"EFFECT OF EXERCISE TRAINING ON COGNITION IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) – A PROSPECTIVE STUDY"

By

REG. NO. –BR0119001

Dissertation

Submitted to

KAHER, Belagavi, Karnataka,

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in

RESPIRATORY MEDICINE

DEPARTMENT OF RESPIRATORY MEDICINE,

JAWAHARLAL NEHRU MEDICAL COLLEGE,

BELAGAVI, KARNATAKA.

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KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH, BELAGAVI, KARNATAKA

Endorsement by head of the Department, Principal/ Head of the Institution

This is to certify that the thesis **"EFFECT OF EXERCISE TRAINING ON COGNITION IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD): A PROSPECTIVE STUDY"** is a bonafide research work done by **REG. NO. –BR0119001.**

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ACCEPTANCE LETTER

The softcopy of thesis entitled: "EFFECT OF EXERCISE TRAINING ON COGNITION IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)- A PROSPECTIVE STUDY" has been submitted for Anti-Plagiarism check through Turnitin software. The scan has been carried out and the scanned output reveals a match percentage of **06%** which is within the acceptable limits of **10%** as per the guidelines given by UGC.

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To,
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2019-20 Batch,
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LIST OF ABBREVIATIONS

ACCP	-	American College of Chest Physicians
ATS	-	American Thoracic Society
BMI	-	Body Mass Index
BTS	-	British Thoracic Society
CHF	-	Congestive Heart Failure
CNS	-	Central Nervous System
COPD	-	Chronic Obstructive Pulmonary Disease
FEV_1	-	Forced Expiratory Volume in One Second
FVC	-	Forced Vital Capacity
GOLD	-	Global Initiative for Chronic Obstructive Lung Disease
HRQoL	-	Health Related Quality of Life
ICS	-	Inhaled Corticosteroids
IMV	-	Invasive Mechanical Ventilation
LABA	-	Long Acting Beta2 Agonist
MoCA	-	Montreal Cognitive Assessment
NIV	-	Non Invasive Ventilation
QoL	-	Quality of Life
SABA	-	Short Acting Beta2 Agonist

ABSTRACT

Background and objectives – Chronic obstructive pulmonary disease (COPD) is a complex multicomponent disorder with significant physical psychological and cognitive sequels that reduce the quality of life. COPD is associated with many extra pulmonary disorders that contribute to morbidity and mortality. Cognitive decline is an associated pathology that affects 14% to 70% patients of COPD. Exercise training is associated with cognitive improvement in COPD patients and thus improve the quality of life (QoL). This study was done to assess the prevalence of cognitive impairment in COPD patients and to study effects of exercise training on cognition in stable COPD patients.

Methods – This study was a one year prospective study. Adult 100 COPD patients of mild to moderate severity (Gold I, II) and 50 adults COPD patients as controls of either sex, all attending OPD/ IPD in the Department of Respiratory Medicine at KLE's Prabhakar Kore Hospital, J.N. Medical College, Belagavi from Oct 2019 to Dec 2020 were enrolled for this study. All stable COPD patients (GOLD stage I and II) were considered for exercise training group. Control group were COPD patients those, who were not given exercise training. Exercise training group COPD patients underwent 20 minutes of aerobic exercise/ day with frequency of 3 times per week for the period of 4 weeks. All patients cognitive functions assessed before (pre-exercise) and after (post-exercise) the completion of 4 weeks of exercise training by Montreal Cognitive Assessment (MoCA).

Result – Among enrolled adult COPD patients the mean age of study population was 58.5 ± 8.5 years with 66% were males and 34% were females. The prevalence of cognitive impairment in COPD patients observed was 41%. Improvement in cognitive functions after 4 weeks of exercise training was seen in 31 (75.6%) COPD patients.

Cognitive functions improved after 4 weeks of exercise training are – attention, language and orientation.

Conclusion – Prevalence of cognitive impairment in COPD patients was 41%. The main finding of this study is that there was improvement in cognitive functions observed after 4 weeks of exercise training in COPD patients. Cognitive functions that were improved after exercise training in COPD patients in our study are – attention, language and orientation. This result supports that exercise training has the potential to improve cognitive functions in COPD patients.

Keywords – Chronic obstructive pulmonary disease (COPD), cognitive functions, exercise training, Montreal Cognitive Assessment (MoCA).

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a disease state characterised by persistent progressive air flow limitation that is not fully reversible and associated with an enhanced chronic inflammatory response in the airways and lung tissue. It is preventable and treatable disease.(1)

Emphysema and Chronic bronchitis are most common conditions that constitute COPD. Chronic bronchitis is a clinically defined condition and has a productive coug

h and phlegm for three months in a year and for successive two or more years and a small airway disease in which chronic airflow obstruction occurs, in a patient in whom other causes of chronic cough have been excluded.(2)

An emphysema is anatomically defined condition, in which there occurs destruction of air sacs.(2)

COPD is most common disease worldwide. It is third leading cause of death. The incidence of COPD is 11% worldwide.(3) COPD is becoming public health problem. The burden of disease is increasing along with financial strain all over the world. The impact of socioeconomic burden and morbidity is huge. Poorly controlled COPD increases the overall cost in the treatment aspect. Appropriate treatment has to be provided to prevent exacerbation and mortality. In spite of standard therapy that includes bronchodilator, Corticosteroids, Beta -2 Agonist, Anti-Cholinergic Agents and Supportive Therapy like Oxygen Rehabilitation COPD is not well controlled. (3,4)

The hallmark of COPD is airflow obstruction also called airflow limitation shown in pulmonary function testing with reduction of FEV_1 and FEV_1/FVC. The degree of airflow obstruction is an important prognostic factor in COPD and is the basis for the 'Global Initiative for Lung Disease (GOLD) severity classification. Post bronchodilator $FEV_1/ FVC < 0.70$ confirms the presence of persistent airflow limitation and thus COPD.[7]

COPD is associated with different co-morbidities like cardio vascular diseases, recurrent respiratory infections, diabetes, anxiety, depression, and impairment of cognitive functions.[8]

Cognition is defined as mental action or the process of acquiring knowledge and understanding through thoughts, experience and the senses. As per Ulric Neisser psychologist "Cognition refers to the mental process by which external or internal input is transformed, reduced, elaborated, stored, recovered and used." It consists of many functions such as perception, attention, memory, coding, retention, and recall, decision making, resolving, problem solving, imaging.[9]

An association between chronic obstructive pulmonary disease (COPD) and cognition is shown in several studies. Cognitive impairment is highly prevalent in COPD patients. A study by Dogra et al.[9] assessed the cognitive function in COPD to understand the exact relationship between COPD and cognitive dysfunction, as cognitive dysfunction is associated with increased morbidity and mortality in COPD patients. Cognitive impairment prevalence was 48% in COPD patients.

In another study by Dodd et al,[10] it was observed that cognitive dysfunction was seen to increase with the severity of COPD and level of hypoxemia. Cognitive dysfunction prevalence was 52 % in COPD cases.

Various studies evaluated the effect of exercise training on cognitive functions.

A study by Ting Wang et al.[11] on influencing factors and exercise intervention in COPD patients showed beneficial effect of exercise training on cognition in COPD patients. The prevalence of cognitive impairment noted in their study was 53% in COPD cases. Another study by Emery et al.[28] on cognitive outcomes after exercise training in COPD patients observed improvement in cognitive functions like attention, verbal fluency, and orientation.

Studies on the effect of exercise training on cognitive function in chronic obstructive pulmonary disease are less in Indian patients. And there are very few Indian studies correlating the effect of exercise training on cognition in COPD cases. Also cognitive dysfunction is overlooked frequently in COPD patients.

Therefore, this study was done to evaluate the effect of exercise training on cognitive functions in COPD patients.

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ANNEXURE I – ETHICAL CLEARANCE CERTIFICATE

K.L.E. ACADEMY OF HIGHER EDUCATION AND RESEARCH
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Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (India)
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To,

PG student in Respiratory Medicine,
J.N.Medical College,
BELAGAVI.

Sub: Institutional Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled **"EFFECT OF EXERCISE TRAINING ON COGNITION IN CHRONIC OBSTUCTIVE PULMONARY DISEASE (COPD) PATIENTS – PROSPECTIVE STUDY"**, is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

(Dr. Anita Dalal)
Member Secretary
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

(Dr. Roopa M Bellad)
Chairman,
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

ANNEXURE II – CONSENT FORM

INFORMED CONSENT

TITLE OF THE STUDY: "EFFECT OF EXERCISE TRAINING ON COGNITION IN CHRONIC OBSTUCTIVE PULMONARY DISEASE (COPD) PATIENTS - PROSPECTIVE STUDY"

RESEARCH INVESTIGATOR

GUIDE:

INTRODUCTION AND PURPOSE:

The purpose of this study is to determine the effect of exercise training on cognition in chronic obstructive pulmonary disease (COPD) patients.

Cognitive decline is an associated pathology that affects 14% to 70% patients of COPD. This disturbance is probably a consequence of neuronal damaged produced by Hypoxemia. Exercise training is associated with maintenance and improvement of physical and cognitive functions.

This study, the effect of exercise training in COPD patients may confer long term benefits on cognition and improve quality of life of COPD patients.

PROCEDURE:

I request you to kindly participate in the study titled **"EFFECT OF EXERCISE TRAINING ON COGNITION IN CHRONIC OBSTUCTIVE PULMONARY DISEASE (COPD) PATIENTS - PROSPECTIVE STUDY"** at Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi is being conducted by DR. VINEET KULKARNI, Post graduate in Respiratory Medicine at J.N. Medical College Belagavi, Karnataka, under the guidance of DR. GAJANAN S. GAUDE, Professor, Dept. of Respiratory Medicine, J. N. Medical College, Belagavi.

We request you to participate in this study as you are eligible to be included. During the study, you will be asked questions regarding your present and past medical history and you will be required to answer to the best of your knowledge. You will also be clinically examined as per the protocol drawn.

If you agree to participate in the study, please furnish the details pertaining to the study.

BENEFITS:

- [redacted] the exercise training confers long term benefits on cognition and improve the quality of life of COPD patients.

COMPLICATIONS: NIL

ALTERNATIVES:

If you are not willing to take part in the study, your treatment or any other further investigations the patient wants to undergo, in future, in KLE will not be affected by your decision.

VOLUNTARY PARTICIPATION/WITHDRAWAL:

Taking part in this study is voluntary. You may choose not to take part in this study, or if you decide to take part, you can later change my mind and withdraw from the study. Your decision will not change the present or future health care or other services that you receive. The study doctor or the sponsor may stop your participation in this study. You will tell if any important new findings that may change my willingness to continue to take part. If you choose not to take part in the study, you will receive the standard treatment for patients with your condition.

COSTS:

NIL (The study is conducted on OPD and IPD patients at Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi)

Payment for Participation: No incentive will be paid to you for participating in this study.

COMPENSATION:

In the event that you become injured as a result of taking part in this study, treatment whatever available at KLE Charitable hospital, Belagavi, will be offered to you. No reimbursement, compensation or free medical care is given.

CONFIDENTIALITY:

All information collected about you during the course of the study will be kept confidential to the extent permitted by the law. The code numbers will identify you in this research record. Information from this study may be published but your identity will be kept confidential in any publicat on/ presentation.

QUESTION: If you have any enquiries in the future or in case of research related injury illness, you may contact following persons.

Signature _____

Name and signature of witness _____

Name and signature of interviewer _____

Date: _____

Place_____

ತಿಳುವಳಿಕೆಯ ಸಮ್ಮತಿ

ಅಧ್ಯಯನದ ಶೀರ್ಷಿಕೆ: "ದೀರ್ಘಕಾಲದ ಪ್ರತಿರೋಧಕ ಶ್ವಾಸಕೋಶದ ಕಾಯಿಲೆ (ಕಾಪ್ಡ್) ರೋಗಿಗಳಲ್ಲಿ ಅರಿವಿನ ಮೇಲೆ ವ್ಯಾಯಾಮ ತರಬೇತಿಯ ಪರಿಣಾಮ - ನಿರೀಕ್ಷಿತ ಅಧ್ಯಯನ"

ತನಿಖಾಧಿಕಾರಿ: -

ಮಾರ್ಗದರ್ಶಿ: -

ಪರಿಚಯ ಮತ್ತು ಉದ್ದೇಶ: -

ದೀರ್ಘಕಾಲದ ಪ್ರತಿರೋಧಕ ಶ್ವಾಸಕೋಶದ ಕಾಯಿಲೆ (ಸಿಒಪಿಡಿ) ರೋಗಿಗಳಲ್ಲಿ ಅರಿವಿನ ಮೇಲೆ ವ್ಯಾಯಾಮ ತರಬೇತಿಯ ಪರಿಣಾಮವನ್ನು ನಿರ್ಧರಿಸುವುದು ಈ ಅಧ್ಯಯನದ ಉದ್ದೇಶವಾಗಿದೆ.

ಅರಿವಿನ ಕುಸಿತವು ಸಂಬಂಧಿತ ರೋಗಶಾಸ್ತ್ರವಾಗಿದ್ದು, ಇದು ಸಿಒಪಿಡಿಯ 14% ರಿಂದ 70% ರೋಗಿಗಳ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುತ್ತದೆ. ಈ ಅಡಚಣೆ ಬಹುಶಃ ಹೈಪೋಕ್ಸೆಮಿಯಾದಿಂದ ಉತ್ಪತ್ತಿಯಾಗುವ ನರಕೋಶದ ಹಾನಿಯ ಪರಿಣಾಮವಾಗಿದೆ. ವ್ಯಾಯಾಮ ತರಬೇತಿಯು ದೈಹಿಕ ಮತ್ತು ಅರಿವಿನ ಕಾರ್ಯಗಳ ನಿರ್ವಹಣೆ ಮತ್ತು ಸುಧಾರಣೆಗೆ ಸಂಬಂಧಿಸಿದೆ.

ಈ ಅಧ್ಯಯನ, ಸಿಒಪಿಡಿ ರೋಗಿಗಳಲ್ಲಿ ವ್ಯಾಯಾಮ ತರಬೇತಿಯ ಪರಿಣಾಮವು ಅರಿವಿನ ಮೇಲೆ ದೀರ್ಘಕಾಲೀನ ಪ್ರಯೋಜನಗಳನ್ನು ನೀಡುತ್ತದೆ ಮತ್ತು ಸಿಒಪಿಡಿ ರೋಗಿಗಳ ಜೀವನದ ಗುಣಮಟ್ಟವನ್ನು ಸುಧಾರಿಸುತ್ತದೆ.

ವಿಧಾನ:

ಶೀರ್ಷಿಕೆಯ ಅಧ್ಯಯನದಲ್ಲಿ ದಯವಿಟ್ಟು ಭಾಗವಹಿಸಲು ನಾನು ವಿನಂತಿಸುತ್ತೇನೆ

"ದೀರ್ಘಕಾಲದ ಪ್ರತಿರೋಧಕ ಶ್ವಾಸಕೋಶದ ಕಾಯಿಲೆ (ಕಾಪ್ಡ್) ರೋಗಿಗಳಲ್ಲಿ ಅರಿವಿನ ಮೇಲೆ ವ್ಯಾಯಾಮ ತರಬೇತಿಯ ಪರಿಣಾಮ - ನಿರೀಕ್ಷಿತ ಅಧ್ಯಯನ" ಡಾ. ಪ್ರಭಾಕರ್ ಕೋರೆ ಆಸ್ಪತ್ರೆ ಮತ್ತು ವೈದ್ಯಕೀಯ ಸಂಶೋಧನಾ ಕೇಂದ್ರದಲ್ಲಿ, ಬೆಳಗಾವಿ ವೈದ್ಯಕೀಯ ಕಾಲೇಜು ನಲ್ಲಿ ಡಾ. ವಿನೀತ್ ಕುಲಕರ್ಣಿ, ಉಸಿರಾಟದ ಅಧಿದಲ್ಲಿ ಸ್ನಾತಕೋತ್ತರ ಪದವಿ. ಡಾ. ಗಜಾನನ್ ಎಸ್. ಗೌಡ ಪ್ರಾಧ್ಯಾಪಕರು, ಉಸಿರಾಟದ ಆಷಧ ವಿಭಾಗ, ಜೆ.ಎನ್. ವೈದ್ಯಕೀಯ ಕಾಲೇಜು, ಬೆಳಗಾವಿ ಕರ್ನಾಟಕ ಅವರ ಮಾರ್ಗದರ್ಶನದಲ್ಲಿ.

ನೀವು ಸೇರ್ಪಡೆಗೊಳ್ಳಲು ಅರ್ಹರಾಗಿರುವುದರಿಂದ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನಾವು ನಿಮ್ಮನ್ನು ವಿನಂತಿಸುತ್ತೇವೆ. ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ, ನಿಮ್ಮ ಪ್ರಸ್ತುತ ಮತ್ತು ಹಿಂದಿನ ವೈದ್ಯಕೀಯ ಇತಿಹಾಸದ ಬಗ್ಗೆ ನಿಮ್ಮನ್ನು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ ಮತ್ತು ನಿಮ್ಮ ಉತ್ತಮ ಜ್ಞಾನಕ್ಕೆ ನೀವು ಉತ್ತರಿಸಬೇಕಾಗುತ್ತದೆ. ಡ್ರಾ ಪ್ರೋಟೋಕಾಲ್ ಪ್ರಕಾರ ನಿಮ್ಮನ್ನು ಪ್ರಾಯೋಗಿಕವಾಗಿ ಪರೀಕ್ಷಿಸಲಾಗುತ್ತದೆ. ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನೀವು ಒಪ್ಪಿದರೆ, ದಯವಿಟ್ಟು ಅಧ್ಯಯನಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ವಿವರಗಳನ್ನು ನೀಡಿ.

ಪ್ರಯೋಜನಗಳು :

ಇದು ವ್ಯಾಯಾಮ ತರಬೇತಿಯನ್ನು ಕರಿಮ ಮಾಡುತ್ತದೆ ಅರಿವಿನ ಮೇಲೆ ದೀರ್ಘಕಾಲೀನ ಪ್ರಯೋಜನಗಳನ್ನು ನೀಡುತ್ತದೆ ಮತ್ತು ಸೊಪಿಡಿ ರೋಗಿಗಳ ಜೀವನದ ಗುಣಮಟ್ಟವನ್ನು ಸುಧಾರಿಸುತ್ತದೆ

ತೊಡಕು: ಶೂನ್ಯ

ಪರ್ಯಾಯಗಳು :

ನೀವು ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ಸಿದ್ಧರಿಲ್ಲದಿದ್ದರೆ, ನಿಮ್ಮ ಚಿಕಿತ್ಸೆ ಅಥವಾ ರೋಗಿಯು ಯಾವುದೇ ಇತರ ತನಿಖೆಗೆ ಒಳಗಾಗಲು ಬಯಸಿದರೆ, ಭವಿಷ್ಯದಲ್ಲಿ, ಕೆಎಲ್ಇಯಲ್ಲಿ ನಿಮ್ಮ ನಿರ್ಧಾರದಿಂದ ಯಾವುದೇ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ.

ಸ್ವಯಂಪ್ರೇರಿತ ಭಾಗವಹಿಸುವಿಕೆ / ಹಿಂತೆಗೆದುಕೊಳ್ಳುವಿಕೆ:

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವುದು ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸದಿರಲು ನೀವು ಆಯ್ಕೆ ಮಾಡಬಹುದು, ಅಥವಾ ನೀವು ಭಾಗವಹಿಸಲು ನಿರ್ಧರಿಸಿದರೆ, ನೀವು ನಂತರ ನಿಮ್ಮ ಮನಸ್ಸನ್ನು ಬದಲಾಯಿಸಬಹುದು ಮತ್ತು ಅಧ್ಯಯನದಿಂದ ಹಿಂದೆ ಸರಿಯಬಹುದು. ನಿಮ್ಮ ನಿರ್ಧಾರವು ಪ್ರಸ್ತುತ ಅಥವಾ ಭವಿಷ್ಯದ ಆರೋಗ್ಯ ರಕ್ಷಣೆ ಅಥವಾ ನೀವು ಸ್ವೀಕರಿಸುವ ಇತರ ಸೇವೆಗಳನ್ನು ಬದಲಾಯಿಸುವುದಿಲ್ಲ. ಅಧ್ಯಯನ ವೈದ್ಯರು ಅಥವಾ ಪ್ರಾಯೋಜಕರು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮ್ಮ ಭಾಗವಹಿಸುವಿಕೆಯನ್ನು ನಿಲ್ಲಿಸಬಹುದು. ಭಾಗವಹಿಸುವುದನ್ನು ಮುಂದುವರಿಸುವ ನಿಮ್ಮ ಇಚ್ಛೆಯನ್ನು ಬದಲಾಯಿಸಬಹುದಾದ ಯಾವುದೇ ಪ್ರಮುಖ ಹೊಸ ಅವಿಷ್ಕಾರಗಳು ನೀವು ಕೇಳುತ್ತೀರಿ. ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸದಿರಲು ನೀವು ಆರಿಸಿದರೆ, ನಿಮ್ಮ ಸ್ಥಿತಿಯ ರೋಗಿಗಳಿಗೆ ನೀವು ಪ್ರಮಾಣಿತ ಚಿಕಿತ್ಸೆಯನ್ನು ಸ್ವೀಕರಿಸುತ್ತೀರಿ.

