

Effects of Post-COVID-19 Syndrome on Neuromuscular Performance and Functional Mobility

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ABSTRACT

Background: The coronavirus 2019 (COVID-19) pandemic has potential to disproportionately and severely affect patients with neuromuscular disorders which effects quality of life of infected patients by deterioration of physical health.

Objective: This study aimed to access the post-covid effect on neuromuscular system.

Material and Methodology: This cross-sectional study was done on post-Covid participants who experienced neuromuscular disorder of age between 20-50 years. In this study 181 participants were selected on the basis of inclusion criteria and exclusion criteria. All the participants were clearly explained about the purpose of study before administration of the questionnaire. Copies of questionnaire were distributed to the participants from various universities and colleges across Faisalabad district and researcher was guide each and every question of questionnaire. All the participants were evaluated using questionnaire form including demographic data and clinical information. Following the administration of questionnaire, neurology screen and fatigue rating scale used for measurement Data

Analysis: data will be analyzed by IBM SPSS version 20. **Results:** mean $\pm$ SD was 25.49 ± 2.157 . Out of 181 participants 78(43.1%) were male and 103(56.9%) were female. There was significant association between fatigues interferes with carrying out certain duties and responsibilities on headache, neck stiffness or eye pain with eye movements with chi square value 13.894 and p-value 0.018.

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Key words: COVID, Neuromuscular system, fatigue, headache, muscle stiffness

Introduction:

Human has a history of considerable pandemic which includes smallpox, cholera, AIDS, plague, influenza, dengue, TB, COVID. These pandemics had bad effect on human's life. Some of these pandemics are discussed as: Influenza pandemics are bizarre but repeated events that can have severe assumptions on societies across the World. Influenza pandemics have impacted about three times every century 1500. In 20th century, the world has come across 3 influenza pandemics which were "Spanish flu 1918-1919", "Asian flu 1957-1958", "Hong Kong flu 1968-1969". Human life and economic development was effected during each pandemic. The pandemic of influenza in 1918-1919 killed more than 29 million people across the world. (Organization, 2012) The ongoing COVID-19 epidemic has attracted worldwide attention since late 2019. We have given many people a new perspective, or, indeed, a new awareness about our potential vulnerability to emerging infectious diseases. The SARS-CoV-2 (previously, 2019-nCoV) virus was first recorded in Wuhan (China) in early december 2019, and it quickly spread throughout the world, resulting in 14 million active cases and 582,000 fatalities as of July 2020 (Shimohata, 2021). Fever, dry cough, exhaustion, production of sputum, breathlessness, sore throat, headache, lightheadedness, muscle aches or arthralgia, cold sweats, stomach problems, nasal congestion, diarrhoea, hemoptysis, as well as conjunctival congestion are classic signs and symptoms predicated on confirmed PCR, which appear 5–6 days after infection (variety of 1–14 days) (Jafari, Kolb and Mohajerani, 2021).

Several measures in Neuromuscular System have been taken public health experts such as: Fatigue, Headache, Muscle stiffness, Numbness, Muscle twitches, Seizures. Previous evidence has shown that adults are the most affected but health officials have also reported that children are also more susceptible to the disease (Cai et al., 2020) adults with post-COVID-19 syndrome or longer COVID may be affected by orthostatic intolerance. syndromes, with autonomic nervous system dysfunction as a possible cause of neuro-cardiovascular instability (NCVI). Long-term COVID can also be seen as chronic fatigue syndrome, which may be linked coronavirus to impaired neuromuscular function (NMFI). (Xue, F, et al. 2022)

The 2019 pandemic (COVID-19) has the potential to affect equally and severely affect participants with neuromuscular disorders. In the short term, it has already led to a reorganization of the delivery of neuromuscular clinical care and education, which may have lasting effects in the field. (Guidon, A. C., & Amato, A. A. .2020)

Depression during the acute and minor stages of infection is another serious risk factor for long-term fatigue This stress may be fundamental to the illness itself or be associated with other stressful life events. One can predict that the pressure associated with COVID-19 infection will be much higher than in other diseases. This concept is based on the deadly effects of the disease, closure and isolation, stigma and isolation, and economic and social conditions, including job security, home schooling, and concern for the health of older relatives etc. (Gaber, T, 2021). Extrapulmonary, sensorial, and neural consequences from SARS-CoV-2 infection include abrupt onset of olfactory and gustatory dysfunction, undifferentiated symptoms, and terribly long term neurological sequelae. The neuroinvasion caused by SARS-CoV-2 has been

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linked to the angiotensin-converting enzyme 2 (ACE2) pathway, which serve as functional receptors for the virus. In lung type 2 alveoli, enzyme receptor is usually detected. Several cells, including glial cells in the brain and neuron, express it, and it can induce neurological involvement by direct or indirect processes (Jafari, Kolb and Mohajerani, 2021).

Several neuromuscular conditions, including Guillain-Barré syndrome, rhabdomyolysis, and myositis, have been reported in participants infected with COVID-19. But even with a temporal association, a causal relationship remains unproven. Direct invasion of neurons or myocytes by the virus, and immune-mediated injury have been speculated but not consistently demonstrated. In addition to potentially causing the above conditions, COVID-19 can trigger exacerbations of preexisting neuromuscular conditions such as myasthenia gravis, and severe infections can lead to critical illness myopathy/polyneuropathy. (Suh, J., & Amato, A. A. 2021)

AIMS AND OBJECTIVES:

The study is aimed to assess post-Covid effect on neurological system.

To see effects of covid on muscle pain.

To determine the association of covid on neuromuscular system.

The objectives of this study was to determine the inter- relation of covid on neuromuscular system among the participants after covid.

To obtain the prevalence of post covid effect on neuromuscular system evaluated among the university and college students.

RATIONALE OF THE STUDY:

Covid effects on various systems of body including respiratory, nervous, and muscular system. But its effects persist even after recovery especially in neuromuscular system but limited literature found about muscle pain, persistent headache and dizziness which influences daily functioning and quality of life of community who suffered from COVID.

MATERIAL AND METHODOLOGY:

Study design:

This study is the cross-sectional study. A cross sectional study is a type of research design in which data is collected from many different individuals in time at a single point. In cross-sectional research variables are observed without influencing them.

