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Impacts of an Exercise Program and Motivational Telephone Counseling on Health-Related Quality of Life in People With Parkinson's Disease

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Abstract

Purpose: The purpose of this study was to test the effects of group exercise and telephone counseling on physical and psychosocial health in people with Parkinson's disease (PD).

Design: This was a quasiexperimental study with a nonequivalent control group.

Methods: This study took place in Seoul, South Korea. Twenty-two and 20 subjects participated in the intervention and comparison groups, respectively. The intervention group performed group exercises twice a week and received motivational telephone counseling every 2 weeks for 12 weeks.

Findings: Significant effects of the intervention were found in overall health-related quality of life (HRQOL; $p = .012$) and in the following HRQOL dimensions: stigma ($p = .026$), social function ($p = .003$), cognition ($p = .028$), and communication ($p = .014$). No other variables such as activities of daily living, functional fitness, and depression exhibited statistically significant effects.

Conclusion/Clinical Relevance: These results indicate that group exercise with telephone counseling positively affects some aspects of HRQOL in PD patients.

Keywords: Exercise; motivation; Parkinson's disease; quality of life.

Introduction

Health-related quality of life (HRQOL) is the subjective evaluation of one's own life. Health-related quality of life is affected by disease, disorder, and health status and is important to patients with chronic disease (Centers for Disease Control and Prevention, 2011). Parkinson's disease (PD) is a chronic progressive and neurodegenerative condition, which is common in elderly people. Typically, people with PD have symptoms such as resting tremor, rigidity, bradykinesia, and gait disturbance caused by loss of dopaminergic neurons in the substantia nigra (Jankovic, 2008; Rodriguez-Oroz et al., 2009). Although there is no cure for PD, medication therapy and surgery to control the symptoms of PD are available. However, PD patients commonly experience motor complications including drug-induced dyskinesia and on–off fluctuation related to treatments wearing off (Shin & Hendrix, 2013). In addition, psychiatric problems such as depression, anxiety, and apathy are prevalent in PD and may appear at any stage of the disease (Grover, Somaiya, Kumar, & Avasthi, 2015; Rodriguez-Oroz et al., 2009). The HRQOL of people with PD is compromised by physical and psychosocial disability (Lee, Choi, Jung, Sohn, & Hong, 2015; van Uem et al., 2016). Thus, it is important for people with PD to extend disability-adjusted life expectancy coping with these challenges in the healthcare field. In addition, because of its chronic nature, PD can be burdensome to patients and their family. Timely and appropriate interventions should aim to promote PD patients' HRQOL and independence (Shin & Hendrix, 2013).

Complex symptoms frequently affect PD patients' daily lives and may cause increasing dependency (Tickle-Degnen, Ellis, Saint-Hilaire, Thomas, & Wagenaar, 2010). van Nimwegen et al. (2011) reported that these motor

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symptoms, as well as physical disability and mood disorders, predict PD patients' physical inactivity. Physical dysfunction and inactivity have been reported as major factors reducing PD patients' HRQOL (Nutt et al., 2014; Soh et al., 2013). Effective interventions are needed to improve PD patients' functional capacity, physical independence, and HRQOL. In a large retrospective study, regular exercise was found to be associated with better HRQOL and with better physical function, lessened progression of PD, and diminished caregiver burden (Oguh, Eisenstein, Kwasny, & Simuni, 2014). Exercise programs are therefore expected in comprehensive care for PD patients. Recently, exercise programs for people with PD have been implemented in several disciplinary fields, including nursing. Programs aimed at improvement in muscle strength and balance positively affected activities of daily living (ADL) and functional fitness (Choi & Sohng, 2008; Dibble, Hale, Marcus, Gerber, & LaStayo, 2009; Lee, Lee, & Song, 2015; Teixeira-Machado et al., 2015). Exercise interventions significantly positively affected psychological as well as physical function. Several studies have also reported that exercise interventions reduce depression and improve self-efficacy and HRQOL (Choi & Sohng, 2008; Dibble et al., 2009; Pretzer-Aboff, Galik, & Resnick, 2011; Teixeira-Machado et al., 2015).