ವೆಚ್ಚಗಳು :

ಶೂನ್ಯ (ಬೆಳಗಾವಿಯ ಡಾ. ಪ್ರಭಾಕರ್ ಕೋರೆ ಆಸ್ಪತ್ರೆ ಮತ್ತು ವೈದ್ಯಕೀಯ ಸಂಶೋಧನಾ ಕೇಂದ್ರದಲ್ಲಿ ಒಪಿಡಿ ಮತ್ತು ಐಪಿಡಿ ರೋಗಿಗಳ ಮೇಲೆ ಅಧ್ಯಯನವನ್ನು ನಡೆಸಲಾಗುತ್ತದೆ)

ಭಾಗವಹಿಸುವಿಕೆಗಾಗಿ ಪಾವತಿ:

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನಿಮಗೆ ಯಾವುದೇ ಪ್ರೋತ್ಸಾಹ ನೀಡಲಾಗುವುದಿಲ್ಲ.

ಪರಿಹಾರ:

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಫಾಲ್ಗೊಂಡ ಪರಿಣಾಮವಾಗಿ ನೀವು ಗಾಯಗೊಂಡರೆ, ಬೆಳಗಾವಿಯ ಕೆಎಲ್ಇ ಟಾರಿಟೇಬಲ್ ಆಸ್ಪತ್ರೆಯಲ್ಲಿ ಲಭ್ಯವಿರುವ ಯಾವುದೇ ಚಿಕಿತ್ಸೆಯನ್ನು ನಿಮಗೆ ನೀಡಲಾಗುವುದು. ಯಾವುದೇ ಮರುಪಾವತಿ, ಪರಿಹಾರ ಅಥವಾ ಉಚಿತ ವೈದ್ಯಕೀಯ ಸೌಲಭ್ಯವನ್ನು ನೀಡಲಾಗುವುದಿಲ್ಲ.

ಗೌಪ್ಯತೆ :

ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ನಿಮ್ಮ ಬಗ್ಗೆ ಸಂಗ್ರಹಿಸಲಾದ ಎಲ್ಲಾ ಮಾಹಿತಿಯನ್ನು ಕಾನೂನಿನಿಂದ ಅನುಮತಿಸಲಾದ ಮಟ್ಟಿಗೆ ಗೌಪ್ಯವಾಗಿಡಲಾಗುತ್ತದೆ. ಈ ಸಂಶೋಧನಾ ದಾಖಲೆಯಲ್ಲಿ ಕೋಡ್ ಸಂಖ್ಯೆಗಳು ನಿಮ್ಮನ್ನು ಗುರುತಿಸುತ್ತವೆ. ಈ ಅಧ್ಯಯನದ ಮಾಹಿತಿಯನ್ನು ಪ್ರಕಟಿಸಬಹುದು ಆದರೆ ಯಾವುದೇ ಪ್ರಕಟಣೆ / ಪ್ರಸ್ತುತಿಯಲ್ಲಿ ನಿಮ್ಮ ಗುರುತನ್ನು ಗೌಪ್ಯವಾಗಿಡಲಾಗುತ್ತದೆ.

ಪ್ರಶ್ನೆ :

ಭವಿಷ್ಯದಲ್ಲಿ ಅಥವಾ ಸಂಶೋಧನೆಗೆ ಸಂಬಂಧಿಸಿದ ಗಾಯದ ಅನಾರೋಗ್ಯದ ಸಂದರ್ಭದಲ್ಲಿ ನೀವು ಯಾವುದೇ ವಿಚಾರಣೆಗಳನ್ನು ಹೊಂದಿದ್ದರೆ, ನೀವು ಈ ಕೆಳಗಿನ ವ್ಯಕ್ತಿಗಳನ್ನು ಸಂಪರ್ಕಿಸಬಹುದು.

ಡಾ. ರೂಪಾ ಬೆಲ್ಲಾಡ್.
ಪ್ರೊಫೆಸರ್,
ಅಧ್ಯಕ್ಷರು,
ಜೆ.ಎನ್. ಮಾನವ ವಿಜಯಗಳ ಸಂಶೋಧನೆಗಾಗಿ ವೈದ್ಯಕೀಯ ಕಾಲೇಜು
ಸಾಂಸ್ಥಿಕ ನೈತಿಕ ಸಮಿತಿ.
ಪಿಎಚ್ .0831-2473777,
ವಿಸ್ತ. 1376 ಪಿ.ಎಚ್. ನಂ 0831-2473777,
ವಿಸ್ತ. 1376 ಪಿಎಚ್ ಸಂಖ್ಯೆ: 0831-2473777,
ವಿಸ್ತ. 1529 ಮೊಬ್ -8151979116
ಗೆ ಸಮಾಲೋಚಿಸಿ

ಸಂಶೋಧನಾ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ಒಪ್ಪಿಗೆ:

1. "ನಾನು ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುತ್ತಿದ್ದೇನೆ ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ, ಇದರಲ್ಲಿ ಸಿಆರ್‌ಪಿ ಅಂದಾಜುಗಾಗಿ ನನ್ನ ರಕ್ತದ ಮಾದರಿಯನ್ನು (ಸುಮಾರು 5 ಮಿಲಿ) ಕಳುಹಿಸುವುದು ಸೇರಿದೆ.

2. ರೋಗಿಯ ಮಾಹಿತಿ ಹಾಳೆಯಲ್ಲಿನ ಮಾಹಿತಿಯನ್ನು ನಾನು ಓದಿದ್ದೇನೆ ಮತ್ತು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ ಎಂದು ನಾನು ಖಚಿತಪಡಿಸುತ್ತೇನೆ. ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಅನಾನುಕೂಲಗಳ ಬಗ್ಗೆ ಮಾಹಿತಿಯೊಂದಿಗೆ ಕಾರ್ಯವಿಧಾನವನ್ನು ನನಗೆ ವಿವರವಾಗಿ ವಿವರಿಸಲಾಗಿದೆ. ವಿಚಾರಣೆಯ ಎಲ್ಲಾ ಅಂಶಗಳನ್ನು ಚರ್ಚಿಸಲು, ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು ಮತ್ತು ಮೇಲೆ ವಿವರಿಸಿರುವ ವಿಚಾರಣೆಯಲ್ಲಿ ಭಾಗವಹಿಸಲು ಈ ಮೂಲಕ ಒಪ್ಪಿಗೆ ನೀಡಲು ನನಗೆ ಅವಕಾಶ ನೀಡಲಾಗಿದೆ.

3. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವ ನಿರ್ಧಾರವು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ ಮತ್ತು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಅಧ್ಯಯನದಿಂದ ಹಿಂದೆ ಸರಿಯಲು ನಾನು ಅರಿಸಿಕೊಳ್ಳಬಹುದು ಎಂದು ನನಗೆ ತಿಳಿದಿದೆ.

4. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಮಾಡಲಾಗುವ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಯಾವುದೇ ಗಮನಾರ್ಹ ಅಪಾಯವಿಲ್ಲ ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ.

5. ಪಡೆಯಬಹುದಾದ ಫಲಿತಾಂಶಗಳಿಗೆ ಸಂಬಂಧಿಸಿದಂತೆ ಯಾರಿಂದಲೂ ಯಾವುದೇ ಭರವಸೆ ಅಥವಾ ಭರವಸೆ ನೀಡಿಲ್ಲ.

6. ಈ ಫಾರ್ಮ್‌ನಲ್ಲಿನ ನನ್ನ ಸಹಿ ಮೇಲಿನ ಮಾಹಿತಿಯನ್ನು ಅರ್ಥಮಾಡಿಕೊಂಡ ನಂತರ ಭಾಗವಹಿಸಲು ನಾನು ಸ್ವಇಚ್ಛೆಯಿಂದ ನಿರ್ಧರಿಸಿದ್ದೇನೆ ಎಂದು ಸೂಚಿಸುತ್ತದೆ ".

ಭಾಗವಹಿಸುವವರ ಹೆಸರು / ಕಾನೂನುಬದ್ಧವಾಗಿ ಅಧಿಕೃತ _____

ಪ್ರತಿನಿಧಿ

ಸಹಿ _____

ಸಾಕ್ಷಿಯ ಹೆಸರು ಮತ್ತು ಸಹಿ _____

ಸಂದರ್ಶಕರ ಹೆಸರು ಮತ್ತು ಸಹಿ _____

ದಿನಾಂಕ: _____

ಸ್ಥಳ_____

माहितीपूर्ण संमती

अभ्यासाचे शीर्षक: "तीव्र ऑब्जेक्टिव पल्मोनरी रोग (कोप्ट) रुग्णांमधील अनुभूतीवर व्यायामाच्या प्रशिक्षणाचा परिणाम - संभाव्य अभ्यास"

अन्वेषक: -

मार्गदर्शन:-

परिचय आणि उद्देश: -

या अभ्यासाचा उद्देश दीर्घकालीन अडथळा आणणाऱ्या फुफ्फुसीय रोग (सीओपीडी) रुग्णांमधील अनुभूतीवर व्यायामाच्या प्रशिक्षणाचा परिणाम निश्चित करणे आहे.
संज्ञानात्मक घट हे सीओपीडीच्या 14% ते 70% रुग्णांवर परिणाम करणारे संबंधित पॅथॉलॉजी आहे. हा वास वाढलेल्या हायपोक्सिमियाद्वारे निर्मित न्यूरोनल नुकसानीचा परिणाम आहे. व्यायामाचे प्रशिक्षण शारीरिक आणि संज्ञानात्मक कार्य देखभाल आणि सुधारण्याशी संबंधित आहे.
हा अभ्यास, सीओपीडी रुग्णांमधील व्यायामाच्या प्रशिक्षणानुळे होणा-या परिणामांमुळे अनुभूतीवर दीर्घकालीन फायदे मिळू शकतात आणि सीओपीडी रुग्णांचे जीवनमान सुधारु शकते.

प्रक्रिया:

मी आपणास विनंती आहे की कृपापूर्वक शीर्षक असलेल्या अभ्यासात सहभागी व्हावे "तीव्र ऑब्जेक्टिव पल्मोनरी रोग (कोप्ट) रुग्णांमधील अनुभूतीवर व्यायामाच्या प्रशिक्षणाचा परिणाम - संभाव्य अभ्यास" डॉ. प्रभाकर कोरे हॉस्पिटल व मेडिकल रिसर्च सेंटर, बेलागावी येथे डॉ. विनीत कुलकर्णी, जे.एन. मेडिकल कॉलेज बेलागावी, श्वसन चिकित्सा पदव्युत्तर डॉ. गजानन एस. गौडे, पाध्यापक, श्वसन चिकित्सा विभाग, जे. एन. मेडिकल कॉलेज, कर्नाटका बेलागावीच्या मार्गदर्शनाखाली.
आपण या अभ्यासामध्ये सहभागी होण्यासाठी आपण पात्र आहात कारण आपण या अभ्यासामध्ये सहभागी होण्यासाठी पात्र आहात. अभ्यासादरम्यान, आपल्यास आपल्या वर्तमान आणि भूतकाळातील वैद्यकीय इतिहासाशी संबंधित प्रश्न विचारले जातील आणि आपल्याला आपल्या सर्वोत्तम ज्ञानाची उत्तरे देण्याची आवश्यकता असेल. काढलेल्या प्रोटोकॉलनुसार आपली वैद्यकीय तपासणी देखील केली जाईल.
आपण अभ्यासामध्ये भाग घेण्यास सहमत असल्यास, कृपया अभ्यासाशी संबंधित तपशील द्या.

फायदे:

यामुळे व्यायामाचे प्रशिक्षण सुरू होते आणि अनुभूतीवर दीर्घकालीन फायदे मिळतात आणि सीओपीडी रुग्णांचे जीवनमान सुधारते.

गुंतागुंत: शून्य

विकल्प:

आपण अभ्यासामध्ये भाग घेण्यास तयार नसल्यास, आपले उपचार किंवा रुग्णाला भविष्यात केएलईमध्ये त्यापेक्षे वाटेल अशी इतर कोणतीही तपासणी किंवा परिणाम आपल्या निर्णयामुळे प्रभावित होणार नाहीत.

ऐच्छिक सहभाग / पैसे काढणे:

या अभ्यासामध्ये भाग घेणे ऐच्छिक आहे. आपण या अभ्यासामध्ये भाग न घेण्याचे निवडू शकता किंवा आपण यास भाग घेण्याचे ठरविल्यास आपण नंतर माझे मत बदलू आणि अभ्यासापासून दूर जाऊ शकता. आपल्या निर्णयामुळे आपल्याला प्राप्त झालेल्या वर्तमान किंवा भविष्यातील आरोग्य सेवा किंवा इतर सेवा बदलणार नाहीत. अभ्यास डॉक्टर किंवा प्रायोजक या अभ्यासामधील आपला सहभाग थांबवू शकतात. भाग घेण्याची माझी इच्छा बदलू शकेल असे कोणतेही नवीन नवीन निष्कर्ष काय ते आपण मला सांगतील. आपण अभ्यासामध्ये भाग न घेणे निवडल्यास, आपल्या आट असलेल्या रुग्णांसाठी तुम्हाला प्रमाणित उपचार मिळेल.

खर्च :

शून्य (डॉ. प्रभाकर कोरे हॉस्पिटल आणि वैद्यकीय संशोधन केंद्र, बेलगावी येथे ओपीडी आणि आयपीडी रुग्णांवर अभ्यास केला जातो)

सहभागासाठी पैसे :

या अभ्यासामध्ये भाग घेण्यासाठी आपल्याला कोणतीही प्रोत्साहन दिले जाणार नाही.

नुकसान भरपाई :

या अभ्यासामध्ये भाग घेतल्यामुळे आपण जखमी झाल्यास, केएलई चॅरिटेबल रुग्णालयात, बेलगावी येथे जे काही उपलब्ध असेल ते उपचार तुम्हाला देण्यात येतील. कोणतेही प्रतिपूर्ती, भरपाई किंवा विनामूल्य वैद्यकीय सेवा दिली जात नाही.

गोपनीयता :

अभ्यासादरम्यान आपल्याबद्दल संकलित केलेली सर्व माहिती कायद्याद्वारे परवानगी असलेल्या मर्यादेपर्यंत गोपनीय ठेवली जाईल. कोड नंबर आपल्याला या संशोधन रेकॉर्डमध्ये ओळखतील. या अभ्यासाची माहिती प्रकाशित केली जाऊ शकते परंतु आपली ओळख कोणत्याही प्रकाशन / सादरीकरणात गोपनीय ठेवली जाईल.

प्रश्न :

भविष्यात किंवा संशोधनाशी संबंधित दुखापतीच्या आजाराच्या बाबतीत आपल्याकडे काही चौकशी असल्यास आपण खालील व्यक्तींशी संपर्क साधू शकता.

डॉ. रोपा बेलद

प्राध्यापक,

अध्यक्ष,

जे.एन. मानव विषय संशोधनांसाठी वैद्यकीय महाविद्यालयांची संस्थागत नैतिक समिती.

Ph.0831-2473777, अतिरिक्त. 1376 फोन नंबर 0831-2473777, एक्स्ट्रा.

1376 फोन नंबर: 0831-2473777,

एक्स्ट्रा. 1529 मोब -8151979116

ची सहमती

संशोधन अभ्यासामध्ये भाग घेण्यासाठी संमती :

1. "मला समजले आहे की मी अभ्यासात भाग घेत आहे, ज्यात माझे रक्त नमुना (सुमारे मिली) सीआरपी अंदाजानुसार पाठविणे समाविष्ट आहे.

2. मी पुष्टी करतो की मी वरील माहिती पत्रकात माहिती वाचली आणि समजली आहे. अभ्यासामध्ये भाग घेण्यापासून होणारे फायदे आणि तोटे याबद्दल माहितीसह मला प्रक्रियेचे तपशीलवार वर्णन केले आहे. मला घटल्याच्या सर्व बाबींवर चर्चा करण्याची, प्रश्न विचारण्याची आणि याद्वारे वरील वर्णन केलेल्या चाचणीत सहभागी होण्यास संमती देण्याची संधी देण्यात आली आहे.

3. मला समजते की या अभ्यासामध्ये भाग घेण्याचा निर्णय पूर्णपणे ऐच्छिक आहे आणि मला माहित आहे की मी केव्हाही अभ्यासातून माघार घेणे निवडू शकतो.

4. मला समजले आहे की या अभ्यासामध्ये घेण्यात येणा testQया चाचणीत कोणताही महत्त्वपूर्ण धोका नाही.

5. मिळणाऱ्या निकालांबद्दल कोणालाही कोणतीही हमी किंवा हमी दिलेली नाही.

6. वरील माहिती समजल्यानंतर मी स्वेच्छेने सहभागी होण्याचा निर्णय घेतला असल्याचे या फॉर्मवरील माझी स्वाक्षरी.

सहभागीचे नाव / कायदेशीररित्या अधिकृत _____
प्रतिनिधी

स्वाक्षरी _____

साक्षीदाराचे नाव व स्वाक्षरी _____

मुखत्यारदाराचे नाव व स्वाक्षरी _____

तारीख : _____

ठिकाण _____

ANNEXURE III – PROFORMA

KAHER
J.N. MEDICAL COLLEGE, BELAGAVI – 590 010.
DEPARTMENT OF RESPIRATORY MEDICINE

Title: Effect of exercise training on cognition in chronic obstructive pulmonary disease (COPD) patients - prospective study.

Research investigator : Dr. Vineet Kulkarni
Guide : Dr. Gajanan S. Gaude, Prof. and HOD: Respiratory medicine department

Proforma for data collection

Date _____

Name of patient: _____

Age: _____ (in years) Sex: Male / Female

OPD / IPD number _____ Mobile number: _____

Address: _____

_____

City: _____ Dist: _____ Pincode: _____

Education of patient: Literate / Illiterate

I **Chief complaints**

1 Cough
2 Sputum
3 Breathlessness
4 Chest pain
5 Fever
6 Any other
7 H/o exacerbations

II **History of presenting illness**

III Past history

1 Tuberculosis (TB): Yes / No
2 Diabetes mellitus: Yes / No
3 Hypertenstion: Yes / No
4 Any other disease NIL /

IV Personal history

1 Smoker Yes / No

Biddi _____ perday _____ for years

Cigarettes _____ perday _____ for years

Hukka _____ perday _____ for years

2 Alcohol Yes / No

If yes

Quantity _____ ml/day _____ for years

3 Tabaco chewer Yes / No

If yes

Number of times _____ perday _____ for years

V Occupational history

Farmer

Office job

Industry worker

- Type of industry
  - Metal
  - Chemical
  - Other
- Exposure to Dust / Fumes / Chemicals every day for _____ hours for _____ year

VI **General examination**

Height _____ cms

Temp _____ °F

Blood pressure _____ mmHg

Respiratory rate _____ \min

Clubbing Present / Absent

JVP Present / Absent

Weight _____ Kg

Pulse _____ /min Regular/ Irregular

SPO_2 _____ %

Cyanosis Present / Absent

Pallor Present / Absent

Ictinus Present / Absent

Edema Present / Absent

VII **Systemic examination**

R/s.

