Validation of Asthma Life Quality Test for the Screening of Asthma Among Indian Adults

Monika Bhuker and Satwanti Kapoor

Department of Anthropology, University of Delhi, Delhi, India

Abstract

Objective. Asthma life quality (ALQ) test has been used in many countries for the diagnosis of asthma and it has been proved to be useful also. The present study aimed to validate the ALQ test for the positive diagnosis of asthma and to assess its severity.

Methods. Two hundred doctor-diagnosed bronchial asthma patients and 200 control subjects were studied. Standard form of ALQ test was used. Patients with bronchial asthma were categorised into mild-to-moderate and severe asthma categories. Receiver operating characteristic curve was plotted to determine the cut-off for ALQ score to assess the severity of asthma among adults in Delhi.

Results. The mean (± standard deviation) values for ALQ score were higher in patients with asthma compared to control subjects (15.0±3.9 *versus* 0.7±0.9; p<0.001). Significantly higher mean ALQ score was seen in patients with severe asthma compared to those with mild-moderate asthma compared to those with severe asthma (18.1±2.0 *versus* 13.1±3.5; p<0.001). At a cut-off value of 16.5, ALQ had a sensitivity of 79% and specificity of 84%, area under curve was 0.887 (p<0.001) for the diagnosis of severe asthma.

Conclusions. Asthma life quality test appears to be a useful tool to diagnose and assess severity of bronchial asthma. **[Indian J Chest Dis Allied Sci 2016;59:177-180]**

Key words: Asthma, Asthma life quality score, Severity, Diagnosis, Adults.

Introduction

Bornchial asthma has become a major health problem worldwide because of its increasing prevalence and severity.[1] In India also, the prevalence of asthma is increasing rapidly. Over all prevalence of asthma is 2.4% among adults in India.[2] There are many public awareness educational programmes going on all over the world but the diagnosis of asthma at primary level is still not easy. Historically, studies of patient outcomes in asthma have focused on clinical and physiologic measures.[3] More recently, however, there is a growing recognition that such clinical measures do not provide a complete, or in some cases, accurate, view of the impact of a disease on an individual's physical, social, psychological or emotional well-being.[4] In response several asthma specific quality of life questionnaires have been designed by various societies to diagnose asthma in population-based studies. Asthma life quality (ALQ) test is one of such instrument that has been used in many countries to diagnose asthma and to assess its severity[5]; it is simple and fast to fill and is readily available in different media including the World Wide Web. One study has addressed the reliability and validity of the Portuguese version of the ALQ test.[6]

The ALQ test is a simple self-administered questionnaire designed to help individuals with breathing problems to determine if they have asthma, or for those already diagnosed with asthma to know if their asthma is under control.[6] It was developed by the American College of Allergy, Asthma and Immunology (ACAAI) and has been shown to be useful as an asthma screening tool.[7] However, the ALQ test has not been used and validated in India. The present study, therefore, aimed to validate the ALQ test for the diagnosis and severity assessment of bronchial asthma in adult patients in India.

Material and Methods

Two hundred physician-diagnosed bronchial asthma patients aged 18-50 years from the general out-patient department of Dr B.R. Ambedkar Hospital, Rohini, Delhi were studied. Healthy controls (n=200) aged 18-50 years were chosen from the same geographic region. Patients and subjects who had renal asthma, cardiac asthma or any other chronic disease were not included in the study. The study protocol was approved by the Institutional Ethics Committee. Study purpose was explained to all the subjects and

a written informed consent was obtained from all those who volunteered for the study.

Name, age and demographic details were collected from all the subjects. ALQ questionnaire was given to every subject. The ALQ comprises 20 questions in yes/no answer format (*See Appendix*). It address six dimensions of asthma's impact in patient's lives: (i) activity and sleep, (ii) symptoms, (iii), triggers, (iv) unscheduled health care use (v) medication, and (vi) psychological. All questions have equal weight and, for each patient, a total ALQ score is calculated as the sum of all positive (yes) responses, ranging from 0 to 20.[6]

Statistical Analysis

Student's t-test was performed to compare the differences in the mean values of ALQ score between patients with and without asthma; and patients with mild and severe asthma. Correlation analysis was done to see the association of ALQ score with asthma and asthma severity. Receiver operating characteristic (ROC) curve analysis was done to determine the cut-off value of ALQ test score for detecting severe asthma. Sensitivity and specificity with positive and negative predictive values were calculated. Multi-variable logistic regression was done to identify severe asthma. For all statistical tests the significant level was 5%. The statistical analysis of the data was done using Statistical Package for Social Sciences (SPSS, version 17.0).