Although exercise has various positive effects, exercise participation rates and levels of physical activity in PD patients are reportedly low (Ellis et al., 2013; van Nimwegen et al., 2011). Exercise interventions targeting PD patients should therefore include strategies to motivate people with PD to maintain exercise. In this study, an exercise program combined resistance training and line dancing to simultaneously arouse participants' interest and improve physical fitness. According to Bandura's social cognitive theory (Bandura, 1989), people determine their actions via several processes. In motivational processes, people who more strongly believe in their capability exert greater and more persistent effort; this self-belief may be facilitated by acquisition of knowledge and skills and by positive reinforcement. Learning enables individuals to adapt to changing health status and circumstances, which is important in health care. The program aimed to provide participants with individualized information and skills of exercise and positively reinforce them. Motivational telephone counseling was designed and conducted to support continuing participation and exercise maintenance (Bishop & Jackson, 2013; Lundahl et al., 2013). It was developed from motivational interviewing by Rollnick and Miller (1995), which is client-centered counseling style that attempts to move an individual toward motivation finding. Key elements of motivational interviewing are collaboration, evocation, and autonomy. Through collaborative effort between professional and client, counseling helps client autonomically make positive decisions, elicit behavior change, and accomplish established goals. In this study, motivational telephone counseling was expected to be evocative of value of exercise, make intrinsic motivation, and finally achieve individual goals with interpersonal relationship between nurses and PD patients.

Therefore, the purpose of this study was to identify the effect of group exercise programs and motivational telephone counseling on physical function and psychosocial factors such as depression and HRQOL in PD patients. Repeated measures were conducted to evaluate the intervention's persisting effect.

Methods

Design

A quasiexperimental pretest–posttest design with a nonequivalent control group was used to examine the effects of group exercise and telephone counseling on physical and psychosocial health including HRQOL in people with PD.

Subjects

Participants were recruited using poster advertisements at a neurology outpatient department and online advertisements on the Korean Parkinson's Disease Association website. Inclusion criteria for participation were (a) a diagnosis of PD, (b) aged 50 years or older, and (c) ability to ambulate independently without walking aid. Participants who (a) experienced a medication change related to PD within 4 weeks; (b) had cognitive impairments; (c) had other severe neurological, orthopedic, cardiopulmonary, or mental disorders; or (d) conducted exercise at least twice a week for 30 minutes were excluded. The necessary sample size was calculated using the G* power 3.1 program (Faul, Erdfelder, Buchner, & Lang, 2009). A sample size of 32 was required to achieve a significant positive change in the primary outcome, with an effect size of 0.4, an α of .05, and power ($1 - \beta$) of 0.8. As in prior studies (Allen et al., 2010; Cruise et al., 2011; Li et al., 2014; Schenkman et al., 2012), we anticipated an attrition rate of 20%; the sample size was therefore set at 38. Ultimately, 22 and 20 patients participated in the intervention and comparison groups, respectively. Three participants in the intervention group and two participants in the comparison group dropped out during the study for health or accessibility reasons (Figure 1).

Nursing Intervention

Participants were assigned to either the intervention group or the comparison group depending on their order of

