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**ALEXANDRA BORISLAVOVA STAVREVA MD**

**ANALYSIS AND ASSESSMENT OF PSYCHOLOGICAL FACTORS IN PATIENTS  
WITH CHRONIC KIDNEY DISEASE IN THE PRE-DIALYSIS AND DIALYSIS  
STAGES**

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**PROF. SVETLA VASILEVA STAYKOVA, MD, DSc**

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**External members for the Medical University – Varna:**

1. Prof. Emil Paskev, MD, PhD, DSc
2. Assoc. Prof. Aleksandar Osichenko, MD, PhD
3. Assoc. Prof. Kiril Nenov, MD, PhD

**Reserve external member:**

1. Assoc. Prof. Rositsa Zorcheva-Vyateva, MD, PhD

**Internal members:**

1. Assoc. Prof. Dobrin Paskev, MD, PhD
2. Assoc. Prof. Zhivko Apostolov, MD, PhD

**Reserve internal member:**

1. Assoc. Prof. Yavor Kashlov, MD, PhD

The final meeting of the Scientific Jury for the defense of the dissertation of PhD candidate Alexandra Borislavova Stavreva, MD is scheduled to be held on **27.11.2025**.

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## Table of contents

|                                                                                                                                                                                   |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. List of Abbreviations.....                                                                                                                                                     | 4  |
| 2. Introduction .....                                                                                                                                                             | 6  |
| 3. Aim. Objectives. Hypothesis. ....                                                                                                                                              | 8  |
| 3.1. Aim of the Study.....                                                                                                                                                        | 8  |
| 3.2. Objectives of the Study .....                                                                                                                                                | 8  |
| 3.3 Hypothesis .....                                                                                                                                                              | 8  |
| 4. Materials and Methods .....                                                                                                                                                    | 9  |
| 4.1. Study Setting .....                                                                                                                                                          | 9  |
| 4.2. Study Population and Scope .....                                                                                                                                             | 9  |
| 5. Results .....                                                                                                                                                                  | 12 |
| 5.1. Descriptive analysis of the study cohort.....                                                                                                                                | 12 |
| 5.2. Comparative analysis of psychological factors - stress, depressive experiences, and social support in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages..... | 17 |
| 5.2.1. Comparative analysis of the psychological factor – stress in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages .....                                       | 17 |
| 5.2.2. Comparative analysis of the psychological factor—depressive experiences in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages. ....                         | 19 |
| 5.2.3. Comparative analysis of the psychological factor—social support in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages. ....                                 | 22 |
| 5.3. Correlation analysis of psychological factors—stress, depressive experiences, and social support—in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages. ....  | 24 |
| 5.3.1. Correlation analysis of the psychological factor—stress in CKD patients in the pre-dialysis (G1–G4) stage.....                                                             | 24 |
| 5.3.2. Correlation analysis of the psychological factor-stress in CKD patients in the dialysis (G5) stage. ....                                                                   | 25 |
| 5.3.3. Correlation analysis of the psychological factor—depressive experiences—in CKD patients in the pre-dialysis (G1–G4) stage. ....                                            | 27 |
| 5.3.4. Correlation analysis of the psychological factor—depressive experiences—in CKD patients in the dialysis (G5) stage.....                                                    | 29 |
| 5.3.5. Correlation analysis of the psychological factor - social support in CKD patients in the pre-dialysis (G1–G4) stage. ....                                                  | 31 |
| 5.3.6. Correlation analysis of the psychological factor - social support in CKD patients in the dialysis (G5) stage. ....                                                         | 32 |
| 5.4. Overall survival (OS) in patients undergoing hemodialysis treatment.....                                                                                                     | 34 |
| 5.5. Cox regression analysis.....                                                                                                                                                 | 35 |
| 5.5.1. Cox regression analysis of the stress factor and its impact on survival in HD patients. ....                                                                               | 35 |

|                                                                                                           |    |
|-----------------------------------------------------------------------------------------------------------|----|
| 5.5.2. Cox regression analysis of depressive experiences and their impact on survival in HD patients..... | 36 |
| 5.5.3. Cox regression analysis of social support and its impact on survival in HD patients. ....          | 37 |
| 6. Discussion .....                                                                                       | 38 |
| 6.1. Conclusion.....                                                                                      | 47 |
| 6.2. Conclusions of the study.....                                                                        | 47 |
| 7. Contributions .....                                                                                    | 49 |
| 7.1. Original contributions .....                                                                         | 49 |
| 7.2. Contributions of scientific and practical value .....                                                | 49 |
| 8. Scientific publications on the topic.....                                                              | 50 |

## **1. List of Abbreviations**

KD – Chronic kidney disease

CKF / CRF – Chronic kidney failure / Chronic renal failure

HD – Hemodialysis

HDR – Hygienic–dietary regimen

HTN – Arterial hypertension

DM – Diabetes mellitus

MetS – Metabolic syndrome

CHF – Congestive heart failure

Perm-cath – Permanent venous catheter

AVF – Arteriovenous fistula

CAI – Catheter-associated infection

CAT – Catheter-associated thrombosis

ESRD – End-stage renal disease

KDIGO – Kidney Disease: Improving Global Outcomes

GBD – Global Burden of Disease

QoL – Quality of life

HRQoL – Health-related quality of life

WHO – World Health Organization

SRDs – Stress-related disorders

PTSD – Post-traumatic stress disorder

GFR – Glomerular filtration rate

BDI – Beck Depression Inventory

CBT – Cognitive behavioral therapy

HADS – Hospital Anxiety and Depression Scale

STAI – State–Trait Anxiety Inventory

CSM – Common Sense Model

DSM – Diagnostic and Statistical Manual of Mental Disorders

SSRIs – Selective serotonin reuptake inhibitors

HIRA - Health Insurance Review and Assessment Service

PCS – Physical Component Summary

SSR – Systematic Self-Reflection

SF-36 – Short Form-36 Health Survey

NIMH – National Institute of Mental Health

MSPSS – Multidimensional Scale of Perceived Social Support

AVG – Arteriovenous graft

## 2. Introduction

Chronic kidney disease (CKD) is a major global public health problem, with statistics showing an increase in mortality over the past two decades (according to the Global Burden of Disease—GBD—2017, 2021; Chen et al., 2024). It is characterized as a chronic condition involving a gradual and irreversible decline in normal kidney function. End-stage renal disease (ESRD)—chronic kidney failure—requires long-term, life-sustaining treatment, with hemodialysis (HD) being the most commonly used method of renal replacement therapy.

