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CLINICAL, EVOLUTIVE AND DIAGNOSTIC CONSIDERATIONS OF COMMUNITY-ACQUIRED PNEUMONIA IN OBESE PATIENTS

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CONTENT

CONCEPTUAL HIGHLIGHTS OF THE RESEARCH

The relevance and importance of the issue

Due to the increasing incidence and prevalence worldwide, community-acquired pneumonia (CAP) and obesity represent two clinical nosologies of research interest for scientific studies [1, 2, 3, 4, 5]. CAP is a heterogeneous entity with variable clinical manifestations and a wide range of responsible pathogens, being considered among the most common causes of infectious death and an important cause of hospitalization involving significant healthcare costs.

Obesity is a clinical entity, but also a risk factor for multiple comorbidities, such as diabetes mellitus, cardiovascular and metabolic diseases, obstructive sleep apnea, cancer, and mortality. From these reason obesity-related multimorbidities is directly proportional to body mass index (BMI) [6, 7, 8, 9]. In recent years, the prevalence of obesity worldwide has reached alarming proportions, with statistics estimating that the prevalence of obesity has increased from 30.5% in 1999-2002 to 41.9% in 2017-2020. At the level of the respiratory system, obesity induces changes in lung function, including changes in lung mechanics, airway resistance and gas exchange [10, 11, 12, 13, 14, 15].

Due to the activation of the proinflammatory cascade, which involves increased levels of cytokines and proinflammatory markers, obesity represents a substrate for the development of various infections, including pneumonia [3, 16, 17]. In addition to storing lipids, white adipose tissue also performs endocrine (adipokine synthesis) and immune functions, containing cells such as macrophages (which constitute 40-50%), T and B lymphocytes [11, 18, 19]. As fat mass increases, macrophages are transformed into proinflammatory macrophages, which produce inflammatory cytokines and maintain a chronic, persistent proinflammatory state called metainflammation or parainflammation [6, 13, 20].

Concomitant to metainflammation, oxidative stress mechanisms are also activated, because the expansion of adipose tissue, as obesity progresses, can lead to the excessive production of toxic free radicals that cause oxidative stress (OS). The mechanisms involved in this process concern the correlation between vascularization imbalance (relatively small number of vessels compared to the relatively large number of adipocytes), tissue hypoxemia, and the generation of oxidative stress through reactive oxygen species (ROS) [21, 22, 23, 24]. Under these conditions, oxidative stress is triggered by persistent inflammation at the adipocyte level, resulting from an imbalance between ROS production and their neutralization through the synthesis of antioxidant compounds [25, 26, 27, 28, 29].

Research data show that obesity is a risk factor for developing CAP. Patients with pneumonia and obesity have a longer hospital stay, including in intensive care units, have more severe complications, and more frequently require mechanical ventilation and complex therapeutic management [30, 31, 32, 33, 34, 35].

Although the number of patients with CAP and obesity is constantly increasing, there are no protocols that provide for the management of this category of patients and none of the frequently used scores for assessing the severity of pneumonia (CURB-65, PORT/PSI, DS-CRB-65, CAP-PIRO) include BMI as a criterion [36, 37, 38, 39].

Moreover, the importance of applying an algorithm for assessing and screening CAP in obese patients would contribute to predicting the severe course of CAP and reduce the mortality rate in obese patients.

In the Republic of Moldova, to date, there is no research that presents data on the particularities of community-acquired pneumonia in the obese. For these reasons, the idea of a study to evaluate clinical particularities and clinical course, anthropometric manifestations, cardiometabolic risk, inflammatory status and oxidative stress markers in patients with CAP and obesity is argued to estimate the prognosis and impact of obesity on CAP.

Aim of the study. Highlighting the clinical and paraclinical course and oxidative stress characteristics of community-acquired pneumonia in obese patients.

Study objectives

1. Determining clinical and paraclinical characteristics of community-acquired pneumonia in obese patients.
2. Estimation of the associated comorbidities, clinical course and complications of community-acquired pneumonia in obese patients.
3. Assessment of prooxidant and antioxidant status markers in community-acquired pneumonia in obese.
4. Correlation of anthropometric features with community-acquired pneumonia severity and cardiometabolic risk assessment in obese patients.
5. Community-acquired pneumonia severity assessment scores (CURB-65, PORT/PSI, DS-CRB-65, SIRS, CAP-PIRO) according to the presence of obesity and elaboration a method for assessing the risk of developing severe community-acquired pneumonia in obese patients.

General research methodology. To achieve the proposed purpose and objectives, a prospective, cohort study was conducted during the years 2017-2023, within the Department of Internal Medicine, Discipline of Clinical Syntheses, PI ,,Nicolae Testemitanu" State University of Medicine and Pharmacy, clinical base Municipal Clinical Hospital ,,Holy Trinity". The sample included 210 patients with community-acquired pneumonia divided into two groups: the research group (group 1) - 105 patients with community-acquired pneumonia and varying degrees of obesity and the control group (group 2) - 105 normal-weight patients with community-acquired pneumonia. Patients were included in the study in the order of admission. The research was conducted based on the signing of the informed consent, the complex clinical examination of the patients, the daily monitoring of clinical parameters, the interpretation of laboratory data and chest X-ray, the measurement of anthropometric data, the assessment of comorbidities, complications and severity scores. The study was conducted according to the principles of the *Declaration of Helsinki* ,,Ethical Principles for Medical Research Involving Human Subjects". The study was approved by the Research Ethics Committee of the PI ,,Nicolae Testemitanu" State University of Medicine and Pharmacy, with the issuance of favorable response, no. 46 of March 27, 2018.

Scientific novelty and originality of the research. This comprehensive study addresses the impact of obesity on community-acquired pneumonia, taking into

account the fact that the number of patients with obesity is constantly increasing. The impact of obesity on the persistence of clinical symptoms and signs of pneumonia, on the duration of hospitalization, the need for transfer to the intensive care unit and the need for mechanical ventilation was evaluated. A more pronounced proinflammatory status (C-reactive protein, lactate dehydrogenase) was determined in pneumonia in obese patients. The particularities of oxidative stress in CAP in obese patients were highlighted.

Scientific solved problem. The research results allowed the development of a calculation formula for assessing the risk of developing severe community-acquired pneumonia in obese patients, which will allow early diagnosis of severe pneumonia and timely transfer to the intensive care unit to minimize possible complications. In obese patients with community-acquired pneumonia, a significant increase in prooxidative markers (AOPP, AGE-pentosidine like, MDA) was observed, counterbalanced by the increase in the antioxidant marker, represented by SH-total groups.

Theoritical significance. Patients with CAP and obesity require a more detailed therapeutic approach, given the longer hospital stay, higher rate of acute respiratory failure, more frequent need for transfer to intensive care unit, and need for mechanical ventilation. The more advanced proinflammatory and prooxidative status is confirmed as the body mass index increases. The correlation between the severity of CAP in obese individuals and anthropometric indices (waist-to-height ratio, body mass index, abdominal circumference, and waist-to-hip ratio) has been demonstrated.

The applicative value of the thesis. Compared to other existing CAP assessment severity scores, the DS-CRB-65 score demonstrated the highest sensitivity and specificity. Threshold values for pro-oxidative markers of oxidative stress (AOPP and AGE-pentosidin-like) were established for the diagnosis of severe community-acquired pneumonia.

Implementation of scientific results. The methodical recommendations were used in the Pulmonology Department, Internal Medicine Department and Intensive Care Department of the ,,Holy Trinity" Municipal Clinical Hospital, as well as in the didactic process at the Discipline of Clinical Synthesis, Department of Internal Medicine, ,,Nicolae Testemitanu" State University of Medicine and Pharmacy.

Approval of results. The scientific results obtained in this research were published in 26 scientific papers (11 articles and 15 abstracts in national and international journals), and the results were presented at 15 national and international conferences: The 75th Anniversary Congress of the "Nicolae Testemițanu" State University of Medicine and Pharmacy, October 21-22. 2020. Chișinău, Moldova; The 8th International Medical Congress for Students and Young Doctors, MedEspera. September 25. 2020. Chisinau, Moldova; The 1st National Congress of Geriatrics and Gerontology of the Republic of Moldova with International Participation. September 23-24, 2021. Chisinau, Moldova; Pulmonology Conference INSPIR. June 8-11, 2021. Iași, Romania; The 32nd Congress of the European Society of Respirology, September 4-6, 2022. Spain, Barcelona; Annual Scientific Conference of the "Nicolae Testemițanu" State University of Medicine and Pharmacy "Research in Biomedicine

and Health: Quality, Excellence and Performance". October 19-21, 2022. Chișinău, Moldova; Annual Scientific Conference of the "Nicolae Testemițanu" State University of Medicine and Pharmacy "Research in Biomedicine and Health: Quality, Excellence and Performance". October 18-20, 2023. Chișinău, Moldova; The 6th International Conference on Nanotechnologies and Biomedical Engineering. 20-23 septembrie, 2023. Chisinau, Moldova; The Internal Medicine Congress of the Republic of Moldova with international participation, IV edition. September 13-14, 2024. Chisinau, Moldova; The 28th National Congress of the Romanian Society of Pulmonology. November 13-16, 2024. Sinaia, Romania, The First National Congress of Pneumology in Moldova. November 14-16, 2025. Chisinau, Moldova; The European Respiratory Society Congress. 27 September – 01 October, 2025. Netherlands, Amsterdam; EuroInvent Exposition. May 8-10, 2025. Iași, Romania; The 4th edition of the International Exposition EXCELLENT IDEA. September 11-12, 2025. Chisinau, Moldova; The 7th International Conference on Nanotechnologies and Biomedical Engineering. 7 – 10 october, 2025. Chișinău, Moldova.

Thesis structure. The thesis is presented on 120 pages of basic text, including 4 chapters and general conclusions, practical recommendations, 277 bibliographic sources, 20 tables, 21 figures, 12 annexes, 2 innovator's certificates, 2 implementation acts, information of publication of results and a statement on assuming responsibility.

Keywords: community-acquired pneumonia, obesity, oxidative stress, clinical course, comorbidities, severity scores.