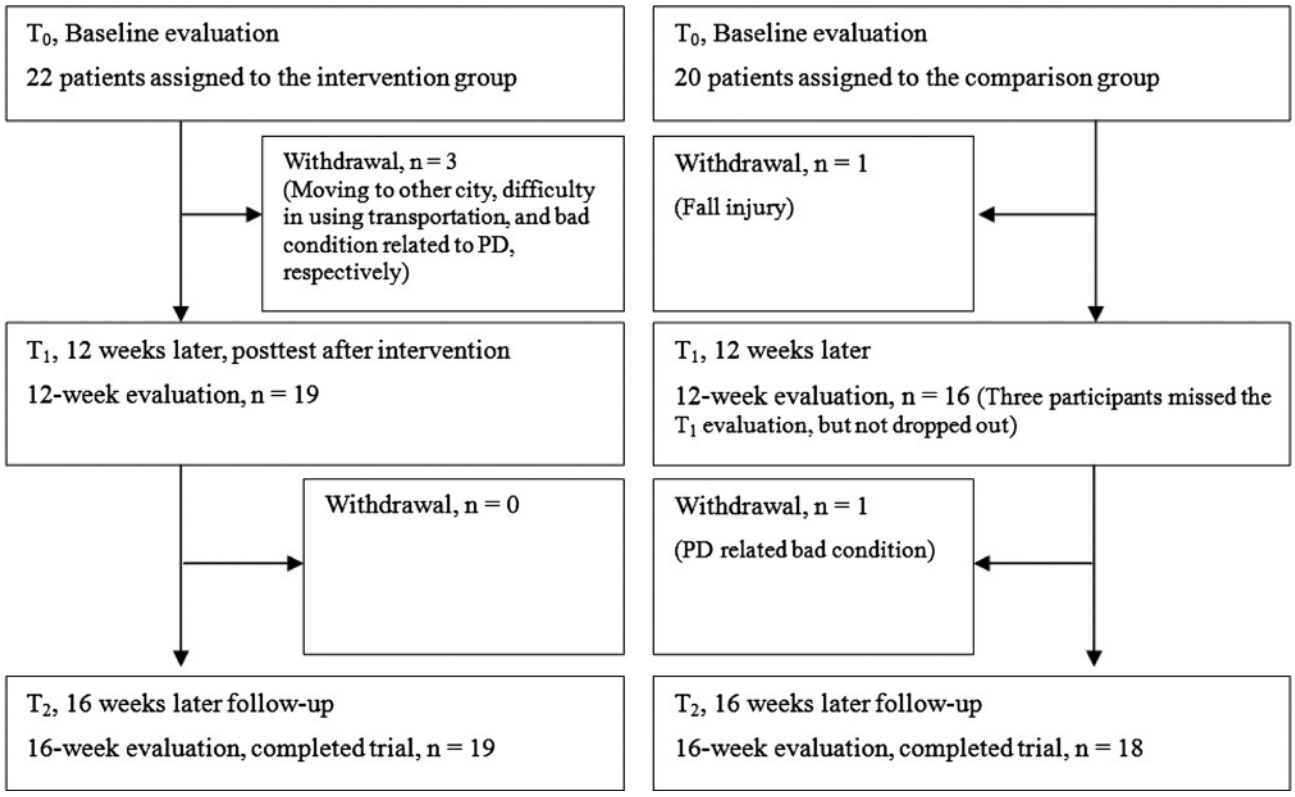

Figure 1. Flow diagram of the sample.

registration for the study. Twenty-two participants who registered for this study earlier were assigned to the intervention group, and others who did later were assigned to the comparison group. The intervention group received group exercise and telephone counseling for 12 weeks; the comparison group received no intervention beyond their usual care, such as pharmacological treatment from outpatient clinic. At 16 weeks postintervention, both the intervention group and the comparison group received identical DVDs containing the group exercise program.

Group Exercise

A preliminary reporting of the group exercise program is found in *The Korea Journal of Sports Science* by Kim et al. (2015). The program consisted of 10 minutes of warm-up, 15 minutes of aerobic exercise, 15 minutes of resistance exercise, and 10 minutes of cool down (Table 1). The group exercise program was administered twice a week. Running time of each exercise program was adjusted considering participants' physical condition. In warming up, a range of motion exercise and stretching were conducted for relaxation of muscles and joints. Aerobic exercise was implemented as line dancing. A line dance is a group dance in one or more lines with a repeated sequence of rhythmic steps. Resistance exercise was composed of a series of movements focused on strengthening muscle and improving endurance. TheraBand was used during upper body resistance exercise. A TheraBand is a flexible band for resistance training and muscle rehabilitation providing force on muscles and joints. Typically, they are coded by color to show different levels of flexibility. In this study, identical TheraBands with the same level of flexibility were used for all participants. However, because of safety considerations, each participant applied a different length for appropriate resistance considering individuals' physical condition. Exercise was implemented at a sport facility located in Seoul, South Korea, and supervised by three experts who were doctoral students majoring in geriatric nursing or sports medicine and who had previously participated in exercise programs for patients with chronic disease.

Telephone Counseling

In this study, telephone counseling was delivered to each participant in the intervention group every 2 weeks to motivate continuation of exercise and obtain feedback on the group exercise program. Counseling content included addressing the following questions with each participant: (1) Have you lately experienced any health problems such as a fall or unpleasant symptoms? (2) Has any positive or pleasing change occurred since you began participating in the group exercise program? If so, what is it? (3) Has any negative or unpleasant change occurred since you began participating in the group exercise program?

