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Original Article

Effects of Individual Education Using a Treating-to-target Strategy in Patients with Rheumatoid Arthritis

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Objective. To examine effects of an individual education program using the treating rheumatoid arthritis to target (RA T2T) strategy in patients with moderate-severe rheumatoid arthritis. **Methods.** Patients were assigned randomly to an educational intervention (n = 33) or conventional care group (n = 33). The intervention was a nurse-delivered 9-month educational program consisting of 3 monthly sessions and monthly telephone counseling. The assessments occurred at the baseline and every 3 months in both groups, but only the intervention group completed the 9-month education follow-up. The outcome variables included the disease activity (DAS28), functional disability (KHAQ), fatigue (FACIT-Fatigue), and quality of life (SF-36). Repeated measures ANOVA and a Bonferroni multiple comparison were used to evaluate the outcome variables comparing the groups and follow-up times. **Results.** Significant interactions were observed between the groups and follow-up times in the disease activity ($p = 0.041$), fatigue ($p = 0.042$), and physical ($p = 0.006$) and mental ($p = 0.031$) health-related quality of life, but there was no significant interaction in the functional disability ($p = 0.110$). Significant differences were noted between the groups at the 9-month period ($p = 0.048$) in disease activity and fatigue, and at the 6-month ($p = 0.023$) and 9-month periods ($p = 0.027$) in the physical health-related quality of life. **Conclusion.** This education program using the RA T2T strategy had significant benefits on the disease activity, fatigue, and quality of life in patients with moderate to severe rheumatoid arthritis, and the results suggested that this contributed to positive clinical outcomes as a good practical nursing intervention. **(J Rheum Dis 2018;25:255-262)**

Key Words. Rheumatoid arthritis, Patient education, Quality of life

INTRODUCTION

Rheumatoid arthritis (RA) is a common autoimmune disease that is associated with progress disability, systemic complications, early death and socioeconomic costs [1]. The primary goal of treatment is to maximize long term health-related quality of life (QoL) through control of symptom, prevention of structural damage, normalization of function and social participation [2]. Pain, fatigue, joint damage and functional disability caused by RA are factors that affect QoL of the patient [3] and disease activity is a good predictor of joint damage, functional disability [4].

Recently the European League Against Rheumatism (EULAR) proposed that treating RA to target (RA T2T), which aimed to achieve the treatment goal of clinical remission or low disease activity through measuring disease activity and adjusting therapy [5].

In recent decades, there have been advances in treatment of RA, along with the development of new ther-

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apeutic agents. However despite such efforts, patients still endure pain and fatigue, which requires the implementation of a holistic approach to care [6,7]. Accordingly, if collaboration of RA T2T strategy and patient education which based on the autonomy, shared decision making may be expected more positive effects on treatment of RA.

So this study aimed to identify the effects that individualized nursing education program incorporating RA T2T strategy and patient education on disease activity, functional disabilities, fatigue, and quality of life in patients with moderate-severe RA.

MATERIALS AND METHODS

Participants

We consecutively enrolled 70 patients with RA in this study during from November 2014 to January 2016 at clinic of rheumatology Seoul St. Mary's Hospital in Korea. All participants were randomly assigned to an experimental intervention or conventional care group as a control group using 2010 Microsoft Excel program (Microsoft, Redmond, WA, USA). This study was approved by the Institutional Review Board (IRB) of Seoul St Mary's Hospital (IRB no. KIRB-00486-004) and all participants provided their informed consent prior to perform the study procedure. The inclusion criteria were as follows:

(i) Patients who diagnosed with RA according to the revised classification criteria of 1987 American College of Rheumatology (ACR) or 2010 ACR/EULAR diagnostic criteria [8,9]

(ii) Those who exceeded a disease activity score of 3.2 based on Disease Activity Score in 28 joints-erythrocyte sedimentation rate (DAS28-ESR) [10]

(iii) Those with no history of rheumatic diseases other than Sjögren's syndrome

(iv) Those with no experience in RA education programs and clinical intervention studies

Sample size

The sample size was determined by referencing a previous study that showed reduction in disease activity following education [11], and between-groups mean difference of 0.7, significance level of $\alpha=0.05$, and statistical power $(1-\beta)$ of 0.80 were assumed. The PASS 13 program indicated that total 54 participants were required and 30% drop-out rate was anticipated, we aimed to recruit 70 participants. During the study period, 4 participants (2 in the experimental and 2 in control group)