The prevalence and incidence of CKD are rising rapidly due to the increasing number of patients with arterial hypertension (AH), diabetes mellitus (DM), metabolic syndrome (MS), and their associated complications (Kovesdy et al., 2022). Recognizing the disease itself, adhering to specific lifestyle and dietary restrictions, and ambulatory monitoring of nitrogenous waste levels during the predialysis stage aim to slow the decline in glomerular filtration (eGFR) and prepare patients for the potential initiation of renal replacement therapy. The most common psychological problem among patients with CKD is distress (Cukor et al., 2007; Chilcot et al., 2016), which encompasses other factors such as stress, depressive experiences, fatigue, anxiety, and the need for social support. As with many chronic illnesses, CKD management involves functional limitations, restrictions on certain foods, monthly monitoring of kidney function, and daily medication use. This often leads to fear of starting HD treatment. Because of these restrictions, individuals diagnosed with CKD are predisposed to disturbances in their psycho-emotional state and to manifestations of distress, anxiety, and tension.

The initial stage of adapting to hemodialysis (HD) has an adverse impact on the psychological, physical, and emotional status of patients beginning HD therapy (Almutary et al., 2023). During this period, and with the gradual deterioration of renal function, they often exhibit symptoms such as pronounced fatigue and weakness, loss of appetite, muscle cramps, and arterial hypotension, as well as face risks of complications including anemia, progressive disturbances in water–electrolyte and acid–base balance, and bone–mineral disorders over the course of the disease (KDIGO 2024 Clinical Practice Guideline). For these reasons, patients become highly dependent on HD therapy and medication, which brings substantial behavioral and psychosocial changes into their lives. In addition to managing comorbidities, patients on HD must cope with psychological states that stem in part from various socioeconomic factors (Turkistani et al., 2014; Ye et al., 2022) and that subsequently lead to other psychological disorders such as depression and anxiety (Loosman et al., 2015; Gerogianni et al., 2018). Receiving the diagnosis and the need for life-sustaining treatment evoke many emotions—

including fear, anger, despair, or hope—as patients pass through different stages of accepting or denying the chronic illness and adapt to a “new” way of life.

Various studies have shown reduced quality of life (QoL) in patients undergoing hemodialysis (HD) compared with those diagnosed with CKD (Kalantar-Zadeh et al., 2016). Both populations also face a high risk of complications, increased hospitalization rates, and mortality. For these reasons, it is essential that a multidisciplinary team—nephrologists together with psychologists/psychiatrists—identify the key psychological factors influencing the psycho-emotional status of these patient groups, with a view to prevention and treatment (Chan R et al., 2017). Analyses from studies worldwide indicate improvements in overall well-being and QoL among patients with CKD in both the predialysis and dialysis stages.



### **3. Aim. Objectives. Hypothesis.**

#### **3.1. Aim of the Study**

The aim of this dissertation is to:

1. Analyze the manifestation of psychological factors in patients with CKD at the pre-dialysis and dialysis stages.
2. Assess their impact on the patients' psycho-emotional status and on survival among those undergoing hemodialysis (HD).

#### **3.2. Objectives of the Study**

- 1) Evaluate the prevalence of stress, depressive experiences, and social support among patients in the pre-dialysis stage of chronic kidney disease.
- 2) Determine the prevalence of psychological factors in patients receiving maintenance hemodialysis.
- 3) Compare patients in the pre-dialysis stage with those at end-stage CKD with respect to the factors under study.
- 4) Examine correlations between the most prominent signs and the subjectively perceived factors—stress, depressive experiences, and social support—among pre-dialysis CKD patients.
- 5) Identify relationships between observed characteristics and subjective psychological factors in dialysis-dependent patients.
- 6) Using regression analysis, evaluate the significance of stress, depressive experiences, and social support for the survival of patients undergoing HD.

#### **3.3 Hypothesis**

We hypothesize that patients in the pre-dialysis stage of CKD exhibit lower levels of stress, depressive experiences, and anxiety compared with patients receiving maintenance hemodialysis.

## **4. Materials and Methods**

### **4.1. Study Setting**

The study was conducted at the Clinic of Nephrology and Dialysis, University Hospital “St. Marina,” Varna.

### **4.2. Study Population and Scope**

- A prospective, non-interventional, single-center clinical study was carried out. The study period spanned from March 2024 to April 2025.
- The study enrolled 90 patients, divided into two groups:
  1. Patients in the pre-dialysis stage of CKD corresponding to stages G1–G4 per KDIGO – 30 participants.
  2. Patients undergoing maintenance hemodialysis, corresponding to stage G5 per KDIGO – 60 participants.
- The study was conducted during routine clinical examinations when patients were hospitalized on the clinic’s inpatient service and during regularly scheduled hemodialysis sessions. Each participant met all inclusion criteria and none of the exclusion criteria.
- **Inclusion Criteria:**
  1. Age over 18 years.
  2. Individuals diagnosed with chronic kidney disease.
  3. Individuals undergoing maintenance hemodialysis.Individuals who provided written informed consent to participate.
- **Exclusion Criteria:**
  1. Age under 18 years.
  2. Individuals who did not provide written informed consent to participate.
  3. Diseases or conditions that would interfere with comprehension of the study tasks.

### 4.3. Study Period

The study assessing psychological factors in patients with chronic kidney disease (CKD) at pre-dialysis and dialysis stages, as well as their impact on quality of life after diagnosis, proceeded in three main phases:

- Phase 1: Selection of the questionnaire items based on a review of the scientific literature.
- Phase 2: Selection of patients to participate in the study after signing informed consent.
- Phase 3: Administration of the survey and maintaining continuous contact with participants to minimize psychological bias/burden.

### 4.4. Methodology

- **Documentary method** – a review of published scientific articles, studies, and available data on CKD and on how psychological factors influence adaptation to the hemodialysis lifestyle in the global literature.
- **Sociological methods** – patients were selected according to strictly defined criteria after detailed prior explanation of the study procedures. Each participant completed a questionnaire consisting of the following parts:
  - Part I: Demographic data—sex, age, education, marital status, employment, and CKD stage.
  - Part II: Questions assessing the level of stress.
  - Part III: Questions related to depressive experiences.
  - Part IV: Questions evaluating received social support.

- **Statistical Analyses**

For statistical processing, SPSS v.20 was used. The described indicators are presented in tables and graphs.

- Descriptive analysis to present the frequency distribution of qualitative variables, including absolute values (n) and relative frequencies (%).
- Comparative analysis – the nonparametric Mann–Whitney test was used to compare two independent groups with non-normal distributions.

