



Original Article

## Evaluation of a chest rehabilitation project in Nepal using the St. George's Respiratory Questionnaire and Chronic Obstructive Pulmonary Disease Assessment Test

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**Abstract.** [Purpose] The incidence of chronic obstructive pulmonary disease is rapidly increasing worldwide. In Nepal, it has the highest mortality rate among all noninfectious diseases. Since 2015, we have been involved in a project that aims to facilitate chest rehabilitation for patients with chronic obstructive pulmonary disease in Nepal. We compared the Nepali version of the St. George's Respiratory Questionnaire with the Chronic Obstructive Pulmonary Disease Assessment Test, the latter of which was translated into Nepali for this project. We also evaluated the extent to which patient quality of life improved after the rehabilitation program. [Participants and Methods] The Nepali St. George's Respiratory Questionnaire and Chronic Obstructive Pulmonary Disease Assessment Test were used to assess the health status of patients both before the intervention's initiation and one year after it. Between May and September of 2016, 122 patients with chronic obstructive pulmonary disease participated in this program. [Results] We collected valid responses from 57 patients both before and after the intervention. The scores of both screening tools were significantly lower after the intervention than before and showed a significant correlation with one another. [Conclusion] These results suggest that the Nepali version of the Chronic Obstructive Pulmonary Disease Assessment Test is a reliable tool for the evaluation of chronic obstructive pulmonary disease and that the intervention used in the project might be effective for patients afflicted with the disease. However, there are limitations to the research design, such as the limited number of participants used in the study.

**Key words:** CAT Nepali version, Pulmonary physical therapy, QOL

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## INTRODUCTION

The number of patients with chronic obstructive pulmonary disease (COPD) is rapidly increasing and is becoming a social problem worldwide<sup>1</sup>. Ninety percent of deaths from COPD occur in those living in low-to-middle income countries<sup>2</sup>. In addition, in the Federal Democratic Republic of Nepal (hereinafter termed “Nepal”), deaths from COPD account for 43% of all deaths from non-infectious diseases, the highest mortality among non-infectious diseases<sup>3</sup>. This may be attributable to some factors such as a high smoking rate among the population, including adolescents; air pollution caused by exhaust fumes; stagnation of air in the basin; and inhalation of soot produced by cooking indoors with firewood and charcoal<sup>3</sup>. Because of a delay in promoting the healthcare system, a shortage of physicians, and many medical institutions located in the central region, only wealthy people living in or around Kathmandu, the capital, can visit physicians at an early stage of the disease. Many of the local people do not even understand that they have difficulty breathing because they have a disease called COPD. Thus, the current status of healthcare is insufficient in areas isolated from relevant services<sup>4-6</sup>. Under such circumstances, chest rehabilitation, a significant treatment for COPD in addition to medication, seems to be an excellent approach in terms of feasibility and medical benefits, because it is less expensive and can be practiced even at a community level with limited access to healthcare services<sup>3, 7-9</sup>.

Evaluation methods for COPD include the St. George’s Respiratory Questionnaire (SGRQ) and the COPD Assessment Test (CAT). SGRQ comprises many questions and is designed to closely measure patients’ health status. The CAT consists of 8 questions and is easier to administer than the SGRQ. It also correlates well with the SGRQ, and it shows excellent responsiveness before and after chest rehabilitation<sup>10</sup>. The SGRQ translated into Nepali has been effectively used in clinical practice in Nepal<sup>11</sup>. However, the CAT has not yet been translated into Nepali. In Nepal, where medical resources are limited, we believe that the CAT is easier to use than the SGRQ, and we obtained permission from the copyrighted CAT governance board to have the Nepali version of CAT certified. We introduced the CAT Nepali version in our project, and verified its correlation with the Nepali version of SGRQ. We also evaluated whether quality of life (QOL) improved after the rehabilitation program to judge the effectiveness of the project.