Table 1. Education program using RA T2T strategy

Time	Theme	Contents	Duration/session
Baseline	Orientation & overview of RA	Introduce overall program and instructor. Inform about general knowledge of RA, comorbid condition and treat to target strategy. Check and record the present point of DAS28 score and goal setting. Inform about monthly telephone counseling.	40 min
After 3 months	Education sharing experiences check DAS28 goal setting	Inform about pharmacological treatment, their benefits and risks. Share these experiences about administration of medication. Explain the present point of laboratory test results, check and record DAS28 score and goal setting. Inform about monthly telephone counseling.	30 min
After 6 months	Education sharing experiences check DAS28 goal setting	Inform about physical activity, exercise and joint protection and share these experiences. Explain the present point of laboratory test results, check and record DAS28 score and goal setting. Inform about monthly telephone counseling.	30 min
After 9 months	Education sharing experiences check DAS28 integrate and encouraging T2T	Inform about nutrition care related the disease and share these experiences. Explain the present point of laboratory test results, record DAS28 score and goal setting. Encourage patients to practice treat to target strategy continuously.	40 min

RA T2T: treating rheumatoid arthritis to target, DAS28: disease activity score in 28 joints.

dropped out due to hospitalization and personal schedule so total 66 participants were analyzed for this study.

Intervention: education using the RA T2T strategy

Education using the RA T2T strategy was performed only on experimental group and over a 9-month period, which included telephone counseling for motivational purposes and 4 individualized education sessions.

Each session lasted 30～40 minutes and was conducted at the baseline and 3, 6, and 9 months in the rheumatology outpatient clinic. At each session, participants were measured disease activity, functional disability, fatigue, and QoL by a self-report questionnaire. The contents of the education program were comprised of overview of RA, pharmacological treatment, education on physical activities and nutrition, laboratory test results, and achievement of disease activity and set goal.

In cases where the disease activity reached the goal, the participants were encouraged for sustained maintenance, whereas in cases the goal was not reached, additional efforts were shared for achieving a goal. Moreover, telephone counseling (total of 8 sessions in 1 month interval with 20 minutes per session) was conducted for motivating and monitoring administration of medication, treatment compliance and physical activities (Table 1) [7].

The education program was constructed based on 10

Table 2. Baseline characteristics of patients with rheumatoid arthritis

Characteristics	Experimental group (n=33)	Control group (n=33)	t or χ^2	p-value
Age (yr)	45.88±11.66	46.48±12.74	−0.20	0.841
Gender			*	0.999
Female	30 (90.91)	29 (87.88)		
Male	3 (9.09)	4 (12.12)		
Educational level			0.00	0.999
≤High school	14 (42.42)	15 (45.45)		
≥College	19 (57.58)	18 (54.55)		
Job			0.00	0.999
Yes	19 (57.58)	18 (54.55)		
No	14 (42.42)	15 (45.45)		
Regular exercise			1.07	0.302
Yes	9 (27.27)	14 (42.42)		
No	24 (72.73)	19 (57.58)		
Height (cm)	160.58±6.29	160.48±5.76	0.06	0.951
Weight (kg)	56.76±10.80	59.18±12.12	−0.86	0.394
Disease duration (mo)	57.36±72.21	59.67±75.79	−0.13	0.900
Methotrexate use			*	0.999
Yes	31 (93.94)	31 (93.94)		
No	2 (6.06)	2 (6.06)		
Steroid use			*	0.258
Yes	31 (93.94)	27 (81.82))		
No	2 (6.06)	6 (18.18)		
Rheumatoid factor			*	0.999
Positive	33 (100)	32 (96.97)		
Negative	0 (0)	1 (3.03)		
ESR (mm/h)	42.00±15.97	40.76±19.60	0.28	0.779
DAS28 (score)	4.61±0.83	4.53±1.06	0.36	0.723
KHAQ (score)	0.70±0.56	0.76±0.63	−0.39	0.701
FACIT-F (score)	32.42±12.32	33.03±10.07	−0.22	0.828
Quality of life (SF-36 score)				
Physical component summary	38.21±7.26	39.04±7.86	−0.44	0.658
Mental component summary	44.35±9.23	46.18±11.72	−0.71	0.483

Values are presented as mean±standard deviation or number (%). ESR: erythrocyte sedimentation rate, DAS28: disease activity score in 28 joints, KHAQ: Korean health assessment questionnaire, FACIT-F: functional assessment of chronic illness therapy-fatigue scale, SF-36: short form- 36. *Fisher's exact test.

recommendation of RA T2T proposed by EULAR [5]. The content validity was validated by two professors of rheumatology and nursing professor with research experience in RA patient education.

