Jama* 324.6 (2020): 603-605.

- 30- Halpin, Stephen J., et al. "Postdischarge symptoms and rehabilitation needs in survivors of COVID-19 infection: A cross-sectional evaluation." *Journal of medical virology* 93.2 (2021): 1013-1022.
- 31- Garrigues, Eve, et al. "Post-discharge persistent symptoms and health-related quality of life after hospitalization for COVID-19." *Journal of Infection* 81.6 (2020): e4-e6.
- 32- Moreh, Elijah, Jeremy M. Jacobs, and Jochanan Stessman. "Fatigue, function, and mortality in older adults." *Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences* 65.8 (2010): 887-895.
- 33- Gülsen, Askin, et al. "The effect of smoking on COVID-19 symptom severity: Systematic review and meta-analysis." *Pulmonary medicine* 2020 (2020).