Parkinsonism and Related Disorders 34 (2017) 62–65

Contents lists available at ScienceDirect

Parkinsonism and Related Disorders

journal homepage: www.elsevier.com/locate/parkreldis

Short communication

Laughter is the best medicine: The Second City® improvisation as an intervention for Parkinson's disease

Danny Bega [a, *], Pamela Palmentera [a], Abby Wagner [b], Matt Hovde [b], Becca Barish [b], Mary J. Kwasny [c], Tanya Simuni [a]

[a] Northwestern University Feinberg School of Medicine, Department of Neurology, Chicago, IL, USA
[b] The Second City®, Chicago, IL, USA
[c] Northwestern University Feinberg School of Medicine, Department of Preventive Medicine, Chicago, IL, USA

ARTICLE INFO

Article history:
Received 28 September 2016
Received in revised form
1 November 2016
Accepted 4 November 2016

Keywords:
Parkinson's disease
Humor
Improvisation
Improv

ABSTRACT

Background: Expressive therapies are increasingly incorporated into the management of Parkinson's disease (PD), although there are little objective data assessing their benefits.
Objective: Develop and study a novel community Improvisation Theater (IT) program for PD in order to improve quality of life.
Methods: A prospective, rater-blinded, modified cross-over design study of IT for PD. 22 subjects were randomized 1:1 to active-start (AS) or control-start (CS) groups, controlling for age and Hoehn and Yahr stage. Participants were recruited from the Northwestern PD and Movement Disorders Center. 60 min IT sessions were led by The Second City® faculty weekly for 12 weeks. The primary aim was to assess feasibility, determined as 70% of participants attending at least 75% of the classes. Exploratory data were obtained comparing pre- and post-intervention outcomes using Wilcoxon signed rank test for UPDRS parts I-IV, PDQ-39, and 5 neuro-QoL measures (communication, anxiety, stigma, depression, and wellbeing).
Results: All 22 participants completed the study. 21/22 (95%) participants attended at least 80% of the classes. All participants indicated that they would recommend the class to others with PD. 21/22 participants enjoyed the class and felt it was beneficial for their symptoms. A significant improvement pre-to-post intervention was seen with the UPDRS part II ADL measure (mean −1.5, $p = 0.019$).
Conclusion: A novel improvisation program can be well-attended, enjoyable, and improve ADL measures among patients with PD of varying ages and disease severity.

1. Background

Parkinson's disease (PD) is a progressive neurodegenerative disorder that affects about 1% of the population over the age of 60, and is manifested by motor impairment as well as a constellation of non-motor symptoms which include depression, anxiety, apathy, cognitive impairment, sleep disturbances, and autonomic dysfunction. As a multisystem disorder that affects many aspects of an individual's physical, psychological, and social well-being, PD is associated with significant negative impact on multiple domains of quality of life (QOL), including stigma, communication and interactions with others [1]. Conventional medications for PD are limited as they often result in motor complications, and they inadequately treat some of the more troublesome non-motor symptoms of PD [2]. There is some evidence that mind-body interventions – treatments that incorporate the emotional, spiritual, and cognitive aspects of health – may be able to improve QOL as complementary interventions to pharmacologic treatments. Expressive therapies like art, music, and dance, are increasingly incorporated into the management of PD, although there are little objective data assessing the benefits of these interventions [3].

Improvisation is the ability to produce novel responses on the spur of the moment. It evokes acting on the unexpected and unknown so that preplanned or prescriptive movements or responses are replaced by the possibility of novel autonomously selected responses [4]. Artistic expression that involves improvisation

* Corresponding author. Department of Neurology, Northwestern University Feinberg School of Medicine, 710 N Lake Shore Drive, Abbott Hall, 1124, Chicago, IL 60611, USA.
E-mail address: dbega@nm.org (D. Bega).

http://dx.doi.org/10.1016/j.parkreldis.2016.11.001
1353-8020/

precludes the need for memorization and instead cultivates focus, improves communication, reduces stress, and promotes feelings of acceptance, compassion, and well-being [5]. Improvisation classes promote learning through experience rather than passive observation and a sense of unconditional acceptance, with the aim of increasing personal awareness and interpersonal attentiveness [5]. The Second City® Training Center has been running improvisation courses for the public for the last 30 years, with an average of 2500 students per term in Chicago. Improvisation humor as a treatment intervention for PD has never been studied. However, there is limited data on improvisation as part of theater training in PD. Modugno et al. [6] demonstrated that long-term theater therapy delayed the need to increase dopaminergic therapy compared with conventional physiotherapy in 10 patients with PD. In that study, theater patients also showed significant improvement from baseline on all clinical motor and non-motor scales measured.