Results

Table 1 shows the patient characteristics and comparison of ALQ scores between cases and controls. Patients with bronchial asthma (cases) had a statistically significant higher mean ALQ score compared with control subjects (p<0.001). The mean ALQ score of patients with severe asthma was significantly higher compared to those with mild-moderate asthma (18.21±2.04 *versus* 13.09±3.49; p<0.001).

Table 1. Comparison of age and asthma life quality (ALQ) test score between patients with (cases) and without (controls) bronchial asthma.

Variable	Cases (n=200)	Controls (n=200)	p-value
Age (years)	34.1±10.0	33.4±10.2	–
ALQ score	15.0±3.9	0.7±0.9	<0.001

The responses to ALQ is presented in table 2. The highest percentage of "yes" was to question (Q): Q2 (97.5%), Q3 (96.5%), Q5 (99.5%), Q6 (94.0%), Q11 (93.0%). The lowest percentages of "yes" were found in the dimension of medication which comprised of six questions regarding the medication of asthma disease: Q14 (28%), Q15 (51%), Q16 (64%), Q17 (37%), Q (50.5%) and Q20 (51.5%).

Table 2. Response to asthma life quality test.

Response to Question		Cases (n=200) (%)	Controls (n=200) (%)	p-value
1	No	15.5	100.0	<0.001
	Yes	84.5	0.0	
2	No	2.5	60.5	<0.001
	Yes	97.5	39.5	
3	No	3.5	81.0	<0.001
	Yes	96.5	19.0	
4	No	12.0	98.0	<0.001
	Yes	88.0	2.0	
5	No	0.5	98.5	<0.001
	Yes	99.5	1.5	
6	No	6.0	99.5	<0.001
	Yes	94.0	0.5	
7	No	8.5	99.5	<0.001
	Yes	91.5	0.5	
8	No	11.0	99.5	<0.001
	Yes	89.0	0.5	
9	No	8.5	98.5	<0.001
	Yes	91.5	1.5	
10	No	9.0	98.5	<0.001
	Yes	91.0	1.5	
11	No	7.0	99.5	<0.001
	Yes	93.0	0.5	
12	No	10.0	97.5	<0.001
	Yes	90.0	2.5	
13	No	71.0	100.0	<0.001
	Yes	29.0	0.0	
14	No	72.0	100.0	<0.001
	Yes	28.0	0.0	
15	No	49.0	100.0	<0.001
	Yes	51.0	0.0	
16	No	35.5	100.0	<0.001
	Yes	64.5	0.0	
17	No	63.0	100.0	<0.001
	Yes	37.0	0.0	
18	No	49.5	100.0	<0.001
	Yes	50.5	0.0	
19	No	16.0	100.0	<0.001
	Yes	84.0	0.0	
20	No	48.5	99.5	<0.001
	Yes	51.5	0.5	

Asthma status showed a negative and statistically significant (r = -0.88; p<0.01) correlation with ALQ. Severity of asthma increased with increasing ALQ score (r = -0.67 p<0.01).

Using multivariable logistic regression analysis, the odds of having severe asthma increased 1.89 times (95% confidence interval [CI] 1.6-2.2) for each one unit increase in ALQ score. However, the increase in asthma severity with age was not statistically significant.

On ROC curve analysis (Figure), ALQ score of 16.5 or more had the best balance between sensitivity (79%) and specificity (85%), area under the curve 0.89 (95% CI 0.84-0.93) and emerged as the optimal cut-off for diagnosing severe asthma.
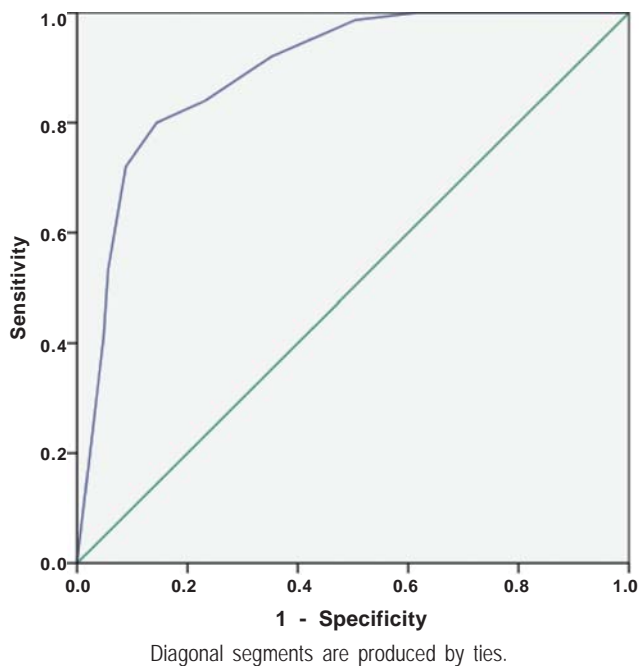

Figure. Receiver-operating-curve for ALQ.

