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PERSONALITY FACTORS IN HEART TRANSPLANT RECIPIENTS

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Objective: to assess the personal psychological profile of heart transplant recipients as the first stage in the development of post-transplant personalized rehabilitation programs. **Materials and methods.** From January 2010 to July 2019, 129 HTs were performed (mean age 46.6 ± 14.1 years; 74% (n = 95) were men, 26% (n = 34) were women). All patients in the heart transplant waiting list were examined by a clinical psychologist and a psychotherapist to exclude contraindications to transplant surgery. To assess personal traits, we used the standard multifactorial questionnaire by Cattell R., 16 PF (version A), which included 187 questions. Heart transplantation and absence of post-transplant severe cognitive impairments were the selection criteria for this study. Patients were surveyed before they were discharged from the hospital – 30–60 days following HT: during the period of complete recovery after surgery. In the present study, a retrospective assessment of the results was performed in 107 patients (n = 76 – men; n = 31 – women). **Results.** Analysis of the personality portrait revealed that over half of recipients were reserved, distant (factor A – schizothymia) and restrained (factor F – restraint; F2 – introvert; F4 – conforming) with lower mental capacity (factor B), and were shy, timid (factor H), with low super ego (factor G: irresponsible, tolerates disorder, flexible, open to change). Our results showed that 47% of patients (n = 18 out of 38 patients, n = 22 are pensioners) with a weak degree of factor C (reactive, affected by feelings) are workers to 42% (n = 29 out of 69, n = 28 – retirees) with a strong degree of the same factor. One year after HT, the number of physically active patients was higher among those with low anxiety compared with high anxiety (41% (18 of 44) and 32% (20 of 63), respectively, p = 0.41). **Conclusion.** Personality factors are non-modifiable characteristics of patients. They affect human behavior, return to work and to social life, as well as physical and psychological recovery from HT. Knowing the personal traits of recipients would allow to develop a personalized approach to their rehabilitation and a technique for timely examination after HT.

Keywords: heart transplantation, psychological well-being, personality factors, quality of life.

INTRODUCTION

Psychological and social factors in patients with chronic heart failure (CHF) and recipients before heart transplantation (HT) take on special significance and determine the patients' compliance at the stage of waiting for the operation, during reconstructive postoperative treatment and rehabilitation, which is related directly to the overall clinical prognosis, including their survival [1]. Despite the fact that every year the number of HT increases [2] and there are studies reflecting the dynamics of quality of life (QL) after surgery, at present there are no publications on the peculiarities of personal characteristics of recipients after a heart transplantation.

Purpose: to assess the personal psychological profile of heart transplant recipients as the first stage in the development of post-transplant personalized rehabilitation programs

MATERIALS AND METHODS

January 2010 to July 2019, 129 HT were performed (mean age 46.6 ± 14.1 years; 74% (n = 95) men, 26% (n = 34) women), of which six were children (median age 15, range 10 to 16); 5 girls, 1 boy). Mechanical circulatory support (MCS) was implanted as a bridge to HT in 14% (n = 18) patients: 11 – extracorporeal membrane oxygenation (ECMO) system, 8 – Berlin Heart "EXCOR" biventricular system, 1 – left ventricular assist circulatory system (and LV "AVK-N"). While on the waiting list for heart transplantation (HT WL), 46 patients were working or studying (school, institute) and 83 were not working, including retirees. One of the points of examination at HT WL was a consultation with a clinical psychologist and a psychotherapist to rule out contraindications for surgery. If necessary, patients were recommended to take antidepressants. After HT, consultations with a clinical psychologist or a psychotherapist were performed only by indications or personal requests of patients: two patients continued to take the drugs recommended by the HT WL, and 5 drugs were first prescribed within 1 month to 5 years after HT.

To assess personal characteristics, we used the standard multifactorial questionnaire by Cattell R., 16 PF

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(version A), which includes 187 questions and is designed to examine adults with an education of at least 8–9 grades. The results of the questionnaire allow us to assess the primary and secondary factors of various personality traits, which have a double (bipolar) title characterizing the degree of development of a trait: strong or weak [3]. This study was conducted in accordance with the principles of the Declaration of Helsinki.

