

Does health-related quality of life in asthma patients correlate with the clinical indices?

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Abstract

Background: Assessment of health-related quality of life (HRQOL) has been shown to be more relevant to patients who have chronic diseases such as asthma, as achieving the best possible quality of life is the paramount objective in the management of such patients. This study assessed the quality of life of asthma patients and correlated it with the various clinical indices of asthma, such as age, sex, the duration of the asthma, medication used and its severity.

Design: The study was a cross-sectional, analytical, case-control design, involving three approaches, i.e. quality of life, clinical assessment and lung function assessment. The patients who participated in this study completed the Asthma Quality of Life Questionnaire (AQLQ) and Asthma Control Questionnaire (ACQ). Statistical analysis was performed using Epi Info™ version 6.04.

Setting and subjects: The clinical setting was the respiratory unit of the department of Medicine, University of Benin Teaching Hospital, Benin City, Nigeria. The recruited patients held various professions. A diagnosis of asthma was made using the clinical features of asthma and lung function measurements with a spirometer and MicroWright® Peak flow meters.

Outcome measures: The outcome measures were the quality of life score scores and clinical indices of asthma in patients attending the respiratory unit of the University of Benin.

Results: Subjects had significantly low lung function values when compared with the controls (p -value < 0.05). The quality of life of asthmatics was 4.82 ± 1.16 (1-7) and correlated with the duration of asthma ($r = -0.83$), body mass index, medication used ($r = 0.96$), asthma severity ($r = 0.96$) and gender ($r = 1$). The difference between male and female quality-of-life values was significant (p -value < 0.05). However, there was no correlation between age and quality of life ($r = 0.06$).

Conclusion: The overall assessment showed that quality of life with regard to asthma was low in this study, and correlated with some clinical asthma indices. The determinants of quality of life in this study included the duration of asthma, body mass index, asthma severity, medication use and gender.

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Introduction

Asthma is a chronic inflammatory airway disease characterised by airway hyperresponsiveness that leads to airway resistance. It is a dynamic heterogeneous clinical syndrome with different patterns and stages. The clinical manifestations of asthma are recurrent coughing, breathlessness, chest tightness, wheezing (widespread rhonchi), sleep disturbances, limitations in respect of daily activities, impairment of lung function and use of rescue medications.¹ Airway narrowing results from smooth muscle contraction of the airway, vasodilatation of the

bronchial vessels, oedema of the submucosa tissue and hypersecretion of mucus into the airway lumen.^{2,3} An objective measurement of airway obstruction in asthma is very vital, using a peak flow meter and spirometer.^{3,4} Asthma is a global disease, with an estimated 300 million affected individuals.^{5,6} The World Health Organization estimated that 15 million disability-adjusted life years are lost annually due to asthma.⁵ Annual worldwide deaths from asthma have been estimated to be 250 000.^{5,6} There is major functional disability in asthma with regard to the psychological, physical and social well-being of a patient.⁵⁻⁷ Furthermore, the cost of treating asthma has been equated

with that of high-profile conditions, such as cardiovascular diseases, where much of the cost has been attributed to the severe end of the asthma spectrum.⁸ Some patients with severe asthma on high-dose systemic steroids are prone to steroid side-effects. One fifth of patients with asthma have less restricted activity and symptoms are less frequent. But this group of patients is still disadvantaged because it needs to devote considerable time and energy to asthma management.^{8,9}

Health-related quality of life (HRQOL) is defined as the functional effects of a disease and its ensuing therapy on a patient, as perceived by the patient, based on personal experiences, beliefs, expectations and perceptions.¹⁰ Physicians treat patients to prevent mortality, reduce the probability of future morbidity and to improve quality of life.¹¹ Measuring the first two objectives has always been possible, but until the introduction of the concept of HRQOL, and of scoring systems for its measurement, it was not possible to quantify the later objective. Assessment of HRQOL is more relevant to patients with chronic diseases such as asthma, as achieving the best possible quality of life is the paramount objective when managing such patients.¹² In addition, an evaluation of HRQOL is important because it helps to identify items of impairment which are vital to the daily lives of asthmatics so that strategic plans to improve quality of life can be recommended.¹³⁻¹⁵

Most conventional clinical measures of asthma control and severity assess the status of the airway, and are assumed to provide insight into a patient's well-being. They are primarily used to gauge whether or not the prevention of mortality and reduction of future morbidity is being achieved.¹¹ Certainly, patients with very severe asthma tend to have a worse quality of life than patients with mild disease. However, quality of life has been shown to be a distinct component of overall asthma health status, and has variable correlation with clinical status.¹⁶ This study assessed the HRQOL of asthma patients in Benin City, Nigeria. The determinants of quality of life were identified and the correlation coefficients between quality of life and the clinical indices of asthma calculated.

Method

The clinical setting was the respiratory unit of the Department of Medicine, University of Benin Teaching Hospital, Benin City, Nigeria. The respiratory unit treats most patients with respiratory conditions who present to the hospital. The recruited patients held various professions. Two hundred asthma patients were seen in the respiratory clinic in the 18-month study period, of whom only 120 relatively stable asthma patients (49 male and 71 female) finally participated.