The aim of this study was to develop a novel community improvisation theater program for people with all stages of PD in order to improve the quality of life of patients and their caregivers. We assessed the effects of the program on both motor and non-motor measures of PD severity.

2. Methods

Population. We conducted a prospective, randomized, single blinded, modified cross-over design study of scenic improvisation theater for patients with PD. The Second City® is an improvisational comedy enterprise based out of Chicago, and they provided the faculty and curriculum for the project. We recruited 24 patients with PD and randomized them 1:1 to active-start (AS) or control-start (CS) groups, controlling for age and Hoehn and Yahr (H&Y) stage. Participants were recruited from the Northwestern PD and Movement Disorders Center which is a National Parkinson Foundation (NPF) Center of Excellence. The inclusion criteria were: All participants had idiopathic PD determined by their treating neurologist using UK brain bank criteria [7]. All participants had to be on a stable PD medication regimen for 30 days prior to starting the study, and had to remain on a stable regimen during the study. Participants were expected not to participate in any new interventions, or stop any ongoing interventions, during the study. All participants were required to understand and sign the consent form. There was no age or disease severity exclusion. Caregivers were given the option of participating but were not counted as subjects. The study was funded by the NPF 2015 Community Grant and was approved by the Northwestern institutional review board.

Procedure. One hour improvisation theater sessions led by The Second City® faculty took place once a week for 12 weeks. Appendix A contains the specific curriculum that was designed and carried out by The Second City® instructors. The same two instructors led every class together. Attendance was taken at all sessions. The AS group had improvisation sessions from week 1 through 12, followed by no intervention from week 13–16 to assess maintenance of effect. The CS group served as a no intervention control from week 1–4, followed by improvisation sessions from week 5–16. Assessments were conducted at 4 time points (Week 0, Week 4, Week 12, and Week 16) in all subjects. All assessments were conducted by a board certified neurologist specializing in movement disorders who was blinded to group assignment. All assessments were conducted in the reported medication "ON" state. Each assessment included the Unified Parkinson's Disease Rating Scale (UPDRS) parts I-IV [8], the PD 39-item Questionnaire (PDQ-39) [9], as well as neurology QOL (neuro-QOL) item bank v 1.0 (short forms) assessment tools of communication, anxiety, stigma, depression, and positive affect and well-being [10]. A satisfaction survey was administered to each participant at the end of the active phase of the study.

Aims/Outcomes. The primary aim of the study was to assess the feasibility of the improvisation intervention. Feasibility was predetermined as 70% of participants attending at least 75% of the classes. Exploratory pilot efficacy data were obtained by comparing pre-intervention and post-intervention outcomes. For the AS group, comparisons were made from assessment 1 (pre-intervention) to assessment 3 (post-intervention). For the CS group, comparisons were made from assessment 2 (pre-intervention) to assessment 4 (post-intervention). These intervals were designated as the "active phase" of the study. Additionally, comparisons were made between the active phase of the study and the "control phase" (the time from assessment 1 to assessment 2 of the CS group). A maintenance of effect analysis was also conducted using the time from assessment 3 to assessment 4 in the AS group.

Statistical methods. Demographic data are presented using counts and percentages for gender, ethnicity, DBS, and H&Y ratings, and medians, (25th, 75th) percentiles, minimum and maximum for age, LEDs, UPDRS subscores, PDQ 39, and Neuro-QOL subscores. Groups are compared at baseline using Fisher's Exact test or Wilcoxon rank sum tests to evaluate equality of groups by randomization group. To examine the effect of the intervention, changes in all outcomes were compared using a Wilcoxon Signed Rank Test. Changes in outcomes for intervention compared to control were compared using Wilcoxon Rank Sum Tests. As the study was designed as a feasibility program, effect sizes (difference in mean/SD) are provided, although tests are based on nonparametric analyses due to small sample sizes.