Table 1 Summary of group exercise program

Warm-up exercise (10 minutes)	(1) Neck exercise
	(2) Shoulder exercise
	(3) Waist exercise
	(4) Wrist and ankle exercise
	(5) Neck stretching exercise
	(6) Shoulder stretching exercise
	(7) Leg stretching exercise
Supervised Exercise (30 minutes)	Aerobic exercise (15 minutes)
	(1) Line dance
	Muscle strength exercise (15 minutes)
	(1) Core & lower body exercise
	1. Half squat or Lunges
	2. Calf raise
	3. Crunch
	4. Leg raise
	5. Pelvic tilt exercise
	6. Alternating lying back extension (superman exercise)
	7. Leg curl (with a partner)
	(2) Upper body exercise with TheraBand
	1. Biceps curl
	2. Triceps extension
	3. Lateral raise
	4. Shoulder press
	5. Chest press
Cool-down exercise (10 minutes)	(1) Neck exercise
	(2) Shoulder exercise
	(3) Waist exercise
	(4) Wrist and ankle exercise
	(5) Neck stretching exercise
	(6) Shoulder stretching exercise
	(7) Leg stretching exercise

If so, what is it? Let's think about what we could do to solve the problem. (4) Are you willing to participate in the group exercise program consistently? If not, what is the reason for your decision? (5) Is there anything more that you want to talk about or suggest? We aimed to communicate with the participants "using open-ended questions, listening with empathy, supporting self-efficacy, and accepting ambivalence" (Bishop & Jackson 2013, p.106). If participants were not contactable by phone call, we sent text messages to them.

Measurements and Methods

Demographic and clinical characteristics were collected prior to commencement of the exercise program via structured questionnaires and clinical examination (T_0). Outcome variables were evaluated at baseline (pretest, T_0), 12 weeks (posttest, T_1), and 16 weeks (follow-up, T_2).

Hoehn and Yahr Stage

Participants' severity of PD was evaluated with Hoehn and Yahr staging tool developed by Goetz et al. (2008). The definitions of each stages were described in Table 2.

Physical Activity

Participants' level of physical activity was measured using the short form of the International Physical Activity Questionnaire (IPAQ-SF), developed by The IPAQ Group (2011). The IPAQ-SF records self-reported physical activity levels in the previous 7 days. Responses were converted to metabolic equivalent task minutes per week (MET-min/week) according to the IPAQ scoring protocol.

Activities of Daily Living

To assess ADL, the Schwab and England Activities of Daily Living Scale was used (Schwab & England, 1969). Scores range from 0 to 100. Higher scores indicate better ADL. Scores of over 80% indicate complete independence in most of daily living tasks; scores of less than 70% indicate dependency.

Depression

Depression was measured using the Short Form Geriatric Depression Scale-Korean Version, developed by Sheikh and Yesavage (1986) and revised by Cho et al. (1999). The Short Form Geriatric Depression Scale-Korean Version is a 15-item scale; responses to items are 0 or 1; total scores greater than 5 are suggestive of depression (Greenberg, 2007).

Functional fitness

Functional fitness was measured regarding (1) muscle strength, (2) mobility, (3) balance, and (4) cardiorespiratory endurance (Berg, Wood-Dauphinee, Williams, & Maki, 1992; Jones & Rikli, 2002). Blood pressure and pulse rate were checked before evaluating functional fitness.

1. Muscle strength

To assess strength and lower limb endurance, a chair stand test was performed: Participants were asked to stand up and then sit down repeatedly on a chair with a straight back without armrests, with their hands crossed to touch the opposite shoulder. The maximum number of times participants were able to stand in 30 seconds was recorded.

Table 2 Hoehn and Yahr stage cited from Goetz et al. (2008, p. 2165)

Stage	Description
0	Asymptomatic
1	Unilateral involvement only
2	Bilateral involvement without impairment of balance
3	Mild to moderate involvement; some postural instability but physically independent; needs assistance to recover from pull test
4	Severe disability; still able to walk or stand unassisted
5	Wheelchair bound or bedridden unless aided

2. Mobility

Mobility was measured using a timed up-and-go test (Podsiadlo & Richardson, 1991). Participants were asked to sit back in an armchair, get up, walk 3 meters, turn, walk back, and sit down in the armchair again. Participants' time to completion was recorded. Participants wore their regular footwear during this test.

3. Balance

Balance was evaluated using the Berg Balance Scale (Berg, Wood-Dauphinee, Williams, & Maki, 1992).The Berg Balance Scale is a 14-item scale with scores ranging from 0 to 56; higher scores indicate greater function.

