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CORRELATION OF BODE INDEX WITH SMOKING INDEX, HOSPITAL STAY, CARDIAC INVOLVEMENT, AND NUTRITIONAL STATUS IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE: A CASE CONTROL STUDY IN PREDICTION OF THE DISEASE SEVERITY

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Background. Chronic Obstructive Pulmonary Disease (COPD) affects such a wide range of population, extending the reach of healthcare facilities and ensuring COPD control is an immense challenge. There is a need of a logical and reliable scoring system which can identify population who need diagnostic or therapeutic assistance but they can't afford it because of a health-care budget crisis.

Aim. Current study aimed to correlate the BODE index of chronic obstructive pulmonary disease with the smoking index, hospital stay, cardiac involvement, nutritional status, and systemic inflammation.

Materials and Methods. 40 Patients with COPD symptoms were enrolled as cases and age matched 40 healthy subjects without any COPD were enrolled as control subjects. BMI, FEV1, distance walked in 6 minutes, and the MMRC dyspnea scale were used to generate the BODE index, and ECHO cardiograph was performed. Correlation assessed between Bode index severity and BMI, hospitalization stay, serum albumin, Hemoglobin, CRP levels, QRS axis by electrocardiography, ejection fraction and pulmonary hypertension by 2D EHCO.

Results: Totally 9 patients had mild COPD with a BODE score between 0 to 2, while 17 patients had moderate COPD with BODE score between 3 to 5, and 14 patients had severe COPD with BODE score of ≥ 6. Mild COPD cases had 10 pack years, moderate cases had 19 pack years, and severe cases had 29 pack years of smoke, and the number of pack years of smoking was significantly associated with the BODE score (P = 0.01). The mean length of hospital stay in the moderate COPD group was 6±1.5 days, and 19±1.6 days in the severe COPD group. Significant association observed between severity and hospital stay (p=0.004). Hemoglobin levels were lower as per disease severity (11.4 ±1.29 vs 9.5± 1.8 vs 10.62 ±2.5 in mild, moderate, severe COPD (P=0.04). Majority of COPD cases had a right axis deviation (RAD), 86.67% (n=13) of severe COPD cases and 35.3% (n=6) of moderate COPD cases had RAD. The mean ejection fraction was lower in severe COPD when compared to moderate and mild COPD with significant association (48.1±7.8% vs 69.5 ± 8.2% vs 65.6 ± 5.9%, P=0.032). There was a positive correlation observed between COPD severity and CRP levels. The changes in BMI and serum albumin can be attributed to reduction in nutritional status of COPD patients, which is directly correlated with BODE index. Severe COPD cases exhibits higher CRP levels of 65.2±52.9 than compared with mild COPD cases with CRP of 26.5±19.5 mg/L. Statistically significant association noted between severity of disease and CRP levels (p=0.0045). 10 cases in severe COPD group had pulmonary hypertension and 2 patients had mild pulmonary hypertension, and 2 cases had moderate pulmonary hypertension. There was significant association observed between COPD severity and pulmonary hypertension severity (P=0.015).

Conclusion: The BODE index is a valid tool to determine the severity of COPD and it is directly associated with the smoking index. An increase in cardiac effects with the severity of COPD disease was observed when it was assessed by BODE index. Current study suggests that the BODE index is reliable in determining the hospitalization and severity of systemic involvement in COPD patients and not only an indicator of mortality.

Keywords: BODE index, chronic obstructive Pulmonary Disease, smoking packs, electrocardiography.

Background. World Health Organization (WHO) reported that chronic obstructive pulmonary disease (COPD) is the third leading cause of death globally and causing 3.23 million deaths in 2019 [1]. The prevalence of COPD increased by 85.9% from 8,722,966 cases in 1990 to 16,214,828 cases in 2019, and the age-standardized incidence rate decreased from 216.48/100,000 persons in 1990 (95%UI, 204.56–227.33) to 200.49 per 100,000 persons (95%UI, 188.63–212.57) in 2019 [2].