3. Results

The characteristics of the study population are presented in Table 1. 24 subjects were screened and 23 met eligibility criteria. 1 subject dropped out of the study after screening due to a scheduling conflict. The remaining 22 subjects were randomized to AS (11 subjects) and CS (11 subjects). There were no significant differences between groups in baseline measures of disease severity with the exception of UPDRS part I, where the CS group had a higher score. 5 caregivers participated in the classes (3 in group AS and 2 in group CS) but were not counted as subjects.

All 22 participants (100%) completed the study. 21/22 (95%) participants attended at least 80% of the classes. All participants indicated that they would recommend the class to others with PD. All but one (95%) of the participants enjoyed the class and all but one (95%) felt it was beneficial for their PD symptoms.

In terms of the effects of the intervention, in comparing pre-session to post-session outcomes, the only statistically significant improvement was seen with UPDRS part II ($p = 0.019$). Effect sizes are shown in Table 2. We examined the change from the end of week 16 to the end of week 12 in the AS group to determine if any effect of the course was maintained, or lost. It appears that UPDRS I increased significantly, as did PDQ39, although in the case of PDQ39, the increase was not as large as the original decrease seen with the intervention.

4. Discussion

This is the first study of improvisation humor as a therapy for PD. The data demonstrate that a novel improvisation program can be well-attended and enjoyable among patients with PD of varying ages and disease severity as shown by at least 70% of participants attending at least 75% of the classes. In fact, all but one participant attended over 80% of the classes. Maintaining PD patients in therapies and exercise classes can be challenging for reasons that may include amotivation, apathy, or simply competing obligations. This

Table 1
Baseline demographics.

Demographic	AS (N = 11)	CS (N = 12)	p-value
Gender (Male)	5 (45%)	9 (75%)	0.214
Age	68 (56, 73) [50, 85]	69 (61, 72) [53, 89]	0.974
Ethnicity (Hispanic)	2 (18%)	0 (0%)	0.217
DBS (Yes)	2 (18%)	2 (17%)	>0.999
Hoehn & Yahr			0.727
2	9 (82%)	11 (92%)	
3	1 (9%)	0 (0%)	
4	1 (9%)	1 (8%)	
LEDs	780 (300, 1309) [0, 1650]	380 (300, 945) [0, 1785]	0.387
UPDRS I	3 (2,3) [1,4]	5 (2, 6) [2, 10]	0.037
UPDRS II	12 (8, 16) [6, 21]	15 (7, 18) [3, 21]	0.853
UPDRS III	27 (19, 35) [14, 51]	22 (19, 30) [15, 37]	0.459
UPDRS IV	3 (2,6) [0, 8]	3 (2, 4) [0, 6]	0.363
PDQ 39	34 (24, 50) [6, 63]	38 (18, 55) [9, 71]	0.805
HQ Communication	20 (20, 22) [13, 24]	19 (17, 24) [13, 25]	0.437
HQ anxiety	16 (12, 20) [8, 25]	20 (16, 25) [9, 33]	0.115
HQ Stigma	15 (12, 16) [8, 21]	14 (12, 16) [8, 20]	0.710
HQ Depression	12 (10, 17) [8, 20]	16 (13, 21) [9, 26]	0.064
HQ PAW	36 (30, 42) [25, 45]	32 (28, 36) [23, 40]	0.084

AS = active start; CS = control start; DBS = deep brain stimulator; LEDs = levodopa equivalency doses; UPDRS = Unified Parkinson Disease Rating Scale; PDQ-39 = Parkinson Disease Questionnaire; HQ = Health-related quality of life measure.

Table 2
Change from pre-improv to post-improv.

