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## QUALITY OF LIFE AND HEALTH BEHAVIOURS OF PATIENTS WITH END-STAGE RENAL DISEASE<sup>5</sup>

### **Abstract:**

**Introduction.** Conservative treatment in patients with renal failure is very often unsuccessful. Failure of the kidneys to function properly results in the need for dialysis. Developments in diagnostic techniques and advances in dialysis techniques allow for longer survival times for patients with end-stage renal failure, but the need to adapt to dialysis appointments makes it more challenging to function and can impair patients' quality of life.

**Objective.** The research assessed the quality of life and health behaviour of patients with end-stage renal disease (ESRD).

**Material and Methods.** The research was conducted between October 2022 and February 2023 among patients with renal failure undergoing dialysis at the Independent Public Health Care Institution in Kolbuszowa and the Independent Public Health Care Institution in Mielec. The research was carried out using a

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*diagnostic survey method. The research tools were the WHOQOL-BREF quality of life questionnaire and the Health Behaviour Inventory (IZZ).*

**Results.** *The respondents' quality of life is average (90.10%, n=91). The overall level of satisfaction with health is average (62.38%, n=63). Respondents present a high level of health behaviour (M=82.46).*

**Conclusions.** *The quality of life of dialysis patients is neither good nor bad. Dialysis patients present high levels of health behaviour. As the duration of dialysis increases, the subjects' quality of life scores decrease.*

**Keywords:**

*Dialysis, quality of life, renal failure, health behaviours.*

## **Introduction**

Chronic kidney disease (CKD) requires patients to be permanently treated with dialysis or through a kidney transplant. While dialysis therapy is available to every patient, a kidney transplant requires the organ to be donated from a person during their lifetime or post-mortem, so performing a kidney transplant requires waiting in the transplant queue. The end-stage renal disease (ESRD) treatment by dialysis extends life but also significantly affects patients' perceived quality of life.

Acute Kidney Injury (AKI) is the term that has replaced the term "acute renal failure". According to experts, AKI is a more capacious term, as only issues of more advanced forms of renal impairment are covered under the term failure, while AKI is defined as a condition in which there is a rapid deterioration of renal function within hours or weeks accompanied by retention of nitrogen and creatinine metabolic products.[1] The epidemiology of AKI is difficult to determine. No standardised disease registries make it difficult to assess the incidence accurately. Based on the available data, it can be estimated that this problem occurs in nearly 3–7% of patients who undergo hospital treatment.[2]

AKI can be divided into three main categories, representing the aetiology of the disease. Therefore, the following causes are distinguished: pre-renal, renal, and extra-renal.[3] The causes of the onset of AKI are fundamental in the diagnostic and therapeutic scope of the disease.[4]

CKD is a multisymptomatic syndrome resulting from permanent damage or reduction in the number of active nephrons destroyed by various disease processes in the renal parenchyma. CKD can be divided into five stages of development. The stages of CKD depend on the degree of renal function, which is measured by the glomerular filtration rate GFR.[5]

Deterioration of renal function is widespread following most chronic nephropathies. The highest proportions of causes of end-stage CKD in Poland are diabetic nephropathy, glomerulonephritis, and hypertensive nephropathy.[6]

CKD, especially in its early stages, may be asymptomatic or sparsely symptomatic. Sometimes, even in advanced stages, the slow buildup of symptoms allows patients to slowly become accustomed to them so that over a long period of the disease, patients do not experience any additional specific symptoms that would refer them to a doctor for diagnosis.[5]

Unfortunately, no single simple test precisely diagnoses or recognises CKD at any stage. A test that can help to guide towards a diagnosis of kidney damage is the determination of serum creatinine and, based on this, an estimate of glomerular filtration rate. In addition, a general urine examination is performed to assess the presence of protein in the urine and urine sediment.[5]