- Correlation analysis to examine relationships between two qualitative features – for non-normally distributed results, Spearman’s rank correlation was applied. The strength of correlation was evaluated on a five-point scale according to the correlation coefficient:

0.70 – very strong correlation

0.40–0.69 – strong correlation

0.30–0.39 – moderate correlation

0.20–0.29 – weak correlation

0.01–0.19 – very weak to negligible correlation

- Linear regression analysis to determine the degree of dependence and to predict values of the dependent variable.
- Kaplan–Meier curve used to assess time-to-event outcomes such as survival or death.
- Graphical analysis for visual presentation of the obtained results.

The study evaluating the impact of psychological factors on patients with chronic kidney disease at pre-dialysis and dialysis stages was conducted after receiving approval from the Research Ethics Committee (KENT) at the Medical University of Varna “Prof. Dr. Paraskev Stoyanov,” Protocol/Decision No. 139 dated 14.12.2023.

## 5. Results

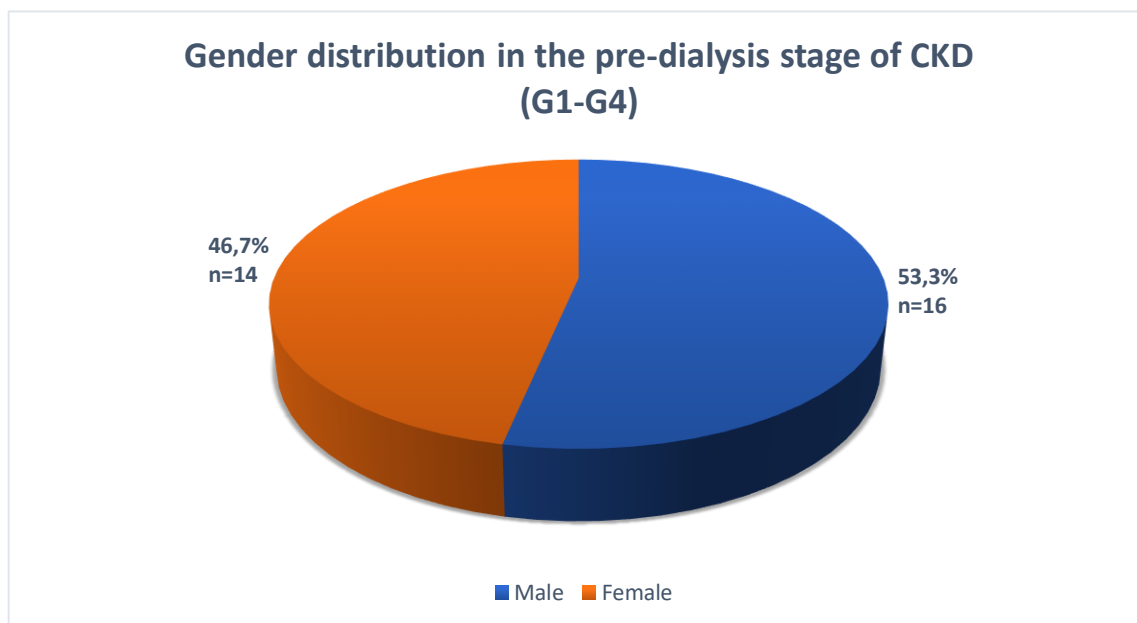
### 5.1. Descriptive analysis of the study cohort

A total of 90 patients with confirmed CKD were included—30 participants in the pre-dialysis stage (G1–G4) and 60 in end-stage CKD (G5) according to the KDIGO classification. The mean age of those in the pre-dialysis group was  $59.7 \pm 16.3$  years, comparable to the hemodialysis (MHD) group at  $60.6 \pm 11.3$  years. In the G1–G4 group, the youngest patient was 28 years old and the oldest 85; in the G5 group, the youngest was 30 and the oldest 82. The descriptive analysis of the sample is shown in Table 1. The distribution of participants by demographic and socio-economic characteristics is presented in Table 1 and Figures 1–5.

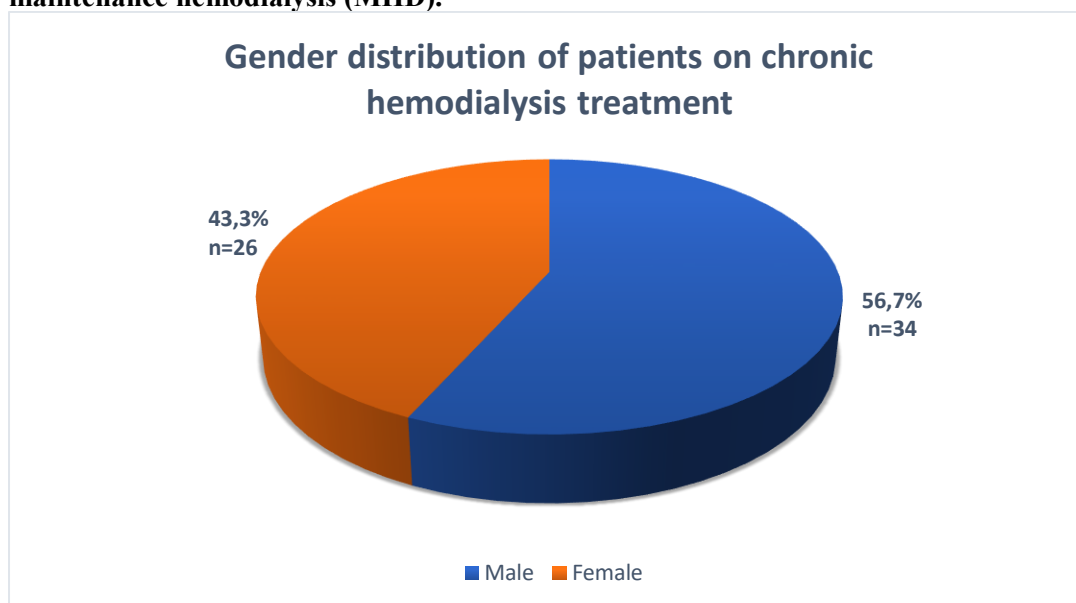
**Table 1. Demographic and socio-economic characteristics of the patients**