Discussion

Many questionnaires have been used and validated for the screening of asthma.[4,7,8] Asthma quality of life questionnaire (AQLQ)[4] administered by telephone, appeared to be useful for assessing changes in the impact of adult asthma in Australia. Likewise ALQ test has also been used for the screening of asthma.[6,7] Though ALQ test has been used in many countries but its validation in India is yet to be done. Winder et al[8] used the same questionnaire to predict whether a high score of ALQ test was a positive predictor for the diagnosis of asthma. Another study[7] also found ALQ test as a useful tool for the diagnosis of asthma and to assess the severity of asthma in Portuguese population. Both the studies are in favour of using ALQ test as a relevant tool for the diagnosis of asthma.

In the present study, ALQ test has been used to diagnose asthma and to assess the severity of asthma among Indian adults. The percentages of "yes" to each question of ALQ test showed statistical significant differences among patients with and without asthma. The mean value of ALQ score was also found to be significantly higher among patients with asthma as compared to control subjects without asthma.

Choosing the optimal cut-off value of the test score is a trade-off between optimising sensitivity and specificity.[7] The best balance between sensitivity and specificity was found at a cut-off value of 16.5 in ALQ score which proves that a score below 16.5 indicates mild asthma and above 16.5 indicates severe asthma. Similar results were reported by Fonseca et al[7] to validate ALQ test for the positive diagnosis of asthma.

From the results of the present study, it can be concluded that ALQ test is a useful tool for the positive diagnosis of asthma and to assess the severity of asthma in the groups: mild/moderate and severe asthma.

This is a known fact that the ALQ test is a simple self-administered questionnaire designed to help individuals with breathing problems, to determine if they have asthma, or for those already diagnosed with asthma if their asthma is under control.[7] It was developed by the American College of Allergy, Asthma and Immunology (ACAAI)[6] and has been shown to be useful as an asthma screening tool. ALQ test is pretested in many screening programmes.[6]

Conclusions

The novel idea which enhances the previous studies was that the ALQ test has not been used and validated among Indian population, so the main objective of the present study was to validate the asthma life quality test for the screening of asthma and to assess asthma severity among Indian adults. The present study found that ALQ score below 16.5 indicates mild asthma and above 16.5 indicates severe asthma. Therefore, ALQ test is a useful tool and can be used to diagnose asthma and to access its severity among adult Indian population.

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Appendix 1
Asthma life quality test questionnaire

Activity and sleep

1. When I walk or do simple chores, I have trouble breathing or I cough

2. When I perform heavier work, such as walking up hills and stairs or doing chores that involve lifting, I have trouble breathing or I cough.

3. Sometimes I avoid exercising or taking part in sports like jogging, swimming, tennis or aerobics because I have trouble breathing or I cough.

4. I have been unable to sleep through the night without coughing attacks or shortness of breath.

Symptoms

5. Sometimes I can't catch a good, deep breath.

6. Sometimes I make wheezing sounds in my chest.

7. Sometimes my chest feels tight.

8. Sometimes I cough a lot.

Triggers

9. Dust, pollen, and pets make my breathing more difficult.

10. Cold weather makes my breathing more difficult.

11. My breathing problem gets worse when I am around tobacco smoke, fumes or strong odours.

12. When I catch a cold it often goes to my chest.

Unscheduled health care utilisation last year

13. I made one or more emergency visits to a doctor in the past year because of my breathing problems.

14. I had one or more overnight hospitalisation due to breathing problems in the past year.

Medication

15. I feel like I use my asthma inhaler too often.

16. Sometimes I don't like the way my asthma medicine makes me feel.

17. My asthma medicine does not control my asthma.

Psychological

18. My asthma controls my life more than I would like.

19. I feel tension or stress because of my asthma.

20. I worry that my asthma affects my breath or may even shorten my life.