1. THE CLINICAL AND PARACLINICAL FEATURES OF COMMUNITY-ACQUIRED PNEUMONIA IN PATIENTS WITH OBESITY

This chapter reflects the synthesis of the specialized literature referring to the evolutionary and clinical-paraclinical data of CP in patients with obesity. According to these analyzed data, community-acquired pneumonia and obesity represent two current clinical nosologies of high scientific interest. The research interest lies in the increased incidence and prevalence in recent years in the general population of pneumonia and obesity. The chapter addresses the general and epidemiological data on obesity and community-acquired pneumonia. The activity and function of adipose tissue as a dynamic and metabolically active tissue, as well as its impact on the evolution of PC were described. Proinflammatory markers and their expression in obese subjects were another aspect addressed in this chapter. Scientific data have been presented on the role of proinflammatory cytokines in maintaining a chronic low-grade proinflammatory status, called metainflammation or parainflammation, which makes obese patients more susceptible to infections, including pneumonia. The chapter also describes the impact of oxidative stress in subjects with community-acquired pneumonia and obesity, the increased activity of the prooxidant balance and the maintenance of oxidative processes at a higher level compared to normal-weight subjects. It is emphasized that obese patients more frequently present cardiometabolic comorbidities and complications associated with CAP. In addition to the studies presented in this chapter, which argue for the development of severe forms of CAP in obese patients, there are controversial data explaining the phenomenon called the “obesity paradox”,

which supports the hypothesis that obese patients have better clinical outcomes. Another aspect presented in the first chapter refers to CAP severity scores. Existing studies were analyzed, in which CAP severity scores are compared in obese versus normal-weight patients.

2. RESEARCH MATERIALS AND METHODS

2.1. General characteristics and study design

The research was conducted within the Department of Internal Medicine, Discipline of Clinical Syntheses, PI „Nicolae Testemitanu" State University of Medicine and Pharmacy, clinical base Municipal Clinical Hospital „Holy Trinity". To achieve the proposed goal and objectives, a prospective cohort study was conducted, in which 210 patients with community-acquired pneumonia were included, divided into two groups: the research group (Group 1) - 105 patients with community-acquired pneumonia and different degrees of obesity and the control group (Group 2) - 105 normal-weight patients with community-acquired pneumonia.

The research was conducted based on the signing of the informed consent, complex clinical examination of patients, daily monitoring of clinical parameters, interpretation of laboratory data and chest X-ray, measurement of anthropometric data, assessment of comorbidities, complications, determination of cardiometabolic risk (SCORE-2 score, SCORE-OP), and severity scores (CURB-65, DS-CRB-65, PSI-PORT, SIRS, SMART-COP) [32, 33, 34, 35]. The inflammatory and biochemical markers was performed in the biochemical laboratory of Municipal Clinical Hospital „Holy Trinity" and the oxidative stress markers were performed in the biochemical laboratory of PI „Nicolae Testemitanu" State University of Medicine and Pharmacy.

For the accuracy of the research, a series of inclusion and exclusion criteria were followed.

Inclusion criteria:

1. Obese patients (BMI > 30.0 kg/m²) and normal weight patients (BMI 18.5 - 24.9 kg/m²) with community-acquired pneumonia (presence of clinical and paraclinical characteristics – acute onset, physical syndrome of pulmonary condensation, new radiological pulmonary infiltrate)
2. Patients over 18 years of age
3. The ability of patients to communicate well with the researcher and the possibility of understanding and complying with the study requirements
4. Signing the informed consent form for inclusion in the study

Exclusion criteria:

1. Pregnancy, breastfeeding
2. Patients with HIV/AIDS, tuberculosis, lung cancer
3. Inability to provide informed consent or individuals who have expressed disagreement to participate in the study
4. Patients for whom it was difficult to obtain anamnestic data, physical data, and paraclinical investigations.

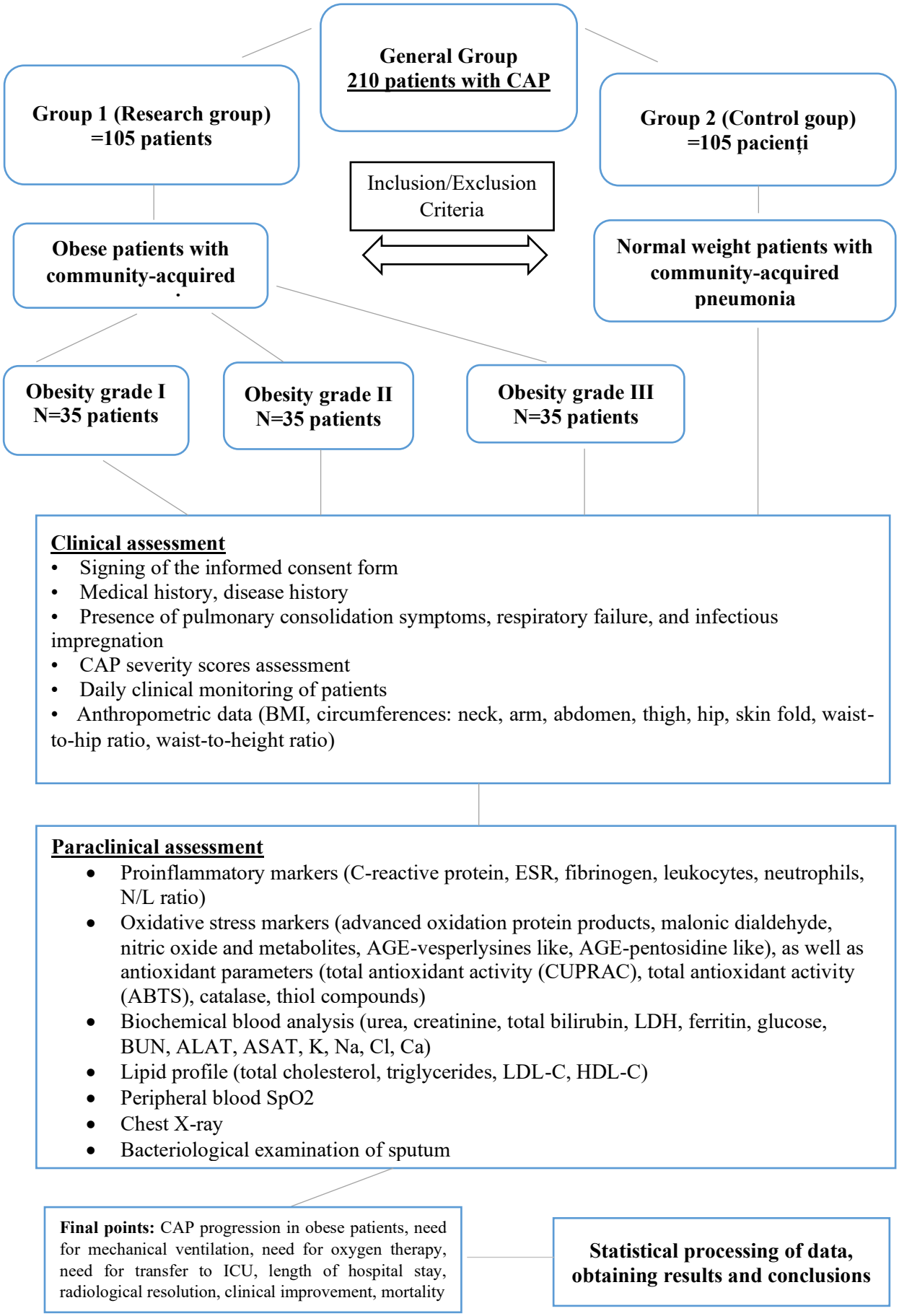

Figure 2.1. **Study design**

2.2. Clinical and paraclinical examinations

The clinical examination was performed in a detailed and standardized manner, according to the study protocol. Objective clinical data corresponding to pulmonary condensation syndrome (accentuated vocal fremitus on palpation, presence of dullness/subdullness on percussion, pulmonary stethoscopic changes such as pathological tubular breath sounds, diminished vesicular murmur, or crackles) were evaluated. *Anthropometric indices.* In order to evaluate anthropometric parameters, various indicators were used to determine obesity status (body mass index, abdominal circumference, neck circumference, arm circumference, hip circumference, waist-to-hip ratio, waist-to-height ratio, skinfold thickness). *Imaging investigations.* The presence of pneumonia was confirmed radiologically in all patients included in the study. Radiological examination was performed upon admission and on the 10^{th} to 14^{th} day, and in case of clinical worsening – as necessary. *Pulse oximetry.* Peripheral oxygen saturation was determined by pulse oximetry. Values <94% indicated acute respiratory failure. *Bacteriological examination of sputum* was the method used to determine the etiological agent. The sputum was cultured on special culture media and incubated for at least 24 hours at 37º Celsius to allow identification of the microbial agent and performance of an antibiogram. *Blood count indices* (hemoglobin, erythrocytes, leukocytes, leukocyte formula, lymphocytes, thrombocytes, RDW-SD, RDW-CD, monocytes, basophils, eosinophils) were determined using the Sysmex XN-2000 biochemical device, by hydrodynamic focusing and fluorescence flow cytometry. The erythrocyte sedimentation rate was determined using the CUBE 30 TOUCH automatic analyzer, based on the modified Westergren method. *Blood biochemical markers* were determined using the Mindray BS-800 automatic biochemical analyzer based on several methods: spectrophotometric, colorimetric, direct, enzymatic, catalytic, immuno-turbidimetric and oxidase. Prothrombin, INR, and fibrinogen values were determined using the Sysmex CS-1600 automatic biochemical analyzer, based on the principles of chromogenic and immuno-turbidimetric detection. *Oxidative stress markers.* The following oxidative stress parameters were examined (pentosidine-like advanced glycation end products (AGE-pentosidine like), vesperlysines-like advanced glycation end products (AGE-vesperlysines like), advanced oxidation protein products (AOPP), total antioxidant capacity according to the CUPRAC method (TAC CUPRAC), total antioxidant capacity according to the ABTS method (TAC ABTS), malonic dialdehyde, nitric oxide and derivatives, catalase, SH thiol groups, free SH groups, total SH groups. Blood was collected from the cubital vein of patients or from a central venous catheter (in the case of patients hospitalized in the intensive care unit) within the first 48 hours of hospitalization, under fasting conditions. Five milliliters of venous blood was collected and immediately centrifuged at 4°C to obtain 2.5 ml of serum, which was stored at -70°C until testing (storage period 6 months).