## PARTICIPANTS AND METHODS

Since 2015, we have been working on the “Early Rehabilitation Support Project for Patients with Respiratory Disease in the Kathmandu Valley: Promotion of Chest Rehabilitation”, performed as a Japan International Cooperation Agency (JICA) Partnership Program (Official Development Assistance [ODA]), targeting patients with COPD who live in the Kathmandu Valley of Nepal. This project, proposed by the Japan International Medical Technology Foundation, aims to promote chest rehabilitation in hub hospitals and local health centers (hereinafter collectively referred to as “health posts”) and to educate patients with chronic respiratory disease including COPD, their family members, and the community about the respiratory disease and its prophylaxis and, thereby, improve their QOL. A health post is a facility attached to a public healthcare facility that provides primary healthcare services to residents at the community level. Taking account of the shortage of healthcare resources, the chest rehabilitation program was designed to enable participants to train themselves with exercises, such as conditioning (pursed lip breathing, relaxation, bronchial drainage), muscle strengthening, and training for activities of daily living (ADL). All the programs were planned and fixed after enough investigation of local life style and discussions with local staffs. We made leaflets of the training contents so that the patients could self-practice at home, with full of illustrations considering the low literacy rate. From the viewpoint of risk management where the cardiopulmonary monitoring systems were unavailable, muscle strength training was limited to mild to moderate work load, with frequent breaks. Rehabilitation training and training for health workers and female community health volunteers in charge of the target patients’ districts are provided as part of a training of trainers (TOT) program so that they can conduct and train in respiratory rehabilitation even without Japanese staff. Female community health volunteers worked to raise public awareness of the disease, while health workers provided chest rehabilitation services to patients with COPD who visited the health posts<sup>12</sup>. The activities were implemented in cooperation with local cooperative organizations: the TOT program was implemented with the Respiratory Medicine Department of the Tribhuvan University Teaching Hospital (TUTH), and monitoring of health posts was performed with the Society for Local Integrated Development Nepal (SOLID NEPAL), a non-governmental organization in Nepal. In addition, through seminars for community members and radio/television programs, we tried to raise public awareness about chest diseases including COPD and to educate them about methods and benefits of smoking cessation and chest rehabilitation.

From July 2015 to December 2017, 1,216 patients with confirmed or suspected COPD participated in this project. Of these, 122 patients with COPD (44 males and 78 females; mean age, 69.9 ± 10.3 years) who first visited the health posts from May to September 2016 and who agreed to participate in this study were enrolled in this study. These subjects were diagnosed with COPD by local clinicians or local health workers. The study sites were 13 health posts in Bhaktapur (Bode, Thimi, Gundu, Duwakot, Sipadol, Nagadesh, Jhaukhel, Sirutar, Katunje, Bageshwori, Changunarayan, Chayamasing, and Balkot). Prior to initiation of chest rehabilitation, the health status of subjects was assessed using the CAT and SGRQ. For those who were illiterate, supporters read aloud each question during the assessments. The same assessments were again performed 1 year later. The staff of SOLID NEPAL performed the assessments. For SGRQ, the version translated into Nepali by Sherpa

et al. was used<sup>11</sup>). For the CAT, the original English version was translated into Nepali by SOLID NEPAL staff with prior approval from the CAT governance board (copyright holder of CAT). The accuracy of the Nepali translation was confirmed with back translation, and its complete acceptability in the Nepalese context was verified by a Nepali medical anthropologist, who also confirmed that there were no ethical violations from the anthropological perspective. The study was conducted after obtaining approval of the Ethical Review Board of the National Disaster Medical Center (approval number: 2016-34). Written, informed consent was obtained from all subjects after providing them with a written explanation. For statistical analysis, the Shapiro-Wilk test was performed for each item as a normality test, and the Wilcoxon rank-sum test was performed for the total CAT and SGRQ scores and lower-level SGRQ component (symptom, activity, and impact) scores, which were not normally distributed, to compare the health status of the subjects before and after the intervention. Similarly, the correlation between the SGRQ and CAT scores, which were not normally distributed, was analyzed using Spearman's rank correlation method. The significance level was set at 1%. For statistical processing, IBM SPSS Statistics 23 was used. The results are shown as medians (interquartile range).