Outcome measures: disease activity

Disease activity was measured using DAS28-ESR, which can show a score range of 0 to 9.4 points, include tender and swollen joint counts among 28 joints, as well as ESR (mm/h) and the overall health status of the subject measured by a 100 mm visual analogue scale.

DAS28 scores can be categorized into <2.6 as remission, ≤ 3.2 as low disease activity, >3.2 and ≤ 5.1 as moderate disease activity and >5.1 as high disease activity [10].

Outcome measures: functional disability

Functional disability was measured by the Korean Health Assessment Questionnaire (KHAQ) validated in Korean by Bae et al. [12], which was developed as the HAQ for assessing RA health status [13].

The KHAQ assesses the level of difficulties experienced in activities of daily living for the previous one week and we used a disability index comprised of 20 items in 8 categories, which included dressing and grooming, arising, eating, walking, hygiene, reach, grabbing, and outside activities.

Outcome measures: fatigue

Fatigue was measured using the Korean version of the Functional Assessment of Chronic Illness Therapy (FACIT)-Fatigue scale, developed from FACIT. The tool was used with license agreement from FACIT and the score means that higher scores indicating lower fatigue levels [14].

Outcome measures: quality of life

QoL was measured using the health-related QoL measurement tool Short form health survey 36 (SF-36) developed by Ware and Sherbourne [15], and was used after approve of the Korean version of SF-36 guidelines, and statistics software from Medical Outcomes Trust and Quality Metric Incorporated (QM026092). This consisted of 8 health domain scales of physical function, role-physical, bodily pain, general health, vitality, social function, role-emotional and mental health. These con-

