



A COMPARISON OF COGNITIVE FUNCTIONS IN STABLE PATIENTS WITH COPD AND AGE-MATCHED HEALTHY VOLUNTEERS USING MINI-MENTAL STATE EXAMINATION QUESTIONNAIRE

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Abstract:

This study attempts to study cognitive dysfunction in patients with stable COPD. Folstein Mini-Mental State Examination Questionnaire was used for this purpose. From this study it is evident, that there was borderline cognitive impairment in stable COPD patients compared to age, height, weight, BMI and education matched healthy controls. This study highlights the importance of using MMSE for assessing cognitive functions, which is inexpensive, non-invasive, and also easy to execute clinically.

INTRODUCTION :

COPD is an airway disease characterized by air flow limitation and is not fully reversible, and it leads to chronic hypoxia. The airflow limitation is progressive and associated with an abnormal inflammatory response of the lung tissues to noxious particles and gases. It is the sixth leading cause of death in worldwide. It is associated with peripheral neuropathy, motor neuron involvement, encephalopathy and derangement of cognitive functions.

Risk factors are cigarette smoking, smoke from combustion of solid fuels like wood, dried cow dung, smoke from automobile and industries, host factors like alpha 1 antitrypsin deficiency, airway hyper-responsiveness and reduced maximal attained lung functions.

Pathogenesis of COPD is characterized by chronic inflammation throughout the airways, parenchyma and pulmonary vasculature with infiltration of cells like macrophages, T- lymphocytes (CD 8 +) and neutrophils. There is release of inflammatory mediators like leukotrienes B₄, interleukin 8, TNF- alpha which damage the lung parenchyma. Imbalance between proteinases and anti-proteinases in the lungs, and oxidative stress factors released during inflammation are other reasons for the pulmonary damage. Diagnosis is made clinically from the history of chronic cough with sputum expectoration, dyspnoea and exposure to known risk factors mentioned above. COPD is confirmed by Spirometry test by GOLD criteria - FEV₁/FVC less than 0.7, FEV₁ < 80 %.

The Mini Mental State Examination (MMSE) or Folstein test is a brief 30-point questionnaire test. It was introduced by Folstein et al. in 1975. It is used as a screening test for cognitive function. It is also used to estimate the severity of cognitive impairment and to follow the course of cognitive changes in an individual over a period of time. It is also used as a tool to document an individual's response to treatment. The test can be performed in about 10 minutes. The MMSE test includes simple questions and problems in a number of areas: the time and place of the test, repeating lists of words, arithmetic such as the serial of sevens, language use and comprehension, and basic motor skills.

The present study is to assess cognitive dysfunction in stable COPD patients by using Folstein Mini-Mental State Examination Questionnaire.

OBJECTIVE :

To assess cognitive functions in stable patients with COPD compared to age-matched healthy volunteers using Mini-mental state examination questionnaire.

MATERIALS AND METHODS :

Study Design : case control study

Subject selection: Total sample size – 100 subjects, 50 Stable COPD patients and 50 healthy Controls.

Period of study: September 2012 –August 2013

Place of study: Department of Physiology, Kilpauk Medical College, Chennai.

Inclusion criteria: Stable COPD patients diagnosed by our medicine OPD, KMCH, male and female > 40 years, duration of illness > 5 years, minimum educational qualification of Std VIII and above.

Exclusion criteria: Pulmonary tuberculosis, Diabetes mellitus, hypertension, alcoholism, neurological disorders, kyphoscoliosis, anemia, vitamin deficiencies, drugs causing neuropathies, thyroid disorders and acute severe COPD.

Controls: 50 healthy volunteers were taken as control.

Screening Procedures: Patients who were qualified under the inclusion criteria were enrolled in the study. Heart rate, blood pressure, height and weight were measured. Brief history was taken to rule out HT/DM/Pulmonary tuberculosis/ alcoholism/drug intake. General clinical examination was done.

Consent : A written consent were taken from the patients and controls after explaining the procedure and its significance in their vernacular language. Ethical clearance was obtained.

Method: Cognitive functions were assessed with Folstein Mini Mental State Questionnaire. Folstein Mini Mental State Questionnaire tests under four headings – I. ORIENTATION – carries maximum score of 10. II. IMMEDIATE RECALL - carries maximum score of 3. III. ATTENTATION AND CALCULATION - carries maximum score of 5. IV. RECALL - carries maximum score of 3. V. LANGUAGE - carries maximum score of 9. MAXIMUM SCORE is 30. Score of 23 – 30 is considered normal; 19 – 23 is considered borderline impairment; < 19 is considered impaired.

