

## Evaluation Of The Quality Of Life Of Patients With Chronic Heart Failure With Systolic Dysfunction While Undergoing Treatment

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### Abstract

Currently, the parameters of the quality of life of patients have independent prognostic significance and are more accurate predictors of survival and the patient's condition during treatment than the general somatic status. The study included 225 patients with chronic heart failure (CHF) FC II-III by NYHA, after suffering Covid19, aged 64.5±3.4. The patients were divided into 4 groups. The first group - 52 patients with CHF, with reduced EF, who received sacubitril-valsartan (Uperio) 24/26 mg in the complex treatment, the second - 57 patients in the complex treatment received empagliflozin (Emaglyph), the third group - in the complex treatment received sacubitril-valsartan and empagliflozin (Emaglyph) – 56 patients, a separate group of 60 CHF patients who had not been ill with Covid19 and received standard therapy. The following questionnaire parameters were studied: physical limitations, symptoms, symptom severity, changes over time in symptoms, social limitations, self-care, quality of life. The average parameters in all groups before treatment were 42.5; 43.0; 42.1 in three groups respectively. The results of questionnaire have shown that the state of quality of life in patients with CHF is unsatisfactory. In the dynamics of therapy, we see a significant increase in rates among all examined groups, amounting to 56.5; 58.6; 65.7 points respectively. It should be noted that although the indicators are almost the same, but the group treated with empagliflozin has advantage in comparison with the group receiving Uperio and there is a more significant increase to 65.7 points in the group treated with a combination of sacubitril-valsartan and empagliflozin. In the group of CHF patients who did not have Covid-19 before treatment, the condition of patients also reached 45.4 points, which is still higher than in groups of patients who had Covid 19. In the dynamics of treatment in this group, the increase was 56.6 points, which nevertheless indicates a fairly good effect of the use of drugs sacubitril-valsartan and empagliflozin and their positive impact on quality of life were studied.

**Key-words:** Kansas City Cardiomyopathy Questionnaire (KCCQ), the quality of life, chronic heart failure, reduced ejection fraction, Covid-19, empagliflozin.

### Introduction

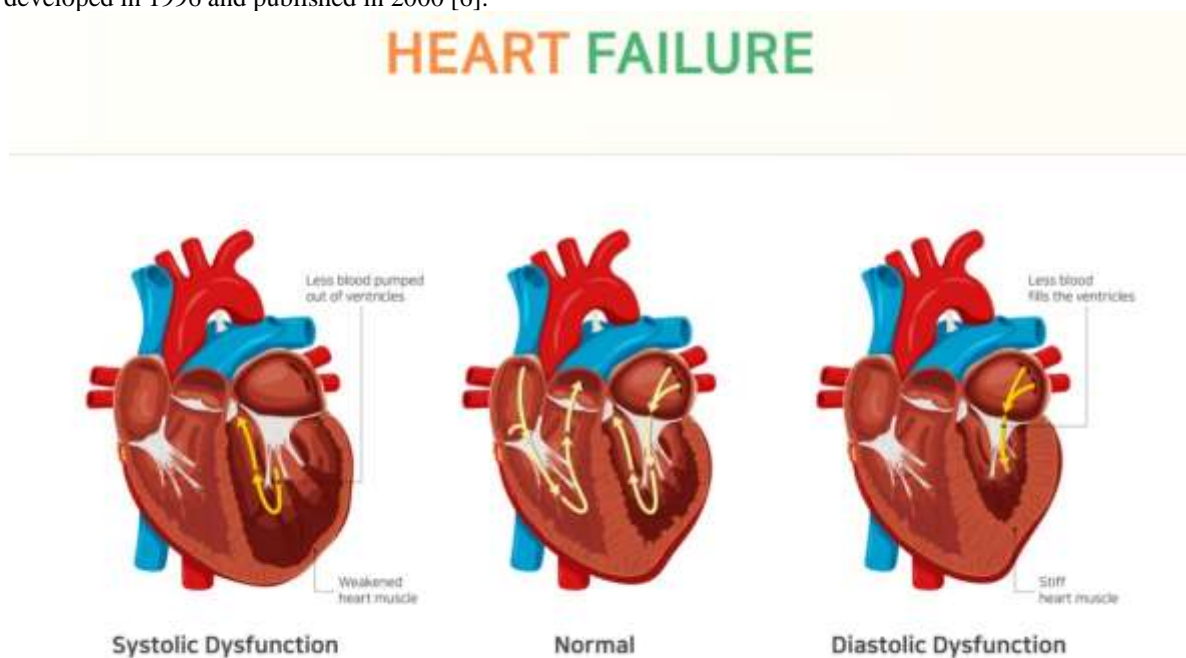
Chronic heart failure (CHF) has been and remains today one of the most important problems of modern cardiology. According to scientists, the prevalence of CHF in Europe is 1-2%, amounting to about 10 million people. In the states of North America, 1.9% of the population suffers from this disease, in Asian countries - from 1.3%, in China up to 6.7%. [1,4]. According to some scientists in the United States, by 2030, the number of patients with CHF is expected to increase to 8.5 million people [5]. According to some researchers, in fact, one patient with CHF dies each one minute, almost half (45%) of them are associated with sudden cardiac death [2]. Mortality in hospitals from acute decompensation of heart failure averages 6.8%. The course of heart failure exacerbates the luggage of comorbid conditions: about 60% have coronary heart disease (CHD), 36% have arrhythmias in the form of atrial fibrillation, about 34% have type 2 diabetes mellitus, 36% have chronic kidney disease, 43% – history of myocardial infarction [7].