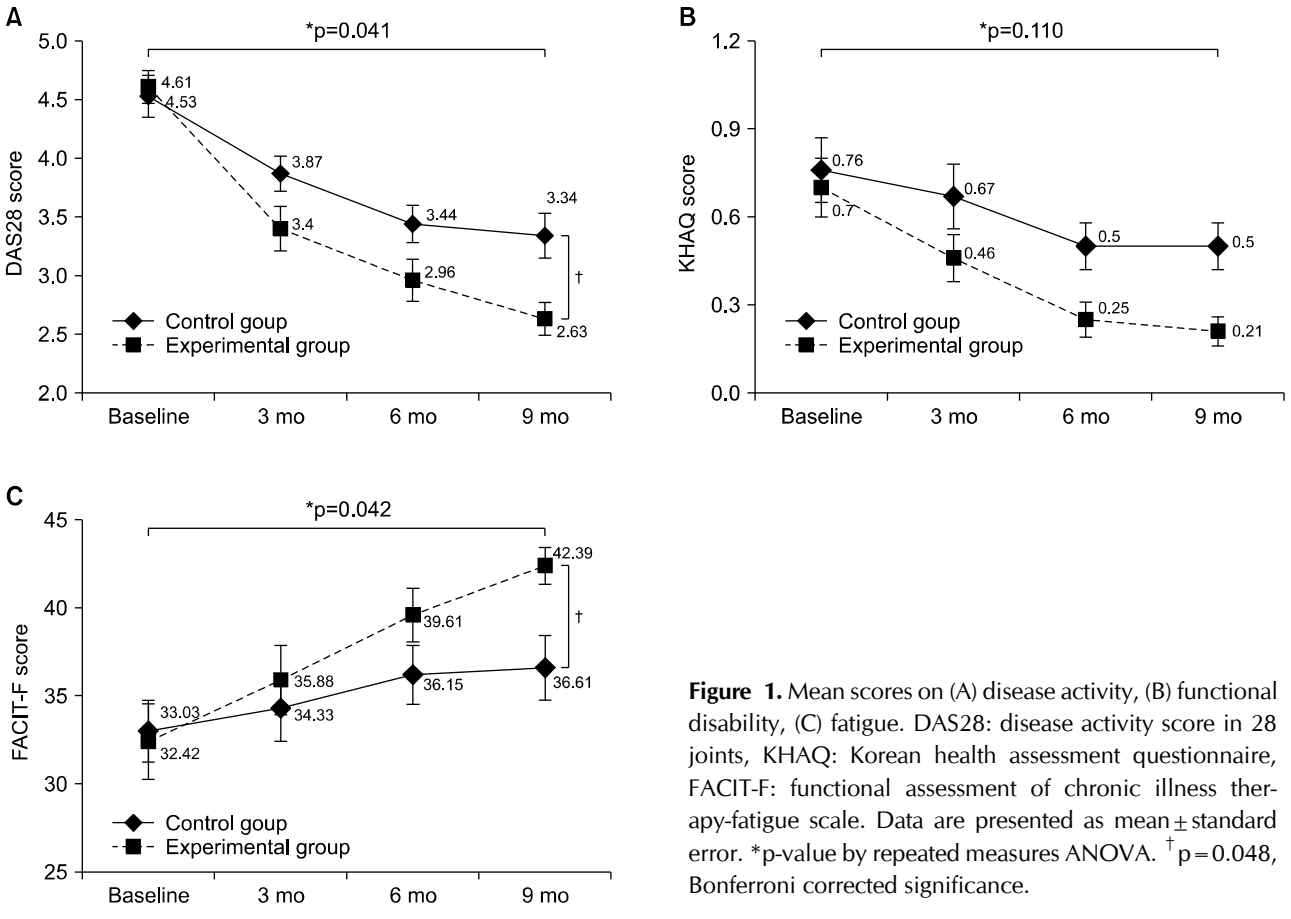

Figure 1. Mean scores on (A) disease activity, (B) functional disability, (C) fatigue. DAS28: disease activity score in 28 joints, KHAQ: Korean health assessment questionnaire, FACIT-F: functional assessment of chronic illness therapy-fatigue scale. Data are presented as mean ± standard error. *p-value by repeated measures ANOVA. † $p=0.048$, Bonferroni corrected significance.

cepts along with both physical health component summary (PCS) and mental health component summary (MCS). The score means that higher score indicating higher QoL.

Statistical analysis

Data were analyzed using the R language program (R Foundation for Statistical Computing, Vienna, Austria). Participant characteristics were analyzed by descriptive statistics, while chi-square test, Fisher's exact test, and t-tests were used for testing homogeneity and differences in DAS28 scores. The between-group differences in effects were analyzed by repeated measures ANOVA and Bonferroni multiple comparison.

RESULTS

Participant characteristics and homogeneity test

The experimental and control group showed no significant differences in the general characteristics and clinical features (Table 2).

At baseline disease activity, functional disability, fatigue, and QoL measured in both two groups also showed no significant differences between the groups (Table 2).

Disease activity

There were significant interactions between the groups and follow-up times in DAS28 score (p=0.041) (Figure 1A). Multiple comparisons of the baseline and different time points showed significant differences at 9 month time point (p=0.048) (Figure 1A). There were significant differences in the rate who achieved remission at 3 month (p=0.027) and 6 month time point (p=0.013) (Table 3).

Functional disability

There were no significant interactions between the groups and follow-up times in functional disability (p=0.110) (Figure 1B).

Fatigue

There were significant interactions between the groups and follow-up times in fatigue (p=0.042) (Figure 1C). Multiple comparisons of the baseline and different time points showed significant differences between the groups at 9 month time point (p=0.048) (Figure 1C).

Table 3. Remission achievement rate by the time point

Time	Remission achievement	Experimental group (n=33)	Control group (n=33)	χ^2	p-value
3 months	Yes	8 (24.24)	1 (3.03)	*	0.027
	No	25 (75.76)	32 (96.97)		
6 months	Yes	14 (42.42)	4 (12.12)	6.19	0.013
	No	19 (57.58)	29 (87.88)		
9 months	Yes	15 (45.45)	7 (21.21)	3.34	0.068
	No	18 (54.55)	26 (78.79)		

Values are presented as number (%). *Fisher's exact test.

