ABSTRACT

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CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF LONG-COVID DEVELOPMENT PATTERNS IN PATIENTS OF DIFFERENT AGE GROUPS

The **aim** of the study was to clarify patterns of Long-COVID development after coronavirus disease.

Materials and methods. A questionnaire and examination of people with COVID-19 and analysis of medical records were conducted. Taking into account the inclusion and exclusion criteria, 77 women and men who had suffered from coronavirus disease were included in the study group. The questionnaire included questions about age, gender, chronic diseases before the onset of coronavirus disease, vaccination status, complaints and general condition after the disease, medication, smoking, and the subjects' assessment of changes in physical endurance and overall quality of life after coronavirus disease. The comparison group consisted of practically healthy people of the appropriate age.

Results. In the period up to 3 months after the coronavirus disease, complaints were mainly from people aged 31-40 years, but with increasing time, older patients (51–60 years) began to predominate. The main groups of complaints (general, respiratory, neuropsychiatric, cardiovascular) were presented by subjects who were mostly vaccinated, with the overall vaccination rate among them exceeding 80%. Diseases of the cardiovascular system were mainly recorded in women aged 51–60 years, regardless of the duration of coronavirus disease.

Decreased physical endurance and a general decline in the quality of life according to subjective assessment were observed mainly in women aged 40 to 60 years, with the proportion of vaccinated women being 81.3%. At the same time, the level of smoking among the above groups of subjects was low.

Conclusions. The majority of people who reported complaints after coronavirus disease were women. The most common complaints were weakness (46.8%), anxiety (44.2%), mood disorders (41.6%), headache (28.6%), shortness of breath (23.4%), palpitations at rest (23.4%), and

dizziness (16.7%). At the same time, there was a smaller proportion of those who reported cognitive impairment (impaired concentration and attention – 7.8%, memory impairment – 14.3%), gastrointestinal disorders (13.0%), and muscle pain (13.0%). The majority were vaccinated (80.0%), and the percentage of smokers was low (18.5%).

Keywords: Long-COVID, cardiovascular disease, clinic, epidemiology, good health.

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КЛІНІКО-ЕПІДЕМІОЛОГІЧНА ХАРАКТЕРИСТИКА ЗАКОНОМІРНОСТЕЙ РОЗВИТКУ LONG-COVID У ПАЦІЄНТІВ РІЗНИХ ВІКОВИХ КАТЕГОРІЙ

Мета дослідження – встановлення клініко-епідеміологічних закономірностей розвитку Long-COVID після перенесеної коронавірусної хвороби.

Матеріали і методи. Здійснено анкетування та огляд осіб, що перехворіли на COVID-19 та аналіз медичної документації. З урахуванням критеріїв включення та виключення були залучені до групи дослідження 77 жінок та чоловіків, які перенесли коронавірусну хворобу. Анкета-опитувальник містила питання щодо віку, статі, наявності хронічних захворювань до початку коронавірусної хвороби, статус щеплення, наявність скарг та загальний стан після перенесеного захворювання, приймання препаратів, відношення до паління, оцінка досліджуваним зміни фізичної витривалості та загальної якості життя після перенесеної коронавірусної хвороби. Групу порівняння склали практично здорові люди відповідного віку.

Результати. У період після перенесеної коронавірусної хвороби до 3 місяців, скарги надавали переважно особи 31–40 років, але із збільшенням часу починали переважати пацієнти більш старшого віку (51–60 років). Основні групи скарг (загальні, респіраторні, нервово-психічні, кардіоваскулярні) надавали досліджувані, які, переважно, були вакциновані, при цьому загальний рівень вакцинованих серед них перевищував 80 %. Хвороби серцево – судинної системи переважно фіксувались у жінок віком 51–60 років незалежно від терміну перенесеної коронавірусної хвороби.

Зниження фізичної витривалості та загальне зниження якості життя за суб'єктивною оцінкою спостерігалось переважно у жінок віком від 40 до 60 років, частка вакцинованих серед них складала 81,3 %. При цьому, рівень тих, хто палить, серед вищезгаданих груп досліджуваних був низьким.

Висновки. Серед осіб, які надавали скарги після перенесеної коронавірусної хвороби, більшість складали жінки. Переважали скарги на слабкість (46,8 %), тривогу (44,2 %), погіршення настрою (41,6 %), головний біль (28,6 %), задишку (23,4 %), відчуття серцебиття у спокої (23,4 %), запаморочення (16,7 %). Водночас, спостерігалася менша частка тих, хто відмічає когнітивні порушення (порушення концентрації та уваги – 7,8 %, погіршення пам'яті – 14,3 %), шлунково - кишкові розлади (13,0 %) та болі у м'язах (13,0 %). Більшість були вакциновані (80,0 %), а відсоток тих, хто палили, був низьким (18,5 %).

