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OPEN

Evaluation of a Self-Management Program for Gastroesophageal Reflux Disease in China

ABSTRACT

Gastroesophageal reflux disease is a chronic disease with a high incidence worldwide. The various symptoms have substantial impact on the quality of life of affected individuals. A long-term self-management program can increase the ability of patients to make behavioral changes, and health outcomes can improve as a consequence. This study's aim was to evaluate the effectiveness of a self-management program for gastroesophageal reflux disease. A total of 115 patients with gastroesophageal reflux disease were allocated to the experimental group and the control group. The former received self-management intervention along with conventional drug therapy, whereas the latter received standard outpatient care and conventional drug therapy. After the clinical trial, the control group also received the same self-management intervention. The levels of self-management behaviors, self-efficacy, gastroesophageal reflux disease symptoms, and psychological condition were compared. Those in the experimental group demonstrated significantly higher self-efficacy for managing their illness, showed positive changes in self-management behaviors, and had comparatively better remission of symptoms and improvement in psychological distress. The program helped patients with gastroesophageal reflux disease self-manage their illness as possible.

Gastroesophageal reflux disease (GERD) is a common chronic condition with a wide spectrum of symptoms, the most predominant being heartburn. One systematic review reported that the range of GERD prevalence is 18.1%–27.8% in North America, 8.8%–25.9% in Europe, and 2.5%–7.8% in East Asia (El-Serag, Sweet, Winchester, & Dent, 2014). GERD is associated with reduced workplace productivity and impairment of health-related quality of life (HRQOL) and is a considerable economic burden to society as a whole (Bruley des Varannes et al., 2013). Frequent recurrence of GERD symptoms has a substantial impact on many aspects of life and the patients' confidence in treatment.

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Anxiety and depression may play an important role in the occurrence of GERD and reduce the level of quality of life (Yang et al., 2015). Although proton pump inhibitors (PPIs) have helped considerably, they have not led to eradication of the disease.

Background

According to the Chinese Consensus on GERD (Lin et al., 2007), changing one's lifestyle is the fundamental treatment option. This is mainly because changes to diet and lifestyle have been shown to alleviate symptoms and reduce the chance of recurrence. For example, acid regurgitation is reduced greatly by sleeping with the head in an elevated position (Khan et al., 2012). The interventions of lifestyle, eating habits, exercise, and psychology plus acupuncture have a synergetic effect on drug treatment, promotion of therapeutic effects, adherence, and alleviation of symptoms (Haruma et al., 2015; Maradey-Romero, Kale, & Fass, 2014). Finding the best management strategy for GERD is, therefore, imperative to deal effectively with increasing numbers of patients and escalating costs.

"Self-management" can be crudely defined as the individual's ability to manage his or her symptoms, lengthy treatment, the resultant physical and psychosocial consequences, and also the inevitable lifestyle changes inherent to living with a chronic condition (Barlow, Wright, Sheasb, Turner, & Hainsworth, 2002). Lorig, Holman, and Sobel (2000) developed a "Chronic Disease Self-management Program (CDSMP)" based on the self-efficacy theory because self-efficacy is a powerful determinant of behavioral change. Through effective self-management skills, patients can monitor their conditions and finally achieve a satisfactory quality of life by changing cognitive-behavioral and emotional patterns. Although such interventions have shown promise in other chronic conditions such as renal failure and rheumatoid arthritis (Slesnick, Pienkos, Sun, Doss-McQuitty, & Schiller, 2015; Vermaak, Briffa, Langlands, Inderjeeth, & McQuade, 2015), studies testing specifically the efficacy of a self-management program in patients with GERD are lacking.

The pathogenesis of GERD involves the breakdown of the protective mechanisms and acid-clearing capability of the esophagus. These actions result in the reduction of lower esophageal sphincter (LES) pressure and transient relaxation of the LES. The primary damaging factor is excessive reflux of gastric content (mainly gastric acid refluxing into the esophagus) causing damage to the mucosa of the esophagus (Mikami & Murayama, 2015).

The esophagogastric junction (EGJ) is an important antireflux barrier. It consists of the LES and crura diaphragm. One study has confirmed that "diaphragm biofeedback training" (DBT) (abdominal breathing) can reinforce the pressure of the crura diaphragm and EGJ, leading to improved GERD symptoms and HRQOL, as well as reducing patients' dependence on PPIs (Sun et al., 2015). Acupuncture and point massage can help regulate gastrointestinal motility, as well as strengthen esophageal body motility and pressure of the LES (Meng, Li, & He, 2011). In the present study, we conducted DBT and point massage as self-management skills to guide patients.

Aim

The aim of the study was to determine the effect of a self-management program for GERD because we wished to provide a theoretical basis for a method of nondrug intervention.

