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Quality of Life of Patients with Chronic Respiratory Disease in the Two Teaching Hospitals in Northern Benin

Ade Serge[1,2]*, Efio Mariano[1,3], Ahossi Athler[1], Dovonou Comlan Albert[1,2] and Harries Anthony David[4,5]

[1]*Faculté de Médecine, Université de Parakou, Bénin*

[2]*Service de Médecine interne, CHU Départemental du Borgou, Bénin*

[3]*CHU Hôpital d'Instructions des Armées de Parakou, Bénin*

[4]*London School of Tropical Medicine and Hygiene, UK*

[5]*International Union Against Tuberculosis and Lung Diseases, France*

***Corresponding Author:** Ade Serge, Faculté de Médecine, Université de Parakou, Parakou, Borgou, Bénin.

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Abstract

Introduction: Chronic Respiratory Disease (CRD) is a major global public health concern.

Objective: This study aimed to determine the quality of life (QoL) of patients with CRD in the pulmonology units of two teaching hospitals in Northern Benin.

Methods: A prospective cross-sectional study was carried out on 84 outpatients with CRD between April and August 2023.

Results: Their mean age was 47.7±20.0 years and their male female ratio was 1.2:1. Asthma was the predominant CRD in 56 (66.7%) outpatients. The main complaints were dyspnea (77.4%), cough (76.2%) and wheezing (70.2%). Of the 68 outpatients who performed a six-Minute Walk Test, the distance covered was less than the lower limit of normal in 67 (98.5%). With the Saint George Respiratory Questionnaire to assess the QoL, the mean scores obtained for symptoms, activities and impacts were 48.2±18.4, 64.3±30.6, 45.1±19.3 respectively; the mean total score was 51.6±19.9 and was higher than that of the general health population, indicating impaired QoL. Factors associated with a poorer QoL were chest pain, an increase in the respiratory rate and WHO Performance Status Grade 2 or 4.

Conclusion: Patients with CRD followed in both centers had a poor QoL. Means should be found to improve this situation.

Citation: *Chronic Respiratory Disease; Asthma; Quality of Life; Six-Minute Walk Test; Parakou*

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Abbreviations: CRD: Chronic Respiratory Disease; QoL: Quality of life; WHO: World Health Organization; COPD: Chronic Obstructive Pulmonary Disease; LMICs: Low-and-Middle-Income countries; SGRQ: Saint George Respiratory Questionnaire; 6MWT: Six-Minute Walk Test; 6MWD: Six-Minute Walk Distance

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Introduction

Chronic Respiratory Disease (CRD) refers to a number of heterogeneous morbid conditions involving airways, lungs and/or pleura and which are responsible for chronic respiratory symptoms, such as dyspnea, wheezing, coughing and expectoration [1]. CRD ranks high among the major causes of morbidity and mortality in the world. In 2017, an estimated 545 million individuals globally developed CRD, representing a 39.8% increase compared to the situation in 1990 [2]. Additionally, CRD ranked third among the leading causes of deaths in the world, accounting for 7% of all causes, behind cardiovascular disease and neoplasms [2]. The two most important CRDs, namely Chronic Obstructive Pulmonary Disease (COPD) and asthma affect more than 500 million people and are responsible for more than one million premature deaths, namely deaths occurring in those younger than 70 years [3]. In sub-Saharan Africa, the prevalence of CRD is thought to be the lowest compared with the other regions, at approximately 5.1% [2]. However, this is likely to be an underestimate, mainly due to poor screening processes and diagnostic issues. On the other hand, as with other Low-and-Middle-Income countries (LMICs), this region records more than 90% of the global CRD-related deaths [3].

Aside from premature death, many patients with CRD complain of poor quality of life (QoL) [4]. Potential reasons include marked deterioration of their respiratory conditions, poor treatment compliance, exercise intolerance, limited daily mobility, psychosocial well-being disruption and school and/or professional absenteeism, which is mainly due to frequent exacerbations of the disease. According to previous literature reports, among patients suffering from chronic morbid conditions, the QoL of those with CRD was the lowest, while that of people with diabetes and hypertension was the highest [5].

In order to reduce the burden of CRD, and to achieve a vision of "a world where all people breathe freely", a Global Alliance against CRD was established by the World Health Organization, with the main focus being to improve the needs of patients with CRD living in LMICs, in all aspects, including their QoL [1]. However, there is dearth of information from LMICs on QoL in this group of patients. This study was therefore carried out to determine the extent to which the QoL of patients with CRD living in Benin, a LMIC setting, was impaired.

