Resilience and mental state of lung recipients in the context of the COVID-19 pandemic

Prężność i stan psychiczny biorców płuc w kontekście pandemii COVID-19

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ABSTRACT

INTRODUCTION: Lung transplantation is the only effective treatment method for patients with lung diseases in final stages. During treatment, the patient may experience numerous stressors that have an adverse effect on their mental state, which the COVID-19 pandemic may aggravate. The study aims to assess patients' resilience and mental state after lung transplantation in the context of the COVID-19 pandemic.

MATERIAL AND METHODS: A study using the General Health Questionnaire (GHQ-28), the Hospital Anxiety and Depression Scale (HADS), the Athens Insomnia Scale (AIS), and the Brief Resilience Coping Scale (BRCS) was conducted during the second wave of the COVID-19 pandemic on 40 patients in the distant period after lung transplantation, who had been tested with the General Health Questionnaire (GHQ-28) before the start of the pandemic. During the second wave of COVID-19, the patients were provided with constant, remote contact with the transplant center.

RESULTS: The average age of patients in the studied group was 51 ± 12 years. The majority were men (57.5%). The mental state of patients on the GHQ-28 scale did not deteriorate during the coronavirus pandemic. 70% of participants were characterized by a high level of coping resilience and 12.5% (5 patients) a low level. Psychological variables were not dependent on age. Their results did not differ significantly in terms of the type of transplant performed, gender, or being in a relationship.

CONCLUSIONS: The second wave of COVID-19 did not negatively affect the mental state of lung recipients. The high percentage of sleep disorders in lung recipients requires attention and more profound research.

KEYWORDS

resilience, mental state, COVID-19 pandemic, lung recipients

STRESZCZENIE

WPROWADZENIE: Transplantacja płuc jest jedyną skuteczną metodą leczenia pacjentów z chorobami tego narządu w końcowym stadium. W trakcie leczenia pacjent może być narażony na działanie licznych stresorów, mających niekorzystny wpływ na jego stan psychiczny, a czynniki te mogą ulegać wzmocnieniu w sytuacji pandemii COVID-19. Celem pracy jest ocena prężności i stanu psychicznego pacjentów po przeszczepieniu płuc w kontekście pandemii COVID-19.

MATERIAŁ I METODY: Badaniu z zastosowaniem *Kwestionariusza ogólnego stanu zdrowia* (GHQ-28), *Szpitalnej skali lęku i depresji* (HADS), *Ateńskiej skali bezsenności* (AIS) oraz *Krótkiej skali prężności zaradczej* (BRCS) poddano, w trakcie drugiej fali pandemii COVID-19, 40 pacjentów w okresie odległym po transplantacji płuc, u których przed rozpoczęciem pandemii wykonano badanie kwestionariuszem GHQ-28. Badani w trakcie drugiej fali COVID-19 mieli zapewniony stały, zdalny kontakt z ośrodkiem transplantacyjnym.

WYNIKI: Średni wiek pacjentów w grupie badanej wyniósł 51 ± 12 lat. Większość stanowili mężczyźni (57.5%). Stan psychiczny pacjentów w skali GHQ-28 nie uległ pogorszeniu w trakcie pandemii koronawirusa. 70% uczestników charakteryzowało się wysokim poziomem prężności zaradczej, a 12,5% (5 pacjentów) niskim. Zmienne psychologiczne nie były zależne od wieku. Zmienne te nie różniły się istotnie pod względem rodzaju wykonanej transplantacji, płci czy pozostawania w związku.

WNIOSKI: Druga fala COVID-19 nie wpłynęła negatywnie na stan psychiczny biorców płuc. Uwagi i pogłębienia badań wymaga wysoki odsetek zaburzeń snu u biorców płuc.

