A dissertation on
A STUDY ON MODIFIED DYSPNEA SEVERITY SCORE FOR RISK STRATIFICATION OF DYSPNEA IN EMERGENCY CARE AND CORRELATION WITH A SUBJECTIVE SCALE AND MODIFIED OBJECTIVE CLASSIFICATION SCALE USING ABG

Submitted in partial fulfilment of requirements for

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CERTIFICATE

This is to certify that this dissertation entitled "**A STUDY ON MODIFIED DYSPNEA SEVERITY SCORE FOR RISK STRATIFICATION OF DYSPNEA IN EMERGENCY CARE AND CORRELATION WITH A SUBJECTIVE SCALE AND MODIFIED OBJECTIVE CLASSIFICATION SCALE USING ABG"**Submitted by **Dr. S. SRIHARII** with Registration Number: **201911021**, appearing for M.D Branch-I – GeneralMedicine Degree examination in MAY 2022 is a bonafide record of work done by him under my direct guidance and supervision in partial fulfilment of regulations of The TamilNadu Dr. M.G.R. Medical University, Chennai. I forward this to The TamilNadu Dr. M.G.R. Medical University, Chennai, Tamil Nadu, India.

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DECLARATION

I, **Dr. S. SRIHARII, REGISTRATION NO:201911021** solemnly declare that this dissertation entitled **"A STUDY ON MODIFIED DYSPNEA SEVERITY SCORE FOR RISK STRATIFICATION OF DYSPNEA IN EMERGENCY CARE AND CORRELATION WITH A SUBJECTIVE SCALE AND MODIFIED OBJECTIVE CLASSIFICATION SCALE USING ABG"** is done by me at Institute of Internal Medicine, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai between April to March 2019 under the guidance and supervision of my Chief **Prof. Dr. T.B. UMA DEVI, M.D.** This dissertation is submitted to the Tamil Nadu Dr.M.G.R. Medical University towards the partial fulfilment of requirements for the award of M.D. Degree in General Medicine (Branch-I).

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LIST OF ABBREVIATIONS

ABG - ARTERIAL BLOOD GAS ANALYSIS

MDSS - MODIFIED DYSPNEA SEVERITY SCALE

ARDS - ACUTE RESPIRATORY DISTRESS SYNDROME

GCS - GLASGOW COMA SCALE

STEMI - ST SEGMENT ELEVATION MYOCARDIAL INFARCTION

CKD - CHRONIC KIDNEY DISEASE

MI - MYOCARDIAL INFARCTION

T2DM - TYPE 2 DIABETES MELLITUS

SHTN - SYSTEMIC HYPERTENSION

CAD - CORONARY ARTERY DISEASE

COPD - CHRONIC OBSTRUCTIVE PULMONARY DISEASE

PTB - PULMONARY TUBERCULOSIS

ILD - INTERSTITIAL LUNG DISEASE

ED - EMERGENCY DEPARTMENT

6MWD - SIX MINUTE WALK DISTANCE

NYHA - NEW YORK HEART ASSOCIATION

TDI - TRANSITIONAL DYSPNEA INDEX

BDI - BASELINE DYSPNEA INDEX

PFSDQ - PULMONARY FUNCTION STATUS AND DYSPNEA QUESTIONNAIRE

SGRQ - St. GEORGE RESPIRATORY QUESTIONNAIRE

VAS - VISUAL ANALOGUE SCALE

MDSS - MODIFIED DYSPNEA SEVERITY SCORE

DKA - DIABETIC KETOACIDOSIS

CONTENTS

INTRODUCTION

INTRODUCTION

Dyspnea is one of the most frequent complaint in emergency. It has very high subjective and affective components. Dyspnea is defined as "a subjective experience of breathing discomfort that consists of a quality distinct sensation that varies in intensity" and involves "interactions among multiple physiological, social, and environmental factors, and may induce secondary physiological and behavioral responses". Breathing is not only regulated by automatic centers located in the brainstem but also by voluntary signals initiated in the cortex. Dyspnea can occur due to many conditions which have a wide range of severity which can be life threatening to some psychiatric disorders. The sensation of breathlessness experienced by an individual during maximal exercise will evoke very different reactions than the same sensation occurring at rest. In the former, it may be perceived as a normal sensation, while in the latter it can provoke great anxiety.

Dyspnea being such a subjective perception, its severity can't be assessed accurately using subjective scales alone. A patient with chronic dyspnea would have adaptive mechanisms which will lead to decreased severity of perception. The commonly used methods to assess the severity of dyspnea take into account mainly subjective parameters and are mainly devised for cardiopulmonary disorders.

Objective evaluation of the severity of dyspnea is crucial in Emergency department, but unfortunately, we do not have any single parameter which would describe correctly the severity of dyspnea. Investigations like Arterial blood gas (ABG) analysis, NT-pro BNP, echocardiography, spirometry are useful in finding out the severity of the underlying condition causing dyspnea, however they are not universally available and are useful only with respective conditions.

It is important to estimate the actual severity components of dyspnea in a simple, objective way which reduces reliance on the patient's subjective feelings. An objective test which could identify the severity of dyspnea irrespective of the condition producing it would be of great value in Emergency department especially in primary care where sophisticated investigations are not available.

AIMS AND

OBJECTIVES

AIMS AND OBJECTIVES

1. To find out the efficiency of a non-cumbersome objective dyspnea score which can be used irrespective of dyspnea etiology in emergency triage and pre hospital care.

2. To validate the score by correlating it with arterial blood gas analysis values and patients subjective perception of dyspnea.

REVIEW OF

LITERATURE

REVIEW OF LITERATURE

DEFINITION

Dyspnea is the term generally applied to 'sensations experienced by individuals who complain of unpleasant or uncomfortable respiratory sensations'. There is wide interplay between physiological and behavioral factors in producing respiratory discomfort as well as the spectrum of phrases used by patients to describe their sensations. Hence dyspnea is a term used to characterize a 'subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity[1]'.

MECHANISM OF DYSPNEA

NORMAL RESPIRATORY CONTROL

Respiratory motor activity is mainly controlled by group of neurons in the medulla. Discharges from efferent respiratory nuclei activate the ventilatory muscles that expand the chest wall, inflate the lungs, and produce ventilation. The resulting breathing regulates the gas exchange and hydrogen ion concentration in the blood and body tissues. Chemoreceptors in the blood and brain as well as mechanoreceptors in the airways, lungs, and chest wall are involved in the automatic regulation of the level and pattern of breathing. Changes in PCO2 and PO2 are sensed by central chemoreceptors in the medulla and peripheral chemoreceptors in the carotid and aortic bodies. Signals from these chemoreceptors are transmitted back to brainstem respiratory centers that adjust breathing to maintain blood-gas and acid-base homeostasis. Pulmonary stretch

receptors are activated by lung expansion. Irritant receptors around the epithelial cells are activated by tactile stimulation, airflow and bronchial smooth muscle tone. The changes in pulmonary capillary pressure and interstitial pressure activate C fibers[2], found in the interstitium of the lung in proximity to the alveoli and pulmonary capillaries. The diaphragm contains tendon organs that signal muscle tension and exert inhibitory influences on central respiratory activity. Muscle spindles of intercostal muscles are involved in spinal and supraspinal reflexes. Chemoreceptor as well as mechanoreceptor afferents also play a role in respiratory homeostasis by projecting to higher brain centers and provide a direct appraisal of the chemical milieu of the body and of the mechanical status of the ventilatory apparatus. Brainstem respiratory centre is also connected to higher cortical centres which has a role in voluntary control of respiration.

DIFFERENT MECHANISMS OF RESPIRATORY CONTROL.

RESPIRATORY MOTOR COROLLARY DISCHARGE.

The most important group of neurons controlling respiration are located in the medulla oblongata.

Dorsal group of neurons – (I neurons) - control inspiration through phrenic nerve nuclei and external intercostal motor nuclei.

Ventral group of neurons (E neurons) - control expiration and also control internal intercostal motor nuclei.

There is a conscious awareness of respiratory motor command , the respiratory centre discharges to both motor neurons as well as exact copy to the sensory cortex.

These discharges to sensory cortex are called corollary discharges and the play an important role is sensing the respiratory effort.

Lack of corollary discharges are one plausible explanation for decreased perception of dyspnea in Covid Pneumonia[26].

AORTIC AND CAROTID CHEMORECEPTORS

Respiratory motor output responds to changes in arterial pH,pCo2, Po2. Increased pco2 causes a sensation of 'air hunger'[3] or an urge to breathe by stimulating respiratory motor neurons. Possible connections are also present between chemoreceptors and motor cortex.

METABORECEPTORS

These receptors are present in skeletal muscles and respond to byproducts of metabolism .Metaboreceptors are afferent signaling pathway that lead to perception of dyspnea in exercise. Neither hypoxia nor hypercapnea occurs in exercise but still sensation of dyspnea is perceived. The exact mechanism of pathways of metaboreceptors and origin of exercise induced dyspnea is unknown.

ROLE OF VAGAL NERVE ENDINGS

There are cold receptors in the upper airway that respond to changes in airflow and temperature. At least five different types of receptors innervated by vagus mediate dyspnea although exact pathways are unclear but complex.

STRETCH RECEPTORS

Slowly adapting (SA) and rapidly acting (RA) stretch receptors[5] are found in smooth muscles of airways. SARs respond to volatile anesthetics, CO2 and furosemide and exhibit inhibitory activity through amino pyridine sensitive potassium channels. They are sensitized by furosemide and inhaled furosemide alleviates dyspnea through these receptors.

Rapidy adapting receptors (RAR) have non myelinated terminals and respond to large number of mechanical and irritant stimuli. They are otherwise known as pulmonary irritant receptors. Some animal studies show that pneumothorax strongly stimulates RARs and contribute to generation of dyspnea. Thus stimulation of SARs and desensitization of RAR can alleviate dyspnea.

The other peculiar group of receptors are the C- fibre receptors which are of two groups. They are also called as juxta pulmonary capillary receptors. Pulmonary C type receptors[7] are found in lung parenchyma and Bronchial C type receptors are located in the airway mucosa. Pulmonary group responds to congestion but doesn't cause much of dyspnea.

ROLE OF CHEST WALL RECEPTORS

There are mechanoreceptors present in joints, tendons and muscles which have projections to brain. These afferent connections contribute to sensation of dyspnea and also modify sensation. There is a possible gate operating central mechanism which responds to afferents from intercostal muscles and has a prominent role in dyspnea sensation. Phrenic nerve afferents also play a role in sensation of dyspnea. Their role is illustrated in the following image (Fig 1.).
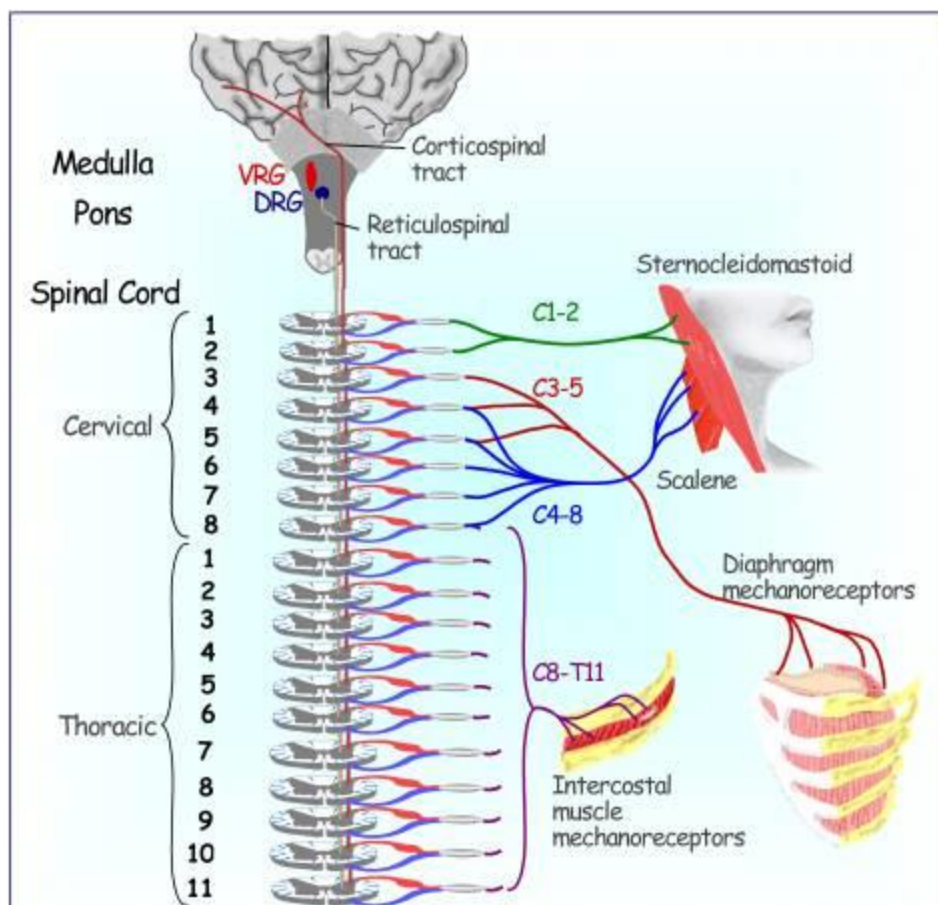
Fig1 .Role of mechanoceptors in respiratory control.

CENTRAL PATHWAY FOR DYSPNEA PERCEPTION

It is postulated that Anterior cingulate cortex, amygdala, cerebellum, medial dorsal thalamus, motor cortex, periaqueductal grey area, prefrontal cortex, primary somatosensory cortex all are involved in neural processing of respiratory afferent sensations.

