A STRUCTURAL EQUATION MODEL ANALYSIS OF PSYCHOSOMATIC SUFFERINGS IN ADULT ASTHMA PATIENTS

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ABSTRACT

Objective: The aim of this study was to disclose asthmatics' psychosomatic sufferings, which meant the body-mind problems, of adult asthma patients in the long-term management of this chronic disease. Using structural equation modeling, we tried to analyze the relations among sub-scores as structural sub-concepts of the Asthma specific Health-related Quality of Life (Asthma-QOL) and the Body Image Disturbance (BID).

Methods: A cross-sectional survey was conducted by using a self-report questionnaire to adult asthma patients who were visiting primary physicians specialized in respiratory disease. The questionnaire was filled in anonymously, and the patient was free to make a final decision on returning the completed questionnaire. BID and Asthma-QOL levels were measured by using Body Image Assessment Tool-22 (BIAT-22) and Asthma Health Questionnaire-33 Japan (AHQ-33J), respectively. Somatosensory Amplification Scale (SSAS) was also used to measure patients' Somatosensory Amplification (SSA). SSA was individuals' psychosomatic sensitivity indicator which has been considered to indicate personal characteristics strongly related to BID.

Results: The survey was conducted in cooperation with eleven municipal hospitals with a bed capacity of 100 to 400, and complete response was obtained in 367 patients（41.8% collected）. As a result, a path diagram in structural equation modeling with effective goodness of fit index was obtained, including six variables of AHQ-33J, one variable SSAS, and four variables of BIAT-22 ($\chi 2$=78.265, df=36, p=0.000, GFI=0.964, AGFI=0.933, RMSEA=0.057). The path diagram of this study confirmed the followings regarding the relationship between QOL and body image of asthma patients. (i) Body image of the asthma patient is defined, not by the degree of symptoms, but rather by obstacles and difficulties felt in everyday life which derive from the degree of symptoms. Emotional problems do not directly affect the body image of asthma patient. (ii) Somatosensory sensitivity affects both QOL and body image of the asthma patient. (iii) Higher somatosensory sensitivity gives more aggravating factors which trigger an asthma attack, leading to increased obstacles and difficulties felt in everyday life. (iv) Somatosensory sensitivity not only affects body image directly but also aggravates body image problems through increased obstacles and difficulties felt in everyday life.

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1. Introduction

Bronchial asthma is an allergic inflammatory disease characterized by reversible obstruction of the airways and hypersensitivity, and is a chronic disease requiring continuous treatment and specific health behaviours for therapeutic regimen [1-2]. There are some peculiar difficulties in asthma patients. The first point is that asthma patients often suffer intermittent attacks, which threaten their usual life. The second point is that asthma patients usually face the risk of sudden death because of asthma attack, even if their disease severity classification are not severe persistent. The third point is that the feeling of "hard to breathe" from obstruction of the airways or cough and sputum directly causes the image of death for asthmatics. And asthma medication is complex, so difficult to use many different kinds of medicines properly, for example, controller and reliever, oral/ inhaler/patch medicine, Corticosteroids/ β 2-agonints/ Theophyllines, Antiallergic agents, Anticholinergics, and so on.

Indeed, inhaled steroids have been used as the main antiasthmatic prescription today, and symptom management have been easier than before [3-4], but many patients have been suffering in chronic complaints and continual impediments in daily life for their importunate attack [5]. So, the issue of body-mind problems is one of the most important points including in the Health-related Quality of Life in adult asthmatics [6-9]. Health care providers have to pay attention to both physical and mental sides of asthma patients simultaneously.

The previous studies found that body image of asthma patients was more disturbed than that of non-asthmatics [10], and the disease specific Health-related Quality of Life of asthmatics was generally worse in the body image disturbance group than in the normal group [11].