Renal replacement therapy aims to remove water and metabolic metabolites from the body, correct electrolyte, and acid-base disturbances, and prevent complications.[7] The following methods of renal replacement therapy are distinguished: haemodialysis, peritoneal dialysis, and kidney transplantation. Dialysis therapy is the primary treatment for renal failure, which is used in nearly 80% of patients undergoing renal replacement therapy.[8]

Currently, there are no absolute contraindications to dialysis therapy, while relative contraindications include end-stage incurable diseases and cerebral organic syndromes, as in the course of these diseases, dialysis treatment has no impact on the patient's health.[9]

In ESRD, kidney transplantation may also be an option for renal replacement therapy. The first successful kidney transplant in Poland was performed in 1966. By 2022, 857 kidneys had been transplanted in Poland, of which approximately 784,000 were from deceased donors and 73 from living donors.[10]

According to current Polish legislation, the condition for receiving a transplant is that the patient who needs an organ transplant is placed on the National Waiting List (KLO), which is maintained by the organisational and coordination centre for transplantation, "Poltransplant".[10]

The indication for renal replacement therapy in the form of kidney transplantation is the qualification of a patient diagnosed with stage 5 of CKD, in which the glomerular filtration rate is less than  $15 \text{ mL/min/1.73 m}^2$ . In diabetic patients, the glomerular filtration rate should be less than  $20 \text{ mL/min/1.73 m}^2$ . In patients with type 1 diabetes, kidney and pancreas transplantation are considered simultaneously.[11]

It should be emphasised, however, that regardless of the stage of renal disease, each person requiring renal replacement therapy should be considered as a potential candidate for renal transplantation. A patient's eligibility for a

kidney transplant is contingent on the patient's successful qualification for the surgical procedure and treatment that reduces the body's defence potential. It is also necessary to assess the health and the presence of absolute and relative contraindications.[12]

The issue of quality of life in the social sciences emerged in the second half of the 20th century. This issue was already dealt with by ancient philosophers who tried to obtain an answer to the question of who man is, what value their life has, as well as how they should live to achieve complete happiness.[13]

With the development of interest in quality of life, this concept was transferred to the medical field. It was mainly related to the fact that traditional health assessment methods were increasingly being defied, thus attempting to connect the patient's health holistically based on their biomedical pattern.[14]

A contemporary pioneer of quality-of-life research was Campbell. Campbell was the first to attempt to assess Americans' lives. To achieve his objectives, he used a scale with questions on fifteen different areas of subjects' lives. These questions concerned satisfaction with health, leisure activities, family and social relationships, education, and work.[13]

From the point of view of medical science, Karnowski pioneered introducing the concept of quality of life in this field of science. He was the first to point out that the result of treatment should be assessed not only by the patient's health improvement but also by the improvement in their activity and mobility.[15]

The definition of quality of life presented by de Walden-Gałuszko refers to the patient's self-image of self-reported life situation, which is made over a specific period and considers the person's adopted hierarchy of values.[16]

In medical science, the most commonly used definition of quality of life is health-related quality of life (HRQoL), which Schipper introduced. According to this definition's author, HRQoL is the "*functional effect of disease and its treatment, as perceived (experienced) by the patient*". Schipper's research focused on effective human functioning both in health, illness and during treatment.[17] Quality of life in medicine is often based on five core areas of quality of life, including physical, mental, social, cognitive functioning and a sense of well-being.[17]

The assessment of quality of life, which depends on the patient's state of health, especially in subjects with chronic illnesses, is a crucial and reliable indicator of the usefulness and effectiveness of the therapies used. Assessing the quality of life of patients during the disease and treatment allows the assessment of the impact of the disease and treatment on the patient's life. Analysis of patients' quality of life gives a broader view of the patient through their expectations of needs and capabilities.[18]

The analysis of quality of life requires several tools to measure HRQoL. For this, questionnaires or analogue scales are most commonly used. Irrespective of the type of research tool used, it should be borne in mind that the quality of life perceived by the respondent is individual and variable over time.[18]