In simpler terms dyspnea occurs due to mismatch between central efferent discharge and afferent sensory inputs from peripheral receptors.
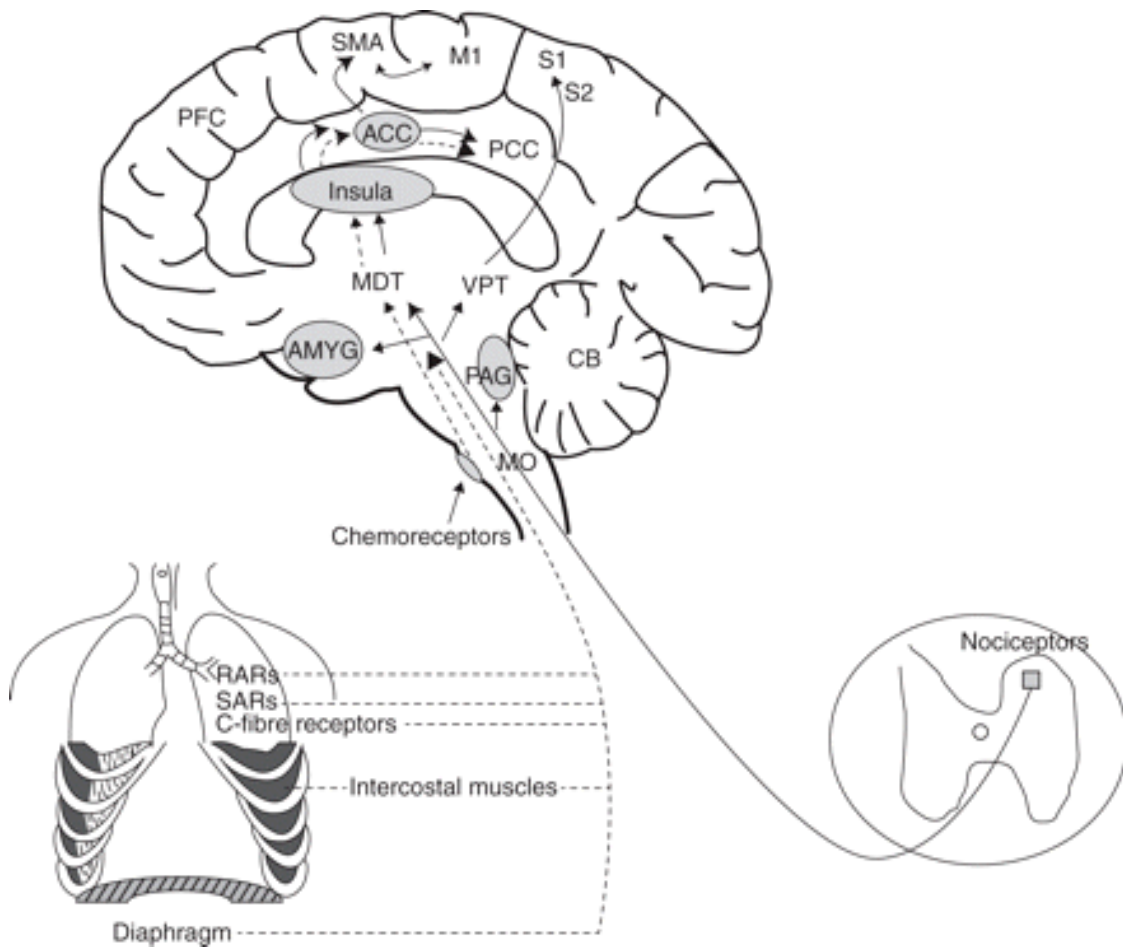
Fig2. Central pathway of respiratory control.

The above pathway (Fig 2). shows the complexity of afferent pathways. The areas predominantly activated in persons experiencing dyspnea found through advanced neuroimaging techniques are Anterior right insula[9], Cerebellar vermis, amygdala, anterior and posterior cingulate cortex[6]. Thalamus is the predominant centre of relay for afferent sensations and thalamocortical projections appear to be same for both pain and dyspnea.

DISTINCT SENSATIONS OF DYSPNEA

- Sensation of dyspnea has multiple dimensions. 'Air hunger' is usually felt when there is a increase in respiratory drive which is present when there is hypoxia or hypercapnia. Thus Chemoreceptors play an important role in sensation of air hunger.

- Derangements in ventilatory mechanics when muscles are weak due to fatigue or paralysis results in sensation of increase work and effort. Here the central motor command discharges are increased and the corollary discharges may incite this sensation.

- The feeling of chest tightness which is usually felt in asthmatics is because of bronchoconstriction and this is mediated by stimulation of Rapidly adapting stretch receptors and C fibre type receptors.

- Other factors like emotion and attention[8] also play a role in perception of dyspnea. The affective component is important as psychotherapeutic approaches may aid in management of dyspnea.

Thus qualitative distinct sensations are due to different mechanisms and have different pathways and produce the sensation of dyspnea.
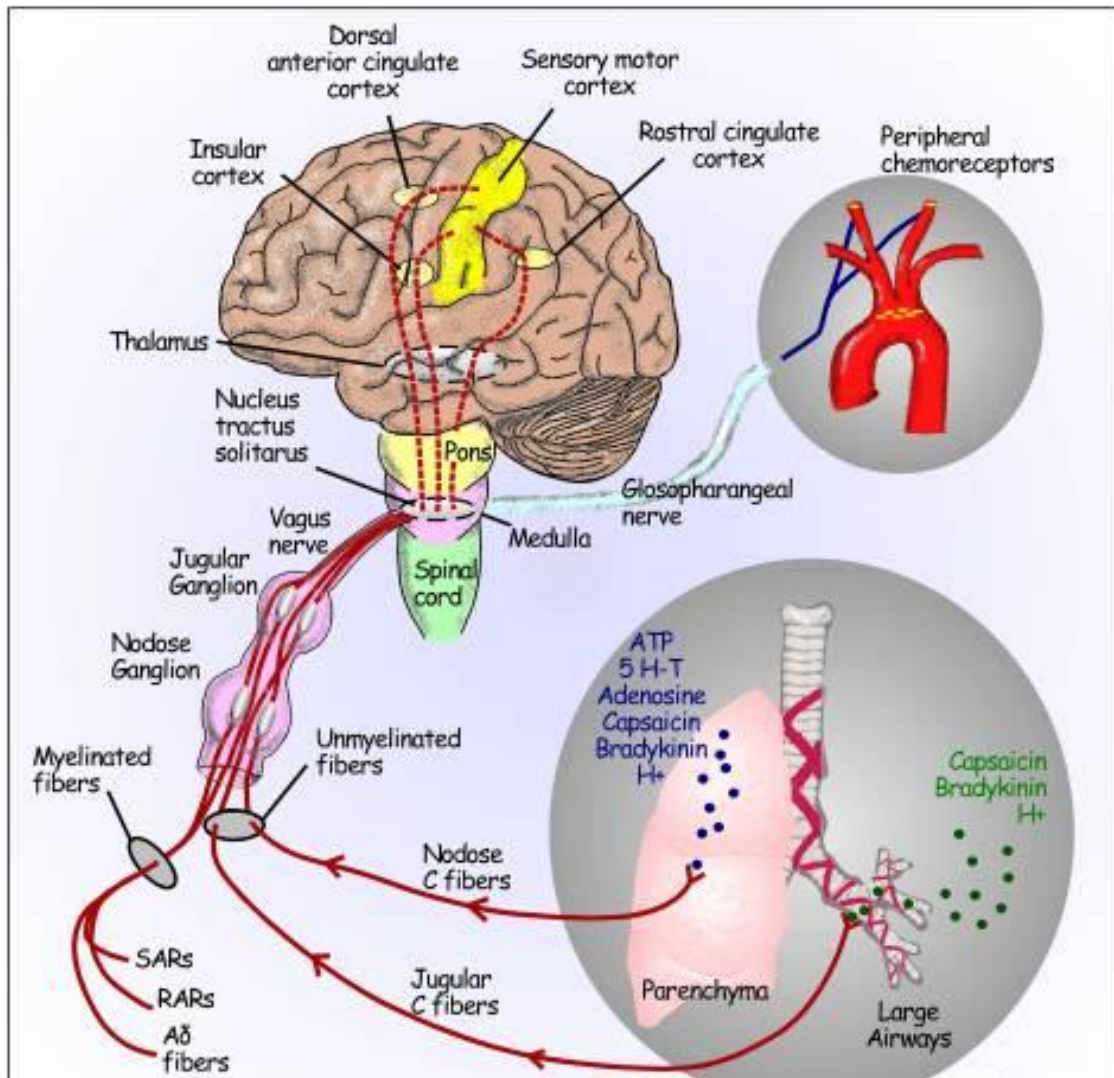
FIG 3.Summary of afferent and efferent pathways.

Common symptoms which are described in specific conditions are as follows

1.Rapid breathing	Chronic heart failure
2.Incomplete exhalation	Asthma
3.Shallow breathing	Restrictive diseases

4.Increased effort	COPD, neuromuscular disorders, chest wall diseases
5.Suffocation	Chronic heart failure
6.Air hunger	COPD, chronic heart failure
7.Tight chest	Asthma
8.Heavy breathing	Asthma

Tab1.Different sensations perceived by a dyspneic individual.

COMMON SCALES FOR DYSPNEA

Assessment of dyspnea is important to assess the severity of underlying disease, disability and also to plan management. Quantifying dyspnea through specific scales is also useful to assess response to treatment. Some the commonly used scales in clinical practice are broadly classified as

1. CLINICAL SCALES

2. PSYCHOPHYSICAL SCALES

- **MRC SCALE**

This scale was proposed by Fletcher et al. in 1959 and was the first clinical scale for determination of functional disability due to dyspnea in patients with respiratory diseases[11].

- It is based on daily life activities and patients are to recognize their own level of respiratory distress.

It has been modified and the currently used scale is

Level	
0	I only get breathless with strenuous exercise.
1	I get short of breath when hurrying on level ground or walking up a slight hill.
2	On level ground, I walk slower than people of the same age because of breathlessness, or have to stop for breath when walking at my own pace.
3	I stop for breath after walking about 100 yards or after a few minutes on level ground.
4	I am too breathless to leave the house or I am breathless when dressing.

Tab 2. mMRC classification

The scale is symptomatic and in essence the amount of effort needed to produce the symptom is assessed.

- **NYHA Functional classification[13]**

    The score originated in 1928 and is used exclusively in classifying extent of heart disease. Current scale used is formulated by the criteria committee of the American Heart Association. (9th edition 1994).

CLASS 1	Patients with heart disease but without resulting limitation of physical activity. Ordinary physical activity doesn't cause undue fatigue, palpitation, dyspnea or anginal pain
CLASS 2	Patients with heart disease resulting in slight limitation of physical activity. Comfortable At rest. Ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain
CLASS 3	Patients with heart disease resulting in marked limitation of physical activity. Comfortable At rest. Less than ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain.
CLASS 4	Patients with heart disease resulting in inability to carry out any physical activity. Symptoms of cardiac insufficiency may be present even at rest. If any physical activity is undertaken discomfort is increased.

Tab 3. NYHA classification

- **Baseline Dyspnea index and Transitional dyspnea index(BDI and TDI)[10]**

This scale used in patients with COPD includes functional impairment as well as magnitude of task that provoked breathing difficulty. Scores are obtained by an interviewer.

Components of score are as follows

Baseline functional impairment

1.Grade 4	No Impairment	Able to carry out usual activities and occupation without shortness of breath.
2.Grade 3	Slight Impairment	Distinct impairment in at least one activity but no activities completely abandoned. Reduction, in activity at work or in usual activities, that seems slight or not clearly caused by shortness of breath
3.Grade 2	Moderate Impairment	Subject has changed jobs and/or has abandoned at least one usual activity due to shortness of breath
4.Grade 1	Severe Impairment	Subject unable to work or has given up most or all usual activities due to shortness of breath

5.Grade 0	Very Severe Impairment	Unable to work and has given up most or all usual activities due to shortness of breath
6.W	Amount Uncertain	Subject is impaired due to shortness of breath, but amount cannot be specified. Details are not sufficient to allow impairment to be categorized
7.X	Unknown	Information unavailable regarding impairment.
8.Y	Impaired for Reasons Other than Shortness of Breath	For example, musculoskeletal problem or chest pain.

Tab 4. BDI- baseline functional impairment

Useful activities are daily up keeping of residence, yard work, gardening, shopping, etc.

BASELINE MAGNITUDE OF TASK

1.Grade 4	Extraordinary	Becomes short of breath only with extraordinary activity such as carrying very heavy loads on the level, lighter loads uphill, or running. No shortness of breath with ordinary tasks.

2.Grade 3	Major	Becomes short of breath only with such major activities as walking up a steep hill, climbing more than three flights of stairs, or carrying a moderate load on the level.
3.Grade 2	Moderate	Becomes short of breath with moderate or average tasks such as walking up a gradual hill, climbing fewer than three flights of stairs, or carrying a light load on the level.
4.Grade 1	Light	Becomes short of breath with light activities such as walking on the level, washing, or standing
5.Grade 0	No Task	Becomes short of breath at rest, while sitting, or lying down
6.W	Amount Uncertain	Subject's ability to perform tasks is impaired due to shortness of breath, but amount cannot be specified. Details are not sufficient to allow impairment to be categorised.

7.X	Unknown	Information unavailable regarding limitation of magnitude of task.
8.Y	Impaired for Reasons Other than Shortness of Breath	For example, musculoskeletal problem or chest pain.

Tab 5.BDI- magnitude of task

BASELINE MAGNITUDE OF EFFORT

1.Grade 4	Extraordinary	Becomes short of breath only with the greatest imaginable effort. No shortness of breath with ordinary effort.
2.Grade 3	Major	Becomes short of breath with effort distinctly submaximal, but of major proportion. Tasks performed without pause unless the task requires extraordinary effort that may be performed with pauses.
3.Grade 2	Moderate	Becomes short of breath with moderate effort. Tasks performed with occasional pauses and requiring longer to complete than the average person.

4.Grade 1	Light	Becomes short of breath with little effort. Tasks performed with little effort or more difficult tasks performed with frequent pauses and requiring 50-100% longer to complete than the average person might require.
5.Grade 0	No Task	Becomes short of breath at rest, while sitting, or lying down.
6.W	Amount Uncertain	Subject's exertional ability is impaired due to shortness of breath, but amount cannot be specified. Details are not sufficient to allow impairment to be categorised.
7.X	Unknown	Information unavailable regarding limitation of effort.
8.Y	Impaired for Reasons Other than Shortness of Breath	For example, musculoskeletal problems, or chest pain.

Tab 6. Magnitude of effort

TRANSITION DYSPNEA INDEX

CHANGE IN FUNCTIONAL IMPAIRMENT

-3	Major Deterioration	Formerly working and has had to stop working and has completely abandoned some of usual activities due to shortness of breath.
-2	Moderate Deterioration	Formerly working and has had to stop working or has completely abandoned some of usual activities due to shortness of breath.
-1	Minor Deterioration	Has changed to a lighter job and/or has reduced activities in number or duration due to shortness of breath. Any deterioration less than preceding categories
0	No Change	No change in functional status due to shortness of breath
+1	Minor Improvement	Able to return to work at reduced pace or has resumed some customary activities with more vigour than previously due to improvement in shortness of breath.

+2	Moderate Improvement	Able to return to work at nearly usual pace and/or able to return to most activities with moderate restriction only.
+3	Major Improvement	Able to return to work at former pace and able to return to full activities with only mild restriction due to improvement of shortness of breath.
Z	Further Impairment for Reasons Other than Shortness of Breath	Subject has stopped working, reduced work, or has given up or reduced other activities for other reasons. For example, other medical problems, being ''laid off'' from work, etc.

Tab 7. TDI- change in functional impairment.

CHANGE IN MAGNITUDE OF TASK

-3	Major Deterioration	Has deteriorated two grades or greater from baseline status.
-2	Moderate Deterioration	Has deteriorated at least one grade but fewer than two grades from baseline status.
-1	Minor Deterioration	Has deteriorated less than one grade from baseline. Subject with distinct deterioration within grade, but has not changed grades.
0	No Change	No change from baseline.
+1	Minor Improvement	Has improved less than one grade from baseline. Subject with distinct improvement within grade, but has not changed grades.
+2	Moderate Improvement	Has improved at least one grade but fewer than two grades from baseline.
+3	Major Improvement	Has improved two grades or greater from baseline
Z	Further Impairment for Reasons Other than Shortness of Breath	Subject has reduced exertion capacity, but not related to shortness of breath. For example, musculoskeletal problem or chest pain.