Inspection

Shape and size of chest

Movements of chest

Palpation

Trachea

Apex beat

Percussion

Auscultation

Breath sounds Decreased / Normal

Crepitations

Rhonchi

CVS

S_1 Normal / Loud / Muffelled

S_2 Normal / Loud / Muffelled

Murmur Yes / No

P/A Normal / L°S°K°

CNS

Cranial nerves Normal / Abnormal

Higher centers Normal / Abnormal

Motor system Normal / Abnormal

Sensesory system Normal / Abnormal

Reflexes Normal / Abnormal

VIII Investigations

X-ray chest

Hb _____ gms% WBC _____ /cmm

N _____ % L _____ % E _____ %

Platelet count _____ /cmm Blood group _____

Blood sugar

Random _____ mg%

Fasting _____ mg% P.P. _____ mg%

Sputum Gram Stain _____

S.creatinine _____

PFT – FVC _____ %

FEV_1 _____ %

FEV_1 / FVC _____

IX **Present treatment**

Bronchodilators

Inhalers

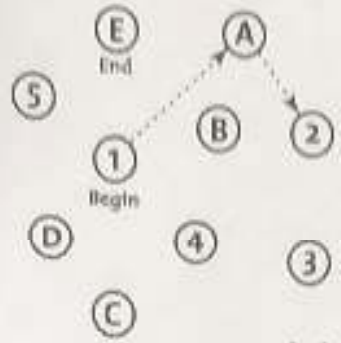
Mucolytic / Expectorants

Others

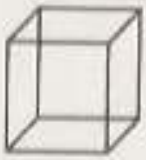
MONTREAL COGNITIVE ASSESSMENT (MOCA)

NAME :
Education : Date of birth :
Sex : DATE :

VISUOSPATIAL / EXECUTIVE



Copy cube



[ ] [ ]

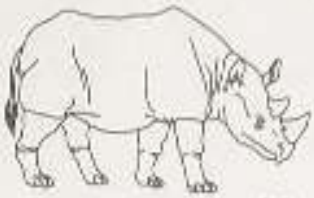
Draw CLOCK (Ten past eleven) (3 points)

[ ] Contour [ ] Numbers [ ] Hands

POINTS /5

NAMING

[ ]



[ ]

[ ] /3

MEMORY

Read list of words, subject must repeat them. Do 2 trials. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION

Read list of digits (1 digit/ sec.): Subject has to repeat them in the forward order [ ] 2 1 8 5 4

Subject has to repeat them in the backward order [ ] 7 4 2 /2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors

[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B /1

Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65

4 or 5 correct subtractions: 3 pts, 2 or 3 correct: 2 pts, 1 correct: 1 pt, 0 correct: 0 pt /3

LANGUAGE

Repeat : I only know that John is the one to help today. [ ]

The cat always hid under the couch when dogs were in the room. [ ] /2

Fluency / Name maximum number of words in one minute that begin with the letter F [ ] ____ (N ≥ 11 words) /1

ABSTRACTION

Similarity between e.g. banana - orange = fruit [ ] train - bicycle [ ] watch - ruler /2

DELAYED RECALL

	Has to recall words	FACE	VELVET	CHURCH	DAISY	RED	Points for UNCUED recall only
	WITH NO CUE	[ ]	[ ]	[ ]	[ ]	[ ]	
Optional	Category cue						
	Multiple choice cue						

/5

ORIENTATION

[ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City /6

© Z.Nasreddine MD Version 7.0 www.mocatest.org Normal ≥ 26 / 30

TOTAL /30

Add 1 point if ≤ 12 yr edu

Administered by: _____

ANNEXURE IV – MASTER CHART

Details of Patients						History of Patients																						Clinical Exam																Average Score of Cognitive Function Tests	
						Cough				Breathlessness								Occupation				History of				General Exam				R/S Exam	Additional Sounds		X-ray Chest		PFT							
Sr. No	Name	Age	Sex	Address	OPD/ IPD No	> 1 year	> 3 years	> 5 years	Sputum	GR I	GR II	GR III	Chest Pain	Fever	Other Symptoms	Exacerbations	Smoking	Farmer	Labor	Sedentory Work	Housewife	TB	DM	HTN	Other	Clubbing	Cyanosis	JVP	Oedema	Decreased Breath Sounds	Crepitations	Rhonchi	COPD Changes	Other Findings	Mild Obstruction	Moderate Obstruction	Severe Obstruction							Before	After
1	Sunandabai Kalkundikar	72	F	Belgavi	8050453759	+	-	-	+	+	-	-	+	-	-	-	-	-	-	-	+	-	-	+	-	+	-	-	-	+	+	-	+	-	-	+	-						15/30	26/30
2	Balkrishna Chikkorde	64	M	Chikkodi	9481741844	+	-	-	+	+	-	-	-	-	-	+	B/10/10	-	-	+	-	-	+	-	-	-	-	-	-	+	+	-	+	-	+	-	-						18	27
3	Shivraj Shinde	65	M	Gadhinglas	9765337890	-	+	-	+	-	+	-	+	-	+	-	C/5/10	-	-	+	-	-	-	-	-	-	-	-	-	+	+	+	+	+	-	-	+						18	26
4	Nagaesh Pusad	72	M	Belgavi	8747933966	-	-	+	+	-	-	+	+	+	-	+	B/10/20	+	-	-	-	+	-	-	-	+	-	-	+	+	+	+	+	-	-	+	+						16	25
5	Tulsavva Hattimani	59	F	Belgavi	9742807891	+	-	-	-	+	-	-	-	-	+	+	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	-	+	+	+	-	-						17	26
6	Sushila Laxman Patil	60	F	Belgavi	996488040	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	-	+	-	+	-	-						17	25
7	Sidappa Ingley	65	M	Gokak	9980108525	-	+	-	+	-	+	-	-	+	-	+	B/10/10	+	-	-	-	-	-	+	-	-	-	-	-	+	+	-	+	-	-	+	-						18	26
8	Suvarna Hiremath	63	F	Chikodi	9740552454	+	-	-	-	+	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	+	-	-	-	+	+	-	+	-	+	-	-						20	27
9	Neelu Hiremath	50	F	Belgavi	9892473391	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	-	+	-	+	-	-						20	26
10	Mahadev Dodamani	30	M	Chipalkatti	9902628982	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						22	28
11	Kasturi Harakum	65	F	Shiv Basav Nagar	2720139	-	-	+	+	-	+	-	+	-	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	+	+	-	+	-	+	-	-						17/30	26/30
12	Nangundeshwar Basavagol	42	M	Khanapur	5578839	+	-	-	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	+	+	-	+	-	-	+	-						20	28
13	Lingappa Magdum	65	M	Hukkeri	5994372	-	-	+	+	-	+	-	+	-	-	-	B/10/10	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	+	-						17	25
14	Laxman Nymgauda	80	M	Belgavi	2720162	-	-	+	+	-	+	-	+	+	+	+	B/5/15	+	-	-	-	+	-	+	+	+	-	-	+	+	+	+	+	-	-	-	+						13	21
15	Basweshwar Govimath	69	M	Belgavi	2575215	-	-	+	+	-	+	-	+	-	-	-	C/10/10	-	+	-	-	-	+	-	-	-	-	+	-	+	-	+	+	-	-	+	-						18	26
16	Sonavva Maniker	58	F	Belgavi	4759783	-	+	-	+	+	-	-	-	-	+	-	-	-	-	-	+	-	+	-	-	-	-	-	-	+	+	-	+	-	+	-	-						20	27
17	Siddaramappa Korani	70	M	Vaibhav Nagar	6022920	-	-	+	+	-	+	-	+	+	-	-	B/10/10	+	-	-	-	-	-	-	-	+	-	-	-	+	+	+	+	-	-	+	-						14	22
18	Narayan Pande	61	M	Belgavi	5661519	-	+	-	+	+	-	-	-	-	-	-	C/5/10	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						19	27
19	Ramesh Malkari	52	M	Hukkeri	5682204	+	-	-	+	+	-	-	-	-	-	-	B/10/5	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						18	27
20	Shivbasayya Hulamani	84	M	Hukkeri	2984640	-	-	+	+	-	+	-	+	+	+	+	B/10/15	+	-	-	-	+	-	-	-	+	+	-	+	+	+	+	+	-	-	-	+						9	18
21	Fakirwa Naik	45	F	Dandeli	5661888	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						20	28
22	Parshuran	59	F	Belgavi	5652811	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						15	26
23	Shanta Chougule	72	F	Belgavi	2689107	-	-	+	+	-	+	-	+	+	+	-	B/10/10	+	-	-	-	-	+	-	-	-	-	+	-	+	+	-	+	-	+	-	-						14	25
24	Balasheb Shetty	42	M	Chikkodi	5659795	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						18	28
25	Babu S.	53	M	Hukkeri	5658658	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	+	+	-	+	-	-						17	26
26	Parashuran Sugi	59	F	Belgavi	5652811	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	+	+	-	+	-	-						16	25
27	Bahubali Kochari	47	M	Chikodi	5703084	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						19	27
28	Madhukar Davre	43	M	Ram Durgh	5057970	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	+	+	-	+	-	-						18	28
29	Basappa Talwar	45	M	Belgavi	572979513	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						17	28
30	Ramu Kante	70	M	Hukkeri	4959572	-	-	+	+	-	+	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	+						13	24
31	Horabai Haye	64	F	Chikkodi	5731824	-	-	+	+	-	+	-	-	-	-	-	-	-	-	-	+	-	-	+	-	+	-	-	-	+	+	-	+	+	+	-	-						14	24
32	Maruti Kamble	65	M	Ram Durgh	5714132	-	-	+	+	-	+	-	+	-	+	+	B/10/10	-	-	+	-	+	-	-	-	-	-	-	-	+	+	-	+	-	-	+	-						15	26
33	Mahadevi Wali	45	F	Ram Durgh	5755254	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						20	28
34	Gangawwa Kabbur	70	F	Saundatti	3311980	-	-	+	+	-	+	-	+	+	+	-	-	-	-	-	+	-	-	+	-	+	-	-	+	+	+	+	+	-	-	+	-						13	23
35	Ghoeba Venkatesh	74	M	Hukkeri	5825237	-	-	+	+	-	-	+	+	+	+	+	B/20/20	-	-	+	-	-	+	+	-	+	-	-	+	+	+	+	+	-	-	+						12	20
36	Rita Fernandez	70	F	Belgavi	5870764	-	-	+	+	-	+	-	+	+	+	-	-	-	-	-	+	-	+	+	+	-	-	+	-	+	+	-	+	-	-	+	-						13	19
37	Purushottam Radeshwar	53	M	Dandeli	5879988	+	-	-	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						18	27
38	Mahendra Sheth	54	M	Gokak	5887242	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	+	+	-	+	-	+	-	-						18	27
39	Madawappa Kaknur	45	M	Gokak	5882333	+	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-						20	28
40	Paragouda Patil	70	M	Gokak	1210279	-	-	+	+	-	-	+	+	-	-	-	B/15/15	+	-	-	-	-	+	-	-	+	-	-	-	+	-	+	+	-	-	+	-						13	20
41	Balkrishna Bhosle	70	M	Chikkodi	1064994	-	-	+	+	-	+	-	+	+	+	-	B/17/15	-	-	+	-	-	-	+	-	-	-	+	+	+	-	+	+	-	-	+	-						13	21

42	Chandrakant Subedar	59	M	Ram Durgh	5920787	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	14	20
43	Farida Jamadar	51	F	Gokak	5919039	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	-	+	-	+	-	-	16	26
44	Suvarna Patil	58	F	Belgavi	2462313	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	+	+	-	+	-	-	15	24
45	Shirish Shinde	61	M	Belgavi	1203445	-	+	-	+	+	-	-	+	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	+	+	-	+	-	-	+	-	13	21
46	Babu Pawar	71	M	Gokak	5902594	-	-	+	+	-	+	-	+	+	+	-	B/10/10	+	-	-	-	+	-	+	-	+	-	-	+	+	+	+	+	+	-	-	+	14	25
47	Harishchandra Gavane	52	M	Dandeli	5944747	+	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	18	26
48	Bhimappa Kadappa	63	M	Bailhongal	5665356	-	-	+	-	+	-	-	-	-	-	-	B/50/5	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	15	25
49	Shobha Chopde	66	F	Hukkeri	6055221	-	-	+	+	-	+	-	-	-	-	-	-	-	-	-	+	-	+	-	+	-	+	-	-	+	+	-	+	-	-	-	+	14	23
50	Maruti Gurav	71	M	Bailhongal	603254	-	-	+	+	-	+	-	+	+	+	+	C/10/10	+	-	-	-	-	-	+	-	-	-	+	-	+	+	+	+	-	-	-	+	13	26
51	Smt Manisha Kallapa	66	F	Hukkeri	5983837	-	+	-	+	-	+	-	-	+	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	+	+	-	+	-	+	-	-	16	26
52	Smt Soumya Ayyer	54	F	Soundati	6015730	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	20	28
53	Ravi Kshtriya	49	M	Gokak	6018867	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	21	29
54	Devraj Dalwat	59	M	Hukkeri	1498847	+	-	-	+	+	-	-	-	-	-	-	B/5/5	+	-	-	-	-	-	+	-	-	-	+	-	+	+	-	+	-	+	-	-	17	26
55	Sayaraswa Netre	62	F	Hukkeri	3042383	-	+	-	+	-	+	-	+	-	+	-	-	-	-	-	+	-	-	-	+	-	-	-	+	+	-	+	+	-	-	+	-	15	25
56	Sharnappa Patted	42	M	Bailhongal	1036826	+	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	+	20	28
57	Durgamma K.	74	F	Chikkodi	1037149	-	-	+	+	-	+	-	+	+	+	+	-	-	-	-	+	-	-	+	+	+	-	-	+	+	+	-	+	-	-	-	+	12	20
58	Vilas Patil	35	M	Chikkodi	2670218	+	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	22	29
59	Shaikh Mohmod Harif	59	M	Hukkeri	3643070	-	+	-	-	+	-	-	-	-	-	-	B/5/10	+	-	-	-	-	-	+	-	-	-	-	-	+	+	-	+	-	+	-	-	14	24
60	Basavraj	71	M	Dandeli	1486790	-	-	+	+	-	+	-	+	+	+	+	B/10/10	+	-	-	-	+	+	+	-	+	-	-	+	+	+	+	-	-	-	+	12	20
61	Ishwar Govind	55	M	Hukkeri	5892029	-	+	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	+	+	-	+	-	14	26
62	Malti Patil	60	F	Chikkodi	5583417	-	+	-	+	+	-	-	+	+	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	-	+	-	+	-	-	13	25
63	Vijay Khurid	46	M	Chikkodi	5986706	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	+	+	+	-	-	20	28
64	Soumitra Kushappa	62	F	Hukkeri	5989170	-	+	-	+	-	+	-	+	-	+	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	+	+	-	-	+	-	14	25
65	Kharam Najor	69	M	Chikkodi	5947094	-	-	+	+	-	+	-	+	+	+	-	+	+	-	-	-	-	-	+	-	+	-	+	-	+	+	-	+	-	-	+	-	12	24
66	Sharda Jadhav	53	F	Hukkeri	59496773	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	+	+	-	-	-	-	-	+	+	+	+	-	+	-	-	15	26
67	Nilvva Chougule	60	F	Chikkodi	4235459	-	+	-	+	-	+	-	+	+	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	-	+	-	+	-	-	13	25
68	Omkrishna P.	53	M	Dandeli	59860154	+	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	14	26
69	Surendra	53	M	Hukkeri	6023409	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	15	26
70	Mallapa Birasdar	85	M	Bailhongal	4951790	-	-	+	+	-	-	+	+	+	+	+	B/20/20	+	-	-	-	+	+	+	+	+	+	-	+	+	+	+	+	+	-	-	+	9	16
71	Nagesh Subhash	76	M	Hukkeri	5264045	-	-	+	+	-	+	-	+	+	+	+	+	+	-	-	-	-	-	+	-	+	-	+	+	+	+	+	+	-	-	+	15	26
72	Chanappa	60	M	Bailhongal	5263134	-	+	-	+	+	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	+	+	-	+	-	-	+	-	16	25
73	Chandu Hurappa	67	M	Dandeli	5157929	-	+	-	+	+	-	-	+	-	+	-	B/15/15	-	-	+	-	-	-	-	+	-	-	-	+	+	+	-	+	-	-	+	-	14	23
74	Laxman	79	M	Gokak	6028039	-	-	+	+	-	+	+	+	+	+	+	B/20/15	+	-	-	-	-	+	+	-	+	+	-	+	+	+	+	+	+	-	-	+	13	22
75	Mahadevi Polkinvar	60	F	Dandeli	5646499	+	-	-	+	+	-	-	-	-	+	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	16	26
76	Vithal Rajbhar	30	M	Hattur	6010169	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	20	29
77	Sidappa	69	M	Bailhongal	8625752	-	-	+	+	-	+	-	+	+	+	-	C/10/10	+	-	-	-	-	-	+	-	-	-	-	+	+	-	+	+	-	-	+	-	13	23
78	Taj Mohamad	47	F	Dandeli	3535190	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	21	29
79	Somappa	65	M	Gokak	1044814	-	+	-	+	-	+	-	+	-	-	-	B/10/10	-	+	-	-	-	+	-	-	-	-	-	-	+	+	-	+	-	+	-	-	16	27
80	Shankar Dundappa	77	M	Hukkeri	1045530	-	-	+	+	-	-	+	+	+	+	-	B/15/15	+	-	-	-	-	+	+	-	+	-	-	+	+	+	+	+	+	-	-	+	12	22
81	Sharnappa Tuprol	61	M	Chikkodi	1046299	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	15	26
82	Kalangauda Patil	73	M	Ram Durgh	1046710	-	-	+	+	-	+	-	+	+	+	+	B/10/10	-	-	+	-	-	-	-	-	-	-	-	+	+	+	-	+	-	+	-	-	12	22
83	Shashikala Patil	50	F	Belgavi	1046730	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	19	28
84	Umadevi Prasad	65	F	Ram Durgh	1047793	-	+	-	+	-	+	-	+	+	+	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	+	+	-	-	+	-	16	26
85	Virbhadrappa	74	M	Ram Durgh	1047855	-	-	+	+	-	+	-	+	+	+	+	B/10/10	+	-	-	-	-	-	-	+	+	-	+	-	+	+	+	+	+	-	-	+	11	21
86	Yallavva Nadgmuri	56	F	Gokak	1047232	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	+	+	-	-	-	-	-	+	+	-	+	-	+	-	-	18	26
87	Ismailsab	69	M	Hukkeri	1043178	-	-	+	+	-	+	-	+	+	+	-	B/5/10	-	+	-	-	-	-	-	+	-	-	-	-	+	-	+	+	-	-	+	-	13	23
88	Bhimarayya Nandergi	60	M	Chikkodi	1043186	-	+	-	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	+	+	-	+	-	+	-	-	14	25
89	Dundappa Teli	68	M	Gokak	1043605	-	+	-	+	-	-	-	+	-	+	-	B/5/10	+	-	-	-	-	-	+	-	-	-	-	-	+	+	+	+	-	-	+	-	13	23
90	Nasirbanu Mansur	55	F	Gokak	1043753	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	17	27
91	Nasrin Mansur	55	F	Gokak	620913	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	15	26
92	Suresh Mali	57	M	Chikkodi	6034396	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	+	+	-	+	-	-	15	27
93	Maya Rathod	61	F	Hukkeri	6034585	-	+	-	+	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	+	+	-	+	-	+	-	-	14	25
94	Somappa Sidapa	65	M	Gokak	1044814	-	-	+	+	+	-	-	+	-	-	-	B/10/10	+	-	-	-	-	-	+	-	-	-	-	+	+	+	+	+	+	-	-	13	13
95	Shankar	77	M	Hukkeri	1045530	-	-	+	+	-	+	+	+	+	+	+	B/15/15	+	-	-	-	+	-	-	+	+	-	-	+	+	+	+	+	-	-	-	+	10	1
96	Dundappa Teli	68	M	Gokak	1043605	-	-	+	+	-	-	+	+	+	+	-	B/5/10	-	+	-	-	-	+	+	-	+	-	+	-	+	+	+	+	+	-	-	+	9	14
97	Sharavappa	61	M	Chikkodi	1046299	-	+	-	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	13	20