Materials and Methods

Study Type

This was a cross-sectional study with data prospectively collected between April and August 2023.

Setting

The study was carried out in pulmonology units within the medical wards of the two teaching hospitals of North Benin, both located in Parakou.

Patients

All outpatients aged 15 years or above with CRD who were seeking care in the pulmonology units during the study period and who gave their informed consent to participate in the survey were included. CRD was defined in this study as bronchopulmonary or pleural damage responsible for chronic respiratory symptoms (such as cough, wheezing and dyspnea) persisting for more than three months or occurring during an exacerbation [6];

The sample size was calculated using Schwartz formula :n= $\frac{Z_{\alpha}^{2}\times p\times(1-p)}{i^{2}}$ with n being the calculated sample size ; p the prevalence of CRD in sub-Saharan Africa that is 5.1%;2 q being 1-p, equal to 0.949; i, the error risk equal to 5% and Zα equal to 1.96. The calculated sample size was 74. With an expected 10% non-response, the final sample size was set at 84.

Data Collection

Participants were interviewed about their demographic, professional, economic, clinical and care-related characteristics, history of the disease and comorbidities. They were then invited to respond to different items of the Saint George Respiratory Questionnaire (SGRQ). This questionnaire of 50 items divided into three components, namely "symptoms", "activities" and "impacts", is an established

baseline reference to assess QoL among patients with CRD [7] This questionnaire has been validated in a black African population [8]. Answers to the different items for each component are weighted, in a range varying from 0 to 100; the weights are added; and the score of the component is calculated by dividing the total weights obtained by the maximum weight possible for the component. The same approach is applied for the total score. More details on the SGRQ are available on https://georges.splf.fr/. Additionally, participants were examined and were asked to perform a six-Minute Walk Test (6MWT), a simple robust and reliable test to assess tolerance to moderate physical activities [9,10]. All the data were collected by a doctorate student in medicine, under the supervision of two lung specialists.

Data Analysis

Data were entered into the EpiData Entry Client software (v4.6.0.0). Data were analysed using RStudio (version 4.3.1.) software. The Six-Minute Walk Distance (6MWD) was compared to the reference value calculated from the Enright's equation [9,11]; and the distance covered was considered abnormal if it was lower than the lower limit of normal [11]. Similarly, to assess the QoL, the scores obtained for symptoms, activities and impacts as well as the total score were compared to that reported for a healthy population by Ferrer et al [12]; and these scores were considered abnormal if they were greater than the upper limit of 95% confidence interval of the normal score [12]. Thus, based on this reference, a poor QoL of life was defined by a total score greater than 5.63 in men and 8.08 in women [12]. The reference standards from the healthy population that were used to interpret the 6MWD and the QoL are summarized in Table 1. Factors associated with a poorer QoL were determined by simple and then multiple linear regression. The level of significance threshold was set at <5%.

		Male	Female
6-Minute Walk Test [11]	Reference equation for 6MWD calculation (m)	6MWD= (7.57 x $height_{cm}$) – (5.02 x age) – (1.76 x weightkg) – 309 m	6MWD= (2.11 x $height_{cm}$) – (5.78 x age) – (2.29 x $weight_{kg}$) + 667 m
	LLN determination*	6MWD – 153 m	6MWD – 139 m
	Abnormal covered distance	< LLN	
SGRQ scores [12]	Symptoms score Mean (SD) 95%CI	 7.63 (10.83) 6.28 – 8.99	 6.49 (9.57) 5.46 – 7.51
	Activities score Mean (SD) 95%CI	 7.10 (10.48) 5.78 – 8.41	 13.13 (15.73) 4.81 – 11.45
	Impacts score Mean (SD) 95%CI	 2.36 (5.02) 1.73 – 2.99	 3.47 (7.66) 2.65 – 4.29
	Total score Mean (SD) 95%CI	 4.84 (6.30) 4.05 – 5.63	 7.14 (8.83) 6.19– 8.08
	Abnormal score	> Upper Limit of the Normal Confidence Interval	

6MWD= 6 minute walking distance; SD= Standard Deviation; 95%CI= 95% Confidence Interval. SGRQ= Saint George Respiratory Questionnaire; LLN= Low Limit of the Normal

Table 1: *References from a healthy population for the interpretation of the 6-minute walk distance and the quality of life [11,12]*

Ethical Considerations

This study was conducted with the approval of the Local Ethics Committee for Biomedical Research of the University of Parakou (REF: 024/2023/CLERB-UP/P/SP/R/SA). The study was conducted in accordance with the Declaration of Helsinki. Informed consent was obtained from all participants.