SŁOWA KLUCZOWE

prężność, stan psychiczny, pandemia COVID-19, biorcy płuc

INTRODUCTION

Lung transplantation (LTx) is the only effective treatment for patients with various diseases of this organ in their final stage, excluding a priori oncological patients [1]. Most transplant patients experience rapid improvement in somatic functioning, but in the area of mental health, they may experience undesirable symptoms such as severe stress, anxiety, or mood deterioration resulting from adaptation difficulties to a new, unfamiliar situation. At a distant time after transplantation, these symptoms may be related, for example, to side effects of chronic immunosuppressive pharmacotherapy or deteriorating function of the transplanted graft [2]. A major source of stress for patients after LTx can also be the increased risk of respiratory infections, including infections of the lungs, associated with both decreased immune system activity related to ongoing treatment and contact with pathogens – the lungs are the only solid organ that comes into direct contact with the external environment after transplantation in the process of respiratory exchange. The first case of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection was detected in November 2019 in China, and in the following months, the coronavirus pandemic gradually spread to all countries of the world. The first such case was recorded in Poland in March 2020 [3]. In response to the increasing number of infections and deaths associated with coronavirus disease 2019 (COVID-19), global measures such as quarantines, social distancing, and other restrictions on daily life were implemented in early 2020 to minimize their numbers. Unfortunately, these measures were associated with the onset of psychological crises in some people [4]. Pandemics and epidemics are part of human history, and only in the past or present century have several of them affected people all over the world. Examples include the Spanish flu (1918–1920), Asian flu (1956–1957), severe acute respiratory syndrome (SARS, 2002––2003), "swine flu" (2009) and Ebola (2013–2014) [5]. Psychological reactions to the pandemic include anxiety, fear, frustration, loneliness, depression, anger or boredom, but also "headline stress disorder" associated with high emotional reactivity to endless media reports [6,7]. Lung transplantation brings many positive changes in the context of resolving respiratory failure in the final stage, enhances the quality of life, and allows one to enjoy a normal, everyday life without having to use home mechanical ventilation [8,9,10]. However, in the distant period, these patients may also experience severe stress in the event of negative effects of the pharmacological treatment regimen, potential infections, or rejection of the transplanted organ, resulting in unplanned hospitalization. Cai et al. [11], in cross-sectional study of organ transplant recipients, showed that psychological suffering was joint among them during the COVID-19 pandemic, manifesting itself in the occurrence of depression, anxiety, insomnia, and post-traumatic stress disorder (PTSD). This single--centre study aimed to analyze the impact of the COVID-19 pandemic on the psychological state of lung transplant patients, considering resourcefulness as a resource for coping adaptively in challenging situations. The study also analyzed the remedial actions that patients took to avoid infection with the SARS-CoV-2 virus.

MATERIAL AND METHODS

The study included 40 patients (17 women and 23 men), with a mean age of 51 ± 12 years (range 24––73 years), who underwent lung transplantation surgery before the start of the COVID-19 pandemic. In the studied group, 22 patients underwent double-lung transplantation (DLT) and 18 underwent single-lung transplantation (SLT). The majority in the study group were those who had chronic obstructive pulmonary disease (COPD; N = 12) and idiopathic pulmonary fibrosis (IPF; N = 10) before transplantation. Each subject had a pre-pandemic COVID-19 mental status assessment using the Polish adaptation of the Goldberg General Health Questionnaire (GHQ-28) [12], at 5.05 ± 3.62 years post-transplant, and the pandemic survey was performed an average of 13.93 ± 4.75 months later. This tool was developed as a screening tool to detect individuals who have or are at risk of developing mental disorders. GHQ-28 is one of the most widely used and validated questionnaires for screening emotional distress and possible psychiatric morbidity, and it has been tested in numerous populations, including people with somatic illnesses [13]. The GHQ questionnaire consists of 28 questions, and the answers given by the respondent are scored on a 4-degree Likert scale for each of four domains including: the presence of somatic symptoms; anxiety; functional impairment; and depressive symptoms. The raw scores are converted to a sten scale, in which a score of ≥ 7 points is considered high, indicating a high likelihood of psychiatric disorders. In the follow-up study, in addition to the GHQ-28 scale, the Hospital Anxiety and Depression Scale (HADS), which is one of the most widely used scales measuring these constructs and whose good psychometric properties have been confirmed in studies conducted, for example, by Czerwiński et al. [14] was additionally used to deepen the assessment of mental status. This scale consists of 14 questions, 7 each for symptoms of anxiety and depression. Scores in the range of 8–10 points are considered borderline scores, scores ≥ 11 points with high probability indicate the presence of disorders in the studied area. In addition, the Athens Insomnia Scale (AIS) was used, which allows quantitative measurement of insomnia symptoms based on ICD-10 criteria. Validation of this tool to the Polish population showed that a score of 6 or more points with a high probability indicates the presence of inorganic insomnia [15]. Patients also filled out the Brief Resilience Coping Scale (BRCS), consisting of 4 questions, in the Polish adaptation by Piórowska et al. [16]. The responses obtained are scored on a 5-degree Likert scale, and scores recalculated to sten and being between 7 and 10 indicate high resourcefulness, which plays an important role in the process of coping not only with everyday challenges but also traumatic situations. At the data collection stage, none of the patients had coronavirus infection. During the study, the preventive measures taken by the patients to avoid SARS-CoV-2 infection were also analyzed.

