Content available at: https://www.ipinnovative.com/open-access-journals

IP Indian Journal of Immunology and Respiratory Medicine

Journal homepage: www.ipinnovative.com

Original Research Article

Applicability of 2017 Global Initiative for Chronic Obstructive Lung Disease guidelines in diagnosing COPD in a tertiary care hospital

Swetha Sasikumar[1,*], Priya Joy[1], Sathishkumar Mani[1], Gangadharan Vadivelu[1], Anbumaran Parivakkam Mani[1]

[1]*Dept. of TB & Chest Medicine, Saveetha Medical College, Chennai, Tamil Nadu, India*

ARTICLE INFO

Article history:
Received 05-08-2020
Accepted 12-08-2020
Available online 16-09-2020

Keywords:
COPD
Clinical Symptoms
Spirometry
ABCD Grading.

ABSTRACT

Chronic obstructive pulmonary disease (COPD) is one of the common conditions that physicians frequently diagnose and treat both in the hospital and outpatient setting. Every year, a new report is generated based on an analysis of published studies which attempts to improve the way physicians handle COPD. In 2011 and 2017, the traditional GOLD guidelines were revised, and it included exacerbation history and COPD Assessment Test (CAT) and modified Medical Research Council Dyspnoea Scale (mMRC) in diagnosis of the disease. This study we used patients' symptoms, risk factors and exacerbation history to diagnose COPD as per 2017 guidelines and checked its accuracy by confirming with spirometry.

Materials and Methods: A prospective study, in which 105 patients with history suggestive of COPD were classified according to ABCD tool, later these patients were subjected to spirometry to confirm the diagnosis of COPD and severity.

Results: The results obtained were analysed by statistical software SPSS-V.24. About 79% of the population diagnosed to have COPD by ABCD tool were confirmed using spirometry, the rest 21% either had spirometric post bronchodilator FEV1/FVC >0.7 or significant reversibility. CAT and mMRC test correlate with the spirometric FEV1 predicted percentage.

On comparing ABCD and Spirometric grading most of them had severe airway obstruction and these people were mostly distributed in group B and D of ABCD grading.

Conclusion: The utility of 2017 GOLD consensus in diagnosing COPD in the Indian scenario was studied. The ABCD tool of GOLD consensus will be helpful in diagnosing COPD in a resource limited setting, primary care centres were spirometry is not available.

1. Introduction

Chronic obstructive pulmonary disease (COPD) is defined as a common, preventable and treatable disease, that is characterised by persistent respiratory symptoms and airflow limitations that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases.[1]

The chronic airflow limitation that is characteristic of COPD is caused by a mixture of small airways disease and parenchymal destruction and these changes do not occur together, and they evolve over the course of time.

Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality across the world.[2] It is estimated that about 65 million people have moderate to severe COPD across the world, as per World Health Organisation.[3]

In the year 2016, there were about 251 million COPD cases in the world and the mortality rate of COPD increased to 3.15 million deaths per year.[4] The economical burden of COPD in developed countries like US was as high as $50 billion[5] and the burden is much higher in low and middle-income countries which are due to its association with smoking and environmental pollution.[6]

* *Corresponding author*.
E-mail address: swethar95@gmail.com (S. Sasikumar).

https://doi.org/10.18231/j.ijirm.2020.056

In India, the burden of all non-communicable diseases has increased since 1990.[7] As on 2016, COPD is the second leading cause of death in non-communicable diseases.[8] The prevalence of COPD in India ranges from 2% to 22% in males and 1.2 to 19% in females.[9]

The Disability Adjusted Life Years (DALY) due to COPD in India had increased of about 36.3% from 1990 to 2016. The second leading cause of DALYs in India is COPD followed by diarrheal disease, lower respiratory tract infections, stroke and iron deficiency anemia.[8]

With such economic and social burden, establishing a diagnosis of COPD requires spirometry as per Global initiative for Chronic Obstructive Lung disease (GOLD) guidelines. However, recent 2017 GOLD guidelines suggest that classifying COPD only by forced expiratory volume in 1 s (FEV_1) % predicted is inadequate in reporting severity of the disease.[10] Thus, assessing a patient's health-related quality of life (HRQoL) will help clinicians to make decision on management of individualised patient.