2.3. Methods for statistical processing of results

The data was entered into a database created in Microsoft Excel 2016. IBM SPSS Statistics 20 and Microsoft Excel 2016 were used for further statistical processing. The data obtained were statistically processed using the following statistical tests: the χ^2 *test* was applied to verify the equality of the dispersions of two normally distributed

independent variables. The *One-way ANOVA test* was used to determine the statistically significant difference between the means of two independent groups. The *mean* represented the value obtained from the sum of the values of a series of variables. *Standard deviation* – the variation of values from the arithmetic mean. *Confidence interval (CI)* – an interval of real numbers determined using the standard error in which the real mean, which we approximate, is estimated. The chosen confidence level was 95%. *The threshold value* of AGE-pentosidine-like and PPOA was calculated using descriptive statistics, identifying the 95% CI, and the minimum value of the CI was considered the „threshold value" of the variable. *The correlation analysis* between variables was performed by applying the Spearman correlation test for ordinal variables and the Pearson correlation test for variables with scalar distribution. *The ROC curve* was used to determine the sensitivity (true positive rate) and specificity (false negative rate) for the evaluated variable. *The logistic regression method* was applied to assess the risk of developing severe forms of CAP in obese individuals.

3. RESEARCH RESULTS

3.1. General characteristics of patients included in the study

Prospective study of general data allowed for analysis of age and age group, social and demographic affiliation in both groups (Group 1/Group 2). Patients aged between 20 and 81 years were included in the study. The average age in group 1 was 65.49±12.53 years, while in group 2 the average age was 65.28±12.04; F=0.014, p=0.906.

Depending on age group, patients aged <65 years in group 1 accounted for 41 (39%; CI 95% [29.0-48.4]) and group 2 - 45 (42.9%; 95% CI [32.7-52.2]), and the age group >65 years predominated numerically: group 1 - 64 (61.0%; 95% CI [51.6-71.0]) and group 2 – 60 (57.1%; 95% CI [48.7-67.3]) patients, with no statistical difference between groups ($\chi 2$=0.315; gl=1; p=0.575).

The distribution of patients by gender was as follows: group 1 – men 39 (37.1%; CI 95% [27.8-47.5]), women – 66 (62.9%; 95% CI [53.5-72.2]), the male/female ratio was 1:1.7; and group 2 – men 40 (38.1%; 95% CI [29.2-47.2]), women 65 (61.9%; 95% CI [52.8-70.8]), the male/female ratio was 1:1.6; ($\chi 2$=5.77; gl=1; p=0.231).

Analysis of the origin of patients in both groups revealed that most patients came from urban areas: group 1 - 75 (71.4%; CI 95% [63.3-79.8]) versus group 2 - 81 (79.5%; 95% CI [66.1-84.1]) patients ($\chi 2$=2.890; gl=1; p=0.380), while the rural origin constituted in group 1 - 30 (28.6%; 95% CI [20.2-36.7]) versus group 2 - 24 (22.9%; 95% CI [14.4-31.6]) patients, ($\chi 2$=2.771; df=1; p=0.250).

The presence of smoking was studied as a proinflammatory, prooxidant substrate and as a cardiometabolic risk factor. In both groups, the number of non-smokers predominates: 72 (68.6%; 95% CI [59.5-77.1]) versus 66 (62.9%; 95% CI [53.3-72.5]) patients in group 1 and group 2, respectively ($\chi 2$=2.527; gl=1; p=0.283). Number of current smokers: 16 (15.2%; 95% CI [8.3-22.4]) versus 25 (23.8%; 95% CI [15.4-32.4]), ($\chi 2$=1.324; df=2; p=0.129) and ex-smokers constituted 17 (16.2%; 95% CI [9.5-23.5]) versus 14 (13.3%; 95% CI [6.9-20.8]) patients in group 1 compared to group 2 ($\chi 2$=2.897; df=1; p=0.375).

3.2. The clinical and paraclinical features of community-acquired pneumonia in patients with obesity

The medical history of patients in both study groups was collected in order to determine the onset of CAP. Subsequently, patients were examined clinically and paraclinically, and the clinical course of CAP was monitored depending on the research group.

According to the bacteriological results, in the etiological structure of bacterial pneumonias, *Streptococcus spp. (Streptococcus pneumoniae, Streptococcus pyogenes, Streptococcus viridans)* predominated, being identified in group 1 in 24 (22.8%; 95% CI [19.1-25.7]) patients and in group 2 in 21 (20%; 95% CI [17.0-22.1]) patients, ($\chi2$=7.852; gl=2; p=0.721) followed by *Staphylococcus aureus,* determined in 3 (2.85%; 95% CI [1.0-5.2]) patients versus 1 case (1%; 95% CI [0.9-2.3]), ($\chi2$=8.80; gl=1; p=0.524). Regarding gram-negative microorganisms *(Moraxella catarrhalis, Escherichia coli)*, they were determined exclusively in the group of obese patients, in 3 cases (2.85%; 95% CI [1.7-4.8]), ($\chi2$=6.5; gl=1; p=0.481). Taking into account the fact that the study was conducted including during the COVID-19 pandemic, the viral etiology of CAP was also taken into account, according to the anamnesis and present symptoms and confirmatory tests in patients. Positive SARS-CoV-2 virus was determined in 11 (10.5%; 95% CI [5.0-16.7]) cases compared to 9 (8.6%; 95% CI [3.8-14.9]) cases, group 1 versus group 2, $\chi2$=1.205, gl=1; p=0.547.

Based on the clinical picture and severity scores at admission, the severity of community-acquired pneumonia was assessed between groups: moderate severity in 71 (67.7%; CI 95% [58.1-76.2]) patients in group 1 and 76 (72.4%; 95% CI [63.1-81.4]) patients in group 2 ($\chi2$=1.253; gl=1; p=0.521), and severe form was observed in 34 (32.4%; IÎ 95% [23.8-41.9]) patients in group 1 and 29 (27.6%; IÎ 95% [18.6-36.9]) patients in group 2, $\chi2$=0.567; gl=1; p=0.451. In accordance with the clinical characteristics at onset of community-acquired pneumonia, obese patients tend to have an acute onset of CAP in 57.1% of cases and an insidious onset in 42.9% of cases, associated with marked infectious signs, while for those of normal weight, a classic onset of CAP and moderate infectious signs was characteristic (Table 3.1.).

According to respiratory system clinical examination, the following results were obtained in group 1 and group 2: marked vocal fremitus of chest palpation – 19 (18.1% CI 95% [11.1-25.9]) and 67 (63.% CI 95% [54.1-72.5]) patients, $\chi2$=46.307; gl=1; p<0.0001; dullness on percussion – 24 (22.9% CI 95% [15.2-31.3]) and 73 (69.5% CI 95% [59.8-77.6]) patients, $\chi2$=46.000; gl=1; p<0.0001; decreased vesicular murmur on lung auscultation – 86 (81.9% CI 95% [74.0-88.8]) and 89 (84.8% CI 95% [77.3-91.4]) patients, $\chi2$=0.309; gl=1; p=0.579; pathological tubular murmur - 2 (1.9% CI 95% [0-0-4.9]) and 8 (7.6% CI 95% [3.0-12.9]) patients, $\chi2$=3.780; gl=1; p=0.052; unilateral crackles – 13 (12.4% CI 95% [6.4-18.7]) and 19 (18.0% CI 95% [11.0-25.9]) patients, $\chi2$=5.351; gl=1; p=0.690; bilateral crackles – 33 (31.4% CI 95% [22.1-40.2]) and 34 (32.4% CI 95% [22.7-39.6]) patients $\chi2$=2.566; gl=1; p=0.463.

Table 3.1. **The clinical features of community-acquired pneumonia at onset**

Medical History	Group 1 (CAP/Obesity)		Group 2 (CAP/N)		p
	N	%	N	%	
Insidious onset	45	42.9 %	32	30.5 %	p=0.060
Acute onset	60	57.1 %	73	69.5 %	p=0.063
Classical onset	26	24.8 %	41	39.0 %	**p=0.026**
The absence of fever	18	17.1 %	18	17.1 %	p=0.457
37.1ºC – 37.9ºC	31	29.5 %	41	39.0 %	p=0.158
38.0ºC – 38.9ºC	47	44.8 %	37	35.2 %	p=0.320
39.0ºC – 39.9ºC	8	7.6 %	9	8.6 %	p=0.620
>40ºC	1	1.0 %	0	0	p=0.728
Moderate infectious signs	29	27.6 %	41	39.0 %	p=0.185
Marked infectious signs	67	63.8 %	55	52.4 %	p=0.059
Absence of infectious signs	9	8.6 %	9	8.6 %	p=0.198

Typical pulmonary consolidation syndrome, determined by physical examination, was recorded in 20 (19.0% CI 95% [11.9-26.8]) and 69 (65.7% CI 95% 56.0-74.1) patients, $\chi 2$=46.821; gl=1; p<0.0001 and the presence of bronchial obstruction syndrome – 26 (24.0% CI 95% [16.2-33.6]) and 23 (21.9% CI 95% [11.4-30.4]) patients, group 1 versus group 2, $\chi 2$=0.240; gl=1; p=0.625.

The characteristic signs of acute respiratory failure were more frequently encountered at admission in patients in study group 1 compared to group 2, with statistical significance between groups: respiratory rate ≥30 breaths per minute – 24 (22.9% CI 95% [14.7-31.4]) and 9 (8.6% CI 95% [3.6-14.7]) patients, $\chi 2$=8.089; gl=1; p=0.004, peripheral oxygen saturation < 92% - 46 (43.8% CI 95% [34.6-53.6]) and 29 (27.6% CI 95% [19.2-36.5]) patients, $\chi 2$=5.994; gl=1; p=0.014, and the mean value of peripheral oxygen saturation (%) at admission was – 90.76±4.71 (95% CI [89.85-91.67]) and 92.50±4.51 (95% CI [91.60-93.35]), respectively, F=7.232, p=0.008.

All patients underwent radiological examination upon admission and discharge (10^{th}–14^{th} day). According to imaging data, at admission, radiological changes of the alveolar infiltrate type were observed in 83 (79.0% CI 95% [70.7-86.8]) cases in group 1 and 78 (74.3% CI 95% [65.8-82.1]) cases in group 2, ($\chi 2$=0.578, gl=1; p=0.447) and imaging changes of the interstitial inflammatory infiltrate type were characteristic of 28 (27.6% IÎ 95% [18.2-35.1]) cases of obese patients with PC and 33 (31.4% IÎ 95% [22.6-40.4]) cases of normal weight patients with PC, $\chi 2$=1.489; gl=1; p=0.496.