According to epidemiological studies of cardiovascular diseases (CVDs) of Uzbekistan, and related heart failure remain leading in the structure of morbidity and mortality, they account for 59.3% in the structure of general mortality [9].

Patients with heart failure are very complex in terms of their psychological and mental state. The low quality of life of such patients worsens the difficult state of health and social adaptation. Therefore, improving the quality of life (QoL), extending it is one of the main tasks of health care today. As the famous scientist Francis Bacon said, “the quality of life is harmony inside a person, between human and the world, to which patients, doctors and the whole society are striving for” [2].

The World Health Organization in its definition of quality of life says “an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” [8].

Currently, it has been proven that the parameters of the quality of life of patients have independent prognostic significance and are more accurate predictors of survival and the patient's condition during treatment than the general somatic status [1]. In this regard, it is very important to study the state of quality of life in patients with CHF with reduced and moderately reduced ejection fraction, that is, systolic dysfunction (Fig.1), and it is possible to evaluate it in more detail using the Kansas City Cardiomyopathy Questionnaire (KCCQ), which was developed in 1996 and published in 2000 [6].



**Fig.1. Heart failure.**

KCCQ is one of the most significant and reasonable instruments for evaluating QoL in patients with heart failure, which provides the most reliable information in a clinical study. The questionnaire is convenient to use, filled out by patients for 10-15 minutes. Points for KCCQ vary from 0 to 100, and higher scores indicate the best QoL [3, 6].

### **Purpose of the research**

The purpose of the study was to analyze the quality of life and the treatment of patients with heart failure, with systolic dysfunction after suffering Covid-19 using KCCQ.

### **Materials and Methods**

The study included 225 patients with CHF II-III functional class (FC) according to the classification of the New York Heart Association (NYHA), after suffering Covid-19, aged  $64.6 \pm 2.4$  years. The patients were divided into 4 groups. The first group - 52 patients with CHF, with a reduced ejection fraction (EF), who received valsartan - sacubitril (Uperio) 24/26 mg  $\frac{1}{2}$  - 1 tablet per day in the complex treatment, the second - 57 patients in the complex treatment who received empagliflozin (Emaglyph) 10 mg 1 tab in the morning, the third group in the complex standard treatment who received valsartan-sacubitril and empagliflozin (Emaglyph) - 56 patients, a

separate group - 60 patients with CHF who did not suffer from Covid-19, who received standard therapy. Standard therapy included angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers, beta-blockers, mineralocorticoid receptor antagonists, and loop diuretics if indicated.

## Results and Discussion

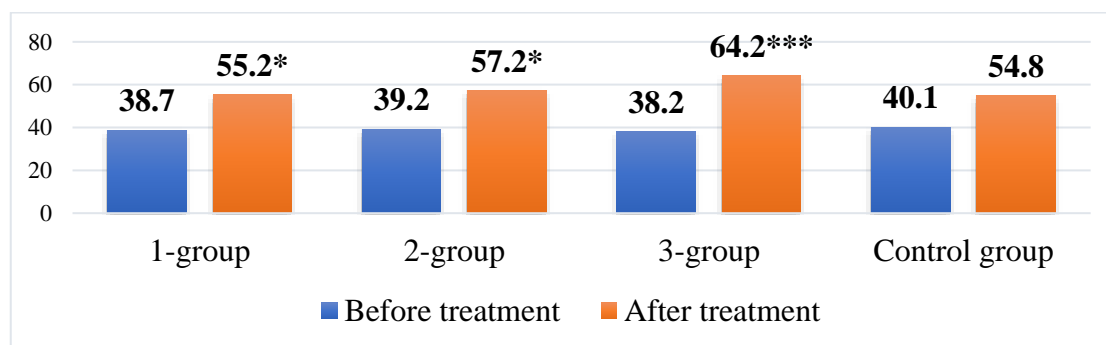
Table presents the results of the dynamics of quality of life indicators, from which it can be seen that the following parameters of the questionnaire significantly changed: physical restrictions, symptoms, severity of symptoms, changes over time of symptoms, social restrictions, self-help, quality of life.

**Table**  
**Dynamics of quality of life in the treatment dynamic**

Показатель и quality of life	1st group, valsartan-sacubitril, n=52		2nd group, empagliflozin, n=57		3-group, empagliflozin+ valsartan- sacubitril, n=56		4-group, non Covid-19 with standard CHF, n=60	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Physical limitations	38,7±5,4	55,2±5,0*	39,2±5,2	57,2±5,4*	38,2±4,0	64,2±5,2***	40,1±5,6	54,8±5,1
Symptoms	41,4±6,0	60,4±5,4*	41,8±5,8	62,8±4,6*	41±5,1	67,1±5,2***	42,6±6,4	59,6±4,7*
Severity of symptoms	35,3±4,5	48±4,3	35,6±3,8	50±4,2*	34,8±5	55±4,6**	39,2±4,2	45±3,8
Recent changes over time	43,2±4,5	51,2±3,6	42,5±5,2	53,4±4,2	43,4±4,3	67,2±3,2**	46±5,5	48±4,5
Sense of self-efficacy	53,1±3,2	66,2±3,6*	52,8±4,3	63,2±3,8*	51,4±3,2	72,6±4,1***	59,2±4	70,2±3,4*
Social functioning	43,4±5,1	57,4±4,8	43,2±4,8	60,8±5*	41,8±4,6	63,5±5,4**	46,2±5	60,4±4,2*
Quality of life	42,6±5,1	57,8±4,2*	43,4±4,3	60,2±4,6	42,3±3,7	66,4±5***	44,6±4,8	58,4±3,9
Overall summary:	42,5±4,8	56,5±4,5*	43±4,7	58,6±4,5*	42,1±4,1	65,7±4,7***	45,4±5	56,6±4,2