GOLD strategy suggest that COPD management can no longer be based only on spirometric classification, but through a multidimensional assessment of specific patient attributes.[11–13] (i.e., symptoms, risk factors and history of exacerbations in the previous year)

The accuracy in diagnosing COPD based on the patient's symptoms and history of exacerbation and confirming the diagnosis with the spirometric forced expiratory volume in 1 second predicted % is analysed in our study.

2. Aim of the study

To check the applicability of 2017 GOLD guidelines in diagnosis of COPD based on Symptoms and exacerbations and to confirm by the spirometric grading to check for the accuracy in a tertiary care hospital.

3. Materials and Methods

3.1. Inclusion criteria

1. Patients attending to the chest OPD at Saveetha Medical college with the history and symptoms of COPD
2. Age above 20 years and below 70 years.
3. Patient willingness to participate in the study.

3.2. Exclusion criteria

1. Age less than 20 years and more than 70 years
2. Patient Refusal
3. Antenatal women
4. Other co morbidities which resembles COPD

3.3. Study Design

Prospective study

3.4. Sample size calculation

Single Mean – Hypothesis testing – One population mean
Standard Deviation – 9.2, Sample Mean – 22.6
Population Mean – 2.5, Alpha Error – 5%
Power – 80%, Sided – 2
Effect Size – 0.2609, Number Needed [n] – 115

3.5. Methodology

All the patients fulfilling the inclusion criteria and coming to the Chest OPD at Saveetha Medical College and Hospital with the history and symptoms suggestive of COPD during July 2019 to May 2020 were included in the study.

The details were collected in the Performa and tabulated with Microsoft Excel and results were analysed with the help of Statistical software SPSS version 24.

4. Results

The data were collected and tabulated using Microsoft Excel, and the Statistics were analysed with the help of SPSS software. P value less than 0.05 is considered as statistically significant.

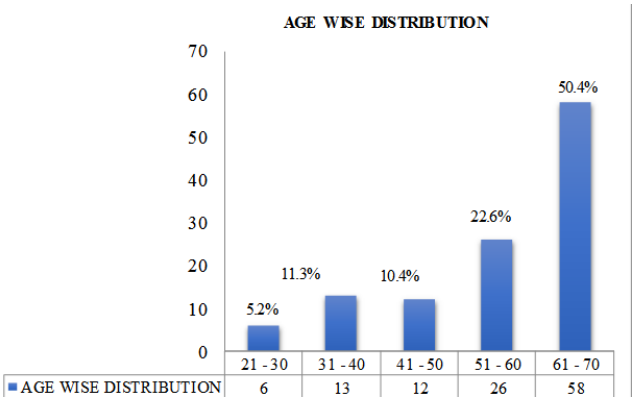

Fig. 1: Age wise distribution

Figure 1 show the age distribution among our study population. The mean age is 56.59 years ± 12.584 in this study.

Table 1: Age wise distribution among genders

Description	Male		Female	
	No of Person	%	No of Person	%
21 – 30 YRS	2	33.3	4	66.7
31 – 40 YRS	8	61.5	5	38.5
41 – 50 YRS	8	66.7	4	33.3
51 – 60 YRS	20	76.9	6	23.1
61 – 70 YRS	52	89.7	6	10.3
Total	90 [78.3%]		25[21.7%]	

Table 2: Educational qualification

Educational qualification	No of person	Percentage
Illitrate	30	26.1
Upto 12^{th}	55	47.8
Under graduate	29	25.2
Post graduate	1	0.9
Total	115	100

The above table shows educational qualification of our study population. Most of the study population had qualified themself up to 12^{th} standard

Table 3: Socio economic status

	No of persons	Percentage
Lower	1	0.9%
Lower middle	68	59.1%
Upper lower	16	13.9%
Upper middle	30	26.1%
Upper	0	0
Total	115	100%

In our study group 59% of study population belong to lower middle class followed by 26% in Upper middle which is illustrated in above table.

