Knowledge of Chronic Obstructive Pulmonary Diseases among Healthcare Workers: Nigerian COPD Research Project (NICORP)

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Abstracts: Background: Chronic obstructive pulmonary disease (COPD) is a preventable and treatable chronic inflammatory lung disease that often causes obstruction to airflow in the lungs. The main risk factor in Nigeria is long term exposure to indoor pollution from cooking with firewood and fossil fuel in poorly ventilated spaces. Aims/ objectives: The aim was to evaluate the level of COPD knowledge among healthcare workers (HCWs) in the southwestern state of Nigeria.Materials/ methods: Self-administered online BCKQ which is made up of 65 stem questions was used to evaluate the level of knowledge of HCWs. The overall score of individual participants was represented in percentages and frequencies. Tests of statistical significance like the Chi-square test are applied to find out the statistical significance of the difference in percentages. Univariate analysis was done using respondent knowledge about COPD as the dependent variable and the socio-demographic were identified as independent variables. A p-value of <0.05 was taken as statistically significant in the calculations of variables. Results: Four hundred and five healthcare workers were involved in this study, 53.3% of whom were females. The mean age of the study cohort was 48.7±0.55 years, significant majority (75.6%) of whom were <40 years. (p< 0.001). Majority of cohorts (39.3%) were doctors, while 32.0% were nurses. Only 11.7% had PhD or Fellowship as their highest educational qualification. The overall mean total score of cohorts on the Bristol COPD questionnaire was 51.9±21.9 %, with 40.4% having good scores and only 11.3% had excellent score. Mean knowledge scores were high among doctors (69.9±02.4), HCWs with medical fellowships /PhD (69.9±02.4) and had worked for <10 years. A positive correlation was demonstrated between age, level of education and knowledge score (p<0.05*). Conclusion: This study examined knowledge of COPD among healthcare workers in the southwestern part of Nigeria and confirmed that the knowledge of COPD among healthcare workers was essentially good but there were serious gaps in knowledge observed in areas of vaccination, inhalational therapy, and use of inhaled and oral steroid.

Keywords: Knowledge; Chronic Obstructive Pulmonary Disease; Bristol COPD Knowledge Questionnaire; Nigeria.

1. INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable chronic inflammatory lung disease that often causes obstruction to airflow in the lungs. It presents persistent clinical symptoms such as cough productive of sputum, difficulties with breathing and wheezing [1]. It is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases [1]. Multiple factors are involved in the etiology of COPD. However, the risk factors of COPD include both genetic and environmental factors [2]. The most common risk factors are long-term exposure to cigarette smoke, irritating gases or particulate matter [1, 2]. In Africa, and Nigeria in particular, the

main risk factor is as a result of long term exposure to indoor pollution from cooking with biomass such as firewood and fossil fuel in poorly ventilated spaces particularly among women [3, 4]. Increasing rates of cigarette smoking among African men and high incidence of tuberculosis infection may also be associated with increasing the disease prevalence [5]. An individual with COPD may have chronic bronchitis, emphysema, or a combination of both conditions [1]. The proportion of each of these conditions differs from person to person and severity of presentation varies in individuals [1, 2].

COPD is a major global problem with high prevalence, morbidity, and mortality [6]. According to the World Health organization (WHO), COPD is the fifth and sixth cause of death in high income and low-income countries, respectively [1]. There is increasing evidence that COPD is on the increase in continental Africa, thus the need to critically examine the level of awareness among healthcare workers in Africa, concentrating on Nigerians as one in every black man on earth is a Nigerian [7]. Few studies have assessed the knowledge of COPD and awareness of available treatment options among healthcare workers in Africa and Nigeria [8, 9]. The facilities and modalities for the prevention, prompt and early diagnosis, treatment as well as overall management of COPD in Africa and particularly in Nigeria have been limited and are highly inefficient [10].

COPD mortality increases as lung function decreases [11]. Mortality is also associated with co-morbid conditions such as acute cardiac events (acute myocardial infarction, acute left ventricular failure and cardio-embolic stroke), infective acute exacerbations, and acute respiratory failure [11, 12]. There are very few data available on the effects of COPD mortality and morbidity on the economic wellbeing of African countries [12, 13]. However, the economic burden of COPD is high in developing countries due to high cost and inadequate access to healthcare and loss of productivity [13].

