

# ADAPTED MOTOR AND EMOTIONAL ACTIVITY IN PARKINSON'S DISEASE WITH MUSIC: EFFECT ON THE MOTOR PERFORMANCES AND QUALITY OF LIFE

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**Introduction:** To verify the long-term impact of adapted motor activity based on emotional involvement through pleasant exercises to music or by dancing on QOL (quality of life) and motor performances in subjects with Parkinson Disease (PD). We compared the results obtained over a year including a stop by motor activity of 3 months. Previous pilot studies suggested that adapted motor activity improve the pattern of body accelerometer and QOL.

**Material and Methods:** We evaluated patients suffering from PD. Only subjects in stable treatment with L-dopa and/or dopa-agonists were included. The mean age was 73.34 ± 9.37 (SD) at the first evaluation. 68 patients were underwent at the first two evaluations, among these 57 patients have been reassessed for the third time. The examination protocol included a life questionnaire (SF-36), Unified Parkinson's Disease Rating Scale (part III), tapping, measuring of acceleration with a triaxial accelerometer (applied on the chest and on the pelvic area while the patients are walking at their comfortable velocity). The adapted motor activity session were held twice a week, each of which lasted 60 minutes, for 8 months. We planned to assess patients at baseline and after 8 months of adapted motor activities. A further evaluation was scheduled after a four month period of no treatment. **Data Analysis:** Standard deviation (SD) or median and Interquartile range (IQR), the independent sample t-test, paired-sample t-test, the Mann-Whitney, the Wilcoxon signed-rank test or the Chi Square test were used when appropriate. SF-36 items were calculated according to published algorithms .

**Results:** 67 PD patients (39 men and 28 women) with a mean age of 69.3 ± 10.9 years, similar in the two genders (p = 0.38), were enrolled. All patients completed the period of treatment. The baseline data are reported in **Table 1**. At the end of the period of adapted motor activity the mean **UPDRS part III** score had significantly improved (p < 0.001). The strongest improvement occurred in rigidity (p < 0.001), finger taps (p < 0.001), hypobradikinesia (p < 0.001), hand pronosupination (p < 0.01), and resting tremor (p < 0.01) scores. Patients scored significantly better also in leg agility (p < 0.05), and gait (p < 0.05). After treatment, we observed an improvement in HRQoL concerning all domains (**Table 2**). The effect size was small for physical functioning and role emotional, large for social functioning and medium for the other HRQoL domains and for the two composite scores capturing both physical and mental health. Significant changes were observed in the dominant and non dominant **hand tapping test** (p < 0.0001). The evaluation of the **acceleration parameters**, with a chest accelerometer, showed a slight improvement from a mean value of 0.72 + 0.22 m/sec<sup>2</sup> to a mean value of 0.77+0.26 m/sec<sup>2</sup> (p < 0.05). On the basis of the pelvic accelerometer we found a mean acceleration of 1.40 + 0.37 m/sec<sup>2</sup> and of 1.57 + 0.45 m/sec<sup>2</sup> before and after treatment (p < 0.01) (**Table 2**). At the time of final examination, after 8 months without treatment, the mean UPDRS score was 22.8 ± 10, significantly higher than that detected at the end of motor activity ( p < 0.05) 0.005, but still lower with respect to baseline ( p < 0.05). The acceleration parameters, with the chest and pelvic accelerometer, showed a decrease to a mean values of 0.71 ± 0.3 m/sec<sup>2</sup> (p<0.05) p<0.005 and 1.45 ± 0.60 (p<0.01) p<0.001 , nearly similar to those at baseline. Self-perceived health-related quality of life, scores decreased in all domains, but they remain significantly higher than those detected at baseline for the dimensions capturing mental and emotional well-being (Mental Health: p< 0.01, Social functioning: p < 0.005; Role Emotional: p < 0.01, Vitality: p < 0.01, and General Health (p < 0.01) (**Table 3**). First we compared the data obtained at the beginning of the first session of adapted motor activity with the results obtained at the beginning of the second session of adapted motor activity. We found, interestingly, that the accelerometric parameters and the score at the UPDRS III were comparable and we found a slight improve in the quality of life perception, but without significance (p > 0.05). After 8 months of adapted motor activity and 4 months of stop-from-activity, the same data were compared. The clinical (UPDRS III) and the objective parameters (acceleration and tapping) resulted worsened, without significance. We found that QoL measured with SF-36 questionnaire significantly improved (p<0.05), specially in these subscales: social functioning (<0.001), physical functioning (<0.01), vitality (0.001), general health (<0.001) role physical (<0.05).