Sampling technique:

A convenient sampling technique is used in this study. The survey was conducted on university and college students.

Setting:

The data was collected from participants who were previously infected with corona virus were evaluated from government colleges and universities all over the Faisalabad.

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Sample size:

Sample size 181 as per calculated by formula (Charan and Biswas, 2013)

$$\text{Sample size} = \frac{Z_{1-\alpha/2}^2 P(1-P)}{d^2}$$

$Z_{1-\alpha/2}$ (type I error at 5 percent) = 1.96

d (absolute error or precision of 5percent) = 0.05

P = prevalence or expected portion in population = 0.136 (13.6%) (Bobker and Robbins, 2020)

Duration of study:

The duration of the study is 3 months. The study is completed in this duration.

Variables:

Variables in the study are of two types,

Dependent variables which depends on other variables and changes throughout the study.

Independent variables do not change at all. These variables remain the same.

Independent variables:

Age

Gender

Fatigue

Dependent variable :

Fatigue rating scale

Neurology screen

Selection Criteria:

The selection criteria is that criteria which the participants are included or excluded from the study. The criteria are as follow:

Inclusion Criteria

Age group: (20-50) year

Both male and female gender

Post covid participants at least after 6 months

Participants who present with neuromuscular issues after COVID.

Participants who experienced fatigue after COVID.

Agree to consent form

Exclusion Criteria:

Participant were not suffering from neurological pathologies like parakinson's disease, multiple sclerosis.

Having history of cancer/metastasis.

Hemorrhagic patient.

Participants with pre cormorbidities

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Participants with history of stroke
Participants with calcium and vitamin D deficiency
Participants with history of neuropathy
Mentally unstable

Data collection tool:

Questionnaire: Neurology screen and Fatigue rating scale tool was used.

Informed consent :

A signed consent was taken by all participants before including subjects to study.

Data collection procedure:

This cross-sectional study is done on post-Covid participants who experienced neuromuscular disorder of age between 20-50 years. In this study 181 participants are selected on the basis of inclusion criteria and exclusion criteria. All the participants were clearly explained about the purpose of study before administration of the questionnaire. Copies of questionnaire were distributed to the participants from various colleges and Universities across Faisalabad district and researcher was guide each and every question of questionnaire. All the participants were evaluated using questionnaire form including demographic data and clinical information. Following the administration of questionnaire, neurology screen and fatigue severity scale was use for evaluation for pain intensity measurements.

Data analysis tool:

The data is analyzed on IBM SPSS version 20. Discriptive statistics was applied on data by SPSS.

Results:

Table:-weakness in face, arms or legs (or all)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid symptoms present before covid illness	4	2.2	2.2	2.2
Valid symptoms present during covid illness	82	45.3	45.3	47.5
Valid symptoms experienced at present	51	28.2	28.2	75.7
Valid symptoms experienced during covid and experienced at present	44	24.3	24.3	100.0
Total	181	100.0	100.0	

Out of 181 participants 4(2.2%) had weakness symptoms present before covid illness,

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82(45.3%) had weakness symptoms present during covid illness, 51(28.2%) had weakness symptoms present, 44(24.3%) had weakness symptoms experienced during covid and experienced at present.

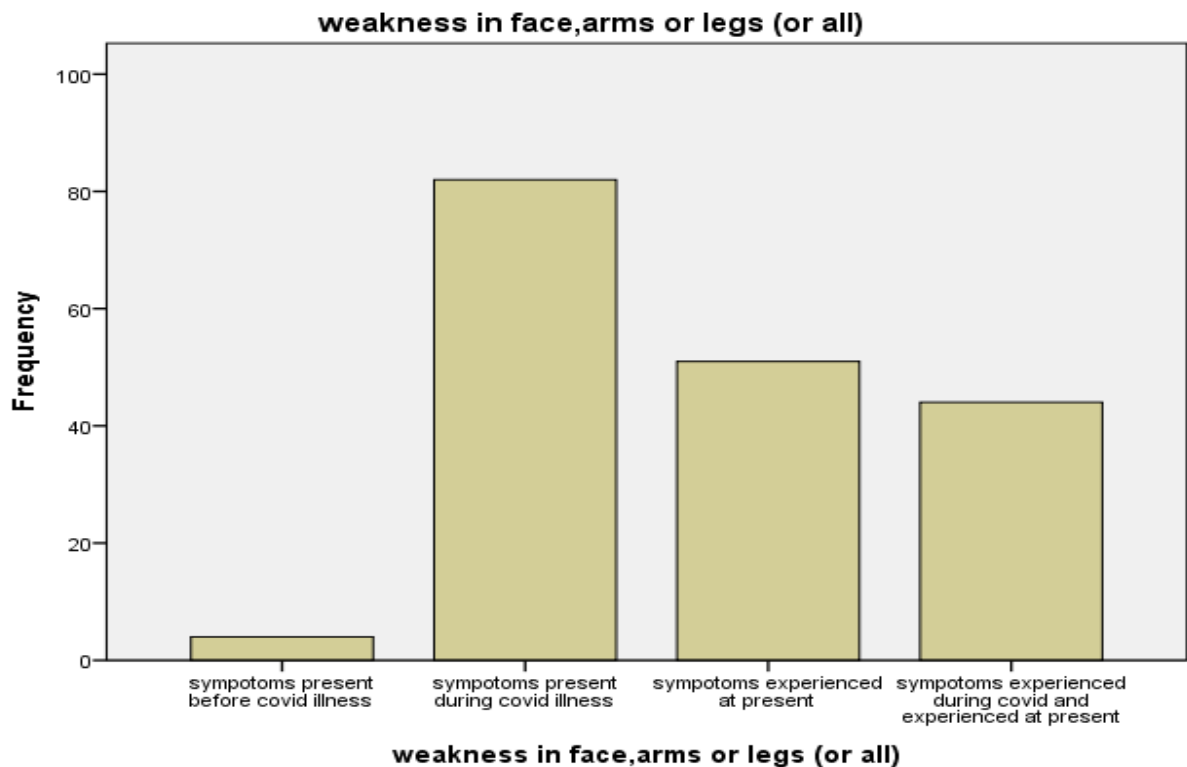


Table:- muscle stiffness or slowness of movements

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid symptoms present before covid illness	2	1.1	1.1	1.1
Valid symptoms present during covid illness	84	46.4	46.4	47.5
Valid symptoms experienced at present	51	28.2	28.2	75.7
Valid symptoms experienced during covid and experienced at present	44	24.3	24.3	100.0
Total	181	100.0	100.0	

Out of 181 participants 2(1.1%) had symptoms present before covid illness, 82(45.3%) had symptom's present during covid illness, 56(30.9%) had symptom's experienced at

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present, 41(22.7%) had symptom's experienced during covid and experienced at present.

