Mental Health, Physical Activity, and Quality of Life in Parkinson’s Disease During COVID-19 Pandemic

Patients with Parkinson’s disease (PD) might be affected by compromised health care, lockdown restrictions, and global stress during the COVID-19 pandemic, similar to the general population.1-3 Therefore, we investigated the impact of the COVID-19 pandemic on the mental health, physical activities, and quality of life (QoL) of PD patients.

Using telephone calls, we were able to reach and interview 38 of 50 PD patients who had recently completed comprehensive assessments in the movement disorders outpatient clinic, Ain Shams University Hospitals, Cairo (Table 1). They were assessed using 11 questions regarding their perception of impact of COVID-19 (supplementary document), the Depression, Anxiety, and Stress Scale–21 (DASS-21),4 the short form of the international physical activity questionnaire (IPAQ)5 and the PD questionnaire (PDQ39); and were compared with 20 age- and sex-matched controls who were recruited from volunteers and relatives of patients with other medical problems. We excluded patients and controls with medical comorbidities, that might affect mobility and relatives of PD patients and persons with more risk of anxiety/stress such as healthcare workers as controls.

### TABLE 1  Demographic and clinical characteristics of PD patients and controls

|                       | PD patients (n = 38) | Controls (n = 20) | t test / Mann-Whitney U test/chi-square test* |
|-----------------------|----------------------|-------------------|---------------------------------------------|
| **Age**b              | Mean/median/frequency | SD/IQR            | Mean/median/frequency | SD/IQR | t/z | P     |
|                       | 55.579               | 9.956             | 55.550                        | 5.708  | 0.012 | 0.990 |
| **Sex (male/female)a**| 29 (76.3%)/9 (23.7%) |                   | 14 (70%)/6 (30%)               |         |      |       |
| **Education (years)a**| 6.763                | 5.55              | 11.65                         | 5.68   | 0.153 | 0.601 |
| **Charlson Comorbidity Indexb** | 0.903              | 0.097             | 0.938                         | 0.049  | 0.012 | 0.972 |
| **MMSe**              | 27.139               | 2.642             |                               |        |      |       |
| **A00**a              | 50.135               | 10.522            |                               |        |      |       |
| **D00a**              | 4.726                | 3.209             |                               |        |      |       |
| **MDS-UPDR III offa** | 44.351               | 19.799            |                               |        |      |       |
| **MDS-UPDRS III ona** | 25.730               | 16.186            |                               |        |      |       |
| **HY scale aff**      | 2.342                | 0.839             |                               |        |      |       |
| **BDIa**              | 18.297               | 8.300             |                               |        |      |       |
| **Pre-lockdown total IPAQa** (median/IQR) (MET minutes/week) | 3012                | 6504.75           |                               |        |      |       |
| **Latency from last visit till phone call (months)b** | 3.876               | 1.490             |                               |        |      |       |
| **LEDD (mean/SD) b**  | 652.92               | 307.79            |                               |        |      |       |
| **DASS (mean/SD), %b**|                      |                   |                               |        |      |       |
| DASS depression       | 7.026 (60.5%)        | 5.726             | 3.500 (30%)                   | 3.606  | 2.500 | 0.015 |
| DASS anxiety          | 4.790 (60.5%)        | 3.573             | 2.050 (25%)                   | 2.395  | 3.472 | 0.001 |
| DASS stress           | 7.342 (52.6%)        | 4.884             | 4.500 (25%)                   | 3.818  | 2.261 | 0.028 |
| DASS total            | 19.158               | 12.883            | 10.050                        | 8.140  | 2.868 | 0.006 |
| **IPAQ (mean/IQR)b**  |                      |                   |                               |        |      |       |
| Vigorous activity (MET minutes/week) | 0.00d               | 30                | 60                            | 1200   | 1.84 | 0.062 |
| Moderate activity (MET minutes/week) | 280                 | 1680              | 1080                          | 3840   | 2.87 | 0.017 |
| Total score (MET minutes/week) | 1009.5              | 4018.13           | 4410                          | 7718.50 | 2.72 | 0.006 |