4. Cardiorespiratory endurance

Cardiorespiratory endurance was measured using the 6-minute walk test. Participants were asked to walk back and forth along a marked 15-meter walkway as fast as possible for 6 minutes; participants' total distance walked was recorded.

Health-Related Quality of Life

Health-related quality of life was measured using the Parkinson's Disease Questionnaire (PDQ-39) developed by Jenkinson, Fitzpatrick, Peto, Greenhall, and Hyman (1997). The PDQ-39 consists of eight dimensions (mobility, ADL, emotional well-being, stigma, social support, cognition, communication, and bodily discomfort) and contains 39 items. Responses used a 5-point Likert scale; participants' overall score was calculated as a percentage ranging from 0 to 100. Higher scores indicated poorer quality of life. The Korean version of the PDQ-39 was translated and tested for validity and reliability by Kwon et al. (2013), who reported Cronbach's α for the internal consistency of each of the eight dimensions to be .56–.79. Cronbach's α of each of the eight dimensions in this study was .65–.92.

Data Analysis

Data were analyzed using SPSS 20.0 program. For categorical variables, the chi-square test was used to assess the homogeneity of the groups' demographic and clinical characteristics at baseline. For continuous variables, mean differences in demographic and clinical characteristics according to group assignment were analyzed, and the statistical significances were determined using estimated significance levels through bootstrapping to avoid normally distributed errors.

The generalized estimation equation (GEE) was used to test the longitudinal effect of the intervention. The GEE provides a correlation matrix of repeated measures of variables for efficient estimates and has several advantages in analyzing longitudinal data (Liu, Dixon, Qiu, Tian, & McCorkle, 2009). Compared to traditional methods such as the repeated-measures analysis of variance, the GEE requires less restrictive assumptions about data distribution. All available data may be used in analysis without the need to omit subjects with incomplete data. All collected data were therefore included in analysis of our intervention's effect. In addition, the GEE analyzes the relationship between dependent variables and one or more predictor variables over time. Each model in our study included a dependent variable, treatment, time, and the pretest score of each dependent variable. Pretest scores were included in the models to control for differences between the groups at baseline. An α of .05 was used in all tests.

Ethical Consideration

Approval for this trial was obtained from the institutional review board of the author's hospital (IRB number 4-2014-0622). All of the program administration and outcome evaluations were conducted after receiving written consents. Participants were provided with an explanation about the purpose and procedure of the study, and any questions that arose were answered. Participants were informed that they could withdraw from participation whenever they wanted. In the event a participant chose to withdraw from the study, existing participant data would be used for statistical analysis without further data collecting. When the subject did not want to use his or her data, all of the data were discarded.

Results

General Participant Characteristics

Baseline participant descriptions are presented in Table 3. No differences existed in demographic and clinical variables between the intervention and comparison groups, except regarding physical activity level. The mean ages of the two groups were 62.73 (*SD* = 8.50) and 62.20 (*SD* = 5.27), respectively. The proportions of male and female participants were similar (approximately 2:3 in both groups). There were no significant differences in stage or severity of PD between the groups. The only variable among participants' general characteristics that differed significantly between the groups was physical activity level (p = .032). Physical activity level in the intervention group was 3,559.42 (*SD* = 2,657.42) MET-min/week; that of comparison group was 1,974.30 (*SD* = 1,559.49) MET-min/week.