To assess HRQoL, questionnaires can be used to evaluate patients' overall quality of life and specific questionnaires tailored to a particular condition or health problem.[19] The choice of the appropriate questionnaire depends on the type of clinical situation of the patient or the study population. It is also necessary to know the study population, the type of condition being assessed and the size of the study group, which will influence the choice of questionnaire. The selection of the research tool should consider the frequency with which quality of life is measured during a clinical trial and the duration of follow-up to ensure reliable results.[19]

The health of individuals and populations in all cultures depends on subjects knowing and understanding what factors influence their health and whether they take this into account in their daily lives — they largely depend on their actions to promote and care for their health.[20] The set of health behaviours and attitudes is a determinant of both individual and population health status. Health-related behaviours are of interest to representatives of various scientific disciplines, and they offer a variety of definitions and classifications. Health or health-related behaviours are any behaviour or activity of an individual that is part of everyday life and influences their health status — they involve the practical application of their knowledge about health and illness. They are the subject of relatively free individual choices and decisions — the part of the factors affecting health over which each individual has the most control.[20]

Changing an individual's behaviour in any sphere of their life is difficult, especially when they do not feel the need to change. The existing reality indicates the need to modify existing behaviours due to their negative impact on health. Two types of health behaviour were distinguished, i.e., pro-health and anti-health.

## **Research Objective**

The research assessed the quality of life and health behaviour of patients with ESRD.

## **Material and Methods**

The research was carried out by a diagnostic survey, using a survey technique with standardised questionnaires, i.e., the WHOQOL-Bref

questionnaire to assess quality of life and the Health Behaviour Inventory (pl. Inwentarz zachowań zdrowotnych, IZZ).

The results obtained were statistically analysed using the following tests: Shapiro-Wilk, Kruskal-Wallis, Comparisons of scores on the quality-of-life subscales and health behaviour subscales were made using Friedman's ANOVA test, where pairwise comparisons were made using Wilcoxon's paired rank-order test with Bonferroni correction. A significance level of  $p < 0.05$  was adopted, indicating statistically significant differences or relationships.

The study was conducted between October 2022 and February 2023 among patients with renal failure undergoing dialysis at the Independent Public Health Care Institution in Kolbuszowa and the Independent Public Health Care Institution in Mielec.

## Results

One hundred one respondents participated in the study, including 49.50% female and 50.50% male subjects. Those aged up to 50 years were — 25.74%, and respondents aged 51–65 were 45.55%, with a mean age of 57.41 years with a median of 59 years. Respondents living in rural areas accounted for 53.47%, while those living in urban areas accounted for 46.53%. The vast majority of respondents — 64.36% - were pensioners. The economically active accounted for 27.70%, while the unemployed accounted for 5.94%. Respondents were unmarried, 14.85%, in relationships — 58.42%, while widows and widowers accounted for 26.73%. In terms of education, the largest group comprised respondents with secondary education — 68.32%, while the smallest group comprised respondents with higher education — 3.96%. Most subjects had been on dialysis for five years and above — 60.40%, while the smallest part of the group had been on dialysis for less than a year — 2.97%. The overwhelming number of subjects were dialysed three times a week — 89.11%. Twice-weekly dialysis was taken by 7.92%, while four times a week was taken by 2.97%.

By analysing the results of the WHQoL-BREF questionnaire, the subjects' self-reported quality of life was identified. Most respondents rated their quality of life as neither good nor bad — 90.10%, 8.91% as good and 0.99% as bad.

In the area of respondents' satisfaction with their health, most respondents could not assess their health, choosing the answer neither satisfied nor dissatisfied — 62.38%. Dissatisfied with their health was 35.64%, while satisfied was 1.98%.

The overall assessment of quality-of-life scores provides an insight into the extent to which respondents show the best and the worst results in terms of perceived quality of life. Obtaining such insights allows measures to be introduced to improve the quality of life in the areas rated lowest. The results of

measuring the quality of life in individual quality of life domains are presented in Table 1.