The statistical analysis was conducted using SPSS 29.0 software. Nominal variables were presented as numbers and percentages, while continuous variables were displayed as mean (M) and standard deviation (SD) or median (Me), quartiles (Q1 and Q3), and interquartile range (IQR), based on the data distribution. Due to the non-normal distribution of most assessed variables, non-parametric tests were used. The Wilcoxon signed-rank test, Mann-Whitney U test, and H Kruskal-Wallis test were employed to compare groups, and the Spearman test was used to explore correlations between variables. A p-value less than 0.05 was considered statistically significant for the analysis results.

RESULTS

In the analyzed group, the majority (57.5%) were men. 72.5% of the respondents were in a formal or informal relationship in the entire group. Among the respondents, 52.5% were people with secondary education, 25% of the respondents had vocational education, 17.5% had higher education, and 5% had primary education. The majority of the respondents were professionally inactive due to retirement (15%) and pension (65%), and 6 people, accounting for 15% of the group, remained professionally active. The age of the patients did not significantly affect the analyzed psychological factors (Table I). The results obtained by the respondents in terms of psychological variables did not differ statistically significantly in the context of the type of transplant performed, gender, or whether the subject was in a relationship/marriage or not (Table II).

Table I. Correlation between psychological variables and age of the respondents (N = 40)

Scales	Age	
	r	p
GHQ-28 overall score	0.102	0.532
GHQ somatic symptoms	0.136	0.403
GHQ anxiety with insomnia	0.076	0.641
GHQ social functioning	0.112	0.492
GHQ depression	0.207	0.199
HADS Anxiety	0.12	0.459
HADS Depression	0.018	0.914
AIS	0.045	0.784
BRCS	-0.14	0.39

Table II. Analysis of psychological variables about the type of transplantation, gender, and being in a relationship or not (N = 40)

Scales	Type of transplant		Gender		Relationship status	
	U Mann-Whitney	p	U Mann-Whitney	p	H Kruskal-Wallis	p
GHQ-28 overall score	185.50	0.734	154.00	0.256	3.111	0.375
GHQ somatic symptoms	173.50	0.502	136.00	0.101	1.016	0.797
GHQ anxiety with insomnia	178.00	0.584	181.00	0.690	3.721	0.293
GHQ social functioning	245.50	0.151	152.50	0.191	1.940	0.585
GHQ depression	190.00	0.817	199.50	0.907	3.453	0.327
HADS Anxiety	172.50	0.484	132.00	0.080	1.453	0.693
HADS Depression	192.00	0.867	182.50	0.715	1.530	0.675
AIS	199.00	0.975	161.50	0.285	3.842	0.279
BRCS	197.00	0.978	211.50	0.658	4.351	0.226

Analyzing the precautions that LTx patients have taken during the pandemic, most of them admitted following recommended behaviours, such as frequently washing their hands, limiting the number of social contacts, or decreasing the frequency of leaving their homes. Most patients claimed that these behaviours are quite common in their daily routine, regardless of COVID-19 (Table III). At the same time, the majority of patients (57.5%) declared that they did not feel anxious due to the pandemic. Only two people reported strong anxiety, which constitutes 5% of the studied group. 47.5% of respondents confirmed that they were afraid of possible coronavirus infection.