The minimum sample size required for this study was 95:

$$\text{Sample size } (n) = \frac{t^2 \times P(1-P)}{M^2}$$

n = sample size, t = confidence level at 95% (standard value at 1.96)

P = estimated prevalence of asthma (6.6%),¹⁷ M = margin of error at 5% (standard value of 0.05%)

$$n = \frac{1.96^2 \times 0.066(1-0.066)}{0.05^2} = \frac{3.8416 \times 0.061644}{0.0025} = 94.7 = 95$$

Inclusion criteria were subjects aged 18 years and older, who were relatively stable, consenting asthma patients. Eighty patients were excluded from the study for various reasons. Exclusion criteria included subjects with severe asthma attacks and co-morbid conditions like cardiac failure, with busy work or home schedules, and with fear of stigmatisation. A control group of 120 healthy Nigerians with a similar socio-demographic background was also included. The study was an analytical, cross-sectional design that involved clinical and lung function assessment.

A diagnosis of asthma was made using the following criteria:

- A history of recurrent coughing, breathlessness, chest tightness and wheezing.
- A physical examination indicating asthma and/or expiratory wheezing with evidence of hyperinflated lungs.
- Lung function tests which included peak expiratory flow rate (PEFR) and spirometry [forced expiratory volume in one second (FEV₁) and forced vital capacity (FVC)].
- A reversibility test with a bronchodilator which indicated improvement of at least 15% after 15 minutes of β_2 agonist bronchodilator aerosol inhalation.

Subjects completed the clinical Asthma Control Questionnaire (ACQ) and the Asthma Quality of Life Questionnaire (AQLQ), designed and validated by Juniper.¹⁸ The ACQ is a composite of asthma symptoms, spirometric values, peak flow rates and bronchodilator use. The AQLQ contains 32 questions in four domains of activity limitation, symptoms, emotional function and exposure to environmental stimuli. Each patient selected the five most important activities which were limited by their asthma. However, some of the activities, such as clearing and shovelling snow, were removed from the list of activities in the AQLQ because they are not practised in our environment. There were standard response items in the other three domains. Items were rated on a scale ranging from 1 (maximum impairment) to 7 (no impairment). Statistical analysis was performed using Epi Info™ version 6.04. The clinical parameters [lung function tests (PEFR, FEV₁ and FVC)] of the study group were compared with those of the control group using Student's t-test. Asthma

Table I: The demographic characteristics, medication and lung function values of the patients

Items, n (%)	Values
Subjects (n)	120
Age (years)	31.7 ± 12.6
Sex (male/female)	49/71
Age of onset (male/female)	17/18
Duration of asthma (male/female)	14/12
Family history (Yes/no)	24/24.8
Medication	81.7/18.3
No medication	2 (1.2%)
Inhaled bronchodilators only	84 (70%)
Inhaled bronchodilator/steroid (ICS)	34 (28.3%)
Lung function tests	
PEFR (l/minute)	Subjects: 321 (68%), controls: 433 (101.2%)
FEV ₁	Subjects: 2.21 (70.5%), controls: 2.66 (95%) p-value 0.05
FVC	Subjects: 2.64 (77.8%), controls: 3 (98.4%)

FEV₁: forced expiratory volume in one second, FVC: forced vital capacity, ICS: combined inhaled corticosteroids, PEFR: peak expiratory rate

Table II: Quality of life and correlation coefficient determined by various asthma parameters

Items	Values
Quality of life	
Mean	4.82 ± 1.16
Males/female	4.94/4.72, p-value 0.05, r = 1
Drug used	
Nil	4.58
Inhaled bronchodilator	4.78, r = 0.96
Inhaled bronchodilator/steroid (ICS)	6.09
Duration	
1-10	5.29
11-20	5.29, r = - 0.83
21-30	4.75
≥ 31	3.31
Age	
18-27	4.80
28-37	4.48, r = 0.06
38-47	4.73
48-60	4.66
Asthma severity	
Mild	5.02
Moderate	4.34, r = 0.96
Severe	4.41
Body mass index/quality of life	24.4/4.83, r = -1

ICS: combined inhaled corticosteroids

quality of life was expressed as the mean score per item for each of the four AQLQ domains, and the overall score was derived from the mean score of all of the items. The correlation coefficient was determined using Pearson's product-moment correlation coefficient.

Results

One hundred and twenty consenting asthma patients, comprising 49 male and 71 female patients, participated in the study. The mean age, age of asthma onset and duration of asthma are documented in Table I. Seventy per cent of patients depended on inhaled bronchodilators versus inhaled corticosteroids to control their asthma, while 28% depended on combined inhaled corticosteroids (ICS) and bronchodilators. The lung function values of asthma patients were low when compared with those of the control group.