Methods

Design

This study used a quasi-experimental design and was conducted between November 2010 and June 2011. Patients were allocated to a control group and an experimental group. Patients recruited between November 2010 and February 2011 were assigned to the control group and obtained standard outpatient care and conventional drug therapy for 3 months. Subjects recruited between March 2011 and June 2011 entered the intervention group and achieved self-management intervention plus conventional drug therapy for 3 months. All participants in the control group were offered the opportunity to receive self-management intervention after completion of the clinical trial. This grouping method was adopted for a specific reason: if two patients presented simultaneously for study participation, choosing who would enter the control group was problematic. This was because there were difficulties recruiting participants when researchers explained to them that they might be allocated to a control group without immediate, active intervention. Data were gathered using a self-administered questionnaire or via telephone interviews conducted by trained interviewers (Figure 1).

Participants

The inclusion criteria were as follows: (i) a confirmed diagnosis of GERD (Lin et al., 2007) with esophagitis proven by endoscopy and a positive result on 24-hour monitoring of esophageal pH or therapeutic diagnosis of a PPI test (i.e., if one's symptoms can be relieved after taking omeprazole 20 mg, twice a day for 1 week, he or she can be diagnosed with GERD); (ii) at least one symptom among the following: heartburn, acid regurgitation, food reflux, and substernal chest pain over the past 4 weeks, and a score on the Reflux Disease Questionnaire (RDQ) of 12 or more; and (iii) aged 18 years or older.
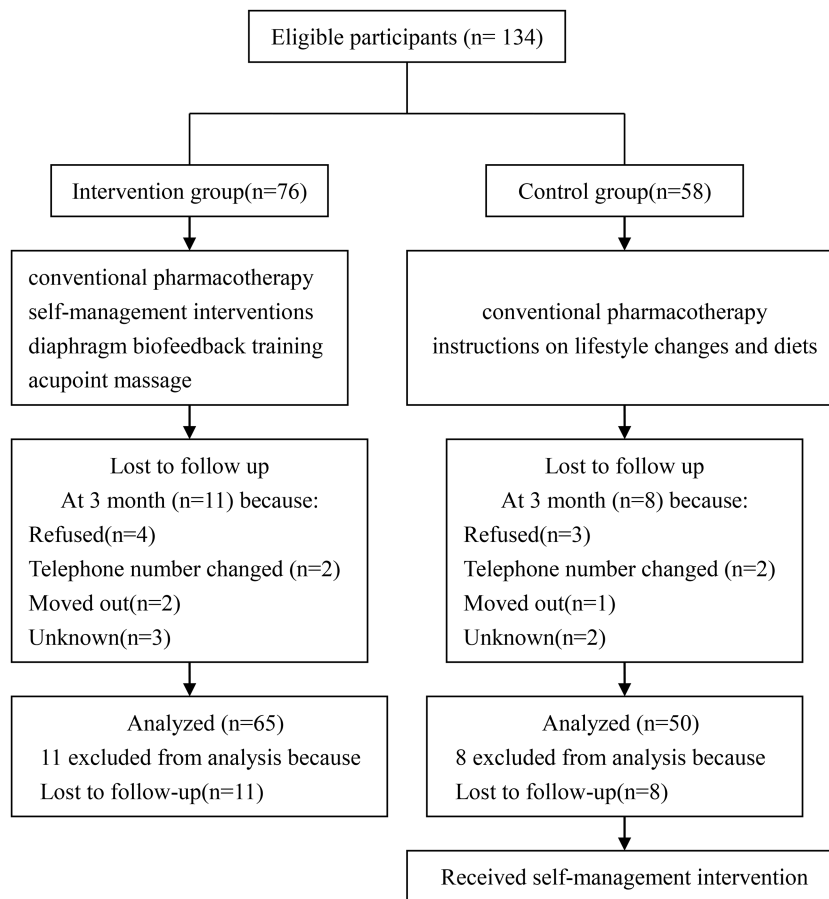
FIGURE 1. Flow diagram of participants.

The exclusion criteria were as follows: (i) a history of upper gastrointestinal hemorrhage, peptic ulcer, or other organic diseases; (ii) lack of results for endoscopy or 24-hour monitoring of esophageal pH; and (iii) a history of mental disease or consciousness disorders.

Ethical Permit

The study protocol was approved by the Ethics Committee of The First Affiliated Hospital of Nanjing Medical University (Nanjing, China). All patients provided written informed consent to be included in the study.

Procedures

Development of the Guideline of a Self-Management Program for GERD

The first draft guideline for the program was created on the basis of the Chinese consensus on GERD and included pathogenesis, diaphragmatic biofeedback, the meridian theory of traditional Chinese medicine, and other related causes for GERD. Another 20 patients with GERD (who met the same inclusion and exclusion criteria) were chosen who underwent intervention in the pilot study, so the guideline was "perfected" with respect to content and flow of intervention. It was also rigorously reviewed and finalized by three gastroenterologists and two nursing experts from The First Affiliated Hospital of Nanjing Medical University. Art designers were commissioned for the composition and layout of the guideline to ensure that it was illustrated clearly and scientifically correct. Finally, the guideline for the program was printed into a booklet for implementation.