98	Sharnappa Patted	49	M	Chikkodi	1036826	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	18	26
99	Dundappa Shankarappa	71	M	Ram Durgh	1037580	-	-	+	+	-	+	-	+	+	+	+	C/10/10	+	-	-	-	-	+	+	-	+	+	-	+	+	+	+	+	-	-	+	-	10	14
100	Vasant Sappakki	50	M	Gokak	1037728	+	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	19	26
101	Bharma Kalkundkar	60	M	Bailhongal	1036584	+	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	-	-	+	-	11	16
102	Channappa Balikar	63	M	Hukkeri	1038169	-	+	-	+	+	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	+	+	-	+	-	-	+	-	15	19
103	Maruti	70	M	Hukkeri	1038656	-	-	+	+	-	+	-	+	+	+	+	B/5/10	+	-	-	-	-	-	+	-	-	-	+	-	+	+	+	+	-	-	+	-	11	16
104	Baburao Phadtare	60	M	Gokak	1039363	-	+	-	-	+	-	-	-	-	+	-	-	+	-	-	-	-	-	+	-	-	-	-	-	+	+	+	+	-	+	-	-	17	24
105	Nakusab Nadaf	69	M	Chikkodi	1039735	-	-	+	+	-	+	-	+	+	+	-	B/5/10	-	+	-	-	+	-	+	-	-	-	-	+	+	+	+	+	+	-	-	+	12	20
106	Abdul Hawaldar	69	M	Hukkeri	5981762	-	-	+	+	-	+	-	+	+	+	-	C/5/10	-	-	+	-	-	+	+	-	-	-	-	+	+	+	+	+	-	-	-	+	9	13
107	Shivaji Patil	77	M	Chikkodi	1039665	-	-	+	+	-	-	+	+	+	-	+	B/20/10	+	-	-	-	-	+	+	+	+	-	-	+	+	+	-	+	-	-	-	+	7	8
108	Mangal Kadam	62	F	Hukkeri	1040132	-	+	-	+	+	-	-	-	-	+	-	-	-	-	+	+	-	-	-	+	-	-	-	-	+	-	+	+	-	+	-	-	14	20
109	Vishnu Kundrikar	57	M	Bailhongal	1040858	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	10	17
110	Nagratna	70	F	Gokak	1042512	-	-	+	+	-	+	-	+	-	-	-	-	-	-	+	+	-	-	+	-	+	-	-	+	+	+	-	+	-	+	-	-	7	7
111	Parsappa Ningappa	55	M	Hukkeri	1042870	+	-	-	+	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	9	14
112	Bhairu Mandolkar	63	M	Hukkeri	1042753	+	-	-	+	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	10	16
113	Kamappa Vallappa	71	M	Gokak	1025793	-	+	-	+	-	+	-	+	+	+	+	B/10/20	+	-	-	-	+	-	+	-	+	-	-	+	+	+	+	+	-	-	-	+	8	15
114	Prakash Rane	66	M	Ram Durgh	1026474	-	+	-	+	-	+	-	+	+	+	-	B/5/10	+	-	-	-	-	-	+	-	-	-	-	-	+	+	+	+	-	-	+	-	11	19
115	Ranjana Revankar	65	F	Hukkeri	1026457	-	+	-	+	+	-	-	+	+	+	-	B/10/10	+	-	-	-	-	-	+	-	-	-	-	+	+	+	+	+	-	+	-	-	14	23
116	Savakka Naueli	62	F	Bailhongal	1018855	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	-	+	+	-	+	-	-	14	26
117	Pargauda Patil	70	M	Hukkeri	1027424	-	-	+	+	-	-	+	+	-	+	+	C/5/10	+	-	-	-	-	+	-	-	+	+	+	-	+	+	+	+	+	-	-	+	8	12
118	Shivaji Narukar	72	M	Hukkeri	1029930	-	-	+	+	-	+	-	+	+	+	+	B/10/20	+	-	-	-	+	-	+	-	+	-	-	-	+	+	+	+	+	-	-	+	9	17
119	Abdul Kadar	66	M	Hukkeri	1031808	-	+	-	+	-	+	-	+	+	+	-	B/5/10	-	+	-	-	-	+	+	-	-	-	-	-	+	+	-	+	-	-	+	-	9	16
120	Bibi Darwad	63	F	Gokak	4366333	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	-	+	-	+	-	-	12	18
121	Manohar Patil	50	M	Chikkodi	1033490	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	15	26
122	Vijaya Basavraj	60	F	Bailhongal	1037012	+	-	-	-	+	-	-	-	-	+	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	+	+	-	+	-	-	15	24
123	Krishnappa Gauli	62	M	Bailhongal	5975311	+	-	-	-	+	-	-	+	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	+	+	-	+	-	-	13	22
124	Chandbi Mulla	60	F	Hukkeri	1024699	+	-	-	-	+	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	+	+	+	-	+	+	-	+	-	7	11
125	Annawa Haligouda	56	F	Bailhongal	14154727	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	9	17
126	Ramesh Gupta	72	M	Hukkeri	5661546	-	+	-	+	-	+	-	+	-	+	+	B/10/10	+	-	-	-	-	-	+	-	+	-	+	+	+	+	+	+	-	-	-	+	8	15
127	Tengin Akai	52	M	Ram Durgh	3031363	+	-	-	-	+	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	14	24
128	Bhima Muncho	68	M	Saundatti	1012043	-	+	-	+	-	+	-	+	-	-	-	B/5/10	+	-	-	-	-	-	+	-	-	-	-	-	+	+	-	+	-	-	+	-	11	19
129	Gangava Kalibai	70	F	Hukkeri	1013432	-	-	+	+	-	-	+	+	+	+	-	-	-	-	-	+	-	+	-	+	-	-	-	+	+	+	+	+	-	-	-	+	8	14
130	Padmavati Jiral	60	F	Chikkodi	1013198	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	9	16
131	Deepa Raikar	51	F	Gokak	1014983	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	26	27
132	Shekharappa Naidappa	57	M	Hukkeri	1013683	+	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	+	-	-	26	26
133	Shankar Limaye	74	M	Ram Durgh	1017378	-	-	+	+	-	+	-	+	+	+	-	B/10/10	+	-	-	-	+	-	-	-	+	+	-	+	+	+	+	+	+	-	-	+	28	27
134	Shivram	72	M	Belgavi	246666	-	-	+	+	-	+	-	+	+	-	-	C/5/5	-	+	-	-	-	-	+	-	-	-	+	-	+	+	-	+	-	-	+	-	9	9
135	Sadanand Somshelchar	71	M	Belgavi	1018532	-	-	+	+	-	+	-	+	-	-	-	B/10/5	+	-	-	-	-	-	+	-	+	-	-	-	+	+	+	+	+	-	-	+	13	14
136	Chandrashekhar Torni	72	M	Chikkodi	5634974	-	-	+	+	-	+	-	+	+	+	-	C/5/10	-	+	-	-	-	-	-	+	-	-	-	+	+	+	+	+	+	-	+	-	18	15
137	Yallappa Bondrolli	66	M	Ram Durgh	1006040	-	+	-	+	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	+	-	19	18
138	Mahadev Baligeri	51	M	Chikkodi	5627056	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	20	26
139	Abdul Karen	62	M	Hukkeri	14125610	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	16	22
140	Madhusudan Kant	77	M	Bailhongal	1004877	-	-	+	+	-	-	+	+	+	+	+	B/10/10	+	-	-	-	-	+	+	-	+	+	-	+	+	+	+	+	-	-	-	+	15	19
141	Gadiappa	82	M	Hukkeri	1438370	-	-	+	+	-	-	+	+	+	+	+	B/15/20	+	-	-	-	+	-	+	-	+	+	-	+	+	+	+	+	+	-	-	+	25	26
142	Shivammvva Malkari	70	F	Gokak	1000346	-	-	+	+	-	+	-	+	-	+	-	B/10/10	-	-	+	+	-	+	-	-	-	-	+	+	+	+	+	+	-	-	-	+	19	22
143	Mahadeo Mane	68	M	Chikkodi	6199081	-	-	+	+	-	-	+	+	+	+	-	B/20/10	+	-	-	-	-	+	+	-	+	-	+	+	+	+	+	+	+	-	+	-	23	26
144	Lohito Yaragudri	55	M	Chikkodi	6271678	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	+	-	+	-	-	17	24
145	Venkappa Bhogale	68	M	Ram Durgh	2199327	-	-	+	+	-	+	+	+	+	+	+	C/5/8	+	-	-	-	-	+	+	+	+	-	-	-	+	+	+	+	-	-	-	+	15	21
146	Ravindra Metgudmath	60	M	Belgavi	6272379	-	+	-	+	-	+	-	-	-	-	-	B/12/10	-	-	+	-	-	-	+	-	-	-	-	-	+	-	+	+	-	-	+	-	20	26
147	Vasangouda Patil	65	M	Belgavi	6224909	-	-	+	+	-	+	-	+	+	+	-	B/20/10	-	+	-	-	+	+	+	-	-	-	-	-	+	+	+	+	+	-	+	-	21	26
148	Raibyya Pujari	58	M	Hukkeri	6272425	+	-	-	-	+	-	-	-	-	-	-	C/8/8	-	-	+	-	-	-	-	+	-	-	-	-	+	-	+	+	-	+	-	-	14	21
149	Mariyanbe Isaq Tolwade	69	F	Belgavi	4285255	-	-	+	+	-	-	+	+	+	+	+	B/22/20	-	-	-	+	-	+	+	+	+	-	+	+	+	+	+	+	+	-	-	+	-	24	27
150	Pandit Shinde	60	M	Belgavi	6272133	-	+	-	+	-	+	-	-	-	+	-	C/10/10	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	22	26

AIMS AND OBJECTIVES

Aim of the study

- To study the effects of exercise training on cognition in stable COPD patients.

Objectives of the study

- To assess the prevalence of cognitive impairment in COPD patients.
- To study the effect of exercise training of 4 weeks on cognition in COPD patients.
- To study the various cognitive domains affected in COPD.

REVIEW OF LITERATURE

Introduction:

The global Initiative On Obstructive Lung Disease (GOLD) states that Chronic Obstructive Pulmonary Disease (COPD) is a disease state characterized by airflow limitation that is not fully reversible.

Epidemiology wise COPD is a world Health problem. The estimated worldwide prevalence of COPD is 11%. In India more than 10 Million Cases are added per year. Worldwide 3.6% of population is affected and it increases with the age. Additionally, the prevalence of COPD in women is increasing. COPD represents a public health challenge that is preventable and treatable.[3,4]

Pathophysiology of COPD consists of airflow limitation, hyperinflation and ventilation-perfusion mismatch. Airflow limitation also called airflow obstruction is due to decreased elastic recoil and increased airway resistance. Airflow limitation is reflected by persistent reduction in FEV1 and FEV1/FVC ratio.

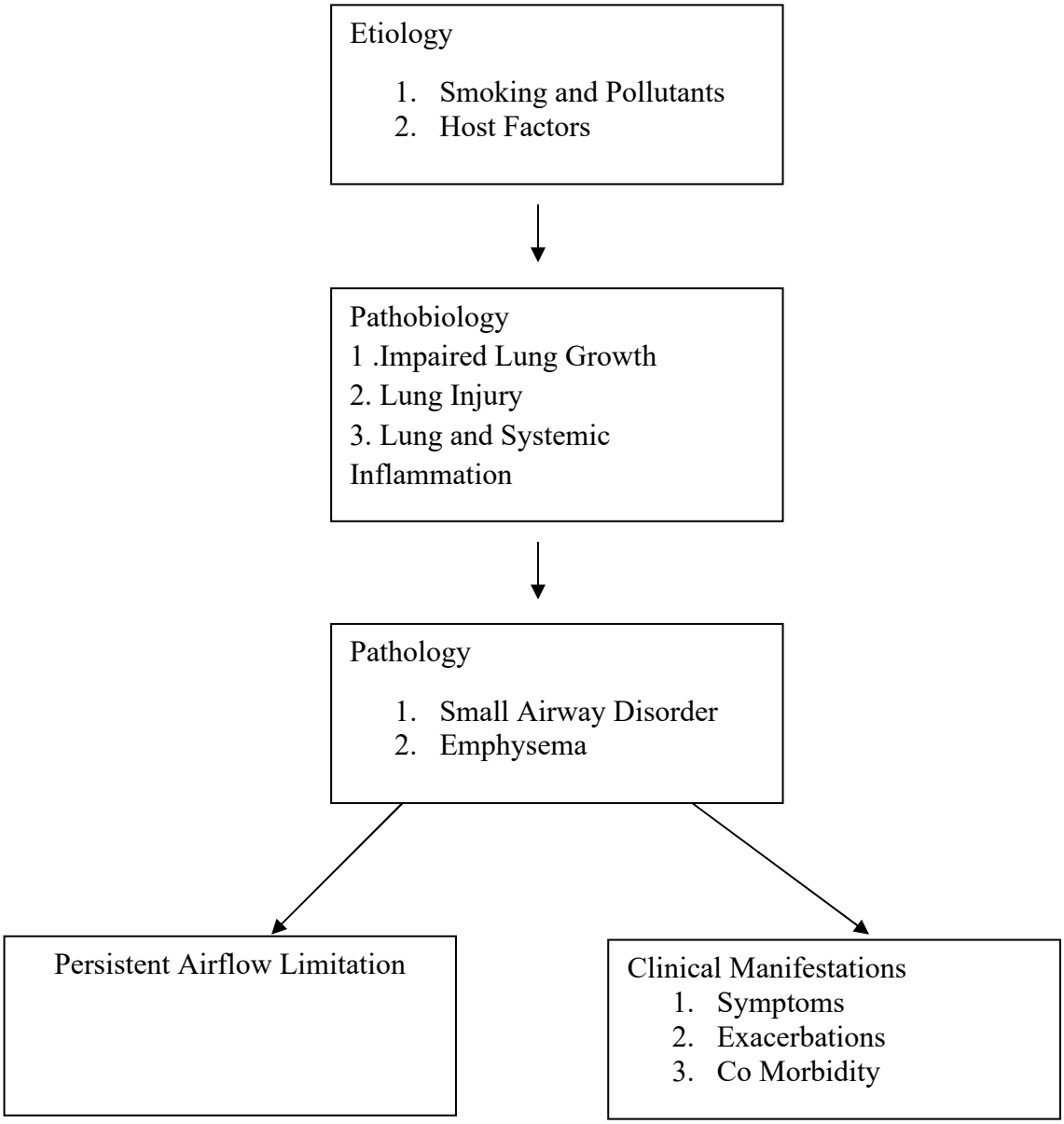
Hyperinflation compensates for airway obstruction and is reflected as increased Total Lung Capacity. Hyperinflation may displace the diaphragm in flattened position with adverse effects. Ventilation – Perfusion mismatch accounts for reduction in PaO2 which occurs in COPD.[4]

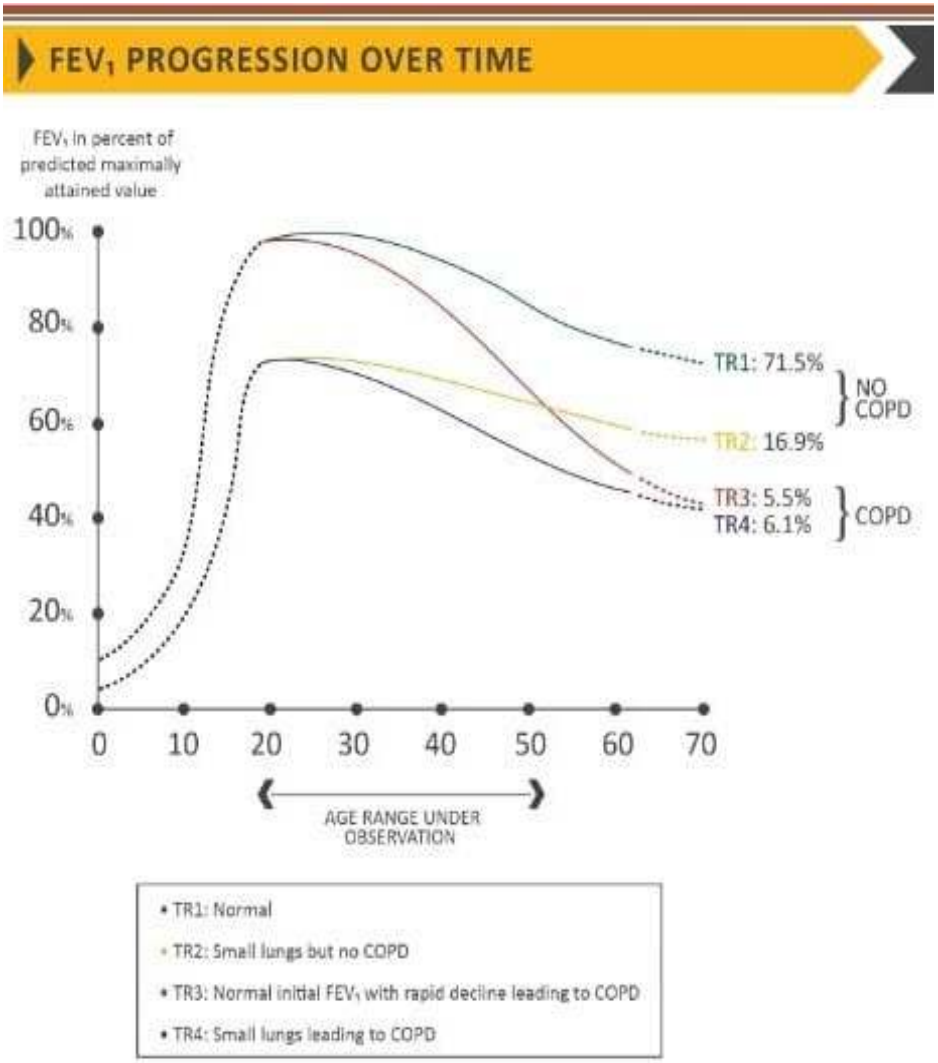
Pathologically small airways may become narrowed, cell hyperplasia, accumulation of mucus and fibrosis. Activation of transforming growth factor B (TGF-B) contributes to airway fibrosis and lack of TGF-B may contribute to parenchymal inflammation and emphysema.[4]

There are 4 interrelated factors in the pathogenesis of emphysema –

1. Chronic smoking leads to inflammatory and immune cell recruitment in terminal air spaces.
2. There occurs a release of elastolytic and other proteinases damaging the extracellular matrix of lung.
3. Apoptosis occurs via oxidant damage.
4. Repair of elastin and other extra cellular matrix leads to air space enlargement which is a feature of pulmonary emphysema.[4]

Figure showing etiology, pathobiology and pathology of COPD leading to Airflow Limitation and Clinical Manifestations.





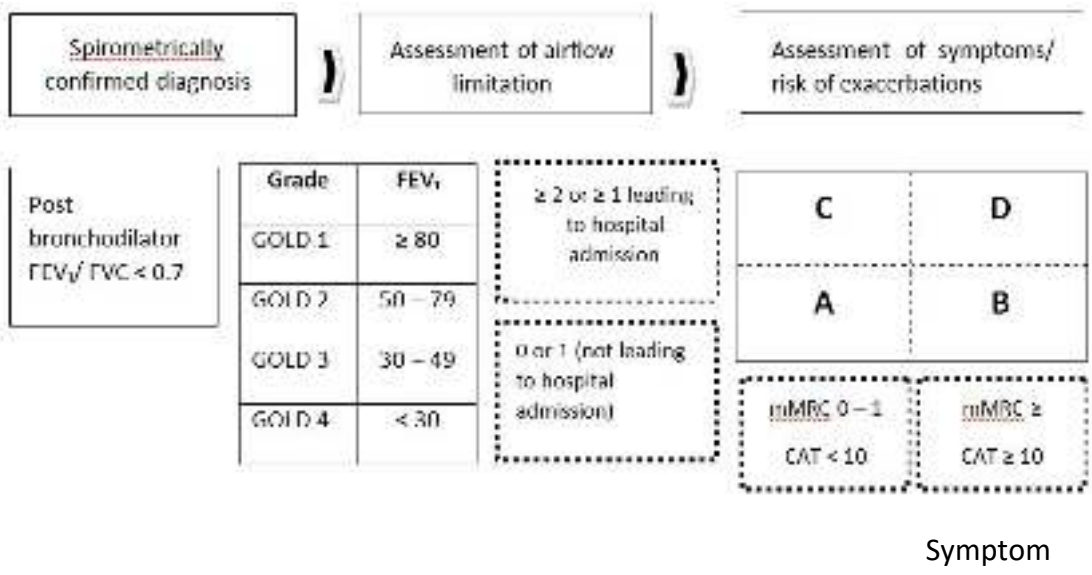
Risk Factors for COPD are: -

1. Tobacco Smoking – Bidi, Cigarette, Cigar
2. Indoor Air Pollution – Biomass fuels used for cooking particularly affects women in developing countries.
3. Occupational Exposure – Organic and Inorganic Dust, Chemical Agents and Fumes.
4. Genetic Factors – Deficiency of Alfa -1 Anti Trypsin, MMP-12.
5. Infections – Severe Childhood Respiratory infections.
6. Lung Growth and Development – Low Birth Weight.[4]

Diagnosis of COPD is considered in any patients who has dyspnea, Chronic Cough or Sputum Production and/or History of exposure to risk factors for the disease. In Spirometry post bronchodilator FEV1/FVC <0.70 confirms the presence of persistent airflow limitation.