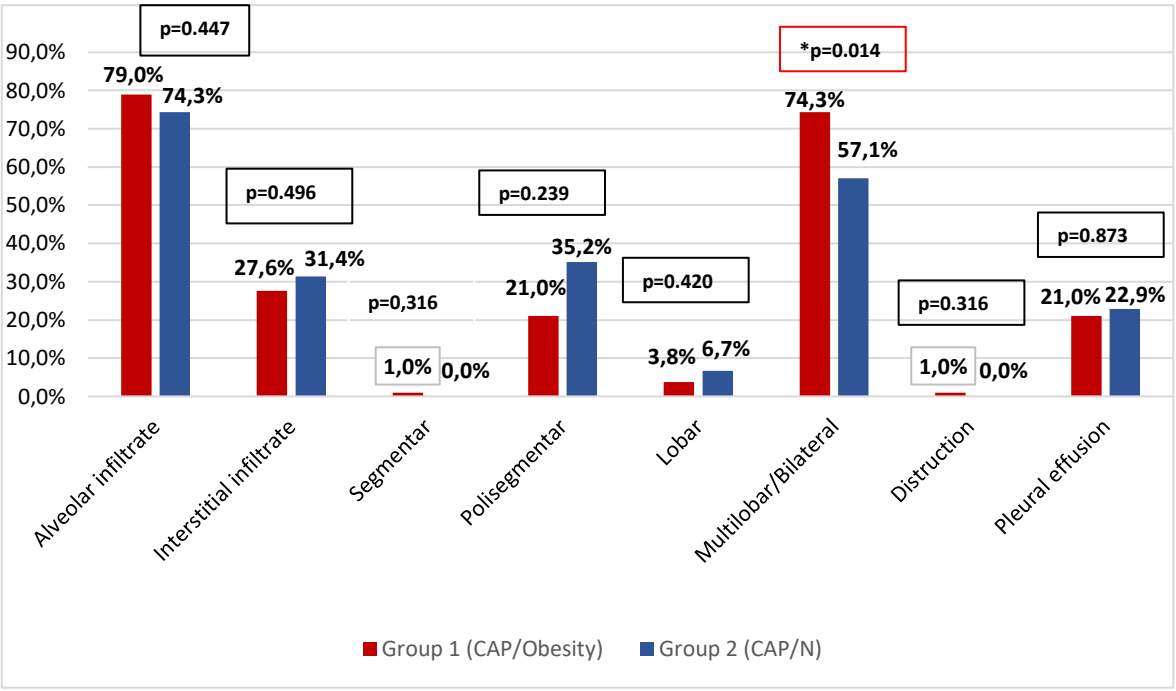

Figure 3.1. **The chest X-ray data available at admission**

According to the data presented in figure 3.1, it can be observed that obese patients show a tendency toward multilobar and/or bilateral radiological extension of CAP, unlike normal-weight patients, who show a predilection for unilateral and lobar polysegmental involvement.

The X-ray performed at discharge on the 10th-14th day revealed the following changes: total resorption – 21 (20.0% CI 95% [13.0-28.2]) and 17 (16.2% CI 95% [9.8-23.2]) patients, p=0.340; partial resorption – 69 (65.7%, CI 95% [48.2-67.3]) and 76 (72.3%, CI 95% [54.2-72.8]) patients, p=0.542; persistence of inflammatory infiltrate was observed in 2 cases (1.9%) in group 2, p=0.320; residual post-inflammatory changes – 15 (14.3% CI 95% [8.1-21.4]) and 12 (11.4% CI 95% [5.7-18.1]) patients, group 1 and group 2, respectively, p=0.504.

Next, we assessed the results of the complete blood count, systemic inflammation markers (fibrinogen, C-reactive protein), tissue damage markers (serum lactate dehydrogenase), and acid-base balance.

The blood count parameters did not show a statistically significant difference between the groups.

Patients who presented acute respiratory failure and had indications for blood gas analysis were evaluated for acid-base balance, with particular interest - PaO2, PaCO2, oxygenation indices, and bicarbonate.

According to the data presented (Table 3.2), in the group of obese patients with PC, acute respiratory failure with hypercapnia and more pronounced hypoxia is observed compared to normal weight patients. These changes may be caused by chronic alveolar hypoventilation and the association of pulmonary mechanics changes present in obesity.

Table. 3.2. **Analysis of gasometry data from acid-base balance assessment**

Gasometry parameters	Group 1 (CAP/O)	Group 2 (CAP/N)	F	P
PaO_2 (mmHg)				
Media	57.89	65.36	1.884	0.180
Median	59.0	67.0		
Standard deviation	11.75	19.38		
Minim	37.0	38.0		
Maxim	77.0	100		
IQR	18.0	29.0		
$PaCO_2$ (mmHg)				
Media	48.68	33.43	3.997	**0.047**
Median	37.0	31.0		
Standard deviation	10.27	13.34		
Minim	29.0	19.0		
Maxim	61.0	55.0		
IQR	17.0	14.0		
Oxygenation index (Horowitz) PaO_2/FiO_2				
Media	241.30	266.79	2.989	0.415
Median	241.0	267.0		
Standard deviation	72.47	105.06		
Minim	78.0	144.0		
Maxim	448.0	380.0		
IQR	130.0	141.0		
Bicarbonate (mEq/l)				
Media	23.08	21.82	0.820	0.372
Median	23.0	23.0		
Standard deviation	3.55	4.40		
Minim	14.0	13.0		
Maxim	30.0	30.0		
IQR	4.0	6.4		

Biochemical and proinflammatory markers were also examined (table 3.3.). Among the proinflammatory markers tested, C-reactive protein (mg/dL) was highlighted, which presented higher values, with statistical significance, in obese patients 66.08±31.24, (95% CI [52,18-79,97]) compared to the group of normal weight patients 40.85±18.12, (95% CI [29.47-52.23]), F=7.772, p=0.006. The assessment of serum lactate dehydrogenase (U/L), a marker of tissue lysis processes, demonstrated significantly higher values in the obese patient group - 286.31±94.66, (95% CI [267.99-304.63]) compared to the normal weight patient group - 215.89±110.16, (95% CI [194.57-237.21]), F=24.682, p<0.0001.

At the next stage, a correlational analysis of clinical manifestations and paraclinical changes was performed. The correlation analysis of clinical and paraclinical characteristics showed a moderate positive correlation between obesity and the presence of dyspnea (rs=0.549, p<0.0001), with the $PaCO_2$ level in the acid-base balance analysis (rs=0.483, p=0.001), with the serum LDL-cholesterol level (rs=0.410, p=0.001) and a strong correlation with the serum lactate dehydrogenase level (rs=0.626, p<0.0001).

Table 3.3. **Biochemical marker values according to the research groups**

Biochemical markers	Group 1 (CAP/Obesity)		Group 2 (CAP/N)		F	p
	Media	Standard deviation (±)	Media	Standard deviation (±)		
C-reactive protein (mg/l)	66.08	31.24	40.85	18.12	7.772	**0.006**
LDH (U/L)	286.31	94.66	215.89	110.16	24.682	**<0.0001**
Fibrinogen (g/l)	5.92	2.21	6.08	3.34	0.019	0.890
Procalcitonin (ng/ml)	1.49	1.04	1.01	0.46	0.190	0.668
Ferritin (ng/ml)	281.1	170.0	236.54	197.32	0.155	**0.045**
Urea (mmol/l)	8.71	6.99	7.45	5.11	0.096	0.757
BUN (mmol//)	24.21	19.53	23.56	14.33	0.074	0.786
Creatinine (μmol/l)	99.69	57.84	95.12	78.81	0.229	0.633
Total bilirubin (μmol/l)	12.44	9.22	13.63	12.27	0.630	0.428
Conjugated bilirubin (μmol/l)	6.68	4.01	5.46	3.87	0.435	0.510
Glucose (mmol/l)	8.55	4.29	7.00	2.96	8.342	**0.004**
ALAT (U/L)	47.01	40.28	47.58	41.69	0.008	0.929
ASAT (U/L)	37.86	24.81	33.74	21.29	0.295	0.588
Potassium (mmol/l)	4.62	0.69	4.47	0.69	2.542	0.112
Sodium (mmol/l)	139.24	6.70	138.81	13.48	0.084	0.772
Chlorine (mmol/l)	104.93	4.87	104.32	4.51	0.886	0.348
Prothrombin (%)	87,88	21,83	83,89	23,14	1,594	0,208
INR	1,92	1,4	1,17	0,35	0,019	0,890

***Note**: LDH – lactate dehydrogenase, ALAT – alanine aminotransferase, ASAT – aspartate aminotransferase, BUN – blood urea nitrogen, INR - International Normalized Ratio.*

Correlational analysis of laboratory markers indicated a moderate positive correlation between serum lactate dehydrogenase levels with the extent of pulmonary infiltrate (rs=0.527, p<0.0001) and serum ferritin levels (rs=0.439, p=0.001). Serum urea levels showed a moderate positive correlation with procalcitonin levels (rs=0.401, p=0.001), and the correlational analysis of serum C-reactive protein levels showed a positive correlation with serum leukocyte levels (rs=0.493, p=0.001) and ESR levels (rs=0.389, p<0.001). Another positive correlation established between laboratory

parameters was observed between serum glucose and procalcitonin levels (rs=0.470, p=0.001). The severity of CAP showed a positive correlation with the presence of fever (p=0.001, rs=0.421), peripheral oxygen saturation level (p<0.0001, rs=-0.682), leukocyte count (p<0.0001, rs=0.537), N/L ratio (p<0.001, rs=0.420) and serum urea level (p<0.0001, rs=0.400). By evaluating the correlation between obesity and clinical, laboratory, and radiological data, we established the following significant correlations: PaCO2 (p=0.001, rs=0.490), pneumonic infiltrate extension (p=0.001, rs=0.411), LDH level (p<0.0001, rs=0.588) and C-reactive protein level (p<0.001, rs=0.698).

3.3. Particularities of clinical course, associated comorbidities and complications of community-acquired pneumonia in obese patients

Further, an analysis of comorbidities associated with community-acquired pneumonia and obesity was performed. Patients in both study groups had an average of five or more associated clinical conditions. The analysis of comorbidities is important in determining the subsequent evolution of CAP, clinical risks and prognosis.