The results of the HADS test showed that the mean values for the whole group were slightly higher in the anxiety subscale, but were within the range of normal scores, and amounted to 4.28 ± 4.36 and 2.53 ± 3.42 points, respectively. Three patients had elevated scores for each subscale, with mean scores of 15.33 ± 2.31 for anxiety and 12.33 ± 1.53 for depressive symptoms. On the AIS, scores indicating the presence of inorganic insomnia were obtained by 9 patients (22.5%). Among them, the average score was 12.89 ± 4.70. These patients most often complained of midnight waking, generally poor sleep quality, as well as malaise and daytime sleepiness. Detailed characteristics of the results of this questionnaire and other psychological measures are provided in Tables IV to VI.

Table III. Frequency of health behaviors aiming at avoiding SARS-CoV-2 infection

Type of behavior	N	% of group
Frequent hand washing	10	25
Not going out	9	22.5
Limiting going out	26	65
Limiting social contacts	14	35
Absolutely use precautions	17	42.5

Table IV. Raw scores for psychological variables (N = 40)

Scales	M	SD	Me	Q1	Q3	IQR
HADS Anxiety	4.28	4.36	3	1	6.75	5.75
HADS Depression	2.53	3.43	1	0	3.75	3.75
AIS	3.20	5.76	0	0	3.75	3.75
BRCS	16.48	2.17	16	15	18	3

Table V. Summary of the high scores for psychological variables

Scales	Borderline score [points]	High score range [points]	Number of patients	% of the group
HADS Anxiety	8–10	–	5	12.5
	–	≥ 11	3	7.5
HADS Depression	8–10	–	1	2.5
	–	≥ 11	3	7.5
AIS	–	≥ 6	9	22.5
BRCS sten score	–	≥ 7	28	70

Table VI. Number of participants who expressed specific insomnia symptoms (score > 0)

AIS item	N	% of the group
Falling asleep	5	12.5
Waking up during the night	11	27.5
Waking up early	6	15
Total sleep time	9	22.5
Sleep quality	12	30
Mood the next day	11	27.5
Physical and mental performance the next day	11	27.5
Sleepiness during the day	9	22.5

The study also found a positive correlation between the prevalence of elevated scores on the AIS and HADS Depression with $r = 0.582$; $p < 0.001$.

The participants showed favourable scores in the BRCS, with high sten scores obtained by 28 people (70%) and low scores indicative of poorly developed remedial resilience by 5 people (12.5%). The BRCS score was not significantly correlated with any other psychological variable (Table VII).

The analysis revealed that in most subscales of the Goldberg GHQ-28 scale, the subjects obtained significantly better scores during the pandemic period compared to those before it in subscales relating to the presence of somatic symptoms, and the severity of anxiety with insomnia, and depression symptoms. The patients did not achieve a significant difference only in the domain relating to their social functioning (Table VIII).

The summative score of this questionnaire in the pandemic study positively correlated with the scores obtained by the subjects on the HADS and the AIS, indicating good sensitivity of these tools in the studied group (Table IX).

