EFFECT OF MEDICAL EDUCATION ON QUALITY OF LIFE IN ADULT ASTHMA PATIENTS

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Background and Purpose: Previous studies revealed that many asthma patients did not understand how to manage their disease, which in turn affected their quality of life. This study investigated the effect of asthma education on quality of life in Taiwanese adults with asthma.

Methods: A before and after quasi-experimental design was used. A total of 85 asthma patients were recruited from the asthma clinic of a medical center in northern Taiwan using purposive sampling. Among these patients, 31 were assigned to the experimental group and 54 to the control group. The experimental group received four 1-hour sessions of group education, while the control group received no instruction. Data were collected at 2 different stages: enrollment (baseline), and at 1 month after enrollment. All subjects completed the Asthma Quality of Life Questionnaire and the Asthma General Knowledge Questionnaire for Adults. Data were analyzed using independent-samples t test and paired t test.

Results: After completing the asthma education sessions, the mean scores on asthma knowledge significantly increased from 19.65 to 23.06 ($p < 0.001$) in the experimental group. The mean scores for overall quality of life significantly increased from 5.06 to 5.42 ($p < 0.01$). The mean scores in the symptom domain and the exposure to environmental stimuli domain also significantly increased from 5.07 to 5.46 ($p < 0.01$) and 4.94 to 5.52 ($p < 0.001$) after education. However, the mean scores of the control group on the same questionnaire did not change significantly.

Conclusion: Asthma education can significantly improve asthma knowledge and quality of life in adult asthma patients.

Key words: Ambulatory care; Asthma education; Outpatient clinic; Patient education; Quality of life

Although enormous human and material resources have been spent on asthma treatment and research, asthma mortality is still high, in part because patients lack asthma knowledge and are unable to deal with the attacks.[1] Chang et al[2] indicated that death caused by asthma attack was common because patients underestimated the severity of the asthma attack and did not understand how to control it. Meeberg noted that medical professionals should not only treat diseases but also acknowledge the importance of the patients' quality of life.[3] The distress and confinement brought about by asthma are impediments to quality of life,[4] and enhancing patients' understanding of asthma and asthma control is an effective strategy for reducing the severity of asthma attacks.

Many studies have shown that medical education of asthma patients can improve asthma symptoms, reduce hospitalization and emergency counseling times, and lower economic expenditures. Quality of life of asthma patients was often used as the basis for evaluating limitations caused by the disease and evaluating the effect of treatment.[5–8] The aim of this study was to determine whether education could be used to improve the quality of life of asthma patients in Taiwan.

Methods

Patients

This study used a before and after quasi-experimental design. A total of 85 asthma patients were recruited from the asthma clinic of a medical center in northern Taiwan using purposive sampling. These patients were divided into an experimental group (n = 31) and a control group (n = 54), the control group being of a

larger size to allow for loss of patients to follow-up. Subjects in the experimental group received usual care and completed four 1-hour sessions of group education, while the control group received usual care. The inclusion criteria were as follows: 1) age between 18 and 80 years; 2) asthma diagnosed by physicians in departments of the same hospital; 3) alert mental status and no severe mental or cognitive disorders; 4) no serious impairment of the sense organs confirmed on physical examination and evaluation; 5) ability to communicate in Mandarin or Taiwanese; and 6) literacy. A written, informed consent form was obtained from each patient and this study was approved by the hospital review committee after an evaluation of ethical considerations.

Measurements

Patients were asked to complete a personal information form with questions on gender, age, marital status, level of education, residential status, religion, economic status, first attack of the disease, drug treatment status, and disease severity.

Asthma medical education scheme

The course content was derived from the US National Institutes of Health manual on asthma diagnosis and treatment,[9] suggestions of researchers and other health professionals, and the results of a literature survey. The main contents included 4 topics: understanding asthma, self-evaluation and rating of asthma severity, understanding asthma drugs, and self-management. The expert validity of our choices was confirmed by examination. Four pulmonary physicians each taught a 1-hour lesson on each of the 4 topics.