*Table 1. Results of Quality-of-Life Measurement in Study Group*

<b>Quality of Life</b>	<b>M</b>	<b>Me</b>	<b>SD</b>
Self-reported quality of life	3.08	3.0	0.31
Satisfaction with health	2.66	3.0	0.52
Somatic sphere	47.66	44.0	9.14
Psychological sphere	56.00	56.0	7.76
Social sphere	61.15	56.0	11.82
Environmental sphere	64.35	63.0	7.51
Comparison of quality-of-life spheres	Chi <sup>2</sup> <sub>ANOVA</sub> = 190.952, p<0.001		
<b>Pairwise comparisons of spheres:</b>			
somatic vs. psychological	Z=7.799, p <sub>B</sub> <0.001		
somatic vs. social	Z=7.698, p <sub>B</sub> <0.001		
somatic vs. environmental	Z=8.555, p <sub>B</sub> <0.001		
psychological vs. social	Z=4.549, p <sub>B</sub> <0.001		
psychological vs. environmental	Z=7.397, p <sub>B</sub> <0.001		
social vs. community	Z=3.797, p <sub>B</sub> <0.001		

*Source: own study. M — mean, Me — median, SD — standard deviation, Chi<sup>2</sup><sub>ANOVA</sub> — comparison of dependent variables (non-parametric test), Z — Wilcoxon paired t test, p<sub>B</sub> — statistical significance with Bonferroni correction*

A statistically significant relationship was found between all spheres of quality of life. The subjects' quality of life score in the somatic domain is statistically significantly different from the score in the psychological domain (p<0.001). Respondents have a statistically significantly worse quality of life in the somatic sphere (M=47.66) than in the psychological sphere (M=56.00). Similar differences were shown in terms of quality of life between the somatic and social spheres. Respondents' quality of life in the somatic sphere was significantly lower (M=47.66) compared to the social (M=61.15) and environmental (M=64.35) spheres. Significant range differences were also found in the perception of quality of life between the psychological, social, and environmental spheres. Respondents showed significantly lower quality of life in the psychological sphere (M=46.00) compared to the social sphere (M=61.15) and the environmental sphere (M=64.35). Comparing the quality-of-life scores for the social and environmental spheres, it was found that the respondents' quality of life was higher in the environmental sphere (M=64.35) compared to the social sphere (M=61.15). There was a statistically significant difference between men and women in social quality of life (p=0.012). The

women surveyed have a higher quality of life in this sphere (mean in the women's group is  $M=64.26$  with a median  $Me=69$ ) than men (mean in the men's group is  $M=58.10$  with a median  $Me=56$ ). There were no statistically significant differences in the other quality of life indicators between the compared groups of women and men (the results of women and men in the other quality of life spheres and the self-reported quality of life and satisfaction with their health were similar).

The age of the respondents can significantly affect the therapy's effectiveness and determine the respondents' quality of life. The impact of age on the subjects' quality of life was analysed. For the somatic, psychological, and environmental spheres, respondents aged up to 55 years scored statistically significantly higher than respondents aged 56–65 years and higher than respondents aged over 65 years. In contrast, there were no statistically significant differences in this sphere of quality of life between respondents aged 56–65 and those aged 65 and over. No statistically significant differences in quality of life between urban and rural residents were noted.

The chronic disease and how it is treated can affect the need for patients to change or limit their work activity, which can impact the economic conditions and subjects' quality of life. Table 2 presents the results of the analysis of the respondents' quality of life in relation to the type of work activity.