Tab 8. Change in magnitude of task

CHANGE IN MAGNITUDE OF EFFORT

-3	Major Deterioration	Severe decrease in effort from baseline to avoid shortness of breath. Activities now take 50-100% longer to complete than required at baseline.
-2	Moderate Deterioration	Some decrease in effort to avoid shortness of breath, although not as great as preceding category. There is greater pausing with some activities
-1	Minor Deterioration	Does not require more pauses to avoid shortness of breath, but does things with distinctly less effort than previously to avoid breathlessness.
0	No Change	No change in effort to avoid shortness of breath.
+1	Minor Improvement	Able to do things with distinctly greater effort without shortness of breath. For example, may be able to carry out tasks somewhat more rapidly than previously.

+2	Moderate Improvement	Able to do things with fewer pauses and distinctly greater effort without shortness of breath. Improvement is greater than preceding category, but not of major proportion
+3	Major Improvement	Able to do things with much greater effort than previously with few, if any, pauses. For example, activities may be performed 50-100% more rapidly than at baseline.
Z	Further Impairment for Reasons Other than Shortness of Breath	Subject has reduced exertional capacity, but not related to shortness of breath. For example, musculoskeletal problem or chest pain.

Tab 9. Change in magnitude of effort.

TDI is used measure change in dyspnea from baseline.

QUESTIONNAIRES FOR DYSPNEA ASSESSMENT

   1. Chronic Respiratory disease questionnaire(CRDQ)

This score contains 20 items which are grouped into 4 domains measuring both physical and emotional aspects of dyspnea and as name implies is used in chronic respiratory diseases like COPD. A likert scale is used for answers and each domain is scored between 1-7.

Simplified version of CRDQ

1.DYSPNEA	- Taking care of your basic needs, such as bathing, showering, eating, or dressing - Walking - Performing chores, such as housework, shopping or grocery shopping Participating in social activities, such as meeting with family, friends
2.EMOTIONAL FUNCTIONING	- How much of the time have you felt frustrated or impatient? - How much of the time did you feel upset, worried, or depressed? - How much of the time did you feel relaxed and free of tension? - How much of the time have you felt discouraged or down in the dumps?

	• How happy, satisfied, or pleased have you been with your personal life? • How often have you felt restless, tense, or uptight?
3. DISEASE CONTROL	• How often did you have a feeling of fear or panic when you had difficulty getting your breath? • How much of the time did you feel very confident and sure that you could deal with your respiratory problem? • How often did you feel upset or scared when you had difficulty getting your breath?
4. FATIGUE	• How tired have you felt? • How much energy have you had? • How often have you felt low in energy? • How often have you felt worn out or sluggish?

Tab 10. CRDQ Questionnaire.

Dyspnea assessment includes choosing five activities that have caused most dyspnea and then giving a score of 1-7 for each and then getting the average score.

2. UCSD shortness of breath questionnaire[14]

Shortness-of-Breath Questionnaire

Patient is asked to assess his shortness of breath when doing, each of the following tasks or best guess the shortness of breath he would have when doing that particular activity.

The shortness of breath is rated as:

 0 None at all

1

2

3

4 Severe

5 Maximum or unable to do because of shortness of breath

How much do these limit you in your daily life?

1. At rest	0 1 2 3 4 5
2. Walking on a level at your own pace	0 1 2 3 4 5
3.Walking on a level with others your age	0 1 2 3 4 5
4. Walking up a hill	0 1 2 3 4 5
5. Walking up stairs	0 1 2 3 4 5
6. While eating	0 1 2 3 4 5
7. Standing up from a chair	0 1 2 3 4 5
8. Brushing teeth	0 1 2 3 4 5
9. Shaving and/or brushing hair	0 1 2 3 4 5
10. Showering/bathing	0 1 2 3 4 5
11. Dressing	0 1 2 3 4 5

12. Picking up and straightening	0 1 2 3 4 5
13. Doing dishes	0 1 2 3 4 5
14. Sweeping /vacuuming	0 1 2 3 4 5
15. Making bed	0 1 2 3 4 5
16. Shopping	0 1 2 3 4 5
17. Doing laundry	0 1 2 3 4 5
18. Washing car	0 1 2 3 4 5
19. Mowing lawn	0 1 2 3 4 5
20. Watering lawn	0 1 2 3 4 5
21. Sexual activities	0 1 2 3 4 5
22. Shortness of breath	0 1 2 3 4 5
23. Fear of "hurting myself" by overexerting	0 1 2 3 4 5
24. Fear of shortness of breath	0 1 2 3 4 5

Tab 11. UCDS questionnaire

3.PULMONARY FUNCTION STATUS AND DYSPNEA QUESTIONNAIRE (PFSDQ)[15]

The PFSDQ is a 164-item self-administered questionnaire, consists of two components measuring dyspnea intensity with activities and changes in functional ability related to 79 activities of daily living. Activities are grouped into scales of 'self-care, mobility, eating, home management, social, and recreational'. The

dyspnea component measures the level of dyspnea patients report with these activities. The functional abilities component evaluates the degree to which the performance of activities has changed as the result of "chronic obstructive pulmonary disease". The activities are relevant for adults of both sexes and reflect various energy workload requirements. Normative data for both components are described.

4. St. GEORGE RESPIRATORY QUESTIONNAIRE[16]

This is a disease-specific instrument designed to measure impact on overall health, daily life, and perceived well-being in patients with obstructive airways disease.

THE questionnaire begins with a question on overall health

Very good-1 Good-2 Fair-3 Poor-4 Very Poor-5

- I cough Most days a week-1

- Several days a week-2

- Only with respiratory infections

- Not at all-5

- I bring up phlegm (sputum): Most days a week

- Several days a week

- Only with respiratory infections

- Not at all

- I have shortness of breath: Most days a week

- Several days a week

- Not at all

- I have attacks of wheezing: Most days a week

    o Several days a week

    o A few days a month

    o Only with respiratory infections

    o Not at all

1) How many attacks of chest trouble did you have during the last year?

   3 or more attacks

   1 or 2 attacks

   None

2) How often do you have good days (with few respiratory problems)

3) If you have a wheeze, is it worse when you get up in the morning?

    o **PART 2**

- How would you describe your respiratory problems?

- Questions about what activities cause breathlessness. These are simple True or False questions.

    o Washing or dressing yourself

    o Walking around the house

    o Walking outside on the level ground

- o d)Walking up a flight of stairs

- o e)Walking up hill

- o patient documents whether the above questions are true or false

- Some questions regarding cough and breathlessness are further documented. All questions are true or false questions.

  - o Coughing hurts

  - o Coughing makes me tired

  - o I am short of breath when I talk

  - o I am short of breath when I bend over

  - o My cough or breathing disturbs my sleep

  - o I get exhausted easily

- General Questions regarding limitation of day to day activities are asked.

- My cough or breathing is embarrassing in public

  - o My respiratory problems are a nuisance to my family, friends, or neighbors

  - o I get afraid or panic when I cannot catch my breath

  - o I feel that I am not in control of my respiratory problems

  - o I have become frail or an invalid because of my respiratory problems

  - o Exercise is not safe for me

  - o Everything seems too much of an effort

- The next set of questions are directed at how respiratory distress affect day to day activities.

- I take a long time to get washed or dressed

- I cannot take a bath or shower, or I take a long time to do it

- I walk slower than other people, or I stop to rest 1

- Jobs such as house chores take a long time, or I have to stop to rest

- If I walk up one flight of stairs, I have to go slowly or stop

- If I hurry or walk fast, I have to stop or slow down

- My breathing makes it difficult to do things such as walk up hills, carry things up stairs, do light gardening such as weeding, dance, bowl, or play golf

- My breathing makes it difficult to do things such as carry heavy loads, dig the garden or shovel snow, jog or walk briskly (5 miles per hour), play tennis, or swim

- I cannot play sports or do other physical activities

- I cannot go out for entertainment or recreation

- I cannot go out of the house to do the shopping

- I cannot do household chores

- I cannot move far from my bed or chair

- The final set of questions are as follows

- How do your respiratory problems affect you?

- They do not stop me from doing anything I would like to do

- They stop me from doing one or two things I would like to do

- They stop me from doing most of the things I would like to do

- They stop me from doing everything I would like to do.

- It is very important to notice that all these questionnaires are used for chronic respiratory diseases and are highly subjective

VISUAL ANALOGUE SCALE[12] and BORG SCALE
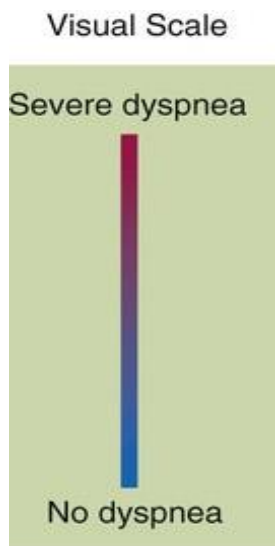
MODIFIED BORG SCALE

0	Nothing at all
0.5	Extremely weak
1	Very weak
2	weak

3	Moderate
4	Somewhat strong
5	strong
7	Very strong
10	Extremely strong

Tab 12. Modified Borg scale

- In Visual analogue scale the subject is asked to quantify dyspnea on a horizontal; or vertical line of 10cm with 0 point being normal and 10 cm mark depicting intolerable breathlessness.

- In Borg scale a vertical line is labelled from 1 to 10 with verbal descriptors of severity labelled to each number. Both the scales are used after cardiopulmonary testing and patient is asked to assess his symptoms. Specific targets on scale can be set to assess the treatment response also.

COPD assessment test (CAT)[17] is the accepted score used in GOLD criteria for stratifying dyspnea severity in COPD patients.

The following parameters are used in CAT score

This questionnaire will help you and your healthcare professional measure the impact COPD (Chronic Obstructive Pulmonary Disease) is having on your wellbeing and daily life. Your answers, and test score, can be used by you and your healthcare professional to help improve the management of your COPD and get the greatest benefit from treatment.

For each item below, place a mark (X) in the box that best describes you currently. Be sure to only select one response for each question.

Example: I am very happy (0) (X) (2) (3) (4) (5) I am very sad

SCORE

I never cough	(0)(1)(2)(3)(4)(5)	I cough all the time	
I have no phlegm (mucus) in my chest at all	(0)(1)(2)(3)(4)(5)	My chest is completely full of phlegm (mucus)	
My chest does not feel tight at all	(0)(1)(2)(3)(4)(5)	My chest feels very tight	
When I walk up a hill or one flight of stairs I am not breathless	(0)(1)(2)(3)(4)(5)	When I walk up a hill or one flight of stairs I am very breathless	
I am not limited doing any activities at home	(0)(1)(2)(3)(4)(5)	I am very limited doing activities at home	
I am confident leaving my home despite my lung condition	(0)(1)(2)(3)(4)(5)	I am not at all confident leaving my home because of my lung condition	
I sleep soundly	(0)(1)(2)(3)(4)(5)	I don't sleep soundly because of my lung condition	
I have lots of energy	(0)(1)(2)(3)(4)(5)	I have no energy at all	

TOTAL SCORE

Most of dyspnea scales have been validated for use in assessing severity and treatment response of chronic respiratory diseases.

Dyspnea is one of the most common symptom reported in emergency department. As dyspnea is a subjective sensation, many factors including patient's level of tolerance and psychological factors also play a major factor in how severe dyspnea is perceived by each individual. These factors can sometime result in overestimation or underestimation of dyspnea, which in emergency care setting can lead to grave consequences.

Can dyspnea be measured more objectively? What parameters can be used to assess this complex symptom?

Some of the existing objective tests include

1. CARDIOPULMONARY EXERCISE TEST (CPET)

It includes assessment of integrative exercise response of Pulmonary, cardiovascular, hematopoietic, neuropsychological and skeletal muscle systems.

One metabolic equivalent (MET) is the resting oxygen uptake in sitting position and equals 3-5ml/kg/min.

In CPET, Modern systems allow for analysis of gas exchange at rest, during exercise and during recovery and yield breath by breath measures of oxygen uptake (VO_2), CO_2 output and ventilation. All systems are computerized and complex data can be easily analyzed and retrieved and compared.

The data analysis and interpretation of the testing is beyond the scope of the article.

ECG along with important parameters like peak VO2, Ve/VO2 slope, oxygen saturation provide useful diagnostic data[18].

Newer advances including noninvasive measurement of cardiac output and flow volume loop provide important information.

Six minute walk test[19]

It is a test of functional exercise capacity which is used in varied age groups. It is a simple test that requires a 100 ft. hallway. The test measures the distance that a patient can walk on a flat, hard surface in a period of 6 minutes. It evaluated the global integrated response of all the systems involved during exercise, including the pulmonary, cardiovascular, systemic circulation, blood, neuromuscular units and muscle mitochondrial metabolism.

The patients are allowed to walk at their own pace and are allowed to stop and rest during the test. Common indications for the test are cardiopulmonary diseases. 6MWT is also a predictor of morbidity and mortality.

Common indications

Pretreatment and post treatment comparison

1.Lung transplantation
2.Lung resection
3.Lung volume reduction surgery
4.Pulmoinary rehabilitation
5.COPD

6.Pulmonary hypertension
7.Heart failure

Functional status assessment

1.COPD
2.Cystic fibrosis
3.Heart failure
4. Peripheral vascular disease
5.fibromyalgia

 Tab 13. Indications for six minute walk test.

Other indications include mortality prediction in heart failure, COPD, Primary pulmonary hypertension. Major limitations of the test include, the inability to identify cause of dyspnea, cause and mechanism of exercise limitation can't be identified.

Unstable angina, myocardial infarction in the previous month are absolute contraindications for the test. The length of the walking course is usually 3 m and it is marked every 3 metres. The patient is asked to rest for 10 minutes before starting the test. Vital parameters like Blood pressure, pulse rate and oxygen saturation are measured at baseline. The patient is asked to walk as far as possible in 6 mins and the patient is allowed to rest as and when required. Post completion

of the test patient's dyspnea is recorded using a Borg scale and vital parameters are recorded and the number of laps completed by the patient is recorded. A statistically significant increase in 6MWD is the expected response after an intervention. Age, Height, weight and sex independently affect the 6MWD and the based on result a thorough evaluation for the cause of dyspnea should be done.

BODE INDEX[20] – uses both objective and subjective parameters to predict all-cause mortality from respiratory complications in patients with COPD.
FEV1, 6 Minute walk distance, mMRC dyspnea scale and BMI are components of the score and score shouldn't be used during acute exacerbations

DECAF[21] score is used in acute exacerbations of COPD to assess the morbidity and in hospital mortality. Extended MRC scale, Eosinopenia, consolidation on CHEST XRAY, Acidemia, and Atrial fibrillation are parameters of score.
As seen above most of the test are used in non-emergency situations and most importantly most scores are disease specific. Many diseases manifest with dyspnea as the major symptom and a simple objective score is needed to grade dyspnea in emergency care irrespective of etiology of dyspnea.

SOME NOTABLE STUDIES DONE ON EXISTING DYSPNEA SCORES

- The New York Heart Association (NYHA) classification is a fundamental tool for risk stratification of heart failure (HF). The ability of NYHA score to predict mortality in various studies was analyzed by Caesar carabello et al. NT-proBNP (N-terminal pro–B-type natriuretic peptide), Kansas City Cardiomyopathy Questionnaire (KCCQ) scores, 6-minute walk distances, left ventricular ejection fraction, and cardiopulmonary test parameters were compared with NYHA score using Wilcoxon rank sum tests and percentage overlap using kernel density estimation. Mortality at 20 months for NYHA class II ranged from 7% for patients in HF-ACTION trial to 15% in GUIDE-IT trial, whereas mortality for NYHA class III ranged from 12% in TOPCAT trial to 26% in GUIDE-IT, whereas the values of nT-pro BNP and the ejection fraction were fairly similar and were better predictors of mortality. The study concluded that NYHA system poorly discriminates HF patients across the spectrum of functional impairment.