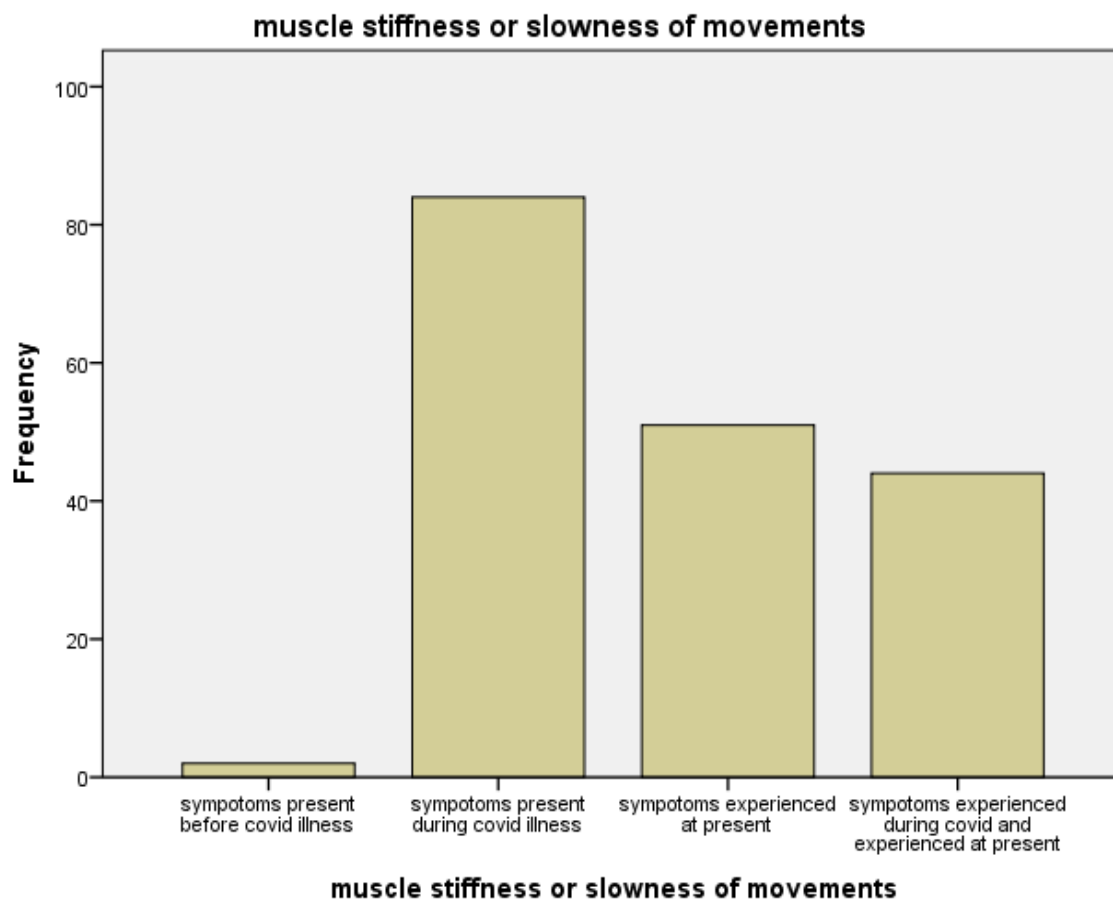


Table:-. headache, neck stiffness or eye pain with eye movements

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid symptoms present before covid illness	6	3.3	3.3	3.3
Valid symptoms present during covid illness	77	42.5	42.5	45.9
Valid symptoms experienced at present	58	32.0	32.0	77.9

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symptoms experienced during covid and experienced at present	40	22.1	22.1	100.0
Total	181	100.0	100.0	