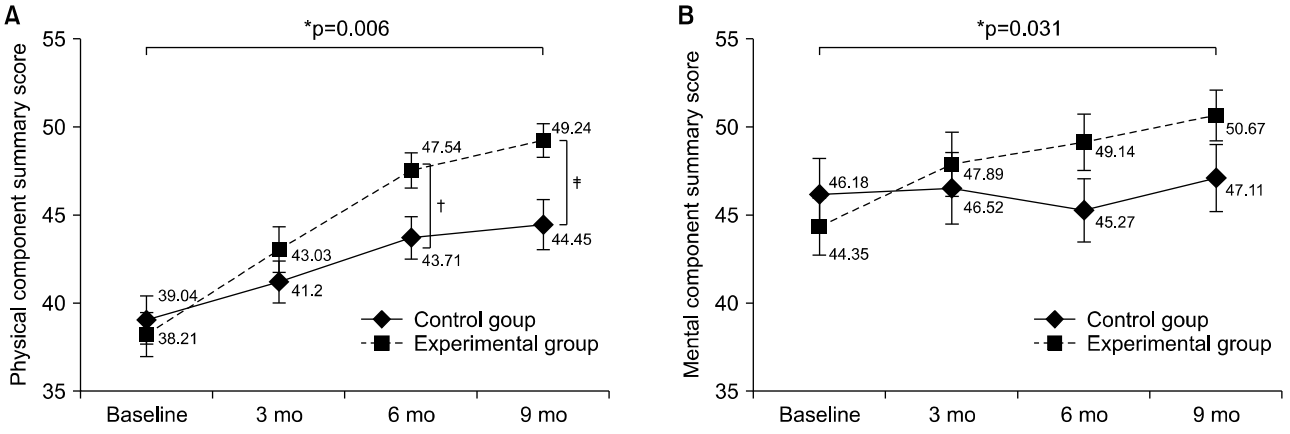

Figure 2. Mean scores on (A) physical component summary, (B) mental component summary. Data are presented as mean±standard error. *p-value by repeated measures ANOVA. †p=0.023, ‡p=0.027, Bonferroni corrected significance.

Quality of life

There were significant interactions between the groups and follow-up times in the PCS (p=0.006) (Figure 2A) and MCS of QoL (p=0.031) (Figure 2B). Multiple comparisons of the baseline and different time points showed significant differences at 6 month (p=0.023) and 9 month (p=0.027) time point only on PCS of QoL (Figure 2A).

DISCUSSION

RA is a chronic inflammatory disease that requires long-term treatment and management, and as such, patient education is recommended as an integral part in established recommendations for the management of arthritis [16].

Recent perspectives on patient education have gone beyond passive knowledge delivery by health professionals to focusing on autonomous behavioral changes through shared decision making and collaboration [7,16].

This study focused on motivating patients to achieve their treatment goal by applying the principles of patient education based on shared decision making and collaboration in RA T2T strategy. Previous studies reported decreases in disease activity of 0.3～0.7 points following patient education that performed as individualized or group education programs [11,17-19]. The education using RA T2T strategy in this study was differentiated by presenting and sharing individualized treatment goal for each participant and providing continued collaboration for achieving goal.

The significance of this study can be found that the experimental group showed a decrease in disease activity by 1.98 points following the education program, which was a greater improvement effect than in previous studies, and that differences were also found in the remission rate.

In this study, functional disability showed no significant interactions between the groups and follow-up times. This was consistent with some Korean studies that did not show decrease in functional disability following education [20,21], but some previous studies showed decreases following education [22], while other studies were unable to test the effects [11,23,24]. The baseline functional disability score in the experimental and control group was 0.7 and 0.76, which fell under the category of mild disability (<1.0) [11]. It is thought that at the baseline, functional disability of the participants was not severe and thus may have been limited in expressing any decrease and that the study period of 9 months may have been too short as well.

Along with fatigue and pain, functional disability is one of the major symptoms in patient with RA and this should be measured as it also serves as an important indicator for determining improvement in the disease [25,26]. A previous study reported decrease in fatigue following 8 weeks of education [20] which was supported by the improvement in fatigue in this study.

Because of the study design, the causal relationships between the variables could not be determined. However, it can be inferred that patients who participated in the education program were able to achieve reduction in disease activity and improvements in physical symptoms of pain and fatigue by promoting positive health management through motivational enhancement and behavioral changes [7,27].

In previous studies, various factors that affect QoL in patient with RA were identified, which included disease activity, functional disability, pain, and fatigue [3,28,29], and it is proposed that the reductions in pain, fatigue, functional disability, and disease activity seen in the experimental group of the present study would have a positive effect on the participants' QoL.

In terms of QoL, the PCS, MCS showed significant interactions between the groups and follow-up times. These findings supported the results of studies that reported improved QoL following self-help management education [30] and that a nurse-led education program was effective in improving overall QoL in patient with arthritis [19].

The ultimate goal of RA treatment is to improve the QoL in the patient and the goal of patient education is also to promote patients being able to maintain high QoL through practicing positive health management on their own [16], and thus the fact that this study show improved QoL following education using the RA T2T strategy can be viewed as significant.

Multiple comparisons between the baseline and different time points in this study showed significant differences between the groups in disease activity and fatigue at 9 months and the PCS of QoL at 6 and 9 month time point. This demonstrated that an intervention period of 9 months is required to achieve the improvement of disease activity following the education program using RA T2T strategy.

In this study the physician in charge conducted without any information of group assignment. The study had the limitation of being a mid-term study so follow-up study is

recommended, in which the effects of long-term education, lasting over a year, can be tested with a more study population from various clinical settings.

CONCLUSION

In conclusion, individualized education using the RA T2T strategy was an effective nursing intervention for achieving reduction in disease activity and fatigue, and improving QoL in the participants. Moreover, such a program is expected to be used in the future as a clinical therapeutic education program for improving disease activity and QoL.

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CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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