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The Effectiveness of Remote Interaction in the Medical and Psychological Rehabilitation of Patients with Somatic Manifestations of Anxiety and Depressive Post-COVID Disorders

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The COVID-19 pandemic posed a significant challenge to the global healthcare system, resulting in not only physical but also profound psychological consequences. Its impact on the mental health of the population has been unprecedented, as many individuals faced negative emotions such as fear of infection, anxiety for loved ones, uncertainty about the future, and depression caused by social isolation. The constant stress triggered by these factors has significantly affected the autonomic nervous system, leading to the development of psychosomatic and somatic symptoms. Research indicates that a considerable portion of patients develop somatic symptom disorders (SSD) after recovering from COVID-19. According to DSM-5 criteria, 64% of patients met the diagnosis for SSD, exhibiting a wide range of symptoms such as chronic fatigue, muscle pain, headaches, and sleep disturbances. Additionally, 90% of patients experienced symptoms of chronic fatigue syndrome, severely diminishing their quality of life. Furthermore, 32% of individuals screened positive for mood and anxiety disorders, including depressive episodes, generalized anxiety, and panic attacks. These somatic symptoms not only exacerbate patients' physical conditions but also lead to significant psychological distress. Patients often feel confused and unsure of how to manage their condition, intensifying feelings of helplessness. Under such circumstances, integrating medical and psychological approaches to treating post-COVID disorders becomes crucial. A comprehensive approach, encompassing medical care, psychological counseling, and rehabilitation, enables the creation of an effective treatment plan tailored to the individual needs of each patient.

The overall prevalence of post-COVID syndrome is approximately 80%. Although symptom intensity gradually diminishes over time, many patients continue to experience symptoms that remain higher than those observed in the general population even months after recovery. Cognitive-behavioral therapy (CBT) has proven particularly effective in treating such disorders, significantly reducing symptoms of SSD, depression, and anxiety. This form of psychotherapy helps patients learn to manage their emotions, understand the connection between thoughts, feelings, and behaviors, and develop new strategies for adapting to stress.

The role of telemedicine, especially during the pandemic and the ongoing war in Ukraine, deserves special attention. Telemedicine has emerged as one of the key tools for supporting patients. The availability of rehabilitation programs through video conferencing, mobile apps, and other online resources has significantly enhanced the interaction between healthcare providers and patients. These tools have enabled effective support for emotional well-being, reduced symptom burden, and mitigated the risks associated with social isolation. Practical

experience underscores the necessity of a multidisciplinary approach in treating post-COVID disorders. Specifically, medical-psychological rehabilitation programs that integrate tele-rehabilitation have become a pivotal step in the evolution of modern clinical practice. These programs contribute not only to the treatment but also to the prevention of psychosomatic disorders, creating a new standard of care. They empower patients to restore their physical health and improve their quality of life, laying a strong foundation for future well-being.

Keywords: COVID-19, post-COVID syndrome, anxiety, depression, proactive psychosomatic medicine, telemedicine, telepsychology, quality of life, mental health

Introduction

During the COVID-19 pandemic, many individuals experienced a wide range of negative emotions such as fear, anxiety, and depression. As emotional response reserves are depleted, these negative emotions begin to impact the autonomic nervous system and the activity of specific brain regions, leading to psychosomatic and somatic symptoms. Numerous studies (Bocheliuk, V.Y., et al., 2021) have demonstrated a significant relationship between perceived stress and psychosomatic complaints.

In a study by Kachaner, A., et al., it was found that among post-COVID-19 patients who did not meet the DSM-5 criteria for functional neurological symptoms, 32 (64%) fully met the DSM-5 criteria for Somatic Symptom Disorder (SSD). For the remaining 18 patients, SSD was deemed probable due to high scores on relevant diagnostic scales, despite physical examinations revealing no organic pathology. Additionally, 45 (90%) of the patients met the criteria for Chronic Fatigue Syndrome, and 17 (32%) screened positive for mood and anxiety disorders (Kachaner, A., et al., 2022).