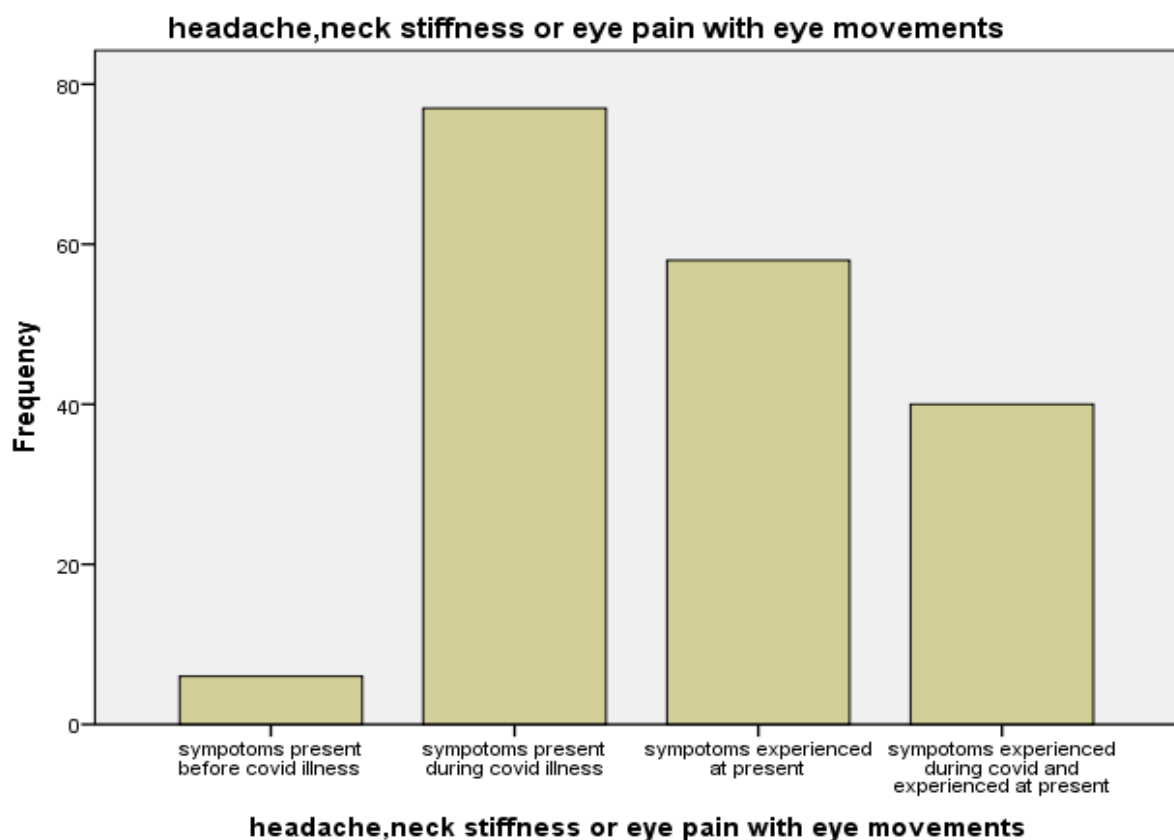


Fig:-: Headache, Neck Stiffness or Eye Pain with Eye Movements

Table:- muscle twitches or involuntary movements

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid symptoms present before covid illness	3	1.7	1.7	1.7
Valid symptoms present during covid illness	93	51.4	51.4	53.0
Valid symptoms experienced at present	49	27.1	27.1	80.1

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symptoms experienced during covid and experienced at present	36	19.9	19.9	100.0
Total	181	100.0	100.0	

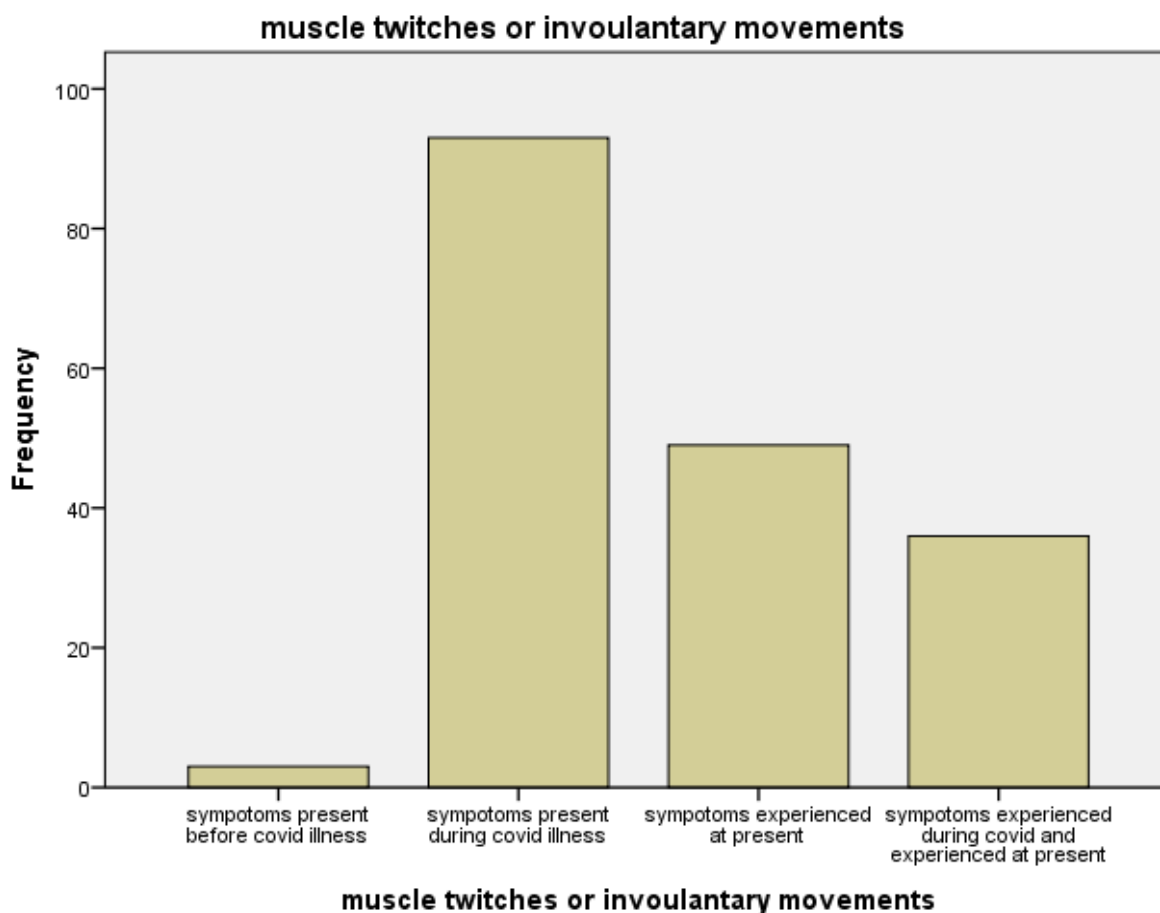


Fig:-Muscle Twitches or Involuntary Movements

Table:- difficulty with walking and balance

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid symptoms present before covid illness	1	.6	.6	.6
Valid symptoms present during covid illness	93	51.4	51.4	51.9

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symptoms experienced at present	50	27.6	27.6	79.6
symptoms experienced during covid and experienced at present	37	20.4	20.4	100.0
Total	181	100.0	100.0	

Out of 181 participants 1(0.6%) had symptoms present before covid illness, 93(51.4%) had symptom's present during covid illness, 50(27.6%) had symptom's experienced at present, 37(20.4%) had symptom's experienced during covid and experienced at present.