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INTRODUCTION / ВСТУП

The coronavirus disease caused by SARS-CoV2, or COVID-19, has had negative economic consequences around the world. According to the European Commission, the impact of Long-COVID was expected to reduce production in the EU by 0.1-0.2% in 2021 and 0.2-0.3% in 2022 [1]. According to the analysis of financial losses of the German economy, healthcare and pension systems in 2021-2022, production losses amounted to EUR 3.4 billion. The gross loss in value added amounted to EUR 5.7 billion [2]. Studies conducted in the United States also show a significant burden on the healthcare system and economic burden due to post-COVID-19 conditions among US citizens at high risk of severe COVID-19 [3]. These negative phenomena are associated with a decrease in work capacity due to a prolonged systemic inflammatory response and the complications that result from it [4]. According to the definition recommended by the WHO, Long-COVID (or Post-COVID) is "a condition occurs in individuals with a history of probable or confirmed SARS CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms and that last for at least 2 months and cannot be explained by an alternative diagnosis" [5]. According to a number of studies, such symptoms include respiratory and cardiovascular, neuropsychiatric and cognitive disorders, and general clinical symptoms. Among others, weakness usually prevails, which is observed in 64.1-70.6%, difficulty in concentration ("brain fog") - 8.9-59.5%, respiratory symptoms (cough - 14.0-46.2% and shortness of breath - 24.1-40.2%), neuropsychiatric symptoms (mood deterioration and depression - 8.2-36.5% or anxiety and irritability - 4.1-36.3%). Changes in the perception of smell and taste (17.0-25.5%) and cardiovascular symptoms (palpitations, 24.7-62.0%) were observed somewhat less frequently. The aforementioned complaints are mainly reported by women [6-13]. The development of complications after COVID-19, such as diabetes mellitus, increases the risk of cardiovascular disease, in particular, coronary heart disease [14, 15].

The relatively large difference between the results creates the need for further study of the prevalence of the above symptoms among recovering patients after coronavirus disease.

The aim of the study is to establish clinical and epidemiological patterns of Long-COVID development after coronavirus disease.

Materials and methods

A survey and examination of 112 people who suffered from COVID-19 during the year and were treated at the St. Panteleimon Clinical Hospital and the University Clinic of Sumy State University were conducted, and the outpatient records of these patients were analyzed.

The questionnaire contained questions about age, gender, presence of chronic diseases before the onset of coronavirus disease, vaccination status against COVID-19, complaints and general condition after the disease, medication, smoking, and the subject's assessment of changes in physical endurance and overall quality of life after coronavirus disease. Taking into account the inclusion and exclusion criteria, 77 patients were included in the study group.

The comparison group included 68 people who are declarants of family doctors at the University Clinic of Sumy State University or who have undergone a medical examination there.

This study was conducted in accordance with the Declaration of Helsinki. Before participating in this study, each participant gave written informed consent to participate.

Criteria: involvement - anamnestic (presence of coronavirus disease in the last year); laboratory (confirmation of the case of coronavirus disease using PCR), removal - clinical and anamnestic (presence of blood diseases or coagulation disorders in the history that were associated with other causes, use of drugs that affect the coagulation function of the blood, the presence of acute diseases); laboratory (changes in clinical blood test that indicate an acute disease - leukocytosis, a significant shift in the leukocyte formula, acceleration of ESR).

The Shapiro-Wilk method was used to test the normality of the distribution of the study groups, comparison and comparability. The critical level of significance for testing statistical hypotheses in this study was 0.05. The Stata/SE 18 software package, which is licensed for use at Sumy State University, was used for statistical calculations.

Results

The average age of the subjects was 45.0 (34.8 - 52.0) years. There were 1.2 times more women than men (54.5% and 45.5%, respectively). The average age of people in the comparison group was 42.0 (34.0 - 50.0) years, and women also predominated among them (1.2 times more than men, 54.4% and 45.6%, respectively). The groups were comparable.