Asthma Quality of Life Questionnaire

This study adopted the questionnaire developed by Juniper et al in 1992 based on the characteristics of asthma, also known as the Asthma Quality of Life Questionnaire, to evaluate the effectiveness of medical education.[10] The questionnaire had 4 parts: activity limitation, symptoms, emotional function status, and exposure to environmental stimuli. With regard to scoring, this questionnaire had a total of 32 items with a Likert scale score from 1 to 7 for each item. The total score could range from 32 to 224, and the mean score from 1 to 7. The lower the score, the more damage to quality of life. From previous studies, the instrument showed good reliability and validity.[11–14] For this study, because this questionnaire had not been used domestically, 5 expert asthma treatment professionals examined and validated the questionnaire after translation and reverse translation. Each item of the questionnaire was modified according to advice from each expert. To determine the test

reliability at the stage of pilot study, Cronbach's alpha was determined using 15 asthma patients. The results were 0.93 for the overall quality of life, 0.75 for activity limitation, 0.91 for symptoms, 0.85 for emotional function status, and 0.37 for exposure to environmental stimuli. At the stage of pre-intervention, Cronbach's alpha was 0.96 for overall quality of life, 0.89 for activity limitation, 0.93 for symptoms, 0.86 for emotional function status, and 0.76 for exposure to environmental stimuli.

Asthma General Knowledge Questionnaire for Adults

The level of disease knowledge pre- and post-medical education was evaluated using the Asthma General Knowledge Questionnaire for Adults, a 31-item questionnaire developed by Royal North Shore Hospital.[15] The tested contents included the cause of asthma, the pathophysiology of asthma, asthma drugs, evaluation of asthma severity, symptom management, and stimulant control and movement. A dichotomous system was used for scoring this questionnaire, with 1 point counted after answering 1 item correctly, and 0 points counted if the answer was incorrect or uncertain. The maximum score was 31 points. A higher score indicated better asthma knowledge. The test results of Allen and Jones in 1998 showed this questionnaire to be a reliable and valid tool that could be used to evaluate medical education implementation.[16] For this study, because use of this questionnaire had not been previously reported in research from Taiwan, 5 experienced asthma treatment professionals examined and validated the questionnaire after translation and reverse translation. The questionnaire was modified according to the advice of each expert. The Kuder-Richardson 20 (KR20) was used to test reliability and gave a value of 0.75 in a pre-investigation assessment and 0.74 in this study.

The personal information form, the Asthma Quality of Life Questionnaire, and the Asthma General Knowledge Questionnaire for Adults were collected 1 hour before the course commenced. The course started after the asthma education manuals were distributed, and concluded with a 30-minute discussion that allowed the patients to share their experiences with each other, and for pulmonary physicians to answer patients' questions. One month after the course, the patients were asked to complete the Asthma Quality of Life Questionnaire and Asthma General Knowledge Questionnaire for Adults again, at the clinic or at home.

Data were collected from the control group pre-intervention and 1 month after the intervention. Each patient was given a complementary copy of the asthma education manual after completing the program.

Statistical analysis

The data collected in this study were processed and analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows version 8.0 computer software package. The results of patient characteristics, asthma knowledge, and asthma quality of life scoring were expressed as percentages or mean ± standard deviation and were analyzed by frequency distribution, chi-squared test, and independent-samples *t* test. Paired *t* test was carried out to evaluate the effect of asthma education on patients' quality of life. In addition, analysis of covariance was used to adjust for differences in the basic characteristics of patients. A value of $p < 0.05$ was taken as the significance level.

Results

Patient characteristics

The majority of patients were male, married, had junior college level education or above, lived with several family members, followed a religion, were economically self-supporting, had suffered from asthma for 1 to 10 years, used bronchial dilator and steroid drug therapy simultaneously, and had moderate persistent asthma. The mean age of the patients was 46.5 years.

Comparison of characteristics between the 2 groups was made by chi-squared test and independent-samples *t* test. Table 1 shows that there was no significant

Table 1. Distribution and comparison of patient characteristics in experimental and control groups.