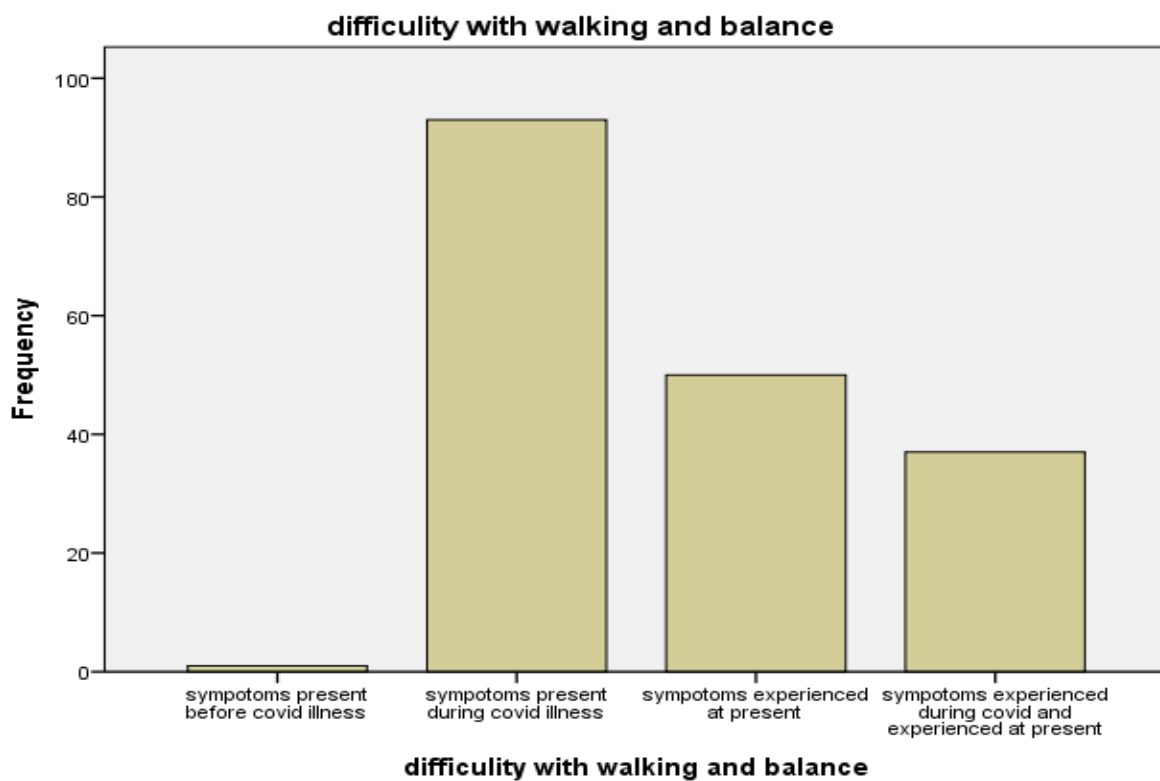


Table:-bowl and bladder problems

	Freque ncy	Percent	Valid Percent	Cumulative Percent
Valid symptoms present before covid illness	3	1.7	1.7	1.7
Valid symptoms present during covid illness	80	44.2	44.2	45.9

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symptoms experienced at present	53	29.3	29.3	75.1
symptoms experienced during covid and experienced at present	45	24.9	24.9	100.0
Total	181	100.0	100.0	

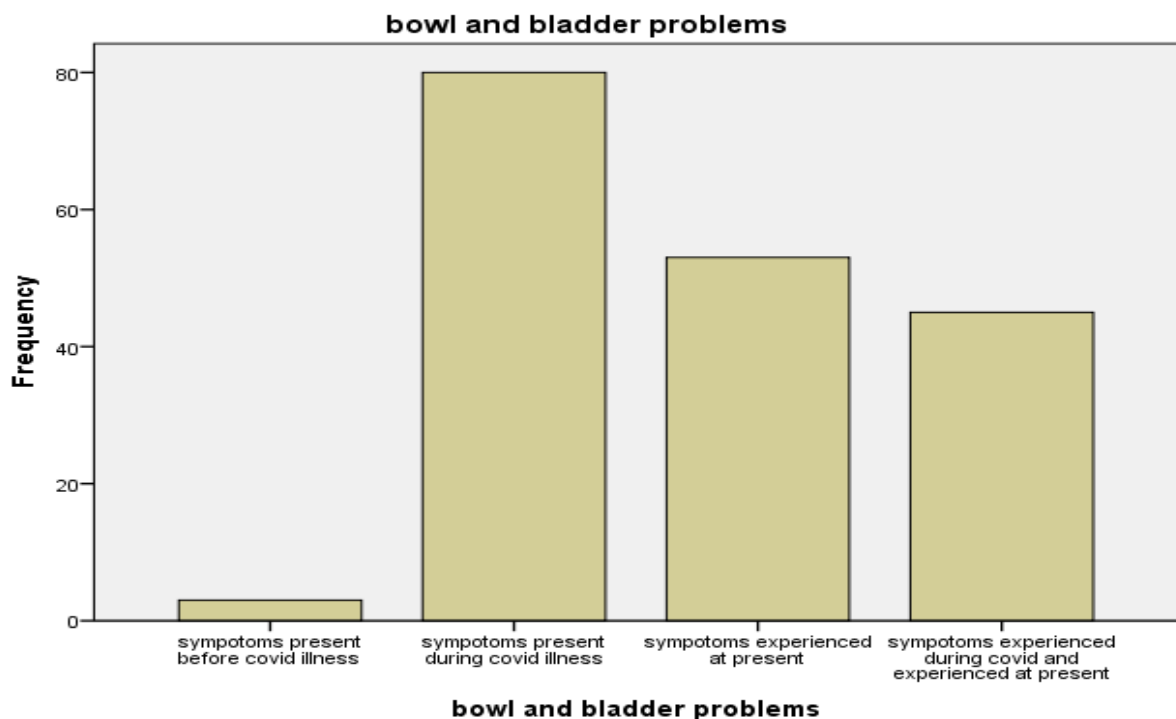


Fig:-bowl and bladder problems

Table:-fatigue interfere with my physical functioning

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid agree	96	53.0	53.0	53.0
strongly agree	43	23.8	23.8	76.8
disagree	16	8.8	8.8	85.6

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strongly disagree	12	6.6	6.6	92.3
neither agree or nor disagree	14	7.7	7.7	100.0
Total	181	100.0	100.0	

Out of 181 participants 96(53.0%) were agree on fatigue interfere with my physical functioning, 45(24.9%) were strongly agree on fatigue interfere with my physical functioning, 15(8.3%) were disagree on fatigue interfere with my physical functioning, 9(5.0%) were strongly disagree on fatigue interfere with my physical functioning, 11(6.1%) were neither agree on fatigue interfere with my physical functioning.

