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The impact of lockdown on Functional Motor Disorders patients during the first COVID-19 outbreak: acase-control study

Functional Motor Disorders (FMDs) are frequent and disabling neurological disorders characterized by motor abnormalities that are inconsistent over time, altered by distraction and clinically incongruent with classical movement disorders [1]. Non-motor symptoms (NMS), including anxiety, pain, fatigue and so forth, common to the general population, are often part of the clinical spectrum [1]. Traditionally viewed as "psychogenic", FMDs raise important concerns in terms of increased susceptibility to stressful conditions and environmental dramatic events [2]. The 2019-Coronavirus disease (COVID-19) pandemic and the severe restrictions adopted during lockdown to limit virus diffusion, might have been expected to exacerbate functional symptoms, also given the increased psychological distress, depression and stress reported in the general population [3]. Interestingly, despite increased levels of NMSs in FMDs, particularly anxiety [4–6], functional motor symptoms have not been clearly reported to worsen during lockdown [4–6]. However, the available studies were limited by the lack of a control group [4–6] or by a small sample size [4–6].

In Italy, the worst-hit European Country by the first outbreak of COVID-19, a strict lockdown of all unnecessary activities was imposed from March to the end of April 2020, with radical measures for social distancing and limitations of all outdoor activities, including physical activity. In our study, we explored the impact of lockdown on motor, numerous NMS and global health status (GHS) in a large cohort of FMDs patients and compared the results with those obtained in healthy controls (HC), matched for age and sex. Patients with an established diagnosis of FMDs followed at our specialized FMDs clinic in Verona and HC, who were friends or relatives of researchers, matched for age and sex, were contacted in October 2020, via phone or mail and given the link for a semi-anonymous Survey and two weeks to complete it. All provided informed consent, and the local Ethics Committee approved the study. We employed a 39-item Survey divided into three sections: i) socio-demographics ii) patient-estimated severity of symptoms during lockdown: motor and NMS, assessed through a 5-point Likert scale (1 = none to 5 = severe) and GHS, assessed using a 5-point scale (1 = excellent to 5

= poor) iii) changes in symptoms severity compared to pre-lockdown (February 2020), assessed through a 3-point Likert scale (improved/ unchanged/worsened) and changes in adherence to home based physical exercise, if prescribed.

Results are shown in Table 1 and main demographics and clinical data are reported in the Supplementary material. We recruited 73 out of 96 contacted patients (response rate 76%) and 101 HC.

During lockdown, motor symptoms were minimal to mild in 62%. Compared to controls, patients showed comparable levels of anxiety, depression, apathy, physical and mental fatigue and suffered from more severe levels of pain and sleep disturbances (Mann-Whitney, p < 0.005). Compared to pre-lockdown, most patients reported stability of motor symptoms (severity and frequency) and NMS, except for mental fatigue that worsened in ~ 50% of patients. In particular, motor symptoms remained stable in ~60% of patients, worsened in about one third and 18% of patients reported new-onset motor symptoms. Worsening in severity of motor symptoms was significantly predicted by mental fatigue in a multiple regression analysis (Table 1). Compared to pre-lockdown, pain worsened significantly more in patients than controls, while anxiety and depression worsened significantly more in controls than in patients (all, Fisher test p < 0.001). Patients reported a significantly worse GHS than controls (Mann-Whitney, p < 0.001), but it did not change due to lockdown, as in HC. Almost 70% of patients who were prescribed with home based physical exercise plan continued exercising, although 36% of them less frequently than the pre-lockdown period.

In line with previous studies, our results confirm that motor symptoms remained stable in the majority of patients [4–6]. In contrast with previous findings, our cohort of patients showed stable NMS [4–6]. Moreover, compared to controls, only pain worsened significantly more in patients, possibly representing a specific manifestation of the stress related to COVID-19 in FMD patients, while anxiety and depression worsened significantly more in controls. Although with inevitable recall bias, this study suggests that patients with an established diagnosis of FMDs have shown a substantial stability of functional motor, MNMS and

Table 1

Clinical variables in FMD and HC and their associations with worsening in severity of motor symptoms.