## RESULTS

In this study, valid responses were obtained from 57 participants (21 males and 36 females; mean age,  $69.7 \pm 11.3$  years) for both the SGRQ and the CAT.

The SGRQ total score was 54.8 (42.5–74.2) before the intervention and 45.6 (38.6–62.7) after the intervention ( $p < 0.01$ ). Concerning lower-level SGRQ component scores, the symptom score was 45.7 (35.1–69.4) before the intervention and 32.1 (16.4–50.8) after the intervention ( $p < 0.01$ ); the activity score was 79.1 (66.2–92.5) before the intervention and 79.1 (65.6–92.5) after the intervention ( $p = 0.378$ ); and the impact score was 47.1 (25.7–70.7) before the intervention and 31.7 (27.0–48.7) after the intervention ( $p < 0.01$ ). A significant decrease was observed after the intervention in terms of total, symptom, and impact scores (Table 1).

The CAT score was 28 (23–31) before the intervention, and it decreased significantly to 19 (14–23) after the intervention ( $p < 0.01$ ; Table 2).

There was a positive correlation between the SGRQ and CAT scores both before and after the intervention [correlation coefficient ( $r$ ): 0.680 ( $p < 0.01$ ) before the intervention and 0.617 ( $p < 0.01$ ) after the intervention] (Fig. 1).

## DISCUSSION

We implemented the chest rehabilitation project at a community level in the Kathmandu Valley, Nepal, and evaluated the utility and co-relationship between the CAT which was translated into Nepali for this project correlated and the SGRQ in Nepali. To the best of our knowledge, there are no available data showing that TOT was provided to local healthcare workers in a developing country to promote chest rehabilitation at a community level, and that QOL was evaluated before and after the intervention. The median SGRQ total score improved by approximately 9 points after the intervention compared with that

**Table 1.** Changes in SGRQ before and after intervention

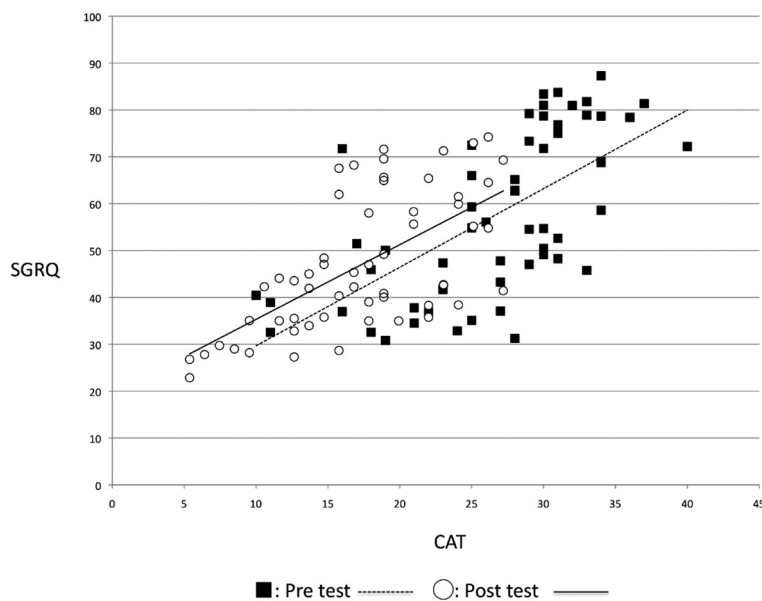
	Median (interquartile range)	Minimum value	Maximum value
Total pre*	54.8 (42.5–74.2)	30.8	87.3
Total post*	45.6 (38.6–62.7)	26.8	75.6
Symptom pre*	45.7 (35.1–69.4)	16.3	87.6
Symptom post*	32.1 (16.4–50.8)	0	86.4
Activity pre	79.1 (66.2–92.5)	42.8	100
Activity post	79.1 (65.6–92.5)	41.3	100
Impact pre*	47.1 (25.7–70.7)	17.7	89.4
Impact post*	31.7 (27.0–48.7)	12.0	78.4

\*Significant decrease was observed after the intervention in terms of total, symptom, and impact scores ( $p < 0.01$ ).