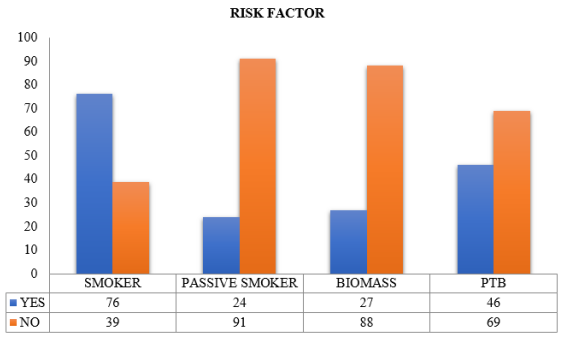

Fig. 2: Risk Factors

The above figure shows the risk factors associated with COPD. In our study the major risk factor was Smoking.

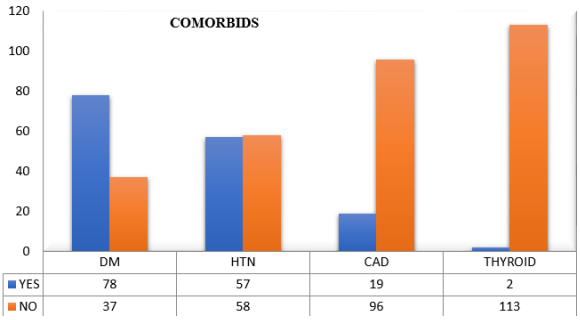

Fig. 3: Co Morbids

Most of the patients in our group were Diabetic (78%) followed by 57% of them were hypertensive.

Table 4: mMRCDyspnoea Grading

	No of person	Percentage
≤ 1	28	24.3
≥ 2	87	75.7
Total	115	100
Mean $\pm$ S.D.	1.97$\pm$0.674	

In our Study mMRC Dyspnoea grading score of more than 2 was found in 75.7 % of population which is represented in above table

Table 5: Cat Score

	No of person	Percentage
Less than 10	9	7.8%
More than 10	106	92.2%
Total	115	100%
Mean $\pm$ S.D.	14.80 $\pm$ 4.117	

The above table shows CAT score analysis in our study group. Among the study population 106 of 115 had CAT score of more than 10.

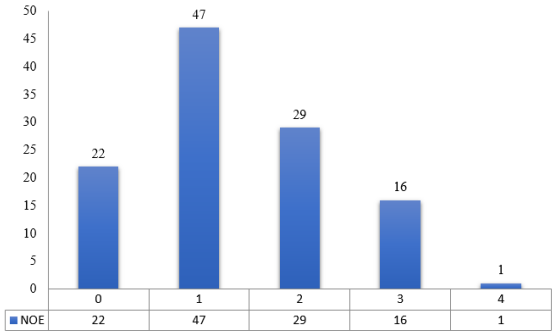

Fig. 4: Number of exacerbation in one year

In our study group 47 people had an episode of exacerbation in the previous year.

Table 6: Number of hospital admissions

No of HOS	No of person	Percentage
0	58	50.4
1	41	35.7
2	15	13
3	1	0.9
4	0	0
Total	115	100
Mean	0.66	
S.D.	0.815	

In our study 58 people had no hospital admission in the previous year.

Table 7: GoldABCD

Gold	No of persons	Percentage
A	5	4.3
B	49	42.6
C	4	3.5
D	57	49.6
Total	115	100

The above table show GOLD ABCD classification. GROUP D had more patients followed by GROUP B.

Table 8: Spirometry gold

Gold	No of persons	Percentage
1	0	0
2	19	16.5
3	53	46.1
4	18	15.7
NC	25	21.7
Total	115	100

The above table shows spirometric classification with maximum of 53 patients in severe group and 25 patients were not found to have COPD

Table 9: Cat score vs spirometry grade

Spirometry gold	Cat score < 10 No of person	Cat score ≥ 10 No of person
FEV1 >80	0	0
FEV1 50 – 79	2	17
FEV1 30 – 49	2	51
FEV1 < 30	0	18
NC	5	20
Total	9	106
P value	0.045	
Chi square	8.063	

On comparing CAT score and Spirometric FEV1% grading maximum patients corresponds to severe airway obstruction group. The results are statistically significant with p value of 0.045.