	Pre (N = 22)	Post (N = 22)	Change (Post-Pre)	Wilcoxon p-value
UPDRS I	3 (2,4) [1,7]	3 (2,4) [0,9]	0 (−1, 1) [−3, 3]	0.999
UPDRS II	12 (8, 17) [4, 21]	10 (6, 17) [2, 21]	−1.5 (−5, 0) [−6, 5]	**0.019**
UPDRS III	23 (18, 33) [14, 51]	26 (19, 31) [9, 46]	−1 (−5, 5) [−10, 11]	0.867
UPDRS IV	3 (1, 5) [0.8]	2 (1, 4) [0, 7]	−1 (−2, 0) [−3, 2]	0.084
PDQ 39	34 (21, 50) [5, 69]	25 (16, 38) [3, 78]	−2 (−14, 6) [−27, 14]	0.099
HQ Communication	20 (19, 21) [13, 25]	21 (19, 23) [13, 24]	0 (0, 1) [-3, 4]	0.375
HQ anxiety	16 (14, 20) [8, 25]	17 (12, 20) [8, 30]	−1 (−4, 1) [−8, 8]	0.380
HQ Stigma	13 (10, 16) [8, 21]	13 (11, 14) [8, 22]	0 (−2, 1) [−9, 4]	0.519
HQ Depression	13 (11, 20) [8, 26]	12 (9, 16) [8, 24]	−1.5 (−4, 0) [−10,7]	0.128
HQ PAW	36 (29, 37) [24, 45]	36 (31, 41) [18, 45]	0.5 (−2, 4) [−10,9]	0.410

Comparison of the change in scores pre-group (week 0 for AS group, and week 5 for CS group) to post-group (week 13 for AS and week 17 for CS) using a Wilcoxon Signed Rank Test. The only significant change was seen with UPDRSII (p = 0.019).

particular intervention was able to overcome issues related to poor compliance. In fact, several members of one group formed a support group after the classes ended. This bond and friendship that formed among the participants argues for the importance of social interaction in the development of future PD programs. Furthermore, the intervention was highly rated by the participants on the measures of satisfaction and perceived benefit which are important patient reported outcomes.

In regard to exploratory measures of efficacy, the only variable that improved significantly post intervention was the change in UPDRS part II, activities of daily living. This may be a result of the humor and games that aimed at improving communication skills, stigma, anxiety and quality of life. However, none of the symptom specific neuro-QOL scores showed significant improvement on these measures. Such data does need to be interpreted with caution as they are patient derived outcomes.

Our study was not statistically powered to demonstrate efficacy so a positive trend in ADL scores is reassuring and deserves further testing in a larger cohort. There are a number of rationales supporting the study of humor in PD. Patch Adams and the Gesundheit Institute gave popular culture awareness to the phrase “laughter is the best medicine”, but the physiologic benefits of humor have been proposed for much longer. Freud described some of the psychological benefits of humor [11], and humor has been described by others to boost emotions, reduce social isolation, and counter frustration, depression, and anxiety [12]. In describing the endocrine and stress hormone changes during laughter, Berk et al. proposed benefits for overall health, as well as cardiovascular and immune health [13]. The mesolimbic dopaminergic reward system and intact logic, attention, working memory, and mental flexibility, have all been implicated in humor appreciation [14,15]. All of these functions can be impaired in PD [16]. In a study of 39 PD patients in Israel, it was found that PD patients rated humor content lower than controls, independent of depression or anxiety [15]. While we did not measure humor appreciation specifically, the overwhelming majority of our subjects clearly reported enjoying the classes, and in feedback sessions many commented on appreciating the fact that others in their class found them to be humorous.

Neurologic disorders may be particularly amenable to therapies that treat the mind and emotions as well as the physical limitations associated with a disease. In PD, as mobility becomes limited, spontaneity of thought and action also becomes impaired. QOL declines as conscious attention and effort in everyday living is forced to replace spontaneous communication and navigation [4,17]. Because the success of an improv scene requires an element of risk-taking, playfulness, and support, the personal development benefits of practicing may include a greater ability to “live in the moment” and focus.

The study has limitations that have to be recognized. First of all this was an open label study. Based on the nature of the intervention, participants could not be blinded, and that could have impacted the results of the patient derived outcome measures. The

study did not have a true control arm. We utilized the modified cross-over design though the lag between AS and CS group start was too short to truly assess the impact of intervention in a controlled fashion.

In conclusion, this first study of improvisation therapy in PD demonstrated excellent safety, tolerability, feasibility, retention and high patient satisfaction. Efficacy will have to be assessed in larger study powered to assess impact on the measures of disability, quality of life and functional impairment.

Conflicts of interest

DB, PP, and TS are part of the Northwestern University Parkinson's Disease & Movement Disorders Center which receives funding from the National Parkinson Foundation as a Center of Excellence. They have no other relevant conflicts of interest to disclose.

AW, MH, and BB are paid employees of The Second City®.

MK has no relevant conflicts of interest to disclose.

Acknowledgments

The study was funded by the National Parkinson Foundation (Grant Number: C09_Improv Therapy) 2015 Community Grant.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.parkreldis.2016.11.001.