The selection criteria for this study were HT performed and the absence of severe cognitive impairments that developed in the post-transplant period. Patients were questioned before they were discharged from the hospital on days 30–60 after HT: during the period of complete recovery after surgery. Patients under 18 completed the questionnaires only after they reached the age of 16–17. In the present study, a retrospective assessment of the results was performed in 107 patients (76 men, 31 women). The analysis did not include 22 recipients (17%): 10% (13 of 129) died in the early postoperative period, 3% (4 of 116) were not questioned due to severe cognitive impairments developed after HT, and five were not included in the present study due to HT performed less than 30 days ago.

After discharge from the hospital, all recipients were put on dispensary registration in the Center, including regular observation, laboratory and instrumental research and specialist consultations.

Data were statistically processed with the SPSS 21.ORU software. Mean values and standard deviation (M ± SD) were calculated. In case of a small sample (<20), the data were presented as medians (Me) [minimum and maximum values]. Statistical significance criterion was $p < 0.05$. Correlation analysis was also performed.

RESULTS

In the described population, the psychological personality profile of patients after HT in most of them is presented by strong features: the frequency of occurrence of personal factors of more than 50% was 13 strong degrees and 7 weak degrees out of 20 (Table 1). According to our results, only one third of patients who underwent HT had high intelligence. When analyzing the personality portrait, it was revealed that more than half of the recipients were secretive, distrustful (factor A – schizothymia) and restrained (factor F – restraint; F2 – introvert; F4 – conformity) with low intelligence (factor B), indecisive (factor H – trektia), with a low superego (factor G: irresponsible, disorganized, fickle, changeable). Among the personal factors, the majority of patients showed emotional stability (factor C – strength I), self-will and stubbornness (factor E – dominance), restlessness and fussiness (factor I – premission), internal tension and egocentricity (factor L – resistance), idealism and dreaminess (factor M – autism), insight (factor N – diplomacy), depression and self-flagellation (factor O – hypothymia), good awareness and tolerance for in-

Table 1

Results of P. Cattell's a6 PF questionnaire in heart transplanted patients (version A)

	Determining factors	Personal characteristics			
		"–"		"+"	
I	Factor A	Schizothymia	60% (n = 64)	Affectothymia	40% (n = 43)
II	Factor B	Low intelligence	65% (n = 70)	High intelligence	35% (n = 37)
III	Factor C	Weak I	36% (n = 38)	Strong I	64% (n = 69)
IV	Factor E	Conformity	33% (n = 35)	Dominance	67% (n = 72)
V	Factor F	Reservedness	61% (n = 65)	Expressiveness	39% (n = 42)
VI	Factor G	Low superego	60% (n = 64)	High superego	40% (n = 43)
VII	Factor H	Trektia	62% (n = 66)	Parmia	38% (n = 41)
VIII	Factor I	Harria	41% (n = 44)	Premsia	59% (n = 63)
IX	Factor L	Alaxia	39% (n = 42)	Protensia	61% (n = 65)
X	Factor M	Praxernia	37% (n = 40)	Autia	63% (n = 67)
XI	Factor N	Straightforwardness	27% (n = 29)	Diplomacy	73% (n = 78)
XII	Factor O	Hyperthymia	48% (n = 51)	Hypothymia	52% (n = 56)
XIII	Factor Q1	Rigidity	43% (n = 46)	Radicalism	57% (n = 61)
XIV	Factor Q2	Group dependence	12% (n = 13)	Self-sufficiency	88% (n = 94)
XV	Factor Q3	Low self-righteousness	30% (n = 32)	High self-righteousnes	70% (n = 75)
XVI	Factor Q4	Low ego tension	32% (n = 34)	High Low ego tension	68% (n = 73)
Secondary factors					
I	Factor F1	Low anxiety	41% (n = 44)	High anxiety	59% (n = 63)
II	Factor F2	Introvert	64% (n = 69)	Extrovert	36% (n = 38)
III	Factor F3	Sensitivity	48% (n = 51)	Reactive balance	52% (n = 56)
IV	Factor F4	Conformity	82% (n = 88)	Independence	18% (n = 19)

conveniences (factor Q1 – radicalism) and reactive balance (factor F3 – stability, cheerfulness, determination).