Notes: reliability indicators before and after treatment \*-p<0.05; \*\*-p<0.01; \*\*\*-p<0.001

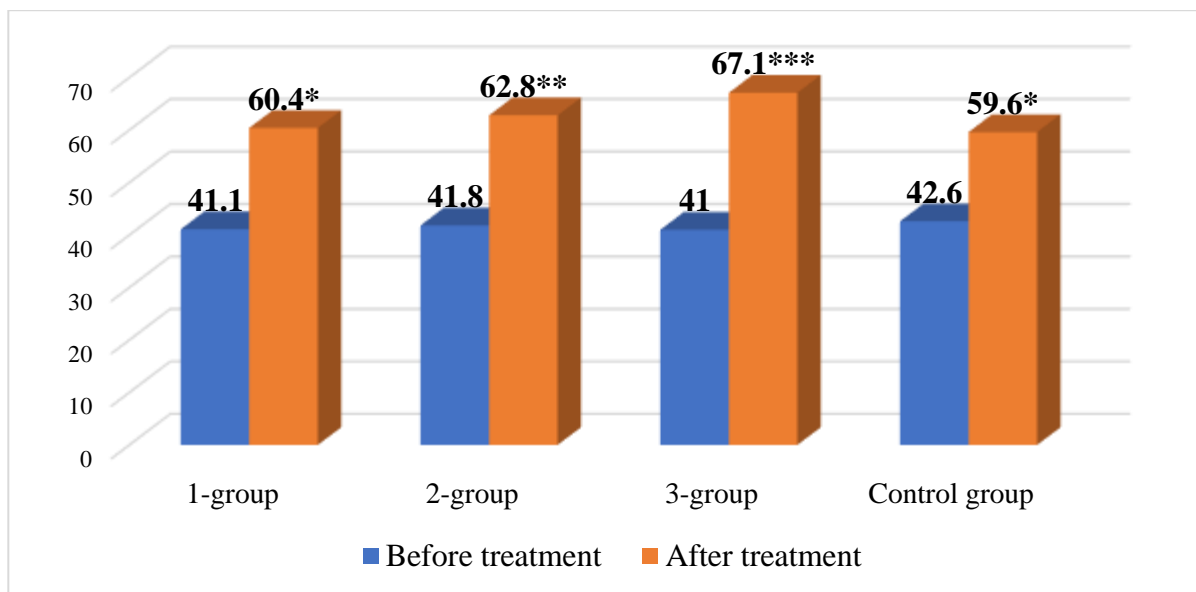
Thus, when evaluating the domain of physical limitation, parameters such as the ability to independently dress, take a shower, walk around the block on level ground, work in the garden around the house or go grocery shopping, climb stairs one flight without stopping, and brisk walking or running were studied.



**Fig.2 Dynamics of the indicator of physical limitations.**

Notes: reliability indicators before and after treatment \*-p<0.05; \*\*-p<0.01; \*\*\*-p<0.001

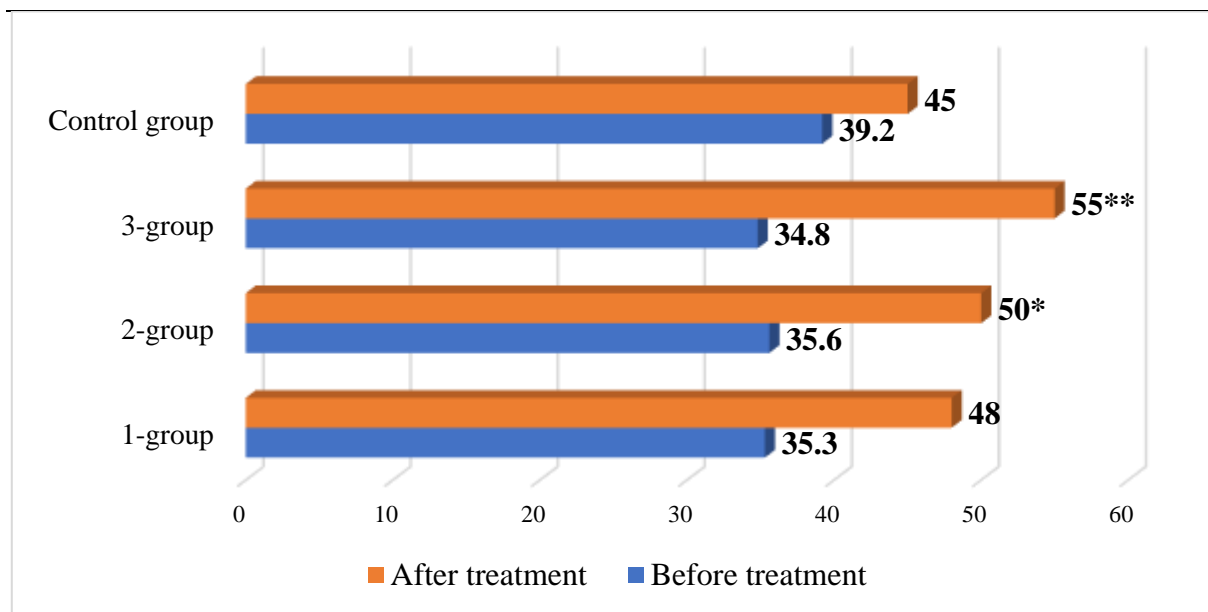
Fig. 2 is obvious that physical limitations amounted to  $38.7 \pm 5.4$  points in the group of patients, after suffering Covid-19 and received Valsartan-Sacubitril for treatment. In the second group of patients who received empagliflozin in complex treatment, the average score was  $39.2 \pm 5.2$ . In the third group of patients, which used a combination of Empagliflozin and valsartan-sacubitril was  $38.2 \pm 4.0$  points, while in the group of patients who did not have a covid-19, this parameter was  $40.1 \pm 5.6$  points. In the dynamics of the treatment, a significant improvement in physical restriction indicators was noted. So, in the first group of patients who received Valsartan-Sacubitril in complex treatment, the physical restriction indicator significantly increased to 55.2 points ( $p < 0.05$ ), in the second group receiving empagliflozin in the complex this indicator was 57.2 ( $p < 0.05$ ), and in the third group, they received Empagliflozin Valsartan – Sacubitril. The indicator was  $64.2 \pm 5.2$  ( $p < 0.001$ ), which was highly reliable. This diagram showed the effectiveness of combination therapy in the treatment of heart failure empagliflozin and valsartan-sacubitril on the parameters of the patient's physical restriction.



