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RELATIONSHIP BETWEEN INDICATORS OF DEPRESSION, QUALITY OF LIFE, COMPLIANCE AND BLOOD PRESSURE IN PATIENTS UNDERGOING RENAL REPLACEMENT THERAPY

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This article presents the results of the relationship between blood pressure indicators and anxiety and depression, indicators of quality of life, compliance to treatment in patients undergoing renal replacement therapy. It was found that in patients undergoing dialysis therapy without accompanying diabetes, there is a direct correlation between blood pressure and the level of anxiety and depression in patients without and with diabetes. Similar changes are observed in patients undergoing peritoneal dialysis. In patients on programmed and peritoneal dialysis with and without concomitant diabetes there is a pronounced inverse correlation between the value of systolic blood pressure and components of quality of life and compliance. Dialysis patients are exposed to a number of components that significantly increase cardiovascular risk, and the elimination of which can significantly improve the effectiveness of therapy in dialysis patients and reduce the degree of cardiovascular risk. These factors include anxiety and depression, quality of life, and compliance to treatment. They are organically interconnected and significantly affect the leading cardiovascular risk factors and, first of all, arterial hypertension.

Key words: programmed hemodialysis, peritoneal dialysis, blood pressure, anxiety, depression, quality of life, compliance.

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ВЗАЄМОЗВ'ЯЗОК МІЖ ПОКАЗНИКАМИ ДЕПРЕСІЇ, ЯКОСТІ ЖИТТЯ, КОМПЛАЄНСУ ТА АРТЕРІАЛЬНИМ ТИСКОМ У ПАЦІЄНТІВ, ЩО ПЕРЕБУВАЮТЬ НА НИРКОВО-ЗАМІСНІЙ ТЕРАПІЇ

У даній статті представлені результати взаємозв'язку між показниками артеріального тиску та тривогою і депресією, показниками якості життя, прихильності до лікування у пацієнтів, що перебувають на нирково-замісній терапії. Виявлено, що у пацієнтів без супутнього цукрового діабету на діалізній терапії існує пряма кореляційна залежність між величиною артеріального тиску та рівнем тривоги і депресії у пацієнтів без цукрового діабету та з цукровим діабетом. Аналогічні зміни наявні у пацієнтів, які перебувають на перитонеальному діалізі. У пацієнтів на програмному та перитонеальному діалізі з наявністю та без наявності супутнього цукрового діабету існує виражений зворотний кореляційний зв'язок між величиною систолічного артеріального тиску та компонентами якості життя і комплаєнсом. У пацієнтів на діалізній терапії наявна низка складових, які суттєво збільшують кардіоваскулярний ризик і усунення яких може значно покращити ефективність терапії пацієнтів на діалізі та зменшити ступінь кардіоваскулярного ризику. Цими факторами є тривожність та депресія, якість життя та прихильність до лікування. Вони органічно пов'язані між собою і суттєво впливають на провідні фактори кардіоваскулярного ризику і, в першу чергу, на артеріальну гіпертензію.

Ключові слова: програмний гемодіаліз, перитонеальний діаліз, артеріальний тиск, тривога, депресія, якість життя, комплаєнс.

Chronic kidney disease, and its treatment, especially in the late stages of kidney disease, is an urgent medical problem of the modern clinic of internal medicine [8, 9]. Currently, about 850 million people in the world suffer from various kidney diseases. One in ten adults in the world has CKD, which progresses irreversibly [7, 10]. The global burden of CKD is increasing, and by 2040, CKD is expected to be the fifth leading cause of years of life lost. Such a high frequency depends on the increase in the number of diseases that lead to kidney damage, on the increase in the quality of treatment and, therefore, life expectancy, the improvement of diagnostic methods, and possible early diagnosis. In the United States, diabetes and hypertension are the leading causes of kidney failure, accounting for approximately 3 out of 4 new cases. Approximately 1 in 3 adults with diabetes and 1 in 5 adults with systematically elevated blood pressure have kidney disease [4, 12].

Cardiovascular disease (CVD) is the most common cause of death in CKD, and the latter is an independent risk factor for cardiovascular disease and death. Bidirectional relationships of 'heart-kidneys', where the pathophysiological disturbance of one of the organs can lead to dysfunction of the other, are defined by the concept of "cardiorenal syndrome" [5].