TABLE SHOWING CLASSIFCATION OC AIRFLOW LIMITATION SEVERTY IN COPD (BASED ON POST- BRONCHODILATOR FEV_1) AND GOLD STAGING		
In patients with FEV_1/ FVC < 0.70		
GOLD 1	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4	Very severe	$FEV_1 < 30\%$ predicted

Refined ABCD assessment tool



Moderate or Severe Exacerbation History:-

- >2 or >1 causing hospital admission
- 0 or 1 (not causing hospital admission)

Symptoms (more in A and B)

- mMRC 0 -1, CAT < 10 (A and C)
- mMRC ≥ 2 , CAT ≥ 10 (B and D)
- **Modified MRC Dyspnea Scale**

mMRC Grade 0	Breathlessness on Strenuous Exertion.
mMRC Grade 1	Feels short of breath while hurrying on level or walking up a slight hill.
mMRC Grade 2	Walks slower than people of same age due to breathlessness.
mMRC Grade 3	Has to stop for breath after 100m of walk.
mMRC Grade 4	Too breathless to leave house or breathless when dressing or undressing

Management of COPD - Important aspect in the management of COPD is based in stepwise approach, depending on disease severity and the aim is to reduce symptoms that result from airway obstruction and inflammation to prevent exacerbation and maintain normal lung functions and minimize the further risk of COPD related mortality. [(4)]

(A) Pharmacological Strategies: -

1. Controller Medications – These control symptoms, reduce airway inflammation, improve lung functions and prevents exacerbation.
   (a) Inhaled Corticosteriods (ICS)
   (b) ICS – LABA Combination
   (c) Systemic Corticosteriods
2. Reliever Medications –
   (a) Short Acting Beta 2 Agonists (SABA)
   (b) Short Acting Anticholingerics
   (c)Theophylline
3. Add on Therapy
   (a) Long Acting Anticholingerics eg Tiotropium
   (b) IV Alfa 1 Anti Trypsin
   (c) N-Acetyl Cysteine
   (d) Antibiotics
4. Other Supportive Medications
   (a) Oxygen – Nasal, NIV (Non Invasive Ventilation), IMV (Invasive Mechanical Ventilation).
   (b) Vaccination – Influenza and Pneumococcal
   (c) Pulmonary Rehabilitation

(B) Non Pharmacological Strategies: -

(a) Smoking Cessation

(b) Regular Physical Exercise

(c) Healthy Diet

(C) Surgical Treatment

(a) Lung Volume Reduction Surgey (LVRS)

(b) Bronchospic Maneuvers

(c) Lung Transplantation

COPD is associated with multiple co-morbity like cardiovascular disease (Hypertension, Coronary Artery Disease and Heart failure are the most common and most notable. Diabetes as a co-morbity in COPD has the prevalence in the range of 10-20%. Osteoporosis due to smoking and systemic inflammation, steroid use. Other co-morbity are depression and sleep disorders.

Neurocognitive comorbidity is frequently missed. Cognitive Impairment is associated with worst outcomes in COPD patients.[12,13]

COPD and Cognitive Dysfunction – Epidemiological Approach: -

As per research COPD is associated with an increased risk of cognitive impairment. [14] A study by Grant et al,[15] which consisted 203 COPD patients.[15] Another study by Antonelliet al,[16] which consists of 149 COPD patients and various other studies showed significant cognitive impairment in COPD.

Nocturnal Oxygen Therapy Trial (NOTT) showed 42% of COPD cases were having impairment in cognition in comparison with 14% in controls.[15,16] Follow up of same study (NOTT) trial showed that cognitive dysfunction increased to 27% in mild hypoxemia COPD patients to 62% in severe hypoxemic COPD cases.[17]

Cognition is assessed by attention, thinking, learning, executive, perception, and memory.[18] The patient is said to have cognitive impairment if any one or more of the above mentioned functions are affected.

Cognitive dysfunction is a common phenomenon in COPD. The stated prevalence of impaired cognition in stable COPD cases is in the range of 56.7% to 67%.[18] Cognitive functions affected in COPD are memory, attention, learning and language.[19]

Meta-analysis of observations studies by Yohannes et al,[45] showed collaborative prevalence of cognitive dysfunction in COPD patients was 32%. Another study by Bonnevie et al,[55] stated the cognitive impairment prevalence in COPD patients was 73%. Andrianopolous et al,[56] observed that prevalence of cognitive impairment prevalence in COPD patients was 42%.

Cognition and Cognitive Domains:

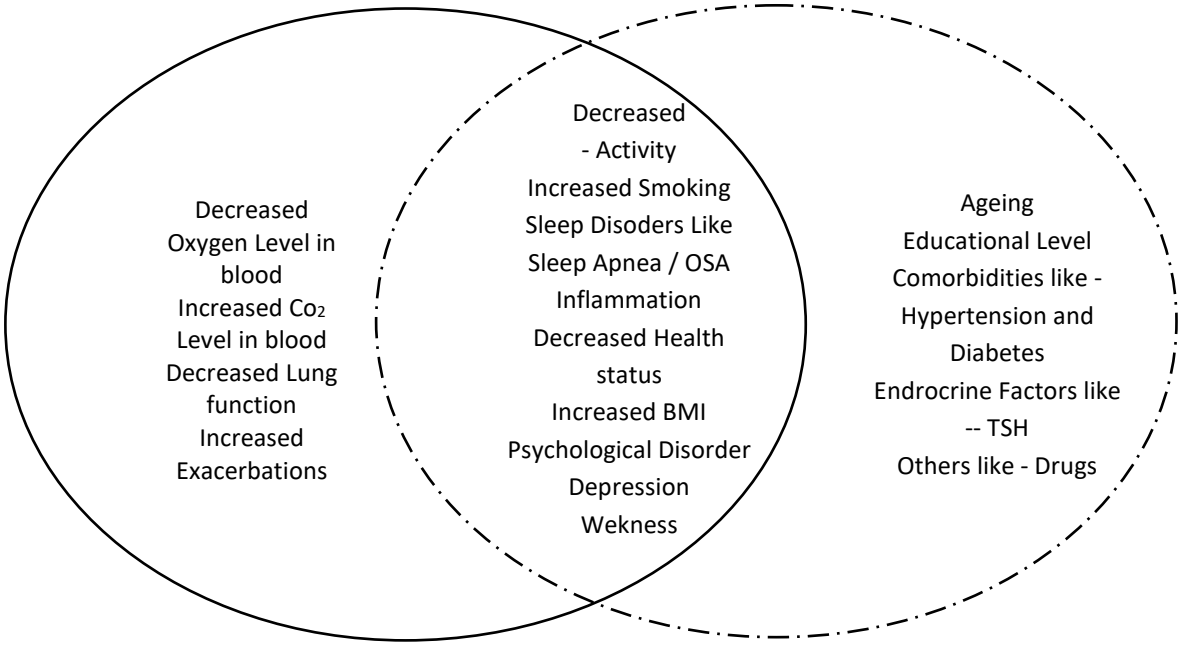
Cognition is a collective term for neural processes which is the foundation of information handling. These high order neuronal processes are sub classified according to conceptual framework as follows (18):

Sr.No.	Cognitive Domain	Description	Cognitive function
1	Receptive	Analysis, integration and encoding of stimuli recognition, discrimination and orientation	Perception construction
2	Learning and memory	Memory of skills, objects, perceptual learning and events	Memory and learning
3	Processing	Ability to correlate information, reasoning concept formation, planning, problem solving	Memory and learning verbal language executive functions
4	Expression function	Gestures, movements, verbal, writing, drawing	Executive functions, motor function
5	Mental activity variables	Attention	Perception, memory and language executive

Influencing Factors of cognitive functions in COPD (19):

1. Demographic Factors like Age and education.
2. Smoking
3. Activity
4. Fatigue
5. Health status
6. Other co-morbidities
7. Hypoxemia and
8. Exacerbations
9. BMI
10. Depression

Figure below shows factors which may have influence on cognition in COPD cases and general population.[19]



_____ COPD: chronic obstructive pulmonary disease _._._. _ general population.

Cognition and lung function:

Relationship of cognition and lung function has been studied in elderly healthy population. It was observed that the correlation between lung function and cognitive function was often weak and inconsistent.[20] It was seen that physical activity was assessed by lung function.

Cognitive Dysfunction and hypoxemia:

Various studies on cognitive function and hypoxemia suggests a clear association between cognitive impairment and hypoxemia.[15]

There is no clear relationship between cognitive impairment and hypoxemia remains unclear. [23,24]Hypoxemia alone, as a sole responsible factor fails to explain cognitive dysfunction in COPD cases.[24]

Long standing anoxic state leads neuron damage and axonal degeneration.[25]. Cognitive dysfunction is seen in 77% of COPD patients with hypoxemia.[25] Prolonged duration of COPD may result in hypoxic injury to brain parenchyma.[26]

Oxygen free radicals may be produced by hypercapnia, which may cause cerebral Injury.[19,26]

Cognitive Dysfunction and COPD exacerbation: -

There are three studies which have noted the effect of exacerbation on cognitive functions in COPD cases. Results of these study showed cognitive function is impaired during exacerbation, but it can improve after the exacerbation is over [25,26].

Cognition and physical activity link:

Available data suggests that, cognitive improvement was seen with physical activity.[27,33]Also cognitive improvement was seen with maintenance of physical activity. Assessment of exercise training plus education and education only, in COPD cases was done in a randomized controlled trial. It showed improvement in cognitive functions in exercise training plus education group of COPD patients than in educations alone group of COPD patients. Another study showed that exercise program with as little as 20 minutes per setting have significant improvement in cognitive function in COPD cases.[29,31]

Vascular disease and other co-morbidities and Cognition:

Hypertension and diabetes are associated with rapid decline in cognitive functions in general population.[34,35] Many of patients with COPD have co-existent vascular disease and co-morbidities like diabetes and hypertension.[35] Impaired Cognition pattern in COPD cases is different from that found in cerebrovascular thrombosis, embolism or cerebrovascular infract.[36]

Smoking and cognitive function:

Smokers are thought to have direct neurotoxic effect by exacerbating cerebral hypoxia.[37] According to multicentre European study, regular decline in cognition function was obsrved in smokers.[38] Smoking has adaverse impact on cognition. Many studies have observed association between middle aged smokers and cognition in males.[39] In smokers, cognitive domains affected were learning, memory, processing, memory, and attention.[39]

Anstey et al.[37] after meta-analysis of 19 prospective studies concluded that smoking is a risk factor for cognitive dysfunction in COPD patients. Another study by Ott et al.[39] on effects of smoking on global cognitive function stated that smokers experienced faster cognitive decline in various cognitive domains in COPD patients.

A study done by Angelaet al.[80] on effect of exercise training on cognition in COPD cases showed beneficial effects of exercise training. They included 28 male COPD patients with the average age 68.3 ± 9.6 years. They recruited patients into AT group (n=14) and CT group (n=14). Both the groups were given exercise session of 20 minutes per day for five times per week for 4 weeks. Both the groups were assessed for cognitive function before and after exercise training. The results of this study showed that exercise training improved cognitive function like memory, attention, verbal fluency. They concluded that combined exercise (i.e. aerobic exercise + resistance exercise) training can be a preventive strategy to decline cognitive associated co-morbidities in COPD cases.

Another study by Charles et al,[79] evaluated acute impact of exercise on cognition. They enrolled 56 COPD patients with males (52%) and females (48%) with the mean age of 68 ± 7 years. Exercise training was given for 20 minutes daily and 3 sessions per week for 3 weeks. Patients assessed for cognitive functions. They concluded that exercise training has beneficial effect on cognitive function in COPD patients.

In a study conducted by Laura et al,[86] in their review article described the effect of exercise training on cognition in COPD patients. In their study they enrolled 293 COPD patients both male (55%) and females (45%) with the mean age of 67 ± 2 years. All enrolled patients were given exercise training for 35 minutes with duration

of 3 sessions per week for 4 weeks. They assessed pre and post exercise cognitive function. They concluded that exercise training may positively impact cognition in COPD patients.

Emery et al,[88] evaluated acute impact of exercise training on cognitive performance in COPD cases and control group. They enrolled 29 COPD males (59%) and females (41%) with mean age of 67.8 ± 7.4 years. All participants given 20 minutes exercise condition and a video control condition. All patients were assessed at baseline and after exercise. They concluded that acute exercise was associated with improved cognitive functions.

Yohannes et al (45), in a systemic review of meta-analysis of observational studies for cognitive impairment in chronic obstructive pulmonary disease (COPD) and chronic heart failure (CHF). Meta-analysis in their study included males and females with mean age of 66.3 years. After assessment they concluded that cognitive dysfunction prevalence was 32 % in COPD and CHF cases.

A study done by Bonnevie et al,[55] in their prospective, multicentre observational study on 56 stable COPD patients, both males (41%) and females (54%) with mean average age of 62 ± 9 years, they performed 24 sessions of exercise training and education. They assessed the patients with Montreal Cognitive Assessment (MoCA). In COPD cases they concluded that cognitive dysfunction prevalence was 73% and exercise training improved short term and long term cognitive function.

Another study done by Andrianopolous et al,[56] in their study compared the effects of pulmonary rehabilitation (including exercise training and education)

outcomes in cognitive normal (CN) and cognitive impaired (CI) patients with COPD. They assessed 60 COPD patients, both males (58%) and females (42%) with the mean age 66 ± 8 years by Montreal Cognitive Assessment (MoCA). Both the groups underwent daily 35 minutes exercise training session, 3 sessions per weeks for 3 weeks. They concluded in COPD Cases cognitive dysfunction prevalence was 42% and there was significant improvement in cognitive functions after exercise training in COPD patients.

Lissa Spencer et al,[53] in her prospective observational study determined in COPD cases cognitive dysfunction incidence. In this study both males and females, 38 COPD patients above the age 40 years were enrolled. Cognitive functions were assessed by MoCA test. They concluded that there was a high incidence (47%) of cognitive impairment in COPD patients.

A study done by Marvisi et al,[91] in their study stated that cognitive dysfunction is documented as a co-morbidity of COPD. In COPD cases the prevalence of cognitive dysfunction ranges between (10-77 %). Data regarding the effect of exercise training plus education (i.e. pulmonary rehabilitation) on cognition are sparse. They recruited 21 COPD patients GOLD stage III. Of the 21 COPD patients 63% were male and 37% were females. All recruited patients were assessed by MoCA test after 30 minutes session per day and 6 day session per week for 4 weeks. They concluded that significant improvement occurred in cognitive functions in COPD patients and MoCA is useful and easy tool to assess cognitive function

Gloecklet al,[92] stated in their study that cognitive impairment (CI) is a prevalent extra pulmonary manifestation in COPD. In this study they assessed the prevalence and the determinants of cognitive impairment in COPD. In this study 52

COPD patients with the average mean age 68 ± 8 years and with 60% males and 40%females were enrolled. All patients were assessed with MoCA test with cut-off score as 25. They observed in their results of this study that 23 (44%) of COPD patients had evidence of cognitive impairment (MoCA ≤ 25). The cognitive functions affected were memory, attention, language, executive skill, fluency, visiospatial and concentration performance. They concluded that, cognitive impairment is highly prevalent (44%) in patients with COPD and affects several cognitive domains like memory, attention, language, orientation, executive skills and concentration. In addition to smoking, diabetes and cerebrovascular disease as determinants of cognitive impairment, the cerebral hypoxemia and local oxygen deficiency to cerebral cortex and large PCO_2 changes at exertion may be linked to cognitive impairment in COPD.

An Indian study done by Gupta et al,[93] in their study stated that cognitive dysfunction is recognised in COPD but uncertainty remains over the nature and factors associated with it. In this study, they compared cognitive function of the people with COPD and people without COPD and determined the factors associated with lower cognition in people with COPD. In this study 124 patients with the mean age 71 ± 7 years with 58% males and 42% females were included. They also enrolled 78 people without COPD of the same age and of those 55% were males and 45% females. Mean MoCA score for COPD group of patients was 25 and for controls it was 26. They concluded that impaired cognition was associated with reduced muscle strength and smoking in COPD patients.

MATERIALS AND METHODS

Study population

- Adult 100 COPD patients of mild to moderate severity (Group I and Group II of GOLD classification) and 50 adult COPD patients as controls of either sex all attending OPD/ IPD in the Department of Respiratory Medicine at KEL's Prabhakar Kore Hospital, JNMC, Belagavi from October 2019 to December 2020 were enrolled for this study.

Inclusion criteria

- Stable COPD cases of mild to moderate severity (GOLD I, II).
- All patients above 40 years of age and of either sex.
- Former/ present smokers.
- FEV_1 / FVC < 70% post bronchodilator reversibility < 12% (< 200 ml of absolute value).

Exclusion criteria

- Cardiac patients with CHF/ unstable angina or recent MI.
- Patients on oxygen therapy.
- H/o brain injury.
- H/o alcoholism.
- H/o anxiety/ depression disorder.

- Patients on medicines like antipsychotics/anticholinergics/ opiates/ mood stabilizers/ benzodiazepines.
- H/o any major illness in recent past.
- Patients on medicines like antipsychotics/anticholinergics/ opiates/ mood stabilizers/ benzodiazepines.
- H/o any major illness in recent past.

Study design

- Prospective interventional study.

Sample size

- Is estimated by the formula

  $n = z^2 \times p \times q / L^2$

  n = sample size

  z = random normal variant for 95% confidence interval

  p = Prevalence of disease

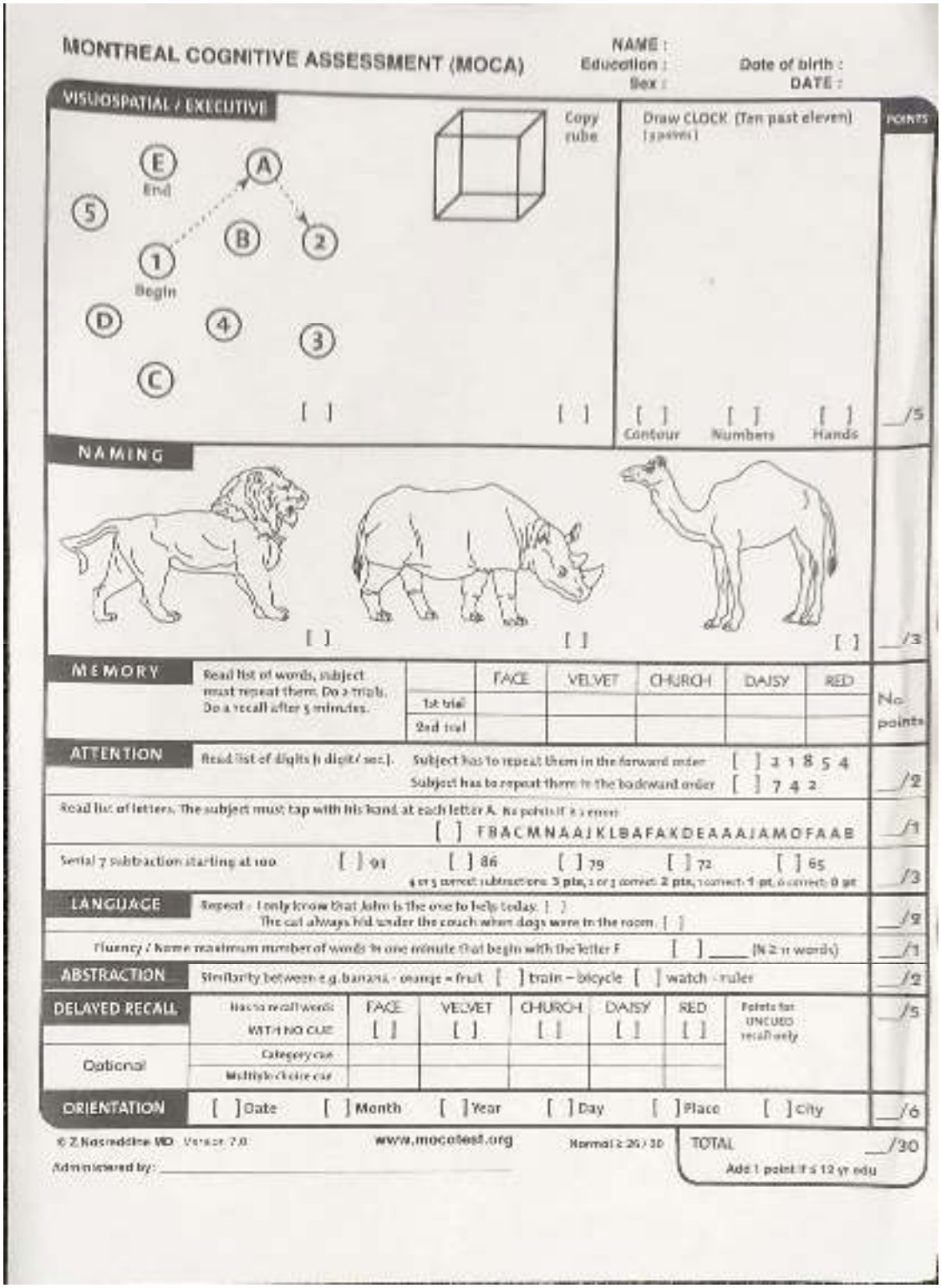
  L = 5%

  z = 1.96

  $n = (1.96)^2 \times 7 \times 93 / 25$

  n = 100

Proforma of Montreal Cognitive Assessment (Moca) Test



MONTREAL COGNITIVE ASSESSMENT (MOCA)

NAME :
Education :
Sex :
Date of birth :
DATE :

VISUOSPATIAL / EXECUTIVE

Copy cube

Draw CLOCK (Ten past eleven) [3 points]

POINTS

E End A B 2 1 Begin D 4 3 C 5

[ ] [ ]

[ ] Contour [ ] Numbers [ ] Hands

/5

NAMING

[ ] [ ] [ ]

/3

MEMORY Read list of words, subject must repeat them. Do 2 trials. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION Read list of digits (1 digit/ sec.). Subject has to repeat them in the forward order [ ] 2 1 8 5 4

Subject has to repeat them in the backward order [ ] 7 4 2

/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 1 error

[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B

/1

Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65

4 or 5 correct subtractions: 3 pts, 2 or 3 correct: 2 pts, 1 correct: 1 pt, 0 correct: 0 pt

/3

LANGUAGE Repeat : I only know that John is the one to help today. [ ]

The cat always hid under the couch when dogs were in the room. [ ]

/2

Fluency / Name maximum number of words in one minute that begin with the letter F [ ] ____ (N ≥ 11 words)

/1

ABSTRACTION Similarity between e.g. banana - orange = fruit [ ] train – bicycle [ ] watch - ruler

/2

DELAYED RECALL

	Words to recall	FACE	VELVET	CHURCH	DAISY	RED
	WITH NO CUE	[ ]	[ ]	[ ]	[ ]	[ ]
Optional	Category cue					
	Multiple choice cue					

Points for UNCUED recall only

/5

ORIENTATION [ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City

/6

© Z. Nasreddine MD Version 7.0 www.mocatest.org Normal ≥ 26 / 30

TOTAL /30

Add 1 point if ≤ 12 yr edu

Administered by: _____

Statistical analysis

- After randomization to consider analysis of variance (ANOVA) and chi-squared analysis in terms of participant's age, instruction levels, functional status/ MRC (Medical Research Council) scale score, severity of co-morbidities, medications and cognition analysis to be considered. The α (alpha) for the analysis is setup at 0.05.