The age distribution in the groups was dominated by people aged 41 to 60. The main group was slightly dominated by convalescents aged 51 to 60 years (1.4 times), while in the comparison group, on the contrary, the age group 41 to 50 years prevailed (1.2 times). The proportion of subjects and comparison group members aged 20 to 40 was the same (see Fig. 1).
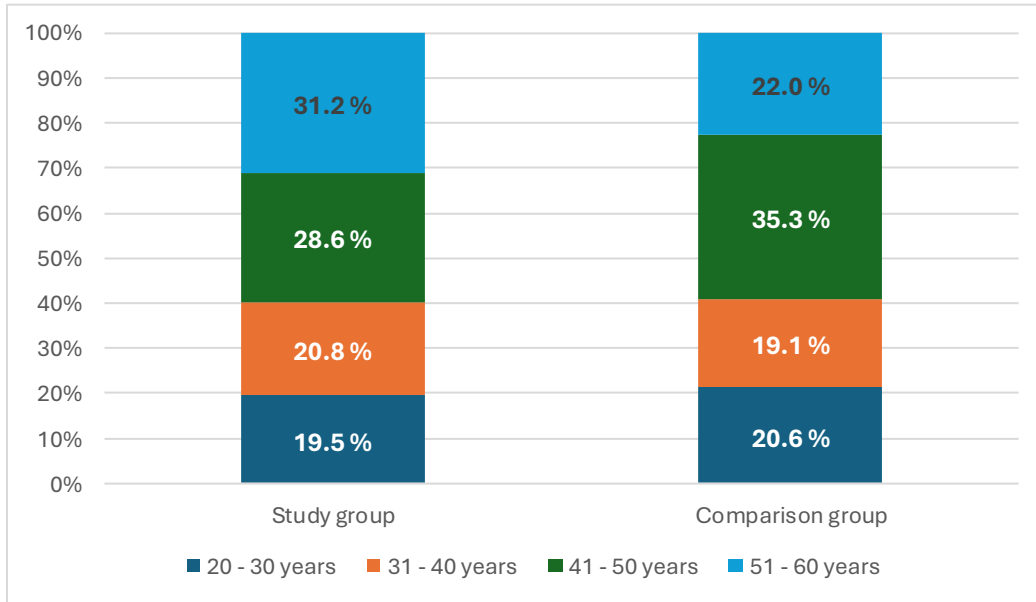

Figure 1. Distribution of people in groups by age

Given that the comparison group consisted of practically healthy people who did not have coronavirus disease and did not report complaints, no comparison was made between the groups of the number and structure of complaints, morbidity, physical tolerance, and quality of life assessment, but the data from this group were used in further research.

Figure 2. Distribution of subjects by the duration of COVID-19 disease

The subjects were divided into 4 subgroups according to the duration of the coronavirus disease: up to 3 months (subgroup A), 3-6 months (B), 6-12 months (C), 12 months and more (D). Subgroup B prevailed - 50 people, the number of other subgroups: A - 13, C - 6, D - 8 (see Fig. 2).
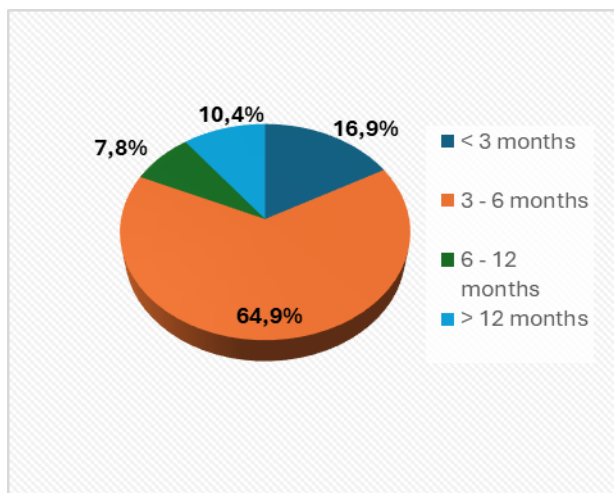
Prior to the onset of the disease, 22 (28.6% of the total) of the study group were diagnosed with a chronic disease, including 4 (18.2%) with coronary heart disease; 11 (50.0%) had other conditions (2 cases of type 2 diabetes mellitus, 2 cases of hypertension, 2 cases of chronic gastroduodenitis, 1 case of rheumatoid arthritis, 1 case of urolithiasis, and 1 case of cerebrovascular disease); 6 (27.3%) were registered with a neurologist for spinal osteochondrosis; 9 (40.9%) had an episode of loss of consciousness.

Among the study population, 61 people (79.2%) were vaccinated, mainly with Comirnaty vaccine - 32 (51.6% of the number of vaccinated) and AstraZeneca - 15 (24.2%), 9 (14.5%) - Moderna, and 5 (8.1%) - other vaccines (see Fig. 3). In the comparison group, 39 people (57.4%) were vaccinated, mainly with Comirnaty (35; 69.2% of the number of vaccinated), 29 (42.6%) were not vaccinated. Regarding smoking in the

study group: 61 people (79.22%) did not smoke, 6 (7.8%) smoked ~30 cigarettes per day, 4 (5.2%) smoked ~20 cigarettes per day, 4 (5.2%) smoked ~10 cigarettes per day, and 2 (2.6%) smoked 1-2 cigarettes per day.