| Examined indicator    |                       | N (%)<br>Patients with<br>CKD in pre-<br>dialysis stage<br>(G1–G4) | N (%)<br>Patients on<br>chronic dialysis<br>treatment |
|-----------------------|-----------------------|--------------------------------------------------------------------|-------------------------------------------------------|
| Studied group (Total) |                       | 30 (33,3 %)                                                        | 60 (66,7 %)                                           |
| Sex                   | Male                  | 16 (53,3 %)                                                        | 34 (56,7 %)                                           |
|                       | Female                | 14 (46,7 %)                                                        | 26 (43,3 %)                                           |
| Age                   | mean $\pm$ SD (range) | 59,7r. $\pm$ 16,3r.                                                | 60,6r. $\pm$ 11,3r.                                   |
| Education             | Primary               | 6 (20,0 %)                                                         | 9 (15,0 %)                                            |
|                       | Secondary             | 21 (70,0 %)                                                        | 40 (66,7 %)                                           |
|                       | Higher                | 3 (10,0 %)                                                         | 11 (18,3 %)                                           |
| Marital status        | Married               | 16 (53,3 %)                                                        | 40 (66,7 %)                                           |
|                       | Cohabiting            | 4 (13,3 %)                                                         | 3 (5,0 %)                                             |
|                       | Single                | 3 (10,0 %)                                                         | 9 (15,0 %)                                            |
|                       | Divorced              | 2 (6,7 %)                                                          | 4 (6,7 %)                                             |
|                       | Widowed               | 5 (16,7 %)                                                         | 4 (6,7 %)                                             |
| Employment status     | Employed              | 12 (40,0 %)                                                        | 11 (18,3 %)                                           |
|                       | Unemployed            | 4 (13,3 %)                                                         | 30 (50,0 %)                                           |
|                       | Retired               | 14 (46,7 %)                                                        | 19 (31,7 %)                                           |

**Figure 1. Pie chart showing the percentage distribution by sex of CKD patients in the pre-dialysis stage (G1–G4).**

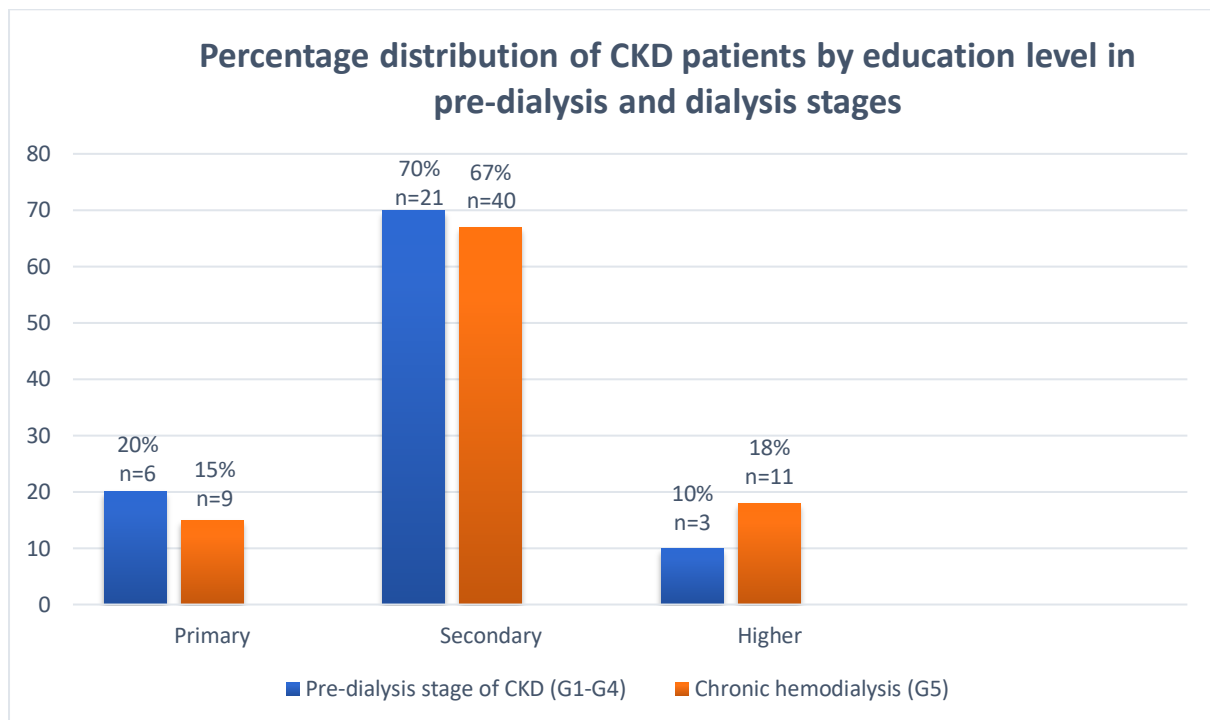


**Figure 2. Pie chart showing the percentage distribution by sex of patients undergoing maintenance hemodialysis (MHD).**



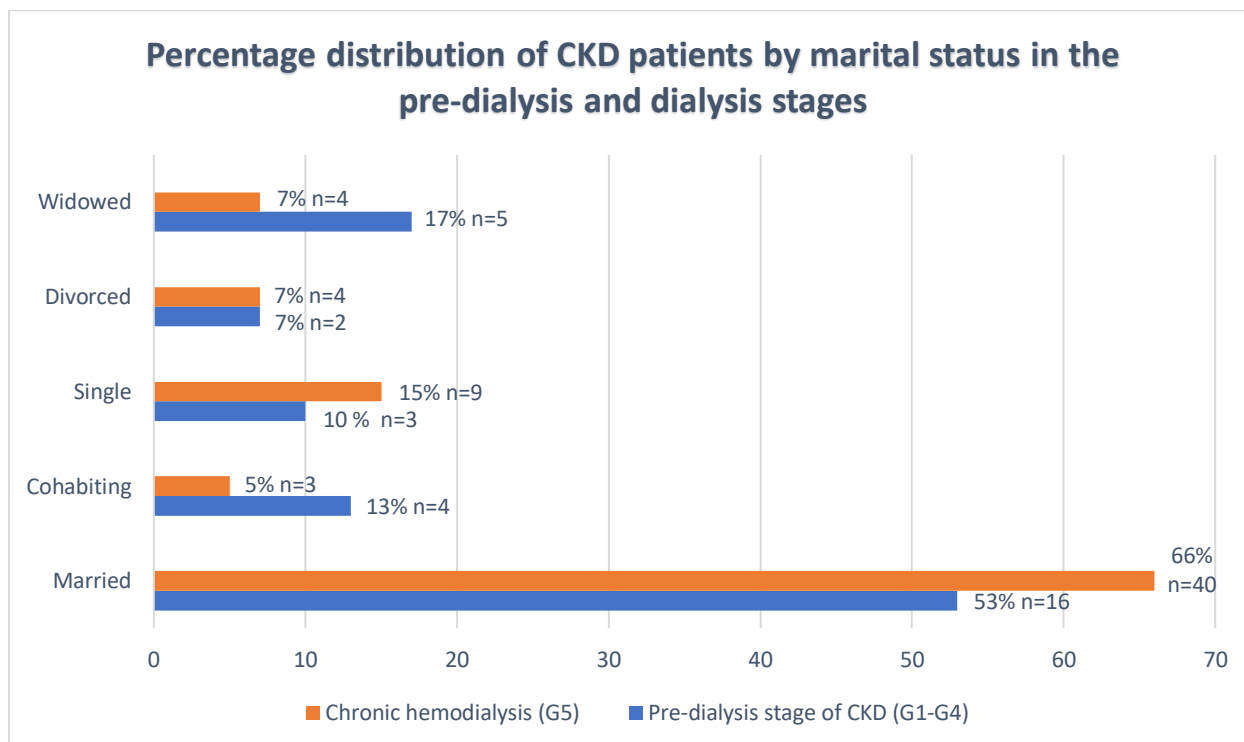
Figures 1 and 2 present the percentage distribution by sex of CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages. The results show an approximately equal distribution in the sample: 53.3% (n=16) men and 46.7% (n=14) women in the pre-dialysis group, and 56.7% (n=34) men and 43.3% (n=26) women in the dialysis group. The groups are equivalent in percentage terms, allowing for comparison of the results.