Results

Demographic and Clinical Characteristics

A total of 153 outpatients were examined or expected to attend in the pulmonology units during the study period. Of these, 51 with acute respiratory disease and 18 who could not be reached were excluded. Therefore, 84 (54.90%) patients were included in the analysis. Their mean age was 47.7±20.0 years, ranging from 15 to 85 years; and their male female ratio was 1.2:1.

		n	(%)
Symptoms	Dyspnoea	65	(77.4)
	Cough	64	(76.2)
	Wheezing	59	(70.2)
	Chest pain	52	(61.9)
	Expectoration	50	(59.5)
	Haemoptysis	13	(15.5)
Comorbidities	Cardiovascular diseases*	22	(26.2)
	Diabetes mellitus	5	(6.0)
	Chronic kidney disease	2	(2.4)
	Other**	3	(3.6)
WHO performance status	Grade 0	49	(58.3)
	Grade 1	24	(28.6)
	Grade 2	7	(8.3)
	Grade 3	2	(2.4)
	Grade 4	2	(2.4)
Body Mass Index (Kg/m^2)	<18.49	13	(15.5)
	18.50 – 24.99	41	(48.8)
	25 – 29.99	14	(16.7)
	≥ 30	16	(19.0)
Respiratory rate (/min)	16 – 20	43	(51.2)
	> 20	41	(48.8)
Heart rate (/min)	< 60	3	(3.6)
	60 – 100	70	(83.3)
	> 100	11	(13.1)
Pulsed oxygen saturation (aa) (%)	< 90	6	(7.2)
	90 – 94	11	(13.1)
	95 – 100	67	(79.8)
Patients investigated		84	

* Hypertension (17); Hypertension + left heart failure (3); Congestive heart failure (1); Chronic pulmonary heart disease (1); ** Undernutrition (1); Neoplastic metastases (1); Ulcer (1)

CHUD B/A=Centre Hospitalier Universitaire et Départemental du Borgou et de l'Alibori ;

CHU HIA = Centre Hospitalier et Universitaire Hôpital d'Instructions des Armées

Table 2: *Clinical characteristics of outpatients with chronic respiratory disease followed up in the two Pulmonology Units, CHUD B/A et CHU-HIA, Parakou, Benin: April – August 2023*

Clinical characteristics are shown in Table 2. Clinically, the main complaints were dyspnoea (77.4%), cough (76.2%) and wheezing (70.2%). Examination revealed a WHO Performance Status ≥ 1 in 35 (41.7%), a high respiratory rate in 48.8% (n=41) and oxygen desaturation <95% in 20.2% (n=17). Cardiovascular diseases were the main associated comorbidities, diagnosed in 22 (26.2%).

Types of CRD	N	(%)
Asthma	56	(66.7)
Pulmonary arterial hypertension	7	(8.3)
Post-tuberculous sequelae (with bronchiectasis)	6	(7.1)
Bronchiectasis Non related to tuberculosis sequelae	6	(7.1)
Chronic Obstructive Pulmonary Disease	6	(7.1)
Lung cancer	5	(6.0)
Obstructive sleep apnea syndrom	5	(6.0)
Idiopathic pulmonary fibrosis	3	(3.6)
Other*	2	(2.4)
Total of patients evaluated	84£	

*: Pleural metastasis of a lingual carcinoma (1) and Systemic erythematosus lupus with pleuropulmonary involvement (1); £12 patients had two of these conditions and hence the numbers add up to more than 84;
CHUD B/A=Centre Hospitalier Universitaire et Départemental du Borgou et de l'Alibori ;
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Table 3: *Underlying chronic respiratory disease of outpatients followed up in the two Pulmonology Units, CHUD B/A et HIA-CHU Parakou, Benin: April – August 2023 (n=84)*

The underlying respiratory conditions of the enrolled outpatients are shown in Table 3. Asthma was the most commonly diagnosed disease in 66.7%. This was followed by pulmonary arterial hypertension (8.3%). Post-tuberculous sequelae, COPD and bronchiectasis accounted for 7.1% respectively. Altogether, there were 72 patients diagnosed with a single CRD, while 12 (14.3%) were diagnosed with two CRDs: Asthma was diagnosed associated with pulmonary arterial hypertension (n=3), obstructive sleep apnea syndrome (n=3), bronchiectasis (n=2), post-tuberculous sequelae (n=1) and pleural metastasis of lingual cancer (n=1) respectively; COPD was associated with pulmonary arterial hypertension in one patient; and obstructive sleep apnea syndrome and pulmonary arterial hypertension were diagnosed in another patient.