Table 10: mMRCscore VS spirometry

Spirometry Gold	mMRC ≤ 1 No of person	mMRC ≥ 2 No of person
FEV1 >80	0	0
FEV1 50 – 79	7	12
FEV1 30 – 49	7	46
FEV1 < 30	1	17
NC	13	12
Total	28	87
P value	0.00	
Chi square	19.010	

On comparing mMRC scoring and Spirometric FEV1% grading maximum patients corresponds to severe airway obstruction group. The results are statistically significant with p value of 0.00.

Table 11: Spirometry vs ABCDgold

SPIRO	Gold [No of Persons]			
	A	B	C	D
1	0	0	0	0
2	1	10	1	7
3	1	20	1	31
4	0	4	0	14
NC	3	15	2	5
P value	0.014			
Chi square	20.626			

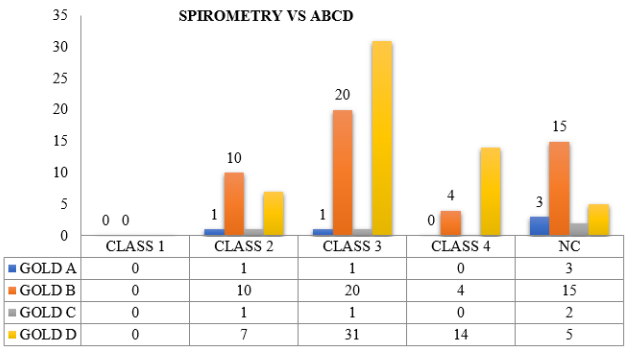

Fig. 5: Spirometry Vs ABCD Gold

On comparing spirometric with ABCD grading maximum population corresponds to Class 3. The results are found to be statistically significant with p value of 0.014.

5. Discussion

The revised 2017 GOLD Guidelines emphasises that diagnosis of COPD by considering spirometric FEV1 predicted % grading and symptoms and exacerbations grading (ABCD) separately. The symptoms and exacerbation grading are considered to assess the severity of disease on patient's quality of life.

However, in our study we considered ABCD grading for diagnosis of COPD in patients with symptoms suggestive of COPD-progressive dyspnoea, cough with expectoration, wheeze, childhood recurrent respiratory infections with associated exposure to noxious particles and/or gases. Following which patients were subjected to spirometry to confirm the diagnosis of COPD, the following results were observed.

Our study is to check the accuracy of ABCD grading in diagnosing COPD, thus can be helpful in diagnosing COPD in a resource limited setting, primary care centres where spirometry is not available.

In our study population about 50.4% were between the age group of 61-70 years followed by 22.6% were between

the age group of 51-60years,10.4% in the age group of 41-50 years,11.3% were between the age group of 31-40years, 5.2% were between the age group of 21-30years with the mean age distribution of 56.59±12.5 years.

In our study population 90 were males and 25 were females, (i.e.) 78.3% were male and 21.7% were female.

COPD has traditionally been associated with older males (>50 years), recent evidence suggested that the disease is already present in 20–45 year old and that gender differences are becoming less pronounced. Likewise, in our study 16.5% of population belongs to the age group of 20-40 years. However, there is a significant difference in the male is to female ratio.

On assessing the educational status in our study population 47.8% had completed primary schooling, followed by 26.1% of illiteracy, 25.2% had completed under graduation and only 0.9% had completed post-graduation.

Socioeconomic status is also the risk factor for COPD. In our study population it was assessed using Modified Kuppusamy scale. Most of our study population belonged to lower middle class.

The results obtained were, 59.1% of our study population belonged to lower middle class, 26.1% belonged to upper middle class, 13.9% belonged to upper lower class and 0.9% belonged to lower class.

Smoking is the most common cause of COPD accounting for 85% (50% smokers develop COPD), the rest 15% is considered non-smoking COPD. In non-smoking COPD 30-50% accounts for biomass fuel exposure. Tuberculosis increases the risk by 2-6 folds even with adequate treatment.[14] In our study on taking individual risk factor into consideration 66.1% of population were smokers and the rest 33.9% were non - smokers, 40% gave history of treatment for tuberculosis in the past and rest 60% had no history of tuberculosis in the past, 23.5% were exposed to biomass fuel gas and 20% had history of passive smoking. This clearly says that smoking being the most important cause for COPD followed by the other causes-which is on the rise.