Complaints that are signs of Long COVID were reported by 65 subjects (84.4%). Among them, women prevailed by 1.2 times (36, 55.4% of women; 29, 44.6% of men). Women who submitted complaints were mostly in the age group of 51-60 years, their number

was 1.7-3 times higher than the number of women in other age groups, and 2.1 times higher than the number of men of this age. Among men, those in the 20-30 age group prevailed, being 1.1-1.8 times more than other categories of men and 1.8 times more than women of the same age (see Fig. 4). 53 (81.5%) of those who submitted complaints were vaccinated, including 28 women (52.8%) and 25 men (47.2%).
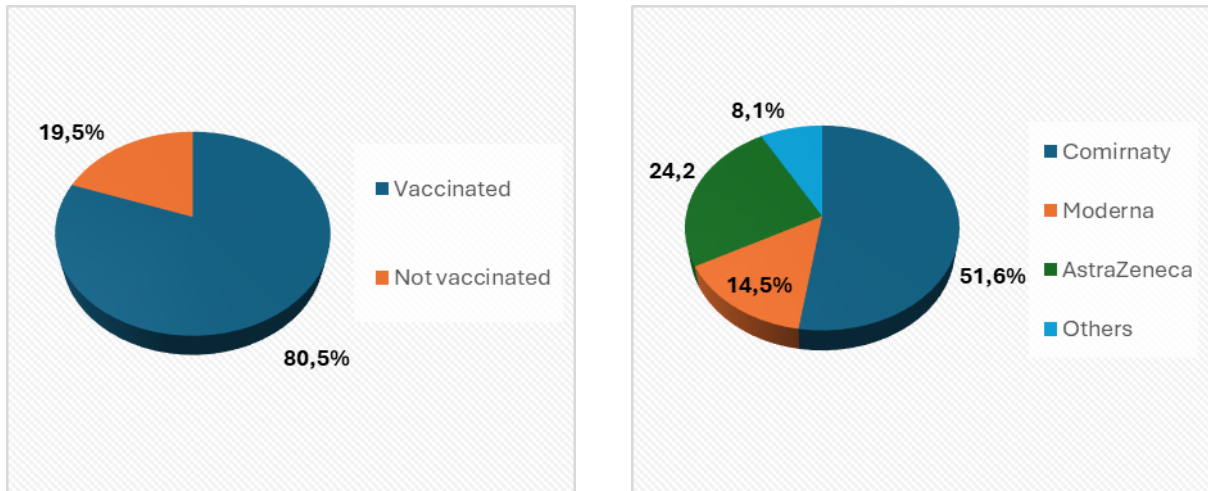

Figure 3. Vaccination and types of vaccines in the study group
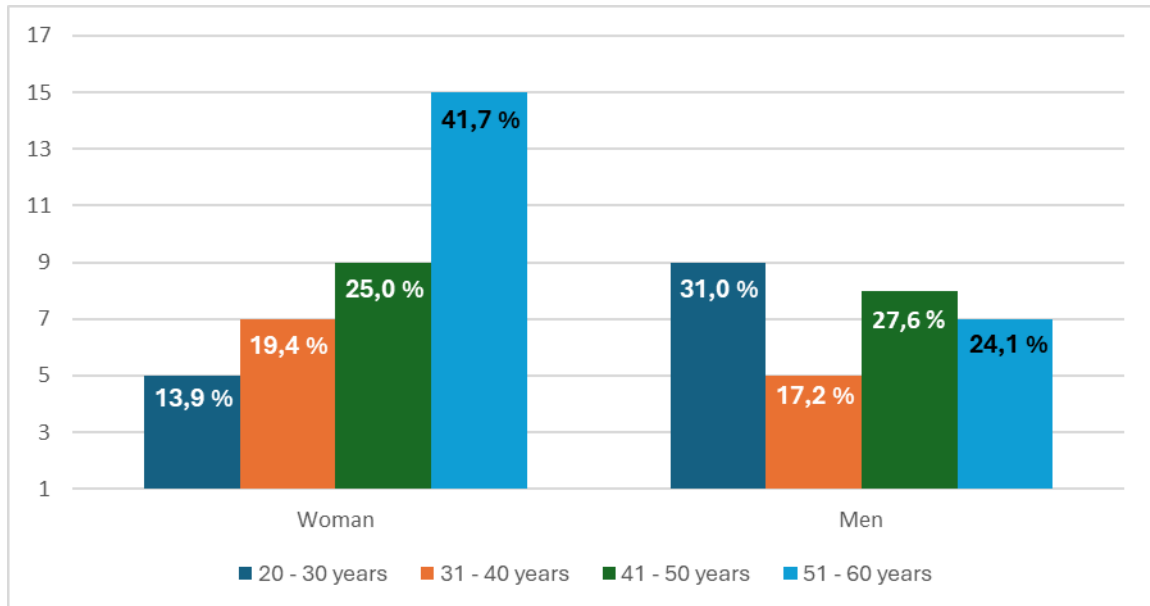
Figure 4. Age distribution among the subjects who had complaints