It is worth noting that somatic symptoms can cause significant psychological distress. Addressing both somatic and psychological complaints in the treatment process allows for a combination of thorough medical examination and care, psychological consultation, and intervention. This approach represents the most promising treatment option. Moreover, a comparative and comprehensive assessment of the severity of post-COVID conditions and associated limitations among patients who have recovered from COVID-19, psychosomatic patients, and those with both physical and psychological symptoms underscores the feasibility of such a multidisciplinary rehabilitation framework (Kupferschmitt, A., et al., 2023).

The prevalence of severe post-COVID syndrome is 80%, indicating substantial symptomatic burden over a 22-month period following infection. Depression, anxiety, and somatic symptoms remain prevalent and significantly elevated. Although their severity diminishes over time, suggesting a self-limiting disease course, symptom levels remain notably higher than in the general population (Schäfer, I.C., et al., 2023).

Simultaneously, the use of psychotherapy as an intervention for post-COVID syndrome in inpatient settings has led to positive changes in the psycho-emotional state and a reduction in the symptomatic presentation of the disease (Koller, K., et al., 2024). This further highlights the importance of a multidisciplinary approach to the care of post-COVID patients, involving mental health professionals for support, psychological assistance, and prevention measures.

During the COVID-19 pandemic and subsequently during the war in Ukraine, telemedicine and telerehabilitation, as forms of remote healthcare, have increasingly solidified their role in real

clinical practice. This evolution underscores the feasibility of using remote information and communication technologies for assessment, prevention, treatment, and psychoeducation (Horn, M. et al., 2023; Fekete, M. et al., 2021; López, C. et al., 2020; Sanchez-Ramirez, D. C. et al., 2024).

Practical experience demonstrates that implementing medical and psychological rehabilitation programs for patients with anxiety and depressive post-COVID disorders enhances the effectiveness of patient interaction. This refinement supports a psychosomatic proactive approach to patient management, representing a novel qualitative concept in multidisciplinary team practice (Khaustova, O.O. et al., 2022).

Objective

To assess the effectiveness of a medical-psychological rehabilitation program for patients with anxiety and depressive post-COVID disorders in a remote setting based on the dynamics of somatic symptoms and quality of life levels.

Methods

The study involved 240 individuals with depressive and anxiety post-COVID disorders who provided informed consent in accordance with ethical and deontological norms based on the principles outlined in the Declaration of Helsinki. The instruments used in the study included: Somatic Symptom Scale-8 (SSS-8) (Gierk B. et al., 2014), to evaluate somatic symptoms, Chaban's Quality of Life Scale (CQLS) (Chaban, O. et al., 2016), to assess quality of life levels.

Materials and Methods

The study sample included 240 patients with anxiety and depressive post-COVID disorders recruited from Kyiv Clinical Railway Hospital No. 1 between October 2022 and December 2023. All participants provided written informed consent after a detailed explanation of the study procedures. The study adhered to the principles of the Declaration of Helsinki and was approved by the Bioethics Committee of the O.O. Bohomolets National Medical University (Protocol No. 151, dated 25.10.2021).

A parallel randomized open controlled trial was conducted with two groups of patients. The study sample included 316 patients with anxiety and depressive post-COVID disorders, after initial screening, 68 individuals were excluded due to non-compliance with the inclusion criteria. Randomization of the remaining 248 participants was performed using an online randomization program (www.randomizer.org) with a simple randomization process involving random number generation (0 – parallel group, 1 – intervention group). Participants were randomly assigned to the intervention group (IG) or the comparison group receiving standard treatment (CG) with a 1:0.96 allocation ratio. Following randomization, eight participants were excluded from the study. The final sample consisted of 122 patients in the intervention group and 118 patients in the comparison group.

Treatment Protocol

The program «Medical and Psychological Rehabilitation for Anxiety and Depressive Post-COVID Disorders in Remote Interaction Conditions» (Burdeinyi, A., 2024) was implemented to provide medical-psychological assistance. This program incorporated techniques and methods targeting stress, anxiety, and depressive symptoms associated with post-COVID conditions. Two dedicated sessions focused on bodily practices aimed at reducing somatic symptoms, improving quality of life, and enhancing psychological well-being and physical self-perception. Techniques utilized included mindfulness, meditation, and bodily reactivation.