Among the chronic comorbidities that were recorded, cardiovascular pathology stands out, namely hypertension, which showed a statistical difference between the study groups: for the group of patients with CAP and obesity, essential hypertension was noted in – 102 (97.1%; 95% CI (88.2-104.1) patients in group 1 and in 80 (76.1%; 95% CI [68.4-94.0]) patients in group 2, $\chi2$=57.006; gl=1; p<0.0001. Chronic coronary syndromes were also more characteristic of the CAP and obesity group, being present in 89 (84.4%; CI 95% [71.4-91.8]) patients in group 1 and in 73 (79.5%; 95% CI [60.9-78.5]) patients in study group 2, $\chi2$=6.914; gl=1; p=0.009. Similarly, chronic heart failure, a complication of pre-existing chronic heart disease, was statistically more prevalent in study group 1 – 63 (60.0%; 95% CI [56.5-73.1]) and in study group 2 – 40 (38.9%; 95% CI [31.2-46.5]) patients, $\chi2$=7.622; gl=1; p=0.006. Dyslipidemia was recorded more frequently in obese patients, with statistical significance between groups: group 1 - 66 (62.9%; 95% CI [52.5-71.4]) patients and group 2 - 35 (33.3%; 95% CI [28.4-41.9]) patients, $\chi2$=18.331; df=1; p<0.0001. Chronic cerebrovascular disease was recorded in 74 (70.5%; 95% CI [62.0-79.5]) patients in study group 1 and in 62 (59%; 95% CI [50.0-69.1]) patients in group 2, respectively, $\chi2$=3.005; df=1; p=0.083. Type 2 diabetes mellitus, as an associated comorbidity, was twice as prevalent in patients in study group 1, 42 (40.0%; CI 95% [30.7-49.5]) patients, compared to group 2 – 17 (16.2%; CI 95% [9.3-24.0]) patients, showing a statistically significant difference ($\chi2$=14.732; gl=1; p<0.0001). Metabolic-associated fatty liver disease was recorded in 16 (15.2%; 95% CI [8.6-22.6]) versus 14 (13.3%; 95% CI [7.4-20.6]) patients, $\chi2$=1.133; df=1; p=0.567.

Chronic pulmonary comorbidities did not show any statistical difference between groups: chronic obstructive pulmonary disease was recorded in 32 (30.5%; 95% CI [21.7-39.6]) versus 31 (29.5%; 95% CI [20.6-38.3]) patients, $\chi2$=0.023; df=1; p=0.880 and bronchial asthma – 4 (3.8%; 95% CI [0.9-7.8]) versus 2 (1.9%; 95% CI [0.0-5.0]) patients, $\chi2$=0.686; df=1; p=0.407.

Chronic kidney disease was present in 20 (19.0%; CI 95% [11.6-26.4]) patients in group 1 and in 7 (6.7%; 95% CI [2.0-12.4]) patients in group 2, respectively, χ27.182=; df=1; p=0.007. Hypothyroidism was noted in – 1 (1.0%; 95% CI [0.0-3.1]) case versus 3 (2.9%; 95% CI [0.0-6.7]) patients, χ2=1.019; df=1; p=0.313.

The analysis of comorbidities reveals that the most common clinical conditions associated with obesity are chronic heart disease (hypertension, chronic coronary syndromes, and chronic heart failure), as well as metabolic diseases (type 2 diabetes mellitus, dyslipidemia), which can directly contribute to the development of community-acquired pneumonia, the onset of complications, and the final outcome.

We followed the dynamics of clinical and paraclinical data in the patients included in the study. According to the obtained data, patients in group 1 had a longer period from the onset of symptoms to hospitalization, estimated at 8.27±6.59 days, (95% CI [5.14-9.68]), compared to patients in group 2, where the period from the onset of the first signs of illness to hospitalization was 7.13±5.40 days, (95% CI [3.92-8.25]), F=7.00, p=0.009. Patients with community-acquired pneumonia and obesity had a longer average duration of hospitalization - 13.35±5.76 days, (95% CI (11.24-13.47]), compared with normal weight group, where the duration of hospitalization was 10.69±4.58 days, (95% CI [10.80-12.57]), F=3.860, p=0.045. Also, patients in the obese group had a longer period of antibacterial treatment (pre-hospitalization/hospitalization stage) - 14.10±5.56 days, (95% CI [13.03-15.18]), compared to the normal weight group, in which the duration of antibiotic therapy was 11.88±4.75 days, (95% CI [11.96-13.80]), F=2.957, p=0.047.

Moreover, 15 (14.3% CI 95% [7.9-21.2]) of the subjects in group 1 and 10 (9.5% CI 95% [4.2-15.6]) of the subjects in group 2 required transfer and treatment in intensive care units, χ2=1.135; df=1, p=0.287, and the average length of stay in intensive care units was longer for subjects with PC and obesity compared to those of normal weight and CAP - 3.9±2.90 days, (95% CI [1.65-5.75]) versus 2.1±0.54 days, (95% CI [1.01-2.94]), showing statistical significance between groups, F=5.276, p=0.023.

Against the background of treatment and care, the following evolution of pneumonia was observed during hospitalization: recovery – 25 (23.8% CI 95% [16.0-32.4]) and 35 (33.3% CI 95% [28.4-41.9]) patients, p=0.074, improvement – 76 (72.4% CI 95% [64.3-81.0]) and 68 (64.4% CI 95% [57.8-73.5]) patients, p=0.259, death – 4 (3.8% CI 95% [0.9-7.6]) and 2 (1.9% CI 95% [0.0-4.9]) patients, p=0.371, group 1 and group 2. Although not statistically significant, a higher recovery rate was observed in the normal weight group, as well as a double number of deaths in the group with obese patients.

Evaluating the complications recorded during hospitalization, we observed that the most frequent complication in both groups was acute respiratory failure, followed by acute respiratory distress syndrome, which were more frequently noted in obese patients (table 3.4.).

Table 3.4. **Community-acquired pneumonia complications recorded in the study groups**

Community-acquired pneumonia complications	Group 1 CAP/O		Group 2 CAP/N		P
	N	%	N	%	
Acute respiratory failure	91	86.7 %	70	66.5 %	**p<0.0001**
ARDS	17	16.2 %	6	5.7 %	**p=0.015**
Pulmonary thromboembolism	6	5.7 %	2	1.9 %	p=0.149
Pleural effusion	22	21.0 %	24	22.9 %	p=0.331
Abscess	1	1.0 %	-		p=0.316
Pneumomediastin	-	-	1	1.0 %	p=0.316
DIC syndrome/Sepsis/MODS	6	5.7 %	3	2.8 %	p=0.313
Shock	3	2.9 %	-		p=0.218
Antibiotic-associated colitis	2	1.9 %	5	4.8 %	p=0.249
Hipercatabolism	54	51.4 %	41	39.0 %	p=0.164
Acute kidney injury	2	1.9 %	4	3.8 %	p=0.407
Cardiogenic pulmonary edema	2	1.9 %	1	1.0 %	p=0.561
Pericardial effusion	-		1	1.0 %	p=0.314
Rhythm disorders (supraventricular arrhythmias)	6	5.7 %	5	4.7 %	p=0.643

Note: *ARDS – Acute Respiratory Distress Syndrome, DIC – Disseminated Intravascular Coagulation, MODS - Multiple Organ Dysfunction Syndrome.*

After obtaining comparative data on registered comorbidities, clinical and paraclinical evolution and complications of community-acquired pneumonia between groups, their correlational analysis was performed. The correlational analysis of obesity degrees with associated comorbidities demonstrated a strong positive correlation with the presence of type 2 diabetes mellitus (rs=0.775, p<0.0001), a moderate correlation with essential hypertension (rs=0.499, p<0.0001), chronic coronary syndromes (rs=0.506, p<0.0001) and dyslipidemia (rs=0.421, p=0.001), a weak correlation with chronic heart failure (rs=0.212, p=0.002).

Correlational analysis of obesity degrees demonstrated a positive strong correlation, which presented a significant value with clinical particularities, such as: persistence of dyspnea (rs=0.646, p<0.0001) and duration of oxygen therapy by mask (rs=646, p<0.0001), a moderate correlation with need for mechanical ventilation (rs=0.399, p=0.002) and need for non-invasive ventilation (rs=0.549, p<0.0001), duration of infectious signs (rs=0.263, p=0.018), duration of expectoration (rs=0.463, p=0.001), need for transfer to the intensive care unit (rs=0.390, p=0.001) and with rehospitalization in the first 30 days after discharge (rs=0.372, p=0.015). The degrees of obesity correlated with the complications that occurred, as follows: with acute respiratory failure (rs=0.593, p<0.0001), with ARDS (rs=0.464, p<0.0001), with shock (rs=0.301, p=0.004), sepsis (rs=0.416, p=0.001), disseminated intravascular coagulation syndrome (rs=0.416, p=0.001), pulmonary thromboembolism (rs=0.416, p=0.001) and rhythm disorders (rs=0.356, p=0.004).

3.4. Prooxidant and antioxidant markers in community-acquired pneumonia in obese patient

Another objective of the research was to evaluate oxidative stress markers in obese patients compared to normal weight patients with CAP. Prooxidant status parameters (AGE-pentosidine like, AGE-vesperlysines like, advanced oxidation protein products (AOPP), malonic dialdehyde, nitric oxide metabolites), as well as antioxidant status (total antioxidant capacity (CUPRAC), total antioxidant capacity (ABTS), thiol compounds, and catalase) were examined.

Table 3.5. **Prooxidant markers of oxidative stress**

Prooxidant markers (μM/L)	Group 1 (CAP/O)		Group 2 (CAP/N)		p
	Media	Standard deviation (±)	Media	Standard deviation (±)	
AGE-pentosidine like	577.92	322.62	485.82	251.05	**0.022**
AGE-vesperlysines like	737.98	354.17	725.51	600.12	0.855
AOPP	97.51	64.95	80.39	49.26	**0.033**
MDA	39.40	8.96	20.68	10.61	**0.046**
NO_2+NO_3	60.83	9.95	60.10	10.26	0.599
NO_2	45.24	8.31	44.65	7.12	0.585
NO_3	16.14	5.60	16.61	6.33	0.563
NO_2/NO_3	3.34	2.27	4.77	1.7	0.393

Note: *AGE-pentosidine like – advanced glycation end products pentosidin like, AGE-vesperlysines like – advanced glycation end products verperlisin like, OAPP – advanced oxidation protein products, MDA – malondialdehyde, NO_2 – nitrite, NO_3 – nitrate.*

Among the prooxidant markers, AGE-pentosidine like, AOPP and MDA presented more expressed values in patients with community-acquired pneumonia and obesity, compared to normal weight patients (table 3.5.). For the purpose of practical application and inclusion in the severe evolution of community-acquired pneumonia, the threshold values of AOPP for obese patients were determined, being ≥72.87 μM/L *(Innovator Certificate No. 6437 of January 20, 2026; Implementation Act No. 10).*

Based on the fact that oxidation reactions are counterbalanced by reduction reactions, the results of the antioxidant status of oxidative stress were estimated.