- The mMRC scale was compared with CAT (COPD assessment test) score by Anelise B Munari et al[29] in predicting restriction in physical activities of daily living (PADL). Both are part of GOLD criteria for classifying COPD patients. In that study, both mMRC and CAT reflected the PADL of COPD subjects. Subjects with mMRC < 2 and CAT < 10 spent less time in physical activities < 1.5 metabolic equivalents of task (METs). Physical

activities $\geq$ 3 METs differed only between mMRC < 2 and mMRC $\geq$ 2 (39.2 [18.8–59.6], $P <$ .001). Furthermore, only the mMRC was able to predict the PADL alone (time active, $r^2 = 0.16$; time sedentary, $r^2 = 0.12$; time $\geq$ 3 METs, $r^2 = 0.12$) and associated with lung function. Thus mMRC should be adopted as the preferred classification criteria when focusing on physical activities.

- The reliability and validity of the UCSD shortness of breath questionnaire was assessed by Elizabeth G. Eakin et al by comparing with Quality of Well-Being Scale, the Center for Epidemiological studies Depression Scale, and a 6-min walk with modified Borg scale ratings of perceived breathlessness following the walk. The results demonstrated that the SOBQ had excellent internal consistency (α=0.96).The study concluded that The SOBQ is a valuable assessment tool in both clinical practice and research in patients with moderate-to-severe lung disease.

- The BODE (Body mass index, airflow Obstruction, Dyspnea, and Exercise capacity) index is a predictor of the number and severity of acute exacerbations of COPD. The correlation between the BODE index, comorbidity, and healthcare resource utilization in COPD was studied by Li CL et al .In that study 396 patients with COPD inclusion with an average age of 71.3 ± 8.4 years was analyzed . Healthcare resource utilization was

positively correlated with the BODE index during the 32 months of retrospective clinical outcomes.

- In another study by Ong KC et al, the BODE staging system, which includes in addition to FEV1 other physiologic and clinical variables, better predicted hospitalization for COPD when compared to FEV1 alone.

- A study done by Eloisa Maria Gatti Regueiro et al showed that there was no correlation between the BODE Index and the ventilatory and metabolic responses in the Activities of Daily Living assessment namely pulmonary ventilation (VE), oxygen consumption (VO2), and carbonic gas production (VCO2). A correlation was observed between the BODE Index and the variables assessed in the 6MWTT, Sit-to-Stand Test, and Hand Grip Strength Test in moderate to very severe Chronic Obstructive Pulmonary Disease patients. This suggests that these tests can be employed as predictors of physical exercise capacity, perhaps as complementary tests to the BODE Index.

- In another study by B Rahimi, E Safavi et al the relation between Cardio-pulmonary exercise testing (CPET) parameters and patients daily symptoms/activities and the disease social/emotional impact were analyzed. In this study, the correlation of COPD daily symptoms and quality of life [assessed by St. George's Respiratory Questionnaire (SGRQ)] and COPD

severity index (BODE-index) with CPET parameters were not strong. They suggested that there was a significant negative correlation between ΔVO2/ΔWR and BODE-index .This shows that along with COPD progression, regardless of negative past history, other comorbidities such as cardiac/musculoskeletal problems should be sought in patients with abnormal CPET tests.

- A meta-analysis by Qiangru Huang et al[31] , the DECAF score in the accuracy analysis, showed good prognostic accuracy for both in-hospital and 30-day mortality when compared with COPD and Asthma Physiology Score, BUN, Altered mental status, Pulse and age >65; Confusion, Urea, Respiratory Rate, Blood pressure and age >65; or Acute Physiology and Chronic Health Evaluation II scores. The study concluded that as a specific and easily scored predictor for patients with Acute exacerbation of COPD, DECAF score was superior to other prognostic scores.

- In a small study by Tan M et al[32], 28 patients admitted with COPD exacerbation were assessed with percentage of predicted forced expiratory volume in 1 second (FEV1% pred), COPD assessment test (CAT), modified British Medical Research Council (mMRC), baseline dyspnea index (BDI), clinical COPD questionnaire (CCQ), St. George's respiratory questionnaire (SGRQ), BODE index, Hamilton Depression Rating Scale (HDRS) at admission and with CAT, mMRC, transition dyspnea index

(TDI), CCQ, SGRQ, and HDRS at 1 month after discharge. The TDI and scores of CAT, mMRC, CCQ, SGRQ, and HDRS at 1 month after discharge among the patients using single dual or triple inhaled medications after discharge was analyzed. The study concluded that in patients with COPD, BDI and TDI are recommended over mMRC for assessing dyspnea. CAT, CCQ and SGRQ allow sensitive assessment of the treatment efficacy to serve as routine evaluation tests, and among them SGRQ is the most comprehensive and is thus recommended when sufficient time is allowed. BODE is relatively complex but highly valuable for predicting the patients' survival outcomes. HDRS is recommended for routine screening of depression in patients with COPD.

- In a study by Karla R.KendrickRN et al[33] modified Borg scale (MBS) was studied. Modified Borg scale had the potential to provide quick, easy, and rapid information about a patient's subjective state of dyspnea. The results showed that a significant correlation existed between the change in MBS scores and the change in PEFR from pretreatment to post treatment scores. They concluded that MBS was a device that could be used to measure and evaluate dyspnea in obstructive lung diseases.

MATERIAL AND

METHODS

MATERIALS AND METHODS

STUDY DESIGN

Cross sectional observational study.

SETTING

Patients presenting with dyspnea to the emergency department at Institute of Internal Medicine, Madras Medical College & Rajiv Gandhi Government General Hospital during the study period between April 2020 and March 2021.

SAMPLE SIZE

Sample size calculation was done using Fishers Z- transformation

Inputs

True expected correlation -0.4

Correlation under null hypothesis-0.2

Alpha-0.05

Power-80%

Sample size was calculated to be 164.

Inclusion Criteria:

1. Patients presenting to Casualty with complaint of breathlessness severe enough to require a blood gas analysis.

2. Age group 18 to 80 years of age.

Exclusion Criteria:

1. Age < 18years or >80 years.

2. Patients with altered mental status not able to respond adequately.

3. Patients with STEMI

4. Patients who are unable to subjectively assess the severity of dyspnea.

METHODOLOGY

150 patients presenting with dyspnea as their major symptom to the emergency department in the Institute of internal medicine, Madras medical college and Rajiv Gandhi Government General Hospital were enrolled in the study. Informed consent was obtained from the patients. The study was approved by the Institutional Ethics committee. Demographic details such as age, gender, detailed history of presenting illness was taken from patients coming to medical emergency ward with breathlessness according to inclusion and exclusion criteria. Once participants are identified they will be given information sheet, following which written information consent will be obtained. This was done by the principal investigator. Patients were asked to assess the severity of breathlessness on a scale (Subjective scale) of 0 (I have no breathing problem) - 10 (I have severe breathing difficulty, I am almost dead). Modified dyspnea severity score[22] (MDSS) for patients was calculated. The components of the score include

MODIFIED DYSPNEA SEVERITY SCORE

DIMENSION	CATEOGORY	0 point	1 point	2 points	3 points
1.	Exercise tolerance	No dyspnea during regular activity	Dyspnea during walking	Dyspnea after a few steps	Dyspnea in rest

2.	Cooperation	Executes instruction	Executes instructions after repeated requests	Difficult to tolerate oxygen mask and not responding to request	Severely Agitated
3.	Breathing	Normal in rest	Respiratory rate >24/min in rest	Respiratory rate>24/min and using accessory respiratory muscles.	Orthopnea
4.	SpO2	In rest >95% in ambient air	90%to 95%in ambient air	<90% in ambient air and >95% after 15lit/min oxygen through mask	<90%in ambient air and <95% after high flow oxygen (15 lit/min)
5.	Speech	Undisturbed in rest	Unable to finish a whole sentence	Tells only short sentences or words	Unable to speak, Nodding.
6.	Heart rate	< 100/min at rest	100-120 /min at rest	120-140/min at rest	>140/min at rest
7.	cyanosis	Present			Absent

Tab 14. MDSS

The components of score were based on a study by Gondos et al. All the

components of the score can be easily calculated and most parameters are used in

daily practice and represent the severity of dyspnea. The minimum score is 0 and maximum score that could be obtained is 21.

Arterial or venous blood gas analysis was done and objective classification score was be calculated using the following values. This score was generated arbitrarily based on an article on dyspnea scoring by Gondos et al. The minimum score is 0 and the maximum score is 9.

Modified objective ABG scale

Parameter	0 point	1 point	2 points	3 points	4 points	5 points
1.pH	7.35 -7.45	7.30-7.35 7.45-7.50	7.25 -7.30 7.50-7.55	7.20-7.25 7.55-7.60	7.10-7.20 >7.6	<7.1
2.Base excess(mmol/l)	1-2.9	3-4.9	5-9.9	10-14.9	>15	

Tab 15. Modified ABG scale.

After the calculation of subjective score, modified dyspnea severity score and the objective score based on ABG, data analysis was done using SPSS software (version 26.0). Pearson's correlation coefficient was calculated between modified dyspnea severity score and objective score as well as the subjective score. Linear regression analysis was made between the three variables. Descriptive statistics including, mean, standard deviation, median and interquartile ranges (IQR) for continuous variables and percentages for categorical variables were analyzed.

OBSERVATION AND

RESULTS

RESULTS

A total 150 people were included in the final analysis

Table 1: Descriptive analysis of age in study population (N=150)

Parameter	Mean ± SD	Median	Min	Max
Age	51.03 ± 15.39	55	16	76

The mean (SD) age of the subjects was 51.03(15.39).

Table 2: Descriptive analysis of age group in study population (N=150)

Age group	Frequency (N)	Percentage (%)
<30	20	13.3%
31-40	18	12%
41-50	23	15.3%
51-60	42	28%
61-70	42	28%
>70	5	3.3%
Total	150	100%

Majority of participants belonged to age group of 50 to 70 years

Figure 1: Bar chart of age group
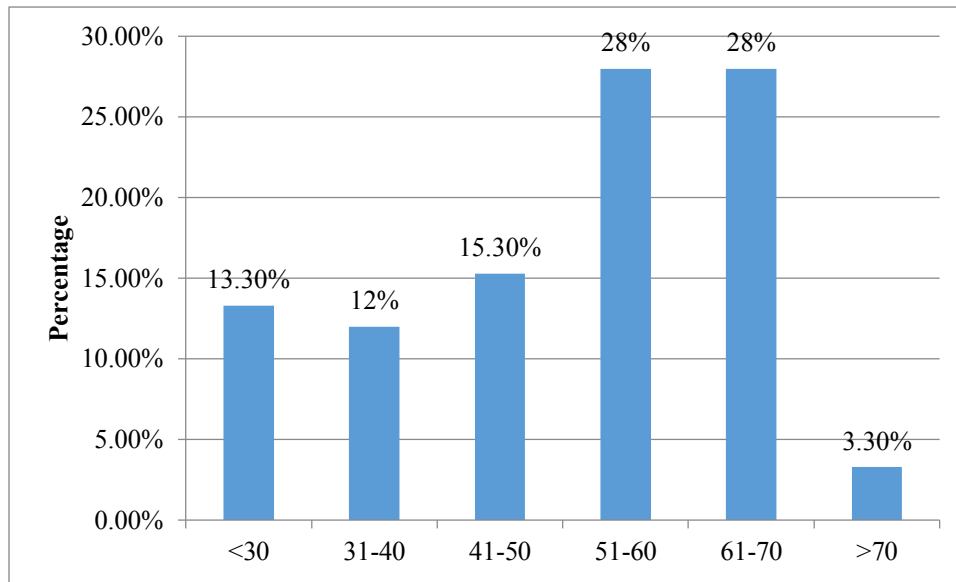
Table 3: Descriptive analysis of gender

Gender	Frequency	Percentage
Male	83	55.3%
Female	67	44.7%
Total	150	100%

Figure 2: Pie chart of Gender distribution
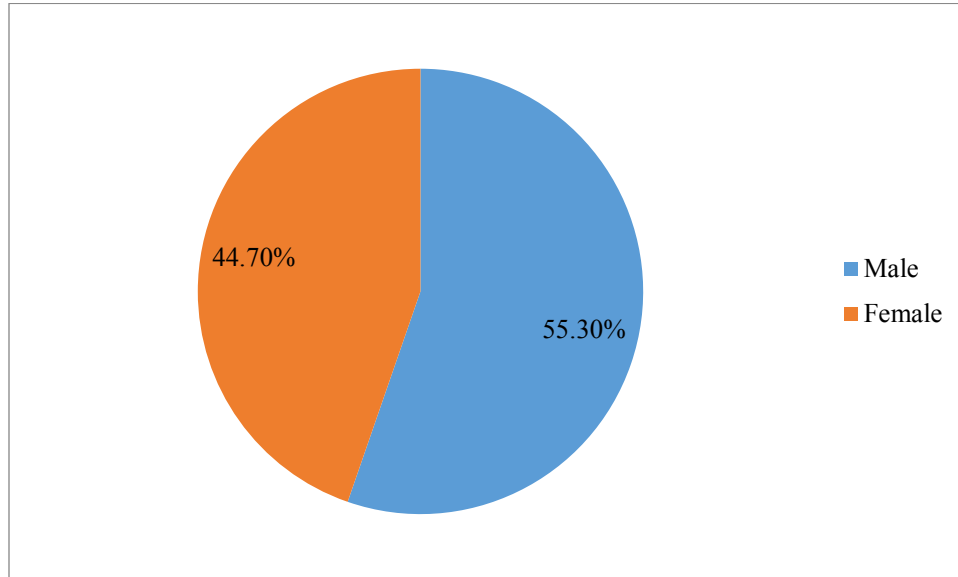
Table 4: Age and gender distribution

Age	Sex		Total
	Male	Female	
<30	6	14	20
31-40	14	4	18
41-50	8	15	23
51-60	27	15	42
61-70	25	17	42
>70	3	2	5
Total	83	67	150