The primary factor "C" is responsible for 2 degrees of development: "–" weakness of the I (weakness, emotional instability, changeable, easily upset, refuses to work, unwavering in interests) and "+" strength of the I (strength, emotional stability, mature, realistic configured, workable). According to our results, 47% (18 patients out of 38; 22 are retirees) with a weak degree of factor C are working, compared to 42% (29 out of 69; 28 are retirees) with a strong degree of this factor ("I Power").

The primary factor "B" has 2 degrees of development of traits: "–" – low intelligence (unfocused, disorganized with rigid thinking and low mental abilities) and "+" – high intelligence (focused, quick-witted, high mental abilities). The number of obese patients (BMI >30 kg/m^2) prevailed among patients with weak factor B (low intelligence) compared with those with high intelligence (11% (8 out of 70) and 5% (2 out of 37), respectively, p = 0.49). Factor Q4 levels, low ego tension and high ego tension, reflect personality characteristics ranging from relaxation, apathy, low motivation and laziness to focus, energy, increased motivation and activity: 35% (12 of 34) of patients with low ego returned to work after HT versus 44% (32 of 73) with high ego (p = 0.53).

One year after HT, the number of physically active patients was higher among those with low anxiety compared with highly anxious (41% (18 of 44) and 32% (20 of 63), respectively, p = 0.41). According to our results, the personal characteristics of patients did not affect the parameters of cardiopulmonary testing (VO_{2peak}, VO_{2peak} (% MV), Ve/VCO_2) 1 year after HT (p > 0.05).

When comparing personality characteristics depending on gender, it was revealed that in men 9 out of 20 factors had a weak degree of development, while in women – 10 out of 20 (Table 2). In men, among the factors, harria prevailed (severity, realistic judgments, does not pay attention to physical ailments, practicality) and extension (great conceit, irritability, the requirement from others to be responsible for their mistakes), while in women – a premium (sensitivity, hypochondria, anxiety, over-caution) and alaxia (gullibility, agreement with the proposed conditions, tolerance). Hypothymia (anxiety, anxiety, depression, feelings of loneliness, hypochondria) prevailed among women, and hyperthymia (carelessness, self-confidence, serenity, thoughtlessness) among men. Both sexes had high self-esteem, self-sufficiency, high ego-tension and anxiety (>50%). 62% of men and 71% of women in the analyzed population were characterized by shyness, secrecy, restraint (factor F2 – introvert) and passivity, the need for support (factor F4 – conformity).

Table 2

Results of personality factors in patients after heart transplantation regarding their gender

Nos.	Factors "–"			Factors "+"		
		Men (n = 76)	Women (n = 31)		Men (n = 76)	Women (n = 31)
Primary factors						
I	Schizothymia	62% (n = 47)	55% (n = 17)	Affectothymia	38% (n = 29)	45% (n = 14)
II	Low intelligence	64% (n = 49)	68% (n = 21)	High intelligence	36% (n = 27)	32% (n = 10)
III	Weak I	33% (n = 25)	42% (n = 13)	Strong I	67% (n = 51)	58% (n = 18)
IV	Conformity	28% (n = 21)	45% (n = 14)	Dominance	72% (n = 55)	55% (n = 17)
V	Reservedness	59% (n = 45)	65% (n = 20)	Expressiveness	41% (n = 31)	35% (n = 11)
VI	Low superego	59% (n = 45)	61% (n = 19)	High superego	41% (n = 31)	39% (n = 12)
VII	Trektia	61% (n = 46)	65% (n = 20)	Parmia	39% (n = 30)	35% (n = 11)
VIII	Harria	57% (n = 43)	3% (n = 1)	Premsia	43% (n = 33)	97% (n = 30)
IX	Alaxia	34% (n = 26)	52% (n = 16)	Protensia	66% (n = 50)	48% (n = 15)
X	Праксерния	41% (n = 31)	29% (n = 9)	Autia	59% (n = 45)	71% (n = 22)
XI	Straightness	29% (n = 22)	23% (n = 7)	Diplomacy	71% (n = 54)	77% (n = 24)
XII	Hyperthymia	58% (n = 44)	23% (n = 7)	Hypothymia	42% (n = 32)	77% (n = 24)
XIII	Conservatism	38% (n = 29)	55% (n = 17)	Radicalism	62% (n = 47)	45% (n = 14)
XIV	Group dependence	15% (n = 11)	6% (n = 2)	Self-sufficiency	85% (n = 65)	94% (n = 29)
XV	Low self-righteousness	29% (n = 22)	32% (n = 10)	High self-righteousness	71% (n = 54)	68% (n = 21)
XVI	Low ego tension	34% (n = 26)	26% (n = 8)	High ego tension	66% (n = 50)	74% (n = 23)
Secondary factors						
I	Low anxiety	47% (n = 36)	26% (n = 8)	High anxiety	53% (n = 40)	74% (n = 23)
II	Introvert	62% (n = 47)	71% (n = 22)	Extrovert	38% (n = 29)	29% (n = 9)
III	Sensitivit	33% (n = 25)	84% (n = 26)	Reactive balance	67% (n = 51)	16% (n = 5)
IV	Conformity	80% (n = 61)	87% (n = 27)	Independence	20% (n = 15)	13% (n = 4)