**Fig. 3 Dynamics of symptoms during treatment**

Notes: reliability indicators before and after treatment \*- $p < 0.05$ ; \*\*- $p < 0.01$ ; \*\*\*- $p < 0.001$

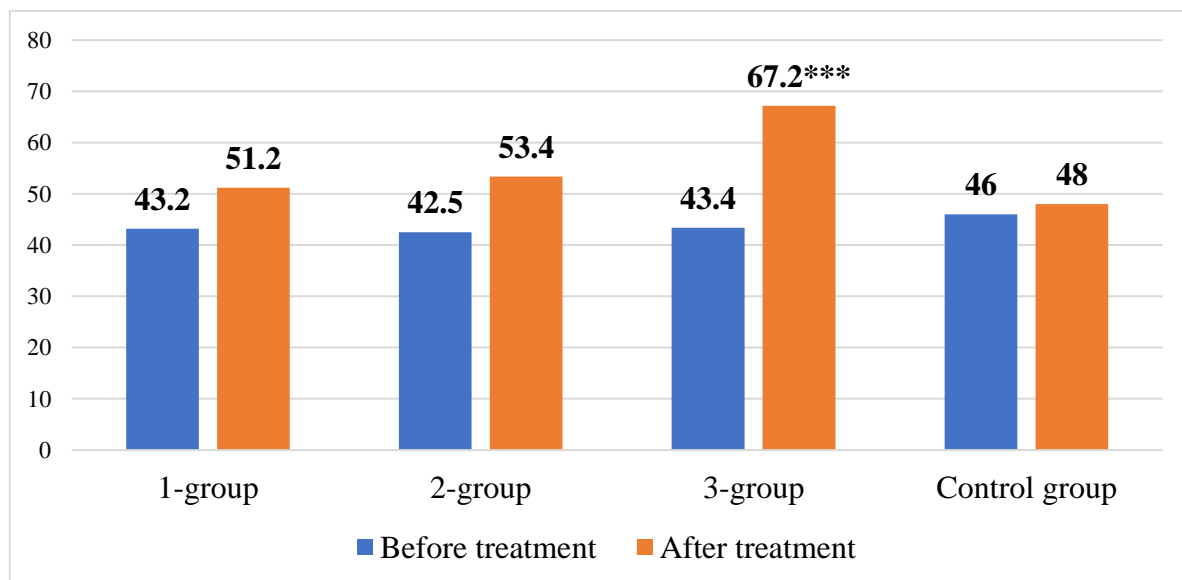
When assessing the dynamics of symptoms, such as shortness of breath, fatigue and edema, the following changes are noted (Fig. 3). The indicators in three groups of patients with CHF after suffering Covid-19 were  $41.4 \pm 6.0$ ;  $41.8 \pm 5.8$ ;  $41 \pm 5.1$ , respectively, in the group of patients who did not have Covid-19, this indicator was  $42.6 \pm 6.4$  points, i.e. in patients with CHF who did not have Covid-19, however, in comparison with patients who had Covid-19, the symptoms are less severe. In the dynamics of the treatment, there is an improvement in the condition in terms of reducing the intensity of symptoms, so in the group of patients with CHF with a reduced fraction after suffering Covid-19 in the first group, the indicator increased to  $60.4 \pm 5.4$  points ( $p < 0.05$ ), in the second group  $62.8 \pm 4.6$  ( $p < 0.01$ ), and in the group of patients with CHF who received the combination of valsartan-sacubitril and empagliflozin, the indicator in dynamics significantly increased to  $67.1 \pm 5.2$  points ( $p < 0.001$ ). As shown in Figure 4, treatment with the inclusion of empagliflozin, as well as valsartan-sacubitril, has a fairly pronounced significant improvement in CHF symptom scores.