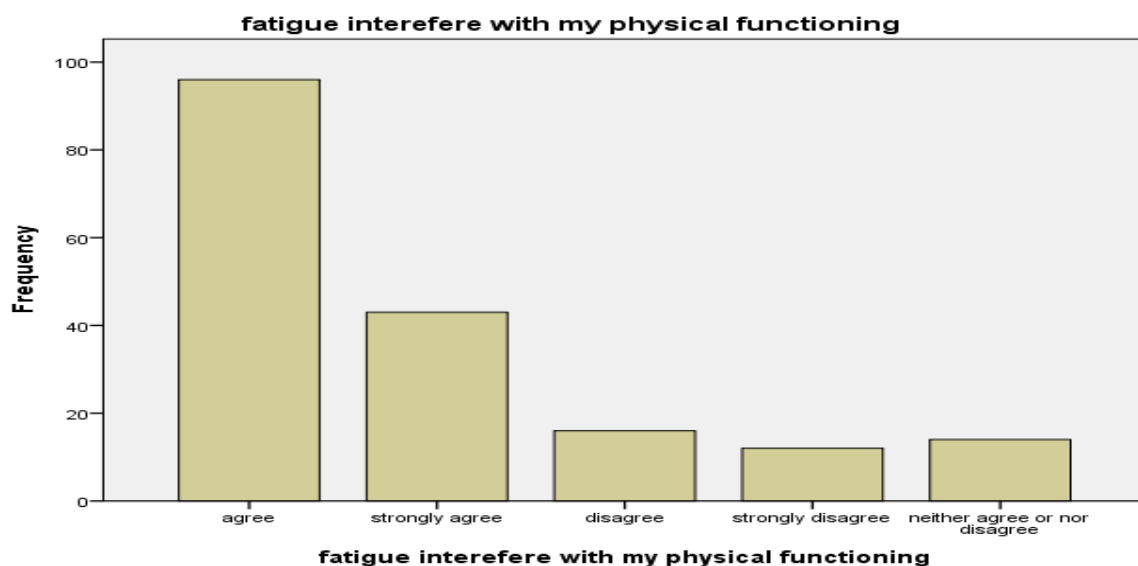


Fig:- Fatigue Interfere with my Physical Functioning

Cross tabulation of fatigue interfere with my physical functioning on muscle stiffness or slowness of movements

Crosstab		
	muscle stiffness or slowness of movements	Total

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			symptoms present before covid illness	symptoms present during covid illness	symptoms experienced at present	symptoms experienced during covid and experienced at present	
fatigue interefere with my physical functioning	agree	Count	1	39	33	23	96
		% of Total	0.6%	21.5%	18.2%	12.7%	53.0%
	strongly agree	Count	1	25	10	7	43
		% of Total	0.6%	13.8%	5.5%	3.9%	23.8%
	disagree	Count	0	7	3	6	16
		% of Total	0.0%	3.9%	1.7%	3.3%	8.8%
	strongly disagree	Count	0	5	2	5	12
		% of Total	0.0%	2.8%	1.1%	2.8%	6.6%
	neither agree or nor disagree	Count	0	8	3	3	14
		% of Total	0.0%	4.4%	1.7%	1.7%	7.7%
Total		Count	2	84	51	44	181
		% of Total	1.1%	46.4%	28.2%	24.3%	100.0%

This table explains cross tabulation of out of 181 participants 44(24.3%) had symptoms experienced during covid and experienced at present out of 44 participants 23(12.7%) were agree on fatigue interfere with their physical functioning and 51(28.2%) had symptoms experienced at present and out of 51 participants 33(18.2%) were agree on fatigue interfere with their physical functioning, 10(5.5%) were strongly agree on fatigue interfere with their physical functioning, 84(46.4%) had symptoms present during covid illness and out of 84 participants 39(21.5%) were agree on fatigue interfere with their physical functioning and 25(13.8%) were strongly agree on fatigue

interfere with their physical functioning.

Table:-- **Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.244	12	.019

For association chi square test was applied. There was significant association between fatigues interfere with their physical functioning on muscle stiffness or slowness of movements with chi square value 18.244 and p-value 0.019.

Cross tabulation of fatigue interfere with my physical functioning on muscle twitches or involuntary movements

Crosstab			muscle twitches or involuntary movements				Total
			symptoms present before covid illness	symptoms present during covid illness	symptoms experienced at present	symptoms experienced during covid and experienced at present	
fatigue interfere with my physical functioning	agree	Count	0	46	34	16	96
		% of Total	0.0%	25.4%	18.8%	8.8%	53.0%
	strongly agree	Count	2	27	3	11	43
		% of Total	1.1%	14.9%	1.7%	6.1%	23.8%
	disagree	Count	0	8	5	3	16
		% of Total	0.0%	4.4%	2.8%	1.7%	8.8%
	strong	Count	0	6	4	2	12

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	gly disagr ee	nt % of Tot al	0.0%	3.3%	2.2%	1.1%	6.6%
	neithe r agree or nor disagr ee	Cou nt	1	6	3	4	14
		% of Tot al	0.6%	3.3%	1.7%	2.2%	7.7%
Total		Cou nt	3	93	49	36	181
		% of Tot al	1.7%	51.4%	27.1%	19.9%	100.0 %

This table explains cross tabulation of out of 181 participants 36(19.9%) had symptoms experienced during covid and experienced at present out of 36 participants 16(8.8%) were agree on fatigue interfere with their physical functioning and 49(27.1%) had symptoms experienced at present and out of 49 participants 34(18.8%) were agree on fatigue interfere with their physical functioning, 3(1.7%) were strongly agree on fatigue interfere with their physical functioning, 93(51.4%) had symptoms present during covid illness and out of 93 participants 46(25.4%) were agree on fatigue interfere with their physical functioning and 27(14.9%) were strongly agree on fatigue interfere with their physical functioning.