On evaluating the co morbidities, 67.8 % of population had Diabetes Milletus, 50.4% of population had Systemic hypertension, 16.5 % of population had Coronary artery disease and only 1.7% of population had Thyroid disorder.

Patients symptoms and risk factors suggesting COPD are diagnosed and classified according to ABCD grading.

mMRC scoring was done and individuals were categorised into two groups.

1. mMRC score $\leq$1 who will fall under Group A and C, which was about 24.3%
2. mMRC score $\geq$2 who will fall under Group Band D, which was about 75.7%
3. The mean mMRC score with standard deviation was found to be 1.97±0.674.
4. CAT scoring was done, and individuals were categorised into two groups.
5. CAT score <10 was found to be 7.8%, who will fall under Group A and C.
6. CAT score $\geq$10 was found to be 92.2%, who will fall under Group B and D.
7. The mean CAT score with standard deviation was found to be 14.80±4.117.

On comparing, CAT score resulted in about 16.5% increase in Group B and D population than mMRC score.

Number of exacerbations in the previous year

Most of our study population about 40.1% had one exacerbation in the previous year. Followed by 25.2% had two exacerbation and 13.9% had three exacerbations.19.1% of population had no exacerbation in the previous year.

On classifying patients based on ABCD tool-predominant of our study population belonged to Group B and D. The results obtained were 4.3% in Group A, 42.6% in Group B, 3.5% in Group C and 49.6% in Group D.

When these patients were subjected to spirometry majority of them had severe disease as per GOLD guidelines of spirometry. The results obtained were 46.1% of population in grade 3, followed by 16.5% in grade 2 and 15.7% in grade 4. We also inferred that 21.1% of population were not found to have COPD (i.e., they either had FEV1/FVC more than 0.7 or showing significant post bronchodilator reversibility and both of these in few individuals).

On comparing the CAT score with the spirometric grading: the study population was categorised as less symptomatic (CAT score <10) and more symptomatic (CAT score $\geq$10) and were compared to spirometric grades. Most of our study population in more symptomatic group had moderate (44.3%) and severe (15.6%) obstruction as per spirometry grading. In less symptomatic group 1.73% population belonged to moderate and severe grades each. The rest 21% were in the not conclusive group. The results were found to be statistically significant with p value of 0.045.Ghobadi, Hassan et al. studied the relationship of CAT scoring with spirometric airflow limitation grading. They compared mean CAT score (four groups) with mean FEV1 of spirometric grade and was found to have significant p value.[15] Similar statistical significance on comparing CAT score and FEV1 spirometric grade were seen in our study.

On comparing mMRC score with spirometric grading, we inferred that patient with severe disease as per spirometric grading had poor exercise tolerance (i.e., higher grades of mMRC). The results obtained were 40% had severe obstruction, 14% had very severe and 10.4% had moderate obstruction in more symptomatic group. In less symptomatic group (mMRC$\leq$1) 6% of population had moderate and severe obstruction each, 0.8% had very severe obstruction. The results were found to be statistically significant with p value of 0.00. Dhanalakshmi[16] D et

al. studied the relationship between mMRC grading and Forced Expiratory Volume in first second (FEV1) in COPD patients. The results were mMRC dyspnoea grade was inversely correlated strongly with post- bronchodilator % FEV_1 (p value <0.001) than pre-bronchodilator % FEV1. This statistical significance was also found in our study.

On comparing the ABCD grading with the airflow limitation by FEV1 in spirometry, most of our study population belonged to Group B and D as per ABCD grading and most of them had severe airway obstruction as per spirometry grading.

The results obtained were GOLD Group A had 5 patients (4.3%) of which spirometry grade 2 and 3 had one each and the rest 3 patients were not found to have COPD.

Group B had 49 patients (42.6%) of which 10 patients corresponds to grade 2, 20 patients belong to grade 3, 4 patients in grade 4 and 15 were found to be not conclusive of COPD.

Group C had only 4 patients (3.5%) of which spirometry grade 2 and 3 found to have one each and 2 patients were found to be not conclusive.