Informed consent

- Written informed consent was obtained from all the patients after explaining the protocol to them.

Ethical and scientific aspect

- Clearance from JNMC institution ethics committee was obtained.

Methods

- Detailed history was taken from all cases and controls and meticulous examination was done according to prepared proforma.
- Information regarding detailed history of symptom including cough, sputum, breathlessness, fever, weight loss, chest pain, smoking history and occupational history was taken in detail.
- Through physical examination of all systemic systems with special emphasis on respiratory system was done.
- All the patients were subjected for X-ray chest, PFT, sputum analysis and routine blood investigations including complete blood counts, blood sugar, creatinine, ECG. Special investigations like USG chest, HRCT chest were carried out if considered necessary in a particular patient.

Procedure

- After written informed consent for willingness to participate in this study, all the patients were explained about the aerobic exercise training.
- All stable COPD patients (GOLD stage I and II) were considered for exercise training group. Control group were COPD patients those who were not given exercise training.
- At a time, a group of 3 to 5 patients underwent an aerobic exercise training in physiotherapy department hall at KLE institute.
- Before exercise training all patients' temperature, pulse, blood pressure, SPO_2 was recorded.
- Then all patients underwent 20 minutes aerobic exercise of brisk walking, upper limb stretch (biceps, triceps, and pectorals major muscle) and exercise for quadriceps of lower limb by squat.
- In addition to 20 minutes of exercise all participants were given 5 minutes of warm-up and 10 minutes of cool down.
- During 20 minutes of exercise patients were told to inform if any severe breathlessness, giddiness or for any other symptoms.
- After the completion of 20 minutes of exercise patients were examined and their pulse, blood pressure, temperature, SPO_2 recorded.
- All patients were assessed for cognitive functions at baseline i.e. before exercise and after exercise with Montreal Cognitive Assessment (MoCA) tests.

- Various domains of cognition like memory, orientation, executive function and visiospatial functions assessed with MoCA test. As per the MoCA score with cut-off score 26 all patients were assessed for their cognitive performances.
- All patients underwent exercise training 20 minutes / day with the frequency of 3 times per week for the total period of 4 weeks.
- All patients' cognitive functions were assessed after completion of 4 weeks of exercise training.

RESULTS

Table No. 01:

Shows distribution of cases according to age

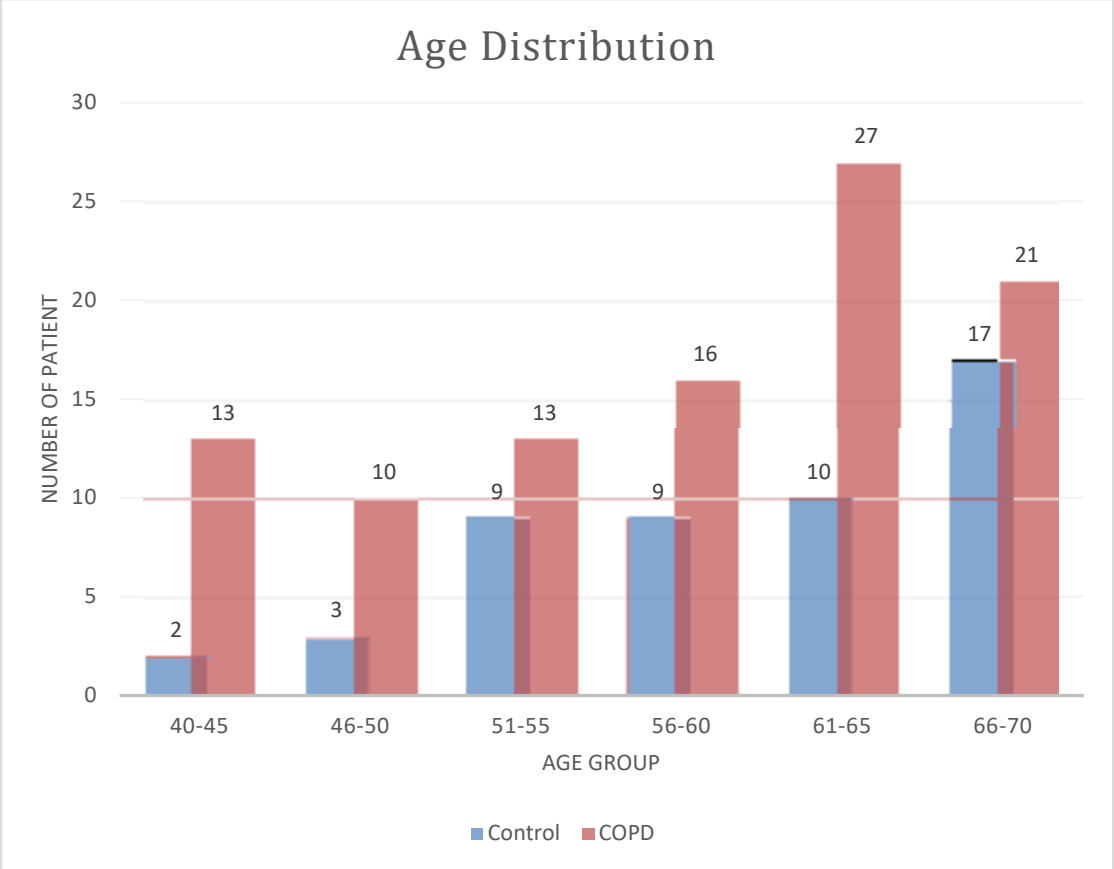
Age group in years	COPD patients with training exercise (n=100)	Control group (n=50)
40 – 45	13	2
46 – 50	10	3
51 – 55	13	9
56 – 60	16	9
60 – 65	27	10
66 – 70	21	17

Variable	Range	Mean	Standard Deviation (S.D.)
Age (in years)	40 – 70	58.8	8.5

Mean age of the patient was 58.8 years with standard deviation of 8.5.

Figure No. 1:

Shows distribution of cases according to age.



As per the above Table No. 1 and Figure No. 1, majority of the patients belonged to 60 and above years of age in COPD patients with exercise training group and in control group.

Mean value of age – 58.8 years.

Table No. 2:

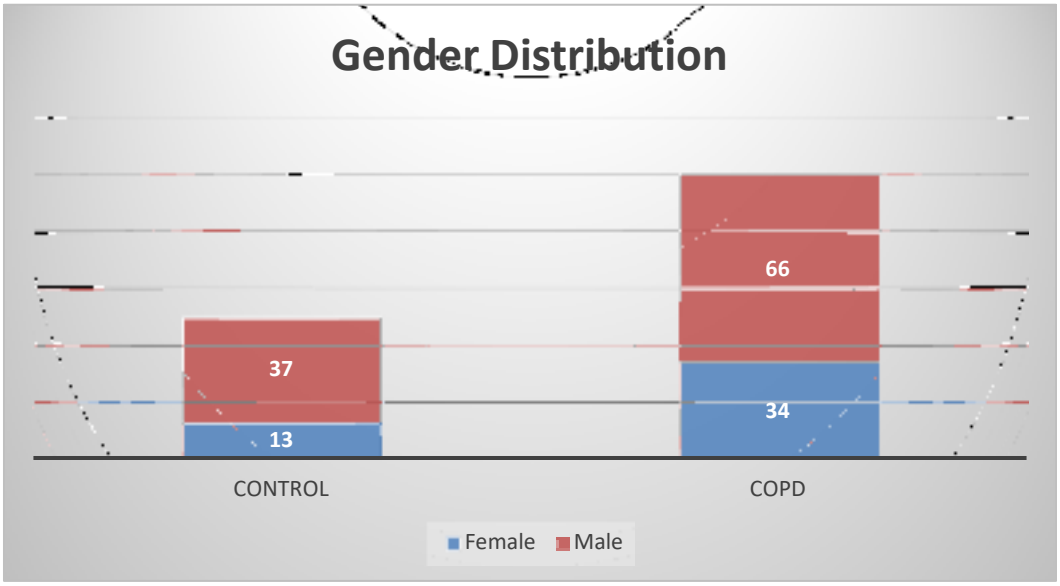
Shows gender distribution of cases.

Gender	COPD patients with exercise training (n=100)	Control cases (n=50)
Male	66 (66%)	37 (74%)
Female	34 (34%)	13 (26%)

Males were 66% in exercise training group and 74% in control group and females were 34% in exercise training group and 26 % in control group.

Figure No. 2:

Shows distribution of gender in COPD patients and control cases.



As per above Table No. 2 and Figure No. 2, the number of males in COPD group is 66% and females are 34%. In control group males 74% and females 26%, which shows male predominance

Table No. 3:

Shows descriptive statistics of cases.

Variable	Range	Mean	Standard Deviation
BMI (Kg/m²)	19 – 25	22.26	2.57
Height (cms)	155 – 170	164.75	5.98
Body weight (Kg)	52 – 71	60.22	5.86

Figure No. 3:

Shows descriptive statistics of cases.

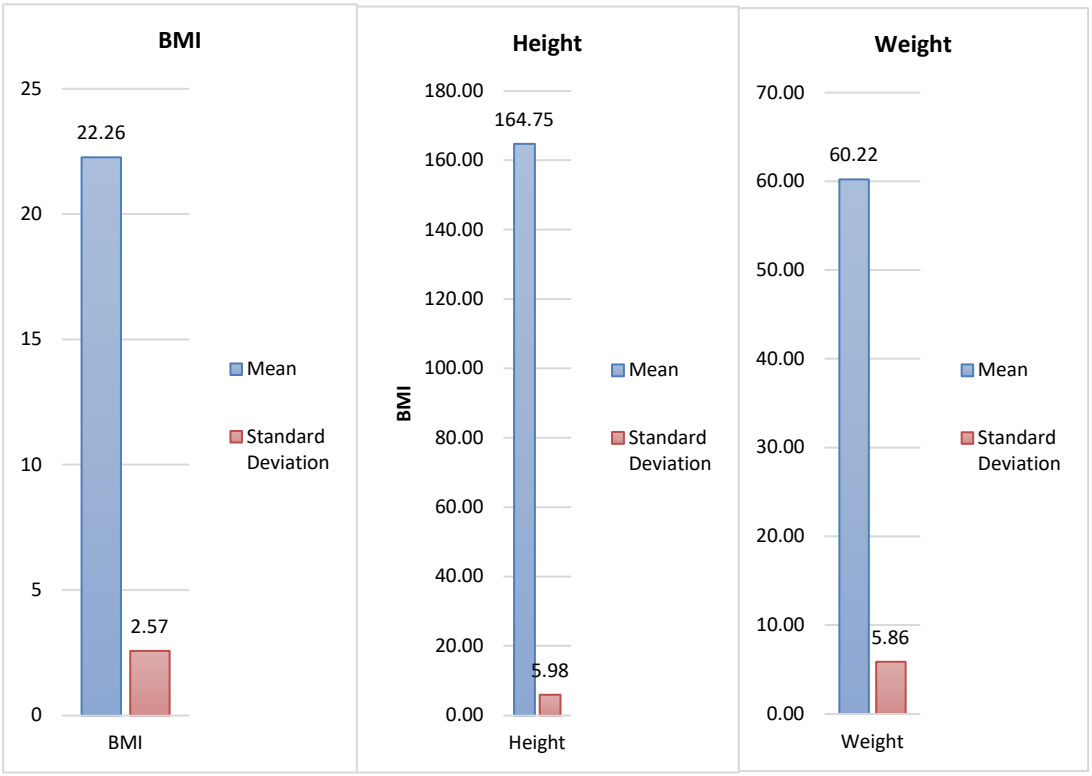


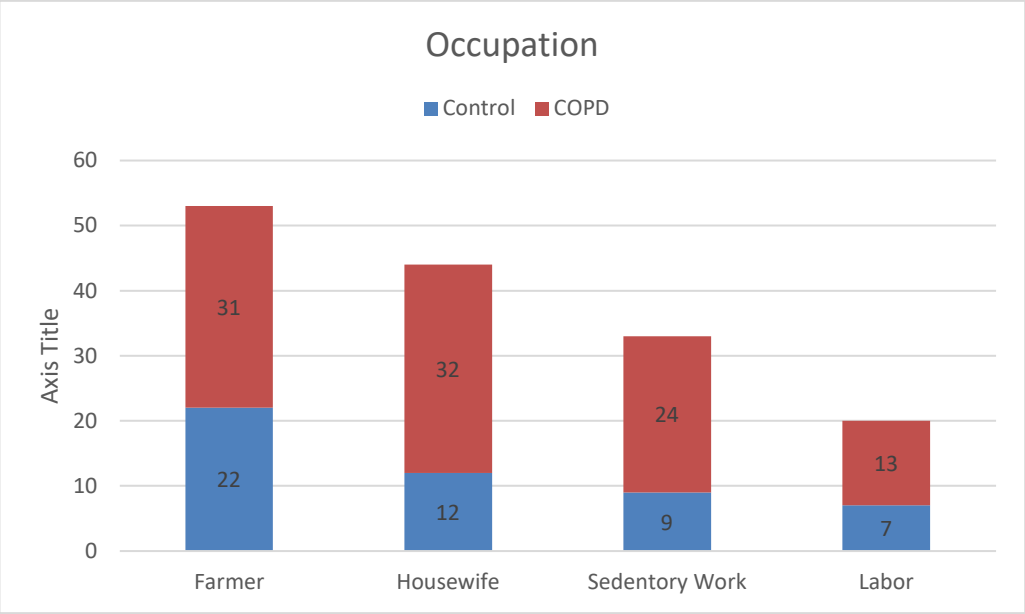
Table No. 4:

Shows distribution of cases according to occupation.

Occupation	COPD patients with exercise training (n=100)	Control group (n=50)
Farmer	31 (31%)	22 (44%)
Sedentary work	24 (24%)	9 (18%)
Labourer	13 (13%)	7 (14%)
Housewife	32 (32%)	12 (24%)

Figure No. 4:

Shows distribution of cases according to occupation.



As per above (Table No. 4 and Figure No. 4) maximum cases were housewife (32%) in COPD group and (24%) in control group. Percentage of farmers was 31% in COPD group and 44% in control group.

Table No. 5:

Shows distribution of cases according to symptoms.

History of symptoms	COPD cases with exercise training (n=100)	Control cases (n=50)
Fever	30 (30%)	20 (40%)
Sputum	66 (66%)	34 (68%)
Chest Pain	43 (43%)	27 (54%)
Other symptoms (Joint pain/ backache/ headache)	36 (36%)	24 (48%)

Figure No. 5:

Shows distribution of cases according to symptoms.

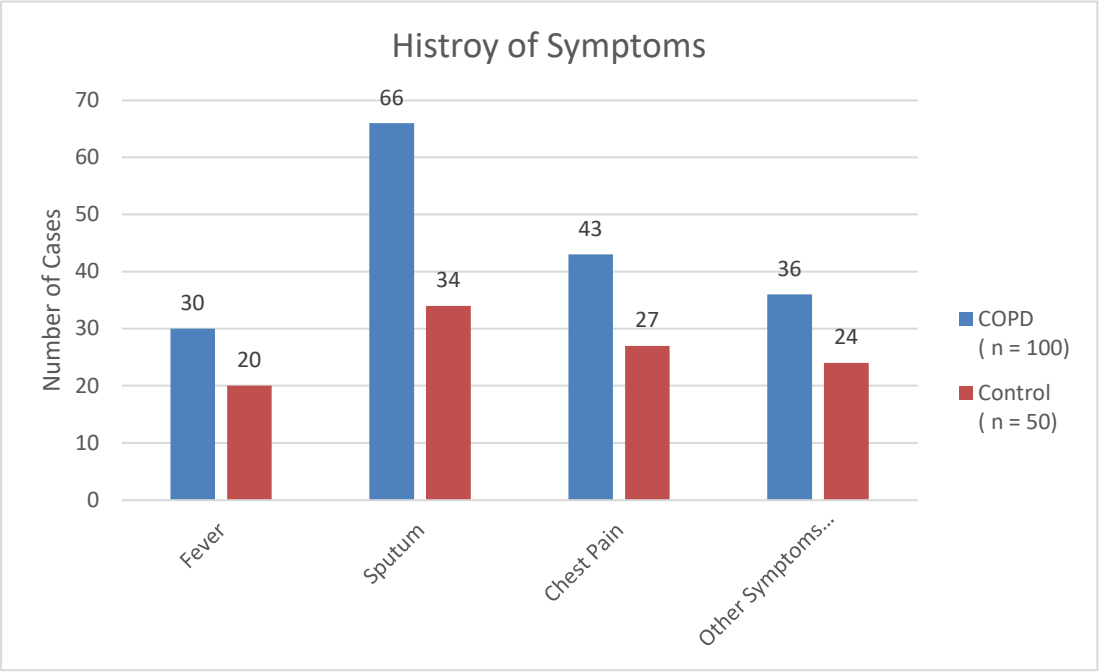


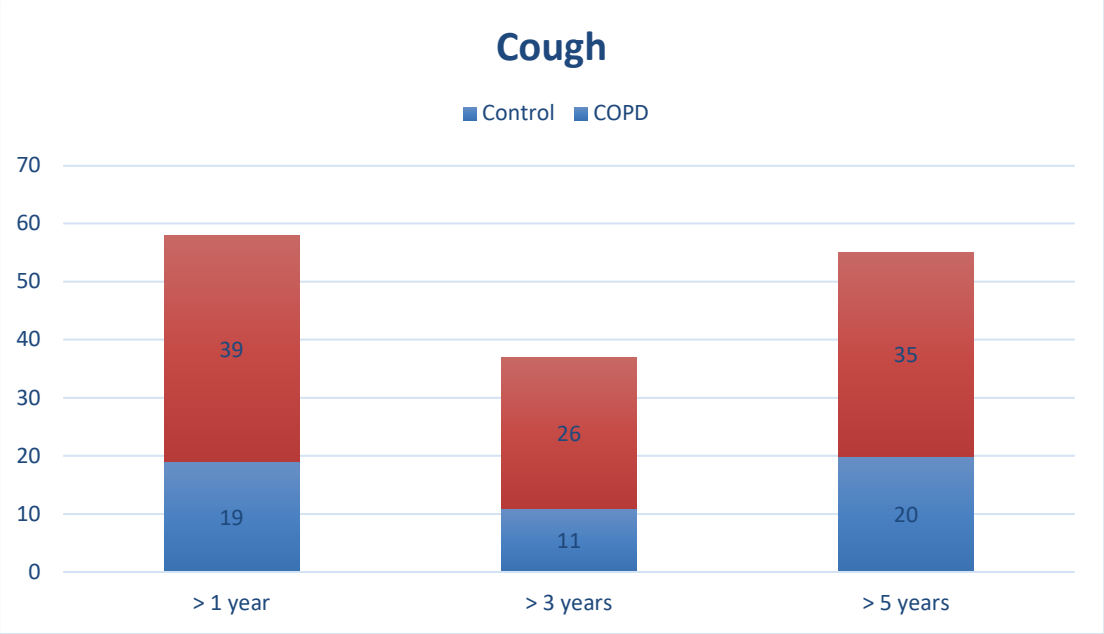
Table No. 6:

Shows distribution of cases as per duration of cough.

Cough	COPD group with exercise training (n=100)	Control group (n=50)
> 1 year	39 (39%)	19 (38%)
>3 years	26 (26%)	11 (22%)
>5 years	35 (35%)	20 (40%)

Figure No. 6:

Shows distribution of cases as per duration of cough



It is seen from the above that cough for more than 1 year was seen in 39 (39%) COPD patients and in control group 19 (36%) cases/ cough more than 5 years was seen 35 (35%) COPD patients and 20 (40%) of control cases.