**Fig.4 Dynamics of the severity of the symptoms.**

Notes: Significance rates before and after treatment \*-p<0,05; \*\*-p<0,01;\*\*\*-p<0,001

When studying the severity of the symptoms of CHF patients, as well as their change over time, such manifestations of CHF as shortness of breath, edema, fatigue, their intensity and depth during therapy were studied. So in fig. 4 and 5 it is noted how the intensity of symptoms changes during treatment in three groups of patients after suffering Covid-19, amounting to 35.3±4.5; 35.6±3.8; 34.8 ± 5 points, respectively, in the group who did not have Covid-19, the intensity was not too severe and amounted to 39.2 ± 4.2 points. In the dynamics of treatment, the severity and intensity of symptoms decreased, the patients felt much better, almost the same in the first and second groups, amounting to 48±4.3 and 50.0±4.2 (p<0.05) points, respectively, and significantly improved in group treated with empagliflozin and valsartan, amounting to 55±4.6 (p<0.01) points, respectively.

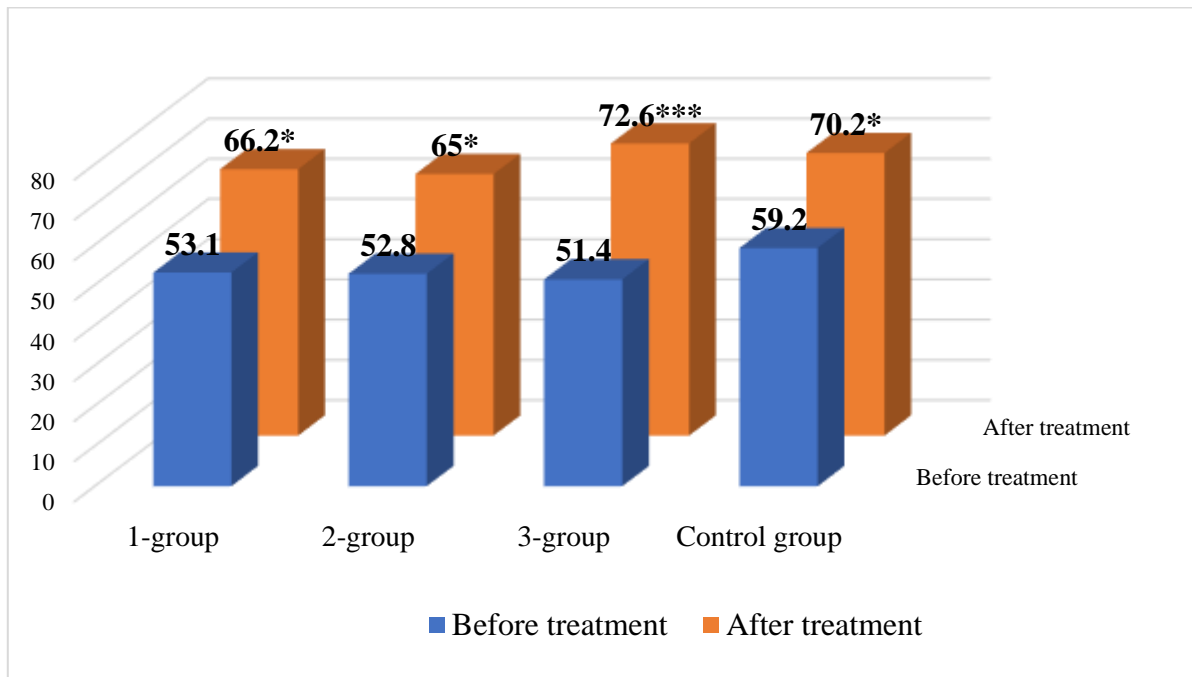


**Fig.5. Dynamics of changes in symptoms during treatment**

Notes: Significance rates before and after treatment \*-p<0,05;\*\*-p<0,01;\*\*\*-p<0,001

When studying the change in symptoms over time, it was taken into account how many times a week shortness of breath bothered, how often fatigue was present, the indicators of these symptoms were 43.2±4.5; 42.5±5.2; 43.4±4.3 points, respectively, in groups, and in the dynamics of treatment, the condition of patients improved, amounting to 51.2±3.6; 53.4±4.2 in the first and second groups, and a more pronounced effect was achieved