(Continues)
TABLE 1. Continued

|                           | PD patients (n = 38) | Controls (n = 20) | t test / Mann-Whitney U test/chi-square test* |
|---------------------------|----------------------|-------------------|---------------------------------------------|
|                           | Mean/median/        | Mean/median/frequency | SD/IQR | t/z P                           |                                          |
|                           | frequency           |                    |        |                                |                                          |
| Mobility                  | 30\(^d\) 55         | 11.25 11.88        | −3.610d | <0.001                         |
| ADL                       | 33.33 50            | 0 0               | −9.519d | <0.001                         |
| Emotional well-being      | 29.17 35.42         | 14.58 19.79       | −2.366d | 0.018                          |
| Stigma                    | 50 87.50            | 0 0               | −4.752d | <0.001                         |
| Social support            | 0 25                | 0 14.58           | −1.063d | 0.288                          |
| Cognition                 | 25 31.25            | 12.50 21.88       | −3.339d | 0.001                          |
| Communication             | 0 20.83             | 0 8.33            | −1.221d | 0.222                          |
| Bodily discomfort         | 33.33 41.67         | 8.33 16.67        | −3.614d | <0.001                         |
| PDQ39 total               | 30.88 32.16         | 7.84 9.39         | −4.899d | <0.001                         |

COVID-19 related questions\(^b\) no/frequency of (yes answer)
Q1: Adopting protective measures against COVID-19 35 (92.1%)
Q2: family members/neighbors diagnosed with COVID-19 4 (10.5%)
Q3: Patients with questions regarding COVID-19 5 (13.2%)
Q4: worried about regular contact with physician\(^c\) 29 (76.3%)
Q5: patients reported disrupted contact with physician\(^c\) 31 (81.6%)
Q6: patients reported anxiety/stress due to COVID-19\(^c\) 20 (52.6%)
Q7: patients reported decline of physical activity\(^c\) 26 (68.4%)
Q8: patients worry of catching the COVID-19\(^c\) 22 (57.9%)
Q9: patients worry about unavailability of their medications\(^c\) 20 (52.6%)
Q10: Patients reported interest of virtual visits 22 (57.9 %)
Q11: Patients need medication adjustment 16 (42.1%)

MMSE, Mini-Mental State Examination; AOO, age of onset; DOI, duration of illness; MDS-UPDRS, MDS Unified Parkinson’s Disease Rating Scale; HY, Hoehn and Yahr scale; BDI, Beck Depression Inventory; LEDD, levodopa-equivalent daily dose; DASS, Depression, Anxiety, and Stress Scale; IPAQ, international physical activity questionnaire, PDQ, Parkinson’s disease questionnaire; ADL, activities of daily living; IQR, interquartile range, n, number.

\(^a\)Data obtained from prior visits.

\(^b\)Data obtained from recent phone call.

\(^c\)Frequency of positive answers (slight, mild, marked, very marked) vs negative answer (no)

Student t test, for normally distributed continuous data comparison.

Mann-Whitney test, for comparison of skewed distribution of continuous variables.

Chi-square test for categorical data comparison.

Significance at P < 0.05.

TABLE 2 Correlations of DASS, IPAQ, and PDQ39 to prepandemic characteristics

|                      | DASS_depression | DASS_anxiety | DASS_stress | DASS_total | IPAQ_total\(^a\) | PDQ-39_total\(^a\) |
|----------------------|-----------------|--------------|-------------|------------|------------------|-------------------|
| Age                  | r               | 0.026        | 0.052       | 0.202      | 0.183            | −0.249            | −0.138            |
|                      | p               | 0.215        | 0.215       | 0.224      | 0.273            | 0.132             | 0.416             |
| AOO                  | r               | 0.149        | 0.076       | 0.075      | 0.116            | −0.213            | −0.076            |
|                      | p               | 0.378        | 0.654       | 0.659      | 0.495            | 0.207             | 0.661             |
| DOI                  | r               | 0.174        | 0.160       | 0.295      | 0.234            | −0.120            | 0.290             |
|                      | p               | 0.302        | 0.344       | 0.076      | 0.164            | 0.478             | 0.086             |
| Years of education   | r               | −0.189       | −0.240      | −0.216     | −0.233           | 0.360             | −0.233            |
|                      | p               | 0.255        | 0.147       | 0.192      | 0.160            | 0.026             | 0.165             |
| MMSE                 | r               | −0.379       | −0.096      | −0.347     | −0.326           | 0.485             | −0.331            |
|                      | p               | 0.023        | 0.579       | 0.038      | 0.052            | 0.003             | 0.052             |
| MDS UPDRS motor off  | r               | 0.430        | 0.426       | 0.317      | 0.432            | −0.240            | 0.632             |
|                      | p               | 0.008        | 0.009       | 0.056      | 0.008            | 0.152             | <0.001            |
| MDS UPDRS motor on   | r               | 0.162        | 0.205       | 0.097      | 0.165            | −0.367            | 0.433             |
|                      | p               | 0.339        | 0.223       | 0.568      | 0.328            | 0.026             | 0.008             |
| HY scale off         | r               | 0.397        | 0.435       | 0.300      | 0.411            | −0.203            | 0.486             |
|                      | p               | 0.013        | 0.006       | 0.067      | 0.010            | 0.221             | 0.002             |
| BDI                  | r               | 0.344        | 0.213       | 0.189      | 0.284            | −0.333            | 0.413             |
|                      | p               | 0.037        | 0.206       | 0.262      | 0.089            | 0.044             | 0.012             |