Figure 3: Bar chart of Age and gender distribution
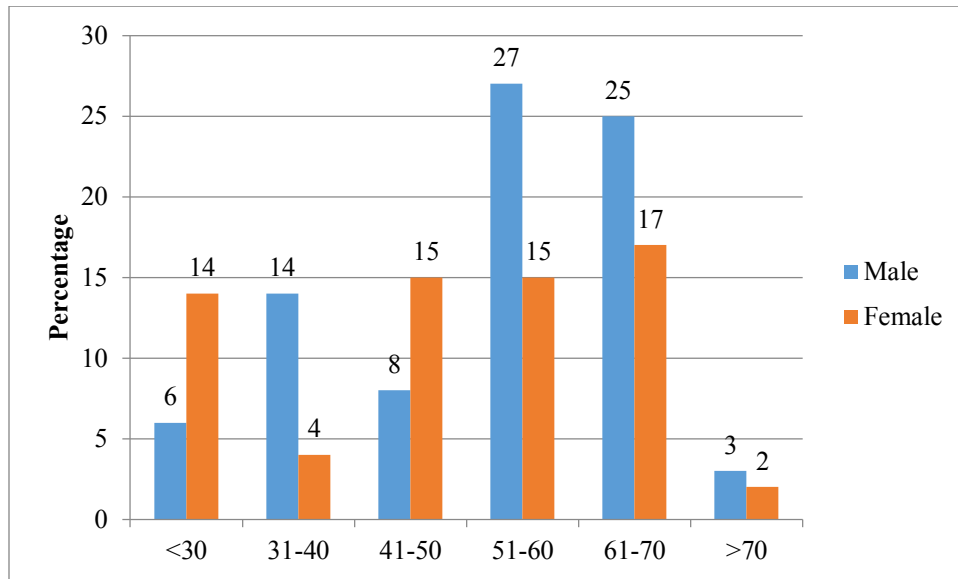
Table 5: Descriptive analysis of Provisional Diagnosis on admission

Provisional Diagnosis on admission	Frequency	Percentage
Acute coronary syndrome (NSTEMI and unstable angina)	4	2.7
Acute glomerulonephritis/Renal failure	1	.7
Community acquired pneumonia	13	8.7
Bronchial asthma exacerbation	8	5.3
Carcinoma lung	1	.7
Coronary artery disease/Acute Pulmonary edema	4	2.7
CAD/COPD/ acute pulmonary edema	1	.7
Congestive cardiac failure	16	10.7
Chronic kidney disease/ Pulmonary edema	22	14.7
COPD exacerbation	11	7.3
Covid pneumonia	39	26.0
DKA	8	5.3
Fever /leptospirosis	1	.7
Interstitial lung disease	5	3.3
Panic attack	1	.7
Pneumothorax	2	1.3
Pulmonary tuberculosis and sequelae	6	4.0
Pulmonary embolism /femur fracture	2	1.3
Sepsis / AKI	1	.7
Anemia	4	2.7
Total	150	100.0

Table 6: Descriptive analysis of Subjective dyspnea score (Borg scale) in study population (N=150)

Parameter	Mean ± SD	Median	Min	Max
Subjective dyspnea score	6.68 ± 1.29	7	3	10

The mean (SD) score of the subjective dyspnea score was 6.68(1.29).

Tab 7.Frequency table of Subjective dyspnea score

Score		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	1	.7	.7	.7
	4	7	4.7	4.7	5.3
	5	16	10.7	10.7	16.0
	6	42	28.0	28.0	44.0
	7	46	30.7	30.7	74.7
	8	26	17.3	17.3	92.0
	9	11	7.3	7.3	99.3
	10	1	.7	.7	100.0
	Total	150	100.0	100.0	

Tab8.Descriptive Statistics of subjective dyspnea score

N	Valid	150
	Missing	0
Mean		6.68
Std. Error of Mean		.105
Median		7.00
Mode		7
Std. Deviation		1.292
Variance		1.669
Skewness		-.121
Std. Error of Skewness		.198
Range		7
Minimum		3
Maximum		10
Percentiles	25	6.00
	50	7.00
	75	8.00

Fig4. Frequency distribution histogram of subjective dyspnea score
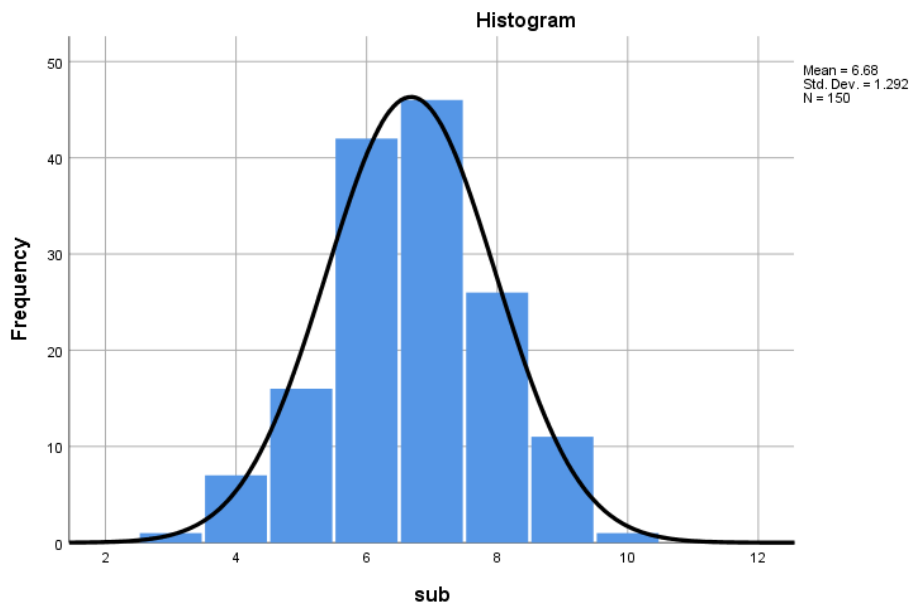
The values of subjective dyspnea score are normally distributed.

Table 9: Descriptive analysis of Modified dyspnea severity score in study population (N=150)

Parameter	Mean ± SD	Median	Min	Max
Total Score	10.16 ± 3.95	10	3	19

The mean (SD) of Modified dyspnea severity score was 10.16 (3.95)

Tab 10. Frequency distribution table of modified dyspnea severity score (MDSS)

Score		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	4	2.7	2.7	2.7
	4	9	6.0	6.0	8.7
	5	6	4.0	4.0	12.7
	6	8	5.3	5.3	18.0
	7	20	13.3	13.3	31.3
	8	7	4.7	4.7	36.0
	9	11	7.3	7.3	43.3
	10	15	10.0	10.0	53.3
	11	16	10.7	10.7	64.0
	12	15	10.0	10.0	74.0
	13	10	6.7	6.7	80.7
	14	5	3.3	3.3	84.0
	15	8	5.3	5.3	89.3
	16	3	2.0	2.0	91.3
	17	7	4.7	4.7	96.0
	18	4	2.7	2.7	98.7
	19	2	1.3	1.3	100.0
	Total	150	100.0	100.0	

Tab 11. Descriptive statistics of MDSS

N	Valid	150
	Missing	0
Mean		10.16
Std. Error of Mean		.323
Median		10.00
Mode		7
Std. Deviation		3.953
Variance		15.625
Skewness		.218
Std. Error of Skewness		.198
Range		16
Minimum		3
Maximum		19
Percentiles	25	7.00
	50	10.00
	75	13.00

Fig 5.Frequency distribution histogram of MDSS in study population

Histogram

Mean = 10.16
Std. Dev. = 3.953
N = 150
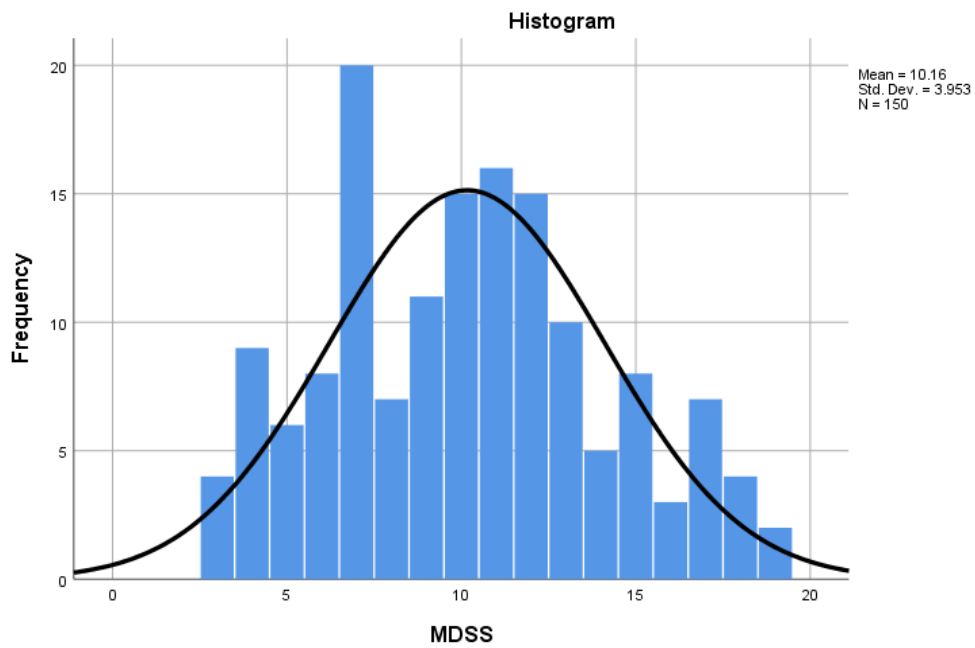
The values of modified dyspnea severity score are normally distributed

Table 12: Descriptive analysis of ABG score in study population (N=150)

Parameter	Mean ± SD	Median	Min	Max
ABG Total Score	4.09 ± 2.17	4	0	9

The mean (SD) of the ABG score is 4.09 (2.17)

Tab 13.Frequency distribution table of ABG score in study population

Score		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	9	6.0	6.0	6.0
	1	10	6.7	6.7	12.7
	2	15	10.0	10.0	22.7
	3	21	14.0	14.0	36.7
	4	36	24.0	24.0	60.7
	5	21	14.0	14.0	74.7
	6	20	13.3	13.3	88.0
	7	7	4.7	4.7	92.7
	8	6	4.0	4.0	96.7
	9	5	3.3	3.3	100.0
	Total	150	100.0	100.0	

Tab 14. Descriptive Statistics of ABG score in study population

ABG

N	Valid	150
	Missing	0
Mean		4.09
Std. Error of Mean		.177
Median		4.00
Mode		4
Std. Deviation		2.165
Variance		4.689
Skewness		.131
Std. Error of Skewness		.198
Range		9
Minimum		0
Maximum		9
Percentiles	25	3.00
	50	4.00
	75	6.00

Fig 6. Frequency distribution histogram of ABG score

Histogram

Mean = 4.09
Std. Dev. = 2.165
N = 150
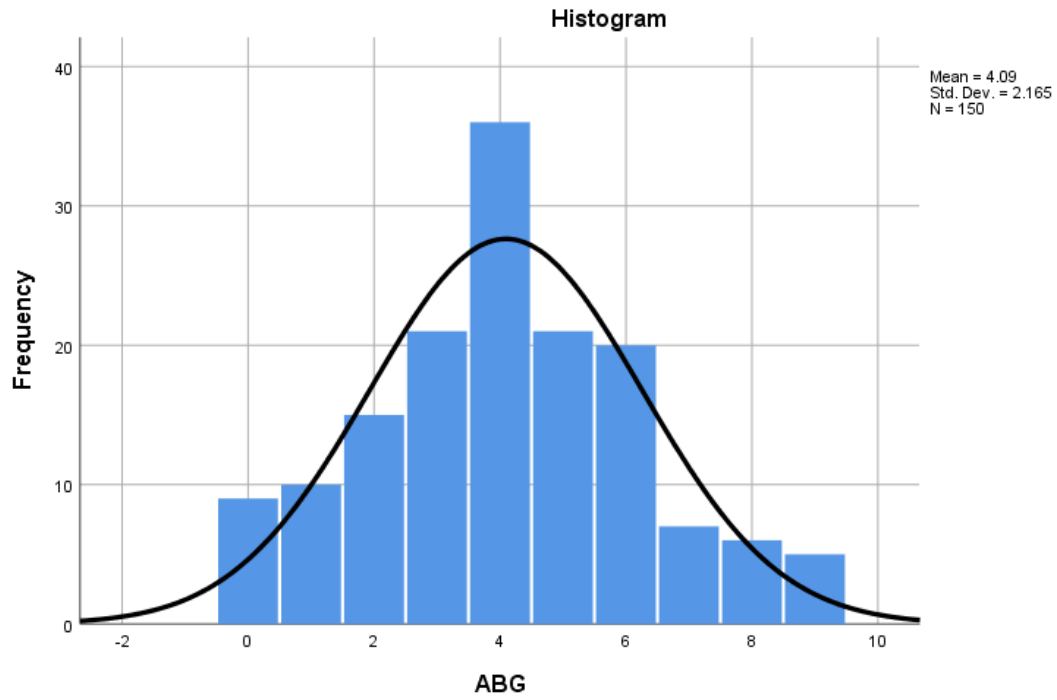
The values of ABG score are normally distributed

Table 15: Descriptive analysis of symptoms

Symptoms	Frequency	Percentage
Breathlessness	150	100%
Cough	81	54%
Chest pain	29	19.3%
Decrease in urine output	32	21.3%
Fever	50	33.3%

Table 16: Descriptive analysis of comorbidities

Comorbidity	Frequency	Percentage
T2DM	82	54.7%
SHTN	46	30.7%
CAD	31	20.7%
CKD	22	14.7%
Bronchial asthma	11	7.3%
COPD	14	9.3%
PTB	9	6%
ILD	5	3.3%

Figure 7: Bar chart of Symptoms distribution and comorbidity analysis
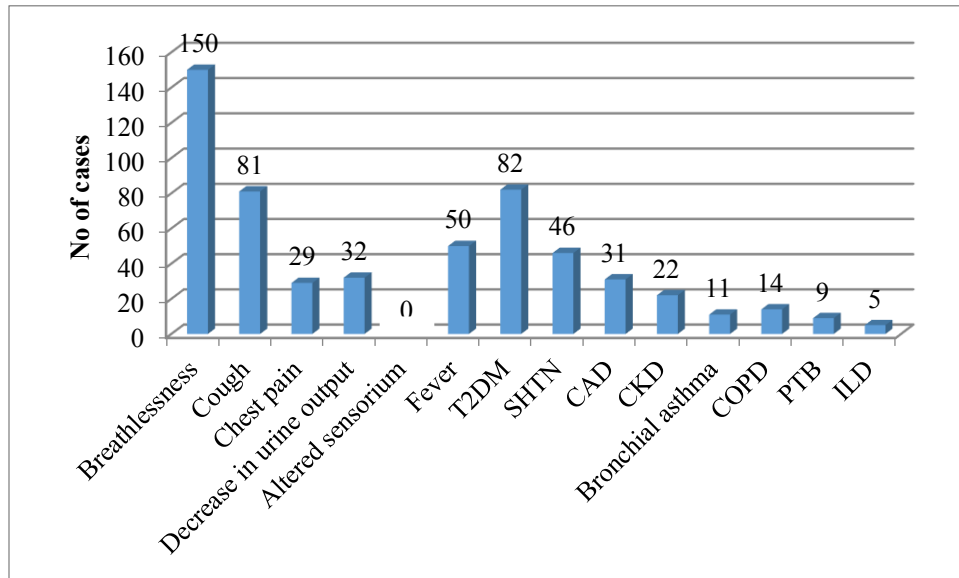
Table 17: Correlation coefficient between Modified dyspnea severity score and ABG Total Score in study population (N=150)

	r	P value
ABG Total score	0.794	<0.001

There is a positive strong correlation between Modified dyspnea severity score and ABG score.