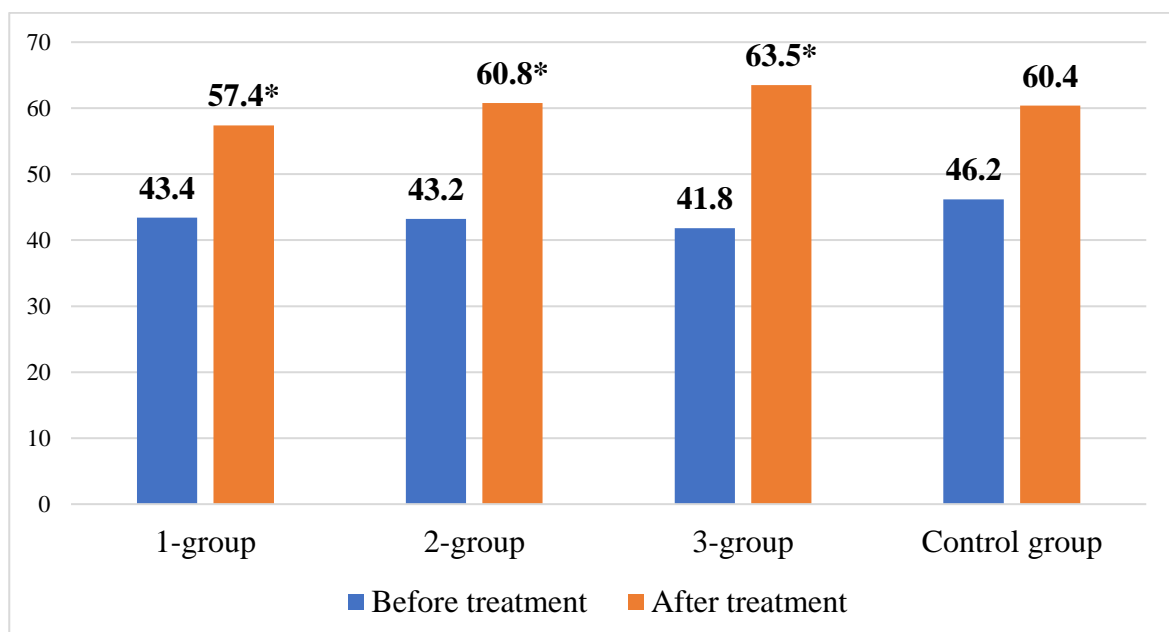
with a combination of drugs in the third group, amounting to  $67.2 \pm 3.2$  ( $p < 0.01$ ) points. In the group who did not have Covid-19, there was no significant increase in indicators.



**Fig.6 Dynamics of self-help.**

Notes: Significance rates before and after treatment \*- $p < 0,05$ ; \*\*- $p < 0,01$ ; \*\*\*- $p < 0,001$

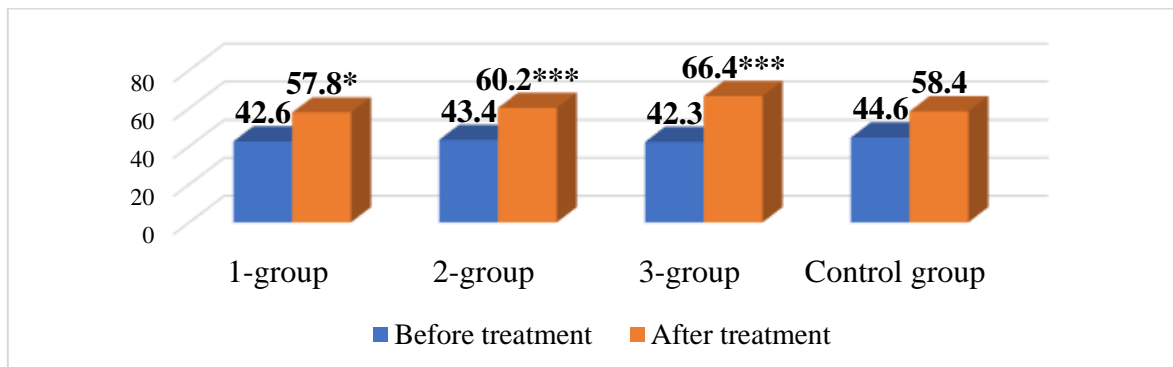
When conducting a survey of patients about the provision of self-help (Fig. 6), that is, the ability to move independently, take a shower and eat, be able to control oneself. The indicators were  $53.1 \pm 3.2$ ;  $52.8 \pm 4.3$ ;  $51.4 \pm 3.2$  points, respectively, before treatment and improved significantly to  $66.2 \pm 3.6$  ( $p < 0.05$ );  $63.2 \pm 3.8$  ( $p < 0.05$ );  $72.6 \pm 4.1$  ( $p < 0.001$ ) points after treatment by groups. There was a significant improvement in the empagliflozin and sacubitril-valsartan combination group.



**Fig.7 Dynamics of social limitation rates.**

Notes: Significance rates before and after treatment \*- $p < 0,05$ ; \*\*- $p < 0,01$ ; \*\*\*- $p < 0,001$

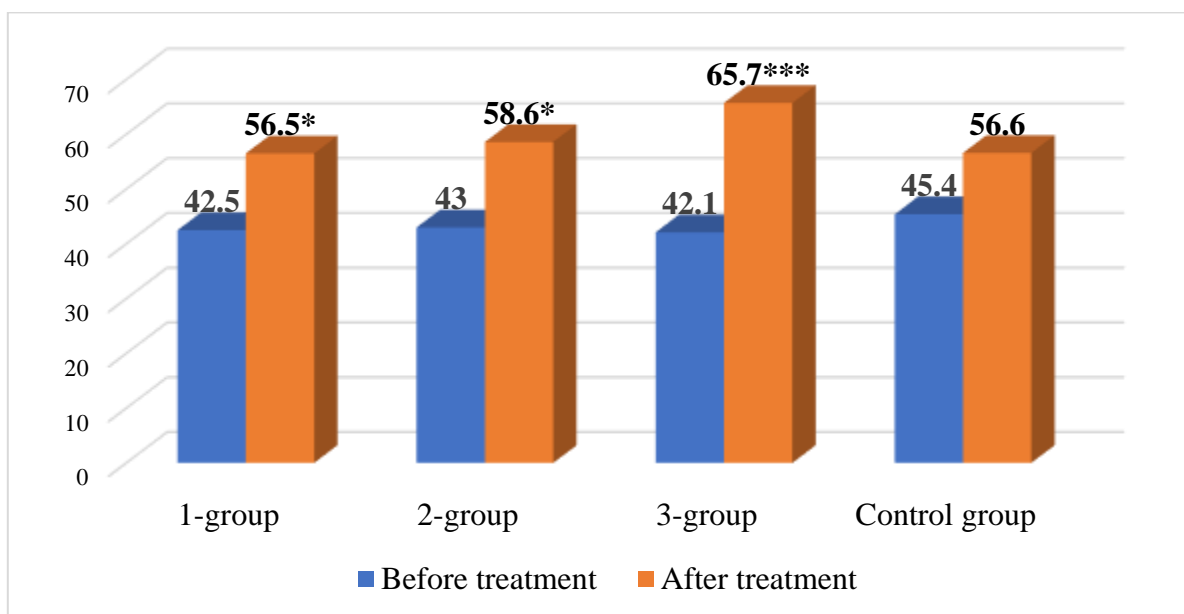
When assessing the social sphere (Fig. 7), where we studied the patient's social adaptation to life in society, for example, does he know what to do or whom to call if heart failure worsens, communication with friends, relatives, hobbies, recreation, entertainment. The examined patients scored  $43.4 \pm 5.1$ ;  $43.2 \pm 4.8$ ;  $41.8 \pm 4.6$  points in all groups, respectively. In the dynamics of treatment, patients became more sociable and adapted to society, and the scores were  $57.4 \pm 4.8$ ;  $60.8 \pm 5$  ( $p < 0.05$ );  $63.5 \pm 5.4$  ( $p < 0.01$ ), in three groups.