Monthly Income and Care Funding

Monthly income of the outpatients was ≥ US$167 for 31 (36.9%), between US$67-166 for 26 (31.0%) and <US$67 for 27 (32.1%). For managing the medical costs of their CRD, their median monthly spending was estimated at US$48 (interquartile range [IQR], US$25-US$119), with a total range from US$5 to US$833. There were 52 (61.9%) patients who completely funded their costs, 22 (26.2%) who were supported by a third-party, eight were supported by the government and two had medical insurance.

6MWT Results

Of the 84 outpatients, the 6MWT was not performed in 16 for various reasons including refusal (n=8), dyspnea + oxygen dependence (n=3), coxalgia (n=1), chest pain (n=1), dyspnea (n=1), uncontrolled Grade 3 hypertension (n=1) and functional impotence (n=1). For the 68 (80.1%) remaining patients who carried out the test, the mean distance covered in 6 minutes was 251.6±92.6 metres, ranging from 36 to 550 metres. The distance covered was less than the lower limit of normal in 67 (98.5%) outpatients and was considered abnormal. Eight (11.7%) patients stopped before the end of the 6MWT, reasons given being: asthenia + hip pain (2), leg pain (1), chest pain (1), chest pain + dyspnoea (1), dyspnoea (1), dyspnoea + arthralgia (1) and a hacking cough (1). At the end of the test, 35 (51.5%) reported

a worsening of their dyspnoea and 5 (7.4%) and 4 (5.9%) had a 4-point drop in oxygen saturation and an increased heart rate (≥ 20/min) respectively.

Quality of Life Assessment

Overall SGRQ scores and scores for symptoms, activities and impacts are shown in Table 4. The mean (SD) scores for symptoms, activities and impacts were 48.2±18.4, 64.3±30.6 and 45.1±19.3 respectively. The mean total score was 51.6±19.9, range 8.3 to 93.1. Overall, these scores were greater than that reported for a healthy population, indicating a poor QoL for all the outpatients. Patients with COPD obtained the highest total score of 64.2±17.4, followed by other CRDs (55.5±19.6) and asthma (48.7±19.8), although none of these differences were significant. Similar findings were observed when considering each component of the SGRQ score, with patients suffering from COPD having the highest scores.

		Asthma	COPD	Other CRDs	All CRDs	P-value
Symptoms score	Means (SD)	49.7 (17.8)	53.8 (25.5)	42.7 (17.5)	48.2 (18,4)	0.232
	Range	11.9 – 85.8	25.4 – 95.5	11.9 – 73.8	11.9 – 95.5	
Activities score	Means (SD)	58.7 (32)	78.9 (26.4)	74.7 (24.6)	63.3 (30.6)	0.052
	Range	0 – 100	34.7 – 100	6.2 – 100	0 – 100	
Impacts score	Means (SD)	43.3 (19.5)	59.0 (16.3)	45.9 (18.6)	45.1 (19.3)	0.161
	Range	9.9 – 85.6	37.2 – 78.3	8.1 – 81.9	8.1 – 85.6	
Total score	Means (SD)	48.7 (19.8)	64.2 (17.4)	55.5 (19.6)	51.6 (19.3)	0.108
	Range	10.4 – 88.4	22.0 – 87.8	12.7 – 91.8	8.2 – 93.1	
Total evaluated		56	6	22	84	

SD=Standard Deviation; COPD= Chronic Obstructive Pulmonary Disease; CRD= Chronic Respiratory Disease; Other CRDs include bronchiectasis (n=8), post-tuberculous sequelae (n=6), lung cancer (n=5), pulmonary arterial hypertension (n=3).
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Table 4: *Symptoms, activities, impacts and total scores with the Saint George Respiratory Questionnaire applied to patients with asthma, chronic obstructive pulmonary disease and other chronic respiratory diseases at the two Pulmonology Units, CHUD B/A et CHU-HIA Parakou, Benin between April and August 2023*