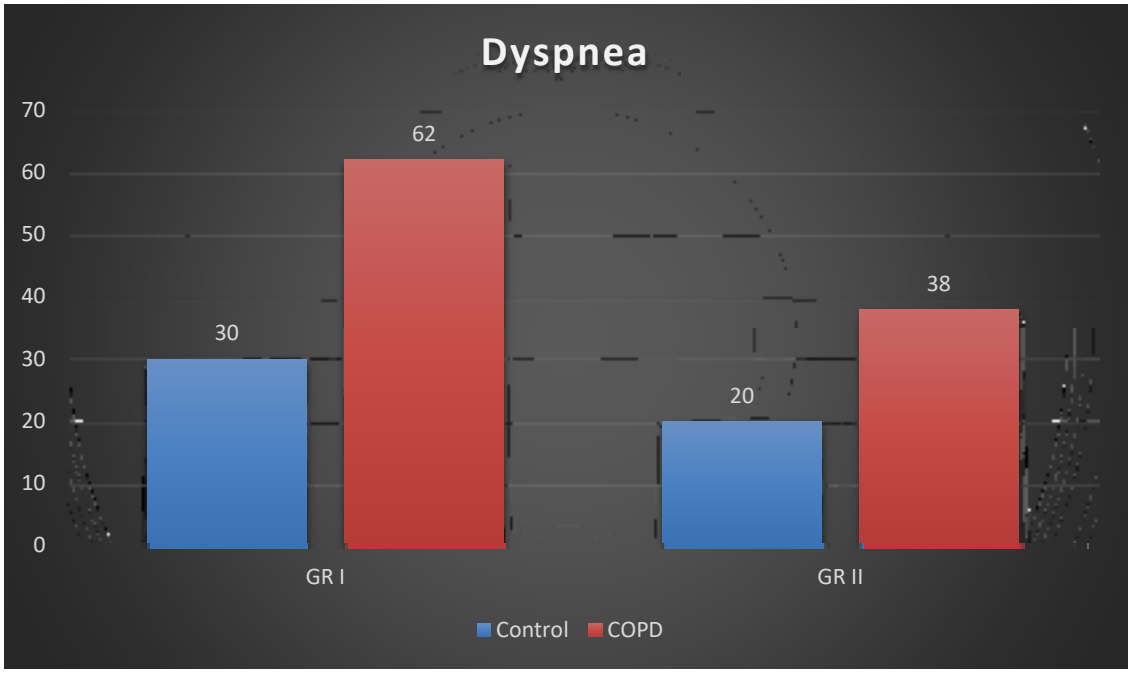
Table No. 7:

Shows distribution of cases as per mMRC dyspnea grade.

Dyspnea	COPD patients with training exercise (n=100)	Control group (n=50)
Grade I	62 (62%)	30 (60%)
Grade II	38 (38%)	20 (40%)

Figure No. 7:

Showing distribution of cases according to mMRC dyspnea grades.



As seen from above Table No. 7 and Figure No. 7, Grade I dyspnea was seen in 62% COPD patients with exercise training group. Grade II dyspnea was seen 38% of COPD patients with exercise group and in control group Grade I dyspnea 60% and Grade II dyspnea was 40%.

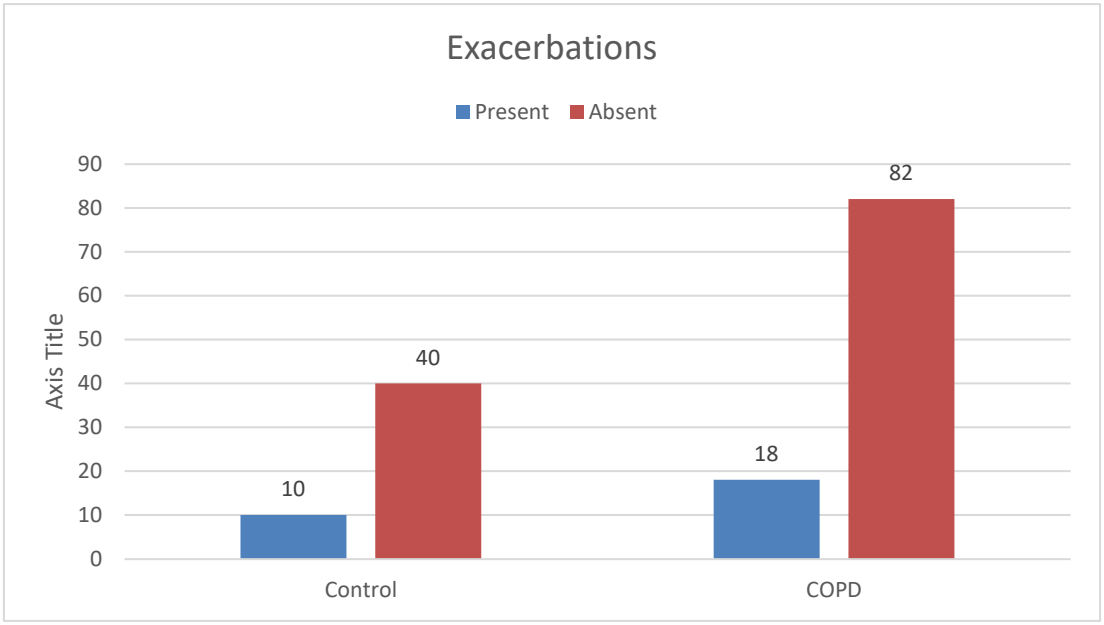
Table No. 8:

Shows distribution of cases according to history of exacerbations in the past.

History of Exacerbations in past	COPD patients with training exercise (n=100)	Control group (n=50)
Present	18 (18%)	10 (20%)
Absent	82 (82%)	40 (80%)

Figure No. 8:

Showing distribution of cases according to history of exacerbations.



Exacerbations were seen in 18 (18%) of COPD patients and in control group 10 (20%) were seen.

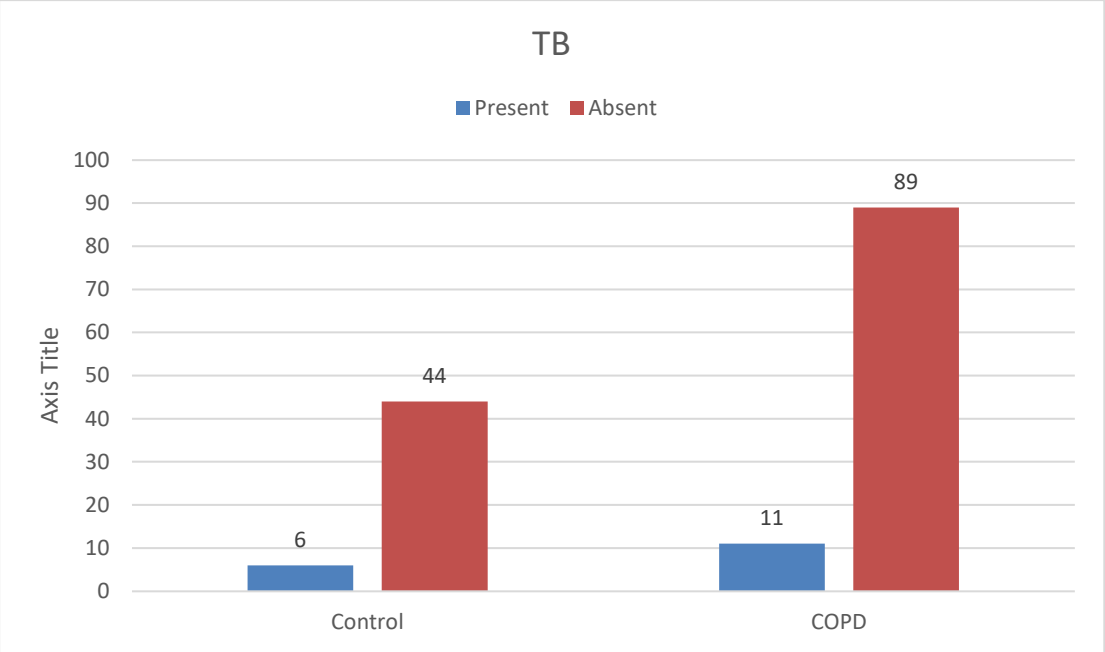
Table No. 9:

Shows distribution of cases according to history of tuberculosis.

History of tuberculosis	COPD patients with training exercise (n=100)	Control group (n=50)
Present	11 (11%)	6 (12%)
Absent	89 (89%)	44 (88%)

Figure No. 9:

Showing distribution of cases of having history of tuberculosis.



Above Table No. 9 and Figure No. 9, shows that history of tuberculosis is seen in 11 (11%) COPD patients with exercise training group and in control group 6 (12%) cases.

Table No. 10:

Showing duration of COPD disease.

Duration of COPD disease in years	COPD patients with training exercise (n=100)	Control group (n=50)
>1 year	23 (23%)	10 (20%)
> 3 year	36 (36%)	21 (42%)
> 5 year	25 (25%)	15 (30%)
> 10 year	16 (16%)	4 (8%)

Figure No. 10:

Showing duration of COPD disease.

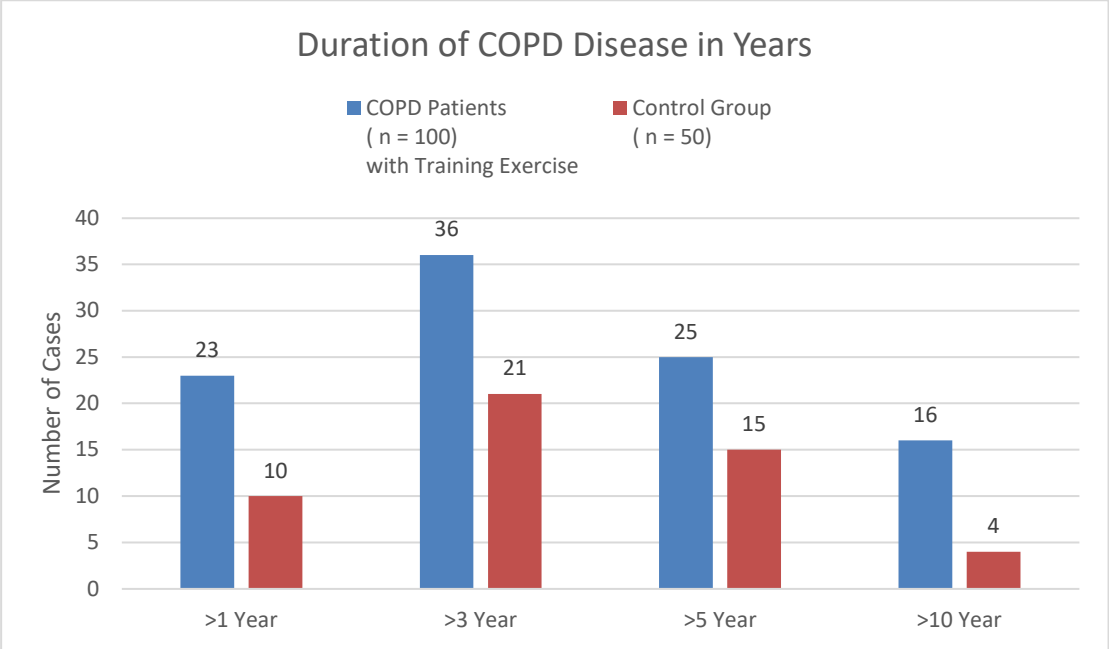


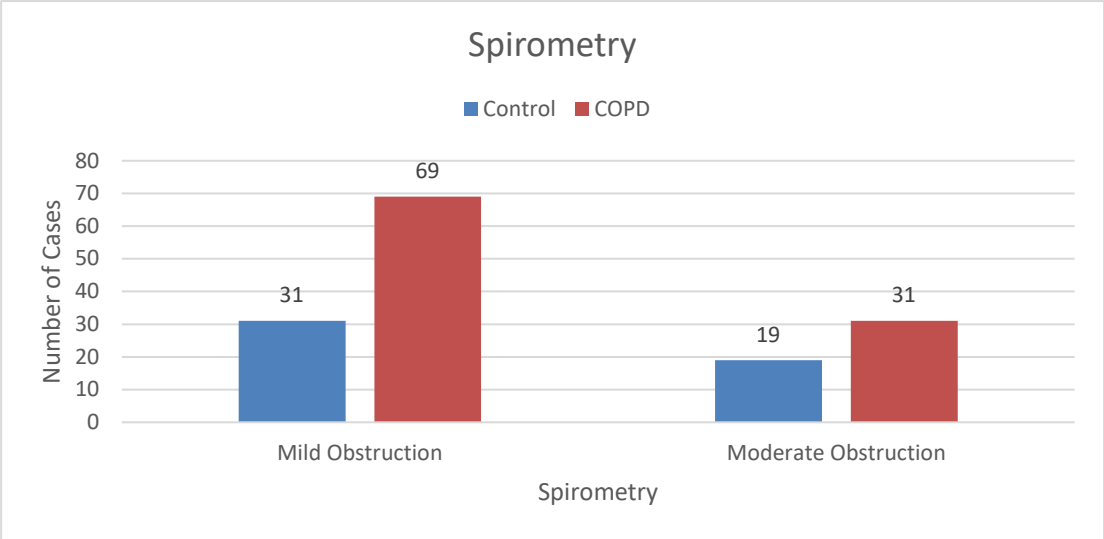
Table No. 11:

Shows distribution of cases as per mild obstruction or moderate obstruction as per spirometry.

Characteristics	COPD patients with training exercise (n=100)	Control group (n=50)
Spirometry		
Mild Obstruction	69 (69%)	31 (62%)
Moderate Obstruction	31(31%)	19 (38%)

Figure No. 11:

Shows distribution of cases as per mild obstruction or moderate obstruction as per spirometry.



From above Table No. 11 and Figure No. 11, it is seen that spirometry showed mild obstruction in 69% and moderate obstruction in 31% of COPD patients with exercise training group and control group showed mild obstruction in 62% and moderate obstruction in 38% of cases.

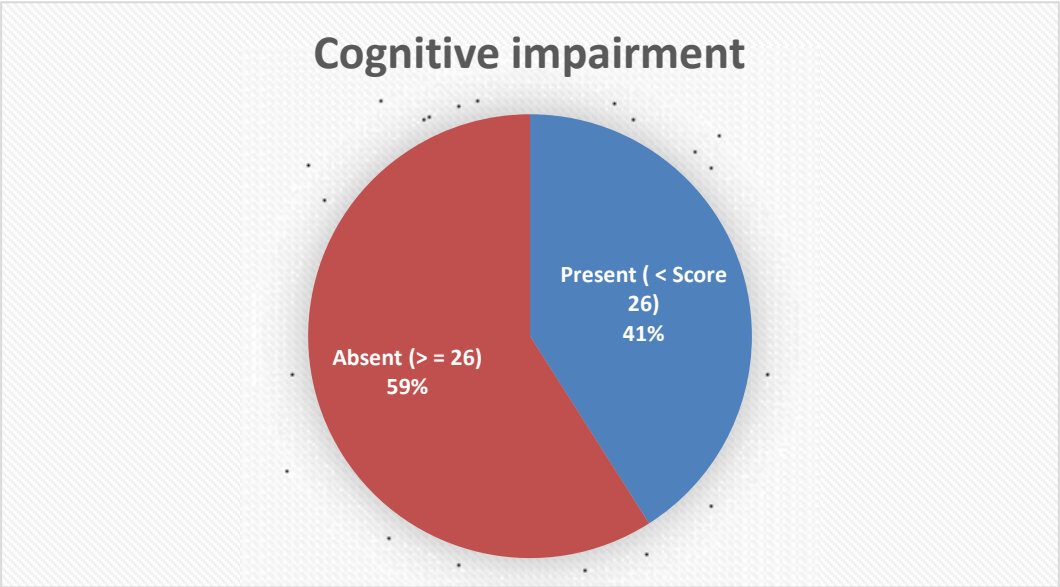
Table No. 12:

Shows prevalence of cognitive impairment in COPD cases (n=100)

Cognitive impairment in COPD cases (n=100)	Number of cases	Percentage
Present (MoCA score < 26)	41	41%
Absent (MoCA score > 26)	59	59%

Figure No. 12:

Shows prevalence of cognitive impairment in COPD cases.



From above Table No. 12 and Figure No. 12, it is seen that prevalence of cognitive impairment was 41% in COPD patients.

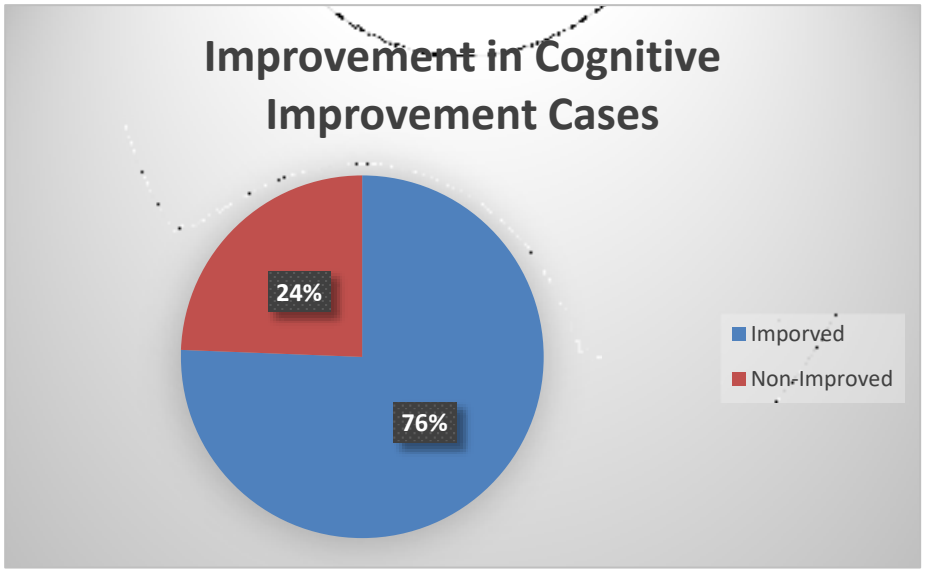
Table No. 13:

Shows prevalence of cognitive improvement after exercise training in COPD cases (n=41)

Cognitive improvement after exercise training in COPD cases (n=41)	Number of cases	Percentage
Improved	31	75.6%
Not improved	10	24.4%

Figure No. 13:

Shows prevalence of cognitive improvement after exercise training in COPD cases



From above Table No. 13and Figure No. 13, it is seen that there is a improvement in cognitive function in 31 (75.6%) COPD patients after exercise training in.

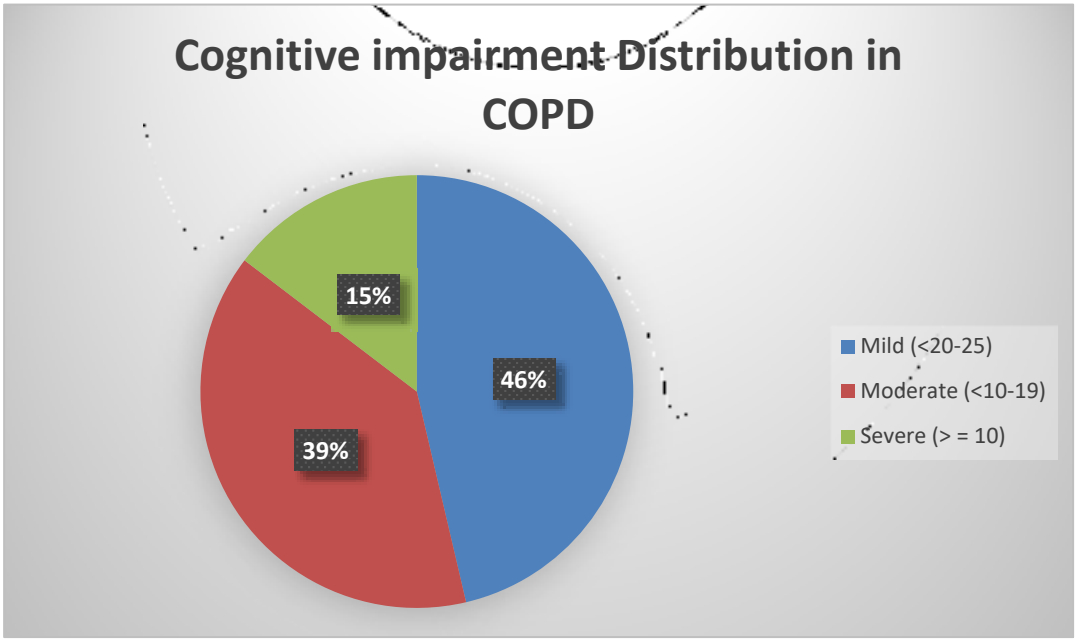
Table No. 14:

Shows cognitive impairment distribution as per MOCA score in COPD patients with exercise training.