Figure 8: Scatter plot diagram of Modified dyspnea severity score (Total score) and ABG total score
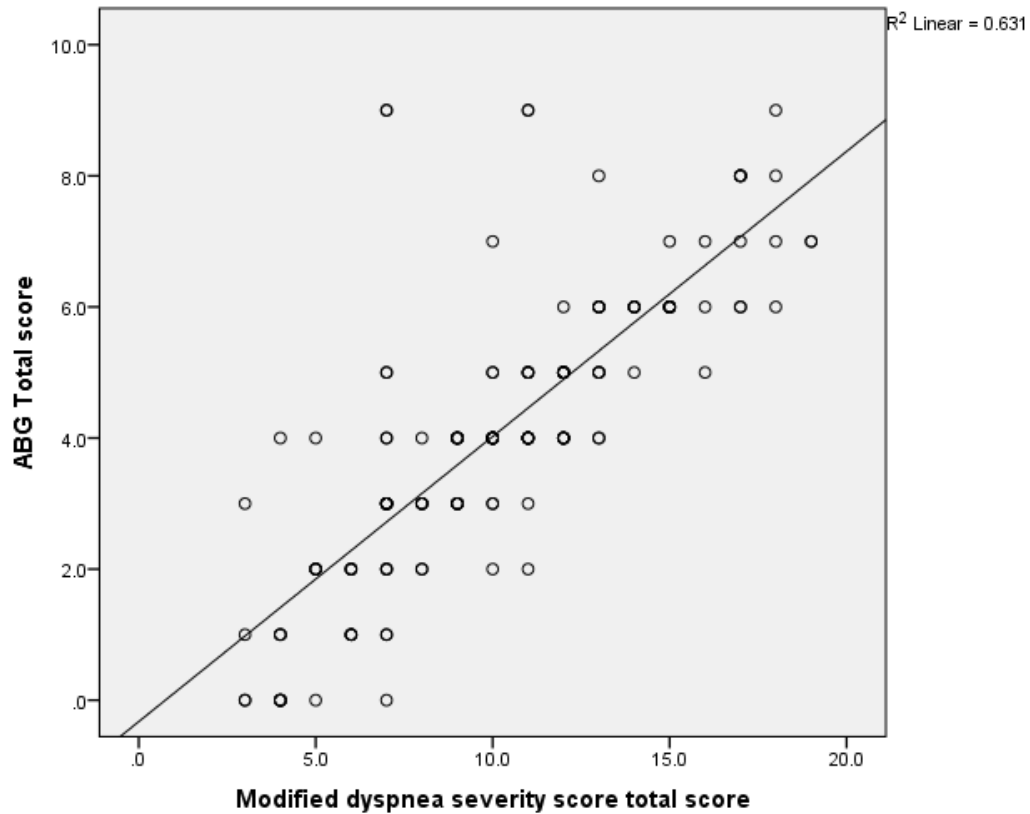
Table 18: Correlation coefficient between subjective dyspnea score (Borg scale) and Modified dyspnea severity score, ABG Total Score in study population (N=150)

	r	P value
Modified dyspnea severity score Total score	0.730	<0.001
ABG Total score	0.560	<0.001

There is a positive strong correlation between modified dyspnea severity score and subjective dyspnea score (Borg scale).

There is a positive moderate correlation between ABG Total score and subjective dyspnea score (Borg scale).

Figure 9: Scatter plot diagram of Subjective dyspnea score (Borg scale) and Modified dyspnea severity score (Total score).
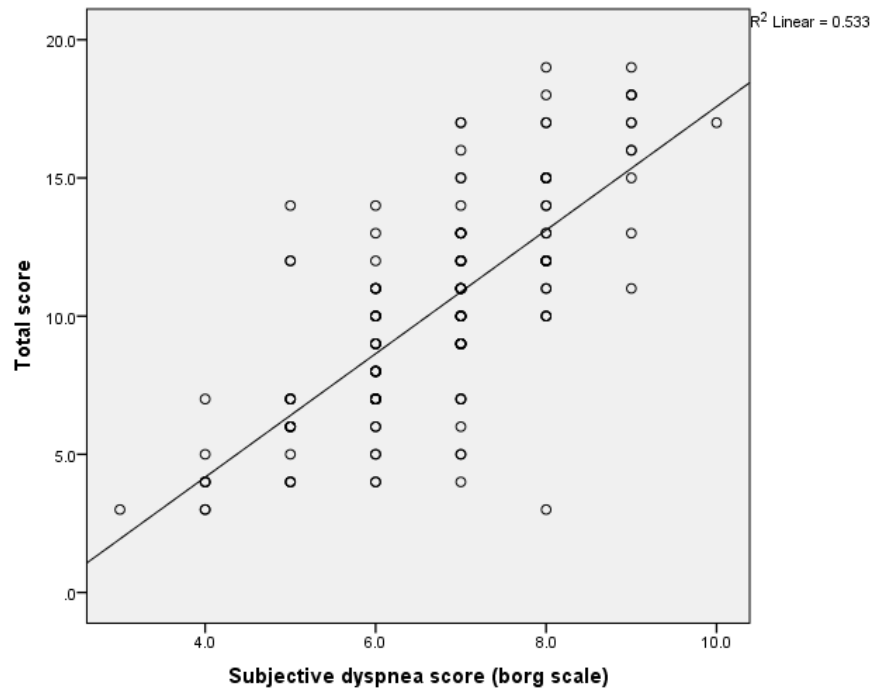
Figure 10: Scatter plot diagram of Subjective dyspnea score (Borg scale) and ABG Total score
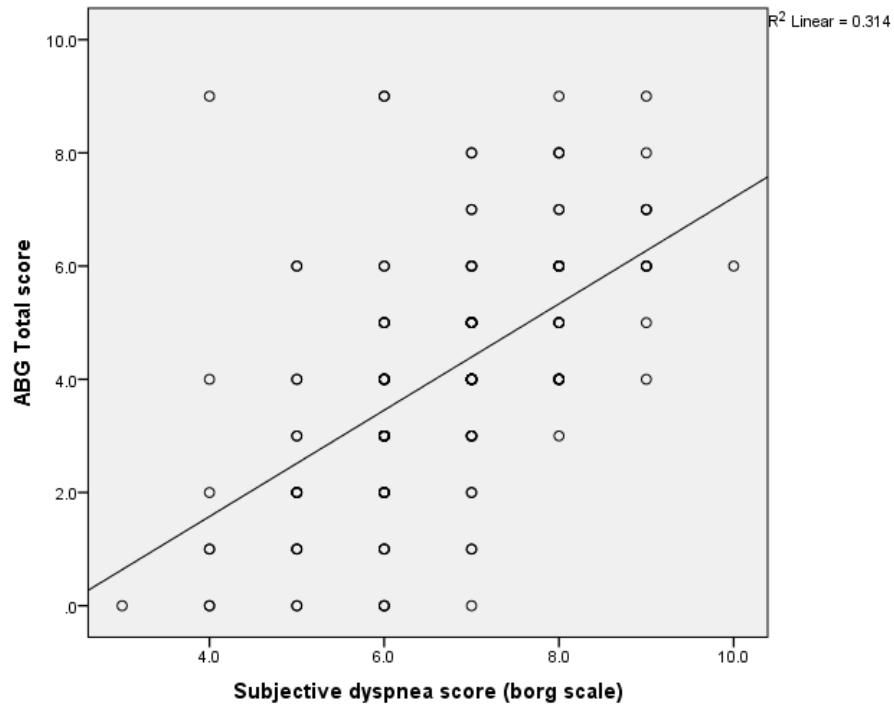
MULTIPLE LINEAR REGRESSION ANALYSIS

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Subjective score, MDSS[b]	.	Enter

a. Dependent Variable: ABG score

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.795[a]	.631	.626	1.324

a. Predictors: (Constant), Subjective score, MDSS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	441.141	2	220.570	125.892	.000[b]
	Residual	257.552	147	1.752		
	Total	698.693	149			

a. Dependent Variable: ABG score

b. Predictors: (Constant), Subjective score, MDSS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.024	.602		-.040	.968
	MDSS	.452	.040	.825	11.254	.000
	Subjective score	-.071	.123	-.042	-.578	.564

a. Dependent Variable: ABG score

DISCUSSION

DISCUSSION

In this study 150 patients presenting to emergency with complaints of breathlessness satisfying inclusion criteria were enrolled in the study. The mean age (SD) of the participants was 51.03(15.39), Median (IQR) was 50 (40, 65) (Tab1). Of the 150 enrolled participants 83 (55.3%) were male and 67(44.7%) were female (tab3.). Eighty four participants (56%) were between ages of 50 to 70. The detailed distribution of age and gender is given in (Tab 4).

The most frequent diagnosis on admission was Covid pneumonia (n=39, 26%). Other common diagnosis at admission were Acute exacerbation of COPD (n=22, 14.7%) and Congestive cardiac failure (n=16, 10.7%).The complete list of diagnosis on admission is given in (Tab 5).

Symptoms at presentation were analysed and as per inclusion criteria all patients had dyspnea (100%), other associated symptoms in order of frequencies were cough (n=81, 54%), Fever (n=50, 33.3%), oliguria (n=32, 21%), Chest pain (n=29, 19.3%), altered sensorium (n=6, 4%). (Tab 15.)

Among the enrolled patients the most common comorbid illness present was Type 2 diabetes mellitus (n=82, 54.7%). The other comorbidities were Systemic hypertension (n=46, 30.7%), Coronary artery disease (n=31, 20.7%) and Chronic kidney disease (n=22, 14.7%). (Tab 16.).

The mean (SD) subjective dyspnea score was 6.68 (1.29) and the median score was 7.

The mean (SD) modified dyspnea severity score was 10.16(3.95) and the median score was 10. The mean (SD) ABG score was 4.09(2.17) and the median score was 4.

Further descriptive analysis of the subjective score showed the distribution of score was normal with skewness of -0.121. Modified dyspnea severity score values were also normally distributed (skewness- 0.218). ABG score values calculated from the scale were also normally distributed (skewness- 0.131). Frequency distribution histograms of the

Three scores are shown in Fig4. Fig5.and Fig6. Respectively.

As the variables were normally distributed correlation was analysed using Pearson's correlation coefficient. A Pearson's r data analysis between modified dyspnea severity score (M=10.16, S.D=3.95) and ABG score (M=4.09, S.D=2.17) revealed a strong positive correlation (r=0.794, p<0.001) (Tab 17). There was also a positive strong correlation between modified dyspnea severity score and subjective dyspnea score (Borg scale) (r=0.730, p<0.001). Correlational analysis between ABG Total score and subjective dyspnea score (Borg scale) showed positive moderate correlation (r=0.560, p< 0.001). (Tab 18).

In this study we also have studied if subjective scale and modified dyspnea severity score can predict changes in ABG score. It was hypothesized that

subjective scale and modified dyspnea severity score will positively predict ABG score. To test this hypothesis multiple linear regression analysis was used. Result show that 62.6% of the variance in the ABG score can be accounted by two predictive scores collectively, $F_{(2,147)} = 125.892$ $p < 0.0001$. Looking at the individual prediction of two scores, the result show that modified dyspnea severity score positively predicts ABG score ($\beta = 0.825$, $t = 11.254$, $p = 0.0001$). However subjective score didn't significantly predict ABG score. ($\beta = -0.042$, $t = -0.578$, $p = 0.564$).

CONCLUSION

CONCLUSION

Dyspnea is one of the most common presenting complaint in emergency department. Dyspnea is a subjective sensation and many subjective scales are available to assess the severity. Most of the objective tests present currently are used in non-emergency setting and to assess response to interventions and are cumbersome. Subjective grading of dyspnea alone may sometimes be misleading in the emergency. So many investigations are now used to identify the cause and prognosticate dyspnea. Some of the recent tests include dyspnea provocation by positioning and walking, structured 3-minute walk test [23], S3 captured acoustic Cardiography[25], non-invasive measurement of cardiac output and thoracic fluid content[24], B-type natriuretic peptide levels, and even the use of a wide range of biomarkers and physiological variables. These tests are quite useful in emergency but time consuming. A single objective parameter which would help in assessing the severity of acute dyspnea accurately is ideally needed but unfortunately no single parameter can accurately grade and prognosticate dyspnea. A simple scoring system based on objective parameters routinely used in emergency is the modified dyspnea severity score and in this study the score correlates well with patients subjective sensation as well with change in acid base status of the patient. Hence Modified dyspnea severity score (MDSS), is simple score which can be used in emergency to assess the severity of dyspnea.

LIMITATIONS OF STUDY

- In this study we have used the score find its correlation with change in acid base status which predicts severity. It would be more beneficial to study if the score predicts in hospital mortality and also other very important parameters like duration of ICU care, and duration of hospitalisation. If the score can predict the above parameters well it can very well be used in practice as all the parameters of the score can be easily calculated.

- Most patients who present to the Emergency department have cardiopulmonary disorders and in our study too majority of patients enrolled had cardiopulmonary disorders. It is to be seen whether similar results can be obtained if studied in dyspnea resulting from non-cardiopulmonary disorders.

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ANNEXURES

PROFORMA

1.NAME:

2.AGE:

3.SEX:

4.SYMPTOMS:

5.DURATION:

6.COMORBID ILLNESS:

7.DIAGNOSIS:

8.SUBJECTIVE DYSPNEA SCORE(1-10):

9.CLINICAL EXAMINATION:

DIMENSION	CATEOGORY	0 point	1 point	2 points	3 points
1.	Exercise tolerance	No dyspnea during regular activity	Dyspnea during walking	Dyspnea after a few steps	Dyspnea in rest
2.	Cooperation	Executes instruction	Executes instructions after repeated requests	Difficult to tolerate oxygen mask and not responding to request	Severely Agitated
3.	Breathing	Normal in rest	Respiratory rate >24/min in rest	Respiratory rate>24/min and using accessory respiratory muscles.	Orthopnea

4.	SpO2	In rest >95% in ambient air	90%to 95%in ambient air	<90% in ambient air and >95% after 15lit/min oxygen through mask	<90%in ambient air and <95% after high flow oxygen (15 lit/min)
5.	Speech	Undisturbed in rest	Unable to finish a whole sentence	Tells only short sentences or words	Unable to speak, Nodding.
6.	Heart rate	< 100/min at rest	100-120 /min at rest	120-140/min at rest	>140/min at rest
7.	cyanosis	Present			Absent

10.TOTAL MODIFIED DYSPNEA SEVERITY SCORE:

11..INVESTIGATIONS

ABG SCALE

Parameter	0 point	1 point	2 points	3 points	4 points	5 points	TOTAL SCORE
1.pH	7.35 -7.45	7.30-7.35 7.45-7.50	7.25 -7.30 7.50-7.55	7.20-7.25 7.55-7.60	7.10-7.20 >7.6	<7.1	
2.Base excess(mmol/l)	1-2.9	3-4.9	5-9.9	10-14.9	>15		

12.OBJECTIVE CALSSIFICATION SCALE ABG SCORE:

INFORMATION SHEET

We are conducting a study on "Dyspnea Severity Score for risk stratification in emergency care and comparison with a subjective and modified objective classification scale using ABG" at Rajiv Gandhi Government General Hospital, Chennai and for that your history, physical examination finding, blood investigation reports may be valuable to us.

The aim of the study is to devise an objective score for dyspnea which can be used in emergency triage

We are selecting certain cases and if you are found eligible, we may be using your clinical details.

The privacy of the patients in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.

Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.