On the other hand, with the introduction of new, more advanced dialysis technologies and methods of medication correction, full control of the physical condition of patients, which led to a significant increase in the life expectancy of patients who receive replacement therapy by the method of programmed hemodialysis, the issue of the mental status of this category of patients is becoming more and more relevant. In modern medicine, it is generally accepted that when assessing the severity of the disease and choosing the correct tactics for managing patients, it is necessary to take into account not only the somatic indices of the state of health, but also the psychological state. Dialysis patients are exposed to a number of components that significantly increase cardiovascular risk, and the elimination of which can significantly improve the effectiveness of therapy in dialysis patients and reduce the degree of cardiovascular risk. These factors include anxiety and depression, quality of life, and compliance to treatment. They are organically interconnected and significantly affect the leading cardiovascular risk factors and, first of all, arterial hypertension [1-3, 15].

The awareness of a life-threatening diagnosis and the need to be treated throughout life, the use of dialysis therapy and the overcoming of transient treatment attempts, awareness of the consequences and complications, determines the need for a thorough analysis of psychosocial factors that have an impact on cardiovascular risk. It is in the world of a number of the above-mentioned components that the psychological problems caused by the disease and its treatment become especially important. Psychosocial status, compliance between doctor and patient, quality of life are important components of social well-being, while health indicators in patients with end-stage renal disease undergoing programmed or peritoneal dialysis can directly and indirectly affect the degree of cardiovascular risk [11, 14]. Therefore, it is important to understand the relationship between anxiety and depression, between anxiety-depressive disorders and organic diseases, the impact of anxiety-depressive disorders on quality-of-life indices and compliance to treatment. And, most importantly, on the existence of a possible relationship between indicators of the psychological state and the indicator of cardiohemodynamics, blood pressure.

The purpose of the study was to determine possible correlations between the level of systolic blood pressure and indices of anxiety, depression, indices of quality of life and compliance to treatment in patients on programmed and peritoneal dialysis, taking into account the presence of type 2 diabetes mellitus.

Materials and methods. After receiving written consent to conduct an interview, in accordance with the principles of the Helsinki Declaration of Human Rights, the Council of Europe Convention on Human Rights and Biomedicine, the relevant laws of Ukraine and international acts in a randomized manner with prior stratification, the presence of CKD (Order of the Ministry of Health of Ukraine No. 89 dated 11 February 2016 "On Providing Medical Care to Patients with Stage V Chronic Kidney Disease Using Hemodialysis or Peritoneal Dialysis"), type 2 diabetes (Order of the Ministry of Health of Ukraine No. 1118 dated 21 December 2012) and its absence, 114 patients who were treated at the nephrology and dialysis centre of the municipal enterprise "M.V. Sklifosovskyi Poltava Regional Clinical Hospital of the Poltava Regional Council" have been enrolled to the study of which: 44 patients were undergoing programmed hemodialysis, 21 were undergoing peritoneal dialysis and 49 patients with stages I-II CKD who made up the control group. Further, the first study group (patients undergoing programmed hemodialysis) was divided into two subgroups: 20 patients (HD1) with diabetic nephropathy (DN), 24 – with other diseases (HD2). The second study group (PD) was also divided into two subgroups: 6 patients with DN (PD1) and 15 patients without DN (PD2). The control group was divided as follows: 23 patients with DN (CG1) and 26 patients without DN (CG2). The mean duration of programmed hemodialysis treatment was 6.1±6.3 years. The mean duration of peritoneal dialysis treatment was 3.2±2.6 years. The mean age of hemodialysis patients was 48.1±10.9 years, with 51.3±8.9 years in HD1 and 48.1±12.8 years in HD2. The mean age of peritoneal patients was 50.1±13.1 years, with 51.7±17.4 in PD1 and 49.2±11.3 years in PD2. The average age of patients in the control group was 48.7±16.9 years, with the average age of 57.4±9.5 years in CG1, and 38.6±17.3 in CG2, respectively.