The burden of COPD continues to grow despite availability of effective pharmacotherapy [14]. The management of COPD continue to face challenges in Africa particularly from poor adherence to medications by patients, epileptic availability of these medications, poor financial strength by patients which further potentiates poor drug adherence, and concerns of the potential side effects of long-term use if some of these medications [12]. However, healthcare workers' understanding of the disease, available treatment modalities and knowledge of self-management by patients has been known to improve overall outcome [15]. A focus on improving the level of knowledge of healthcare workers and patient education is therefore belief to improve care and adherence to medication which have positive influence on COPD outcome [15].

COPD education, defined as a program designed to transfer information about COPD and its treatment in verbal, written, and audio-visual formats. These include provisions of written and pictorial materials or short verbal interaction with healthcare educators. It may also involve the use of short films and storytelling to pass important information across [16]. This educational program may be directed towards addressing issues surrounding drug dosing and side effects, smoking cessation, nutrition, exercise, inhalational techniques and self-treatment of exacerbations [17]. Therefore, it is very important for healthcare workers to have up to date knowledge of the disease, its diagnosis and treatment.

Studies have shown that there is a low level of awareness of COPD reported among healthcare workers in some parts of the world [18, 19]. There is however, paucity of data concerning similar studies among healthcare workers in Nigeria and Africa. Lack of awareness probably contributes to the under diagnosis of the COPD, as being seen apparently to various degrees in every population groups in different part of the world [6]. This study was aimed at evaluating the level of knowledge of COPD, and its potential effect the quality of care received by COPD patients in southwestern Nigeria.

After diligent searches of the literature, we discovered that there is no published data, or any local study about the knowledge of COPD and its risk factors among healthcare personnel in Nigeria, especially in the mostly urban centers in the southwestern region. This study is urgently needed and is overdue, so as to determine the baseline against which other future studies can be compared. This may aid in the development of preventive strategies and promote good health behaviors and habits among the populations. This study was therefore undertaken to assess

the level of knowledge of COPD and its risk factors among health care workers in southwestern states of Nigeria.

2. MATERIEL AND METHODS

2.1. Study Area and Population

This was a descriptive cross-sectional study that was conducted at Babcock University Teaching Hospital, Ilishan Remo in Ogun State in the southwestern region of Nigeria. The hospital services patients from the southwestern region of the country and beyond. The study was carried out among healthcare workers in the six southwestern states. The southwestern states were Lagos, Ogun, Oyo, Osun, Ekiti and Ondo. The study took place between January 1, 2023, and June 30, 2023.

2.2. Sample Size Estimation

Nin- probability sampling technique (convenient sampling) was employed for this study. All healthcare workers who fulfilled the eligibility criteria were allowed to voluntarily participate in the study. A minimum sample of 405 was used and this was arrived at by using the formula.

$$n = (z)^2 p (1 - p)/d^2$$

Where Sample size = n, prevalence (p) = 50%, the confidence level 95%, so Z score = 1.96, margin of error (E) =5% and Population 100,000.

The calculated sample was approximately 405 individuals.

2.3. Inclusion Criteria

All consenting healthcare workers who work in the southwestern region of Nigeria were included in this study. Those who were unwilling to participate in the study were excluded.

2.4. Data Collection Tool

The knowledge of COPD among the study participants was evaluated using the Bristol COPD self- administered questionnaire [21]. The Bristol COPD knowledge questionnaire (BCKQ) contained 13 topics, each with five statements giving a total of 65 questions. The topics covered are epidemiology and physiology, etiology, common symptoms, dyspnea, sputum production, chest infections, roles of exercise, smoking, immunization, inhaled bronchodilators, antibiotic use, and use of oral and inhaled Steroids. This questionnaire was written in English and translated into Yoruba (indigenous) language. The questionnaire was sent to individual health care worker via electronic mail or WhatsApp. Informed consent was obtained before the questionnaire could be accessed by participants. The questionnaire had 2 major sections; A and B. Section A was on the socio-demographics of the study participants while section B evaluated participants' knowledge of COPD with information obtained through closed-ended questions were to be answered as "Yes", "No" or "Don't know". The final knowledge score was calculated by dividing participants' individual score by 65 and multiplying the outcome by 100%, which gives knowledge score of between 0-100. A knowledge score <40 was classified as poor, while scores ranging between 40-79, and ≥80 were classified as good and excellent knowledge scores respectively.