Group D had 57 patients (49.6%) of which 7 patients were in spirometric grade 2,31 patients in grade 3, 14 patients in grade 4 and the rest 5 patients were in not conclusive group.

Graciane L Moreira[17] et al., which compared GOLD B-C-D groups with GOLD II-III-IV grades and the results showed 68% of study population belonged to Group D in ABCD groups and in Spirometry grades 51% of population belonged to severe airway obstruction grade. Similar results were found in our study. But they also analysed the functional status of the patients using Six minutes walk test, which was not considered in our study.

6. Conclusion

The utility of 2017 GOLD consensus in diagnosing COPD in the Indian scenario was studied. 79% of the study population diagnosed to have COPD by ABCD grading were confirmed by spirometry. CAT and mMRC test correlates with the spirometric FEV1 predicted percentage. The ABCD tool of GOLD consensus will be helpful in diagnosing COPD in a resource limited setting, primary care centres were spirometry is not available.

7. Source of Funding

None.

8. Conflict of Interest

None.

References

1. Global initiative for chronic obstructive lung diseases-2018.
2. Lozano R, Naghavi M, Foreman K. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study. *Lancet*. 2010;380(9859):2095–2128.
3. Koul PA. Chronic obstructive pulmonary disease: Indian guidelines and the road ahead. *Lung India: Official Organ Indian Chest* . 2013;30(3):175–7.
4. WHO. Chronic obstructive pulmonary disease (COPD). Geneva, Switzerland: WHO; 2017.
5. Banerjee ER. Perspectives in inflammation biology; 2014.
6. Hossain MM, Sultana A, Purohit N. Burden of Chronic Obstructive Pulmonary Disease in India: Status, Practices and Prevention. *Int J Pul Res Sci*. 2018;2(5):555599.
7. Mahal A, Karan A, Engelgau M. The Economic Implications of Non-Communicable Disease for India. Health, Nutrition and Population (HNP); 2010.
8. ICMR-PHFI-IHME India: Health of the Nation's States; 2017.
9. Jindal SK, Aggarwal AN, Gupta D. A review of populationstudies from India to estimate national burden of chronic obstructivepulmonary disease and its association with smoking. *Indian J Chest Dis Allied Sci*. 2010;43(3):139–47.
10. Vestbo J, Hurd SS, Agusti AG. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. *Am J Respir Crit Care Med*. 2013;187:347–65.
11. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global Strategy for the Diagnosis, Management, and Prevention of COPD; 2011.
12. Guyatt GH. Measuring Health-Related Quality of Life. *Ann Internal Med*. 1993;118(8):622–9.
13. Gupta N, Pinto LM, Morogan A, Bourbeau J. The COPD assessment test: a systematic review. *Eur Respir J*. 2014;44(4):873–84.
14. Brashier BB, Kodgule R. Risk factors and pathophysiology of chronic obstructive pulmonary disease (COPD). *J Assoc Physicians India*. 2012;60:17–21.
15. Ghobadi H. The Relationship between COPD Assessment Test (CAT) Scores and Severity of Airflow Obstruction in Stable COPD Patients. *Tanaffos*. 2012;11(2):22–6.
16. Dhanalakshmi D. Relationship between Dyspnoea mMRC Scale and Forced Expiratory Volume in First Second (FEV1) In Chronic Obstructive Pulmonary Disease Sch. *J App Med Sci*. 2016;4(9E):3544–7.
17. Moreira GL, Donária L, Furlanetto KC, Paes T, Sant'Anna T, Hernandes NA, et al. GOLD B-C-D groups or GOLD II-III-IV grades. *Chronic Respir Dis*. 2015;12(2):102–10.

Author biography

Swetha Sasikumar Senior Resident

Priya Joy Senior Resident

Sathishkumar Mani Assistant Professor

Gangadharan Vadivelu Professor and HOD

Anbumaran Parivakkam Mani Assistant Professor

Cite this article: Sasikumar S, Joy P, Mani S, Vadivelu G, Mani AP. **Applicability of 2017 Global Initiative for Chronic Obstructive Lung Disease guidelines in diagnosing COPD in a tertiary care hospital**. *IP Indian J Immunol Respir Med* 2020;5(3):190-195.