The salient points of the guideline were as follows: (i) the importance of self-management upon rehabilitation from GERD; (ii) the pathogenesis and risk factors of GERD along with the therapeutic methods and goals of GERD; (iii) interventions for dietary management and lifestyle changes; (iv) targeted rehabilitation training, that is, diaphragm biofeedback and acupoint massage. In Chinese medicine, the acupoint is a point of the body related to physiological function.

Interventions

Patient Enrollment

Patients in both groups had to create individual health records. These records covered general information, lifestyle, levels of self-management, medications, and

cards for follow-up (one copy was kept in the file and the other held by the patient who was informed to attend follow-up visits according to the time stated on the card).

Intervention Group

Patients in the intervention group received conventional pharmacotherapy, self-management interventions, DBT, and cave massage (described later). The self-management program emphasized the central role and responsibility of patients in managing their illness. Data were collected at baseline and 3 months after the start of self-management intervention. Patients also had to complete a card pertaining to medical records and weekly monitoring of symptoms.

The intervention was divided into three stages. The first stage was analysis of issues. That is, (i) explore the main problems influencing recovery and the knowledge patients must master according to baseline data; and (ii) establish a mutually agreed agenda by discussion with patients to provide motivation and enthusiasm for self-management. The second stage was implementation: Researchers explained the parts of the guideline that were relevant to the problems patients were facing and taught them self-management skills and rehabilitation training. Patients were followed up specifically for levels of understanding of the guideline and behavior change 1 week after the start of the intervention according to their educational background, exercise habits, disease severity, and problems. Those who did not grasp rehabilitation skills had opportunities for direction in the outpatient department or by telephone. The third stage was consolidation and strengthening.

The time for every stage lasted for 20–30 minutes. That is, patients were followed up to be offered guidance 1, 2, and 3 months after the start of the self-management intervention by clinic appointment, telephone, short-message platform, and letters. Patients were given guidance two or three times during the first month and once a month thereafter for 2 more months. All patients completely grasped the content and skills contained in the guidelines after they were offered between four and six episodes of guidance.

Patients received one-on-one interventions initially; patients could telephone researchers or make clinic appointments individually or in group sessions at any other time. Researchers reminded patients of changes in diet and recovery by messages (mainly short messages delivered via cell phone).

Diaphragm Biofeedback Training

Patients were trained in the appropriate use of abdominal respiration. They were trained to use abdominal respiration at a frequency of two to three times per minute, lasting for a period of 15–20 minutes twice a day. There were written instructions for this training. The predominant one was that patients should take DBT with an empty stomach or 2 hours after meals; otherwise, the exercise may cause regurgitation. In addition, the time and intensity of DBT could be adjusted by the individual according to one's endurance (Sun et al., 2015).

Cave Massage

Cun is a unit of length in Chinese medicine.
- 1 cun is the individual length of the thumb joint (Figures 2 and 3).
- 1.5 cun is the individual length of the second transverse striation when putting the index and middle fingers together (Figure 4).
- 3 cun is the individual length of the second transverse striation when putting the index, middle, ring, and little fingers together (see Figure 5) (Jin et al., 2006).

The following procedure was used for cave massage.

(1) Massaging the Zhongwan point (RN12) can relieve stomachache, abdominal distension, vomiting, and indigestion. The Zhongwan point is located on the midline, 4 cun above the umbilicus.

Mo Fa (rubbing method in circles) was used on the RN12 region. The left or right hand was placed on the RN12 region and rubbed in circles 36 times counterclockwise from small circle to big circle. The same rubbing movement was repeated 36 times, but clockwise, from big circle to small circle (Figures 6 and 7).

(2) Massaging the Zusanli point (ST36) can enhance gastrointestinal peristalsis, appetite, and digestive function. The Zusanli point is 3 cun below the Dubi point,

1 cun

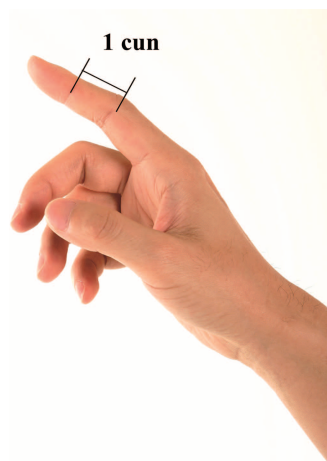**FIGURE 2.** The individual length of the thumb joint represents 1 cun.

FIGURE 3. The individual length of the thumb joint represents 1 cun.