Table 3 Participants' characteristics at baseline

	Intervention Group (n = 22)	Comparison Group (n = 20)	p
Age	62.73 (8.50)	62.20 (5.27)	.798
Gender			
Male	9 (40.9%)	8 (40.0%)	1.000
Female	13 (59.1%)	12 (60.0%)	
Education (year)			
<7	4 (18.2%)	4 (20.0%)	.756
7–12	9 (40.9%)	10 (50.0%)	
>12	9 (40.9%)	6 (30.0%)	
Employed			
Yes	5 (22.7%)	8 (40.0%)	.227
No	17 (77.3%)	12 (60.0%)	
Income (U.S. dollar)			
<1,000	3 (13.6%)	5 (25.0%)	.649
1,001–2,000	8 (36.4%)	4 (20.0%)	
2,001–3,000	3 (13.6%)	2 (10.0%)	
>3,000	6 (27.2%)	6 (30.0%)	
Don't know	2 (9.1%)	3 (15.0%)	
Comorbidity			
Hypertension	18 (81.8%)	12 (60.0%)	.222
Diabetes	21 (95.5%)	18 (90.0%)	.932
Dyslipidemia	19 (86.4%)	18 (90.0%)	1.000
Health status	2.77 (0.75)	3.05 (0.95)	.297
Very good	0 (0.0%)	1 (5.0%)	.692
Good	3 (13.6%)	5 (25.0%)	
So-so	12 (54.5%)	9 (45.0%)	
Bad	6 (27.3%)	4 (20.0%)	
Very bad	1 (4.5%)	1 (5.0%)	
PD duration (year)	7.72 (3.84)	10.02 (6.27)	.161
PD onset (year)	55.01 (9.57)	52.18 (8.14)	.303
Body mass index	23.81 (2.73)	23.94 (3.60)	.891
Physical activity (MET-min/week)	3559.42 (2657.42)	1974.30 (1559.49)	.032*
Hoehn and Yahr staging	1.59 (0.67)	1.95 (0.85)	.166
0	1 (4.5%)	1 (5.3%)	.238
1	8 (36.4%)	4 (21.1%)	
2	12 (54.5%)	9 (47.4%)	
3	1 (4.5%)	5 (26.3%)	

Note. PD = Parkinson's disease; MET = metabolic equivalent task.
*p < .05

Effectiveness of the Nursing Intervention

Table 4 presents the results relevant to this study's hypothesis, including the means and *SD*s of the dependent variables at each measure (0, 12, and 16 weeks) and GEE analysis of the program's effect. Participants' overall K-PDQ-39 scores differed significantly at baseline; participants' scores on depression (p = .015), cognition (p = .018), and discomfort (p = .020) differed significantly. Although other variables did not exhibit statistically significant differences, they differed from each group's baseline mean. When pretest scores and time were statistically controlled, significant effects of the intervention were found in overall K-PDQ-39 score (p = .012) and in scores on stigma (p = .026), social function (p = .003), cognition (p = .028), and communication (p = .014). This implies that the intervention group's HRQOL was improved, particularly regarding stigma, social function, cognition, and communication, compared with the comparison group; however, no significant differences were found in ADL, depression, and functional fitness such as leg strength, mobility, balance, and cardiopulmonary endurance.

Telephone Counseling

Overall, participants gave positive feedback about the exercise program, indicating that they enjoyed the exercise and that it promoted their activity level. Minority opinions about the program included demands for more intensive exercise and exercise focused on specific movement such as leg raise and pelvic tilt exercise.

Discussion

This study was conducted to analyze the impact of a nursing intervention including a group exercise program with motivational telephone counseling on physical and psychosocial health in people with PD. Initial homogeneity is generally considered optimal in experimental design; however, significant differences between the intervention and control groups were found in several variables at baseline. These were controlled in the analysis using the GEE and likely resulted from randomization failure. Nevertheless, the present study's findings are important as they provide clinical evidence that nursing interventions may enhance HRQOL in people with PD.

In this study, the group exercise program with motivational telephone counseling positively affected HRQOL in people with PD. Several studies have reported the effectiveness of exercise intervention on improving HRQOL through experimental design or meta-analysis of trial results. Sharp and Hewitt's (2014) meta-analysis found that dancing positively affected PD patients' HRQOL, as well as their motor symptoms and balance. Teixeira-Machado et al. (2015) also reported that group exercise was associated with improved HRQOL and reduced depression. In contrast, some studies have reported that exercise programs led to improvements in physical function but not HRQOL. Shu et al.'s (2014) meta-analysis found that aerobic exercise did not improve HRQOL in people with PD but did enhance gait and balance. Similarly, an exercise program targeting functional fitness improved functional performance and ADL, but not HRQOL (Schenkman et al., 2012). Despite these inconsistent results, exercise is recommended as it positively affects variables (i.e., physical function and mood) that are deemed important to PD patients' quality of life (Cheon, Chae, Sung, Lee, & Kim, 2013; Li et al., 2014; Uc et al., 2014). Exercise programs