«Mindfulness and Meditation». Meditation practices have been shown to effectively alleviate somatic symptoms of anxiety and depressive disorders often present in post-COVID syndrome. These interventions promote emotional regulation, physical relaxation, and reduction of somatic reactions. Chronic post-COVID stress is linked to prolonged dysfunction of the hypothalamic-pituitary-adrenal (HPA) axis, maintaining tension, fatigue, and emotional imbalance. Mindfulness and meditation techniques activate the parasympathetic nervous system, fostering a relaxation state characterized by reduced heart rate, blood pressure, and muscle tension. This also improves gastrointestinal regulation (Alpart, J. M., 2019; Shanok, N. A. et al., 2019; Williams, M., 2024).

Meditative techniques lower cortisol levels, mitigating symptoms such as headaches, muscle tension, and sleep disturbances, thus enhancing both physical and psychological recovery (Carlson, L.E. et al., 2004; Black, D.S. et al., 2015). Mindful meditation enables patients to develop a heightened awareness of their bodies and emotions, helping them recognize early signs of stress or anxiety. This awareness facilitates timely self-regulation to prevent psychosomatic manifestations (Hölzel, B.K., et al., 2011; Mehling, W.E., et al., 2011; Weinstein, R., 2021). **Table 1** presents a stepwise guide for implementing the recommended meditation techniques.

Stage Title	Main Elements	Description
I. «Preparation for Meditation»	Space and Time	Choose a quiet place where you won't be disturbed. Sit in a comfortable position – this could be a chair, sofa, or cushion on the floor. You may also lie down if it doesn't make you feel drowsy. Close your eyes or focus your gaze on a point in front of you.
	Breathing Adjustment	Start by taking a few deep breaths in and out to relax your body and release tension. Inhale through your nose, exhale through your mouth.
II. «Mindful Breathing»	Observing the Breath	Start by focusing on your breath. Don't try to change its rhythm, just observe how the air enters and leaves your body.
	Focusing on Sensations	Feel how the air moves through your nose, fills your lungs, and then exits. Focus your attention on the sensations in your abdomen – how it rises during the inhale and falls during the exhale.
III. «Calming the Mind»	Focus on the Present Moment	If you notice that your attention starts to wander to thoughts, plans, or memories, gently bring your focus back to your breath. Don't judge your thoughts or criticize yourself for distractions – it's completely normal.
	Anchor Technique	If it's difficult to maintain your focus, you can use the «Anchor Technique» – each time you feel your attention shift to thoughts, simply mentally say "Inhale" on the inhale and «Exhale» on the exhale.
IV. «Awareness of Sensations»	Body Awareness	Shift your focus to your body awareness. Imagine your breath moving through every part of your body. Start by paying attention to your legs – what sensations do they evoke? Warmth, cold, tension, or relaxation? Gradually bring your attention upward to your abdomen, chest, arms, shoulders, and face.
	Relaxation through Breathing	With each exhale, imagine that tension leaves each part of your body, relaxing your muscles.
V. «Here and Now»	Observing Your State	Stay in the present moment, focusing on your breath or body sensations. If

		thoughts arise, simply observe them without delving into them. Let them pass by.
	Gentle Focus	Don’t try to achieve any specific result or feeling – just remain an observer of what’s happening in your body and mind.
VI. «Meditation Conclusion»	Gradual Return	When you feel ready to end the meditation (or after a set time, e.g., 10-15 minutes), take a few deep breaths. Gradually widen your focus, and once again become aware of your body — feel your legs on the floor, your hands on your knees.
	Don’t Rush	Before opening your eyes or changing your position, slowly stretch, move your fingers and toes to "wake up" again in the physical world.
	Final Sensations	Pay attention to how you feel — do you feel more relaxed, calm, or simply aware?
Expectations: Reduction of Physical Symptoms — decreased muscle tension, normalized heart rate, improved breathing.Improvement in Mood and Emotional Resilience — reduced anxiety levels, improved stress management ability.Increased Awareness — enhanced ability to be present in the moment and respond consciously to stressful situations.		
Prognosis: Reduction of Anxiety and Depression — increased ability to regulate emotional responses and decreased negative impact of stressful situations.Enhanced Emotional Resilience — improved ability to separate emotions from thoughts, allowing for a more constructive response to stress and reducing their impact on mental and physical health.Decreased Psychosomatic Symptoms — reduced muscle tension, normalized breathing and heart rate, helping to alleviate psychosomatic symptoms related to anxiety and depression, such as headaches, muscle pain, cardiovascular issues, and digestive disturbances.Improved Quality of Life — better psychological and emotional state, reduced stress levels, improved sleep, focus, and increased stress resilience and emotional stability.		