*Table 2. Differences in Quality of Life by Occupational Activity of Respondents*

Quality of Life	Economically Active			Economically Inactive			Z	p
	M	Me	SD	M	Me	SD		
Self-reported quality of life	3.03	3.0	0.18	3.10	3.0	0.34	-0.998	0.318
Satisfaction with health	2.53	3.0	0.51	2.72	3.0	0.51	-1.607	0.108
Somatic sphere	51.33	56.0	9.01	46.11	44.0	8.81	3.123	0.002
Psychological sphere	59.23	56.0	7.50	54.63	56.0	7.50	3.772	<0.001
Social sphere	64.17	69.0	14.11	59.87	56.0	10.56	2.145	0.032
Environmental sphere	69.13	69.0	6.75	62.32	63.0	6.91	4.639	0.000

*Source: own study.*

In each of the quality-of-life spheres, economically active respondents showed a higher quality of life compared to inactive respondents.



The marital status of the respondents may also be a factor affecting the quality of life of those undergoing dialysis therapy. It may be related to the support and care received from loved ones, or the lack thereof. With this in mind, the impact of marital status on respondents' quality of life was analysed.

Table 3. Differences in Quality of Life by Marital Status of Respondents

Quality of Life	I. Single			II. Married			III. Widow/ Widower			H	p	Inter-group differences
	M	Me	SD	M	Me	SD	M	Me	SD			
Self-reported quality of life	3.07	3.0	0.46	3.10	3.0	0.30	3.04	3.0	0.19	0.854	0.653	–
Satisfaction with health	2.67	3.0	0.72	2.64	3.0	0.48	2.70	3.0	0.47	0.354	0.838	–
Somatic sphere	54.67	56.0	11.11	47.59	44.0	8.33	43.93	44.0	7.57	11.857	0.003	I>III
Psychological sphere	61.80	63.0	10.50	56.42	56.0	6.78	51.85	50.0	5.62	15.948	<0.001	I>II, I>III
Social sphere	58.73	56.0	13.17	63.47	69.0	11.78	57.41	56.0	10.22	5.530	0.063	–
Environmental sphere	67.27	69.0	9.65	65.64	63.0	6.92	59.89	63.0	5.53	13.870	0.001	I>II, I>III

Source: own study.

Marital status was a significant factor in assessing quality of life in the somatic, psychological, and environmental spheres. In terms of the somatic, psychological, and environmental spheres, unmarried subjects rated their quality of life significantly better compared to widowed subjects. Significant differences can also be seen in the psychological and environmental spheres between single subjects and those in relationships. Single subjects rate their quality of life higher.

The last sociodemographic factor analysed that could affect the respondents' quality of life was the level of education. Table 4 presents the analysis results.

Table 4. Differences in Quality of Life by Respondents' Education

Quality of Life	Elementary/ Vocational			Secondary/ Higher			Z	p
	M	Me	SD	M	Me	SD		

Self-reported quality of life	3.18	3.0	0.39	3.04	3.0	0.26	2.015	0.044
Satisfaction with health	2.75	3.0	0.52	2.63	3.0	0.51	1.007	0.314
Somatic sphere	44.14	44.0	10.14	49.01	50.0	8.42	-3.063	0.002
Psychological sphere	54.43	56.0	7.73	56.60	56.0	7.73	-1.933	0.053
Social sphere	58.93	56.0	12.35	62.00	69.0	11.59	-1.448	0.148
Environmental sphere	61.46	59.5	9.47	65.45	63.0	6.34	-2.722	0.006

Source: own study.

Statistically significant differences between the overall perception of quality of life and the somatic and environmental spheres can be found. In terms of general perception of quality of life, those with primary/secondary education had a higher quality of life, while in terms of the somatic and environmental spheres, respondents with secondary and higher education had a higher quality of life.

The time elapsed since the start of dialysis therapy can determine the subjects' quality of life, resulting from the subjects' disease. The need to undergo regular treatments may affect the subjects' quality of life assessment.