COPD is a common, treatable, and preventable disease characterized by persistent respiratory symptoms and airflow limitation caused by airway and or alveolar abnormalities, which are typically caused by significant exposure to noxious particles and gases and influenced by host factors such as abnormal lung development [3,4].

Tobacco smoke, indoor and outdoor air pollution, occupational exposures such as chemicals and dusts, ageing and female sex, low birth weight and low socioeconomic status, and also past history of asthma, recurring infections are some risk factors [5]. The biochemical mediators for COPD are oxidative stress and increased circulating amounts of inflammatory mediators and acute-phase proteins [6]. Malnutrition is visible in COPD patients because it promotes muscular wasting and weight loss. COPD patients experience selective fat-free mass loss, as well as changes in respiratory and skeletal muscle function and a lower exercise tolerance [7].

Even while FEV1 can be used to determine the severity of COPD, cases of COPD include systemic implications that cannot be determined only by FEV1. A multifactorial assessment tool was required to take these into account. The body mass index (B), the degree of airflow obstruction (O) and dyspnea (D), and exercise capacity (E), as measured by the six-minute–walk test, were the four factors that best predicted severity [8]. The BODE index, a multidimensional 10-point scale in which higher scores are proportionate to the probability of mortality, was created using these data [9].

In our regular practice, there is a need of consistent scoring system which can identify patients who need diagnostic or therapeutic assistance but can't afford it due to budget crisis.

Hence, current study aimed to correlate the BODE index of COPD with smoking index, hospital stay, nutritional status, cardiac involvement, and systemic inflammation.

Aim: Current study aimed to correlate the BODE index of chronic obstructive pulmonary disease with the smoking index, hospital stay, cardiac involvement, nutritional status, and systemic inflammation.

MATERIALS AND METHODS

A retrospective study conducted by collected the data from records, and study was conducted at Respiratory medicine, Narayana Medical College and Hospital, Nellore for the duration of 12 months.

Inclusion criteria

- Male patients with COPD symptoms.
- Age matched healthy individuals without COPD symptoms were referred as controls subjects.

Exclusion criteria

- Patient with recent myocardial infarction in last 4 months.
- Patients with uncontrollable angina and congestive heart failure.
- Spirometry was found to be accurate after administration of a bronchodilator (bronchial asthma is defined as an increase in FEV1 of > 15% above the baseline value or 200 ml) such as Bronchial asthma cases was excluded.
- Hepatitis, Tuberculosis, patients with acute exacerbation

Procedure:

A total of 80 patients, in which 40 individuals with symptoms of COPD were grouped as cases, and 40 subjects without any COPD, were enrolled as controls. COPD was diagnosis was based on GOLD criteria.

The BODE score was evaluated as a predictor of hospitalization and severity of systemic involvement in individuals with COPD using a Case control study design.

GOLD criteria:

- Cough and sputum production for at least 3 months in each of the previous 2 years (chronic bronchitis).
- Exertion-induced dyspnea.
- The physical examination reveals COPD features.

Excessive expiration and non-reversible expiratory wheezing - signs of airflow restriction. Hyperinflationary symptoms:

- Spirometry reveals a FEV1/FVC ratio of 0.70 even after bronchodilation.

A complete history was gathered for each enrolled subject, including smoking, personal histories, and family histories.

Spirometry was done 20 minutes after the salbutamol inhaler administration. As we input height, weight, and age, the software estimated FEV1 and FVC.

MMRC dyspnea scale was calculated after taking a complete history. The 6-minute walk test was repeated twice with a 30-minute break in between, with the average collected at the conclusion. Periods of rest were taken in between 6 minute intervals, and they were instructed to walk as far as they could in 6 minutes, with the value recorded.