		β0	β1	*p*-value
Demographic characteristics	Age	42.4	0.2	0.079
	Sex	51.5	0.1	0.983
Symptoms	Cough	49.1	1.4	0.781
	Expectoration	50.5	0.7	0.871
	Dyspnoea mMRC 1 mMRC 2 mMRC 3 mMRC 4		 15.2 12.0 22.0 43.6	 0.005 0.031 <0.001 <0.001
	Wheezing	60.2	-5.0	0.291
	Chest pain	32.0	12.1	0.006
	Haemoptysis	47.1	3.9	0.520

Vital constants	Respiratory rate	3.0	02.2	<0.001
	Heart rate	42.2	00.1	0.367
	Mean blood pressure	77.9	-0.3	0.067
	Pulse oxygen saturation	94.7	-0.4	0.138
WHO Performance Status	Grade 1		09.9	0.018
	Grade 2		32.1	<0.001
	Grade 3		37.0	0.003
	Grade 4		41.8	<0.001
Body mass index		55.9	-0.2	0.607
Type of CRD	Asthma	66.0	-8.6	0.060
	COPD	37.1	13.6	0.108
	Bronchiectasis	44.5	06.4	0.345
	Post-tuberculous sequelae	53	-1.3	0.879
	Lung cancer	37.6	13.0	0.122
	Idiopathic pulmonary fibrosis	44.5	06.9	0.560
	Obstructive Sleep Apnea	50	01.6	0.866
	Pulmonary Arterial Hypertension	47.9	03.5	0.662
Comorbidities	Heart disease	47.9	02.9	0.564
	Chronic pulmonary heart disease	27.9	22.9	0.049
	Chronic kidney disease	30.5	20.6	0.148
	Diabetes mellitus	51.2	06.6	0.477

CRD= Chronic Respiratory Disease; COPD= Chronic Obstructive Pulmonary Disease;
mMRC= Modified Medical Research Council; WHO= World Health Organization;
CHUD B/A=Centre Hospitalier Universitaire et Départemental du Borgou et de l'Alibori ;
CHU HIA= Centre Hospitalier et Universitaire Hôpital d'Instructions des Armées

Table 5: *Factors associated with a poorer quality of life after bivariate analysis among patients with chronic respiratory disease attending two Pulmonology Units, CHUD B/A et CHU-HIA, Parakou, Benin from April to August 2023*

		β0	β1	R^2	*p*-value
Chest pain			7.6		0.036
Respiratory rate			1.4		0.003
WHO Performance status	Grade 1	3.4	6.6	44.3	0.106
	Grade 2		25.8		<0.001
	Grade 3		18.8		0.130
	Grade 4		30.6		0.009

WHO= World Health Organization
CHUD B/A=Centre Hospitalier Universitaire et Départemental du Borgou et de l'Alibori ;
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Table 6: *Factors associated with a Poorer quality of life after multivariate analysis among patients with chronic respiratory disease attending two Pulmonology Units, CHUD B/A et CHU-HIA, Parakou, Benin from April to August 2023*

Factors associated with a poorer QoL after bivariate and multivariate analysis are shown in Table 5 and Table 6 respectively. Key variables independently associated with poorer QoL (total score >5.63 in men and >8.08 in women) were chest pain (β1=7.6; p=0.036), a respiratory rate (β1=1.4; p=0.003), a WHO Performance Score of 2 (β1=25.8; p<0.001) and a WHO Performance Score of 4 (β1=30.6 ; p=0.009). These factors all together explain 44.3% of the variation of the SGRQ total score.

Discussion

This study is one of the few in the literature from sub-Saharan Africa and the first from Benin that addresses the issue of QoL of patients with CRD. There were some interesting findings.

Patients with CRD were relatively young, with a mean age of 47.7 years and were predominantly male (54.8%). This young age, which represents the country's workforce, reinforces the relevance of the study and the importance of drawing more attention on this public health issue.

Our findings show the financial challenges encountered by many patients in meeting their respiratory health needs. The monthly income (less than US$167 in more than 60% of participants), would be insufficient to cover the healthcare expenses, estimated on average at US$48, in the face of other vital needs such as housing, nutrition and family. Of note, this cost of US$48 represents about half of the guaranteed inter-professional minimum wage in the country, which is US$87. Over one quarter of our patients had to resort to third-party support. Additionally, from our routine observations, the ability of patients or their families to cover the cost of care is rapidly overtaken if there is an exacerbation of symptoms or a respiratory decompensation that requires hospitalization. For example, one patient in acute decompensation for chronic respiratory failure caused by post-COVID-19 sequelae, reported having to pay in excess of US$900 during hospitalization. Such patients usually have other comorbidities that also require care, and of which cardiovascular disease was the most commonly reported in our study. All these factors call for actions to develop policies to provide substantial and reasonable support to patients with CRD, through for example help with health insurance, lowering the costs of drugs and the costs of relevant investigations, depending on their pathology, to make them affordable.