MOCA Score	Number of cases (n=41)	Percentage
< 20 – 25	19	46.34%
< 10 – 19	16	39.02%
< 10	6	14.63%

Figure No. 14:

Shows cognitive impairment distribution as per MOCA score in COPD patients with exercise training.



From above Table No. 14 and Figure No. 14, in the MoCA score group of <20 – 25 cognitive impairment was seen in 46.34% of the COPD patients.

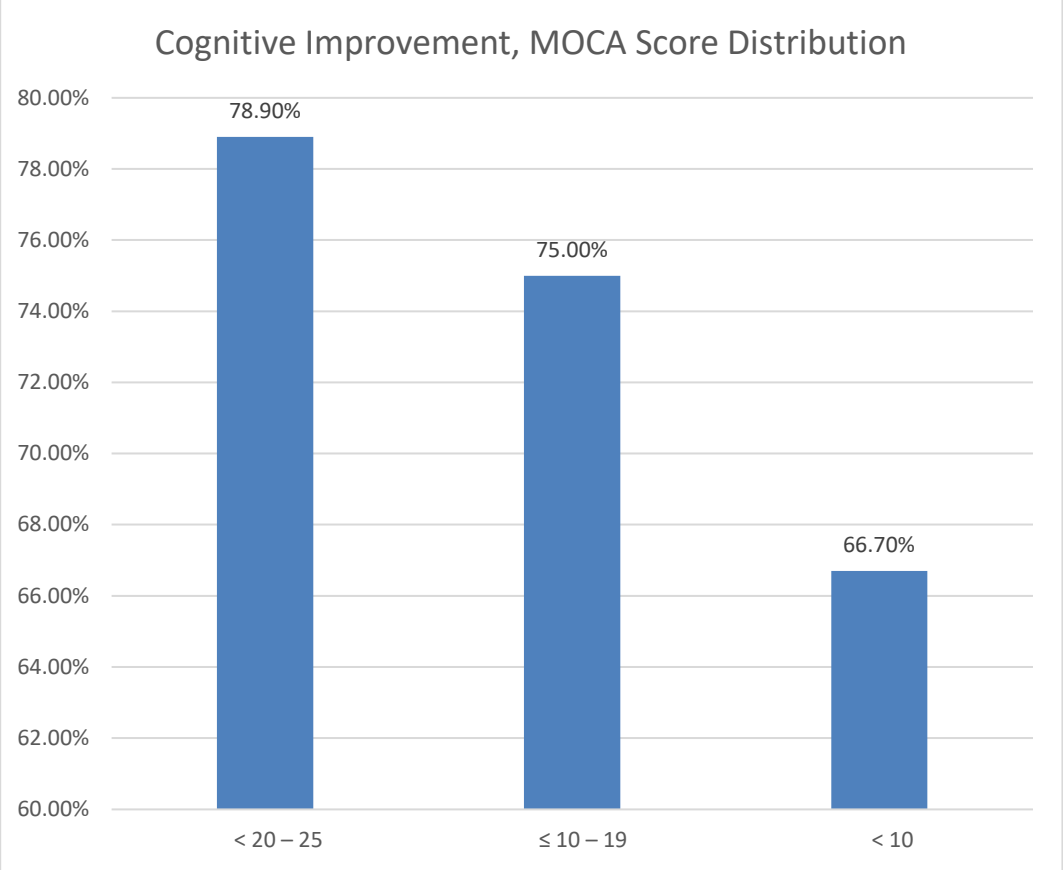
Table No. 15:

Shows cognitive improvement distribution as per MOCA score in COPD patients with exercise training.

MOCA Score	Number of COPD cases with cognitive impairment pre-exercise (Baseline)	Number of COPD cases with improved cognition after exercise training	Percentage
< 20 – 25	19	15	78.9%
≤ 10 – 19	16	12	75.0%
< 10	6	4	66.7%
Total number of cases	41	31	75.6%

Figure No. 15:

Shows cognitive improvement distribution as per MOCA score in COPD patients with exercise training.



From above Table No. 15 and Figure No. 15, it is seen that

1) Cognitive improvement was seen in 31(75.6%) COPD cases after exercise training.

2) It is also seen that in COPD cases with exercise training having MOCA score range < 20-25 have maximum i.e. 78.9% cognitive improvement.

Figure No. 16:

Shows line plot (trend analysis) of cognitive function – "ORIENTATION" before and after exercise in COPD cases. It is seen that there is an improvement in cognitive function – "ORIENTATATION" after exercise in COPD cases.

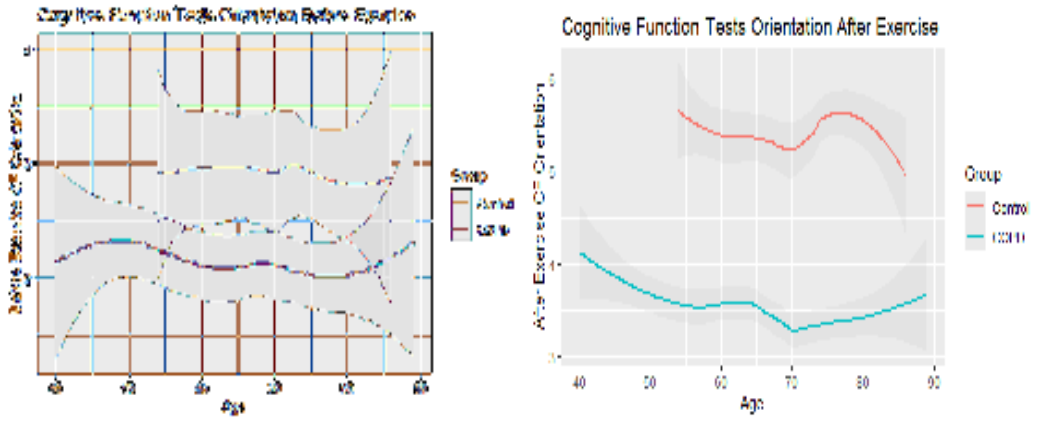


Figure No. 17:

Shows line plot (trend analysis) of cognitive function – "ATTENTION" before and after exercise in COPD cases. It is seen that there is an improvement in cognitive function – "ATTENTION" after exercise in COPD cases.

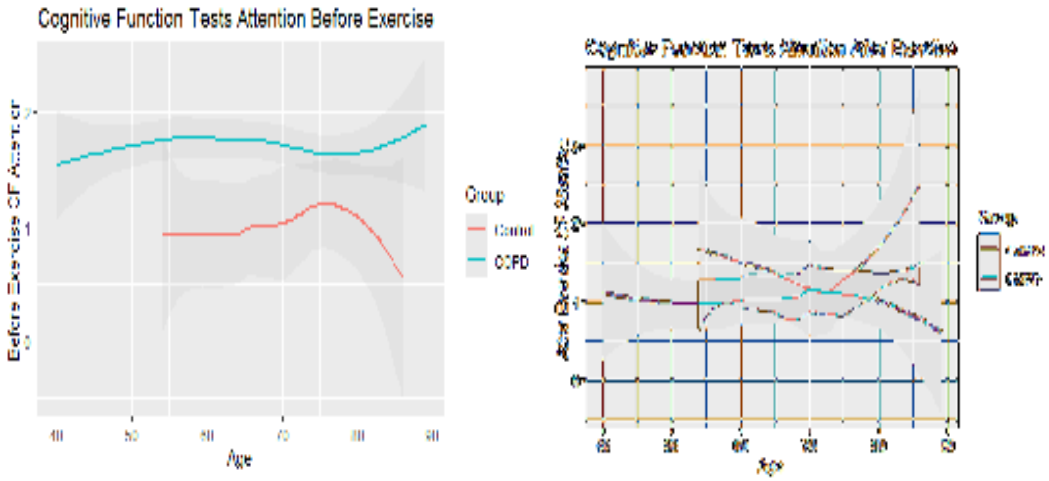
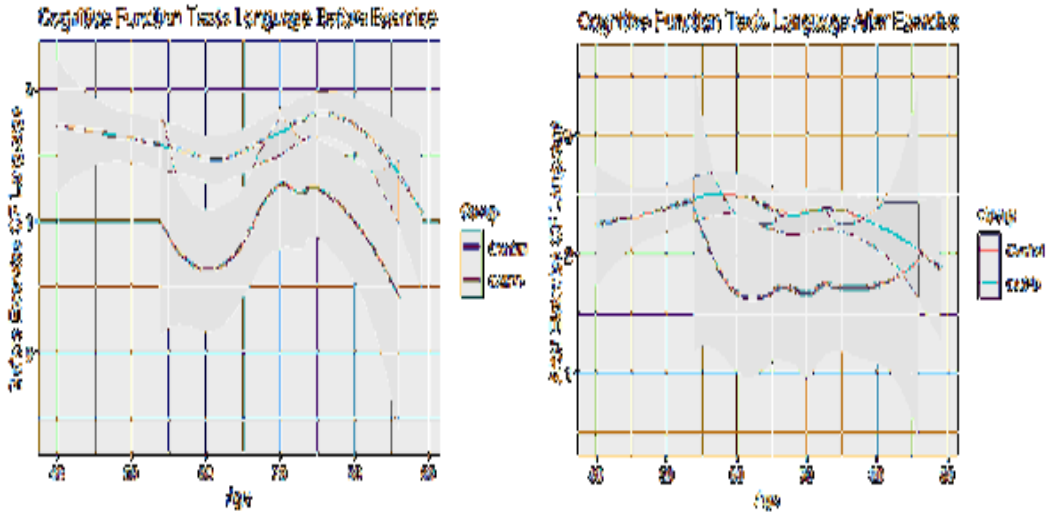


Figure No. 18:

Shows line plot (trend analysis) of cognitive function – "LANGUAGE" before and after exercise in COPD cases. It is seen that there is an improvement in cognitive function – "LANGUAGE" after exercise in COPD cases.



DISCUSSION

The main findings of this study showed that the prevalence of cognitive impairment in COPD patient seen in this study was 41%.

Study done by Campman et al, who studied the prevalence of cognitive impairment amongst COPD patients has ranged from 10% to 77%.[44]

In recent systemic review and meta-analysis of observations studies by Yohannes et al the collaborative prevalence of cognitive impairment in COPD patients was 32%.[45]

A study done by Bonnevie et al stated the prevalence of cognitive dysfunction in COPD patients was 73%.[55] Andrianopolous et al in their study assessed cognitive functions by MoCA test in COPD patients. They observed the prevalence of cognitive impairment in COPD patients was (42%),[56]which is consistent with our study.

Lisa Spencer et al,[53] in their prospective observational studies determined the prevalence of cognitive impairment in COPD patients. In this study 38 COPD patients both males and females above the age of 40 years were studied for the prevalence of cognitive impairment. Cognitive function was assessed by MoCA test. They observed prevalence of cognitive impairment was 47% in COPD patients.

In another study done by Gloeckl et al, observed the prevalence of cognitive impairment was44% in COPD patients.[92]

From the above studies it is seen that cognitive dysfunction is highly prevalent in COPD patients, but it has potential in COPD patients to improve following the exercise training and education.[55]

Cognitive dysfunction is highly prevalent in COPD patients probably because of neuronal damage produced by hypoxemia and altered cerebral perfusion in COPD patients due to arterial desaturation which may affect cognitive function.[57]

After exercise training there was a reduction in hypoxemia, improved cerebral perfusion and also improved arterial oxygen saturation and also increased levels of neurotransmitters. All of the above factors may improve cognitive function after exercise training in COPD patients.[58]

Dyspnea, leg fatigue and discomfort are the main principal symptoms that limit the exercise in COPD patients and hence these patients typically limit their activity to avoid these uncomfortable sensations. The resultant inactivity leads to progressive worsening of symptoms.[58]

Several co-existing factors may contribute to exercise intolerance in COPD patients. These factors are ventilatory limitation, dynamic hyperinflation, gas exchange abnormalities, cardio vascular and muscle dysfunction.[59,60,61,62]

Available data suggests that skeletal muscle dysfunction in COPD patients may be caused by many other co-existing factors like systemic inflammation, low anabolic hormone levels, reactive oxygen species (ROS), nutritional impairment, aging and hypoxia are likely to play a role.[63,61,65,66]

Possible mechanism of skeletal muscle dysfunction in COPD patients [64,65] was characterised by reduction in muscle mass and strength.[63,64,65] There occurs atrophy of type I and type IIa muscle fibres and reduction in fibre capillaries and also reduction in oxidative enzyme capacity and hence there was impairment of muscle metabolism.[64,65]

Importantly, muscle abnormalities noted in COPD may be improved or reversed by exercise training .[64,65] The skeletal muscle dysfunction was the basis of scientific rationale for undertaking exercise training for COPD patients. [64,65] and exercise training has been proven conclusively to improve cognitive functions in COPD patients. [64,65,66]

According to study done by Barrends et al, some of the proposed mechanisms for improvement in cognitive functions after exercise training include physiological changes such as increased cerebral blood flow, increased arousal and mood may improve cognitive performance, also direct effects on brain function through performance of motor skills may improve cognitive functions. [65]

As per study done by Richordson et al, exercise training may increase the ability of the heart to deliver oxygen, which in turn may lead to better oxygenation and greater blood flow to cerebral areas and improving cognitive function in COPD patients. [42,60,62] Improved levels of neurotransmitters after exercise training may promote cognitive functions. [65]

In our study we found improvement in cognitive functions even in COPD patients who were smokers.

Singh et al, demonstrated in their study that current smokers achieved gains in exercise tolerance after exercise training. [50]

Swan et al, evaluated clinical outcomes of exercise training in smokers and they found no significant gains in exercise tolerance after exercise training between smokers and non-smokers. [38]

Some data suggests that smoking leads to biologic changes that might limit the response to exercise training. [67]

Current clinical guidelines of American Thoracic Society (ATS) and British Thoracic Society (BTS) do suggests that patients who are actively smoking should be strongly encouraged to quit smoking program. Thus effect of smoking is important, as it may increase the risk of both COPD and vascular brain disorder.[67]

As regards to optimal duration for exercise training program, it is also not known exactly.

In our study, exercise training was given for four weeks of duration, and we observed a significant improvement in cognitive functions with four weeks of exercise training in COPD patients.

Green et al, [71] in a randomized controlled trial of four weeks versus seven weeks of exercise training in COPD patients, they observed that patients who underwent seven weeks exercise training show no significant difference in clinical outcomes from those who were given four weeks of exercise training. [71]

A study done by Clini et al [72] demonstrated that a short term program i.e. exercise training three times per week for four weeks duration led to comparable gains in the cognitive functions and also more ability to perform day-to-day activities after exercise training in COPD patients. [72] Thus our findings are consistent with other studies.

In a study done by Stewart et al [75] in their study stated that several factors influence the continuation of exercise training, which include motivation, family and or social support and disease stability [75].

In a COPD patients whose disease is clinically stable as was in our study and who continue to exercise even after completion of exercise training program may be most likely to maintain the improvement in exercise tolerance.[74] However, maintenance of exercise training may be often interrupted by COPD exacerbations which may lead to worsening of functional impairment. [74] It may be possible that reduction in exacerbation frequency which may be due to regular exercise training program can alter the disease outcome and improvement in survival. [74]

Exercise training in COPD patients may also reduce COPD exacerbations, and also may reduce hospitalization. [75,76] Cambach et al [77] in their study observed benefit of exercise training in COPD patients. In addition to improvement in cognitive function they also observed that there was improvement in exercise tolerance, improvement in dyspnea, and hence improved ambulation and improved quality of life (QoL).[68,69,70,77,78] Exercise limitation due to dyspnea in COPD patients may lead to cognitive deficit which may contribute to impaired quality of life (e.g. confusion, memory problems, problem solving difficulty) and also may lead to difficulty in ambulation. [78]

A study done by Charles et al. [79] indicated that the components of exercise training like increased respiration, increased blood flow, excitation of CNS and release of neurotransmitters may be particularly beneficial for cognitive function improvement in COPD patients.[79]

Aquino et al [80] in their study stated that, the possible mechanisms for cognitive impairment in COPD patients include hypoxia mediated neuronal damage or reduction in neurotransmitters, hypercapnia, systemic inflammation and oxidation stress.[68,80]

O'Donnell et al [81] in their study considered that cognitive impairment in COPD may be mediated through increased cerebrovascular damage. It is also suggested that microvascular rather than macrovascular damage plays a great role.[81]

In a recent study done by Zambom et al [83] reported that exercise training improves the respiratory muscle performance with potential positive effects on blood oxygenation and consequently the improved cognition performance in patients with COPD.[83]

In another study done by Morris et al,[84] stated that serotonin and B-endorphin are secreted after exercise may have positive impact on cognitive function in COPD cases.

As regards the clinical outcomes after exercise training in addition to cognitive improvement are – decrease in the breathlessness, decrease in leg fatigue, better ambulation and improved day-to-day activities.

Carolyn et al [85] in their study reported betterment in clinical outcomes like fatigue, weakness, ambulation after exercise training in addition to cognitive improvement and there was improved quality of life (QoL), which was comparable with our observation.

Laura et al [86] in their study also observed better ambulation and improved day-to-day activities as clinical outcome in addition to cognitive improvement in COPD patients.

In our study, we observed that cognitive functions that were improved after exercise training in COPD patients were attention, language, and orientation.

Charles et al [79] in their study evaluated 29 COPD patients. These 29 adults with mean age 67.8 years, 17 female and 12 male COPD patients were assessment for cognitive functions after exercise training. They found that exercise was associated with improved performance of 31% in verbal fluency, and attention.

Francis et al [87] in their analysis of cognitive functions in COPD patients, they evaluated 83 patients, both males and females with mean age 68 ± 3 years. After assessment of cognitive functions, they observed 36% improvement with respect to memory, and executive function.

Emery et al [88] in their study on 63 COPD patients both 40 males and 23 females with mean age of 61.4 ± 5.2 years analyzed effect of exercise on cognitive function in COPD patients and they observed improvement in about 36% with respect to attention, memory, reasoning and problem solving cognitive functions.

It appears that adherence to exercise training program may help in maintaining the long term benefit of cognitive improvement in COPD patients and therefore strategies for maintaining the benefits of exercise training on a long term basis are needed. [90]

The positive effects of exercise training on cognitive function may deteriorate over the time, hence continuous outpatient (OPD) based or home based exercise training may be useful. Home base exercise training may be easy and convenient. [90]

Thus our study revealed that the prevalence of cognitive impairment in COPD patients was 41% and after 4 weeks of exercise training to these COPD cases there was improvement in cognitive functions. The improvement in cognitive functions was notably in attention, language and orientation.

Based on the existing medical literature, current clinical guidelines published by American Thoracic Society (ATS) and British Thoracic Society (BTS) has led to a recommendation that exercise training be included routinely in the management of COPD patients.[68,70]

American College of Chest Physicians (ACCP) and Global Obstructive Lung Disease (GOLD) guidelines on the management of patients with COPD also supports that all COPD patients should be considered for regular exercise training. [89]

Concept of tele health care (i.e. telephonic conversation and guidance for exercise training) to COPD patients may have an impact on health related quality of life (HRQoL) which may reduce frequency of hospital visits and hospitalization. [90]

Despite decades of research, our understanding of cognitive impairment in COPD patients remains incomplete. There is a need for further research to optimize and to evaluate the benefits of exercise training in COPD patients.

Limitation of this study are:

- The patients included are from a tertiary care center, and this study might not be a representative of the overall population.
- Number of cases studied are less.
- Only stable COPD patients (GOLD I, and II) were included in the study.
- Non-availability of long term follow-up of these patients.

CONCLUSION

- In our study we found that the prevalence of cognitive impairment in COPD patients was 41%. The main finding of this study is that there was improvement in cognitive functions observed after 4 weeks of exercise training in COPD patients.
- Cognitive functions that were improved after exercise training in COPD patients in our study are – attention, language and orientation.

  There is a potential for exercise training to improve cognitive functions in COPD cases

SUMMARY

- A total number of 100 COPD patients were studied and 50 patients as controls.
- Mean age of study population was 58.5 ± 8.5 years.
- 66% were males and 34% were females.
- Average mean BMI 22.6.
- 31% farmers by occupation.
- Stable COPD (GOLD I, II) patients were considered for this study.
- The duration of COPD disease >5 years was seen in 35% of cases.
- Presented with history and predominant symptoms:
    - Cough >1 year in 39% of cases and <5 years in 35% of cases
    - Sputum in 66% and
    - Breathlessness grade II in 38%.
- Mild obstruction was seen in 69% of cases and moderate obstruction was seen in 31% of cases.
- Prevalence of cognitive impairment in COPD patients was 41%.
- Four weeks of exercise training showed cognitive function improvement in 31 (75.6%) COPD cases.
- Cognitive functions improved after 4 weeks of exercise trainings are – attention, language and orientation.
- In COPD cases, exercise trainig of 4 weeks duration was associted with improved cognition.
- This result supports that exercise training has the potential to improve cognitive function in COPD patients.