The results of the assessment were used to generate the BODE index, which includes BMI, FEV1, distance walked in 6 minutes, and the MMRC dyspnea scale. The patients were given points ranging from 0 to 3, with 0 being the lowest and 3 being the highest. The values for body mass index were 0 if the BMI was > 21 and 1 if the BMI was less than 21. FEV1 was given a score of 0 if the value was ≥65 percent, 1 if it was between 50 and 64 percent, 2 if it was between 36 and 49 percent, and 3 if it was between 36 and 49%(≤to 35%). The 6 minute walk test results were 0 if they walked for more than 350 meters, 1 if they walked for 250–350 meter, 2 if they walked for 150–249 meters, and 3 if they walked for less than 150 meters. Class 0 and I received 0 points on the MMRC dyspnea scale, class II received 1 point, class III received 2 points, and class IV received 3 points. The points for each variable were summed together, yielding a BODE index that varied from 0 to 10 for each patient. Mild COPD was assigned a score of 0–2; moderate COPD was assigned a score of 3–5, and severe COPD was assigned a score of more than 6.

A standard ECG was taken with all 12 leads, for each patient. Echo cardiography was performed in in all patients. Ejection fraction and pulmonary pressure gradient was assessed with the same. Pulmonary artery hypertension has been graded as mild, moderate and severe grades. Serum CRP was estimated in the lab and a value of 6 or less was taken as negative.

Statistical analysis: Statistical analysis was performed in COPD patients & controls after variable was categorized. The one-way ANOVA F-test between was done two groups was used to determine the significance of the difference in means from the study, and the Chi square test used to identify

Table 1

MMRC breathlessness scale

Grade	Grade Degree of breathlessness related to activities
Grade 0	Not troubled by breathlessness except on strenuous exercise
Grade 1	Short of breath when hurrying on the level or walking up a slight hill
Grade 2	Walks slower than most people on the level, stops after a mile or so, or stops after 15 minutes walking at own pace
Grade 3	Takes a hold after walking about 100 yards or after a few minutes on level ground
Grade 4	Very much dyspneic to leave the house, or breathless when undressing

Table 2

BODE INDEX

BODE score	0	1	2	3
FEV1	≥65 %	50 – 64 %	36 – 49 %	< /= 35 %
6 min walk test	>350 meter	250 – 349 meter	150 – 249 meter	<149 meter
Dyspneascale	0 – 1	2	3	
BMI	> 21 kg/m^2	<21 kg/m^2		

Mild COPD: 0 – 2; Moderate COPD 3 – 5; Severe COPD ≥ 6

the significance of the difference in proportions. The parameter such as Age, BMI, total days of hospitalization, mean Hb concentration, QRS axis by electrocardiography, ejection fraction and pulmonary hypertension from 2D EHCO, serum albumin concentration, and CRP level. P value less than 0.05. The usual formula was used for statistical analysis.

RESULTS AND DISCUSSION

All were male patients in our study. 9 patients had mild COPD with a BODE score of 0 to 2. There were 17 patients had moderate COPD with a BODE score of 3 to 5. There were 14 patients had severe COPD with a BODE score of ≥ 6.

Demographics: The mean age of the study participants was 52.5 ± 4.4 years. The mild group having a mean age of 51.9±4.1 years, the moderate group had 52.8 ± 4.76 years, and the severe group had mean age of 54.5 ± 4.8 years. Control group had mean age of 53.6 ± 4.2 years. The difference was statistically significant, with a P value of 0.00010.

Pack years of smoking: The proportion of smokers was higher in the higher BODE index group compared to the lower index group. There was no significant difference between the control group and the lower score group regarding smoking habit. Hence smoking habit shows positive risk correlation and the BODE index is higher.

Controls had 6 pack years, mild cases had 10 pack years, moderate cases had 19 pack years, and severe cases had 29 pack years (p=0.01). The number of pack years of smoking was found to be strongly associated with the BODE score in the study.

BMI: Study population had mean BMI of 21.3±1.8 kg/m^2. Control group BMI was 22.5±1.6 kg/m^2. The mild group had mean BMI of 22.5±1.2 kg/m^2, the moderate group had mean BMI of 21.8±2.6 kg/m^2, and the severe group had mean BMI of 18.9±2.2 kg/m^2. There was significant association observed between BMI and severity of COPD (p=0.0325, Oneway ANOVA F Test).