2.5. Data analysis

The collected data were coded, entered into and analyzed using Statistical Package for Social Sciences, version 17.0 (SPSS, Inc., Chicago, IL, USA). Data were presented in descriptive statistics like, frequency and percentage as appropriate. Tests of statistical significance like the Chi-square test are applied to find out the statistical significance of the difference in percentages. Univariate analysis was done using respondent awareness about

COPD as the dependent variable and the socio-demographic were identified as independent variables. A p-value of <0.05 was taken as statistically significant in the calculations of variables.

2.6. Ethical Declaration

The ethical approval for this study was gotten from Babcock University Health Research Ethics Committee. Confidentiality and privacy of participants was duly respected during and after the period of collecting and collating data. Serial numbers rather than the participants' names were used to ensure confidentiality. This is in accordance with the ethical standard of the responsible committee on human experimentation and Helsinki declaration of 1975, revised in 2013.

3. RESULTS

3.1. Socio-Demographics Of Study Respondents

Four hundred and five healthcare workers who fulfilled the inclusion criteria were involved in this study, 53.3% of whom were females. All subjects were recruited from the from among healthcare workers in the southwestern states of Nigeria. The mean age of the study cohort was 48.7±0.55 years, majority (75.6%) of whom statistically significant. (p< 0.001) Majority of the cohorts were overweight (52.1%) with only with only about a third (38.5%) being married at the time of this study. Majority of cohorts were below the age of 40 years, which was (39.3%) were doctors, while 32.0% were nurses. Only 27.8% were made up of other health workers and 10.9% did not specify their specialty. Also, 38.0% had Bachelor's degree as their highest qualification while only 11.7% had PhD or Fellowship as their highest educational qualification. Significantly, majority had their practice located in Ogun state (63.5%) and had worked as healthcare worker for <10 years (62.5%). (p<0.05) (Table 1)

Table 1: Socio-demographic characteristics of study participants

Characteristics		Frequency (%)	p-value
Age	<40 years	306(75.6)	<0.001
	≥40 years	99(24.4)	
Gender	Male	189(46.7)	0.211
	Female	216(53.3)	
Body Mass Index (kg/m^2)	Underweight (<18.5 kg/m^2)	16(4.0)	<0.001
	Normal (18.5-25 kg/m^2)	109(26.9)	
	Overweight (25-30 kg/m^2)	211(52.1)	
	Obese (>30 kg/m^2)	69(17.0)	
Marital status	Single	109(26.9)	0.062
	Married	156(38.5)	
	Separated	77(19.0)	
	Divorced	29(7.2)	
	Widowed	34(8.4)	
Specialty	Doctors	159(39.3)	0.054
	Nurses	130(32.0)	
	Others	72(17.8)	
	Unspecified	44(10.9)	
Education level	Diploma	118(29.1)	0.699
	Bachelor's degree	154(38.0)	
	Master's degree	86(21.2)	
	Fellowships/PhD	47(11.7)	
State of practice	Lagos	63(15.6)	0.002
	Ogun	257(63.5)	
	Osun	22(5.4)	
	Oyo	43(10.6)	
	Ondo	17(4.2)	
	Ekiti	3(0.7)	
Duration of practice	<10 years	253(62.5)	0.023
	≥10 years	119(29.4)	
	Unspecified	33(8.1)	

Mean age = 48.7±0.55

3.2. Responses To Bristol COPD Knowledge Questionnaire

The summary of the responses to the 13 stem questions by cohorts are shown in Table 2. The outcome of the questionnaire showed that majority of healthcare workers had above average information about COPD, with the lowest information seen in the section of the questionnaire that dealt with vaccination, use of inhaled bronchodilator, use of antibiotics and steroids. Majority of cohort lacks information on the use of steroid with the lowest COPD information of 23.9% seen in question 13c, which is about the use and usefulness of spacer device and effects on patient developing oral thrush. As judged by the domain scores, the greatest information among healthcare workers was in the area of general knowledge and symptoms of COPD. (Table 2)