Table VII. Correlations between BRCS scores and other measurements (N = 40)

Scales	BRCS	
	r	p
HADS Anxiety	-0.037	0.819
HADS Depression	0.084	0.607
AIS	-0.129	0.428
GHQ-28 overall score	0.146	0.369
GHQ somatic symptoms	0.256	0.111
GHQ anxiety with insomnia	0.112	0.490
GHQ social functioning	0.039	0.809
GHQ depression	-0.036	0.825

Table VIII. The difference between GHQ-28 overall score and subscales (N = 40)

Scale	First assessment			Second assessment			p
	M_1	SD_1	Me_1	M_2	SD_2	Me_2	
GHQ-28 overall score	21.08	11.72	18.00	15.50	8.17	13.00	< 0.001
GHQ somatic symptoms	6.13	4.13	5.50	4.58	2.24	4.00	0.025
GHQ anxiety with insomnia	5.80	4.69	5.50	3.25	3.71	2.00	0.001
GHQ social functioning	7.70	2.92	7.00	7.10	2.62	7.00	0.390
GHQ depression	1.45	2.24	1.00	0.58	1.24	0	0.005

Table IX. Correlations between GHQ-28 scores and other measurements (N = 40)

Scales	HADS Anxiety		HADS Depression		AIS	
	r	P	r	p	r	p
GHQ-28 overall score	0.458	0.003	0.732	< 0.001	0.688	< 0.001
GHQ somatic symptoms	0.331	0.037	0.565	< 0.001	0.377	0.016
GHQ anxiety with insomnia	0.531	< 0.001	0.645	< 0.001	0.728	< 0.001
GHQ social functioning	0.340	0.032	0.503	< 0.001	0.380	0.016
GHQ depression	0.574	< 0.001	0.685	< 0.001	0.549	< 0.001

DISCUSSION

The presented data concerns the mental functioning of patients after lung transplantation, in the context of the COVID-19 pandemic, taking into account the assessment of their resilience. Although interest in the mental state of patients after organ transplantation is common, it usually concerns the evaluation of the severity of clinical symptoms. It does not focus on analyzing resources and positive factors that allow for a dynamic response to difficulties or adversities encountered and effective coping with them. For this reason, the number of studies considering resilience in

the population after lung transplantation is small. The PubMed database shows that the situation is slightly better regarding kidney or liver transplantation [17,18,19,20]. In 2014, Cohen et al. [21] examining lung transplant recipients, showed that mild cognitive impairment occurred in the majority of the study group. Symptoms of moderate to severe anxiety and depression were observed in 21 and 3% of patients, respectively. None of the recipients reported PTSD symptoms, and 37% of them were characterized by high resilience. In 2020, a paper was published on the assessment of resilience as a predictor of outcomes in a group of lung transplant candidates, which showed that one in six lung candidates had low resilience, predicting increased pre-transplant death/delisting, and resilience may represent a novel risk factor [22]. There is no doubt that interest in resilience has increased following the outbreak of the COVID-19 pandemic and has increased the frequency of including this factor in the transplant recipients group. The results obtained in this study indicate both a high level of mental resilience among people after LTx and gradually improving indicators of mental health after LTx, despite the ongoing pandemic, which may be a risk factor for a mental crisis, especially in people who are particularly susceptible to the disease. It is also worth noting that most patients declare compliance with recommendations related to avoiding infection with the SARS-CoV-2 virus, emphasizing that they are an element of their daily routine, regardless of the COVID-19 pandemic.

The good results regarding the state of mental health obtained in the study group can be explained in several ways. Firstly, patients in the Center where the study was conducted, already at the stage of qualification for transplantation, receive detailed guidelines regarding the need to introduce changes in lifestyle and way of life after a possible surgery. They contain guidelines stating that during the period of increased, seasonal morbidity in the general population, e.g. flu or other infections, it is not advisable for them to be in large gatherings (e.g. cinema, theatre, hypermarket), that they should limit social contacts mainly to the immediate surroundings, and use disposable protective masks in public transport. This means that even before the start of the pandemic, the study participants had been well-trained in some of the rules introduced by the COVID restrictions, which could have facilitated their adaptation process to the new situation.