Motor symptoms, NMS and GHS during lockdown				
	FMD	HC	Test	P-value Z value (Mann-Whitney Test) X-squared (Chi-squared Test) OR (Fisher Test)
Motor symptoms (5-point Likert)		-	-	-
Mean ± SD	2.90 ± 1.15;			
Median (IQR)	3.00 (2–4)			
None	11% (n = 8)			
Minimal	26% (n = 19)			
Mild	36% (n = 26)			
Moderate	16% (n = 12)			
Severe	11% (n = 8)			
I do not Know	-			
I felt anxious (5-point Likert)			Mann-Whitney	
Mean ± SD	2.53 ± 1.14	2.54 ± 0.95		p = 0.863
Median (IQR)	3.00 (2–3)	3.00 (2–3)		Z = −0.172
I felt depressed (5-point Likert)			Mann-Whitney	
Mean ± SD	2.73 ± 1.29	2.64 ± 1.02		p = 0.875
Median (IQR)	3.00 (2–4)	3.00 (2–3)		Z = −0.157
I felt physically fatigued (5-point Likert)			Mann-Whitney	
Mean ± SD	3.04 ± 1.21	2.36 ± 1.20		p = 0.017
Median (IQR)	3.00 (2–4)	2.00 (1–3)		Z = −2.379
I felt mentally fatigued (5-point Likert)			Mann-Whitney	
Mean ± SD	2.90 ± 1.22	2.56 ± 1.13		p = 0.075
Median (IQR)	3.00 (2–4)	3.00 (2–3)		Z = −2.379
I felt demotivated (5-point Likert)			Mann-Whitney	
Mean ± SD	2.46 ± 1.31	2.34 ± 1.16		p = 0.728
Median (IQR)	2.00 (1–3)	2.00 (1–3)		Z = −0.347
I felt pain (5-point Likert)			Mann-Whitney	
Mean ± SD	2.76 ± 1.29	1.50 ± 0.78		**p < 0.001**
Median (IQR)	3.00 (2–4)	1.00 (1–2)		Z = −6.783
I had trouble sleeping (5-point Likert)			Mann-Whitney	
Mean ± SD	2.64 ± 1.45	1.99 ± 1.09		**p = 0.004**
Median (IQR)	3.00 (1–3)	2.00 (1–3)		Z = −2.893
Global Health Status (5-point Likert)		3.02 ± 0.81	Mann-Whitney	
		3.00 (3-3)		
Mean ± SD	2.19 ± 0.97			**p < 0.001**
Median (IQR)	2.00 (1–3)			Z = −5.416

Changes in motor symptoms, NMS and GHS

Symptoms	FMD	HC	Test	P value X-squared (Chi-squared test)
Severity of Motor symptoms n (%)		-	-	-
Worsened	30% (n = 22)			
Unchanged	56% (n = 41)			
Improved	14% (n = 10)			
Frequency of Motor symptoms n (%)		-	-	-
Worsened	27% (n = 20)			
Unchanged	63% (n = 46)			
Improved	10% (n = 7)			
Anxiety n (%)			Fisher Test	**p = 0.002**
Worsened	34% (n = 25)	58% (n = 59)		
Unchanged	59% (n = 43)	41% (n = 41)		
Improved	7% (n = 5)	1% (n = 1)		
Depression n (%)			Fisher Test	**p < 0.001**
Worsened	41% (n = 30)	72% (n = 73)		
Unchanged	48% (n = 35)	25% (n = 25)		
Improved	11% (n = 8)	3% (n = 3)		
Physical Fatigue n (%)			Chi-squared	p = 0.96
Worsened	45% (n = 33)	47% (n = 48)		X-squared = 0.092
Unchanged	47% (n = 34)	45% (n = 45)		
Improved	8% (n = 6)	8% (n = 8)		
Mental Fatigue n (%)			Fisher Test	p = 0.47
Worsened	49% (n = 36)	58% (n = 59)		
Unchanged	45% (n = 33)	36% (n = 36)		
Improved	6% (n = 4)	6% (n = 6)		
Apathy n (%)			Chi-squared	
Worsened	38% (n = 28)	55% (n = 56)		
Unchanged	50% (n = 37)	40% (n = 40)		p = 0.055
Improved	12% (n = 9)	5% (n = 5)		X-squared = 5.79
Pain n (%)			Fisher Test	**p < 0.001**
Worsened	33% (n = 24)	15% (n = 15)		
Unchanged	57% (n = 42)	84% (n = 85)		
Improved	10% (n = 7)	1% (n = 1)		
Quality of Sleep n (%)			Fisher Test	p = 0.085
Worsened	32% (n = 23)	42% (n = 42)		
Unchanged	60% (n = 44)	56% (n = 57)		
Improved	8% (n = 6)	2% (n = 2)		
General Health Status n (%)			Fisher Test	0.089
Worsened	32% (n = 23)	30% (n = 30)		
Unchanged	58% (n = 42)	67% (n = 68)		
Improved	11% (n = 8)	3% (n = 3)		
Adherence to Physical Exercise				