The overall mean knowledge score of cohorts on the Bristol COPD questionnaire was 51.9±21.9 %, with 40.4% having good scores and only 11.3% had excellent scores (Figure 1). This suggest that majority of healthcare workers have good general knowledge base of COPD. (Table 2)
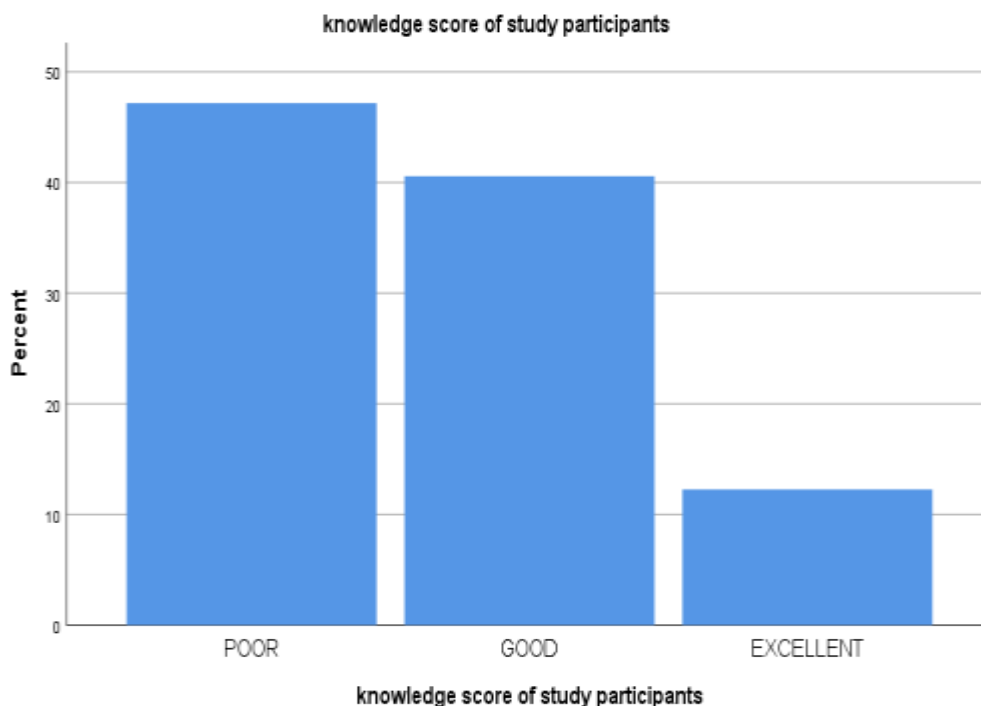

Figure 1: shows the knowledge scores of study participants.

3.2. Responses To Subsection Of Questionnaire

i. When subjects were asked to answer simple concept of COPD, 54.6% wrongly believed that the word "chronic" in COPD means it is severe. Majority were correct that COPD can only be confirmed by breathing test while 50.2% ascertained correctly that in COPD oxygen levels in the blood are not always low.

ii. Although 52.8% knew that more than 80% of COPD cases are caused by cigarette smoking, 53.6% were right of the fact that it can also be due to occupational dust exposure but only 22.2% knew that longstanding asthma can develop into COPD. 53.7% of respondents wrongly believed it is an inheritable disease. However, 56.3% wrongly believed that women are less vulnerable to the effect of cigarette smoking than men. These painted a picture of a mixed understanding of COPD pathophysiology among study cohort. (Table 2)

Table 2: Percentages of study participants' responses for all 65 items in Bristol COPD questionnaire indexed by topic (13 topics) and their five stems (a, b, c, d, e)