The aim of this study was to disclose asthmatics' psychosomatic sufferings, which meant the body-mind problems, of adult asthma patients in the long-term management of this chronic disease. Using structural equation modeling, we tried to analyze the relations among sub-scores as structural sub-concepts of "Asthma specific Health-related Quality of Life (Asthma-QQL)", "Body Image Disturbance (BID)", and "Somatosensory Amplification (SSA). SSA has been considered to indicate personal characteristics strongly related to BID.

2. Conceptual framework

1) Variables

"Asthma specific Health-related Quality of Life (Asthma-QOL)" includes various somatic symptoms, psychological influences, and the degree of obstacles in social life, which the asthma patients face daily in the process of medical care [12].

"Body image disturbance (BID)" is defined as sensory confusions and predisposition to cognitive appraisal which are highly likely to cause individual health problems. It includes 5 sub-concepts of "Body-cathexis", "Low body-control", "Low body-esteem", "Somatic boundary disturbance", and "Body-depersonalization" [13-14]. Among the 5 sub-concepts, "Somatic boundary disturbance" was excluded from the framework of this study since it could not be assumed as a body image problem of asthma patients.

"Body-cathexis" means extraordinary strong concerns and interest toward the body, because of which a person feel incongruity and anxiety. "Low body-control" is the confusion caused by unstable body conditions, consequently causing distrust in uniformity and constancy of the body. "Low body-esteem" is the dissatisfaction with body conditions and the loss of feeling that the body is invaluable. "Body-depersonalization" is the feeling that the whole body or part of the body does not belong to oneself and there is something incongruous or foreign, accompanied by abnormal sensations.

The concept of "Somatosensory amplification (SSA)", by Barks *et al.*, was employed to assess somatosensory sensitivity. Somatosensory amplification refers to a tendency of becoming highly inquisitive or excessively cautious and vigilant toward relatively weak, infrequent visceral or somatic sensations, which are normally paid little attention to, and considering them pathological [15-16].

2) Assumption for analysis

The accumulation of various impediments and obstacles in daily life should damage the body image of asthma patients, and raise the level of body image disturbance. In other words, "Asthma-QOL" and the "BID" seem to have a relation between cause and effect (Fig.1).
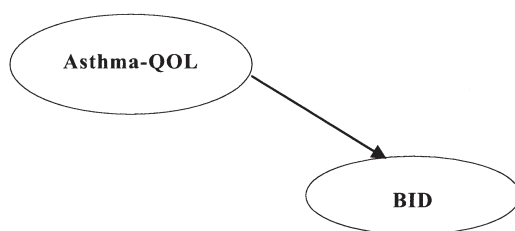

Fig.1 Relationship between "Asthma-QOL" and "BID"

Footnote: ※1: Ellipses are Latent variables. ※2: Arrow exhibits to be the premise of causality.

On the other hand, the previous studies found that no significant difference in the score of "SSA" between asthmatics and non-asthmatics, and as compared within asthma patients, the score of "SSA" was highly in the body image disturbance-group than in the normal body image group [17]. These results show that the concept of "SSA" has a different peculiarity from the concept of "BID". It is considered that the variable of "SSA" is more stable than that of "BID", and to be an indicator as such as built-in personal characteristics. So, it can be supported that the patients' "SSA" level will affect "Asthma-QOL" and "BID" level (Fig.2).
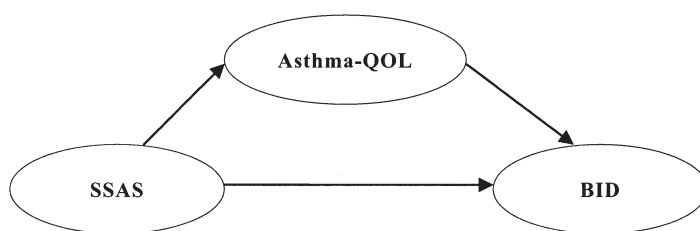

Fig.2 Conceptual Framework

Footnote: ※1: Ellipses are Latent variables. ※2: Arrows exhibit to be the premise of causality.