A questionnaire survey was conducted to assess quality of life, compliance to treatment, anxiety and depression indices, using the following questionnaires: SF-36, Morisky-Green Medication Adherence Scale (MMAS-8), Hospital Anxiety and Depression Scale (HADS).

Before the comparison, statistical indices were checked for normality (criteria quality). Statistical calculations were performed using applied computer programs MS Excel 2010, Statistica 10, using statistical calculation options (arithmetic mean, standard error). The probability of differences between comparative groups was determined using the parametric Student's test. The difference at the $p<0.05$ level was considered reliable. The correlation coefficient was determined using the non-parametric Spearman correlation method and the parametric Pearson correlation method.
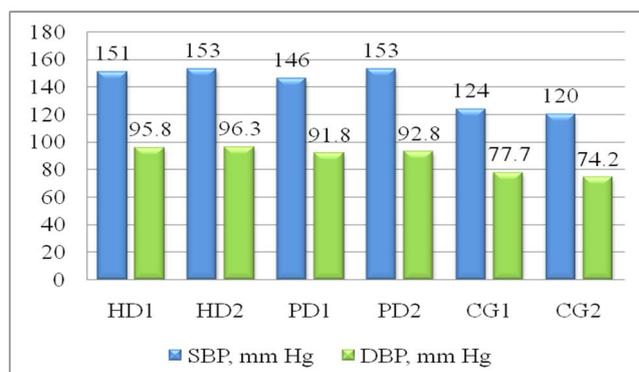
Fig. 1. Average indices of SBP and DBP in patients of study and control groups (p>0.05).

Results of the study and their discussion. A mandatory index during the objective examination was the determination of the blood pressure level (Fig. 1). The mean values of blood pressure, both systolic and diastolic, show a statistically significant difference between the study and control groups (p<0.05), while no statistically significant difference was found between the subgroups of the study groups themselves (p>0.05).

Before determining the correlation between the level of systolic blood pressure and indicators of anxiety, depression, indicators of quality of life and compliance to treatment in patients on programmed and peritoneal dialysis, taking into account the presence of type 2 diabetes mellitus, indicators of anxiety and depression, indicators of compliance to treatment and indicators of psychological and physical components of QOL. Thus, a reliably significant difference was found in patients without signs of anxiety in groups HD1 and CG1, HD2 and CG2, PD1 and CG1, PD2 and CG2, HD2 and PD2, p<0.05, respectively (Table 1).

Table 1

Indices of anxiety and depression in study and control groups

Index/groups	HD1, n (%), M±m, p	HD2, n (%), M±m, p	PD1, n (%), M±m, p	PD2, n(%), M±m, p	CG1, n (%), M±m, p	CG2, n (%), M±m, p
No signs of anxiety	7 (35.0) 4.6±0.4	14 (58.3) 4.7±0.4	2 (33.3) 5.5±0.7	10 (66.7) 6.7±0.8	18 (69.3) 3.2±0.4	18 (78.3) 1.7±0.5
Confidence, p	p_1<0.01; p_2>0.05	p_1<0.001 p_3<0.05	p_1<0.001	p_1<0.001	p_1<0.001	p_1<0.001
Subclinical stage of anxiety	11 (55.0) 9.1±0.3	10 (41.7) 8.3±0.5	3 (50.0) 8.7±0.6	5 (33.3) 9.2±0.8	8 (30.7) 7.2±0.5	5 (21.7) 7.2±0.4
Confidence, p	p_1<0.05; p_2>0.05	p_1<0.05 p_3>0.05	p_1<0.05	p_1<0.05	p_1<0.05	p_1<0.05
Clinical stage of anxiety	2 (10.0) 12.5±0.5	-	1 (16.7)	-	-	-
No signs of depression	14 (70.0) 4.4±0.4	14 (58.3) 5.3±0.8	5 (83.3) 6.4±0.9	12 (80.0) 6.0±1.1	21 (80.8) 3.8±0.8	22 (95.7) 1.8±0.7
Confidence, p	p_1>0.05 p_2<0.05	p_1<0.001 p_3>0.05	p_1<0.001	p_1<0.001		
Subclinical stage of depression	5 (25.0) 9.6±0.4 p_2<0.05	10 (41.7) 7.3±0.5	1 (16.7%)	3 (20.0%) 9.3±0.6	5 (19.2) 8.4±0.5	1 (4.3)
Confidence, p	p_1<0.05	p_3<0.05				
Clinical stage of depression	1 (5.0)	-	-		-	-