. Chi-Square Tests

	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	19.574	12	.021

For association chi square test was applied. There was significant association between fatigues interfere with their physical functioning on muscle twitches or involuntary movements with chi square value 19.574 and p-value 0.021.

Cross tabulation of fatigue is among my three most disabling symptoms on muscle stiffness or slowness of movements

Crosstab		
	muscle stiffness or slowness of movements	Total

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			symptoms present before covid illness	symptoms present during covid illness	symptoms experienced at present	symptoms experienced during covid and experienced at present	
fatigue is among my three most disabling symptoms	agree	Count	2	44	25	23	94
		% of Total	1.1%	24.3%	13.8%	12.7%	51.9%
	strongly agree	Count	0	21	11	9	41
		% of Total	0.0%	11.6%	6.1%	5.0%	22.7%
	disagree	Count	0	5	7	5	17
		% of Total	0.0%	2.8%	3.9%	2.8%	9.4%
	strongly disagree	Count	0	6	5	3	14
		% of Total	0.0%	3.3%	2.8%	1.7%	7.7%
	neither agree or nor disagree	Count	0	8	3	4	15
		% of Total	0.0%	4.4%	1.7%	2.2%	8.3%
Total		Count	2	84	51	44	181
		% of	1.1%	46.4%	28.2%	24.3%	100.0%

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	Total					
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This table explains cross tabulation of out of 181 participants 44(24.3%) had muscle stiffness or slowness of movements symptoms experienced during covid and experienced at present, out of 44 participants 23(12.7%) were agree on fatigue is among their three most disabling symptoms and 51(28.2%) had symptoms experienced at present and out of 51 participants 25(13.8%) were agree on fatigue is among my three most disabling symptoms, 11(6.1%) were strongly agree on fatigue is among their three most disabling symptoms, 84(46.4%) had symptoms present during covid illness and out of 84 participants 44(24.3%) were agree on fatigue is among my three most disabling symptoms and 21(11.6%) were strongly agree on fatigue is among my three most disabling symptoms.

Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.437 ^a	12	.002

For association chi square test was applied. There was significant association between fatigues is among my three most disabling symptoms on muscle stiffness or slowness of movements with chi square value 10.437 and p-value 0.002.

Cross tabulation of fatigue is among my three most disabling symptoms on muscle twitches or involuntary movements

Crosstab							
			muscle twitches or involuntary movements				Total
			symptoms present before covid illness	symptoms present during covid illness	symptoms experienced at present	symptoms experienced during covid and experienced at present	
fatigue is among my three	agree	Count	1	42	30	21	94
		% of Tot	0.6%	23.2%	16.6%	11.6%	51.9%

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most disabli ng sympto ms	stron gly agree	al						
		Cou nt	2	21	8	10	41	
		% of Tot al	1.1%	11.6%	4.4%	5.5%	22.7 %	
	disag ree	Cou nt	0	8	8	1	17	
		% of Tot al	0.0%	4.4%	4.4%	0.6%	9.4%	
	stron gly disag ree	Cou nt	0	11	1	2	14	
		% of Tot al	0.0%	6.1%	0.6%	1.1%	7.7%	
	neith er agree or nor disag ree	Cou nt	0	11	2	2	15	
		% of Tot al	0.0%	6.1%	1.1%	1.1%	8.3%	
	Total		Cou nt	3	93	49	36	181
			% of Tot al	1.7%	51.4%	27.1%	19.9%	100. 0%

This table explains cross tabulation of out of 181 participants 36(19.9%) had muscle stiffness or slowness of movements symptoms experienced during covid and experienced at present, out of 36 participants 21(11.6%) were agree on fatigue is among their three most disabling symptoms and 49(27.1%) had symptoms experienced at present and out of 49 participants 30(16.6%) were agree on fatigue is among my three most disabling symptoms, 8(4.4%) were strongly agree on fatigue is among their three most disabling symptoms, 93(51.4%) had symptoms present during covid illness and out of 93 participants 42(22.2%) were agree on fatigue is among my three most disabling symptoms and 21(11.6%) were strongly agree on fatigue is among my three most disabling symptoms.

Chi-Square Tests

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Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.044	12	.002

For association chi square test was applied. There was significant association between fatigues is among my three most disabling symptoms on muscle twitches or involuntary movements with chi square value 10.437 and p-value 0.002.

Cross tabulation of Fatigue interfere with my physical functioning on headache, neck stiffness or eye pain with eye movements

Crosstab							
			headache, neck stiffness or eye pain with eye movements				Total
			symptoms present before covid illness	symptoms present during covid illness	symptoms experienced at present	symptoms experienced during covid and experienced at present	
fatigue interfere with my physical functioning	agree	Count	3	32	34	27	96
		% of Total	1.7%	17.7%	18.8%	14.9%	53.0%
	strongly agree	Count	2	23	10	8	43
		% of Total	1.1%	12.7%	5.5%	4.4%	23.8%
	disagree	Count	0	5	7	4	16
		% of Total	0.0%	2.8%	3.9%	2.2%	8.8%

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		al					
	strongly disagree	Count	0	7	4	1	12
		% of Total	0.0%	3.9%	2.2%	0.6%	6.6%
	neither agree or nor disagree	Count	1	10	3	0	14
		% of Total	0.6%	5.5%	1.7%	0.0%	7.7%
Total		Count	6	77	58	40	181
		% of Total	3.3%	42.5%	32.0%	22.1%	100.0%

This table explains cross tabulation of out of 181 participants 40(22.1%) had headache, neck stiffness or eye pain with eye movements symptoms experienced during covid and experienced at present, out of 40 participants 27(14.9%) were agree on fatigue interfere with my physical functioning and 58(32.0%) had symptoms experienced at present and out of 58 participants 34(18.8%) were agree on fatigue interfere with my physical functioning, 10(5.5%) were strongly agree on fatigue interfere with my physical functioning, 77(42.7%) had symptoms present during covid illness and out of 77 participants 32(17.7%) were agree on fatigue interfere with my physical functioning and 23(12.7%) were strongly agree on fatigue interfere with my physical functioning.

Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.401 ^a	12	.011

For association chi square test was applied. There was significant association between fatigues interfere with my physical functioning on headache, neck stiffness or eye pain with eye movements with chi square value 17.401 and p-value 0.011.

Cross tabulation of fatigue interferes with carrying out certain duties and

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responsibilities on headache, neck stiffness or eye pain with eye movements

Crosstab							
			headache,neck stiffness or eye pain with eye movements				Total
			symptoms present before covid illness	symptoms present during covid illness	symptoms experienced at present	symptoms experienced during covid and experienced at present	
fatigue interferes with carrying out certain duties and responsibilities	agree	Count	1	41	33	24	99
		% of Total	0.6%	22.7%	18.2%	13.3%	54.7%
	strongly agree	Count	3	19	9	10	41
		% of Total	1.7%	10.5%	5.0%	5.5%	22.7%
	disagree	Count	1	10	7	4	22
		% of Total	0.6%	5.5%	3.9%	2.2%	12.2%
	strongly disagree	Count	1	3	8	1	13
		% of Total	0.6%	1.7%	4.4%	0.6%	7.2%
	neither agree or nor	Count	0	4	1	1	6
		% of Total	0.0%	2.2%	0.6%	0.6%	3.3%

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	disagree	al					
Total		Count	6	77	58	40	181
		% of Total	3.3%	42.5%	32.0%	22.1%	100.0%

This table explains cross tabulation of out of 181 participants 40(22.1%) had headache, neck stiffness or eye pain with eye movements symptoms experienced during covid and experienced at present, out of 40 participants 24(13.3%) were agree on fatigue interferes with carrying out certain duties and responsibilities and 58(32.0%) had symptoms experienced at present and out of 58 participants 33(18.2%) were agree on fatigue interferes with carrying out certain duties and responsibilities, 9(5.0%) were strongly agree on fatigue interferes with carrying out certain duties and responsibilities, 77(42.7%) had symptoms present during covid illness and our of 77 participants 41(22.7%) were agree on fatigue interferes with carrying out certain duties and responsibilities and 23(12.7%) were strongly agree on fatigue interferes with carrying out certain duties and responsibilities.

Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.894 ^a	12	.018

For association chi square test was applied. There was significant association between fatigues interferes with carrying out certain duties and responsibilities on headache, neck stiffness or eye pain with eye movements with chi square value 13.894 and p-value 0.018.

DISCUSSION

The purpose of the study is to evaluate the effects of covid on the neurological system, the effects of covid on muscle pain, and the relationship between covid and the neuromuscular system. The goal of this study was to ascertain how participants' post-covid neuromuscular systems interacted with covid and to find out how common post-covid impact on the neuromuscular system is among college and university students.

A study conducted in July 2020 by Ahmad and Rathore, according to them the main symptoms of COVID-19 are respiratory and cardiac, however case studies and case series in the literature also mention neurological characteristics. Headache and vertigo are the most often reported symptoms. Cerebrovascular accident, Guillain-Barré syndrome, and acute encephalitis are a few of the problems mentioned. Hyposmia was

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the most typical peripheral symptom. Furthermore, it should be emphasized that in some cases, neurological symptoms might appear before classic signs like fever and cough, and classic symptoms later appear in these people.¹

Grover S and his co-researchers conducted a study in 2021, they concluded that after recovering from COVID-19, a large percentage of patients exhibit at least one tiredness symptom, according to the current study, and 38% experience cognitive loss in at least several of the categories.² Our study results showed that there was a significant correlation between fatigues that interfere with physical functioning and muscular stiffness or slowness of motions, with a p-value of 0.019.

In a study conducted on post-acute COVID-19 functional movement disorder by Garg A et. al. in 2021, compared to other COVID-19 neurological symptoms, movement impairments are rather uncommon. Months after they have recovered from an acute respiratory distress syndrome coronavirus-2 infection, patients still experience a number of incapacitating symptoms. At a year's follow-up, the patient was still experiencing jerky movements in addition to mental impairment, headaches, intermittent breathlessness, sleeping issues, fatigue, and dizziness. This instance emphasizes how functional motor impairment might present as one of the symptoms of an underlying mental disease.³ With a p-value of 0.021, there was a significant correlation between fatigues that interfere with physical functioning and muscular twitches or involuntary movements.

Ortelli P et.al, in 2021 conducted a study according to them, fatigue is experienced by more than half of COVID-19 survivors. In post-COVID-19 healthy subjects and patients, they conducted cognitive and neurophysiological studies to examine fatigue. Exercise-induced neuromuscular exhaustion is a decrease in a muscle's capacity to produce force. It is crucial for defending the body against harm caused by overexertion within defined bounds. The causes of neuromuscular tiredness might be peripheral or central.⁴ In the current study results showed a p-value of 0.002, there was a strong correlation between fatigue and muscle spasms or slowness of movement, two of my three most incapacitating symptoms.

In 2022, Soares MN and his research fellows conducted a study in which they found that the symptoms of acute coronavirus illness (Covid)-19 and its post-acute consequences frequently involve the skeletal muscles (PASC). People with significant Covid-19 and PASC experience weakening in their muscle cells and are intolerant to activity. More mysterious is the skeletal muscle weakening and activity intolerance linked to PASC. Direct penetration of the SARS-CoV-2 coronavirus into muscle tissue or a dysfunctional immune system are potential factors. Further research is needed to determine whether changes to the skeletal muscles seen in chronic fatigue syndrome are related.⁵ Our study results showed that there was a significant association between fatigue interfering with carrying out certain duties and responsibilities headache, neck stiffness, or eye pain with eye movements with a chi-square value of 13.894 and a p-value of 0.018.

CONCLUSION

The study concluded that covid has an impact on the body's different systems, including the respiratory, neurological, and muscular systems. But its effects continue even after

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recovery, particularly on the neuromuscular system, and the research results showed a significant impact on the consequences of muscle discomfort, persistent headaches, and vertigo on daily activities and quality of life in the COVID population.

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