**Figure 3. Column chart showing the percentage distribution of CKD patients by education level in the pre-dialysis and dialysis stages.**



Education is part of the socio-demographic profile and can be used to help address psycho-emotional disturbances that arise after a CKD diagnosis or after starting HD treatment. According to Cukor et al. (2022), education influences patients' ability to understand their illness, make informed decisions, and apply effective coping strategies. The results in Figure 3 show similar percentages across the study groups. Regardless of whether a patient is in the pre-dialysis or dialysis stage of CKD, educational level may remain a stable moderating factor for mental health.

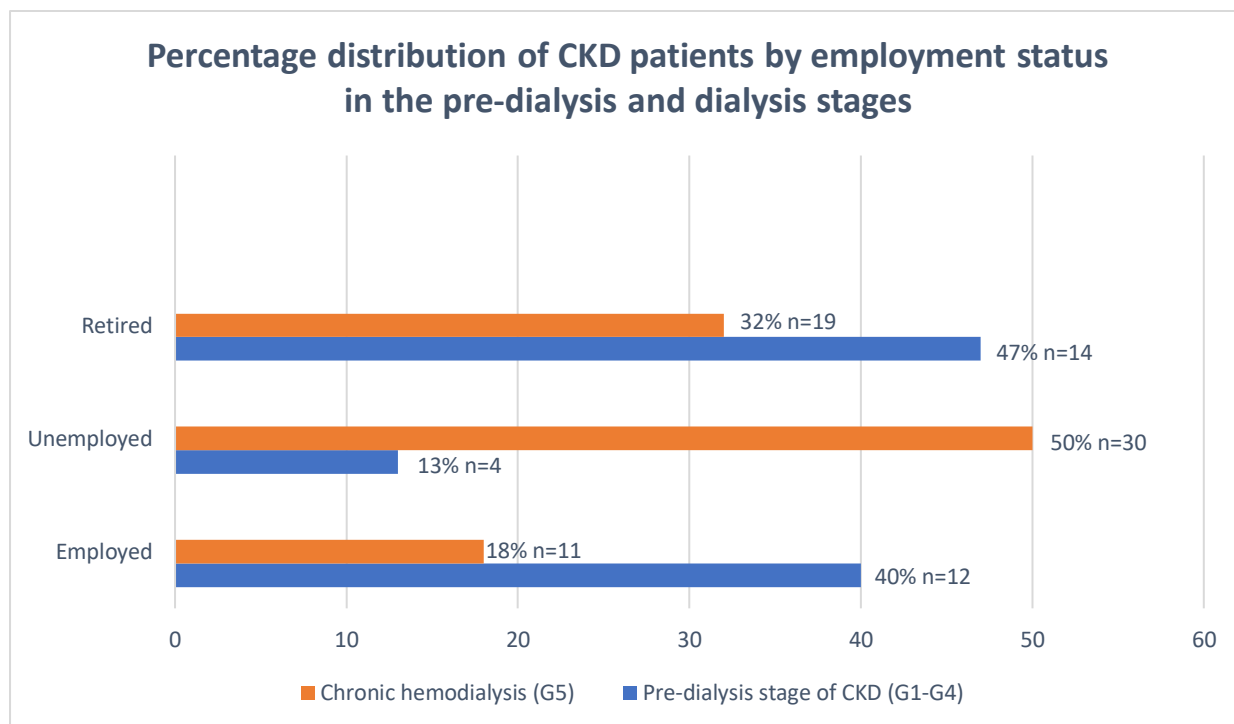
**Figure 4. Bar chart showing the percentage distribution of CKD patients by marital status in the pre-dialysis and dialysis stages.**



Marital status is directly related to the factor of social support, which matters for the subjective experience of stress associated with chronic illness and the need to adapt to HD treatment. Support from a spouse, family, or close friends can significantly reduce tension, worry, anxiety, and emotional distress, thereby facilitating acceptance of the diagnosis and adherence to therapy. Its presence often contributes to better psycho-emotional well-being and a higher quality of life. Figure 4 illustrates a similar distribution of respondents across the two study groups.



**Figure 5. Bar chart showing the percentage distribution of CKD patients by employment status in the pre-dialysis and dialysis stages.**



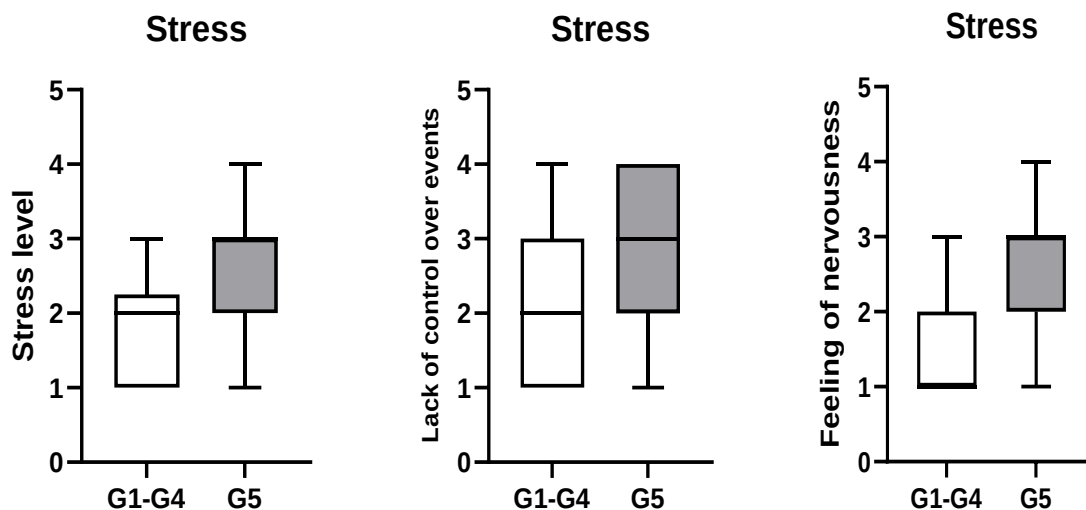
Employment is considered a variable demographic factor and is important for patients' economic situation and psycho-emotional well-being (Choi et al., 2019; van Manen et al., 2001). As seen in Figure 5, among patients in stage G5 (end-stage CKD), 50% are unemployed after starting HD, while only 18% manage to remain employed by coordinating their work schedules with dialysis sessions. By comparison, among patients with CKD in the pre-dialysis stage (G1–G4), 40% are still employed, 13% are unemployed, and 47% are retired. As the disease progresses, there is a marked decline in work activity, most often due to physical limitations, the treatment schedule, and psycho-emotional strain.