FIGURE 5. The individual length of the second transverse striation when putting the index, middle, ring, and little fingers together represents 3 cun.

one-finger width lateral from the anterior crest of the tibia, in the tibialis anterior muscle. The Dubi point is below the patella in a depression lateral to the patella ligament found with the knee flexed.

An Fa (pressing method) was used on the Zusanli point (ST36): thumbs, index fingers, or middle fingers were placed on ST36 using a pressing and kneading movement with slightly forceful strength for about 3 minutes until the local area bulged (Figure 8).

(3) Massaging the Ganshu point (BL18) has an effect on relieving pain in the hypochondriac region. The Ganshu point is located 1.5 cun lateral to the Jinsuo point level with the spinous process of T9

(thoracicvertebrae). The Jinsuo point is below the spinous process of T9.

Massaging the Danshu point (BL19) helps control the pain in the hypochondriac region, and jaundice, and relieves the bitter taste in the mouth. The Danshu point is 1.5 cun lateral to the Zhongshu point level with the spinous process of T10. The Zhongshu point is below the spinous process of T10.

Massaging the Pishu point (BL20) is beneficial to reduce distention pain in the epigastric area, as well as indigestion. The Pishu point is 1.5 cun lateral to the

FIGURE 4. The individual length of the second transverse striation when putting the index and middle fingers together represents 1.5 cun.
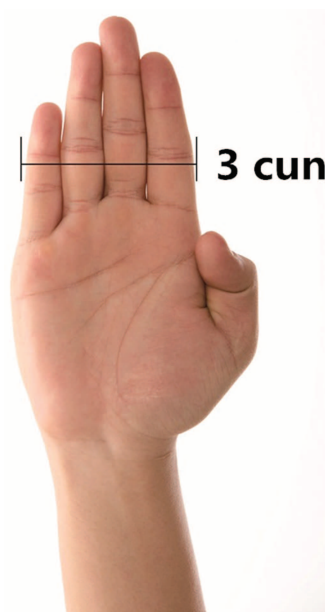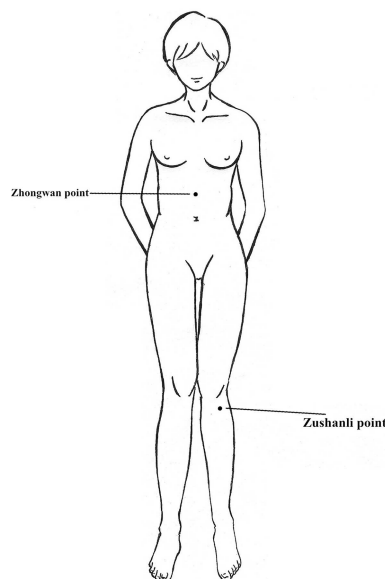

FIGURE 6. Locations of the Zhongwan and Zusanli points.

Massage Zhongwan Point

Mo Fa

FIGURE 7. Mo Fa massage of the Zhongwan point.

Zusanli piont

3 cun

Zusanli piont

Zusanli point

FIGURE 8. An Fa massage of the Zusanli point.

Gansu point

Dansu point

Pisu point

Weisu piont
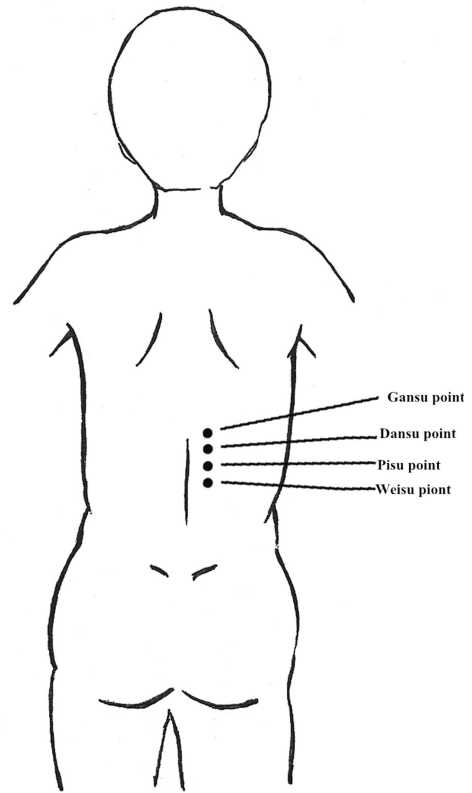
FIGURE 9. Zhi Rou Fa massage of the Ganshu, Danshu, Pishu, and Weishu points.
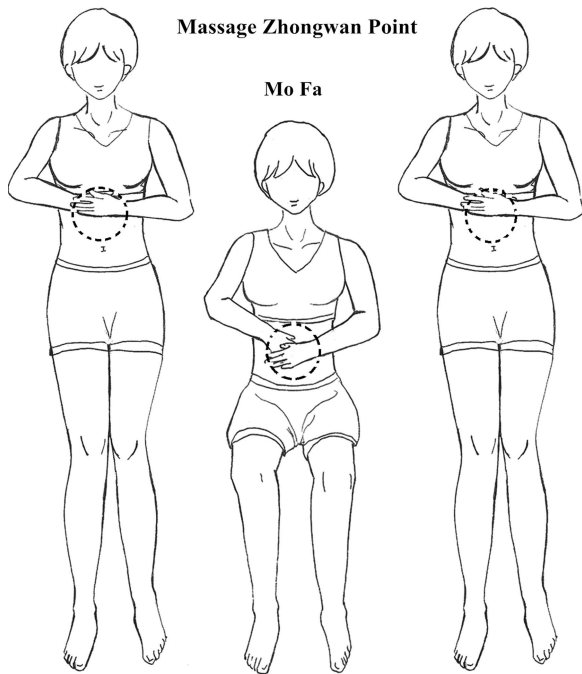
Jizhong point level with the spinous process of T11. The Jizhong point is below the spinous process of T11.