The psychological comfort of the respondents could also be influenced by the organization of the lung transplantation ward where they are treated daily and the fact that only some of the respondents were afraid of being infected with the virus, and none of them had had a COVID-19 infection at the data collection stage. Although physical access to the ward was significantly limited, due to the need to maintain regular follow-up visits resulting from the schedule of managing patients after lung transplantation, they remained in constant and regular remote contact with the treatment team, which means that the frequency of contact with this team was maintained, and only the form of this contact changed. During data collection for the presented study, the standard of the transplant center where it was performed assumed that in the case of an uncomplicated course, within the first year after transplantation, the patient would undergo an outpatient or in-hospital follow-up visit on average every 2–3 weeks, which in total meant a dozen or so visits per year. Later, if the course was still uncomplicated, follow-up visits took place on average every 2–3 months. A high frequency of follow-up visits is also described in heart recipients [23]. In addition, due to the limited experience of physicians in managing patients after this type of surgery in their place of residence and the intensifying COVID-19 pandemic, regardless of the schedule of follow-up visits, lung recipients, depending on their own needs, used teleconsultations at the transplant center. The presented work did not include data on the frequency of contact between the lung recipient and the transplantology specialist in the statistical analysis, which constitutes its limitation. This was related to the fact that frequent doctor-patient or patient-doctor contacts are an element of a specific routine of the treatment team and were not taken into account by the researchers at the stage of collecting material. However, it can be assumed that the very fact of being in constant contact with the attending physician could result in an increased sense of security and being cared for, as well as reduce the risk of emotional difficulties during the pandemic, which was also observed in other clinical groups [24]. As we know effective communication is a cornerstone of quality healthcare. It helps providers bond with patients, forming therapeutic relationships. The information exchanged between the provider and patient can help in medical decision-making, such as better self-management [25]. A review of the literature also shows that impressive evidence exists between physician communication behaviours and patient adherence to therapy [26]. Of course, the lack of data allowing for statistical analysis of the variable in the form of the total number of visits or contacts of the patient with the treatment team means that the assumption regarding the beneficial effect of these contacts on the psychological well-being of the respondents remains only a hypothesis. It can only be mentioned here that McKay et al. [27] showed that recipients of solid organ transplants with difficult access to health care and an increased sense of the possibility of contracting COVID-19 were characterized by a lower health status indicator.

The analysis also showed that in the somatic symptoms domain of the GHQ-28 scale, in the second study, patients reported significantly lower severity of somatic symptoms compared to the first study, which confirms their general good health and might be a beneficial factor in stabilizing mental comfort at a good level.

In the presented study, coping resilience was considered a protective factor for mental well-being recognized in psychology. 70% of the study participants were characterized by high resilience, and 80% of the examined group on the HADS scale obtained results within the norm for anxiety symptoms and 90% for symptoms. However, our analysis did not show a statistical relationship between the level of resilience and the assessed psychological parameters, which may be related to the small group size. Resilience is understood as the ability to mentally or emotionally cope with a crisis or the ability to quickly return to the state before its occurrence [28]. It is manifested by using mental processes and behaviours to strengthen personal resources and protect against the potential negative effects of stressors [29]. In simpler terms, high resilience characterizes people who develop psychological and behavioural abilities that allow them to remain calm during a crisis/chaos or to emerge from it without long-term negative consequences. Colloquially, resilience is sometimes compared to the "psychological immune system" [30]. Its importance in human life has been proven in many studies. Having resources that protect mental health facilitates functioning in society and enables a more constructive way of adapting to unfavourable circumstances and promotes the individual's adaptation to the disease [31], which results in a reduced risk of clinical symptoms in the area of mental health, which include the parameters analysed in this study, i.e. anxiety, depression, and sleep disorders. A fundamental element of resilience is the ability to accept, overcome, and thrive in the face of crises. Resilience encompasses psychosocial, physical, relational, role, and philosophical traits [32]. Cohen et al. [21] have shown that lung transplant patients are resilient, and higher resilience after lung transplantation correlates with fewer symptoms of depression or posttraumatic stress disorder. With the growing interest in positive psychology, which means promoting well-being rather than just reducing suffering, resilience has been identified as an essential factor in promoting mental health [33,34]. It has also been shown that higher levels of optimism or a better balance of positive and negative traits in the same person before lung transplantation correlate with improved mental health after this procedure [35]. Merisio et al. [36] have shown that resilience may be a protective factor for liver transplant recipients and candidates for this organ transplant in minimizing the risk of adverse psychosocial symptoms associated with COVID-19. Unfortunately, due to the use of different tools in organ transplant recipients' studies, we could not directly relate our results to the results of other authors.