In the context of oxidative stress, the obtained data demonstrate the compensatory reaction of the body in conditions of obesity to protect itself from the action of prooxidant markers. First of all, this is explained by the compensatory increase in the

values of total SH-groups (table 3.6.), which are extremely reactive. These compounds are extremely dynamic and are rapidly activated even under conditions of minor oxidative stress.

Table 3.6. **Antioxidant markers of oxidative stress**

Antioxidant markers (μM/L)	Group 1 (CAP/O)		Group 2 (CAP/N)		p
	Media	Standard deviation (±)	Media	Standard deviation (±)	
TAC (ABTS)	128.04	19.52	124.52	20.13	0.201
TAC (CUPRAC)	29.14	12.69	26.33	10.93	0.606
SH-total groups	192.68	137.78	156.95	94.99	**0.030**
SH-thiol groups	7.21	3.67	6.84	3.41	0.448
Free SH-groups	148.0	81.97	131.44	68.24	0.112
Catalase	37.07	10.70	37.34	27.63	0.925

Notă: *TAC (ABTS) – Total Antioxidant Capacity (ABTS), Total Antioxidant Capacity (CUPRAC).*

In the next stage, we performed the correlation analysis between the degrees of obesity and the serum levels of prooxidant and antioxidant markers, as a result, we obtained a significant strong correlation with: AOPP level ($p<0.0001$, $rs=0.616$) and a moderate correlation with AGE-pentosidine like level ($p<0.0001$, $rs=0.503$), MDA level ($p=0.027$, $rs=0.439$), NO2+NO3 level ($p=0.007$, $rs=0.337$) and NO2 level ($p=0.001$, $rs=0.406$).

3.5. Anthropometric indices particularities and cardiometabolic risk in community-acquired pneumonia in obese patients

Based on the fact that obesity is an important component of metabolic risk and cardiometabolic syndrome, we aimed to analyze these aspects as well. Anthropometric indices were evaluated.

Body mass indices (kg/m^2) were 37.74±6.09 for group 1 and 23.57±1.31 for group 2, ($F=542.172$; $p<0.0001$). Neck circumference (cm) was 47.16±39.22 in the group with obese patients and CAP and 33.86±3.62 in the group with normal weight patients and CAP, showing statistical significance between groups ($F=11.976$; $p=0.001$). Arm circumference (cm) also showed statistical significance: in group 1 being 38.05±6.22 and in group 2 - 28.29±3.31, ($F=201.351$; $p<0.0001$).

Abdominal obesity was assessed according to the values of abdominal circumference (cm), which proved to be more expressed in the subjects in the study group – 117.17±13.70, compared to the subjects in control group – 85.90±7.82 ($F=412.482$; $p<0.0001$).

The waist/hip ratio was 1.07±0.09 for the patients in group 1 and 0.89±0.10 for the patients in group 2 of the study, which presented significant statistical significance between the groups (F=161.20; p<0.0001).

The waist/height ratio, which is an important predictor of cardiovascular morbidity and mortality, was significantly higher in the group with obese patients and CAP 1.44±0.59, compared to the group of patients with normal weight and CAP – 0.49±0.45, (F=11.710; p=0.001).

Correlation analysis of CAP severity in obese subjects with anthropometric index values demonstrated a strong correlation with waist/height ratio (rs=0.90, p<0.0001), BMI (rs=0.85, p<0.0001), body mass (rs=0.72, p<0.0001), arm circumference (rs=0.70, p<0.0001), abdominal circumference (rs=0.81, p<0.0001), waist/hip ratio (rs=0.66, p<0.0001) and skinfold thickness (rs=0.60, p<0.0001). According to these data, it can be concluded that anthropometric indices influence the severity of CAP.

Therefore, we also evaluated the lipidogram indices. The lipid profile examination reveals, although without statistical difference, that the average cholesterol value is more expressed and exceeds the reference limits in the group of obese subjects (5.89±2.83 mmol/l in group 1, compared to 5.04±2.02 mmol/l in group 2, F=1.127, p=0.290) and the average triglyceride value registered a statistical difference between the groups (group 1 – 3.32±1.75 mmol/l, compared to 1.29±0.58 mmol/l in group 2, F=1.408, p=0.002).

Table 3.7. **Estimating cardiovascular mortality risk in patients with obesity according to the SCORE2-OP score**

SCORE2-OP score	Group 1 (CAP/O) N=105		Group 2 (CAP/N) N=105		**p**
	N	%	N	%	
<1%	6	5.7%	12	11.4%	p=0.241
1-2%	3	2.9%	13	12.4%	p=0.270
3-4%	10	9.5%	14	46.8%	p=0.418
5-9%	18	17.1%	51	13.3%	**p=0.016**
10-14%	10	9.5%	5	4.8%	p=0.529
>15%	58	56.0%	10	9.5%	**p<0.0001**

Note: *<1% - risk of mortality over the next 10 years less than 1%; 1-2% - risk of mortality over the next 10 years between 1-2%; 3-4% - risk of mortality over the next 10 years between 3-4%; 5-9% - risk of mortality over the next 10 years between 5-9%; 10-14% - risk of mortality over the next 10 years between 10-14%; >15% - risk of mortality over the next 10 years greater than 15%*

Following, we assessed cardiometabolic risk, which was estimated according to the SCORE/SCORE-2 and SCORE-2 OP scores. According to the data in table 3.7.,

we can state that obese patients tend to develop cardiovascular diseases more frequently with a potential mortality risk of >15% estimated in the next 10 years, compared to those with normal body mass, presenting a higher cardiometabolic risk.

The presence of metabolic syndrome was recorded more frequently in patients with CAP and obesity, compared to those of normal weight: 102 (97.1%) versus 27 (25.7%), (χ2=15.103; df=6; p=0.016). This explains the association of multiple comorbidities, especially cardiovascular, in the group of obese patients.

Cardiometabolic risk (assessed according to the SCORE2-OP score) demonstrated a statistically moderate correlation with: the severity of community-acquired pneumonia (rs=0.440, p=0.001), the presence of acute respiratory failure (rs=0.470, p<0.0001), the need for mechanical ventilation (rs=0.338, p=0.015) and the state of hypercatabolism (rs=0.324, p<0.0001). The degree of obesity showed a significant strong correlation with the presence of cardiometabolic risk (rs=0.650, p<0.0001). These results, together with statistically significant positive correlations obtained regarding anthropometric indices, confirm the importance of evaluating anthropometric data and cardiometabolic risk in patients with community-acquired pneumonia.

3.6. Assessment of community-acquired pneumonia severity scores according to the presence of obesity

The assessment of the severity of community-acquired pneumonia was estimated according to severity scores, such as: CURB-65, DS-CRB-65, SMART-COP and PSI (PORT), the assessment of the inflammatory response was performed according to the SIRS score.

Table 3.8. **Severity and inflammatory response assessment scores in CAP**

Score	Group 1 (CAP/O) N=105			Group 2 (CAP/N) N=105			F	P
	Media Standard deviation (±)	Median IQR	CI 95%	Media Standard deviation (±)	Median IQR	CI 95%		
CURB-65	1.69±1.09	2.0 IQR 2	1.22-1.74	1.28±1.07	1.0 IQR 2	1.07-1.48	1.028	0.312
DS-CRB-65	2.2±1.44	2.0 IQR 2	1.70-2.26	1.41±1.26	1.0 IQR 2	1.36-1.84	4.136	**0.043**
SMART-COP	1.89±1.76	2.0 IQR 2	1.14-1.93	0.90±0.37	1.0 IQR 1	0.63-1.16	7.321	**0.048**
PORT	40.43±30.0	30.0 IQR 55	33.45-47.41	24.20±19.2	20.0 IQR 40	18.55-29.85	12.844	**0.037**
SIRS	2.43±1.14	2.0 IQR 1	2.21-2.65	1.49±1.11	1.0 IQR 1	1.29-1.72	35.040	**0.050**

According to the average score obtained (table 3.8.), the severity scores, except CURB-65 score, presented a statistically significant difference in subjects with obesity

and CAP. This allows us to conclude that obese patients have a higher risk of developing severe CAP and an increased risk of mechanical ventilation. The analysis of the sensitivity and specificity of the severity and mortality prognostic scores estimated a good diagnostic discriminative value for the scores: DS-CRB-65 – $AUC_{0.829}$, SMART-COP - $AUC_{0.896}$ and PSI-PORT - $AUC_{0.810}$.

Of all the scores analyzed, we determined the highest diagnostic accuracy for the DS-CRB-65 score, the other scores (CURB-65, SMART-COP, PSI-PORT) having a high sensitivity and low specificity.

3.7. Method for assessing the risk of developing severe community-acquired pneumonia in obese patients

Based on the fact that oxidative stress parameters positively correlate with obesity levels in obese patients, we attempted to develop a method for assessing the severity of community-acquired pneumonia in obese patients, using oxidative stress markers. Therefore, we have developed the method for assessing the risk of developing severe community-acquired pneumonia in obese patients (*Innovator Certificate No. 6271 of 29.07.2024, Implementing Act No. 112).* The innovation refers to the use in the clinical activity of internal medicine physicians, intensive care physicians, pulmonologists, endocrinologists, emergency physicians and family physicians of the adjusted formula, which includes the parameters of the clinical examination and which will directly contribute to the stratification of obese patients at increased risk of developing severe community-acquired pneumonia.

Table 3.9. **Variables of the formula for calculating the risk of severe CAP progression**

Variable	Coefficient (β)	ES	Wald (χ^2) Criterion	P
Peripheral blood saturation, $SpO_2 < 92\%$	-0.073	0.007	-11.137	**0.000**
Abdominal circumference (cm): Men ≥ 102 cm Women ≥ 88 cm	0.005	0.002	2.200	**0.003**
Advanced oxidation protein products, µM/l	-0.001	0.000	-1.189	0.237
SH total groups, µM/l	0.000	0.000	-1.042	0.300
Constant	7.491	0.682	10.985	0.000

The result of the logistic regression analysis is the calculation of the coefficients b1, b2... from equation (1): $y=b_0+b_1X_1+b_2X_2+...+biXi$, where $X_1...Xi$ – independent prognostic variables.