Massaging the Weishu point (BL21) helps regulate stomach disorders and indigestion. The Weishu point is 1.5 cun lateral to the midline level, with the spinous process of T12.

The Zhi Rou Fa (kneading method) was performed on the Ganshu point (BL18), Danshu point (BL19), Pishu point (BL20), and Weishu point (BL21) with slightly forceful strength for about 2–3 minutes until there was soreness and distending pain in the local area. This was done twice a day, in the morning and at night (Figure 9).

Control Group

Patients underwent conventional pharmacotherapy, as well as being given instructions on lifestyle changes and diets just as in the intervention group. Furthermore, the telephone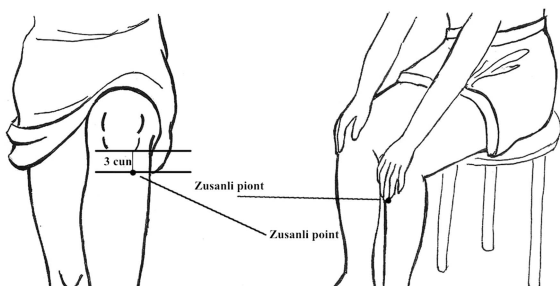 numbers of researchers were provided so that patients could make appointments for clinics or have telephone consultations. Patients were evaluated at baseline and 3 months after the start of the program.

Outcome Measures

Questionnaire on Demographic Data

The questionnaire on demographic data contained demographic characteristics (name, age, gender, education level, marital status, monthly family income, frequency of physical activity, body mass index), course of illness, history of PPI therapy, and disease-related factors (e.g., diet, lifestyle).

Symptom Assessment

The Chinese version of the Reflux Disease Diagnostic Questionnaire (RDQ) was used to assess the severity and frequency of four typical GERD symptoms in the previous 4 weeks (heartburn, food reflux, acid regurgitation, and substernal chest pain) using the 6-point Likert sale. A GERD score was calculated by adding together the 8 items and 4 typical symptoms; this resulted in a minimum score of 0 and a maximum score of 40 (Chinese Gastroesophageal Reflux Disease Study Group, 2004).

Self-Management Behavior Scale for GERD

The self-designed questionnaire had 26 items covering four domains of self-management behavior: (i) management of knowledge of disease (seven items); (ii) management of health behavior (eight items); (iii) adherence to treatment (seven items); and (iv) emotional self-management (four items). A 4-point Likert scale was used to assess how often (frequency [impossible to do, occasionally do, basically do, completely do]) or how much the item described self-management behavior (management of knowledge of the disease [have no idea, basically know, largely know, completely know]). The higher the score, the better the self-management behavior. In our pilot study, the scale demonstrated acceptable overall internal consistency (α = .859), content validity (CVI = 0.837), and test–retest reliability (intraclass correlation coefficient = .914). Because of the different numbers of items in the dimensions, a 10-point Likert scale was used on the basis of the following formula:

$$\text{Score of dimension} = \left(\frac{\text{Actual score of a dimension}}{\text{Highest score of a dimension}} \right) \times 10$$

Self-Efficacy for Managing Chronic Disease Scale (Xu, Ling, Lin, & Wang, 2011)

The Self-efficacy for Managing Chronic Disease Scale comprises six items. It was used to assess patients' confidence in managing the generic requirements of a chronic disease (e.g., fatigue, emotions, treatment). A 10-point Likert scale ranging from 1 (not at all confident) to 10 (totally confident) was employed. It was developed especially for patients with chronic diseases, and the internal consistency was excellent (α = .910) (Lorig, Stewart, & Ritter, 1996).