Characteristic	Control group (n = 54)	Experimental group (n = 31)	Total (n = 85)	p value
Gender (cases [%])				
Male	28 (51.9)	17 (54.8)	45 (52.9)	0.83
Female	26 (48.1)	14 (45.2)	40 (47.1)	
Marriage (cases [%])				
Unmarried	14 (25.9)	7 (22.6)	21 (24.7)	0.17
Married	40 (74.1)	22 (71)	62 (72.9)	
Spouse lost		2 (6.4)	2 (2.4)	
Residential status (cases [%])				
Lives with spouse	5 (9.3)	7 (22.6)	12 (14.1)	0.37
Lives with children	6 (11.1)	1 (3.2)	7 (8.2)	
Lives with parents	10 (18.5)	5 (16.1)	15 (17.6)	
Lives with several people	32 (59.3)	17 (54.8)	49 (57.6)	
Other	1 (1.8)	1 (3.2)	2 (2.4)	
Educational status (cases [%])				
Primary school	6 (11.1)	3 (9.7)	9 (10.6)	0.17
Middle school	5 (9.3)	3 (9.7)	8 (9.4)	
High school	24 (44.4)	7 (22.6)	31 (36.5)	
Junior college or above	19 (35.2)	18 (58.0)	37 (43.5)	
Working status (cases [%])				
Full-time job	30 (55.6)	10 (32.3)	40 (47.1)	0.20
Part-time job	1 (1.8)	1 (3.2)	2 (2.4)	
No job	18 (33.3)	16 (51.6)	34 (40.1)	
Student	4 (7.4)	4 (12.9)	8 (9.4)	
Self-assessment of economic status (cases [%])				
Hard	1 (1.8)		1 (1.2)	0.75
Acceptable	46 (85.2)	27 (87.1)	73 (85.9)	
Rich	7 (13.0)	4 (12.9)	11 (12.9)	
Duration of asthma (cases [%])				
1–10 years	28 (51.9)	18 (58.0)	46 (54.1)	0.58
11–20 years	16 (29.6)	6 (19.4)	22 (25.9)	
Above 21 years	10 (18.5)	7 (22.6)	17 (20.0)	
Religion (cases [%])				
No	16 (29.6)	9 (29.0)	25 (29.4)	1.00
Yes	38 (70.4)	22 (71.0)	60 (70.6)	
Drug therapy status (cases [%])				
Bronchial dilator	19 (35.2)	3 (9.7)	22 (25.9)	0.06
Steroid	1 (1.8)	2 (6.5)	3 (3.5)	
Both	33 (61.2)	25 (80.6)	58 (68.2)	
Other	1 (1.8)	1 (3.2)	2 (2.4)	
Disease severity (cases [%])				
Mild intermittent	20 (37.0)	6 (19.4)	26 (30.6)	0.01
Mild continuous	9 (16.7)	1 (3.2)	10 (11.8)	
Moderate continuous	20 (37.0)	14 (45.2)	34 (40.0)	
Severe continuous	5 (9.3)	10 (32.2)	15 (17.6)	
Age in years (mean [SD])	43.22 (15.7)	52.13 (18.2)	46.47 (17.1)	0.02

Table 2. Comparison of asthma knowledge and quality of life questionnaire scores between experimental and control groups before and after asthma education.

	Before education, all patients [n = 85; mean (SD)]	Before/after education (mean)		Change [control group/experimental group]
		Control group (n = 54)	Experimental group (n = 31)	
Asthma knowledge	19.92 (4.66)	20.07/20.29	19.65/23.06	0.22/3.42[†]
Quality of life				
Overall	5.26 (1.05)	5.38/5.47	5.06/5.42*	0.09/0.36
Activity	5.30 (1.12)	5.44/5.64	5.06/5.33	0.20/0.27
Symptom	5.22 (1.15)	5.31/5.41	5.07/5.46*	0.10/0.40
Emotion	5.32 (1.24)	5.44/5.43	5.12/5.40	-0.01/0.28
Environment	5.19 (1.15)	5.33/5.26	4.94/5.52[†]	-0.07/0.58*