Table 1. *Psychological Intervention Methods Aimed at Awareness and Establishing the Connection Between the Mind and Body*

«**Bodily Reactivation**». The aim of this psychological intervention was to achieve awareness of the connection between bodily and mental reactions, as well as to establish emotional regulation through the use of techniques and methods for managing bodily sensations. A description of the applied interventions is presented in **Table 2**. Each of the described psychological intervention methods was conducted in a shortened form during the session due to time constraints, and was therefore provided in an electronic version for self-application at home, with the possibility of further individual use outside the study.

Name	Goal	Expectations	Prognosis
«Concentration on Breathing»	To reduce tension, calm the mind, and focus on the present moment.	Participants may feel a reduction in tension and a decrease in anxiety after a few minutes of concentrating on breathing. This will help them become more aware of their breathing patterns and learn to use breathing for emotional regulation.	Regular practice will lead to reduced stress and anxiety levels and improve the ability to control emotions in stressful situations.
«Concentration on the Body»	To focus on sensations of tension or discomfort in each part of the body, identifying where tension accumulates.	Participants will be able to identify tension accumulating in various parts of the body that were previously ignored (e.g., head, back, arms). This will help raise awareness of the connection between emotional states and physical sensations.	Regular practice will help participants better understand and respond to their bodily signals, leading to improved emotional regulation.

«Movement Expression»	To reduce emotional and physical tension by expressing and releasing emotions through physical activity.	Participants will experience emotional release, relaxation, and mood improvement through movement. This will help decrease internal tension and improve overall well-being.	Regular use of this exercise will foster the development of creative and emotional self-expression, as well as increase emotional resilience.
«Progressive Muscle Relaxation (Jacobson's Method)»	To reduce physical and emotional tension.	Participants will experience intense tension at the beginning, but significant relief and reduction of physical tension after completing the exercise. This will help participants learn how to identify and relax tense muscles independently.	Regular practice will reduce stress levels and improve the ability to relax autonomously.
«Visualization and Relaxation»	To enhance awareness and reduce anxiety levels.	Participants will experience emotional relaxation and mood improvement through positive imagery, leading to a reduction in anxiety, stress, and emotional tension.	Regular practice will help shift perceptions of stressful situations, reducing their catastrophic thinking and negative interpretations.
«Sensory Sensitivity»	To focus on physical sensations and distract from negative thoughts.	Participants will heighten their sensitivity to bodily sensations and emotions by using various textures and objects, promoting mood improvement and relaxation.	Regular practice will effectively reduce anxiety and stress in everyday life.
«Tension Reduction through Physical Contact»	To improve body awareness and reduce physical and emotional tension.	Participants will improve body awareness and reduce tension through touch and self-massage, leading to decreased physical and emotional tension.	Regular use will lead to a better understanding of bodily needs and a reduction in somatic symptoms.
«Emotional Self-Expression»	To reduce emotional and physical tension and promote relaxation.	Participants will experience emotional relaxation and reduced internal tension through free expression of their feelings.	Regular practice will improve emotional resilience and help reduce anxiety and depressive symptoms.

Table 2. *Psychological Intervention Methods Aimed at Raising Awareness and Establishing the Connection Between Mind and Body*

Results of the Study

There were no statistically significant differences in the socio-demographic characteristics between the main group and the comparison group at the beginning of the study ($p>0.05$), indicating comparability of the groups.