Self-Rating Anxiety Scale and Self-Rating Depressive Scale

A self-rating anxiety scale was used to evaluate anxiety levels. It consisted of 20 items and employed a 4-point scale; the higher the score, the more serious the level of anxiety. A self-rating depressive scale was used to assess the level of depression and change of therapy (which is especially appropriate for the investigation of depression in general hospitals). It comprised 20 items that reflected four specific symptoms: spiritual-affective symptoms, physical barriers, psychomotor disorders, and depression. The higher the score, the more severe was the depression (Wang & Cong, 2001).

Data Analyses

Wilcoxon's test and Student's *t* test were used for interval data. The chi-square test was used for categorical data. Demographic characteristics of the participants in the intervention and control groups were compared using a Student's *t* test or chi-square test. The paired-samples *t* test (for normally distributed data) and the paired-samples Wilcoxon test (for data that were not normally distributed) were used to compare the outcomes of two groups at both pretesting and post-testing. An independent-samples *t* test (for normally distributed data) and independent-samples Wilcoxon tests (for nonparametric data) were used to compare changes that occurred over 3 months between the two groups. The value of $p < .05$ (alpha) was considered significant.

Results

Demographic data for both groups are displayed and compared in Table 1. No significant differences were found between the two groups ($p > .05$).

Self-Management Behavior

Both groups showed significant increases in the four domains of self-management behaviors before and after the intervention ($p < .05$; Tables 2 and 3). Participants in the experimental group had significantly greater changes of scores in disease knowledge, healthy behaviors, and emotion management than those in the control group ($p < .05$). However, no significant difference in compliance with treatment was found between the two groups ($p > .05$; Table 4).

Self-Efficacy

Two groups showed significant increases in the two subscales of self-efficacy before and after the intervention ($p < .05$; Tables 2 and 3). The experimental group demonstrated significantly greater changes at 3 months on scoring of symptom management ($p < .05$). However, no significant difference was observed in the changes at 3 months on scoring of disease management in general between the two groups ($p > .05$; Table 4).

Symptoms

Both groups displayed significant decreases in the RDQ score before and after the intervention ($p < .05$; Tables 2 and 3). A comparison of the results over 3 months showed that patients in the experimental group had a significantly greater decrease in the RDQ score than those in the control group ($p < .05$; Table 4).

Psychological Distress

The experimental group showed a significant decrease in anxiety and depression before and after the intervention ($p < .05$; Table 3). The control group demonstrated a significant change in anxiety ($p < .05$) but no significant difference in depression before and after the intervention ($p > .05$; Table 2). When changes in the two groups over 3 months were compared,

TABLE 1. Demographic Data of Patients With Gastroesophageal Reflux Disease in the Control and Experimental Groups

Items	Control	Experimental	χ^2/t	p
Age ($M \pm SD$)	53.46 ± 12.08	50.67 ± 12.76	1.025	.307[a]
Gender			49.766	.289[b]
Male	33 (66.0)	40 (61.5)		
Female	17 (34.0)	25 (38.5)		
Education			0.398	.819[b]
Middle school or lower	19 (38.0)	22 (33.8)		
High school or secondary school	16 (32.0)	20 (30.8)		
College or higher	15 (33.0)	23 (35.4)		
Family income (RMB, monthly income)			3.400	.183[b]
<1,000	10 (20.0)	8 (12.3)		
1,000–3,000	25 (50.0)	27 (41.5)		
>3,000	15 (30.0)	30 (46.2)		
Frequency of physical activity			0.441	.802[b]
<4 times per month	26 (52.0)	34 (52.3)		
1–2 times per week	4 (8.0)	10 (15.4)		
>3 times per week	20 (40.0)	21 (32.3)		
Work stress			0.207	.649[b]
Light	33 (66.0)	41 (63.1)		
Middle	13 (26.0)	17 (26.2)		
Heavy	4 (8.0)	7 (10.8)		
BMI			2.426	.297[b]
<25.0	29 (58.0)	42 (64.6)		
25.0–29.9	16 (32.0)	21 (32.3)		
>30	5 (10.0)	2 (3.1)		
Duration of illness (years)			0.441	.802[b]
<1	20 (40.0)	24 (36.9)		
1–5	17 (34.0)	26 (40.0)		
>5	13 (26.0)	15 (23.1)		
History of PPI use			0.002	.960[b]
Yes	21 (42.0)	27 (41.5)		
No	29 (58.0)	38 (58.5)		

Note. The values given are number (percentage), unless indicated otherwise. BMI = body mass index; PPI = proton pump inhibitor.
[a]Independent-samples *t* test.
[b]Chi-square test.

the experimental group was found to experience a significantly greater decrease in the incidence of depression and anxiety than the control group ($p < .05$; Table 4).