Asthma, whose diagnosis was based on clinical and spirometry investigations, ranked first among all the CRDs that were diagnosed and this therefore must be given special priority. For people with asthma, the main challenge routinely faced is compliance with controller medication, which remains problematic for various reasons, including the cost and unavailability of certain molecules or their combination. Effective solutions to these issues would help to achieve a better QoL for patients, since the attacks will become less common. Frequent education of health practitioners on the recommendations of best practices is of the utmost importance in this situation. With COPD, which is the most prevalent CRD affecting 10.3% of people globally [13], The proportion found in this study was low in comparison, accounting for only 7% of all cases. The diagnosis in our setting was confirmed by spirometry. This prevalence is most probably due to low levels of smoking in the general population, estimated at 6.90% in 2020 among people aged ≥ 15 years, with a gradual decline even before that in the previous years [14]. However, the influence of exposure to biomass, as well as the increasing automobile and industrial air pollution in the country is not reassuring, leading to fears of an increase in the number of cases in the future. The diagnosis of pulmonary arterial hypertension is still based on echocardiographic findings in Benin and would certainly be more accurate if confirmation was possible using right heart catheterization.

For those who performed the 6MWT, all except one patient walked a shorter distance compared with that of the general healthy population published by Enright and colleagues [11]. The mean distance covered (252 metres) was also more than two times lower than that reported from a healthy West-African population (517 metres) [15]. Additionally, some outpatients refused to complete the test due to a variety of symptoms such as pain and increased dyspnoea or because of oxygen desaturation. Similar observations regarding patients with CRD have also been reported from elsewhere [16,17], highlighting the negative impact of CRD on daily activities.

With respect to QoL, patients reported a worse score for symptoms" and "impact" compared to the general population. Similarly, the score for "activities" was worse in nine out of ten patients compared to the general population. Overall, the total score obtained by patients was worse than that of the general population without CRD, reflecting thereby a greater QoL impairment. Studies that have assessed the QoL in a whole group of patients with CRD are rare. The only study that we identified was focused on both COPD and asthma

and included African American patients aged ≥65 years living in an economically disadvantaged area of Los Angeles, USA [18]. In this study, CRD was associated with a low physical quality health-related QoL, after controlling for confounders such as demographic factors, socio-economic status, cigarette smoking, presence of comorbidities, pain and depressive symptoms [18].

Other QoL questionnaires, different from the SGRQ, have been used to assess patients with CRD, and with, these QoL has also been found to be impaired [19–21]. In our setting in Benin, when patients come for consultation they frequently complain about respiratory symptoms and disability and the negative effect that the CRD has on their well-being. In our study, respiratory complaints were very common. However, certain clinical parameters such as chest pain, a one-unit increase in respiratory rate and a Grade 2 or 4 on the WHO performance status scale were all independently associated with a poorer QoL and together these three factors explained 44% of the variation in the total score. These are important parameters to identify, and should suggest to the health practitioner that the patient is suffering a poor QoL and requires additional support. Our findings are consistent with previous scientific reports where dyspnoea and chest pain were closely associated with a poor QoL among patients with CRD [19–21].

There are several strengths to the study. These include its prospective nature, the avoidance of information bias due to missing data, the use of a pre-tested and validated questionnaire, that included the SGRQ whose performance has been well established [22] and the involvement of specialists in the diagnosis of the CRD diagnosis. Similarly to other studies that addressed this issue in the literature, limitations relate to the responses provided by patients that cannot be crosschecked; and therefore some scores might have been overestimated. However, the findings reflect patient distress and endorse the need to put in place measures to relieve the suffering. Further research should focus on the psychological impacts, including depression or anxiety, caused by these disabling conditions in our setting.

Conclusion

Of 84 patients with CRD followed up in two teaching hospitals of Benin, asthma was the predominant disease. For the majority of the patients, the 6MWT was abnormally low indicating functional disability. The QoL of patients was significantly impaired compared with that of the general healthy population.

Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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