Hospital stay: A higher BODE score associated to a higher likelihood of hospitalisation for COPD-related reasons. The moderate COPD group had no significant hospital admissions in the previous two years, while the control group had an average stay of 0.5. The mean length of stay in the moderate COPD group was 6±1.5 days, and 19±1.6 days in the severe COPD group. There was significant association observed between hospital stay and severity of COPD (p=0.004, Oneway ANOVA F-Test).

Hemoglobin levels: The mean Hemoglobin levels were low in cases when compared to controls (10.5gm/dL vs 10.9 gm/dL). No significant correlation was found between cases and conrol regarding Hemoglobin levels. There was significant association observed between COPD severity and Hb levels (11.4 ±1.29 vs 9.5± 1.8 vs 10.62 ±2.5 in mild, moderate, severe groups (P=0.04)

ECG and BODE score: All control subjects had normal QRS axis. 6 mild COPD cases and 13 severe COPD cases had right axis deviation (RAD). While one severe COPD case had left axis deviation (LAD).

Table 3

Association between BODE score and QRS axis

	RAD		LAD		Normal		P value
	N	%	N	%	N	%	
Mild	0	0	0	0	9	100%	0.03
Moderate	6	35.3%	0	0	11	64.7%	
Severe	13	86.67%	1	12.5%	0	0%	
Control	0	0	0	0	40	100%	

Ejection fraction and BODE score:

In control group, mean Ejection fraction was 70.5 ±5.5%. The mean ejection fraction in mild COPD group 69.5 ± 8.2%, the moderate group was 65.6 ± 5.9% and the severe COPD had 48.1±7.8%. There was significant association observed between BODE score and mean EF (P = 0.032).

There was a positive correlation observed between COPD severity and CRP levels. Severe COPD cases exhibits higher CRP levels of 65.2±52.9 than compared with mild COPD cases those shows CRP of 26.5±19.5. A statistically significant association observed, and the difference was statistically significant with a P value of 0.0045.

Table 4

Association between Ejection fraction and BODE score severity

Group	N	Mean ± SD (%)	P value
Control	40	70.5 ±5.5	0.032
Mild	9	69.5 ± 8.2	
Moderate	17	65.6± 5.9	
Severe	14	48.1±7.8	

Oneway ANOVA F-test

Table 5

Association between Pulmonary hypertension and BODE score

Group	Pulmonary hypertension								P value
	Normal		Mild		Moderate		Severe		
	N	%	N	%	N	%	N	%	
Mild	9	100%	-	-	-	-	-	-	0.015
Moderate	10	58.83%	4	23.53%	3	17.65%	-	-	
Severe	-	-	2	14.28%	2	14.28%	10	71.42%	
Control	40	100%	-	-	-	-	-	-	
Total	59	73.75%	6	7.5%	5	10%	10	20%	

Pearson chi square test

Table 6

Association between C reactive protein concentration Vs BODE score

Group	N	Mean ± SD (%)	P value
Control	40	6.5±4.2	0.0045
Mild	9	26.5±19.5	
Moderate	17	49.5±39.8	
Severe	14	65.2±52.9	

Oneway ANOVA F-test

There was no incidence of pulmonary hypertension in the control subjects and mild COPD group. In moderate COPD cases, 4 cases showed mild, and 3 patients had Moderate pulmonary hypertension. 10 cases in severe COPD group had pulmonary hypertension and 2 patients had mild pulmonary hypertension, 2 cases had moderate pulmonary hypertension. 3 cases in moderate COPD group had moderate pulmonary hypertension, and 4 moderate COPD cases had mild pulmonary hypertension. There was significant association observed between COPD severity and pulmonary hypertension severity (P=0.015).

Table 7

Association between Albumin concentration and BODE score

Group	N	Mean ± SD (%)	P value
Control	40	5.9±1.1	0.0032
Mild	9	5.45±1.6	
Moderate	17	4.1±0.95	
Severe	14	3.5±1.25	

Oneway ANOVA F-test

Albumin concentration was found to progressively decrease with increase in BODE score. There was negative correlation observed between COPD severity and Albumin levels. The mean albumin concentrations were 5.9±1.1 gm/dL in the control group, 5.45±1.6gm/dL in the mild group, 4.1±0.95gm/dL in the moderate group and 3.5±1.25 gm/dL in the group of severe COPD cases respectively. The difference of the severe and moderate categories shows higher significance compared to others (P< 0.0001).