Discussion

GERD is a chronic disease, and medical treatment is typically provided in the outpatient setting. Because of symptom diversity and the ease of relapse, patients

TABLE 2. Changes in Outcome in the Control Group Before and After Intervention

Outcome	Pretest, M ± SD	Post-test, M ± SD	t/z	p
Self-management behavior				
Disease knowledge	3.91 ± 1.11	4.89 ± 1.10	4.908	.000[a]
Healthy behaviors	6.90 ± 1.24	7.67 ± 1.04	5.629	.000[a]
Compliance with treatment	7.61 ± 1.22	8.16 ± 1.08	3.286	.002[a]
Emotion management	5.96 ± 1.45	7.08 ± 1.23	−4.714	.000[b]
Self-efficacy				
Symptom management	6.91 ± 2.06	8.28 ± 1.66	7.183	.000[a]
Disease management in general	5.87 ± 2.23	7.83 ± 1.65	8.750	.000[a]
RDQ	19.68 ± 6.68	9.36 ± 6.71	9.355	.000[a]
SAS	39.46 ± 10.58	31.92 ± 6.53	−5.224	.000[b]
SDS	46.42 ± 11.73	43.25 ± 12.69	1.724	.091[a]

Note. RDQ = Reflux Disease Questionnaire; SAS = self-rating anxiety scale; SDS = self-rating depressive scale.
[a]Paired-samples *t* test.
[b]Paired-samples Wilcoxon test.

with GERD need frequent visits to the clinic. Such visits may result in physical pain, mental stress, and considerable economic burden. The CDSMP addressed areas such as diet, exercise, medication, fitness, problem-solving skills, and communication skills with physicians. It was seen as being helpful for patients to cope with somatic and emotional problems associated with having chronic conditions (Vermaak et al., 2015).

In self-management programs, the physician and the patient identify the key problems and information and then deal with those issues via self-management skills (Blixen et al., 2015). In the present study, the main issues that concerned patients the most related to symptom disturbance and relapse after treatment were summarized and integrated with the daily self-management method along with targeted rehabilitation training, which eventually became a standardized guidance

TABLE 3. Changes in Outcome in the Experimental Group Before and After Intervention

Outcome	Pretest, M ± SD	Post-test, M ± SD	t/z	p
Self-management behavior				
Disease knowledge	4.15 ± 1.05	7.27 ± 1.13	19.37	.000[a]
Healthy behaviors	6.62 ± 1.51	8.52 ± 1.05	11.101	.000[a]
Compliance with treatment	7.99 ± 1.26	8.72 ± 1.01	4.602	.000[a]
Emotion management	6.40 ± 1.26	8.37 ± 1.14	−6.205	.000[b]
Self-efficacy				
Symptom management	6.48 ± 1.74	8.78 ± 1.26	−6.518	.000[b]
Disease management in general	6.53 ± 2.13	9.01 ± 1.10	−6.141	.000[b]
RDQ	21.72 ± 6.84	4.61 ± 5.59	−6.961	.000[b]
SAS	38.87 ± 9.37	27.65 ± 4.17	−6.853	.001[b]
SDS	47.31 ± 10.88	29.91 ± 6.18	16.874	.000[a]

Note. RDQ = Reflux Disease Questionnaire; SAS = self-rating anxiety scale; SDS = self-rating depressive scale.
[a]Paired-samples *t* test.
[b]Paired-samples Wilcoxon test.

TABLE 4. Comparison of Changes Between the Control and Experimental Groups at 3 Months

Outcome	Control, M ± SD	Experimental, M ± SD	t/z	p
Self-management behavior				
Disease knowledge	0.98 ± 1.40	3.12 ± 1.29	8.448	.000[a]
Healthy behaviors	0.76 ± 0.95	1.89 ± 1.38	5.290	.000[a]
Compliance with treatment	0.56 ± 1.19	0.73 ± 1.27	0.721	.473[a]
Emotion management	1.13 ± 1.17	1.97 ± 1.56	−3.206	.001[b]
Self-efficacy				
Symptom management	1.37 ± 1.36	2.30 ± 1.70	3.150	.002[a]
Disease management in general	1.96 ± 1.58	2.47 ± 2.14	1.432	.155[a]
RDQ	10.32 ± 7.13	17.10 ± 5.81	5.621	.000[a]
SAS	7.54 ± 7.95	11.23 ± 7.75	2.502	.014[a]
SDS	3.14 ± 12.88	10.30 ± 8.30	3.617	.010[a]

Note. RDQ = Reflux Disease Questionnaire; SAS = self-rating anxiety scale; SDS = self-rating depressive scale.
[a]Independent-samples *t* test.
[b]Independent-samples Wilcoxon test.

made available to patients. During the study, patients were made to feel that their participation was greatly appreciated. Overall, patients were encouraged to make outpatient appointments or stay in contact with the instructors by telephone for follow-up and strengthening skills according to the marked time on their recorded card in the hope that patients could become leaders, executors, and survivors of disease management.