Note: p_1 is a significant difference between study and control groups, p_2 is a significant difference between HD1 and PD1, p_3 is a significant difference between HD2 and PD2

The frequency of detection of the subclinical stage of anxiety in HD1 and CG1 patients and in PD1 and CG1 patients had a significantly reliable difference (p<0.001). There was also a statistically reliable difference in the indicators of the subclinical stage of anxiety in HD2 and CG2 patients of p≤0.05, PD2 and CG2 of p<0.05. The frequency of detection of the subclinical stage of depression in HD1 and CG1 patients had a statistically reliable difference (p<0.05).

When determining quality of life indicators, it was found that both the QOL physical component (PCQOL 49.5±8.4 and 81.0±3.5; 48.7±5.4 and 85.2±6.6) and the QOL mental component (MCQOL 49.7±11.5 and 91.4±2.1; 44.5±10.6 and 90.1±8.2) in HD1 with CG1 and HD2 with CG2 have a high degree of confidence, p<0.001. Similar changes were also detected when determining indicators in the PD1 and PD2 groups: physical component indicators 52.8±14.0, 49.0±12.9 and mental component indicators 59.2±5.6, 58.0±3.7 had a significantly reliable difference when compared with the indicators of the control groups, p<0.001.

The Morisky-Green questionnaire consisting of 8 questions was used to determine the level of compliance between the doctor and the patient or adherence to treatment. Thus, 6 (30.0 % of the total number of patients in this group) patients in HD1 had a high adherence to treatment, 5 (20.8 %) patients in HD2, 2 (33.3 %) patients in PD1, 3 (20.0 %) patients in PD2. Whereas, there were 4 (15.4 %) patients in

CG1, 2 (8.7 %) patients in CG2. Average compliance to treatment had the highest number of patients in both study and control groups: 33 (28.9 % of the total number of patients in the study) patients to 18 (15.7 %), respectively. Interestingly, it is the patients from the control groups that had a low level of compliance: 25 (21.9 %) patients compared to 16 (14.0 %) patients in study groups. Based on the results, it can be concluded that the revealed data is a result of rare communication between the doctor and the patient and, as a result, a low level of health control by both the patient and the doctor. The low level of compliance of CG1 and CG2 patients determines the further prognosis, work capacity and life expectancy.

We determined the correlation between anxiety, depression, and SBP, PCQOL and MCQOL and compliance to treatment. Correlation analysis was performed in study groups both with type 2 diabetes and without type 2 diabetes (Fig. 2 and 3).
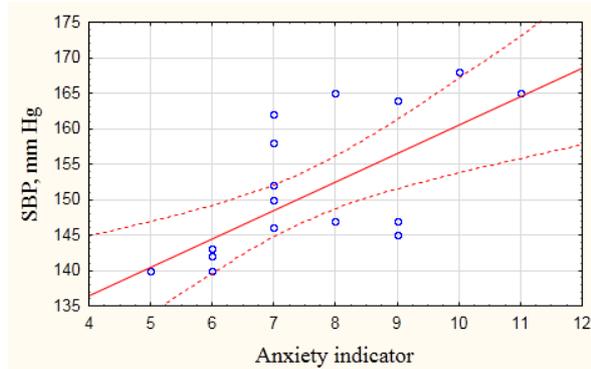

Fig. 2. Correlation dependence of SBP and anxiety in HD1 (r=0.6626)

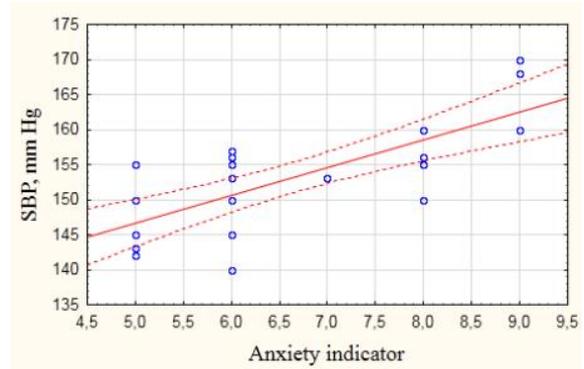
Fig. 3. Correlation dependence of SBP and anxiety in HD2 (r=0.74741)

In HD1 and HD2 groups, a significant and strong feedback was found, which makes it possible to assert the influence of anxiety on the SBP level. Similar changes were also found in the patients undergoing peritoneal dialysis.