References

[1] M. Hermanns, The invisible and visible stigmatization of Parkinson's disease, J. Am. Assoc. Nurse Pract. 25 (2013) 563–566.
[2] H.I. Hurtig, Problems with current pharmacologic treatment of Parkinson's disease, Exp. Neurol. 144 (1997) 10–16.
[3] D. Bega, P. Gonzalez-Latapi, C. Zadikoff, T. Simuni, A review of the clinical evidence for complementary and alternative therapies in Parkinson's disease, Curr. Treat. Options Neurol. 16 (2014) 314.
[4] G. Batson, C.E. Hugenschmidt, C.T. Soriano, Verbal auditory cueing of improvisational dance: a proposed method for training agency in Parkinson's disease, Front. Neurol. 7 (2016) 15.
[5] G. Bermant, Working with(out) a net: improvisational theater and enhanced well-being, Front. Psychol. 4 (2013) 929.
[6] N. Modugno, S. Iaconelli, M. Fiorlli, F. Lena, I. Kusch, G. Mirabella, Active theater as a complementary therapy for Parkinson's disease rehabilitation: a pilot study, ScientificWorldJournal 10 (2010) 2301–2313.
[7] A.J. Hughes, Y. Ben-Shlomo, S.E. Daniel, A.J. Lees, What features improve the accuracy of clinical diagnosis in Parkinson's disease: a clinicopathologic study, Neurology 42 (1992) 1142–1146.
[8] C.G. Goetz, G.T. Stebbins, T.A. Chmura, S. Fahn, H.L. Klawans, C.D. Marsden, Teaching tape for the motor section of the unified Parkinson's disease rating scale, Mov. Disord. 10 (1995) 263–266.
[9] C. Jenkinson, R. Fitzpatrick, J. Norquist, L. Findley, K. Hughes, Cross-cultural evaluation of the Parkinson's Disease Questionnaire: tests of data quality, score reliability, response rate, and scaling assumptions in the United States, Canada, Japan, Italy, and Spain, J. Clin. Epidemiol. 56 (2003) 843–847.
[10] D. Cella, J.S. Lai, C.J. Nowinski, D. Victorson, A. Peterman, D. Miller, F. Bethoux, A. Heinemann, S. Rubin, J.E. Cavazos, A.T. Reder, R. Sufit, T. Simuni, G.L. Holmes, A. Siderowf, V. Wojna, R. Bode, N. McKinney, T. Podrabsky, K. Wortman, S. Choi, R. Gershon, N. Rothrock, C. Moy, Neuro-QOL: brief measures of health-related quality of life for clinical research in neurology, Neurology 78 (2012) 1860–1867.
[11] M. Micozzi, Fundamentals of Complementary and Alternative Medicine, Churchill Livingstone, Philadelphia, Pennsylvania, 2001.
[12] M. Gelkopf, The use of humor in serious mental illness: a review, Evid. Based Complement. Altern. Med. 2011 (2011) 342837.
[13] L.S. Berk, S.A. Tan, W.F. Fry, B.J. Napier, J.W. Lee, R.W. Hubbard, J.E. Lewis, W.C. Eby, Neuroendocrine and stress hormone changes during mirthful laughter, Am. J. Med. Sci. 298 (1989) 390–396.
[14] A. Mensen, R. Poryazova, S. Schwartz, R. Khatami, Humor as a reward mechanism: event-related potentials in the healthy and diseased brain, PLoS One 9 (2014) e85978.
[15] A. Thaler, J. Posen, N. Giladi, Y. Manor, C. Mayanz, A. Mirelman, T. Gurevich, Appreciation of humor is decreased among patients with Parkinson's disease, Park. Relat. Disord. 18 (2012) 144–148.
[16] J.N. Caviness, E. Driver-Dunckley, D.J. Connor, M.N. Sabbagh, J.G. Hentz, B. Noble, V.G. Evidente, H.A. Shill, C.H. Adler, Defining mild cognitive impairment in Parkinson's disease, Mov. Disord. 22 (2007) 1272–1277.
[17] A. Schrag, M. Jahanshahi, N. Quinn, What contributes to quality of life in patients with Parkinson's disease? J. Neurol. Neurosurg. Psychiatry 69 (2000) 308–312.