Among those who belonged to subgroup A, mostly 41-50 year olds complained, but later their share decreased by 1.5 times (subgroup D). The proportion of people aged 31-40 years, which was the second largest in subgroup A, decreased in subgroup C by 1.6 times, and they were absent in other subgroups. The proportion of

subjects aged 20-30 years, which was lower in Subgroup A compared to the above age groups, increased 1.4 times in Subgroup D over time, and the proportion of people aged 51-60 years, which was on par with 20-30 year olds, increased 2.7 times over time and made up the vast majority in Subgroup D (see Fig. 5).

Figure 5. Age structure of those who filed complaints, depending on the period after COVID-19
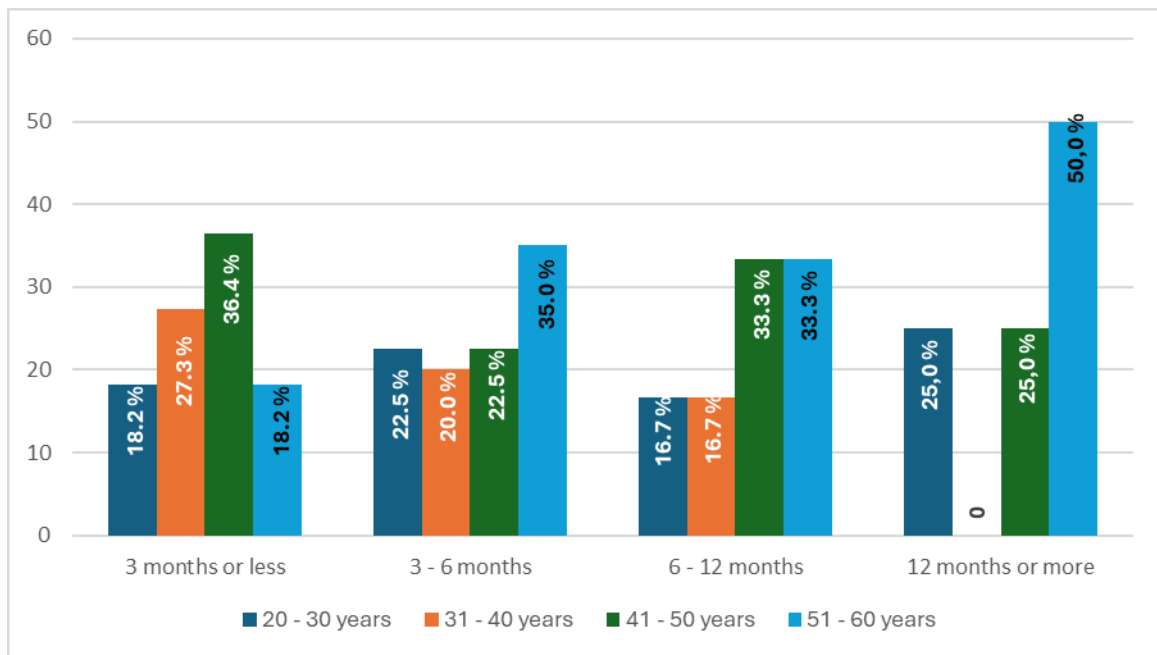
According to Table 1, the main complaints were those related to general, neuropsychiatric, respiratory, and cardiovascular complaints. The most common complaints (in % of the total number of subjects) were weakness - 36 (46.8%), and headache - 22 (28.6%); neuropsychiatric complaints - mood deterioration - 32 (41.6%), and anxiety - 34 (44.2%); respiratory - shortness of breath - 18 (23.4%); cardiovascular - palpitations at rest - 18 (23.4%) and dizziness - 13 (16.7%).