The value y in the regression equation is the natural logarithm of the odds ratio for the event under study.

In the case of the presence of all statistically significant prognostic variables, we obtain the following equation:

$$\mathbf{Y = 7{,}491 + (-0{,}073 \times X_1) + (0{,}005 \times X_2)}, \quad (1)$$

where X_1 represents peripheral blood saturation (SpO_2); X_1 is equal to 1 if SpO_2 <92%, X_1 is equal to 0 if SpO_2 >92%;

where X_2 represents the abdominal circumference measured in centimeters, X_2 is equal to 1 if the abdominal circumference in men ≥102 cm and in women ≥ 88 cm, X_2 is equal to 0 if the abdominal circumference in men <102 cm and in women < 88 cm.

Therefore, if X_1 is equal to 1 and X_2 is equal to 1, equation 2 allows us to calculate the value of Y:

$$Y = 7{,}491 + (-0{,}073 \times 1) + (0{,}005 \times 1) = 7{,}422$$

To calculate the probability of the event (severe evolution of community-acquired pneumonia in obese people), we apply formula (2):

$$P = \frac{e^y}{1+e^y}, \; e - \text{mathematical constant} = 2{,}72 \quad (2)$$

The Y value we obtained (equal to 7.422), we enter into formula 2 to calculate the probability of the event:

$$P = \frac{2{,}72^{7{,}422}}{1 + 2{,}72^{7{,}422}} = 0{,}997$$

The probability of severe community-acquired pneumonia in obese patients is equal to 0.997 or 99.7%.

Explanation: In a patient with the risk factors included in the formula calculation, the chance of developing severe community-acquired pneumonia is 99.7%.

Aim of the innovation: To identify and assess the risk of severe community-acquired pneumonia in obese patients.

Result of the innovation: The result consists of stratifying the risk of developing severe community-acquired pneumonia among obese patients.

Effect of innovation: The importance of the proposed method lies in the early detection, even from the first day of hospitalization of the risk (%) of developing severe community-acquired pneumonia in obese patients with the aim of providing appropriate treatment.

GENERAL CONCLUSIONS

1. Community-acquired pneumonia in obese patients more frequently presents an onset dominated by dyspnea, tachypnea, multilobar/bilateral clinical-radiological lung involvement, the degree of obesity having a positive correlation with the duration of infectious signs and the duration of dyspnea. Obesity significantly contributes to a more expressed systemic inflammatory response (C-reactive protein) and tissue injury (lactate dehydrogenase, ferritin), correlating with the extension of the pneumonic infiltrate and hypercapnia.
2. The comorbidities that registered statistical significance between the groups were chronic cardiometabolic diseases. The degree of obesity influences the complications of community-acquired pneumonia, reflected by direct positive

correlations with acute respiratory failure, acute respiratory distress syndrome, shock, sepsis, disseminated intravascular coagulation syndrome and pulmonary thromboembolism. Patients with community-acquired pneumonia and obesity required more frequent transfer to the intensive care unit and rehospitalization in the first 30 days after discharge, had a longer average duration of hospitalization and non-invasive ventilation.

3. Oxidative stress in community-acquired pneumonia in obese individuals involves more pronounced peroxidation of lipids, proteins, and carbohydrates compared to normal weight patients. The degree of obesity having a positive correlation with malonic dialdehyde values, advanced oxidation protein products, and advanced glycation end products similar to pentosidine. The severe progression of community-acquired pneumonia in obese patients is reflected in increased protein peroxidation (advanced oxidation protein products) and carbohydrate peroxidation (advanced glycation end products similar to pentosidine). At the same time, the increased activity of the prooxidant system contributes to the compensatory activation of antioxidant mechanisms, expressed by increased serum levels of total thiol groups.
4. From an anthropometric aspects, obesity has a significant impact on the severity of community-acquired pneumonia. The severity of pneumonia in obese individuals correlates positively with: waist-to-height ratio, waist-to-hip ratio, body mass index, and abdominal circumference. A cardiometabolic risk (cardiovascular mortality over the next 10 years) greater than 15% is found in more than half of obese patients, and the degree of cardiometabolic risk correlates positively with the severity of community-acquired pneumonia, the development of acute respiratory failure, need for non-invasive ventilation, and hypercatabolism.
5. Of all the community-acquired pneumonia severity scores analyzed, the highest diagnostic accuracy was determined for the DS-CRB-65 score. The other scores (CURB-65, SMART-COP, PSI-PORT) having high sensitivity and low specificity. In the context of the study, a formula was developed that allows the prediction (with a probability of 99.7%,) of severe community-acquired pneumonia in obese patients, enabling optimal therapeutic management, hospitalization/transfer to intensive care and avoid unfavorable clinical outcomes.

PRACTICAL RECOMMENDATIONS

1. At the primary care stage, it is recommended to determine the body mass index, abdominal circumference, waist-to-hip ratio, and cardiometabolic risk in all patients with CAP, given that these indices correlate positively with the severity of community-acquired pneumonia.
2. In pre-hospital medical institutions, as well as in hospitals, in the departments of Internal Medicine, Pulmonology and Intensive Care Unit it is recommended to use the method of assessing the risk of developing severe community-acquired pneumonia, approved in the study, in all obese patients.

3. At the hospital stage it is recommended to measure prooxidant markers: AGE-pentosidine like. For practical application and severe community-acquired pneumonia stratification, is recommended the determination of threshold values for AGE-pentosidine like: for obese patients being ≥506,58 μM/L.
4. Also, at the hospital stage, it is recommended to measure advanced oxidation protein products level. For practical application and severe community-acquired pneumonia stratification, is recommended the determination of threshold values: for obese patients being ≥72,87 μM/L.

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32. **Fetco-Mereuță D.** Severe community-acquired pneumonia: clinical manifestations in obese patients. Oral Presentation in Internal Medicine Section, The 8th International Medical Congress for Students and Young Doctors, MedEspera. September 25, 2020, Chisinau, Moldova .
33. **Fetco-Mereuță D.** Influența obezității asupra manifestărilor clinice și a severității pneumoniei comunitare. Prezentare Orală în Secțiuni pe profil tematic - Probleme Actuale ale Medicinei Interne, în cadrul Congresului consacrat aniversării a 75-a de la fondarea USMF „Nicolae Testemițanu”, 21-22 octombrie, 2020, Chișinău, Moldova.
34. **Fetco-Mereuță D.** Particularitățile pneumoniei comunitare la pacienții vârstnici cu obezitate. Prezentare orală în cadrul I-ul Congres Național De Geriatrie Și Gerontologie Din Republica Moldova cu Participare Internațională. 23-24 septembrie 2021, Chișinău, Moldova.
35. Cașcaval V., **Fetco-Mereuță D.,** Grib L., Pantea V., Andronache L., Dumitraș G. Comparația parametrilor stresului oxidativ la pacienții cu pneumonie comunitară în dependență de severitatea insuficienței cardiace. Prezentare orală

în cadrul Conferinței științifice anuale, USMF„N. Testemițanu” „Cercetarea în Biomedicină și Sănătate: Calitate, Excelență și Performanță”. 19-21 octombrie, 2022. Chișinău, Moldova.

36. **Fetco-Mereuță D.** Parametrii stresului oxidativ în pneumoniile comunitare la pacienții obezi. Prezentare orală în cadrul Conferinței științifice anuale, USMF„N. Testemițanu” „Cercetarea în Biomedicină și Sănătate: Calitate, Excelență și Performanță”. 18-20 octombrie, 2023. Chișinău, Moldova.
37. **Fetco-Mereuță D.** Abordarea miltidimensională a pneumoniei comunitare la obezi. Prezentare orală în cadrul Congresului De Medicină Internă din Republica Moldova Cu Participare Internațională, ediția IV, 13-14 septembrie, 2024. Chișinău, Moldova.
38. **Fetco-Mereuță D.** Pneumoniile comunitare la obezi: corelații clinico-paraclinice**.** Comunicare orala. Primul Congres Național de Pneumologie din Moldova. 14-16 Noiembrie, 2025.

- ✓ **Participation with posters at scientific conferences:**
- ✓ **International/national**

39. **Fetco-Mereuță D.** Pneumonia cauzată de SARS-CoV-2 asociată obezității: evoluție și consecințe. Prezentare de poster în cadrul Conferinței de pneumologie INSPIR. 08-11 iunie, 2021. Iași, România.
40. Dumitraș T., **Fetco-Mereuță D.** Antioxidative stress markers in obese patients with community-acquired pneumonia. Prezentare de poster în cadrul celui de al 32-lea Congres al Societățiii Europene de Respirologie, 4-6 septembrie, 2022. Spania, Barcelona.
41. Dumitras T., **Fetco-Mereuta D.,** Capros N., Chihai V., Terna E., Matcovschi S., Cascaval V. Assessment of oxidative stress markers in obese patients with community-acquired pneumonia. 6th International Conference on Nanotechnologies and Biomedical Engineering, 20-23 septembrie, 2023. Chișinău, Moldova.
42. Calancea V., Cascaval V, Calancea E., Matcovschi S., Dumitras M., **Fetco-Mereuta D.,** Dumitras T. Oxidative and antioxidative stress markers in community-acquired pneumonia associated with chronic heart failure. Poster. ERS Congress. September, 2025. Amsterdam.
43. Cașcaval V., Dumitraș T., Grib L., Matcovschi S., **Fetco-Mereuță D.** „Metoda de apreciere a riscului evolutiei severe a pneumoniilor comunitare la pacientii cu insuficienta cardiacă”. Expoziția EuroInvent Iasi. 8-10 Mai 2025.
44. **Fetco-Mereuță D.,** Dumitraș T., Grib L., Matcovschi S., Cascaval V. Metodă de apreciere a riscului evolutiei pneumoniei comunitare la pacienții obezi. Ediția a 4-a a Expoziției Internaționale de Inovație și Transfer Tehnologic EXCELLENT IDEA. 11-12 septembrie 2025.

ADNOTARE

Fetco-Mereuță Diana „Considerații clinico-evolutive și diagnostice ale pneumoniei comunitare la pacienții obezi”

Teză de doctor în științe medicale, 321.01 Boli interne (Pulmonologie), Chișinău, 2026

Structura tezei: teza este expusă pe 120 pagini text de bază ce include 4 capitole și concluzii generale, recomandări practice, 277 surse bibliografice, 20 tabele, 21 figuri, 12 anexe, 2 certificate de inovator, 2 acte de implementare, informație privind valorificarea rezultatelor și declarația privind asumarea răspunderii. Rezultatele obținute au fost publicate în 26 lucrări științifice (11 articole și 15 rezumate în reviste naționale și internaționale), iar rezultatele au fost prezentate la 15 conferințe naționale și internaționale.