Table II demonstrated a significant difference in the quality of life between male and female patients. However, it was also revealed that there was positive correlation between quality of life and sex, drug use, asthma severity and body mass index (BMI). But, there was a strong negative correlation between quality of life and the duration of asthma. However, there was no correlation between quality of life and age.

Discussion

Asthma is a chronic medical condition which impairs the daily activities of its sufferers.¹⁹ The HRQOL assessment in this study involved the use of the validated AQLQ, designed by Juniper,¹⁸ The female preponderance of asthma in this study corroborated the studies of Apter et al and Schmier, Chan and Leidy, who demonstrated a higher prevalence of asthma in female patients.^{20,21} They explained that socio-demographic factors are important determinants of the quality of life for asthmatics.^{20,21} The average duration of asthma in patients affects quality of life because remodelling of the airway occurs in chronic asthmatics who have poorly treated recurrent asthma attacks. Airway remodelling includes new vessel formation and fibrosis, with progressive deterioration of the patient's clinical state and impairment of overall quality of life. Airway remodelling in asthma leads to irreversible airway obstruction which is similar to chronic bronchitis and emphysema. This report corresponds with the outcome of other researchers, like Laor, Cohen and Danon, who demonstrated that patients who were symptomatic for a longer duration had poorer quality of life.²²

Asthma has been widely studied, but little attention has been devoted to the study of HRQOL in asthma patients. The importance of HRQOL in patients cannot be overemphasised. It is more relevant in patients who have chronic diseases, such as asthma, as achieving the best possible quality of

life is the paramount objective in the management of such patients.¹² Some studies have reported that asthma patients have a low quality-of-life measure,²³ while others like Drazen et al, demonstrated that quality of life was not markedly impaired, despite abnormalities pertaining to lung function values.²⁴ Asthma severity was found by many researchers to correlate with asthma quality of life scores, whereby it was demonstrated that patients with severe asthma had poorer quality of life scores than patients with moderate and mild asthma.^{20,25-27} Therefore, their findings corroborate those in the present study's report ($r = 0.96$). Patients' daily activities are impaired by asthma as they have to miss school and work and are unable to complete home chores. Low quality of life in asthmatics is partly the consequence of a restricted social lifestyle owing to recurrent asthma attacks. The influence of gender on the quality of life of patients with asthma cannot be overemphasised. Researchers have reported good correlation between quality of life and gender.²⁸ This was demonstrated in this report as gender correlated perfectly with the quality of life scores ($r = 1$). The difference between male and female patients' quality of life scores was very significant when p-value was set at the 0.05 level. The reason for this significant difference in quality of life according to gender in our environment was not clear.

The fact that asthma is a chronic inflammatory disease with subsequent airway resistance necessitates the use of a combined inhaled anti-inflammatory drug (to prevent further inflammation) and a bronchodilator (for immediate relief).²⁹ The results of this study showed that 28% of patients who were treated with an inhaled bronchodilator/ICS had a better quality of life than their counterparts taking an inhaled bronchodilator alone. Furthermore, few studies on quality of life and age provide divergent results. For example, Juniper reported that younger asthmatics had poorer quality of life than older patients who adapt to their restricted lifestyle.²² However, Vesna et al reported that younger asthmatics had a better quality of life score than older asthma patients. He further explained that younger patients have a better functional reserve with a low threshold of adaptation than older counterparts.³⁰

The results of our study demonstrate that there was no age difference with regard to quality of life. This is at variance with previous reports. BMI is now being used increasingly to assess patients with chronic disease. It has been found to correlate with quality of life, life expectancy, morbidity and mortality in respect of various diseases, including asthma. However, there is scarcity of data on the relationship between BMI and quality of life in Nigeria. This present study showed a good correlation between BMI and quality of life ($r = 1$). Increased BMI leads to limited surface area in the lungs, associated with easy collapsibility of the airway. This further leads to increased workload and ventilation, which culminate to create exacerbation of asthma. Obesity has

been shown to be a risk factor for asthma because certain mediators in obesity, like leptin, may affect airway function and increase the likelihood of asthma development.^{31,32} The findings of this study correspond with those of Brita et al and Elamin, who also demonstrated that an increase in lung function, an improvement in overall health status and a reduction in clinical asthma symptoms were the effects of weight reduction.^{33,34}

In conclusion, the overall quality of life of asthma patients was low in this study, probably owing to the fact that few patients (28%) used an inhaled bronchodilator/ICS. The quality of life of our asthma patients correlated with determinants like gender, duration of asthma, drug use, asthma severity and BMI.

Recommendation

The results of this study should be used to motivate patients in the region to greater use of controller therapy. Assessments of asthma patients with symptoms and lung function parameters should be supported with measurement of their quality of life.

Hopefully, studies of this nature will motivate the formulation of management guidelines for asthma patients in our environment. Local guidelines should be in line with international asthma guidelines.

Further studies are needed to define a composite clinical assessment parameter that incorporates the quality of life score, symptoms score and pulmonary function tests (PEFR, FVC and FEV₁).

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