Table 4 Analysis of the impact of a nursing intervention on outcome variables

	Intervention Group			Comparison Group			Significance of Effect
	T_0 (n = 22)	T_1 (n = 19)	T_2 (n = 19)	T_0 (n = 20)	T_1 (n = 16)	T_2 (n = 18)	
ADL	76.36 (23.21)	81.58 (13.02)	82.63 (14.85)	80.00 (14.91)	84.67 (15.52)	82.94 (10.47)	.406
Functional fitness							
Leg strength	12.48 (2.98)	13.67 (2.57)	13.28 (2.95)	11.28 (3.30)	12.27 (3.65)	15.44 (2.56)	.874
Mobility	9.44 (1.52)	8.08 (1.66)	8.27 (1.85)	9.41 (2.83)	8.75 (2.02)	6.95 (1.56)	.541
Balance	52.32 (2.77)	53.63 (3.00)	53.63 (2.69)	51.89 (3.40)	52.87 (4.42)	54.12 (2.26)	.699
Cardiopulmonary endurance	398.04 (75.81)	427.05 (82.98)	434.34 (82.52)	401.69 (72.24)	433.89 (82.12)	460.15 (72.55)	.258
Depression	7.45 (5.28)	7.68 (4.55)	6.05 (4.52)	3.45 (3.53)	4.44 (4.55)	5.33 (4.47)	.370
HRQOL	38.75 (20.28)	32.63 (17.99)	30.45 (14.52)	26.72 (13.47)	32.55 (19.84)	30.11 (16.47)	.012*
Mobility	38.86 (24.20)	33.82 (25.03)	29.21 (19.91)	30.63 (17.05)	31.72 (21.64)	30.14 (17.96)	.272
ADL	37.69 (29.50)	31.58 (27.12)	31.80 (23.00)	28.13 (24.14)	31.25 (24.67)	27.78 (21.20)	.262
Emotion	40.15 (22.25)	40.13 (22.27)	35.53 (19.06)	29.17 (18.82)	34.64 (25.99)	33.56 (23.20)	.350
Stigma	37.50 (28.67)	28.95 (25.45)	27.96 (23.05)	22.50 (19.60)	28.91 (19.62)	25.69 (21.43)	.026*
Social	34.47 (25.76)	24.12 (24.20)	21.49 (16.27)	24.58 (24.70)	32.29 (27.53)	30.09 (22.89)	.003*
Cognitive	39.49 (15.83)	29.61 (13.64)	29.61 (16.52)	27.50 (15.63)	32.81 (20.60)	31.60 (15.08)	.028*
Communication	32.95 (22.19)	28.07 (24.88)	21.93 (20.07)	20.00 (21.01)	29.69 (30.42)	30.09 (33.72)	.014*
Discomfort	48.86 (26.76)	44.74 (21.55)	46.05 (20.48)	31.25 (16.64)	39.06 (25.41)	31.94 (17.91)	.467

Note. ADL = activities of daily living; HRQOL = health-related quality of life.
*$p < .05$

are therefore expected to improve physical and psychosocial health as complementary PD therapy. Future research should aim to verify the effectiveness and safety of various exercises, as this may inform exercise programs implemented in clinical and community settings.

This research's exercise program had remarkable effects on the psychological dimensions of the K-PDQ-39; specifically, on stigma, social function, and communication. Previous research has established the effect of physical activity on psychosocial health (Dibble et al., 2009; Teixeira-Machado et al., 2015). These effects may reflect improved physical condition following exercise, as well as the social aspects of group exercise. Social interaction and social support engendered by group activity may help PD patients to overcome handicap related to PD and promote their self-efficacy, enjoyment, and satisfaction. Other dimensions of the K-PDQ-39—specifically, mobility, ADL, and discomfort—exhibited longitudinal tendencies to improvement; however, no significant differences were found between the groups. This may be due to inadequate exercise. According to the 2008 Physical Activity Guidelines, it is suggested that adults with disability should exercise at least 150 minutes per week of moderate intensity (U.S. Department of Health and Human Services, 2008). The Korean Movement Disorder Society (2012) also recommends that individuals with PD perform regular exercise such as walking, stretching, and resistance exercise at least for 20 minutes every day. In light of these guidelines, the present program's exercise frequency may have been insufficient to observe changes in physical dimensions of HRQOL.