The results of the special study may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

Signature of Investigator   Signature of Participant

<div align="center">**ஆய்வு தகவல் தாள்**</div>

ஆய்வு தலைப்பு :

திருத்தப்பட்ட மூச்சத்திணறல் தீவிரத்தை மதிப்பிடும் அளவுகோலை தமனி இரத்த வாயு பகுப்பாய்வு மற்றும் பங்கேற்பாளர்களின் அகநிலை மூச்சத்திணரலோடு தொடர்புபடுத்தும் ஆய்வு.

ஆய்வாளர் பெயர்	:	மரு. ஸ்ரீஹரி
ஆய்வு நிலையம்	:	பொது மருத்துவப் பிரிவு, சென்னை மருத்துவக் கல்லூரி, சென்னை-3.

இந்த ஆய்வில் தங்களை பங்கேற்க அழைக்கிறோம். இந்த தகவல் அறிக்கையில் கூறப்பட்டிருக்கும் தகவல்கள் தாங்கள் இந்த ஆராய்ச்சியில் பங்கேற்கலாமா வேண்டாமா என்பதை முடிவு செய்ய உதவியாக இருக்கும். இந்த படிவத்தில் உள்ள தகவல்கள் பற்றி உள்ள சந்தேகங்களை நீங்கள் தயங்காமல் கேட்கலாம்.

இந்த ஆய்வில் திருத்தப்பட்ட மூச்சத்திணறல் தீவிரத்தை மதிப்பிடும் அளவுகோலை தமனி இரத்த வாயு பகுப்பாய்வு மற்றும் பங்கேற்பாளர்களின் அகநிலை மூச்சத்திணரலோடு தொடர்புபடுத்தும் ஆய்வு இங்கு நடைபெறுகிறது. அதற்குத் தங்கள் ஒத்துழைப்புத் தேவை.

நீங்கள் இந்த ஆராய்ச்சியில் பங்கேற்க நாங்கள் விரும்புகிறோம். முடிவுகளை அல்லது கருத்துகளை வெளியிடும் போதோ அல்லது ஆராய்ச்சியின் போதோ தங்களது பெயரையோ அல்லது அடையாளங்களையோ வெளியிடமாட்டோம் என்பதையும் தெரிவித்துக் கொள்கிறோம்.

இந்த ஆராய்ச்சியில் பங்கேற்பது தங்களுடைய விருப்பத்தின் பேரில்தான் இருக்கிறது. மேலும் நீங்கள் எந்த நேரமும் இந்த ஆராய்ச்சியில் இருந்து பின் வாங்கலாம் என்பதையும் தெரிவித்துக்கொள்கிறோம்.

இந்த சிறப்புப் பரிசோதனையின் முடிவுகளை ஆராய்ச்சியின் போது அல்லது ஆராய்ச்சியின் முடிவில் தங்களுக்கு அறிவிப்போம் என்பதையும் தெரிவித்துக் கொள்கிறோம்.

ஆராய்ச்சியாளர் கையொப்பம்   பங்கேற்பாளர் கையொப்பம் /
                                                        இடது கட்டைவிரல் ரேகை

தேதி :   தேதி :

PATIENT CONSENT FORM

Study Detail   :   "A study on Dyspnea Severity Score for risk stratification in   emergency care and comparison with a subjective and modified objective   classification scale using ABG"

Study Centre   :   Rajiv Gandhi Government General Hospital, Chennai.

Patient's Name   :

Patient's Age   :

 Identification Number   :

Patient may check (√) these boxes

a) I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask question and all my questions and doubts have been answered to my complete satisfaction.   ❏

a) I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving reason, without my legal rights being affected.   ❏

a) I understand that sponsor of the clinical study, others working on the sponsor's behalf, the ethical committee and the regulatory authorities will not need my permission to look at my health records, both in respect of current study and any further research that may be conducted in relation to it, even if I withdraw from the study I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from this study.   ❏

a) I agree to take part in the above study and to comply with the instructions given during the study and faithfully cooperate with the study team and to immediately inform the study staff if I suffer from any deterioration in my health or well being or any unexpected or unusual symptoms.   ❏

a) I hereby consent to participate in this study.   ❏

a) I hereby give permission to undergo detailed clinical examination and blood investigations as required.   ❏

Signature/Thumb impression Patient name and address:

Signature of investigator:

Study investigator Name: Dr. S.Sriharii

ஆய்வு ஒப்புதல் படிவம்

ஆய்வு தலைப்பு :

    திருத்தப்பட்ட மூச்சுத்திணறல் தீவிரத்தை மதிப்பிடும் அளவுகோலை தமனி இரத்த வாயு பகுப்பாய்வு மற்றும் பங்கேற்பாளர்களின் அகநிலை மூச்சுத்திணரலோடு தொடர்புபடுத்தும் ஆய்வு

பெயர் :	தேதி :
வயது :	உள்நோயாளி எண் :
பால் :	ஆராய்ச்சி சேர்க்கை எண் :

    இந்த ஆராய்ச்சியின் விவரங்களும் அதன் நோக்கங்களும் முழுமையாக எனக்கு தெளிவாக விளக்கப்பட்டது. எனக்கு விளக்கப்பட்ட விஷயங்களை நான் புரிந்துகொண்டு நான் எனது சம்மதத்தை தெரிவிக்கிறேன்.

    நான் ஆராய்ச்சியாளருடன் ஒத்துழைப்பேன் என்றும், எனக்கு ஏற்படக்கூடிய ஆசாதாரண நிகழ்வுகள் பற்றியும் உடனடியாக ஆராய்ச்சியாளரிடம் தெரிவிப்பேன் என்று உறுதி கூறுகிறேன். இந்த ஆய்விலிருந்து எப்போது வேண்டுமானாலும் எக்காரணமும் கூறாமல் என்னை விடுவித்துக்கொள்ளலாம் என்பதை அறிவேன்.

    என்னிடம் இருந்து பெறப்படும் தகவல்களை அரசு, வரைமுறை அதிகாரிகள் ஆகியோர்களுடன் பகிர்ந்துகொள்ள ஆராய்ச்சியாளருக்கு அனுமதி அளிக்கிறேன். என்னுடைய சிகிச்சைக்கட்டுகளை பார்வையிட உரிமை உண்டு. என்னுடைய தகவல்களின் அடையாளம் இரகசியமாக வைக்கப்படும் என்பதை அறிவேன்.

    இந்த ஆராய்ச்சியில் பங்கேற்க தன்னிச்சையாக முழு மனுதுடன் சம்மதிக்கிறேன்.

பங்கேற்பவரின் கையொப்பம் / ரேகை	ஆய்வாளர் கையொப்பம்
பங்கேற்பவர் பெயர்	ஆய்வாளர் பெயர்
இடம் :	இடம் :
தேதி :	தேதி :

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI 600 003

EC Reg.No.ECR/270/Inst./TN/2013/RR-16
Telephone No.044 25305301
Fax: 011 25363970

CERTIFICATE OF APPROVAL

To
Dr.S.SRIHARII
Post Graduate, MD (General Medicine),
Institute of Internal Medicine,
Madras Medical College,
Chennai – 600003.

Dear Dr. **S.SRIHARII**

    The Institutional Ethics Committee has considered your request and approved your study titled " **A STUDY ON MODIFIED DYSPNEA SEVERITY SCORE FOR RISK STRATIFICATION IN EMERGENCY CARE AND CORRELATION WITH SUBJECTIVE SCALE AND MODIFIED OBJECTIVE CLASSIFICATION SCALE USING ABG**"- **NO.21092020.** The following members of Ethics Committee were present in the meeting held on **01.09.2020** conducted at Madras Medical College, Chennai 3.

1. Prof.P.V.Jayashankar   :Chairperson
2. Prof.N.Gopalakrishnan,MD.,DM., FRCP, Director, Inst.of Nephrology,MMC,Ch
                                           : Member Secretary
3. Prof. K.M.Sudha, Prof. Inst. of Pharmacology,MMC,Ch-3   : Member
4. Prof. Alagarsamy Jamila ,MD, Inst. of Patholoy, MMC, Ch-3 : Member
5. Prof.Rema Chandramohan,Prof.of Paediatrics,ICH,Chennai   : Member
6. Prof.S.Lakshmi, Prof. of Paediatrics ICH Chennai   :Member
7. Tmt.Arnold Saulina, MA.,MSW.,   :Social Scientist
8. Thiru S.Govindasamy, BA.,BL,High Court,Chennai   : Lawyer
9. Thiru K.Ranjith, Ch- 91   : Lay Person

    We approve the proposal to be conducted in its presented form.
    The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary – Ethics Committee

Curiginal

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CERTIFICATE – II

This is to certify that this dissertation work titled **"A STUDY ON MODIFIED DYSPNEA SEVERITY SCORE FOR RISK STRATIFICATION OF DYSPNEA IN EMERGENCY CARE AND CORRELATION WITH A SUBJECTIVE SCALE AND MODIFIED OBJECTIVE CLASSIFICATION SCALE USING ABG"** of the candidate **Dr.S.SRIHARII** with registration number **201911021** for the award of M.D., in the branch of GENERAL MEDICINE. I personally verified the urkund.com website for plagiarism check. I found that the uploaded file contains from introduction to conclusion pages and result shows **2 Percentage** of plagiarism in the dissertation.

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Name	Age	Sex	Provisional Diagnosis on admission	Subjective dyspnea score (borg scale)	MDSS Total score	ABG Total score
Lakshmanan	39	Male	CKD / ACUTE PULMONARY EDEMA	8	3	3
Suguna	56	Female	Congestive cardiac failure	7	5	4
Gajendran	55	Male	Cad/copd/ acute pulmonary edema	9	11	4
Rajendran	68	Male	Copd exacerbation	10	17	6
Badal	24	Male	Ckd/acute pulmonary edema	9	17	6
Pachaiammal	75	Female	Sepsis / AKI	8	11	9
Suresh	35	Male	Bronchial asthma	7	5	2
Ragini	25	Female	Fever /leptospirosis	6	7	9
Krubhashankar	54	Male	Copd exacerbation	9	16	5
Ankaiya	55	Male	Shtn/copd	7	6	1
Anbarasan	67	Male	T2dm/shtn/bronchopneumonia	8	12	5
Perumal	40	Male	Covid pneumonia	8	12	4
Gandhi	54	Male	Covid pneumonia	4	3	0
Selvam	63	Male	CAD/PULMONARY EDEMA	9	16	6
Gokula kannan	28	Male	Dka	6	10	4
Irudhayaraj	45	Male	Covid pneumonia	7	13	5
Senthil durai	38	Male	CAD /ACS	5	7	3
Haridoss	65	Male	Covid pneumoia	7	14	5
Sivaraja	54	Male	Ckd/pulmonary edema	7	17	8
Sellapan	75	Male	Covid pneumonia	7	11	4
Venkatesan	74	Male	Copd /acute exacerbation	7	13	6
Dhijere	60	Male	Covid pneumonia	6	7	3
Sagadevan	65	Male	Covid pneumonia	5	7	3
John	67	Male	PTB SEQUALAE	7	9	4
Subramani	65	Male	Covid pneumonia	6	11	3
Saravana kumar	35	Male	Covid pneumonia	4	3	1
Thirupathi	56	Male	Cad / acute pulmonary edema	5	14	6
Balaji	45	Male	Covid pneumonia	6	10	4
Umar	70	Male	Covid pneumonia	6	9	4
Dhandapani	65	Male	Copd / exacerbafion	6	7	3
Bhavani	50	Female	Covid pneumonia	7	9	4
Yasmin jahan	51	Female	Acute severe asthma	7	17	8
Girilakshmi	36	Female	Covid pneumonia	5	4	1
Seemakani	68	Female	CCF	8	17	8

Name	Age	Sex	Diagnosis			
Chitra	70	Female	Ccf	7	12	5
Shanthi	65	Female	Covid pneumonia	7	10	4
Jayamary	52	Female	Ckd / pulmonary edema	7	16	7
Devi	60	Female	Ckd/ pulmonary edema	6	14	6
Chitra	31	Female	Ra/ILD	8	18	8
Karpagam	45	Female	Covid pneumonia	7	10	4
Akshaya	16	Female	Panick attack	7	7	3
Ponni	21	Female	T1DM	7	10	5
Seetha	67	Female	Ckd/pulmonary edema	8	14	6
Mary	26	Female	Primary spontaneous pneumothorax	9	17	7
Ravi	70	Male	Copd exacerbation	7	13	5
Pavithra	54	Female	Ckd/pulmonqrynedema	9	18	9
Sakthivel	31	Male	Pulmonary embolism /femur fracture	6	8	3
Kuppa bai	70	Female	BacterialPneumonia	6	11	5
Kalavathy	60	Female	CAD /PULMONARY EDEMA	8	12	5
Papathy	60	Female	Covid pneumonia	8	17	8
Sundaram	76	Male	Right upper lobe pneumonia	7	11	5
Ganesan	56	Male	Viral pneumonia	7	12	5
Kannaiyan	65	Male	CCF	7	15	6
Chandran	67	Male	Acs/nstemi	6	6	2
Badal	23	Male	T1dm/dka	5	7	4
mohamad amen	66	Male	Copd exacerbation	8	13	4
Purushotaman	42	Male	Bronchial asthma exacerbation	8	12	5
Shanmugam	45	Male	Pneumonia	5	5	2
Revathi	22	Female	Severe anemia	7	4	0
Ravikumar	54	Male	Ckd/pulmonary edema	7	11	5
Rajesh	40	Male	PTB	4	5	2
Seetha	30	Female	Ild/Sjogren syndrome	6	10	4
Murugan	65	Male	Covid pneumonia	7	15	6
Senthil kumar	66	Male	CCF	6	8	3
Vinoth kumar	35	Male	Ckd/acute pulmonary edema	8	15	6
Raghul	40	Male	ACS	6	5	2
Malliga	55	Female	Copd exacerbation	8	13	6
Kamatchi	44	Female	Bronchial asthma exacerbation	7	12	4
Pandiaselvi	45	Female	CKD/ PULMONARY EDEMA	8	15	6
patchiammal	55	Female	CKD/ PULMONARY EDEMA	8	19	7
Rahmath	55	Female	Ckd/pulmonary edema	7	11	4