And regarding the internal structure of AHQ-33J, "Daily activity ", "Social activity" and "Economics" have a common peculiarity. Those three variables are included in the feelings about obstacles and difficulties in everyday life of asthmatics. Those can be compiled into a new latent variable whose name is "Living conditions". So, in this study, a linear causal relationship was hypothesized that; "Asthma aggravating factors" effected on "Asthma symptoms", "Asthma symptoms" effected on "Living conditions", and "Living conditions" effected on "Emotion" (Fig.3).
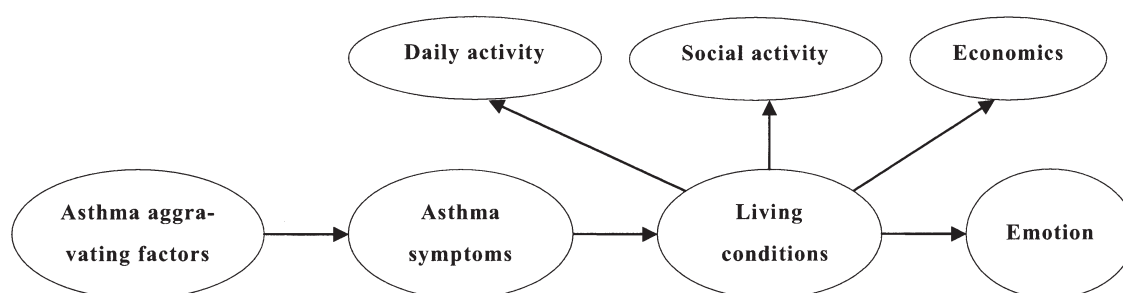

Fig.3 Structural Relationship within "Asthma-QOL"

Footnote: ※1: Ellipses are Latent variables. ※2: Arrows exhibit to be the premise of causality.

3. Methods

A cross-sectional survey was conducted by using a self-report questionnaire to adult asthma patients who were visiting physicians.

1) Subjects

Study subjects were obtained by convenient sampling method. The asthma patient group includes those who are 20 years old or older and have been visiting a physician for the treatment of asthma for more than the past 6 months.

2) Questionnaire and scales

The questionnaire consisted of basic background items, "Body Image Assessment Tool 22 item version (BIAT-22)" developed by Fujisaki [13-14], "Asthma Health Questionnaire-33 Japan (AHQ-33J)" developed by Arioka et al. [18-19], and "Japanese version of Somatosensory Amplification Scale (SSAS)" translated by Muramatsu et al. [20].

BIAT-22 was a self-report scale to measure "Body image disturbance" with 4 subscales of (i) Body-cathexis (7 items), (ii) Body-depersonalization (4 item), (iii) Low body-control (5 items), and (iv) Low body-esteem (6 items). The higher score indicates more disturbed body image.

AHQ-33J was a self-report scale to measure asthma-specific QOL, consisting of 7 subscales of (i) Asthma symptoms (8 items), (ii) Emotion (8 items), (iii) Daily activity (3 items), (iv) Asthma aggravating factors (8 items), (v) Social activity (4 items), (vi) Economics (1 item), and (vii)

Global QOL (1 item). The higher score indicates lower self-rating of QOL.

SSAS was a self-report scale with 10 items. The higher score means higher somatosensory sensitivity, thus being sensitive.

Sufficient reliability and validity about every scale was reported in the developing step.

3) Data Collection

The survey was conducted in cooperation with eleven municipal hospitals with a bed capacity of 100 to 400. The cooperative doctors explained about the proposal to their outpatients on their visits. Only when the patient consented, the doctor filled in some part of the background information in reference to the patient's medical history, and gave the patient a set of the survey request letter, the questionnaire, and a return envelope with postage. The patient brought it home to fill in anonymously and mailed back to the investigator.

4) Ethical considerations

The surveys were conducted anonymously, considering the patient's privacy and anonymity. The participants were assured that the data would be used only for the study and discarded immediately after analysis. In Survey, to make sure that patients would not feel the request for participation obligatory, it was explained orally and in a written form that the patient was free to make a final decision on returning the completed questionnaire, there was no need to tell the doctor whether the questionnaire was sent back, and participation would not affect medical care to be provided or the relationship with the doctor.