Var.	a (100%)			b (100%)			c (100%)			d (100%)			e (100%)		
	CR	ICR	NA	CR	ICR	NA	CR	ICR	NA	CR	ICR	NA	CR	ICR	NA
1	19.3	54.6	26.1	51.6	16.3	32.1	54.6	20.3	25.1	50.2	18.9	30.9	52.7	20.6	26.7
2	52.8	26.2	21.0	53.6	28.9	17.5	22.2	56.1	21.7	22.3	53.7	24.0	19.7	56.3	24.0
3	21.6	57.4	21.0	52.4	24.0	23.6	49.9	25.3	24.8	34.7	47.1	18.2	33.4	47.2	19.4
4	37.5	57.0	5.5	51.1	41.0	7.9	59.3	32.2	8.5	54.9	32.3	12.8	59.0	36.2	4.8
5	46.2	24.9	28.9	48.4	26.1	25.5	50.1	27.3	22.6	43.3	23.8	32.9	49.5	22.9	27.6
6	42.7	49.1	8.2	49.6	47.7	2.7	44.6	43.9	11.5	31.7	44.4	23.9	44.1	50.6	5.3
7	47.4	44.2	8.4	46.4	48.6	5.0	49.9	39.8	10.3	49.2	37.7	13.1	47.7	49.5	2.8
8	47.2	46.2	6.6	49.6	44.7	5.7	41.5	45.5	13.0	47.3	47.9	4.8	48.3	42.7	9.0
9	39.9	41.9	18.2	52.8	35.3	11.9	43.5	39.7	16.8	30.3	44.6	25.1	40.2	44.6	15.2
10	31.7	53.2	15.1	56.2	34.9	8.9	33.3	57.1	9.6	51.6	33.5	14.9	52.9	35.5	11.6
11	27.2	50.1	22.7	45.8	37.2	17.0	42.8	39.4	17.8	41.2	41.9	16.9	42.1	40.6	17.3
12	33.7	59.9	6.4	23.2	60.9	15.9	37.2	50.0	12.8	29.8	49.0	21.2	35.9	53.2	10.9
13	24.4	52.8	22.8	55.1	26.4	18.5	49.7	23.9	26.4	27.2	55.3	17.5	32.6	47.7	19.7

CR= Correct, ICR = Incorrect, NA = Not answered.)

iii. On the knowledge of symptoms of COPD, 57.4% incorrectly believed that ankle swelling is a common symptom of COPD. However, 52.4% and 49.9% of study respondents were correct with responses that fatigue or tiredness and wheezing were common symptoms of COPD. Also, 47.1% and 47.2% were correct that crushing chest pain and rapid weight loss were not common symptoms of COPD respectively.

iv. On the question about breathlessness, majority of respondents incorrectly believed that severe breathlessness prevent travel by air while 51.1% were correct in asserting that breathlessness can be worsened by eating. However, 59.3% incorrectly answered that breathlessness means oxygen levels are low. 54.9% and 59.0% were correct in answering that Breathlessness is a normal response to exercise and it is primarily caused by a narrowing of the bronchial tubes respectively.

v. Majority of respondents were right that in COPD, Coughing phlegm is a common symptom (46.2%), Clearing phlegm is more difficult if you get dehydrated (48.4%), Bronchodilator inhalers can help clear phlegm (50.1%), and Clearing phlegm can be assisted by breathing exercises (49.5%). However, over a fifth (22.9%) wrongly believed that Phlegm produced in COPD causes harm if swallowed.

vi. On the issue of chest infection and exacerbation, majority (49.1% and 44.4%) were incorrect in believing that Chest infections does not often cause coughing of blood and that Chest infections are not always associated with a high temperature respectively, but were correct that with chest infections phlegm usually becomes coloured (yellow or green) (49.6%) and also were correct that exacerbations (episodes of worsening) can occur in the absence of a chest infection (44.6%). However, more than half (50.1%) were wrong that Steroid tablets should be taken whenever there is an exacerbation.

vii. During pulmonary rehabilitation in COPD, a slim majority (47.4 %) of respondents were right that walking is better than breathing exercise to improve fitness in COPD while about half (48.6 %) incorrectly asserted that exercise should be avoided as it strains the lungs. Only 49.9% knew that exercise can help maintain bone density in COPD. About half 949.2) were correct in answering that exercise can help to relieve depression.

viii. When asked if stopping smoking will reduce the risk of heart disease and will slow down lung damage, only a slim majority answered these questions correctly (47.2% and 49.6% respectively). 45.5% wrongly believed that stopping smoking is pointless as the damage is done. Also a narrow majority were wrong in believing that stopping smoking does not usually results in improved lung function. However, less than half were correct of the fact that nicotine replacement therapy is not only available on prescription.

ix. Our study also revealed that a narrow majority (41.9%) of study respondents wrongly believed that a flu jab is recommended to be taken every year. More than half (52.8%) however, were right that you cannot get flu from having flu jab. A sizable number of respondents were also wrong that you can only have a flu jab if you are 65 or over and that a pneumonia jab protects against all forms of pneumonia. Majority of respondents (44.6%) also had incorrect knowledge of subsections 9e "You can have a pneumonia jab and a flu jab on the same day".