Various studies attempted to identify an approach to quantify the severity of COPD and revealed that the BODE index would be appropriate.

In our current study, we classified COPD patients into 3 groups based on their BODE scores: 0–2, 3–5, and ≥ 6. This classification significantly correlates with severity in terms of hospitalization and also with mortality.

According to celli et al [8] and Kian-chungetal [10], the BODE score raises with the age. This may be due to the advancement of COPD as the people get older. We got a similar trend even though the range of age group was lower as compared to Kian et al and Celli et al. Some studies have shown no association between the two. This disparity is mostly owing to the fact that smoking duration and age were not proportional to each other.

Current study observed an significant association between smoking and BODE index. Studies by Kumar et al [11] and Celli et al were shown that smoking over a longer period of time is associated with a higher BODE index. In Celli et al study, even though the smoking index was at a higher domain the significance was 0.36 as compared to our study and Kumar et al getting 0.001 in both studies. The study shows that smoking for a longer period was associated with a significant increase in BODE index. Current study found no differences between the study groups in the moderate COPD and the control group. This suggests that the condition may still be reversible if patients stop smoking.

In our study, the mean length of stay in the moderate COPD group was 6 ± 1.5 days, and 19 ± 1.6 days in the severe COPD group. Similarly, Kumar et al shows that the mean length of stay in the moderate COPD group was 12.46 ± 14.32 days, and 19.45 ± 18.97 days in the severe COPD group. The variation in number of days can be institutional differences in admission or due to extreme values in calculating mean Hospital stay days.

When compared to COPD classifications such as (British Thoracic Society, ATS, and GOLD), a multicomponent staging system combining FEV1, 6- min walking distance, dyspnea scored

on the MMRC scale, and PaO2 can better describe health-care resource utilization among COPD patients in different geographic areas. The BODE score outperformed FEV1 as a predictor of severity in COPD acute exacerbations. The effectiveness of the BODE index in predicting hospital readmission was supported in a prospective research with the same prediction [12]. Another study backs up these findings, claiming that a limited 6-minute walking test increases the chance of COPD hospitalization [13]. Hence, it's possible that the BODE index is higher power to predict the hospital readmissions in COPD patients compared to FEV1 is due to the different components of the BODE scoring system's evaluation of physical performance status.

A value of more or less than 21 is deemed significant in the BODE Index as a BMI criteria. Due to the severity of COPD, we found a drop in BMI. Emil et al study revealed that BMI decreases in COPD sufferers, as we found in our study, is backed up by Engelem et al and Schols et al [14,15] that looked at the systemic consequences of COPD, we have compared with Kumar et al which equally significant results. As a result of an imbalance in the continual process of protein degradation and replenishment, it is possible that this wasting syndrome seen in patients is contributing. Our study also had a similar significance as Kumar et al, can be attributed to regional changes in Built and corresponding BMI of the study population, and in both the others BMI is in wide ranges as least as 12, and can be due to better clinical facility which helps in there longevity even in malnourished severe COPD cases.

Because COPD patients have hypoxia, erythropoietin is generated, resulting in polycythemia. According to BODE INDEX, mild COPD patients have lower haemoglobin levels than controls, and as severity grows, the mean haemoglobin concentration drops, indicating that these patients may have poor nutrition.

The majority of patients in our study had a right axis deviation (RAD), 86.67% (n=13) of severe COPD patients and 35.3%(n=6) patients in moderate category had RAD, which was also supported by Caird et al [16], who shows that 80% of severe COPD patients have RAD. This can be explained by the fact that these patients' lung functions and PAH are deteriorating at a faster rate. In Chapell et al, it is only 29%[17]. Hence our study shows that severe BODE index patients are prone for right heart diseases but it's not universal.