According to the Somatic Symptom Scale-8 (SSS-8), the mean score for the main group was 9.237±4.148, while the comparison group had a mean score of 9.550±3.949 ($t=0.598$; $p=0.550$). Initial SSS-8 measurements revealed the following degree of somatic symptom intensity among participants in the study group: 5 (4%) minimal, 38 (31%) low, 34 (28%) medium, 43 (39%) high, and 2 (2%) very high intensity. In the parallel group, the results were as follows: 4 (3%) minimal, 35 (30%) low, 36 (31%) medium, 40 (34%) high, and 3 (3%) very high intensity.

For the initial measurements of the Chaban Quality of Life Scale (CQLS), the mean score for the study group was 56.418±15.041, and for the parallel group, it was 56.347±13.535 ($t=-0.038$; $p=0.970$). CQLS results in the study group were as follows: 6 (5%) high, 29 (24%) medium, 38 (31%) low, and 49 (40%) very low levels of quality of life. In the parallel group, the results were: 4 (3%) high, 31 (26%) medium, 34 (29%) low, and 49 (42%) very low levels of quality of life.

The results presented below represent the re-assessment of somatic symptoms and quality of life after the completion of the psychological intervention program on day 63 for participants in the study group, and for the comparison group overall, based on the techniques and methods included in the «Medical-Psychological Rehabilitation Program for Anxiety and Depressive Post-COVID Disorders in Remote Conditions».

SSS-8					
	SS	**Error SS**	**df**	**F value**	**P value**
Intercept	29130.2	5457	1	1270.484	<0.001
Group	1436	5457	1	62.628	<0.001
Time	1233	1140.2	1	257.364	<0.001
Group×time	1187.8	1140.2	1	247.928	<0.001
CQLS					
	SS	**Error SS**	**df**	**F value**	**P value**
Intercept	1853213	66012	1	6681.61	<0.001
Group	14295	66012	1	51.54	<0.001
Time	15930	10278	1	368.88	<0.001
Group×time	14111	10278	1	326.75	<0.001

Table 3. *Results of ANOVA with Repeated Measures for SSS-8 and CQLS*

Table 4 presents the comparative statistical data for the Patient Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder Questionnaire (GAD-7) before and after the intervention.

PHQ-9					
Day	**Group**	**μ**	**SD**	**P value**	**t**
Day 1	Study	16.590	6.612	0.594	- 0.534
	Parallel	16.127	6.811		
Day 63	Study	6.942	5.073	<0.001	11.437
	Parallel	15.567	6.540		
GAD-7					
Day	**Group**	**μ**	**SD**	**P value**	**t**
Day 1	Study	14.926	4.108	0.597	-0.530
	Parallel	14.644	4.137		
Day 63	Study	3.991	3.589	0.597	-0.530
	Parallel	12.966	4.137		

Table 4. *Results for the PHQ-9 and GAD-7 Questionnaires Before and After the Intervention*

Somatic Symptom Scale-8 (SSS-8)

As mentioned above, at the start of the study, the SSS-8 scores in the main group of the study (9.237±4.148) and the comparison group (9.550±3.949) indicated no statistically significant differences between the groups (p=0.550; t=-0.598). However, by day 63, significant improvement was noted in the main group, with a corresponding reduction in the average score on the SSS-8 scale to 2.885±3.059, while in the parallel group, the score remained at 9.491±3.648, indicating a statistically significant difference between the groups (p<0.001; t=15.219) due to the psychological intervention. The results of the repeated-measures ANOVA are presented in **Table 3**.

A significantly different distribution of patients in the main group and the comparison group was also observed regarding the intensity of somatic symptoms on day 63, at the conclusion of the intervention. In the main group, the intensity of somatic symptoms was minimal in 82 individuals (67%), low in 29 individuals (24%), medium in 7 individuals (6%), and high in 4 individuals (3%) out of 122 patients. In the comparison group, the distribution of the 118 patients according to the

intensity of somatic symptoms on day 63 was as follows: 7 individuals (6%) had minimal intensity, 38 individuals (32%) had low intensity, 40 individuals (34%) had medium intensity, 31 individuals (26%) had high intensity, and 2 individuals (2%) had very high intensity (**Figure 1**).