The distribution of people with complaints changed unevenly with increasing time after coronavirus disease. For example, weakness and headache were identified by convalescents mainly in subgroups B, C, and D, with the relative proportion of those with these complaints increasing over time by 9.7 and 2.7 times, respectively, and in the long-term period (subgroup D), 75.0% of subjects had these symptoms.

Deterioration of mood gradually increased in all others compared to subgroup A, and among the recuperates of subgroup D, they were 3.2 times more, which amounted to 50.0%. Anxiety was reported by 46.2% of people in subgroup A, in the next period their share decreased by 1.3 times (B), but then increased again by 2 times and amounted to 75.0% of the subjects (D). Complaints of shortness of breath were noted by 15.4% of people in subgroup A, over time their proportion increased by 1.2 times (B), in the next period decreased by 1.1 times (C), and then increased again by 4.5 times, accounting for 75.0% of those in subgroup C.

Palpitations at rest were reported by 7.7% of subgroup A, in the next period their proportion increased by 2.3 times (B), then slightly decreased by 1.1 times (C), and then increased again by 5.2 times and

prevailed among individuals in subgroup D, amounting to 87.5%. There were no complaints of dizziness in subgroup A, but among those who belonged to subgroup B, this proportion was 18.0%, decreasing in the next period by 1.1 times (C) and increasing again by 2.2 times (D), accounting for 37.5% of the subjects in this period.

In general, the number of reconvalescents who filed complaints in subgroup A was 11 (16.9% of those who filed complaints; 84.6% of the number of people in this subgroup), subgroup B - 40 (61.5%; 80.0%, respectively), subgroup C - 6 (9.2%; 100%, respectively), subgroup D - 8 (12.3%; 100%, respectively).

According to Table 2, the vast majority of subjects with major complaints were vaccinated - the vaccination rate among them was more than 80%. The number of smokers among them was 18.5%.

9 people (11.7% of the total) from the study group were diagnosed with cardiovascular disease after COVID-19. Of these, 5 (6.5%) had a disease associated with heart rhythm disturbances (single ventricular extrasystoles, atrial fibrillation), and 4 (5.2%) had grade 1 or 2 hypertension. Among them, 66.7% were vaccinated, and 0 were smokers.

Among the patients with cardiovascular disease, vaccinated women (77.8%) from subgroups B and D predominated. The vast majority of them belonged to the age group of 51-60 years and accounted for 60.0% of subgroup B and 50.0% of subgroup D. People aged 41-50 years made up 40.0% and 25.0% of the respective subgroups. 25.0% of those diagnosed 12 months or more after COVID-19 (subgroup D) were aged 20-30 years. No patients were included in subgroups A and C.