DASS, Depression, Anxiety, and Stress Scale; IPAQ, international physical activity questionnaire; PDQ, Parkinson’s disease questionnaire; AOO, age of onset; DOI, duration of illness; MMSE, Mini-Mental State Examination; MDS-UPDRS, MDS Unified Parkinson’s Disease Rating Scale; HY, Hoehn and Yahr scale, BDI, Beck Depression Inventory, r, correlation coefficient.

\(^a\)Spearman coefficient correlation, for nonparametric data. Other correlations by the Pearson coefficient correlation (parametric data). Significance at P < 0.05 (boldface).
**Most PD patients reported a negative impact on their mental health, physical activity, and health care and an interest in virtual visits. Compared with controls, patients showed significantly worse stress, depression, anxiety, total DASS, moderate physical activity, walking, total IPAQ, total and most of the PDQ39 dimensions (Table 1). PD patients showed a significant decline in physical activity compared with pre-lockdown ($P = 0.002$).

DASS-total, depression, and anxiety were correlated with pre-lockdown motor severity–off. DASS depression was positively correlated with pre-lockdown Beck Depression Inventory (BDI) and negatively with cognition. Total IPAQ scores were negatively correlated with total DASS ($r_s = -0.354, P = 0.029$), DASS depression ($r_s = -0.441, P = 0.006$), pre-lockdown motor severity–on, and BDI, but positively correlated with education and cognition. Total PDQ39 scores were significantly correlated with total and subscors of DASS, pre-lockdown motor severity, BDI, (Table 2), and patients’ worry about unavailability of medication ($r_s = 0.347, P = 0.035$).

The current report demonstrated that PD patients had worse stress, depression, anxiety, physical activity, and QoL compared with controls during the COVID-19 pandemic, which were correlated with current mental health and pre-lockdown characteristics. In addition, subjective negative impact of the pandemic on mental health, physical activity, and health care was reported by most of PD patients. Furthermore, worsening of physical activity of patients was detected compared with their pre-lockdown state.

These findings are consistent with expected indirect sequelae of the COVID-19 pandemic\(^2\) and previous studies beyond the era of COVID-19.\(^1\) Consistently, Prasad et al reported increased stress and depression in 9% of PD patients during COVID-19 lockdown,\(^6\) and the reported 10 PD patients with COVID-19 showed worsening of anxiety and other nonmotor symptoms.\(^7\)

The current findings should be interpreted in the context of possible variability in pandemic severity, degree of lockdown, patients’ perception, and cultural characteristics.\(^8\) The smaller number of subjects and higher education of controls were the limitations of the study.

The current study confirmed the impaired mental health, physical activity, and QoL of PD patients and identified their correlates during the COVID-19 pandemic, implying the importance of managing these issues and continuing care of PD patients, particularly by adopting telemedicine.\(^3\)

### References

1. Helmich RC, Bloem BR. The Impact of the COVID-19 Pandemic on Parkinson’s disease: hidden sorrows and emerging opportunities. J Parkinsons Dis 2020;10(2):351–354.

2. Cullen W, Gulati G, Kelly BD. Mental health in the Covid-19 pandemic. QJM 2020;113(5):311–312.

3. Stoessl AJ, Bhatia KP, Merello M. Movement disorders in the world of COVID-19. Mov Disord 2020;35(5):709–710.

4. Ali AM, Ahmed A, Sharaf A, Kawakami N, Abdeldayem SM, Green J. The Arabic version of the Depression Anxiety Stress Scale-21: cumulative scaling and discriminant-validation testing. Asian J Psychiatr 2017;30:56–58.

5. Craig CL, Marshall AL, Sjöström M, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc 2003;35(8):1381–1395.

6. Prasad S, Holla VV, Neeraja K, et al. Parkinson’s disease and COVID-19: perceptions and implications in patients and caregivers. Mov Disord 2020;35(6):912–914.

7. Antonini A, Leta V, Teo J, Chaudhuri KR. Outcome of Parkinson’s disease patients affected by COVID-19. Mov Disord 2020;35(6):905–908.