Table 5. Differences in Quality of Life by Since When Respondents Have Required Dialysis

Quality of Life	Up to 5 Years			More than 5 Years			Z	p
	M	Me	SD	M	Me	SD		
Self-reported quality of life	3.08	3.0	0.35	3.08	3.0	0.28	-0.074	0.941
Satisfaction with health	2.60	3.0	0.59	2.70	3.0	0.46	-1.197	0.231
Somatic sphere	51.38	50.0	10.35	45.23	44.0	7.37	3.097	0.002
Psychological sphere	59.78	59.5	9.37	53.52	56.0	5.24	4.286	<0.001
Social sphere	63.93	69.0	10.76	59.33	56.0	12.21	2.076	0.038
Environmental sphere	67.63	69.0	8.44	62.20	63.0	5.99	3.658	<0.001

Source: own study.

Statistically significant differences based on the duration of dialysis were shown in individual quality-of-life domains. In each quality-of-life domain, subjects requiring dialysis for less than five years had a higher quality of life than those requiring dialysis for more than five years.

During the study, the results obtained using a test — the IZZ — were analysed to determine the level of health behaviour presented by the respondents. The results of this analysis are shown in Table 6.

*Table 6. Level of Health Behaviour*

<b>Level of Health Behaviour</b>	<b>N</b>	<b>%</b>
Low	33	32.67
Average	24	23.76
High	44	43.57
In total	101	100.00

*Source: own study.*

Based on the analysis questions of the IZZ questionnaire, a “health behaviour index” was calculated according to the key to this tool, which was then converted according to norms into a standardised sten scale. On this basis, the number of subjects with low (1–4 sten), average (5–6 sten), and high (7–10 sten) levels of health behaviour was determined. In the study group, 43.57% of respondents had a high, 23.76% average, and 32.67% low level of health behaviour.

A detailed analysis of the IZZ identified the type of health behaviour with the highest and lowest intensity, as shown in Table 7.

*Table 7. Measurement Results of Health Behaviour Subscales in Study Group*

<b>Health Behaviour</b>	<b>M</b>	<b>Me</b>	<b>SD</b>
Overall health behaviour indicator	82.46	87.0	17.63
Proper eating habits	3.24	3.3	0.84
Prevention behaviours	3.59	3.8	0.90
Positive mental attitudes	3.47	3.3	0.66
Health practices	3.45	3.7	0.99
Comparison of health behaviour subscales	Chi <sup>2</sup> <sub>ANOVA</sub> =50.657 p<0.001		
<b>Pairwise comparisons of subscales:</b>			
Proper eating habits vs. prevention behaviour	Z=5.383, p <sub>B</sub> <0.001		

<b>Health Behaviour</b>	<b>M</b>	<b>Me</b>	<b>SD</b>
Proper eating habits vs. positive mental attitudes	Z=4.046, $p_B < 0.001$		
Proper eating habits vs. health practices	Z=3.541, $p_B < 0.002$		
Prevention behaviour vs. positive mental attitudes	Z=1.806, $p_B < 0.426$		
Prevention behaviour vs. health practices	Z=2.191, $p_B < 0.171$		
Positive mental attitudes vs. health practices	Z=0.018, $p_B < 1.000$		

*Source: own study.*

Statistically significant differences between the health behaviour subscales occurred between proper eating habits and prevention behaviour (higher score in prevention behaviour), between proper eating habits and positive mental attitude (higher score in positive mental attitude) and between proper eating habits and health practices. The other subscales do not differ.

### **Conclusions**

1. The quality of life of dialysis patients is average, and dialysis patients present a high level of health behaviour.
2. Respondents' quality of life scores decrease with increasing duration of dialysis treatment.
3. Respondents rated their quality of life as highest in the environmental domain and lowest in the physical domain.
4. Respondents present the highest level of health behaviours regarding prevention behaviours and the lowest regarding proper eating habits.
5. Only the level of education is a significant factor in the respondents' quality of life assessment.