Table 1 - Severity of clinical symptoms in the study group

Groups of complaints	Number (abs. / % of the number of respondents) n=77	Subgroups (time in months after the disease) abs. / % of the number of people in the period			
		A (3 or less) n=13	B (3-6) n=50	C (6-12) n=6	D (12 or more) n=8
General	**47 / 72.3 %**	**3 / 23.1 %**	**33 / 66.0 %**	**4 / 66.7 %**	**7 / 87.5 %**
fever	1 / 1.3 %	0	1 / 2.0 %	0	0
weakness	36 / 46.8 %	1 / 7.7 %	26 / 52.0 %	3 / 50 %	6 / 75.0 %
headache	22 / 28.6 %	0	14 / 28.0 %	2 / 33.3 %	6 / 75.0 %
weight loss	6 / 7.8 %	2 / 15.4 %	3 / 6.0%	0	1 / 12.5 %
Neuropsychiatric symptoms	**53 / 81.5 %**	**10 / 76.9 %**	**31 / 62.0 %**	**5 / 83.3 %**	**7 / 87.5 %**
difficulty swallowing	2 / 3.7 %	0	2 / 4.0 %	0	0
mood deterioration	32 / 41.6 %	2 / 15.4 %	22 / 44.0 %	4 / 66.7 %	4 / 50.0 %
depression	10 /13.0 %	0	7 /14.0 %	1 / 16.7 %	2 / 25.0 %
insomnia	21 /27.3 %	2 / 15.4 %	10 / 20.0 %	4 / 66.7 %	5 / 62.5 %
anxiety	34 / 44.2 %	6 / 46.2 %	18 / 36.0 %	4 / 66.7 %	6 / 75.0 %
aggression	11 / 14.3 %	0	6 / 12.0 %	2 / 33.3 %	3 / 37.5 %
Cognitive impairment	**14 / 21.5 %**	**2 / 15.4 %**	**8 / 16.0 %**	**1 / 16.7 %**	**3 / 37.5 %**
memory impairment	11 / 14.3 %	2 / 15.4 %	6 / 12.0 %	0	3 / 37.5 %
impaired concentration and attention	6 / 7.8 %	0	2 / 4.0 %	1 / 16.7 %	3 / 37.5 %
Loss of sense of smell and taste	**9 / 11.7 %**	**0**	**7 / 14.0 %**	**2 / 33.3 %**	**0**
Gastrointestinal disorders	**10 / 13.0 %**	**0**	**5 / 10.0 %**	**3 / 50.0 %**	**2 / 25.0 %**
loss of appetite	5 / 6.5 %	0	3 / 6.0%	2 / 33.3 %	0
nausea	1 / 1.3 %	0	1 / 2.0 %	0	0
abdominal pain	3 / 3.9%	0	1 / 2.0 %	1 / 16.7 %	1 / 12.5 %
diarrhea	1 / 1.3 %	0	0	0	1 / 12.5 %
Visual impairment	**13 / 16.7 %**	**0.0**	**9 / 18.0 %**	**1 / 16.7 %**	**3 / 37.5 %**
Respiratory symptoms	**23 / 29.9 %**	**2 / 15.4 %**	**13 / 26.0 %**	**2 / 33.3 %**	**6 / 75.0 %**
sore throat	6 / 7.8 %	0	3 / 6.0%	2 / 33.3 %	1 / 12.5 %
shortness of breath	18 / 23.4 %	2 / 15.4 %	9 / 18.0 %	1 / 16.7 %	6 / 75.0 %
cough	8 / 10.4 %	0	5 / 10.0 %	1 / 16.7 %	2 / 25.0 %
distant wheezing	1 / 1.3 %	0	1 / 2.0 %	0	0
voice change	4 / 5.2 %	0	3 / 6.0%	1 / 16.7 %	0
sneezing, runny nose	7 / 9.1 %	0	5 / 10.0 %	1 / 16.7 %	1 / 12.5 %
Pain in the muscles	**10 / 13.0 %**	**0**	**7 / 14.0 %**	**1 / 16.7 %**	**2 / 25.0 %**
Hearing impairment, tinnitus	**8 / 10.4 %**	**0**	**5 / 10.0 %**	**2 / 33.3 %**	**1 / 12.5 %**
Cardiovascular symptoms	**30 / 38.9 %**	**3 / 23.1 %**	**18 / 6.0 %**	**2 / 33.3 %**	**7 / 87.5 %**
chest pain	4 / 5.2 %	2 / 15.4 %	2 / 4.0 %	0	0
palpitations at rest	18 / 23.4 %	1 / 7.7 %	9 / 18.0 %	1 / 16.7 %	7 / 87.5 %
palpitations when changing body position	7 / 9.1 %	0	4 / 8.0 %	1 / 16.7 %	2 /25.0 %
dizziness	13 / 16.7 %	0	9 / 18.0 %	1 / 16.7 %	3 / 37.5 %
edema	6 / 7.8 %	0	3 / 6.0%	1 / 16.7 %	2 /25.0 %

Changes in physical endurance after coronavirus disease were noted by 18 people (23.4%), of whom 16 (88.9%) were women. In the period from 3 to 6 months after COVID-19, the majority belonged to the age groups 31-40 and 41-50 years with the same proportion of 33.3%. In the time period of 12 months or more, those in the 41-50 and 51-60 age groups prevailed, with an equal share of 40.0%. At the same time, 6 (7.8%)

reported that they could not fully engage in physical exercise. 12 (15.6%) indicated that they had to reduce the intensity or duration of physical activity. 59 (76.6%) did not experience any changes in physical activity tolerance. Of those who reported a decrease in physical endurance, 15 (83.3%) were vaccinated with Comirnaty vaccine, 12 (66.7%) with Astra Zeneca vaccine, 2 (11.1%) with other vaccines, and 1 (5.6%) with other vaccines. There were 2 smokers (11.1%).

A general decrease in quality of life after coronavirus disease was noted by 12 people (15.6% of the total number of subjects). In subgroup B, the vast majority were aged 31-40 and 51-60 years with an equal proportion of 33.3%. Subgroup D was dominated by those aged 41-50 and 51-60 years, with an equal share of 40.0%. At the same time, 11 (14.3%) rated the decline in quality of life as moderate, and 1 (1.3%) as significant. Of those who gave this assessment, 12 (100.0%) were women. Of those, 9 (75.0%) were vaccinated with Comirnaty vaccine, 7 (77.8%) with Moderna, 0 with Astra Zeneca, 2 (22.2%) with other vaccines, and 0 with other vaccines.