x. A little bit above half (53.2%) of study respondent erroneously believed that all bronchodilators act quickly (within10 minutes). However, most (56.2%) were right that both short and long acting bronchodilators can be taken on the same day. Almost a third (57.1%) was wrong by believing that spacers should be dried with a towel after washing. More than half of respondent were right about the fact that using a spacer device will increase the amount of drug deposited in the lungs (51.6%) and that tremor may be a side effect of bronchodilators (52.9%).

xi. About the use of antibiotic in COPD, 50.1% of respondents were incorrect in stating that to be effective, the course should last at least 10 days. However, 45.8 % stated rightly that excessive use of antibiotics can cause resistant bacteria. Majority were also correct that antibiotics will not clear all chest infections (42.8%) and antibiotic treatment with antibiotic is not necessary for an exacerbation (41.2%). Also, 41.2% were right in stating a patient should seek advice if antibiotics cause severe diarrhea.

xii. Concerning the use of steroid tablets in the treatment of COPD, About two third were right in stating that steroid tablets does not help strengthen muscles (59.9%) and should not be avoided if there is a chest infection (60,9%). 50.0% were right that the risk of long-term side effects due to steroids is less with short courses than with continuous treatment and 49.0% were also right that indigestion is a common side effect from using steroid tablets. Though 53.2% did not know that use of steroid tablets can increase appetite.

xiii. Above half of respondents (52.8%) did not know that inhaled steroids should be stopped if you are given steroid tablets but 55.1% and 49.7% respectively, were correct that steroid inhalers cannot be used for rapid relief of breathlessness and spacer devices does not reduce the risk of getting thrush in the mouth. 55.3% were incorrect that steroid inhaler should be taken before bronchodilator. Majority (47.7%) did not know that inhaled steroids improve lung function in COPD.

3.3. Correlation With Socio-Demographic Characteristics

In this cohort, COPD mean knowledge scores were high among study cohorts who were <40 years old (56.4±40.2), those with normal body mass index (BMI) (56.2±16.1), in single patients (68.1±09.1), among doctors (69.9±02.4) and particularly individuals with medical fellowships /PhD (69.9±02.4). It is however, low among healthcare workers in Osun state (30.6±19.4) but highest among healthcare workers in Lagos state (69.2±23.3). However, the average knowledge score was highest among healthcare workers who had worked for <10 years. A positive correlation was demonstrated between age, level of education and knowledge score (p<0.05). There was no correlation between gender, BMI, marital status, specialty, and state of practice, duration of practice and knowledge score using the Bristol COPD knowledge questionnaire. (Table 3)

Table 3: shows association between socio-demographic characteristics and knowledge score of study participants.

Variables		knowledge score (mean±SD)	P-value
Age (years)	<40	56.4±40.2	0.041
	≥40	47.5±11.7	
Gender	Male	47.2±22.2	0.786
	Female	56.6±20.5	
BMI	Underweight (<18.5 kg/m^2)	47.4±11.3	0.533
	Normal (18.5-25 kg/m^2)	56.2±16.1	
	Overweight (25-30 kg/m^2)	49.7±32.7	

	Obese (>30 kg/m^2)	53.3±24.9	
Marital status	Single	68.1±09.1	0.271
	Married	52.2±31.7	
	Separated	49.0±26.6	
	Divorced	47.5±17.4	
	Widowed	42.7±20.6	
Specialty	Doctors	69.9±02.4	0.067
	Nurses	54.7±23.5	
	Others	46.3±54.4	
	Unspecified	40.5±0.01	
Level of Education	Diploma	31.7±31.6	0.019
	Bachelor's degree	44.3±14.3	
	Master's degree	47.8±19.5	
	Fellowship/Phd	69.9±02.4	
State of practice	Lagos	69.2±23.3	0.896
	Ogun	61.7±16.2	
	Osun	30.6±19.4	
	Oyo	44.6±20.2	
	Ondo	54.4±27.1	
	Ekiti	50.9±20.4	
Duration of practice	<10 years	52.9±29.8	0.813
	≥10 years	50.6±17.3	
	Unspecified	52.2±15.0	

Mean knowledge score = 51.9±21.9

DISCUSSION

The incidence of COPD in the developing countries such as Nigeria is on the increase mainly due to increasing use of biomass fuel in day-to-day activities such as cooking in poorly ventilated areas and rapid level of urbanization. However, to the best of our knowledge, our study is the first study that evaluated the level of knowledge of healthcare workers of COPD in Nigeria population. Although this cross sectional study involved 405 participants with majority being doctors and nurses, the mean knowledge score was 51.9±21.9 which is much higher than what was obtained in other similar studies carried out in patients [22] who had received prior education on COPD and health care workers [23, 24] but lower than in the study done by White R et al in which the mean knowledge score was 63.6±8.1 [21]. The highest mean knowledge of COPD was seen among doctors (69.9±02.4), however, in comparison with the full score of 65, the mean BCKQ score for nurses in this study was 54.7±23.5 which is much higher than 35.76 ± 5.49 seen in a similar study involving nurses [23].