There were no correlations between personality characteristics and mortality after heart transplantation ($p > 0.05$).

The following correlations between the factors of personal characteristics have been determined (Table 3). In 51% (n = 54) patients, a relationship was found between two factors: restraint, caution (factor F) and self-sufficiency, independence in decision-making (Q2). Moreover, 11% (6 out of 54) of patients with the above factors died within 3 months to 3 years after HT, compared with 15% (n = 8 out of 53) of patients who died without the personality characteristics F and Q2 (2 – sudden cardiac death, 1 – acute cerebrovascular accident (CVA) and 5 – progression of chronic diseases). In 5 out of 6 recipients, lethal outcomes (3 – crises of allograft rejection with graft dysfunction, 1 – myocardial infarction, transplanted heart coronary artery disease (ACVD), 1 – CVA) occurred due to complications for which they did not timely report complaints.

Moreover, 57% (n = 61) of patients had a combination of factors F1 + Q4 (irritability and aggressiveness), 13% (8 of 61) of which died, compared with 8.7% (7 of 46) of patients, not having these personality factors.

DISCUSSION

Patients after heart transplantation use different types of defense mechanisms, and more active use of defense mechanisms leads to psychological readiness for transplantation [4, 5]. Quality of life (QL) levels in physical well-being in patients after HT are improved, results are better in physically active patients [6]. QL and the incidence of depression after transplant have been studied in various works [7–10], but there are currently no publications on personality characteristics in recipients who received HT.

Personal characteristics are features that occur in all patients and do not change regardless of the operation. Depending on certain personal factors, the behavior of the recipient may differ and lead to different reactions to complications and coping mechanisms to negative dynamics of the state [4, 5]. Emotionally labile, or vice versa, reserved patients may underestimate the emergence of new complaints and untimely seek medical attention. While determined, radical patients with extroverted thinking will be motivated to improve their quality of life, perform regular physical activity and

Table 3

Correlations between personality factors in patients after heart transplantation

Nos.	Factor correlations	Value	Deciphered personality factors	Patients
Positive correlations				
1	E and F2	r = 0.390 (p < 0.001)	Being a dominant, unyielding, conflicting, wayward and extrovert who is good at establishing and maintaining social contacts	34% (n = 36)
2	E and F4	r = 0.304 (p = 0.002)	Being dominant and independent and aggressive	15% (n = 16)
3	F and F2	r = 0.393 (p < 0.001)	Being expressive, impulsive and extroverted	27% (n = 29)
4	H and F2	r = 0.595 (p < 0.001)	Being bold, adventurous, light-hearted and extroverted	26% (n = 28)
5	M and F4	r = 0.310 (p < 0.001)	Being dreamy, distracted, unbalanced and independent	16% (n = 17)
6	Q1 and F4	r = 0.365 (p < 0.001)	Being radical and critical, with intellectual interests, and aggressive, quick-witted	16% (n = 17)
7	F1 and Q4	r = 0.757 (p < 0.001)	Being irritable, motivated and aggressive, but quick-witted	57% (n = 61)
Negative correlations				
8	F and Q2	r = –0.377 (p < 0.001)	Being reserved, cautious, pessimistic and self-sufficient, independent in making decisions	51% (n = 54)
9	H and F1	r = –0.371 (p < 0.001)	Being indecisive, irritable, strictly adhering to rules and guidelines and satisfied with life, but with little motivation to strive for new goals and better quality of life	13% (n = 14)
10	H and Q4	r = –0.329 (p < 0.001)	Being emotionally labile and calm with a lack of motivation to take additional actions	12% (n = 13)
11	I and F3	r = –0.546 (p < 0.001)	Being realistic, practical, who doesn't pay attention to physical ailments	19% (n = 20)
12	M and F3	r = –0.324 (p < 0.001)	Being practical, attentive to small things, conscientious and calm, but having difficulty making quick decisions on their own	25% (n = 27)
13	N and F2	r = –0.302 (p = 0.002)	Being straightforward, emotionally labile and at the same time secretive, reserved and shy	19% (n = 20)