As the other studies, Echocardiographic changes were similar, as in our study groups our study attains significant reduction in ejection fraction. This may be due to smoking induced Cardiomyopathy. Due to Bernheim's effect due to paradoxical movement of the interventricular septum causes LV dysfunction in patients with COPD.

More than 16% in patients with COPD demonstrated an incidence of pulmonary hypertension in Arcasoy et al [18]. In our study, the incidence of pulmonary hypertension is 52.5%. Stevens et al showed that the proportion of patients with pulmonary hypertention is higher among patients with severe COPD in which average pulmonary hypertension was 59±7 mmHg. The pulmonary hypertension in affected patients occurs due to pulmonary vasoconstriction because of alveolar hypoxia, acidemia and hypercarbia; increased lung volume causes compression of pulmonary vessels; emphysema lead to loss of small vessels, secondary to hypoxia there is increased viscosity of blood and cardiac output.

Direct effects of TNF-α and the time-dependent and concentration-dependent reductions in total protein has been demonstrated in Li et al [20]. Hypoalbuminemia in COPD patients were demonstrated in Wouters et al [6]. There was a significant reduction in serum albumin concentrations with corresponding increase in severity of COPD as assessed by the BODE score in our study.

As C-reactive protein (CRP) upregulate the production of tissue factors and proinflammatory cytokines by monocytes, associated increase in uptake of LDL by macrophages and expression of adhesion molecules by the human endothelial cells we selected it as inflammatory marker in our study this was demonstrated in Cirillo et al [21] which says a decrease in FEV1 was associated with a standard deviation increase in serum LDL level. They produce atherosclerotic plaques by interacting with inflammatory markers ending up as Foam cells thus atherogenesis occurs in blood vessel walls. Worsened obstruction of airflow was

found to be seen as there is increase in CRP which was demonstrated in cirillo et al. In Our study, moderate and severe COPD cases were associated with significant levels of low grade systemic inflammation.

The BODE index is a highly valuable prognostic information giving tool, particularly for COPD patients, and the outcomes of this study support the use of the BODE index as a tool for COPD patient assessment.

Limitations of this study includes the predictive value of the BODE Scoring system and FEV1 were not determined prospectively to produce a meaningful difference. Since some patients may avoid clinical care it can't be representative of population as it is conducted in hospital setup.

Male report in our study could not be applied to female population. Some unknown or known causes and medication that may have effects on parameters studied should also be considered.

More studies were needed to see if BODE index can be used as a reliable index to track illness progression. Whether lowering the BODE index improves patients' illness status. More research is needed to determine which therapeutic methods have the most influence on the BODE index.

CONCLUSIONS

The BODE index is valid tool to determine the severity of COPD and is directly associated with the length and intensity of smoking. An increase in cardiac effects with the severity of COPD disease was noted when it was assessed by BODE index. Study suggests that the BODE index is reliable in determining the hospitalization and severity of systemic involvement in COPD patients and not only an indicator of mortality. The BODE index is extremely useful in evaluating COPD patients in any health-care setting.

Conflict of interest. The authors of this manuscript claim that there is no conflict of interest during the research and writing of the manuscript.

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КОРЕЛЯЦІЯ ІНДЕКСУ BODE З ІНДЕКСОМ ПАЛІННЯ, ПЕРЕБУВАННЯМ У СТАЦІОНАРІ, УРАЖЕННЯМ СЕРЦЯ ТА СТАНОМ ХАРЧУВАННЯ ПРИ ХРОНІЧНОМУ ОБСТРУКТИВНОМУ ЗАХВОРЮВАННІ ЛЕГЕНЬ: ДОСЛІДЖЕННЯ ВИПАДОК-КОНТРОЛЬ ДЛЯ ПРОГНОЗУВАННЯ ТЯЖКОСТІ ЗАХВОРЮВАННЯ

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Актуальність. Хронічне обструктивне захворювання легень (ХОЗЛ) вражає широке коло населення, розширення охоплення закладів охорони здоров'я та забезпечення контролю над ХОЗЛ є величезною проблемою. Існує потреба в логічній і надійній системі підрахунку балів, яка б могла ідентифікувати осіб, що потребують діагностичної або терапевтичної допомоги, але не можуть собі її дозволити через кризу бюджету охорони здоров'я.