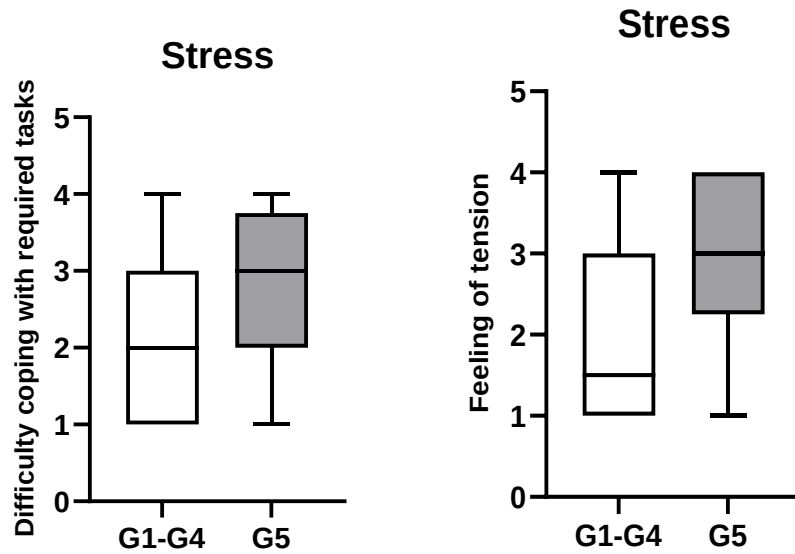
## 5.2. Comparative analysis of psychological factors - stress, depressive experiences, and social support in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages

### 5.2.1. Comparative analysis of the psychological factor – stress in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages

Table 2. Mean stress levels in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages.

| Patients                              |                    | Mean  | (N) | Std. Deviation | Sig. (2-tailed) |
|---------------------------------------|--------------------|-------|-----|----------------|-----------------|
| Everyday stress                       | Pre-dialysis stage | 1,767 | 30  | 0,8172         | 0,000           |
|                                       | Hemodialysis       | 2,783 | 60  | 0,8456         |                 |
| Lack of control over events           | Pre-dialysis stage | 2,167 | 30  | 0,9855         | 0,009           |
|                                       | Hemodialysis       | 2,967 | 60  | 0,9013         |                 |
| Feeling of nervousness                | Pre-dialysis stage | 1,367 | 30  | 0,6687         | 0,000           |
|                                       | Hemodialysis       | 2,633 | 60  | 1,041          |                 |
| Difficulty coping with required tasks | Pre-dialysis stage | 2,033 | 30  | 1,098          | 0,004           |
|                                       | Hemodialysis       | 2,750 | 60  | 0,9320         |                 |
| Feeling of tension                    | Pre-dialysis stage | 1,867 | 30  | 1,042          | 0,000           |
|                                       | Hemodialysis       | 3,167 | 60  | 0,8862         |                 |





**Figure 6. Stress levels in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages.**

The nonparametric Mann–Whitney analysis (Table 2) between the two study groups shows that patients undergoing HD treatment (stage G5) report significantly higher stress levels compared with patients in the pre-dialysis stage (G1–G4) of CKD. Statistically significant differences were found for all stress-related items, including the presence of everyday stress, frequent feelings of tension and/or nervousness, a perceived lack of control over events, and difficulty coping with required tasks.

These results underscore that HD patients experience more intense and prolonged psychological distress related to physical limitations and the treatment regimen, as well as a sense of lost autonomy and control over their lives. Elevated stress indicates ongoing difficulties in adapting to the therapeutic regimen and the chronic nature of the condition. The feelings of lack of control and emotional tension, together with difficulties performing tasks due to physical limitations, suggest an increased risk of developing depressive experiences or social isolation. The data are presented in tabular (Table 2) and graphical (Figure 6) form.

### 5.2.2. Comparative analysis of the psychological factor—depressive experiences in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages.

**Table 3.** Mean values of depressive experiences in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages.

| Patients                               |                    | Mean  | (N) | Std. Deviation | Sig. (2-tailed) |
|----------------------------------------|--------------------|-------|-----|----------------|-----------------|
| Anxiety                                | Pre-dialysis stage | 1,933 | 30  | 1,015          | 0,010           |
|                                        | Hemodialysis       | 2,750 | 60  | 0,9500         |                 |
| Decreased interest in daily activities | Pre-dialysis stage | 1,833 | 30  | 0,8743         | 0,000           |
|                                        | Hemodialysis       | 2,883 | 60  | 0,8253         |                 |
| Fatigue                                | Pre-dialysis stage | 1,967 | 30  | 1,033          | 0,000           |
|                                        | Hemodialysis       | 3,200 | 60  | 0,7983         |                 |
| Loss of appetite                       | Pre-dialysis stage | 1,933 | 30  | 0,9444         | 0,178           |
|                                        | Hemodialysis       | 2,100 | 60  | 0,9863         |                 |
| Changes in body weight                 | Pre-dialysis stage | 1,900 | 30  | 0,8030         | 0,008           |
|                                        | Hemodialysis       | 2,567 | 60  | 0,8511         |                 |
| Difficulty concentrating               | Pre-dialysis stage | 1,833 | 30  | 0,9499         | 0,004           |
|                                        | Hemodialysis       | 2,283 | 60  | 0,9037         |                 |
| Inner restlessness                     | Pre-dialysis stage | 1,667 | 30  | 0,7112         | 0,002           |
|                                        | Hemodialysis       | 2,650 | 60  | 1,117          |                 |
| Sleep disturbances                     | Pre-dialysis stage | 1,800 | 30  | 0,8052         | 0,001           |
|                                        | Hemodialysis       | 3,033 | 60  | 0,9382         |                 |
| Feelings of worthlessness              | Pre-dialysis stage | 1,567 | 30  | 0,7739         | 0,000           |
|                                        | Hemodialysis       | 2,283 | 60  | 0,9758         |                 |