**Table 2.** Changes in CAT before and after intervention

	Median (interquartile range)	Minimum value	Maximum value
CAT pre	28 (23–31)	10	40
CAT post	19 (14–23)	7	28

\*CAT decreased significantly after intervention ( $p < 0.01$ ).



**Fig. 1.** Correlation between SGRQ and CAT. There was a positive correlation between the SGRQ and CAT scores both before and after intervention.

before the intervention. Given that the minimal clinically important difference (MCID) in the SGRQ total score is 4 points<sup>13</sup>, the results of the present study suggest a beneficial effect of our activities for the target patients. The significant improvement in the symptom score was likely the result of our encouragement of local people to visit a health post as soon as possible if they had any relevant symptoms and our distribution of leaflets on conditioning exercise designed to improve symptoms during community meetings. The improvement in the impact score seemed to reflect a feeling of safety among local people who were assured that Nepali healthcare workers would treat them even when the Japanese healthcare team was absent, because local health workers were trained to teach chest rehabilitation to community people through TOT, and the staff of SOLID NEPAL periodically visited each health post to check whether chest rehabilitation was appropriately performed. Meanwhile, no significant difference was observed in the activity score. This was probably attributable to insufficient content related to physical training, such as muscle strengthening and aerobic exercise, as well as inadequate preparation of relevant materials.

The CAT scores correlated with the SGRQ scores, both before and after the intervention. It can be used as an effective evaluation method in Nepal as well as in other countries where the CAT has been translated into local languages<sup>14, 15</sup>. A shortage of medical human resources is one of the greatest problems at the community level. It is difficult to perform detailed assessments of individual patients with COPD. Considering that the SGRQ, although excellent as an evaluation tool, is difficult to use at a health post level due to its length, the CAT, which is easier to use, seems to be useful for evaluation.

This study had limitations. The diagnosis of COPD was made by local clinicians or local health workers. Neither pulmonary function tests (PFTs) nor bronchodilator reversibility tests could be performed at a health post, it was possible that some participants had diseases other than COPD. Valid responses were obtained only from a limited number of participants because it was difficult for some participants to visit a health post, which was far from their home, a number of times, or because it was difficult for evaluators to come to a health post in an area with poor access to transportation even if participants visited. Considering that the staff of SOLID NEPAL engaged in both assessments and instruction regarding chest rehabilitation, there may have been a bias in their assessments made before and after the intervention. In addition, as an open, uncontrolled, non-randomized study, there were limitations related to the study design. It is possible that only those who experienced the beneficial effects of the program visited a health post more than once, and that, therefore, evaluations of participants with poor responses to the program were few. In this study, only 2 types of QOL assessments were performed, and objective assessments, such as PFTs, oxygen saturation measurement, and the 6-minute walk test, could not be conducted. Furthermore, the severity of the disease and relationships between physical function and improvement in QOL were not evaluated. Similarly, no evaluation was made in terms of medications used before and after the intervention. However, given that the purpose of the project was to enhance comprehensive pulmonary health including chest rehabilitation, it seems meaningful that QOL in some participants was partly improved by medical intervention, even though it was difficult to conclude that this improvement in QOL was solely attributable to chest rehabilitation.

In conclusion, this study confirmed that the results of the Nepali version of the CAT that we created were correlated with those of SGRQ. In addition, a community-level respiratory rehabilitation project was conducted in Kathmandu Valley, Nepal, confirming that there was a group of people who were able to achieve improved quality of life through this intervention.

Although it seems difficult to examine the overall effects of the project only from SGRQ and CAT evaluations, the above result might suggest the effectiveness of the project, which can serve as the foundation on which similar activities could be performed at a larger scale, and Nepali version of CAT might serve as a convenient tool for assessments

### *Conflict of interest*

There are no conflicts of interest to report regarding the contents of this paper.

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