**Conclusions:** These results suggest that an adapted motor activity proposed with emotional involvement through pleasant exercises to music or by dancing performed for months improves the quality of life perception, also after a long discontinuation. Moreover, after the stop-from-activity period motor performances of the patients seem to return to the starting conditions, after the improvement seen in a previous study with the same patients. A periodic, but repetitive, adapted motor activity in the neurodegenerative diseases could be considered a concomitant approach to support the social and self-perception physical performances.

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**Table 1:** UPDRS III, Tapping test, Accelerometry, SF36 QoL at baseline and after 4 months of activity.

	Baseline	After 8months treatment	P value
<b>Mean UPDRS III</b>	<b>25.3 (12.4)</b>	<b>20.5 (9.9)</b>	<b>P &lt; 0.001</b>
<b>Hand tapping test (dominant)</b>	<b>44.3 (13.2)</b>	<b>50.3 (12.8)</b>	<b>P &lt; 0.001</b>
<b>Hand tapping test (non dominant)</b>	<b>41 (13.6)</b>	<b>46.1 (12.1)</b>	<b>P &lt; 0.001</b>
<b>Accelerometer thoracic</b>	<b>0.72 (0.22)</b>	<b>0.77 (0.26)</b>	<b>P &lt; 0.05</b>
<b>Accelerometer pelvic</b>	<b>1.41 (0.37)</b>	<b>1.60 (0.45)</b>	<b>P &lt; 0.01</b>
<b>SF36 Physical composite</b>	<b>40.2 (8.5)</b>	<b>45.25 (8.8)</b>	<b>P &lt; 0.001*</b>
<b>SF36 Mental composite</b>	<b>45.8 (10.6)</b>	<b>50.8 (8.8)</b>	<b>P &lt; 0.001*</b>

**Table 2:** Comparison between SF-36 scores before and after a 8-month treatment period in PD patients.

	Baseline		After 4-month treatment		P-value*	Effect size
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)		
<b>Physical Functioning</b>	62.2(27)	65(45-85)	68.5(26)	80(45-90)	p< 0.005	<b>0.24</b>
<b>Role Physical</b>	42.9(35.8)	50(0-75)	62.3(34.9)	75(25-100)	p< 0.005	<b>0.55</b>
<b>General Health</b>	49.1(21.7)	52(30-66)	60.45(19.2)	62(52-67)	p< 0.0001	<b>0.55</b>
<b>Vitality</b>	54.6(19.7)	55(40-65)	65(18)	65(55-80)	p< 0.0001	<b>0.55</b>
<b>Mental Health</b>	63.3(18.4)	68(48-76)	72(15.2)	65(55-80)	p< 0.0001	<b>0.52</b>
<b>Role Emotional</b>	55.3(39.7)	66.6 (16.6-100)	67.3 (34.3)	66.7(33.3-100)	p< 0.01	<b>0.32</b>
<b>Social Functioning</b>	72.6(25.4)	75(50-100)	89.2(15.5)	100(75-100)	p< 0.0001	<b>0.8</b>
<b>Pain</b>	66.2 (27)	67.5(45-90)	78.8 (21.6)	80(63.65-100)	p< 0.0001	<b>0.51</b>
<b>Physical composite score</b>	40.2 (8.5)	40(35.7-46.6)	45.2(8.8)	46.5(38.8-52.6)	p< 0.0001	<b>0.58</b>
<b>Mental composite</b>	<b>45.7 (10.6)</b>	<b>45.3 (38.7-54)</b>	<b>50.8 (8.8)</b>	<b>52.75(44.23-57.75)</b>	<b>p&lt; 0.0001</b>	<b>0.52</b>

**Table 3:** UPDRS III, Tapping test, Accelerometry, SF36 after 8 months of activity and after 4 months at rest

	After 8-month treatment	After 4-month of rest of the treatment	P value
<b>Mean UPDRS III</b>	20.5 (9.9)	22.8 (10.9)	<b>p &lt; 0.005</b>
<b>Hand tapping test (dominant)</b>	50.3 (12.8)	47.4 (12.9)	<b>p &lt; 0.005</b>
<b>Hand tapping test (non dominant)</b>	46.1 (12.1)	44.3 (13)	<b>p &lt; 0.005</b>
<b>Accelerometer thoracic</b>	0.77 (0.26)	0.71 (0.27)	<b>p &lt; 0.005</b>
<b>Accelerometer pelvic</b>	1.60 (0.45)	1.45 (0.40)	<b>p &lt; 0.001</b>
<b>SF36 Physical composite</b>	45.25 (8.8)	44.7 (8.8)	<b>p &lt; 0.05</b>
<b>SF36 Mental composite</b>	<b>50.8 (8.8)</b>	<b>50.3 (8.7)</b>	<b>p &lt; 0.05</b>