*$p < 0.01$, [†]$p < 0.001$.

difference between the 2 groups in gender, marriage, residential status, education level, working status, self-assessment of economic status, period of suffering from asthma, religion, or drug treatment. However, there were significant differences between the 2 groups in age and disease severity. No correlation was found between age and quality of life scores in the 2 groups (correlation coefficient, –0.035 for the experimental group and 0.027 for the control group). In addition, 1-way analysis of variance showed no significant correlation between disease severity and quality of life scores in either group. These results indicate that age and disease severity had no influence on quality of life.

Patient status before asthma education

The mean knowledge score of patients before asthma education is shown in Table 2. The mean overall quality of life score was 5.26 points. Among the 5 aspects of quality of life assessed by the instrument, the highest mean value was the emotional function score of 5.32 points and the lowest mean value was the exposure to environmental stimuli score of 5.19 points (Table 2).

Before asthma education, the asthma knowledge and asthma quality of life scores of the 2 groups were not significantly different ($p > 0.05$).

After adjusting for age and disease severity, no significant differences on the Asthma Quality of Life Questionnaire were found overall (F = 1.607, $p > 0.05$), or in activity limitation (F = 1.679, $p > 0.05$), symptoms (F = 0.905, $p > 0.05$), emotional function status (F = 0.953, $p > 0.05$), or exposure to environmental stimuli (F = 2.638, $p > 0.05$). These results indicated that after adjusting for age and disease severity, quality of life scores of the groups were similar before asthma education.

Effect of asthma education on quality of life

Table 2 compares the knowledge and quality of life scores before and after asthma education. The

asthma knowledge, overall asthma quality of life, symptoms, and environmental exposure to stimuli scores of the experimental group changed significantly following asthma education, while these scores did not change in the control group ($p > 0.05$). The mean difference of the asthma knowledge and exposure to environmental stimuli scores was significantly different between the 2 groups. After asthma education, no significant difference was found between the 2 groups in general scores, and scores for activity limitation, symptoms, and emotional function ($p > 0.05$).

After adjusting for the factors of age and disease severity, Asthma Quality of Life scores overall (F = 2.697, $p > 0.05$), and for activity limitation (F = 0.211, $p > 0.05$), symptoms (F = 1.736, $p > 0.05$) and emotional function scores (F = 2.671, $p > 0.05$) did not significantly change after asthma education for both groups, while the exposure to environmental stimuli score improved in the experimental group (F = 11.140, $p < 0.01$).

Discussion

In the experimental group of this study, the mean knowledge score prior to asthma education was 19.92 points, which was lower than that (25.5 points) obtained by Allen and Jones in 1995 using a similar Asthma General Knowledge questionnaire for adult asthma.[17] Possible reasons for this difference might be related to cultural background, value systems, and health beliefs. Such differences would likely affect the motivation for acquiring related disease information. With regard to quality of life scores, the patients' mean score before the experiment was 5.26 points, which was similar to the results reported by some studies.[11,13,18–20] However, the results for mean score in this study were higher than in previous studies.[21,22] A possible reason might be that this study included patients with mild to severe disease. In addition, these patients had not been hospitalized

recently for acute asthma attack or deterioration, and so would be expected to have higher quality of life scores than patients recently hospitalized for acute asthma attack, patients visiting the emergency department, and patients with moderate to severe asthma.

Asthma knowledge scores of the experimental group increased by an average of 3.42 points ($p < 0.05$), while those of the control group did not change significantly. This result is similar to some previous studies.[17,23–26] In addition, the change in knowledge scores in this study was significantly different between the 2 groups, unlike the results of a study by Abdulwadud et al.[27] Differences in the time elapsed between education and scoring in the 2 studies, which was 6 months after education in the study of Abdulwadud et al[27] and 1 month in this study, might have affected the results. While the 1-month interval after education in this study was short enough for patients to remember the educational content clearly, it appears to have been too short for control patients to improve their knowledge.