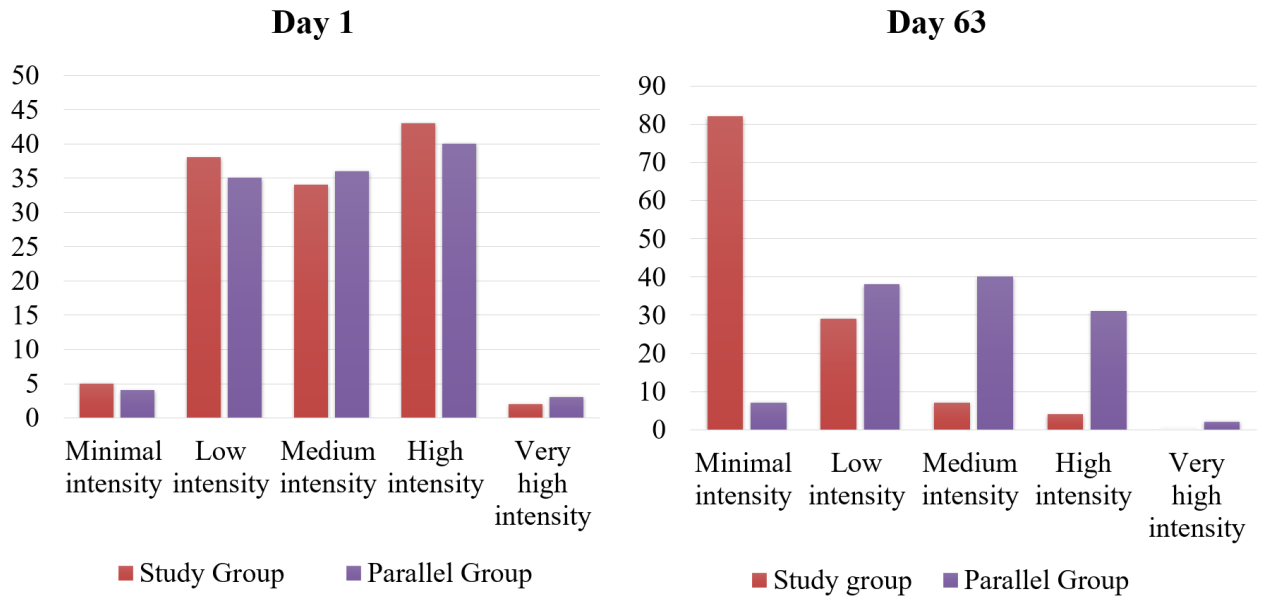

Figure 1. *Comparison of qualitative values of the Somatic Symptom Scale-8 (SSS-8) in all study participants on day 1 and day 63.*

Chaban's Quality of Life Scale (CQLS)

At the beginning of the study, the average scores on the CQLS in the experimental group were 54.418±15.041 points, and in the parallel group, it was 56.347±15.535 points, indicating no statistical significance between the groups (p=0.970; t=-0.038). On day 63, significant improvement in quality of life was observed in the experimental group, with the average score increasing to 78.786±9.379 points, while the parallel group showed no change, remaining at 57.025±9.374 points. This indicated a statistically significant difference between the groups (p<0.001; t=15.686) due to the psychological intervention. The results of the repeated-measures ANOVA are also presented in **Table 3**.

On day 63, the distribution of participants by quality of life level according to the CQLS was as follows: in the experimental group (122 participants), 40 individuals (33%) had a very high quality of life, 36 (30%) had a high level, 32 (26%) had a medium level, and 14 (11%) had a low quality of life. In the parallel group, only 2 participants (2%) had a high quality of life, 35 participants (30%) had a medium level, 33 participants (28%) had a low level, and 48 participants (41%) had a very low level of quality of life (**Figure 2**).