Results and Statistical analysis: Results were derived by statistical analysis of the data obtained and expressed in tables and charts.. The data were analyzed using SPSS 7.5 for windows student version software. The data were analyzed using independent samples t-test.

TABLE – I Comparison of age, height, weight and BMI between cases and controls

Variable	Group	Numbers	Mean	S.D	P value
Age	Case	50	50.12	5.752	0.145
	Control	50	51.72	5.131	
Height	Case	50	1.6986	0.06105	0.857
	Control	50	1.7008	0.06044	
Weight	Case	50	69.82	5.185	0.537
	Control	5	69.20	4.806	
BMI	Case	50	24.2106	1.45328	0.270

There is no significant difference between cases and controls in respect to age, height, weight and BMI.

EDUCATION		GROUP		TOTAL
		CASE	CONTROL	
8	COUNT	11	11	22
	% WITHIN GROUP	22%	22%	22%
9	COUNT	14	10	24
	% WITHIN GROUP	28%	20%	24%
10	COUNT	12	12	24
	% WITHIN GROUP	24%	24%	24%
11	COUNT	4	10	14
	% WITHIN GROUP	8%	20%	14%
12	COUNT	9	7	16
	% WITHIN GROUP	18%	14%	16%
TOTAL	COUNT	50	50	100
	% WITHIN GROUP	100%	100%	100%

TABLE – II Comparison of education between cases and controls

P =0.480

In our study, cases and controls were selected with minimum qualification of standard VIII and above (P value 0.480). There was no significant difference in education qualification between cases and controls.

TABLE – III

Comparison of Folstein MMSE scores between cases and controls

Variable	Group	Number	Mean	S.D	P VALUE
Folstein MMSE score	Case	50	22.34	2.869	<0.001
	Control	50	25.84	1.822	

We observed there was borderline impairment of cognitive function in stable COPD patients as per MMSE scores (P < 0.001).

DISCUSSION :

In our study, we enrolled 50 stable COPD patients and 50 healthy controls after general clinical examination. The mean age of the control group was 51.72 ± 5.131 ranging from 40 – 60 years. The mean age of the COPD patients was 50.12 ± 5.752 ranging from 40 – 60 years. P value is 0.145(not statistically significant). The mean height of the control group was 1.7008 ± 0.06044 . The mean height of the COPD patients was 1.6986 ± 0.06105 . P value is 0.857 (not statistically significant).

The mean weight of the control group was 69.20 ± 4.806 . The mean weight of the COPD patients was 69.82 ± 5.185 . P value is 0.537 (not statistically significant). The mean BMI of the control group was 23.8828 ± 1.50071 . The mean BMI of the COPD patients was 24.2106 ± 1.45328 . P value is 0.270 (not statistically significant). The mean MMSE score of the control group was 25.84 ± 1.822 . The mean MMSE score of the COPD patients was 22.34 ± 2.869 (borderline impaired cognitive function). P value is < 0.001 (statistically significant). We observed there was borderline impairment of cognitive function in stable COPD patients as per MMSE scores (P < 0.001).

Antonelli-Incalzi R et al reported that MMSE can be used to exclude cognitive dysfunction in COPD patients. In their study,149 COPD patients were screened for cognitive dysfunction using MMSE. Incalzi RA et al reported cognitive decline in COPD patients, and cognitive decline was faster in the presence of severe bronchial obstruction. Isoaho R et al studied the relative contribution of COPD to the occurrence of cognitive impairment and dementia in the elderly. Gupta PP et al reported cognitive dysfunction in stable COPD patients. MMSE scores were significantly reduced in COPD group (P value < 0.001). 27/40 COPD patients had reduced MMSE scores. All these studies are in accordance with my observations which also showed cognitive dysfunction in COPD patients.

CONCLUSION :

Thus from the above study, it is evident that there was borderline cognitive impairment in stable COPD patients compared to age, height, weight, BMI and education matched healthy controls. This study highlights the importance of using MMSE for assessing cognitive functions, which is inexpensive, non-invasive, and also easy to execute clinically.

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