### **Discussion**

CKD is a serious social and epidemiological problem both in Poland and worldwide. In Poland, the prevalence of CKD is about 15%, while in the world population, it is about 10%. CKD is a multisymptomatic syndrome that arises due to a reduction in the number of active nephrons destroyed by various disease processes occurring in the renal parenchyma. In a high proportion of patients diagnosed with ESRD, it is necessary to implement specialised renal replacement therapy in the form of haemodialysis or peritoneal dialysis. Renal transplantation is also performed in a high proportion of patients.[21]

In the course of kidney disease, it is not only the presence of a chronic, incurable disease that is of concern but also its impact on quality of life. Quality of life and health satisfaction in relation to chronic renal failure is crucial due to the severity of the disease, as well as its stage and the increasing number of

patients with this disorder. CKD adversely affects patients' daily functioning and involves many sacrifices, including the need to limit physical activity, change lifestyle, implement restrictions on eating a variety of foods, and spend many hours a week on dialysis. An additional complication for patients with kidney disease is the diet, which makes daily life difficult.

It should be emphasised that the quality of life of dialysis patients is crucial, as, at present, medicine is not able to completely halt the progression of the disease, as well as to reverse the destructive damage to the kidneys. For kidney disease patients on dialysis, health behaviours are also critical and significantly impact the patients' health status. In patients with CKD, implementing positive health behaviours is extremely important as it affects health-promoting behaviours, allowing such patients to maintain the best possible quality of life. Therefore, patients with chronic diseases, especially those with kidney disease, must be able to adhere to the principles of self-care, which means caring for vascular access for haemodialysis, adhering to a proper diet, undertaking physical activity, preventing infections, and using disease prevention.[22]

In our study, the overall quality of life of dialysis patients was average. Most patients described their quality of life as "neither good nor bad".

In a study on the quality of life of dialysis patients conducted by Ponczek et al., it was shown that almost half of the patients rated their quality of life as average, similar to our study's results. Only 35% of patients described their quality of life as good or very good, which differs significantly from the results of our study, in which none of the patients surveyed described their quality of life as very good.[23] The study's results on the quality of life of dialysis patients presented by Kocka et al. show that more than half of the subjects (52%) were satisfied with their quality of life despite their existing chronic disease. In comparison, no satisfaction with their quality of life was shown in approximately 20% of subjects.[24]

Our study also analysed the extent of quality of life, with patients rating it as highest and lowest. It was shown that the highest quality of life was presented by the study patients in the environmental domain and the lowest in the physical domain. In the study by Ponczek et al., the respondents obtained the highest scores regarding quality of life in the psychological and environmental domains and the lowest in the physical domain.[23] The results of this study can be seen to partially coincide with the results of our research, especially in terms of the lowest rated domain of physical quality of life. Similarly, the study of Gętek et al. showed that respondents scored lowest in the physical domain, which is consistent with the results of our study, but highest in the environmental and social domain of quality of life, which does not coincide with the results of our study.[25] CKD reduces the range of opportunities related to physical activity, resulting in high dissatisfaction and a

decrease in quality of life in this domain. Dialysis patients also often struggle with lowered mood, sleep disturbances, weakness, and pain, which can affect quality of life. In addition, the diagnosis of a chronic, incurable disease can have the effect of triggering negative emotions such as anxiety, anger, fear, and the need to change lifestyles, habits and diets resulting from a chronic disease places an additional burden on patients.

Our study also analysed the impact of sociodemographic factors on the quality of life of respondents. It was shown that only the level of education was a significant factor in the subjects' quality of life assessment and the duration of dialysis. As the duration of dialysis increased, the subjects' quality of life scores decreased. The study by Pączek et al. showed that patients with a better financial situation rated their quality of life higher.[23] Similar conclusions are drawn by the authors of other studies, according to which financial independence and independence in daily activities influence the feeling of a better quality of life. During the illness and the need for long-term treatment, the financial balance is disrupted, and the dependence on third parties affects the existing life of those who care for the patient at home, which is also reflected in a deterioration of the carer's and patient's quality of life. For many patients, the reduction in quality of life was also a result of losing their job or having to apply for a disability pension for reasons and disorganising their daily schedule and dialysis, resulting in a worse financial situation[26,27,28]