Name	Age	Sex	Diagnosis			
Savithri	32	Female	PTB	4	4	1
Shanmugapriya	19	Female	Severe anemia	5	4	0
Maragatham	20	Female	T1DM	6	8	3
Saroja	67	Male	Covid pneumonia	8	15	6
Malliga	65	Female	Ccf	6	8	3
Kuppabai	64	Female	Pneumonia	5	6	1
Rajeshwari	55	Female	Ckd/pulmonary ecema	8	15	6
Mani	40	Male	Femur fracture/lulmonary embolism	6	7	3
Lakshmi	64	Female	Pmeumonia	6	7	5
Sriharii	24	Female	Ild flare	9	18	7
Kanaga	65	Female	PTB	5	6	2
Kamatchi	50	Female	Viral pneumonia	6	10	3
Padmavathy	65	Female	Viral pneumonia	7	9	3
Lakshmi	45	Female	Viral pneumonia	8	10	4
Pushpalatha	43	Female	Viral pneumonia	5	12	6
Indira	72	Female	Viral pneumonia	7	13	6
Kamtchi	65	Female	CKD/PULMONARY EDEMA	7	13	5
Devaki	56	Female	Ccf	8	15	7
Devi	70	Female	Bronchial asthma exacerbation	6	13	6
Vasanthi	50	Female	ACS	6	9	3
Lalitha	60	Female	CCF	6	11	4
Abdul kadhar	64	Male	Copd exacerbation	5	12	4
Shankar	60	Male	CCF	8	10	4
Sarath	54	Male	Ckd/pulmonary edema	7	11	4
Karthikeyan	65	Male	CCF	8	14	6
Sathya prakash	67	Male	CCF	7	12	5
Prabhakaran	66	Male	Ckd/pulmonary edema	9	15	6
Sakthipriya	65	Female	Ckd/pulmonary edema	8	12	5
Ganapathy	23	Male	DKA	7	7	5
Krishnamoorthy	56	Male	COPD/EXACERBATION	6	12	5
Karmegam	45	Male	Ckd/ pulmonary edema	6	11	5
Divya	26	Female	Severe anemia	5	6	2
Chandrasekar	64	Male	Covid pneumonia	8	11	4
Shanmugam	54	Male	Covid pnuemonia	7	10	5
Kalaivani	70	Female	Covid pneumonia	7	13	4
Kavitha	43	Female	Bronchial asthma exacerbation	6	7	2
Madhan	60	Male	Covid pneumonia	7	11	4
Aravind	18	Male	DKA/T1DM	6	9	3

Baskar	50	Male	Covid pneumonia	4	4	0
Pavithra	27	Female	Covid pneumonia	3	3	0
Logammal	67	Female	CKD/PULMONARY EDEMA	8	12	4
Savithri	40	Female	Bronchial asthma exacerbation	6	8	2
Jayamary	45	Female	PTB	6	8	2
Devikala	66	Female	Ckd / pulmonary edema	8	10	4
Radha	63	Female	Pneuminia	6	9	4
Narasamma	60	Female	CCF	7	11	4
Papathy	44	Female	CCF	5	6	2
Hari	35	Male	NSIP	9	19	7
Saravana kumar	56	Male	Ckd/ pulmonary edema	6	7	3
Dhandapani	70	Male	Covid pneumonia	8	12	4
Sakthivel	22	Male	Acute glomerulonephritis/renal failure	7	10	7
Shivalingam	55	Male	Covid pneumonia	7	12	4
Krishnan	69	Male	Ca lung	6	7	0
Stephen raj	41	Male	Covid pneumonia	7	7	1
Munirathnam	60	Male	Covid pneumonia	5	7	2
Murugesan	61	Male	Covid pneumonia	7	10	3
Sakthi kumar	40	Male	Covid pneumonia	5	4	0
Aaadhimoolam	55	Male	Covid pneumonia	4	4	4
Tamilarasu	55	Male	Covid pneumonia	6	6	1
Kadhirvel	55	Male	Covid pneumonia	6	7	3
Kadhirvel	54	Male	Ccf	6	7	2
Dhanasekar	52	Male	Ckd/pulmonary edema	7	9	4
Padmanabhan	60	Male	ACS	6	4	0
Paneer selvam	55	Male	Covid pneumonia	6	7	1
Rajagopal	38	Male	Covid pneumonia	5	6	1
Vasudevan	60	Male	Covid pneumonia	7	9	3
Suganya	21	Female	Severe anemia/hemolytic anemia	6	5	0
Vasanthi	45	Female	Bronchial asthma	7	11	2
Fathima	42	Female	Pneumothorax	9	18	6
Sujatha	22	Female	DKA	4	7	9
Kamala	17	Female	DKA	6	11	9
Saroja	56	Female	CCF	6	7	4
Dhanalakshmi	43	Female	Ild flare	6	8	4
Giri	33	Male	PTB	7	9	3
Satish	54	Male	CCF	7	10	4

Name	Age	Sex	Diagnosis			
Chandran	54	Male	Covid pneumonia	7	9	4
Sivabalan	68	Male	COPD ecacerbation	9	13	8
Indira kumar	43	Male	COVID pneumonia	6	4	1
Kaveri	45	Female	Covid pneumonia	6	10	2

Name	Age	Sex	Breathlessness	Cough	Chest pain	Decrease in urine output	T2DM	SHTN	CAD	CKD	BA	COPD	PTB	ILD	Fever
Lakshmanan	39	Male	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	No	No	No	No
Suguna	56	Female	Yes	Yes	No	No	Yes	Yes	Yes	No	No	No	No	No	No
Gajendran	55	Male	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	No
Rajendran	68	Male	Yes	Yes	No	No	No	No	No	No	No	Yes	No	No	No
Badal	24	Male	Yes	Yes	No	Yes	No	No	No	Yes	No	No	No	No	No
Pachaiammal	75	Female	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No
Suresh	35	Male	Yes	Yes	No	No	No	No	No	No	Yes	No	No	No	No
Ragini	25	Female	Yes	No	No	Yes	No	No	No	No	No	No	No	No	Yes
Krubhashankar	54	Male	Yes	No	No	No	Yes	No	No	No	No	Yes	No	No	No
Ankaiya	55	Male	Yes	No	No	No	Yes	No	No	No	No	Yes	No	No	No
Anbarasan	67	Male	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No	No	Yes
Perumal	40	Male	Yes	Yes	No	No	No	No	No	No	No	No	No	No	Yes
Gandhi	54	Male	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	Yes
Selvam	63	Male	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Gokula kannan	28	Male	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Irudhayaraj	45	Male	Yes	No	No	No	Yes	No	No	No	No	No	No	No	Yes
Senthil durai	38	Male	Yes	No	Yes	No	Yes	No	Yes	No	No	No	No	No	No
Haridoss	65	Male	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	Yes
Sivaraja	54	Male	Yes	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	No
Sellapan	75	Male	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No	No	Yes
Venkatesan	74	Male	Yes	Yes	No	No	Yes	No	No	No	No	Yes	No	No	Yes
Dhijere	60	Male	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	No
Sagadevan	65	Male	Yes	Yes	No	No	No	No	No	No	No	No	No	No	Yes
John	67	Male	Yes	Yes	No	No	Yes	No	No	No	No	Yes	Yes	No	No
Subramani	65	Male	Yes	No	Yes	No	No	No	No	No	No	No	No	No	Yes
Saravana kumar	35	Male	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No
Thirupathi	56	Male	Yes	No	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No
Balaji	45	Male	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No
Umar	70	Male	Yes	No	No	No	Yes	No	Yes	No	No	No	No	No	No
Dhandapani	65	Male	Yes	Yes	No	No	Yes	No	No	No	No	Yes	No	No	No
Bhavani	50	Female	Yes	Yes	Yes	No	Yes	No	No	No	No	No	No	No	No
Yasmin jahan	51	Female	Yes	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No
Girilakshmi	36	Female	Yes	Yes	No	No	No	No	No	No	No	No	No	No	Yes

Name	Age	Gender	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
Seemakani	68	Female	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Chitra	70	Female	Yes	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Shanthi	65	Female	Yes	Yes	No	No	Yes	No	Yes	No	No	No	No	No	No
Jayamary	52	Female	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Devi	60	Female	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No	No
Chitra	31	Female	Yes	Yes	No	No	No	No	No	No	No	No	No	Yes	No
Karpagam	45	Female	Yes	Yes	No	No	No	No	No	No		No	No	No	No
Akshaya	16	Female	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Ponni	21	Female	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No
Seetha	67	Female	Yes	No	Yes	Yes	No	No	No	Yes	No	No	No	No	No
Mary	26	Female	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No
Ravi	70	Male	Yes	Yes	No	No	Yes	No	No	No	No	Yes	Yes	No	Yes
Pavithra	54	Female	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Sakthivel	31	Male	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No
Kuppa bai	70	Female	Yes	Yes	Yes	No	Yes	No	No	No	No	No	No	No	Yes
Kalavathy	60	Female	Yes	No	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No
Papathy	60	Female	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	Yes
Sundaram	76	Male	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No	No	Yes
Ganesan	56	Male	Yes	Yes	Yes	No	Yes	No	No	No	No	No	No	No	Yes
Kannaiyan	65	Male	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Chandran	67	Male	Yes	No	Yes	No	Yes	No	Yes	No	No	No	No	No	No
Badal	23	Male	Yes	No	No	No	No	No	No	No	No	No	No	No	No
mohamad ameen	66	Male	Yes	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
Purushotaman	42	Male	Yes	Yes	No	No	No	No	No	No	Yes	No	No	No	No
Shanmugam	45	Male	Yes	Yes	No	No	No	No	No	No	No	No	No	No	Yes
Revathi	22	Female	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Ravikumar	54	Male	Yes	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	No
Rajesh	40	Male	Yes	Yes	No	No	No	No	No	No	No	No	Yes	No	Yes
Seetha	30	Female	Yes	Yes	No	No	No	No	No	No	No	No	No	Yes	No
Murugan	65	Male	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	Yes
Senthil kumar	66	Male	Yes	No	No	No	Yes	Yes	Yes	No	No	No	No	No	No
Vinoth kumar	35	Male	Yes	No	No	Yes	No	Yes	No	Yes	No	No	No	No	No
Raghul	40	Male	Yes	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No	No
Malliga	55	Female	Yes	Yes	No	No	No	No	No	No	No	Yes	No	No	No
Kamatchi	44	Female	Yes	Yes	No	No	No	Yes	No	No	Yes	No	No	No	No
Pandiaselvi	45	Female	Yes	No	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No
patchiammal	55	Female	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Rahmath	55	Female	Yes	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	No
Savithri	32	Female	Yes	Yes	No	No	No	No	No	No	No	No	Yes	No	Yes
Shanmugapriya	19	Female	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Maragatham	20	Female	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No
Saroja	67	Male	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No	No	Yes
Malliga	65	Female	Yes	No	No	No	Yes	Yes	No	No	No	No	No	No	No
kuppabai	64	Female	Yes	Yes	Yes	No	Yes	No	No	No	No	No	No	No	Yes
Rajeshwari	55	Female	Yes	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	No
Mani	40	Male	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No
Lakshmi	64	Female	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	Yes

Name	Age	Gender													
Sriharii	24	Female	Yes	Yes	Yes	No	Yes	No	No	No	No	No	No	Yes	Yes
Kanaga	65	Female	Yes	No		No	Yes	No	No	No	No	No	Yes	No	Yes
Kamatchi	50	Female	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	No
Padmavathy	65	Female	Yes	Yes	No	No	No	Yes	No	No	No	No	No	No	Yes
Lakshmi	45	Female	Yes	Yes	No	No	No	No	No	No	No	No	No	No	Yes
Pushpalatha	43	Female	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes
Indira	72	Female	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes
Kamtchi	65	Female	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	No	No	No	No
Devaki	56	Female	Yes	No	No	No	Yes	Yes	Yes	No	No	No	No	No	No
Devi	70	Female	Yes	No	No	No	No	No	No	No	Yes	No	No	No	No
Vasanthi	50	Female	Yes	No	Yes	No	Yes	No	Yes	No	No	No	No	No	Yes
Lalitha	60	Female	Yes	No	No	No	No	Yes	Yes	No	No	No	No	No	No
Abdul kadhar	64	Male	Yes	No	No	No	No	No	No	No	No	Yes	No	No	No
Shankar	60	Male	Yes	No	No	No	Yes	Yes	Yes	No	No	No	No	No	No
Sarath	54	Male	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No
Karthikeyan	65	Male	Yes	No	No	No	Yes	No	Yes	No	No	No	No	No	No
Sathya prakash	67	Male	Yes	No	No	No	Yes	Yes	No	No	No	No	No	No	No
Prabhakaran	66	Male	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Sakthipriya	65	Female	Yes	No	No	Yes	Yes	No	No	Yes	No	No	No	No	No
Ganapathy	23	Male	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Krishnamoorthy	56	Male	Yes	No	No	Yes	Yes	No	No	No	No	Yes	No	No	Yes
Karmegam	45	Male	Yes	No	Yes	No	Yes	Yes	No	Yes	No	No	No	No	No
Divya	26	Female	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Chandrasekar	64	Male	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	Yes
Shanmugam	54	Male	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	Yes
Kalaivani	70	Female	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	No
Kavitha	43	Female	Yes	Yes	No	No	Yes	No	No	No	Yes	No	No	No	Yes
Madhan	60	Male	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No	No	Yes
Aravind	18	Male	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes
Baskar	50	Male	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	Yes
Pavithra	27	Female	Yes	Yes	No	No	No	No	No	No	No	No	No	No	Yes
Logammal	67	Female	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes
Savithri	40	Female	Yes	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No
Jayamary	45	Female	Yes	No	No	No	No	No	No	No	No	No	Yes	No	No
Devikala	66	Female	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Radha	63	Female	Yes	Yes	No	No	No	Yes	No	No	No	No	No	No	Yes
Narasamma	60	Female	Yes	Yes	No	Yes	Yes	No	Yes	No	No	No	Yes	No	No
Papathy	44	Female	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No
Hari	35	Male	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No
Saravana kumar	56	Male	Yes	No	No	Yes	No	Yes	No	Yes	No	No	No	No	No
Dhandapani	70	Male	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	Yes
Sakthivel	22	Male	Yes	Yes	No	Yes	No	No	No	No	No	No	No	No	No
Shivalingam	55	Male	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes
Krishnan	69	Male	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No
Stephen raj	41	Male	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No
Munirathnam	60	Male	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Murugesan	61	Male	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No

Name	Age	Gender												
Sakthi kumar	40	Male	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No
Aaadhimoolam	55	Male	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No
Tamilarasu	55	Male	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No
Kadhirvel	55	Male	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Kadhirvel	54	Male	Yes	Yes	No	No	No	No	Yes	No	No	No	No	No	No
Dhanasekar	52	Male	Yes	No	No	No	No	Yes	No	Yes	No	No	No	No	No
Padmanabhan	60	Male	Yes	No	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No
Paneer selvam	55	Male	Yes	No	No	No	Yes	Yes	No	No	No	No	No	No	Yes
Rajagopal	38	Male	Yes	Yes	No	No	No	No	No	No	No	No	No	No	Yes
Vasudevan	60	Male	Yes	No	No	No	Yes	No	No	No	No	No	No	No	Yes
Suganya	21	Female	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Vasanthi	45	Female	Yes	Yes	Yes	No	Yes	No	No	No	Yes	No	No	No	No
Fathima	42	Female	Yes	No	No	No	No	No	No	No	Yes	No	No	No	No
Sujatha	22	Female	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Kamala	17	Female	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Saroja	56	Female	Yes	No	No	No	Yes	No	Yes	No	No	No	No	No	No
Dhanalakshmi	43	Female	Yes	Yes	No	No	No	No	No	No	No	No	No	Yes	No
Giri	33	Male	Yes	No	No	No	No	No	No	No	No	No	Yes	No	Yes
Satish	54	Male	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No
Chandran	54	Male	Yes	No	No	No	Yes	No	No	No	No	No	No	No	Yes
Sivabalan	68	Male	Yes	Yes	No	No	Yes	Yes	No	No	No	Yes	No	No	No
Indira kumar	43	Male	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No	No	Yes
Kaveri	45	Female	Yes	Yes	No	No	No	Yes	No	No	Yes	No	No	No	Yes