Healthcare workers in this study, showed significant good knowledge in the topics of epidemiology, symptoms, breathlessness, infections, exercise and smoking with knowledge deficit in the topics of vaccination, inhaled bronchodilators, oral steroids, and inhaled steroids. This suggests that most healthcare worker lack COPD-related knowledge in the areas of the above-mentioned topics, therefore there is need for further education about COPD knowledge among healthcare workers designed to address the deficit in knowledge on these aspects of COPD care. Detailed analysis of each item of the BCKQ showed that study participants had generally incorrect knowledge of subsections on vaccination, inhaled bronchodilators, oral steroids, and inhaled steroids. The need to correct these errors or gaps in knowledge cannot be over emphasized as it may have significant negative effects on the ability of these healthcare workers to provide adequate care for patients with COPD [24, 25].

Studies have shown that education and information provided by health care workers go a long way to improve patients' knowledge and perspectives of medical conditions [24]. Documented finding in the Global initiative for chronic obstructive lung disease manual indicated that patients education is vital in the overall care for COPD patients and such education should cover topics such as risk factors, disease progression and severity, smoking cessation, correct use of inhaler devices and accessories, early recognition of exacerbation and use of appropriate medications [1]. Therefore, healthcare workers should possess good knowledge of COPD so as to be able to provided adequate and correct information to patients.

Antecedents have however shown that over the years, all over the world, the knowledge of COPD among healthcare workers saddled with the responsibility of providing education have not been up to par [24, 26]. In a study done among Respiratory Therapists in Saudi Arabia, only 53.2% showed good knowledge of COPD with many having significant deficit in knowledge of COPD diagnosis and assessment of patients [27]. A study by Perez et al, in New York, USA reported that clinicians' familiarity with recommendations on COPD care is poor [29]. Another study reported that nurses do not possess adequate knowledge of COPD and lack sufficient knowledge and skills needed for pulmonary rehabilitation [29]. The above showed why appropriate and well designed and organized education about COPD is germane and important among healthcare workers.

Since most healthcare workers come into contact with COPD patients on daily basis, the ability of the healthcare providers to meet the needs of COPD patients is very critical. Therefore, there is a great need for healthcare workers such as nurses to rotate through different wards in order to have a good COPD-related knowledge and be able to provide better health guidance for patients. Use of Continued Medical Education and rotation through different wards and units in the hospital are important tools in this regard. This is supported by a study done Akure, Nigeria which showed that non nephrology nurses who rotated through nephrology unit showed significantly higher mean knowledge score of chronic kidney disease that others [30].

Our study showed that there was statistically significant association between respondents' age, level of education and knowledge score ($p<0.05$). This is in contrast to the finding in a study carried out among respiratory therapists in Saudi Arabia [27] in which the education level did not appear to make a difference in scores of knowledge. Also, in our study there was no correlation between gender, BMI, marital status, specialty, and state of practice, duration of practice and knowledge score of respondents. The Saudi Arabia study is in agreement with our study in which there was no statistically significant relationship between gender and knowledge score [27].

CONCLUSIONS

This study examined knowledge of COPD among healthcare workers in the southwestern part of Nigeria and confirmed that the knowledge of COPD among healthcare workers was essentially good but there were serious gaps in knowledge observed in areas of vaccination, inhalational therapy, and use of inhaled and oral steroid. The results may not represent the COPD-related knowledge levels among healthcare workers in other parts of Africa but may be used to speculate COPD knowledge level in other parts of Nigeria with similar demographics. Therefore, a large scale study to cover other parts of Africa can be done in the future with our study being a stepping stone. This however is an observational study, rather a study examining the effect of CME and other interventions can be done in the nearest future to further shed light on this important area of healthcare.

ACKNOWLEDGEMENT

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