**Fig.8. Assessment of the quality of life in the dynamics of treatment.**

Notes: Significance rates before and after treatment \*- $p < 0,05$ ; \*\*- $p < 0,01$ ; \*\*\*- $p < 0,001$

When assessing the quality of life of patients, they were asked to answer such questions as does the disease limit the enjoyment of life? Are they satisfied with life, how often did they feel disappointed or discouraged due to heart failure and the average score for the groups was  $42.6 \pm 5.1$ ;  $43.4 \pm 4.3$ ;  $42.3 \pm 3.7$ , respectively. In the dynamics of treatment, the indicators were  $57.8 \pm 4.2$  ( $p < 0.05$ );  $60.2 \pm 4.6$ ;  $66.4 \pm 5$  ( $p < 0.001$ ), respectively, a significant breakthrough was observed in the group taking the combination of empagliflozin and valsartan-sacubitril in complex treatment.



**Fig.9. The total score of the questionnaire in the dynamics of treatment.**

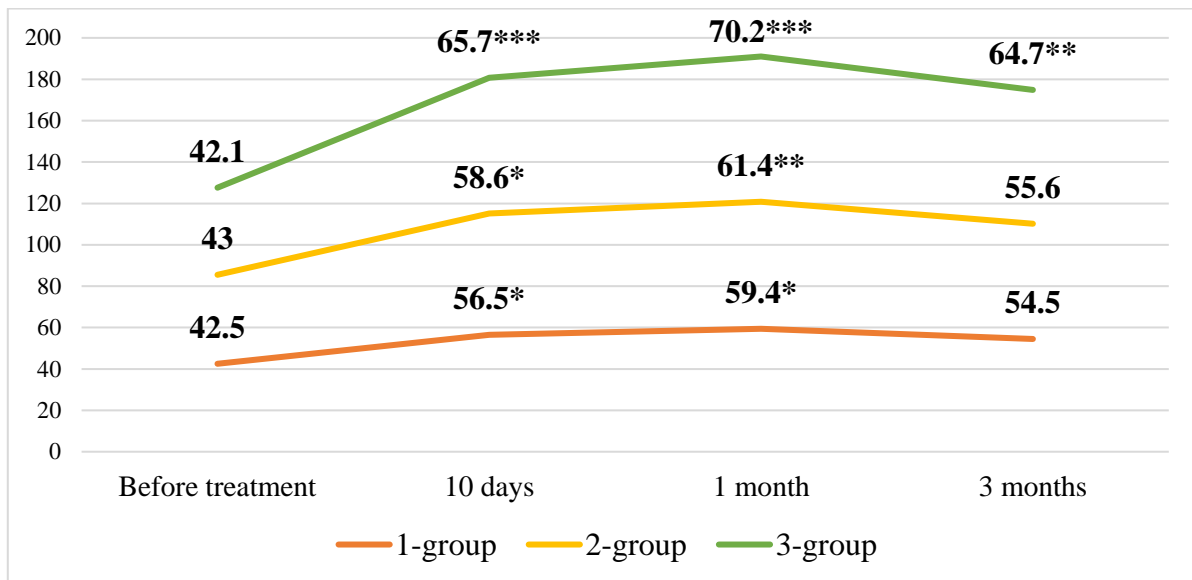
Notes: Significance rates before and after treatment \*- $p < 0,05$ ; \*\*- $p < 0,01$ ; \*\*\*- $p < 0,001$

Fig. 10 shows the overall picture of the survey of patients according to the Kansas questionnaire. Mean values before treatment were  $42.5 \pm 4.8$ ;  $43 \pm 4.7$ ;  $42.1 \pm 4.1$  in three groups, respectively. As a result, it was noted that the state of quality of life in patients with CHF is unsatisfactory.