This study was approved by the Research Ethics Committee of St. Luke's College of Nursing in 2002 prior to the study implementation.

4. Results

1) Basic background

The questionnaires were distributed to 964 individuals at 11 hospitals, and 403 responded (41.8% collected). After screening, complete data from 367 individuals (171 males and 196 females) were analyzed.

The average age of the asthma patient group was 55.8 ± 16.0 years old, of which 46.0% was in the middle-age, prime working generation from 41 to less than 65 years old, and 34.1% was in the elderly generation of 65 years old or older. The average age of the first asthma onset was 36.4 ± 19.5 years old with the highest frequency at 45 years old. It showed bimodal distribution with the first peak in childhood onset group at around 5 years old, and the second peak in the adulthood onset group at the age of 45-50. The average total year with asthma was 17.9 ± 12.6 years.

According to the asthma severity classification, 18.3% of the patients were in Intermittent (Step 1), 37.9% in Mild persistent (Step 2), 34.3% in Moderate persistent (Step 3), and 9.5% in Severe persistent (Step 4). Among all the patients, 54.8% have been previously admitted in a hospital, of which 37.0%

experienced repeated admissions.

2) Structural equation model analysis

Before the main analysis, reliability and validity of each scale and subscale was tested for this data set (n=367). Those results were sufficient to confirm of adequacy. The score of SSAS, the sub-scores of AHQ-33J and the sub-scores of BIAT-22 could be used as observed variables.

And, as a result of main analysis, a path diagram in structural equation modeling with effective goodness of fit index to accept the conceptual framework was obtained (χ^2=78.265, df=36, p=0.000, GFI=0.964, AGFI=0.933, RMSEA=0.057) (Fig.4).
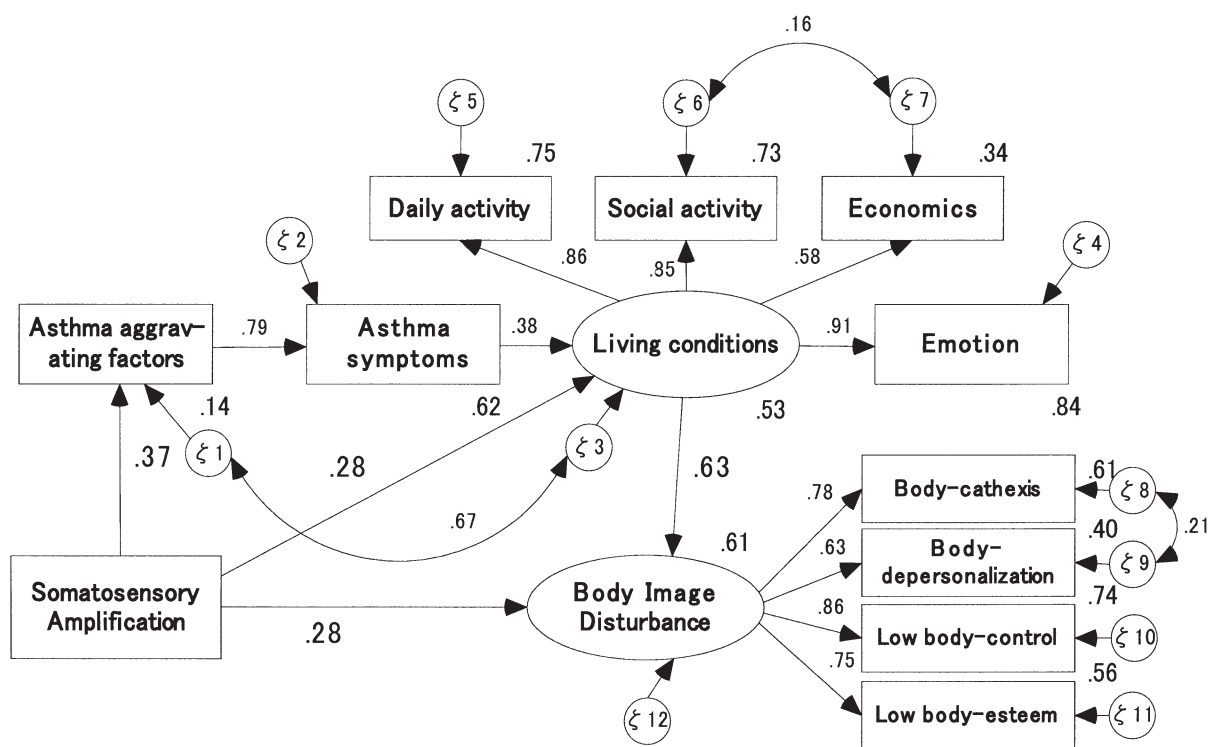