The purpose of a CDSMP is not only to provide health information to patients, but also to promote behavior changes. Guidelines in the form of an illustrated handbook let patients, know the significance of self-management in GERD rehabilitation. Patients were taught the skills and methods of rehabilitation by consultation, group sessions, interaction, and mass education. Face-to-face communication and regular mutual education could reverse negative moods, correct patients' adverse behavior, and assist them to finally achieve the goals of health promotion.

The single-group analysis showed that both groups achieved significant increases in self-management behaviors. The comparison between the experimental group and the control group showed that the effect of intervention was more significant than the effects seen in the control group, especially in the management of disease knowledge. Results demonstrated that the self-management program was beneficial for patients to understand their disease, establish good health behaviors, and cope with physical and mental discomfort. The result was consistent with another study showing that a significant improvement in knowledge

of end-stage renal disease could lead to improved self-management behaviors and better outcomes (Lingerfelt & Thornton, 2011).

Self-efficacy refers to an individual's confidence in carrying out an expected behavior, which can control and regulate one's behavior to affect outcome (Bandura, 1986). A CDSMP based on self-efficacy theory focuses on the patient's involvement in managing an illness. A previous study showed that self-efficacy was a powerful determinant of behavioral change (i.e., higher levels of self-efficacy can predict better behavioral change) (Sun, Zhao, Dong, & Li, 2011). In the present study, the single-group analysis showed that both groups displayed significant increases in two aspects of self-efficacy. In particular, the experimental group demonstrated significantly greater symptom management than the control group. Self-management programs can increase patients' belief in utilizing certain health behaviors and strategies to cope with symptoms such as fatigue, pain, and negative moods, thereby raising levels of self-management behaviors.

In the present study, single-group analyses showed that symptoms improved significantly in both groups. Comparison of the results demonstrated that the experimental group had significantly more symptom improvement than that observed in the control group. This finding suggested that patients in the experimental group realized the importance of self-management of the disease through their thoughts and actions. They gradually lessened their dependence on short-term therapy using prescription drugs. They then started to

pay attention to the synergetic effects of changing their lifestyle, rehabilitation training, improving compliance with treatment, and psychological factors in GERD.

Sun et al. demonstrated that the tension of the crural diaphragm upon deep abdominal inspiration can increase the pressure of the EGJ (Sun et al., 2015). Hence, training in "diaphragm biofeedback" was shown to effectively improve GERD symptoms and reduce exposure of the esophagus to acids and dependence on antacids (Sun et al., 2015). On the basis of the pathogenesis of GERD, researchers in the current study combined training in diaphragm biofeedback with acupoint massage as a targeted self-management tool for patients; it appeared to improve adherence to treatment, alleviate symptoms, and consolidate the curative effect. In addition, participants in the experimental group grasped self-management skills with regard to medication and understood the type, timing, and manner of GERD medication. They could take the medicine according to their condition in a flexible way to aid symptom control. In brief, self management using diaphragm biofeedback combined with acupoint massage enhanced the ability of patients to cope with frequent interruption of symptoms and reduced their visits to outpatient clinics and hospital utilization.

Psychological factors are considered to have an important role in the pathogenesis of GERD symptoms and the sense of acid reflux experienced by patients (Lara et al., 2014). Comparison of the results in the present study showed that the self-management program could effectively improve depression and anxiety. Overall, researchers tend to pay more attention to psychological characteristics and teach coping skills with emotion regulation to patients. In addition, researchers can promptly find psychological problems and provide an outlet to them by ensuring regular follow-up. Patients with nonerosive reflux disease (NERD) often suffer anxiety and depression, and some subjects have reported that stress aggravates their symptoms, which leads to a suboptimal response to PPIs (Sun et al., 2015). In the present study, the cohort included patients with NERD and esophagitis, but we did not make interventions directed specifically to patients with NERD to improve psychological conditions. Thus, in further studies, we might focus on exploring strategies beneficial to patients with NERD and promote their curative effect on PPIs.

Limitations

Despite the positive outcomes of the present study, there are recognized limitations. The sample size of the intervention was small and time for follow-up fairly short. Further studies might be based on a larger patient cohort and extension of the follow-up time to observe the long-term effects of this self-management program.

Implications for Nursing and Health Policy

The doctors have promoted use of the guideline of a self-management program in The First Affiliated Hospital of Nanjing Medical University. It helped patients with GERD self-manage their illness as possible. The program indeed reduced some patients' visits to doctors, clinical test, and drug use, saving a lot of financial burden. Furthermore, some patients who benefitted from our research actively brought the content of this program to patients with GERD in their community.

Conclusions

The present study showed that a self-management program increased the participants' self-efficacy for managing illness and levels of self-management behaviors. Furthermore, targeted rehabilitation training improved GERD symptoms and the curative effect. This program provided a new management tool for nondrug intervention in GERD. ✪

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