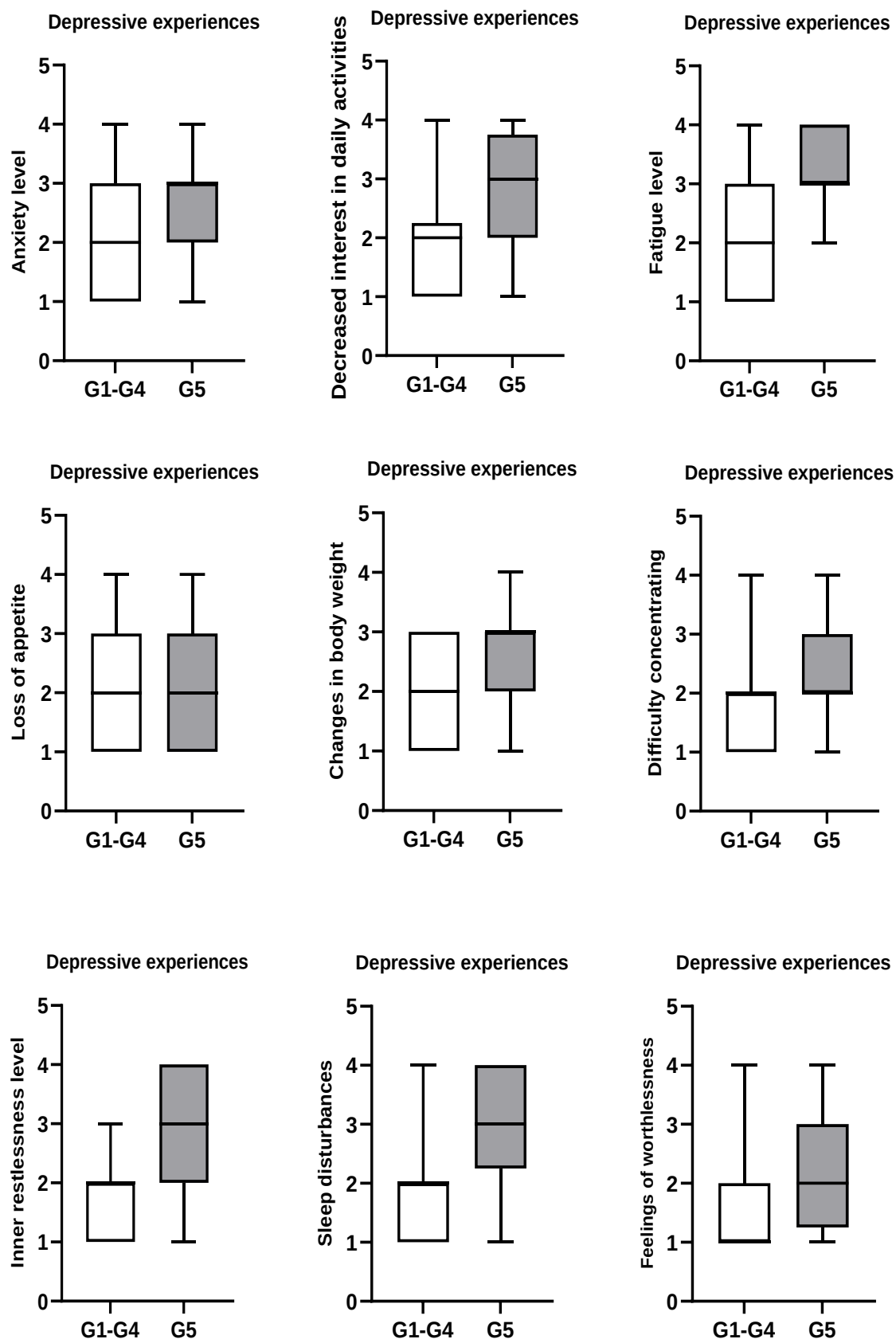


Figure 7. Levels of depressive experiences in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages.

The analysis (Table 3) between the two study groups shows significantly higher levels of depressive experiences among patients undergoing HD treatment (stage G5) compared with those diagnosed in the pre-dialysis stage (G1–G4) of CKD. Notably, the following symptoms are more pronounced:

- **Anxiety, chronic fatigue, inner restlessness, and a sense of tension**, most likely due to the unpredictability of the chronic condition, fear of future complications, and the emotional burden of constant dependence on care at the HD center.
- **Feelings of worthlessness and difficulty concentrating**, associated with reduced self-esteem and cognitive overload.
- **Sleep disturbances**, manifested as both insomnia and hypersomnia, which indicate an increased risk of developing depressive disorders.
- **Decreased interest in daily activities and changes in body weight**, associated with emotional exhaustion due to ongoing medical dependence and loss of motivation.

The findings indicate a more pronounced psycho-emotional vulnerability in dialysis patients, likely related both to physical limitations and to the impact of treatment on their way of life.

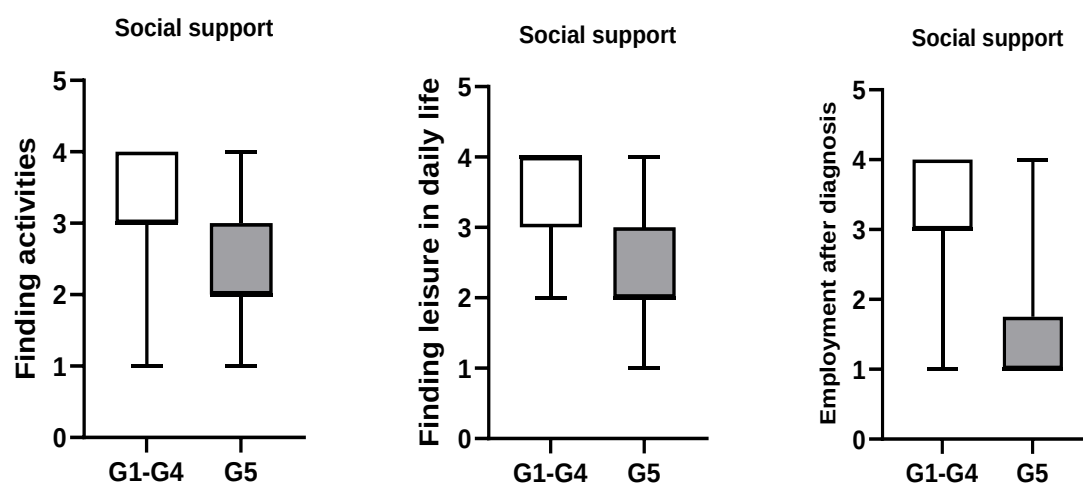
An exception is the symptom of **loss of appetite**, for which no statistically significant difference was found between the two groups. This result is likely due to the fact that appetite disturbances are relatively common among patients with chronic illnesses regardless of stage, or are influenced more by physiological than by emotional factors. Loss of appetite is a frequent somatic symptom; patients do not always identify it as a problem or may perceive it as a normal part of their condition, which can affect self-reporting.