Fig.4 Structural Equation Modeling of Psychosomatic Sufferings in Asthma Patients

Footnote: ※1: Ellipses are Latent variables, rectangles are Observed variables, and ζ 1～12 are Unique variables. The values appendant to Latent and Observed variables are Squared Multiple Correlations.

　　　　　※2: Unidirectional arrows exhibit to be the premise of causality, and their concomitant values are their Standardized Regression Weights (P=.000).

　　　　　※3: Interactive arrows exhibit to be the premise of covariances , and their concomitant values are their Correlations (P<.001).

In the path diagram, "Somatosensory Amplification" had a direct effect on "Asthmaaggravating factors" and "Living conditions" as tow elements of Asthma-QOL. Respectively,the numerical values of standardized partial regression coefficient were 0.37 and 0.28. "Somatosensory Amplification" also had a direct effect on "Body Image Disturbance" with a coefficient of 0.28.

The total effect of "Somatosensory Amplification" on "Living conditions" was 0.39 including an indirect effect via "Asthma aggravating factor" and "Asthma symptoms". While,the total effect of "Somatosensory Amplification" on "Body Image Disturbance" was 0.53.

The standardized causal coefficient from "Asthma aggravating factors" to "Asthmasymptoms" was 0.79, from "Asthma symptoms" to "Living conditions" was 0.38, and from "Living conditions" to "Emotion" was 0.91. Judging from the standardized causal coefficients and r^2 values, the most contributing variable to "Living conditions" was "Daily activity", followed by "Social activity", while "Economics" was less contributing.

Among the elements of "Asthma-QOL", significant direct effect on "Body Image Disturbance" was found with only one variable of "Living conditions". The partial regression coefficient was 0.62. Regarding the other elements, no direct effects on "Body Image Disturbance" were verified. "Asthma aggravating factors", "Asthma symptoms" and "Emotion" had no direct effects on "Body Image Disturbance".

Looking at the level of relationship between "Body Image Disturbance" and the 4 structural sub-concepts, "Low body-control" affected body image more seriously than "Body-cathexis" or "Low body-esteem". "Body depersonalization" did not contribute so much.

5. Conclusions

The final path diagram of this study confirmed the followings regarding the relationship between QOL and body image of asthma patients.

(1) Body image of the asthma patient is defined, not by the degree of symptoms, but rather by obstacles and difficulties felt in everyday life which derive from the degree of symptoms. Emotional problems do not directly affect the body image of asthma patient.

(2) Somatosensory sensitivity affects both QOL and body image of the asthma patient.

(3) Higher somatosensory sensitivity gives more aggravating factors which trigger an asthma attack, leading to increased obstacles and difficulties felt in everyday life.

(4) Somatosensory sensitivity not only affects body image directly but also aggravates body image problems through increased obstacles and difficulties felt in everyday life.

The results of this study provided findings about the relationship within body-mind problems. Indeed nurse can not control the disease symptoms directly such as doctor can do, but nurse will be able to pay attention to the patients' life conditions and patients' SSA level. Caring from the point of view will be able to contribute in order to prevent the aggravation of patients' body-mind problems or sufferings, and to hold their quality of life in the high level for a long time.

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