Ponczek et al. also points out that quality of life is determined by the length of dialysis treatment. The authors note that patients' quality of life decreases as the number of years of ongoing treatment increases, which is consistent with the results of our study.[23] In the study by Grochans et al., it has also been confirmed that subjects on dialysis for long periods are characterised by fatigue, mental fatigue, and impaired cognitive functioning, which are associated with lower satisfaction and quality of life scores.[29] The negative impact of haemodialysis duration on quality of life is also pointed out by Gerasimoula et al.[30] The analysis of the effects of sociodemographic factors on patients' quality of life showed that only the level of education was a significant factor in assessing patients' quality of life. A higher quality of life was characterised by those with a university education. The impact of education level on the quality of life of dialysis patients is also highlighted by Pączek et al. They showed that quality of life in the physical, psychological, and environmental domains was highest among patients with higher education.[23] Kocka et al. also confirm that there is a relationship between quality of life and education level, especially in the social sphere. Results converging on the effect of educational level on quality of life are also presented by Gerassimoula et al., reporting that subjects with higher education rate their quality of life better.[24,30]

In the care of the dialysis patient, particular attention is paid to the patient's informed participation in treatment and care. Patients are expected to be proactive and to cooperate multidimensionally with healthcare professionals, which is directly linked to the implementation of health-promoting behaviours in patients' daily lives.

Our study also attempted to assess the level of health behaviour of dialysis patients. A high level of health behaviour was demonstrated in 43.57% of respondents. In addition, it was shown that the respondents presented the highest level of health behaviours in terms of prevention behaviours and the lowest in terms of proper eating habits. The level of health behaviour of dialysis patients was also analysed by Gniadek et al. The authors also based the study on the Juczyński IZZ. The study found that the highest-rated category of health behaviour was positive mental attitude, while the lowest-rated was health practices.[31] Such a research result is at odds with the results of our research.

The health behaviour of dialysis patients includes proper vascular access care, an essential aspect of care. The study by Grzelewska et al. showed that among dialysis patients in Łódź centres, the most common sources of information on fistula care were nurses and physicians. This source of knowledge is very often chosen by patients as it is a source of expertise. The authors also highlight that the most common recommendation followed by patients was hygiene of the fistula area. The vast majority of respondents (76%) declared that they check the noise of the fistula every day and therefore monitor its proper functioning.[32]

In dialysis patients, it is also worth paying attention to diet, as it is an important predictor of their survival. One of the main conditions of malnutrition is reduced food intake and reduced nutrient supply resulting from the elimination of certain food components due to the need for dialysis. It should be emphasised that, while it is the right approach to eliminate ingredients that increase, for example, the amount of potassium and sodium in the diet, a reduced supply of nutrients also becomes a cause of weakness, decreased immunity and, consequently, increased hospitalisation and mortality. Particular care should be taken to ensure that the meals taken by dialysis patients are appropriately balanced.

In conclusion, it is important to note that improving the quality of life and health satisfaction of patients struggling with CKD should be one of the main priorities of interdisciplinary care for dialysis patients. It is very important to pay close attention to the comfort of the dialysis patient and to provide dialysis options in such a way that they are least disruptive to the patient. The important role in improving the quality of life of dialysis patients with regard to patient education should also be noted. According to Abraham et al., patients on long-term renal replacement therapy require education. Patients who undergo ongoing refresher training in how to function with ESRD, as well as how to

function with the need for systematic dialysis, show a higher quality of life in each domain, especially mental.[33]

The positive impact of education among haemodialysis patients is also highlighted by Gerassimoula et al. In their study, patients with a higher quality of life were those who were well-informed about the health problem and adhered to therapeutic and health behaviour recommendations.[30]

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