outpatient examination according to the protocol after heart transplantation.

The stress associated with HT can also occur long after transplant. The types of psychological disorders and associated risk factors confirm the need for ongoing psychological and clinical support of recipients after HT [11]. Symptoms of depression and post-traumatic stress disorder (PTSD) can also increase mortality and morbidity among patients in HT WL and after HT [11, 12]. Factors influencing the development of stress and psychological disorders after surgery: young age, female sex, orthopedic diseases and lack of psychological support [11]. But personality traits are not modifiable factors due to HT or other surgical interventions, but only reflect the personal character of patients. It is important to organize social support for patients both in HT WL and after heart transplantation [12]. Currently, there is no unified system of social and psychological support for recipients after HT in the Russian Federation; each center chooses its own protocol for working with them. In the conditions of our Center, we adhere to a personalized approach to working with patients at HT WL and after HT. All recipients are regularly monitored and have the opportunity of telephone contact with the attending physician when complaints or changes in their state of health appear, which made it possible to form a patient-physician relationship and increased the number of cases of timely access to medical institutions, examination and treatment initiation. We also recommend conducting training on the peculiarities of life after HT not only for recipients, but also for their relatives (parents, spouses, children). In informed consent for observation, patients with heart transplants always indicated the closest contact for communication, the closest relatives reported a deterioration in the patients' well-being, including with the appearance of febrile fever, shortness of breath, neurological disorders, etc., which made it possible to start treatment on time and unscheduled them hospitalize. Formation of communication "patient–doctor" can be especially useful in relation to secretive and restrained patients, and in relation to anxious and hypochondriacal patients, knowledge of the anamnesis of the disease and long-term observation will make it possible to verify the disease in a shorter time.

Gender differences also affect the types of stress and coping mechanisms and the tactics of their treatment after heart transplantation [13]. According to our results, male transplanted patients were more secretive, decisive and inclined to ignore difficulties (factors F2 – introvert, F3 – reactive balance), while patients after HT were dominated by hypochondria, hypercaution, sensitivity, anxiety, anxiety and depression. (factors I – premium, O – hypothymia, F3 – sensitivity).

According to L. Petrucci et al., 87% (n = 131) of recipients worked before transplant, and only 39% (n = 51) returned to work after surgery [14]. In our analyzed population, 36% (46 of 129) of patients worked or studied during their stay at HT WL and 43% (47 of 107) returned to work/school after a heart transplant. Moreover, some employers approached the patients' attending physicians to clarify their professional suitability and obtain a written work permit, considering their state of health.

In the future, a large study is required to assess the frequency of hospitalizations and post-transplant complications, as well as to search for risk factors for the development of psychological problems and failure to achieve psychological well-being after HT.

CONCLUSION

Personality characteristics are non-modifiable traits of patients that affect their behavior, return to work and social life, and their physical and psychological recovery after HT. Rehabilitation of patients should include the formation of a trusting relationship "patient–doctor", the possibility of unscheduled telephone contact with the attending physician in the event of new complaints or the development of complications. Knowledge of the personal characteristics of recipients will allow to develop a personalized approach to their rehabilitation and an algorithm for timely examination after HT.

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