Correlations between SBP, anxiety, depression, PCQOL, MCQOL, and compliance to treatment are shown in Table 2.

Table 2

Correlation between components of cardiovascular risk in hemodialysis and peritoneal groups

Index	Anxiety	Depression	PCQOL	MCQOL	Compliance
HD1					
SBP	0.6626	0.6042	-0.8722	-0.8891	-0.6609
Anxiety	-	-	-0.4907	-0.6906	-0.6393
Depression	-	-	-0.5058	-0.7263	-0.6299
Compliance	-	-	0.3684	0.6327	-
HD2					
SBP	0.7474	0.5238	-0.9214	-0.8164	-0.8247
Anxiety	-	-	-0.7939	-0.7040	-0.7324
Depression	-	-	-0.5970	-0.6593	-0.4499
Compliance	-	-	0.8081	0.8363	-
PD1					
SBP	0.9039	0.4918	-0.9027	-0.7210	-0.8619
Anxiety	-	-	-0.9037	-0.8771	-0.9147
Depression	-	-	-0.7042	-0.6428	-0.8280
Compliance	-	-	0.7969	0.9006	-
PD2					
SBP	0.5570	0.6842	-0.8496	-0.6617	-0.9379
Anxiety	-	-	-0.3125	-0.3050	-0.5141
Depression	-	-	-0.4704	-0.5309	-0.5824
Compliance	-	-	0.8524	0.7024	-

This table illustrates the inverse correlation between SBP and quality of life indicators and compliance to treatment, as well as the direct correlation between SBP and anxiety and depression. As rates of anxiety-depressive disorders increase, rates of both QOL and compliance to treatment decrease. This relationship is bidirectional, i.e., in turn, a decrease in quality of life indicators and compliance to treatment can negatively affect the level of anxiety-depressive disorders and increase their indices.

The results of our research proved that in order to choose the correct, rational tactics for managing patients, it is necessary to take into account not only indices of the physical state of health, but also their mental state, because they are closely intertwined. Other researchers, including Michael J. Fischer et al, who investigated the level of depression in patients with CKD, found that out of 3,853 patients, 28.5 % had signs of depression (in our study, 26 patients, i.e. 22.8 %) and emphasized the problem of mental health, and also recommend screening for depression, which may also be a key intervention to improve quality of life, compliance to treatment, and physical status in patients with CKD [6]. Robert W. Schouten et al, investigating depression in patients of 10 dialysis centres in the Netherlands, proved that there is an independent effect of symptoms of anxiety and depression on the clinical outcome, worsening the course of cardiovascular complications, which emphasizes its clinical significance [13]. That is, our research, which is harmoniously combined with the results obtained in other foreign studies, proves the close relationship between indicators of physical and mental state, which is important for both therapy and prevention of combined pathology.

Conclusions

1. In patients undergoing programmed hemodialysis, there is a direct correlation between the value of blood pressure and the level of anxiety without diabetes (r=0.7474) and with diabetes (r=0.6626), as well as with the level of depression (respectively, r=0, 5238 and r=0.6042). Similar changes are observed in patients undergoing peritoneal dialysis. In patients on programmed and peritoneal dialysis with and without concomitant diabetes there is a pronounced inverse correlation between the value of SBP and components of quality of life and compliance.

2. Dialysis patients are exposed to a number of components that significantly increase cardiovascular risk, the elimination of which can significantly improve the effectiveness of therapy in dialysis patients and reduce the degree of cardiovascular risk. These factors include anxiety and depression, quality of life, and compliance to treatment. They are organically interconnected and significantly affect the leading cardiovascular risk factors and, first of all, arterial hypertension.

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