Regarding asthma quality of life, the mean symptom scores of experimental patients after education changed significantly after education, while those of the control group did not. This result is similar to some previous studies.[28–31] Similar to our results, Kotses et al[29] found that symptoms experienced by asthma patients (including wheezing, dyspnea, chest tightness, and coughing) declined significantly after asthma education, while no significant decrease was experienced by control patients. In addition, Synder et al showed that asthma symptoms improved after asthma education, and asthma attacks recurred significantly less often,[30] results also identical to this study. Wilson et al showed that the number of days asthma symptoms lasted was significantly reduced after education,[31] which also is consistent with this study. These studies indicate that asthma education can improve disease status and reduce the occurrence of asthma symptoms.

With regard to the exposure to environmental stimuli, both this study and that by Wilson et al[31] showed significant improvement after asthma education. After taking the course, asthma patients made greater attempts to control their environment and avoid allergen contact, thus reducing the frequency and severity of allergen contact and exposure, and thereby reducing the number of asthma attacks. In the study of Huss et al,[32] allergen prevention and treatment were provided to asthma patients as a part of their medical education course, and the results showed that the symptoms of asthma were improved by self-management. These results agree with those of our study, indicating that effective prevention and treatment behavior can be implemented by patients, thus reducing the number of asthma attacks after instruction on prevention and treatment.

Wilson et al[31] showed that patients felt that physical activity was less limited 5 months after completing their asthma education course. Moreover, Osman et al[33] showed that patients were less frequently interrupted when sleeping at night, and activity limitation during the day also significantly decreased 12 months after asthma education. Although in this study activity limitation was also decreased after asthma education, this decrease did not reach significance, which might have been related to differences in the interval between education and assessment. In this study, the assessment was done 1 month after asthma education, and asthma patients might require longer times to adjust their activity patterns. Regarding emotional function status, Jenkinson et al[34] found that 12 months after asthma education, the feelings of disability among attendees were significantly reduced. In addition, Wilson et al[31] showed that asthma symptoms were significantly improved 12 months after group medical education in adults with moderate to severe asthma. The study of Kotses et al[29] showed that while feelings of disability were reduced 1 to 2 months and 5 to 6 months after asthma education, they were significantly reduced 5 to 6 months after education, and more confidence was gained in the self-management of asthma. However, quality of life 1 to 2 months after education did not improve significantly, indicating that a relatively longer period of time may be necessary before improvement in emotional function is apparent. In this study, emotional function scores increased, though not significantly.

With regard to quality of life of the patients in the 2 groups, the change in exposure to environmental stimuli score reached significance, but quality of life in general and other aspects of quality of life scores were not significantly different. These results were somewhat different from 3 previous studies[27,35,36] which showed that changes in quality of life scores were not significantly different after asthma education. These differences might have been due to the timing of assessment of quality of life after education, and a longer follow-up period might have revealed a greater effect. In our study, the control group had significantly higher mean quality of life scores in general and in all aspects of quality of life before education than the experimental group. These mean quality of life scores increased after the asthma education such that they were not significantly different between the 2 groups. However, the scores for exposure to environmental stimuli increased significantly only in the experimental group.

Because asthma is greatly influenced by external environment and climate, generalization of these results to all asthma patients should be done cautiously. The disease severity among our subjects varied considerably and future studies are needed with patients having disease of more specific severity. In addition, in this study, patients were recruited by purposive sampling and this may have resulted in bias. Random assignment should be used to control deviation between groups in future study. Owing to limitations on personnel and time, a 4×1-hour session program was adopted in this study. Future studies involving individual or small group instruction with medical education continued for several weeks would allow the influence of the number of participants and time of instruction on quality of life to be evaluated. In addition, because resources and time were limited, we only tested 1 month after asthma education was completed, and the long-term effect of medical education was not evaluated. Future studies involving long-term follow-up could provide useful information on the long-term effect of asthma medical education on disease control and quality of life.

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