The analysis showed that in the presented material, 9 people obtained results indicating the occurrence of insomnia and they were positively correlated with obtaining elevated results in the subscales assessing the occurrence of symptoms of anxiety and depression in the HADS questionnaire. Insomnia is a subjective complaint associated with insufficient quantity and/or poor quality of sleep, which consequently leads to deterioration of functioning during the day. The most common cause of chronic insomnia is mental disorders, including anxiety disorders or the entire spectrum of affective disorders – from a major episode of depression to oligosymptomatic depression, in which insomnia, not low mood, is the primary symptom [37]. The occurrence of insomnia in the group of patients after lung transplantation is common, and its frequency is higher compared to the general population. Some studies indicate that it may reach 40% and be associated with the use of cumulative doses of tacrolimus. Although the quality of sleep in patients undergoing solid organ transplantation improves in the postoperative period, there is evidence that compared to recipients of other organs, in lung transplant patients this improvement is relatively small or the quality of sleep remains at a level comparable to that before surgery [38,39]. Because the AIS was not performed on patients before the pandemic, it is difficult to determine whether these disorders occurred in the study participants before the pandemic or were its effect. It is known that some of these 9 people obtained high sten scores on the GHQ-28 test both before and during the pandemic, which allows us to assume that their sleep difficulties were not generated by the circumstances of the pandemic but began before it. At the same time, these patients obtained elevated scores on both subscales of the HADS test in the second study, so insomnia likely is one of the symptoms of more extensive clinical disorders.

CONCLUSIONS

Our results complement the narrow literature on the knowledge of the psychological functioning of lung recipients in the context of the COVID-19 pandemic. Lung recipients are a group that usually experiences various health problems due to the effects of immunosuppressive therapy and a higher risk of infections, with respiratory inflammation being particularly dangerous. Therefore, during the pandemic caused by the virus attacking the respiratory

organs, they were considered to be the group at the highest risk of developing adverse psychological reactions. The presented study showed that, surprisingly, lung recipients improved their psychological state despite the most adverse conditions related to the COVID-19 pandemic. This can be attributed to the detailed selection process of transplant candidates, with a particular focus on mental health and adaptive resources, as well as the inclusion of intrapsychic resources helpful in resisting the disease before the onset of the global pandemic. One area that may require more attention is the prevalence of sleep disorders in more than 20% of patients, which can affect their physical and mental health if left untreated. However, there is no evidence that these symptoms are related to experiences related to the COVID-19 pandemic. These data indicate the need to deepen the knowledge about sleep disorders in the group of lung transplant recipients in a separate analysis and the need for long-term monitoring of the mental state of these people. It is also reasonable to strengthen the comprehensive care of lung transplant recipients and cover them with preventive measures, such as psychoeducation taking into account the principles of sleep hygiene or learning relaxation training, which, in addition to intrapsychic resources, may be an additional protective factor for the mental well-being of the study group.

Author's contribution

Study design – I. Jaworska, R. Pudlo, A. Mierzyńska, T. Stącel, M. Urlik, T. Hrapkowicz

Data collection – I. Jaworska, R. Pudlo, A. Mierzyńska, T. Stącel, M. Urlik, T. Hrapkowicz

Data interpretation – I. Jaworska, R. Pudlo, A. Mierzyńska, T. Stącel, M. Urlik, T. Hrapkowicz

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Literature research – I. Jaworska, R. Pudlo, A. Mierzyńska, T. Stącel, M. Urlik, T. Hrapkowicz

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