In the dynamics of the therapy, there was a significant increase in scores in all the examined groups, which amounted to  $56.5 \pm 4.5$  ( $p < 0.05$ );  $58.6 \pm 4.5$  ( $p < 0.05$ );  $65.7 \pm 4.7$  ( $p < 0.001$ ) points, respectively. It should be noted that although the indicators are practically close and have an advantage in the group receiving empagliflozin

than in the group with Uperio, a more pronounced significant increase to  $65.7 \pm 4.7$  ( $p < 0.001$ ) points in the group receiving the combination of valsartan-sacubitril and empagliflozin. In the group of CHF patients who did not have Covid-19 before treatment, the condition of the patients also reached  $45.4 \pm 5$  points, which is still higher than in the groups of patients who had Covid-19. In the dynamics of treatment in this group, the increase was  $56.6 \pm 4.2$  points, which nevertheless indicates a fairly good effect of the use of valsartan drugs - sacubitril and empagliflozin and their positive effect on the quality of life.

Further, a study was conducted on the use of the above drugs for 3 months. (Fig. 10).



**Fig.10 Dynamics of the total number of points within 3 months.**

Notes: Significance rates before and after treatment \*- $p < 0,05$ ; \*\*- $p < 0,01$ ; \*\*\*- $p < 0,001$

The graph shows that during the first 10 days of treatment, the total number of points on the Kansas questionnaire increases significantly in all three groups, as indicated above. In the dynamics after a month, it can be seen that the quality of life of patients and their condition continues to improve significantly and amounted to 59.4 points in the group receiving valsartan-sacubitril in complex treatment. In the group of patients who received empagliflozin in complex treatment after a month, patients scored 61.4 points, which is slightly higher than in the first group. And in the group of patients with CHF who received a combination of empagliflozin and valsartan-sacubitril, the average score increased significantly and amounted to 70.2 points, which is much higher than in the first and second groups.

In the DAPA-HF study, patients were considered to improve in health if the KCCQ score increased by 5 points or if it remained  $\geq 95$  points both at baseline and after 8 months. In our study of therapy, we also see a significant increase in scores in all examined subgroups, amounting to 56.5; 58.6; 65.7 points respectively. In the subgroup receiving sacubitril-valsartan, the total score increased by 14 points, in the subgroup of patients receiving empagliflozin by 15.6 points, in the subgroup receiving both sacubitril-valsartan and empagliflozin increased by 23.6 points. There was a benefit in the empagliflozin subgroup with a significant margin in the combination subgroup. Our data are consistent with the findings of the DAPA-HF multicenter study.

In the DAPA-HF study, patients treated with dapagliflozin had a more pronounced improvement in the mean KCCQ-TSS, total clinical score and total score after 8 months, and more patients showed at least a slight, moderate and significant improvement [10].

According to researcher Grinn P.K. and C.C. Porter, large changes in scores were observed among patients whose CHF decompensation improved after three months ( $n = 39$ ; mean change = 15.4 to 40.4 points,  $p < 0.01$  for all). The sensitivity of the KCCQ was significantly higher than that of the Minnesota Living with Heart Failure and SF-36 questionnaires. The data of this study are also similar to the results of our study where our patients improved their scores from 14 to 23.6 points during the treatment period for 3 months [11].



Results of the PRESERVED-HF study, which investigated the effect of the SGLT2 inhibitor dapagliflozin on measures of quality of life in patients with HFpEF (n = 324), a multicenter, double-blind, randomized, placebo-controlled study demonstrated a significant improvement in the primary endpoint of quality of life by 5.8 score determined by the KCCQ.

The EMPEROR-Preserved protocol included quality of life assessments at 12 and 32 weeks, but KCCQ scores at these interval assessments have not yet been published [12].

## Conclusion

Thus, based on the literature data, studies and data obtained during the study, we can draw preliminary conclusions that the Kansas Quality of Life Questionnaire showed that the condition of patients with CHF has an unsatisfactory assessment and in the dynamics of therapy against the background of therapy, there is an improvement in quality parameters. Life with a large advantage in the group of patients treated with empagliflozin.

The examined patients were invited and filled out the questionnaire in the dynamics of 12 weeks. In the first group, in the complex treatment that received valsartan-sacubitril, patients scored 54.5 points. In the second group of patients who received empagliflozin in the complex treatment, the total score was 55.6, and in the third group it was 64.7 points. After three months, the quality of life indicators was at a level slightly less than after ten days of the dynamics and stopped at these indicators, that is, there is a good rise in the quality of life indicators, which reach a certain level within 8-10 weeks, and then the effect freezes and no further growth is observed. Thus, based on the above, the following conclusions can be drawn:

1. Patients with CHF with systolic dysfunction, both with and without Covid-19, have an unsatisfactory state of quality of life based on the Kansas Quality of Life Questionnaire.
2. The use of empagliflozin and valsartan-sacubitril separately in the complex treatment of CHF has a positive effect on the parameters of quality of life, the social sphere, the severity and duration of symptoms, and the physical condition of patients suffering from heart failure.
3. The use of a combination of drugs empagliflozin and valsartan-sacubitril has a more significant effect in terms of reducing the severity and duration of symptoms, quality of life in the social sphere of patients with CHF with reduced ejection fraction.
4. The results show that empagliflozin and valsartan-sacubitril statistically significantly improve CHF-associated health status (symptoms, physical function, and quality of life) according to the Kansas City Inventory; while the beneficial effect was manifested in the first week, remained stable for 8-10 weeks, and then there was a decrease in the growth of the effect. To elucidate the mechanism of this effect, a longer, deeper further observation is required.

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