Table 2 - Dependence of complaints on vaccination and smoking status in the study group

Groups of complaints	Quantity	Of those vaccinated, % of the group					Of these smokers
		Comirnaty	Moderna	Astra Zeneca	Other	Overall	
General	47	25 (53,2 %)	4 (8,5 %)	9 (19,2 %)	1 (2,3 %)	39 (83,0 %)	11 (23,4 %)
Neuropsychiatric symptoms	53	25 (47,2 %)	5 (9,4 %)	11 (20,8 %)	3 (5,7 %)	44 (83,0 %)	9 (17,0 %)
Respiratory symptoms	23	9 (39,1 %)	0	8 (34,8 %)	2 (8,7 %)	19 (82,6 %)	1 (4,35 %)
Cardiovascular symptoms	30	12 (40,0 %)	4 (13,3 %)	6 (20,0 %)	2 (6,7 %)	24 (80,0 %)	2 (6,7 %)

Discussion. The results of the study show a tendency for some signs of Long-COVID to persist for 12 months or more after coronavirus disease. Data from literature reviews indicate that the incidence of Long-COVID among young people (18-35 years old) is significantly lower than among older convalescents, and those with such manifestations were predominantly women, which was associated with their greater social propensity to complain [13]. According to our data, women aged 40-60 years predominated among those who filed complaints after coronavirus disease. The complaints mostly reported by the respondents were distributed as follows (from highest to lowest): weakness, anxiety, mood deterioration, headache, shortness of breath, palpitations, dizziness. This structure generally reproduces the results of other studies [6-13], but the proportion of respiratory manifestations, which according to other researchers prevailed over neuropsychiatric symptoms, did not exceed them, according to our data. Also, there is a smaller proportion of those who report impaired concentration and attention, and complaints of cognitive impairment, gastrointestinal disorders, and muscle pain than in other studies [6-13]. This may be due to the fact that the subjects suffered from coronavirus disease mainly in the second half of 2022, when the XBB.1.5 "Omicron" strain dominated in Ukraine, characterized by a less severe course and a lower level of respiratory system damage. Palpitations and shortness of breath were equally prevalent among the subjects who reported complaints, changing equally with the increase in the time after coronavirus disease. This dynamic can be explained by the prolonged inflammatory response of the muscles and blood vessels of the heart, especially in elderly patients, due to multisystemic inflammatory syndrome, which is one of the complications of COVID-19.

In the period up to 3 months after the coronavirus disease, complaints were mainly reported by people aged 31-40 years, but with increasing time, older patients (51-60 years) began to predominate. The main groups of complaints (general, respiratory, neuropsychiatric, cardiovascular) were presented by subjects who were mostly vaccinated, with the overall vaccination rate among them exceeding 80%. Diseases of the cardiovascular system were mainly recorded in women aged 51-60 years, regardless of the duration of coronavirus disease.

Decreased physical endurance and a general decline in the quality of life according to subjective assessment were observed mainly in women aged 40-60 years, with the proportion of vaccinated women being 81.3%. At the same time, the level of smokers among the above groups of subjects was low. The high level of vaccination among convalescents who reported complaints, experienced a decrease in physical endurance, and assessed a decrease in quality of life can be explained by the strict vaccination requirements for the period 2020-2022.

CONCLUSIONS / ВИСНОВКИ

The majority of people who reported complaints after coronavirus disease were women. The most common complaints were weakness (46.8%), anxiety (44.2%), mood deterioration (41.6%), headache (28.6%), shortness of breath (23.4%), palpitations at rest (23.4%), and dizziness (16.7%). At the same time, there was a smaller proportion of those who reported cognitive impairment (impaired concentration and attention - 7.8%, memory impairment - 14.3%), gastrointestinal disorders (13.0%), and muscle pain (13.0%). The majority were vaccinated (80.0%), and the percentage of smokers was low (18.5%).

PROSPECTS FOR FUTURE RESEARCH / ПЕРСПЕКТИВИ ПОДАЛЬШИХ ДОСЛІДЖЕНЬ

It is planned to further study the variability of Long-COVID clinical signs, their structuring and relationship with the results of laboratory changes, and the long-term impact on the performance of convalescents and their quality of life.

AUTHOR CONTRIBUTIONS / ВКЛАД АВТОРІВ

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1. Significant contribution to the design or construction of the manuscript; acquisition, analysis, or interpretation of data for the manuscript;
2. Drafting a manuscript or critically reviewing its important intellectual content;
3. Final approval of the version for publication;
4. Agreeing to be responsible for all aspects of the work, ensuring that issues related to the accuracy or integrity of any part of the work are properly investigated and resolved.

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