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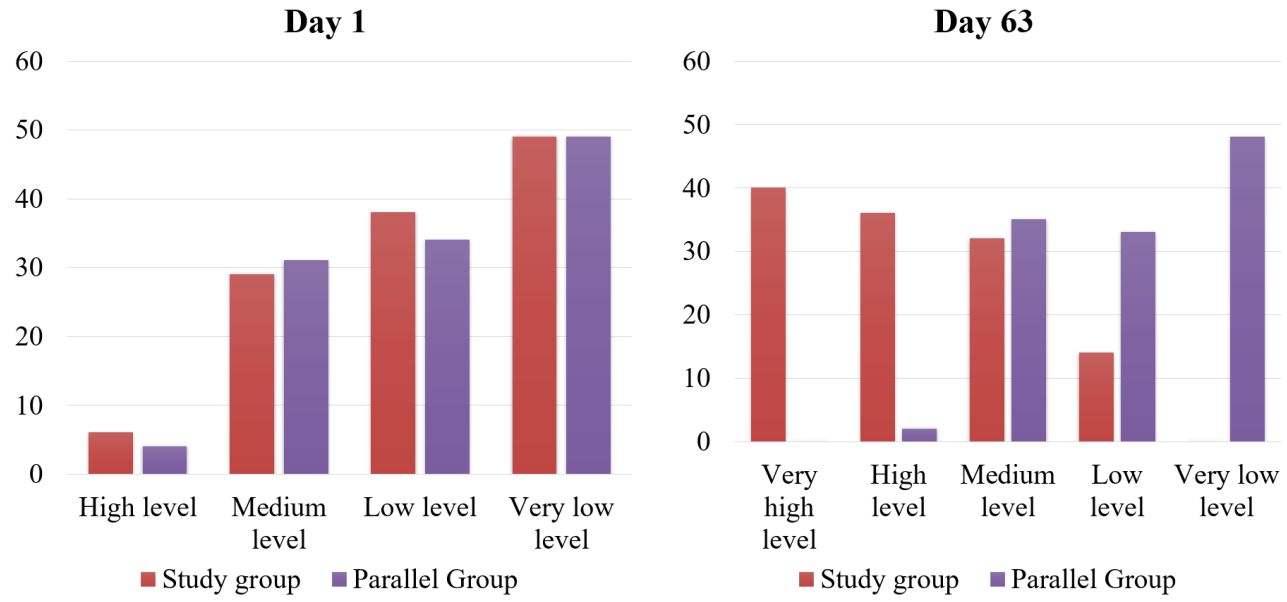

Figure 2. *Comparison of quality values on the Chaban's Quality of Life Scale (CQLS) for all participants in the study on Day 1 and Day 63*

Discussion

The obtained results confirmed the effectiveness of remote interaction in the medical-psychological rehabilitation of patients with anxiety and depressive post-COVID disorders for reducing somatic symptoms and improving quality of life. This indicates the appropriateness of implementing such programs for patients with post-COVID syndrome. The proposed program has the potential for the development of improved strategies for psychological support in crisis situations, allowing treatment to be adapted to modern challenges, such as pandemics or military conflicts, where remote interaction becomes the primary form of support.

Conclusion

We have demonstrated that the program «Medical and Psychological Rehabilitation for Anxiety and Depressive Post-COVID Disorders in Remote Interaction Conditions» showed significant effectiveness in reducing somatic symptoms and improving the quality of life of patients in the study group. Confirmation of this was the statistically significant and thus reliable reduction in the intensity of somatic symptoms on day 63, as measured by the SSS-8 scale in the main group (2.885±3.059), compared to the parallel group, where the average level of somatic symptoms remained almost unchanged (9.491±3.648). The second confirmation was the statistically significant and reliable increase in the quality of life score on day 63, as measured by the CQLS scale, in the main group, which reached 78.786±9.379 points, while in the parallel group, this indicator remained almost unchanged (57.025±9.374 points).

Thus, the intervention in the form of a psychological intervention program via remote interaction had a significant positive impact not only on psychosomatic symptoms by reducing the physical manifestations of stress and anxiety ($p<0.001$), but also on the overall well-being of the participants, as confirmed by the statistical significance of the results regarding the quality of life changes in the main group ($p<0.001$).

The obtained data indicate the effectiveness of the techniques and methods used in reducing anxiety and depressive post-COVID disorders in the context of remote interaction, specifically in reducing the degree of somatic manifestations and improving the quality of life. These interventions contributed to the reduction of physical tension, improved emotional regulation, and the restoration of the physical condition of the study participants.

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