Ціль: встановити кореляцію індексу BODE з індексом паління, перебуванням у стаціонарі, ураженням серця, станом харчування та системним запаленням.

Матеріали та методи. 40 пацієнтів із симптомами ХОЗЛ були зареєстровані як випадки, а 40 здорових суб'єктів без ХОЗЛ відповідного віку були зареєстровані як контрольні суб'єкти. ІМТ, ОФВ1, відстань, пройдену за 6 хвилин, і шкалу диспное MMRC використовували для генерації індексу BODE, а також проводили ЕХО-кардіографію. Оцінено кореляцію між тяжкістю індексу BODE та ІМТ, перебуванням у стаціонарі, сироватковим альбуміном, гемоглобіном, рівнями CRP, віссю QRS, визначеною за допомогою електрокардіографії, фракцією викиду та легеневою гіпертензією, визначеною за допомогою 2D ЕНСО.

Результати. Загалом 9 пацієнтів мали легкий ХОЗЛ з балом BODE від 0 до 2, у той час як 17 пацієнтів мали помірний ХОЗЛ з балом BODE від 3 до 5, а 14 пацієнтів мали тяжкий ХОЗЛ з балом BODE ≥6. Пацієнті з легким ХОЗЛ використовували 10 пачок цигарок на рік, з середнім – 19 пачок, з важким – 29 пачок на років. Кількість пачок на рік куріння була суттєво пов'язана з балом BODE (P=0,01). Середня тривалість перебування в стаціонарі в групі ХОЗЛ середнього ступеня тяжкості становила 6±1,5 дня, у групі тяжкого ХОЗЛ – 19±1,6 дня. Між ступенем тяжкості та перебуванням у стаціонарі спостерігався значний зв'язок (P=0,004). Рівні гемоглобіну були нижчими залежно від тяжкості захворювання (11,4±1,29 vs 9,5±1,8 vs 10,62 ± 2,5 при легкому, середньому та важкому ХОЗЛ (P=0,04). Більшість випадків ХОЗЛ мали відхилення електричної осі серця вправо (RAD), 86,67% (n=13) важких випадків ХОЗЛ і 35,3% (n=6) випадків ХОЗЛ середнього ступеня тяжкості мали РА. Середня фракція викиду була нижчою при тяжкому ХОЗЛ порівняно з ХОЗЛ середнього та легкого ступеня зі значним зв'язком (48,1±7,8% vs 69,5±8,2% vs 65,6±5,9%, P=0,032). Спостерігалася позитивна кореляція між тяжкістю ХОЗЛ та рівнями СРБ. Зміни ІМТ та сироваткового альбуміну можна пояснити зниженням харчового статусу пацієнтів з ХОЗЛ, що прямо корелювало з BODE. Пацієнти з тяжкими ХОЗЛ демонстрували вищі рівні СРБ 65,2±52,9 мг/л, порівняно з легкими випадками ХОЗЛ із СРБ 26,5±19,5 мг/л. Статистично значущий зв'язок відзначений між тяжкістю захворювання та рівнями СРБ (p=0,0045). 10 випадків тяжкого ХОЗЛ мали легеневу гіпертензію, 2 пацієнти мали легку легеневу гіпертензію, а 2 – помірну. Спостерігався значний зв'язок між тяжкістю ХОЗЛ та тяжкістю легеневої гіпертензії (P=0,015).

Висновок. Індекс BODE є дійсним інструментом для визначення тяжкості ХОЗЛ і безпосередньо пов'язаний з індексом куріння. При оцінці за індексом BODE спостерігалося посилення серцевих ефектів із збільшенням тяжкості ХОЗЛ. Дослідження показує, що індекс BODE є надійним у визначенні госпіталізації та тяжкості системного ураження пацієнтів з ХОЗЛ, а не лише показником смертності.

Ключові слова: індекс BODE, хронічна обструктивна хвороба легень, куріння, електрокардіографія.