Cuvinte cheie: pneumonie comunitară, obezitate, stres oxidativ, evoluție clinică, comorbidități, scoruri de severitate.

Domeniul de studiu: Boli interne, Pulmonologie.

Scopul studiului: Evidențierea particularităților clinico-paraclinice, evolutive și ale stresului oxidativ în cadrul pneumoniei comunitare la pacienții obezi.

Obiectivele studiului: Determinarea particularităților clinico-paraclinice ale pneumoniei comunitare la pacienții cu obezitate; estimarea comorbidităților asociate, particularităților evolutive și complicațiilor pneumoniei comunitare la pacienții obezi; aprecierea markerilor statutului prooxidant și antioxidant în cadrul pneumoniei comunitare la obezi; corelarea particularităților antropometrice cu severitatea pneumoniilor comunitare și aprecierea riscului cardiometabolic la pacienții obezi; evaluarea scorurilor de apreciere a severității pneumoniei comunitare (CURB-65, PORT/PSI, DS-CRB-65, SIRS, CAP-PIRO) în conformitate cu prezența obezității și elaborarea metodei de apreciere a riscului evoluției severe a pneumoniei comunitare la obezi.

Noutatea și originalitatea științifică: S-a evaluat influența obezității asupra persistenței unor simptome și semne clinice ale pneumoniei, asupra duratei de spitalizare, necesității de transfer în secția de terapie intensivă și a ventilației mecanice. Au fost puse în evidență particularitățile stresului oxidativ în pneumonia comunitară la pacienții cu obezitate.

Problema științifică soluționată în teză: Rezultatele cercetării au permis elaborarea unei formule de calcul pentru aprecierea riscului dezvoltării formei severe de pneumonie comunitară la pacienții cu obezitate, care va permite diagnosticarea precoce a evoluției severe a pneumoniei și transfer în timp oportun în secția terapie intensivă pentru minimalizarea complicațiilor posibile.

Semnificația teoretică a cercetării: Pacienții cu pneumonie comunitară pe fundal de obezitate necesită o abordare terapeutică mai detaliată, reieșind din durata mai lungă de spitalizare, rata mai frecventă de instalare a insuficienței respiratorii acute, necesitatea mai frecventă de transfer în terapie intensivă și a ventilației mecanice. Se confirmă statutul proinflamator și prooxidativ mai avansat pe măsura creșterii indicelui masei corporale.

Valoarea aplicativă a temei. Comparativ cu alte scoruri existente de apreciere a severității pneumoniei comunitare, scorul DS-CRB-65 a demonstrat cea mai înaltă sensibilitate și specificitate. Au fost stabilite valorile prag ale markerilor prooxidanți ai stresului oxidativ pentru diagnosticarea evoluției severe a pneumoniei comunitare.

Implementarea rezultatelor științifice: Recomandările metodice au fost utilizate în secțiile Pneumologie, Terapie generală și Terapie Intensivă ale Spitalului Clinic Municipal „Sfânta Treime” și în procesul didactic de pregătire a cadrelor medicale la Disciplina de sinteze clinice, Departamentul Medicină Internă, IP Universitatea de Stat de Medicină și Farmacie „Nicolae Testemițanu”.

SUMMARY

Fetco-Mereuță Diana „Clinical, evolutive and diagnostical considerations of community-acquired pneumonia in obese patients”

PhD thesis in medical sciences, 321.01 Intenal Medicine (Pulmonology), Chisinau, 2026

Thesis structure: the thesis is presented on 120 pages of basic text, including 4 chapters and general conclusions, practical recommendations, 277 bibliographic sources, 20 tables, 21 figures, 12 annexes, 2 innovator's certificates, 2 implementation acts, information of results publication and a statement on assuming responsibility. The results obtained are published in 26 scientific papers (11 articles, 15 abstracts in national and international journals) and the results were presented at 15 national and international conferences.

Keywords: community-acquired pneumonia, obesity, oxidative stress, clinical course, comorbidities, severity scores.

Field of study: Internal Medicine, Pulmonology.

Aim of the study: Highlighting the clinical and paraclinical course and oxidative stress characteristics of community-acquired pneumonia in obese patients.

Study objectives: determining clinical and paraclinical characteristics of community-acquired pneumonia in obese patients; estimation of the associated comorbidities, clinical course and complications of community-acquired pneumonia in obese patients; assessment of prooxidant and antioxidant status markers in community-acquired pneumonia in obese; correlation of anthropometric features with community-acquired pneumonia severity and cardiometabolic risk assessment in obese patients; community-acquired pneumonia severity assessment scores (CURB-65, PORT/PSI, DS-CRB-65, SIRS, CAP-PIRO) according to the presence of obesity and elaboration a method for assessing the risk of developing severe community-acquired pneumonia in obese patients.

Scientific novelty and originality of the research: The impact of obesity on the persistence of clinical symptoms and signs of pneumonia, on the duration of hospitalization, the need for transfer to the intensive care unit and the need for mechanical ventilation was evaluated. The particularities of oxidative stress in community-acquired pneumonia in obese patients were highlighted.

Scientific solved problem: The research results allowed the development of a calculation formula for assessing the risk of developing severe community-acquired pneumonia in obese patients, which will allow early diagnosis of severe pneumonia and timely transfer to the intensive care unit to minimize possible complications.

Theoritical significance: Patients with community-acquired pneumonia and obesity require a more detailed therapeutic approach, given the longer hospital stay, higher rate of acute respiratory failure, more frequent need for transfer to intensive care, and need for mechanical ventilation. The more advanced proinflammatory and prooxidative status is confirmed as the body mass index increases.

The applicative value of the thesis: Compared to other existing community-acquired pneumonia assessment severity scores, the DS-CRB-65 score demonstrated the highest sensitivity and specificity. Threshold values for prooxidative markers of oxidative stress were established for the diagnosis of severe community-acquired pneumonia.

Implementation of scientific results: The methodical recommendations were used in the Pulmonology Department, Internal Medicine Department and Intensive Care Department of the „Holy Trinity" Municipal Clinical Hospital, as well as in the didactic process at the Discipline of Clinical Synthesis, Department of Internal Medicine, „Nicolae Testemitanu" State University of Medicine and Pharmacy.

АННОТАЦИЯ

Фетко-Мереуцэ Диана „ Клинические, эволюционные и диагностические аспекты внебольничной пневмонии у пациентов с ожирением”

Диссертация на соискание ученой степени доктора медицинских наук, специальности 321.01 Внутренние болезни (Пульмонология), Кишинэу, 2026

Структура диссертации: диссертация изложена на 120 страницах основного текста, включающей 4 главы и общие выводы, практические рекомендации, библиографический список из 277 источников, 20 таблиц, 21 рисунков, 12 приложений, 2 сертификата новатора, 2 акта о внедрении инновации, сведения о публикации результатов и декларация ответственности. Полученные результаты были опубликованы в 26 научных статьях (11 статей и 15 тезисов в национальных и международных журналах), а также представлены на 15 национальных и международных конференциях.

Ключевые слова: внебольничная пневмония, ожирение, оксидативный стресс, клиническое течение, коморбидности, шкалы степени тяжести.

Область исследования: Внутренние болезни, Пульмонология.

Цель исследования: Выявление клинико-параклинических, особенностей течения и окислительного стресса при внебольничной пневмонии у пациентов с ожирением.

Задачи исследования: определение клинико-параклинических особенностей внебольничной пневмонии у больных ожирением; оценка сопутствующих заболеваний, особенностей течения и осложнений внебольничной пневмонии у пациентов с ожирением; оценка маркеров прооксидантного и антиоксидантного статуса при внебольничной пневмонии у лиц с ожирением; корреляция антропометрических характеристик с тяжестью внебольничной пневмонии и оценка кардиометаболического риска у больных ожирением; оценка шкал тяжести внебольничной пневмонии (CURB-65, PORT/PSI, DS-CRB-65, SIRS, CAP-PIRO) в зависимости от наличия ожирения и разработка метода для определения риска развития тяжелой внебольничной пневмонии у лиц с ожирением.

Научная новизна и оригинальность: Было оценено влияние ожирения на персистенцию некоторых симптомов и клинических признаков пневмонии, на продолжительность госпитализации, необходимость перевода в отделение интенсивной терапии и необходимость искусственной вентиляции легких. Были выявлены особенности окислительного стресса при внебольничной пневмонии у пациентов с ожирением.

Научная задача, решаемая в диссертации: Результаты исследования позволили разработать формулу расчета для оценки риска развития тяжелой формы внебольничной пневмонии у пациентов с ожирением, что позволит своевременно диагностировать тяжелое течение пневмонии и своевременно перевести пациента в отделение интенсивной терапии для минимизации возможных осложнений.

Теоретическая значимость исследования: Пациенты с внебольничной пневмонией на фоне ожирения требуют более тщательного терапевтического подхода, исходя из более длительной госпитализации, более частого развития острой дыхательной недостаточности, более частой необходимости перевода в отделение интенсивной терапии и необходимости искусственной вентиляции легких. Подтверждается более выраженный провоспалительный и прооксидативный статус, пропорциональный увеличению индекса массы тела.

Практическая значимость исследования: По сравнению с другими существующими шкалами оценки тяжести внебольничной пневмонией, шкала DS-CRB-65 продемонстрировала наибольшую чувствительность и специфичность. Были установлены пороговые значения прооксидантных маркеров окислительного стресса для диагностики тяжелого течения внебольничной пневмонии.

Внедрение научных результатов: Методические рекомендации были использованы в отделениях Пулъмонология, Общей терапии и Интенсивной терапии, Муниципальной Клинической Больницы „Сфынта Треиме”, а также в процессе подготовки медицинских кадров по дисциплине Клинический синтез, Департамента Внутренней Медицины, Государственного Университета Медицины и Фармации имени „Николае Тестемицану”.

FETCO-MEREUȚĂ Diana

CLINICAL, EVOLUTIVE AND DIAGNOSTIC CONSIDERATIONS OF COMMUNITY-ACQUIRED PNEUMONIA IN OBESE PATIENTS

321.01 Internal Medicine (Pneumology)

Summary of the doctoral thesis in medical sciences

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