Although the effectiveness of exercise in improving physical function has been established (Allen et al., 2010; Cheon et al., 2013), in the present research, the GEE analysis identified no statistically significant effect of exercise on ADL or functional fitness. The exercise program in the present research combined resistance training and aerobic exercise; physical functions such as ADL were therefore expected to improve because of increasing muscle strength, endurance, mobility, and balance. In the intervention group, participants' ADL and functional fitness gradually improved over the program's 12 weeks and remained elevated until the last evaluation at 16 weeks; however, in the comparison group, participants' physical function also increased over the 16 weeks and even exceeded that of the intervention group. As participants in comparison group got to know the purpose and process of the exercise program through informed consent of participation, their awareness of the study purpose may have affected their performance (Shadish, Cook, & Campbell, 2002). As well, we did not track the level of physical activity during the study period of the comparison group, which is one of the limitations in this study. Despite these findings, as functional fitness critically promotes physical independence and prevents falls (Gazibara et al., 2015; Oguh et al., 2014), the importance of regular exercise needs to be emphasized.

In this study, the nurses organized the exercise program to improve balance, strength, and endurance considering PD patients' clinical symptoms; set individual goals such as intensity and times of exercise considering the participants' condition to improve physical and psychosocial function; and conducted counseling on the phone for the participants to sustain the exercise program. Previous studies reported that age, gender, motor

Key Practice Points

- Parkinson's disease (PD) is a chronic progressive and neurodegenerative disease that has complex clinical symptoms.
- The health related quality of life (HRQOL) of people with PD is compromised by physical and psychosocial disability.
- Group exercise programs and motivational telephone counseling positively affects some aspects of HRQOL in people with PD.

symptom, physical fitness, self-efficacy, etc., were associated with regular exercise in individuals with PD (Dontje et al., 2013; Lee, Park, & Choi, 2016). Thus, role of nurses to advocate for people with PD to sustain exercise programs is suggested as follows: identifying relating factors of exercise, strategizing to overcome barriers and adhere exercise to their routine, suggesting appropriate exercise program, and referring a patient to a physical therapist in case of necessity. In addition, nurses should set a realistic goal with individualized approach, for example, setting a regular time for exercise with the avoidance of "off period" that characterizes by the return of poor motor function at end-of-dose. These nurses' interventions can facilitate continuity of care for patients who have few chances to receive professional medical service. It is important that nurses should help enable isolated patients, who have difficulties in managing symptoms and maintaining daily life, to proactively cope with disease.

This study has several limitations. First, heterogeneity in baseline outcome variables between groups, which resulted from randomization failure, critically affected the scope for determining the intervention's impact. The risk of selection bias was high because of inadequate group assignment, threatening the study's validity. This underlines the importance of rigor in experimental design, particularly regarding randomization. The major reason for the randomization failure was patients' strong preference to participate in the experimental group. The design was changed from a randomized controlled trial to a quasiexperimental study that assigned participants to groups depending on their order of registration for the study. A delayed-treatment design in which intervention would have been provided to the comparison group following posttest was considered, but not implemented in this study in order to permit examination of maintenance of the intervention's effect. Participants' preference to be in the intervention group reflects the need for nonpharmacological intervention and for social support groups among patients with a given disease. Some participants attended the program despite travel times of over 2 hours. Healthcare professionals should therefore develop and implement community- and clinic-based interventions for PD patients.

Second, the trial was not blinded. The participants were aware of their group assignment; biases due to awareness, for example, hypothesis guessing within the experimental conditions, might be therefore uncontrolled. In light of these limitations, the present study suggests several directions for further studies. Future research examining exercise programs should randomize group assignment, identify and control confounding factors, and carry out blinding to enhance experimental validity.

Conclusion

This experimental study's results indicate that group exercise programs with motivational telephone counseling positively affect some aspects of HRQOL in people with PD. In this study, improvement in HRQOL was related to psychosocial rather than physical aspects. Besides, there was no improvement in physical function. In summary, these findings suggest that the care and support received from the exercise intervention and motivational telephone counseling were most likely what accounted for the improved HRQOL of participants. In addition, the effect of motivational telephone counseling was particularly meaningful. In the intervention group, three participants (13.6%) dropped out due to transportation problems, moving to the other city, and poor health, respectively. This attrition rate was comparable to other studies that administered exercise program reporting attrition rates of 11.8%–18.4% (Allen et al., 2010; Cruise et al., 2011; Li et al., 2014; Schenkman et al., 2012). However, the structured telephone counseling enabled us to receive feedback about the exercise program, comprehend facilitating factors or barriers to participation, and motivate participants to maintain exercise. In addition, this nursing intervention program was developed based on previous reported evidence and consulted by experts in the field of sports for the chronic illness patients. It is thought that evidence-based intervention improved the HRQOL of this study's participants. The present study's findings should inform and motivate the development of interventions targeting people with PD.

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