Table 1 (*continued*)

Motor symptoms, NMS and GHS during lockdown			
	FMD	HC	Test	P-value Z value (Mann-Whitney Test) X-squared (Chi-squared Test) OR (Fisher Test)

Table 1 (*continued*)

Motor symptoms, NMS and GHS during lockdown				
	FMD	HC	Test	P-value Z value (Mann-Whitney Test) X-squared (Chi-squared Test) OR (Fisher Test)
(prescribed in n = 55) n (%)				
Not performed	31% (n = 17)	-		
	Lower frequency	36% (n = 20)		-
	Same frequency	26% (n = 14)		-
Higher frequency	7% (n = 4)	-		

Associations of NMS and adherence to rehabilitation with worsening in severity of motor symptoms in FMDs

NMS Changes during lockdown in FMDs	Single comparison		Multivariable Logistic model	
	Odds ratio	p-value	Odds ratio	p-value
Adherence to rehabilitation	3.81 [0.94–15.4]	0.061	1.98 [0.24–16.3]	0.52
Anxiety	3.51 [1.23–10]	0.019*	1.21 [0.16–9.13]	0.86
Depression	5.14 [1.75–15.2]	0.003**	0.63 [0.08–5.03]	0.66
Physical Fatigue	29.23 [6–142]	<0.001***	2.16 [0.15–30.7]	0.57
Mental Fatigue	50.4 [6.21–409]	**<0.001***	30.82 [2.11–450]	**0.012***
Apathy	3.47 [1.22–9.82]	0.019*	2.38 [0.35–16.1]	0.37
Pain	14.33 [4.3–47.8]	<0.001***	1.46 [0.18–11.8]	0.72
Quality of sleep	4.36 [1.49–12.7]	0.007**	1.36 [0.22–8.56]	0.74

Abreviations: FMD, Functional Motor Disorders**; HC**, Healthy Controls. **NMS**, Non-motor Symptoms; **GHS**, General Health Status.

Legend: the Table shows motor symptoms, non-motor symptoms (NMS), general health status during lockdown (March–April 2020), their changes compared to pre-lockdown (February 2020) and regression analyses between changes in NMS in FMD and worsening in motor symptoms severity. All variables were classified as 0 or 1 (0 = unchanged, improved; 1 = worsened).

*p value adjusted for multiple comparisons (Bonferroni correction) p < 0.007 was statistically significant. Statistically significant results are given in bold.

GHS during lockdown. In the context of social isolation and home confinement, decreased operational demands and lower psychosocial strains, compared to everyday life, could have prevented worsening of symptoms. Moreover, FMDs are known to be affected by self-attention/monitoring [3] and the diverted attention toward external events due to a global pandemic might have further influenced our findings. We are now facing unpredictable phases of a longstanding pandemic and future studies are needed to elucidate long-term effects of COVID-19 pandemic on FMDs.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.parkreldis.2021.11.007.

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