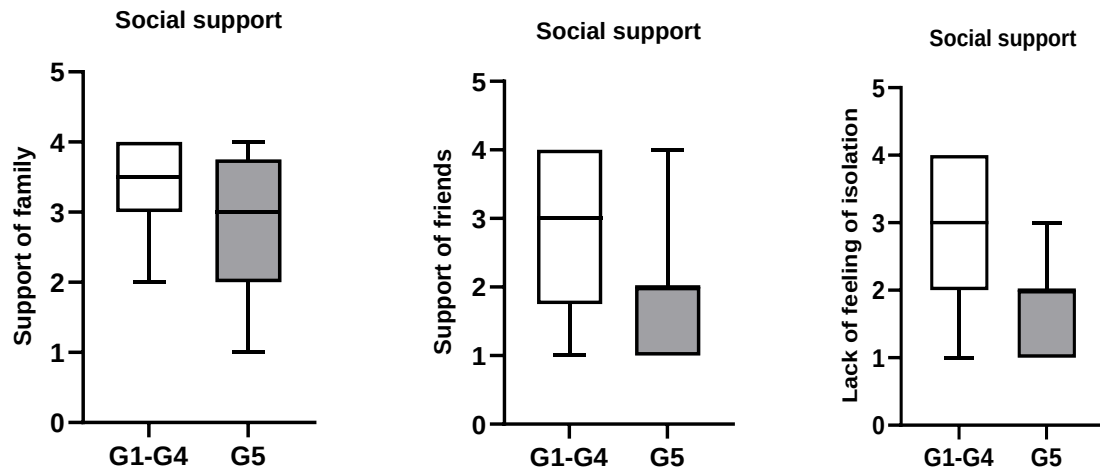
Overall, the results show that patients undergoing HD treatment—beyond the need to adhere to regular therapy accompanied by lifestyle restrictions—often experience social isolation and abrupt changes in daily roles (e.g., leaving employment, dependence on the HD schedule). They are exposed to chronic stress and adaptive strain, which underlie the risk of depressive disorders. In contrast, patients in the pre-dialysis stage of CKD still retain partial autonomy and are not yet burdened by the physical and social consequences of dialysis, which explains their lower levels of depressive experiences. The results are presented in tabular (Table 3) and graphical (Figure 7) form.

### 5.2.3. Comparative analysis of the psychological factor—social support in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages.

**Table 4.** Mean values of social support in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages.

| Patients                                     |                    | Mean  | (N) | Std. Deviation | Sig. (2-tailed) |
|----------------------------------------------|--------------------|-------|-----|----------------|-----------------|
| Finding activities                           | Pre-dialysis stage | 3,200 | 30  | 0,8867         | 0,001           |
|                                              | Hemodialysis       | 2,300 | 60  | 0,9620         |                 |
| Finding leisure in daily life                | Pre-dialysis stage | 3,433 | 30  | 0,7279         | 0,000           |
|                                              | Hemodialysis       | 2,300 | 60  | 0,8694         |                 |
| Employment after diagnosis                   | Pre-dialysis stage | 3,200 | 30  | 0,9248         | 0,000           |
|                                              | Hemodialysis       | 1,400 | 60  | 0,7855         |                 |
| Support of family                            | Pre-dialysis stage | 3,367 | 30  | 0,7184         | 0,001           |
|                                              | Hemodialysis       | 2,683 | 60  | 1,033          |                 |
| Support of friends                           | Pre-dialysis stage | 2,633 | 30  | 1,159          | 0,001           |
|                                              | Hemodialysis       | 1,817 | 60  | 0,8535         |                 |
| Lack of feeling of isolation after diagnosis | Pre-dialysis stage | 2,767 | 30  | 1,073          | 0,000           |
|                                              | Hemodialysis       | 1,817 | 60  | 0,6763         |                 |





**Figure 8. Levels of social support in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages.**

The role of social support affecting the psycho-emotional status in the studied sample was also evaluated. The nonparametric analysis (Table 4) shows that patients in the pre-dialysis stage of CKD (G1–G4) report significantly higher levels on social support indicators compared with patients on regular HD (stage G5). The survey questions included support from family and friends; finding activities and/or leisure in daily life, employment, and the feeling of isolation after diagnosis. These results are most likely due to the better preserved functional status of patients diagnosed with CKD, as well as higher social activity and everyday leisure, which help maintain active relationships with family and friends. Among those undergoing regular HD therapy, a reduced sense of support is observed, which may be related to an increased feeling of social isolation, dependence, and impaired psycho-emotional well-being. Dialysis patients are subject to a strict therapeutic regimen involving absences from work, family, and social events, and chronic fatigue after procedures that limits communication. The data are presented in tabular (Table 4) and graphical (Figure 8) form.



### 5.3. Correlation analysis of psychological factors—stress, depressive experiences, and social support—in CKD patients in the pre-dialysis (G1–G4) and dialysis (G5) stages.

#### 5.3.1. Correlation analysis of the psychological factor—stress in CKD patients in the pre-dialysis (G1–G4) stage.

**Table 5. Correlation analysis between the stress factor and related symptoms in patients in the pre-dialysis (G1–G4) stage of CKD.**

|                                       |                 | Everyday stress | Lack of control over events | Feeling of nervousness | Difficulty coping with required tasks | Feeling of tension |
|---------------------------------------|-----------------|-----------------|-----------------------------|------------------------|---------------------------------------|--------------------|
| Everyday stress                       | r               | 1               | 0,541**                     | 0,721**                | 0,163                                 | 0,770**            |
|                                       | Sig. (2-tailed) |                 | 0,002                       | 0,000                  | 0,390                                 | 0,000              |
|                                       | N               | 30              | 30                          | 30                     | 30                                    | 30                 |
| Lack of control over events           | r               | 0,541**         | 1                           | 0,559**                | 0,605**                               | 0,636**            |
|                                       | Sig. (2-tailed) | 0,002           |                             | 0,0013                 | 0,000                                 | 0,001              |
|                                       | N               | 30              | 30                          | 30                     | 30                                    | 30                 |
| Feeling of nervousness                | r               | 0,721**         | 0,559**                     | 1                      | 0,219                                 | 0,637**            |
|                                       | Sig. (2-tailed) | 0,000           | 0,001                       |                        | 0,246                                 | 0,001              |
|                                       | N               | 30              | 30                          | 30                     | 30                                    | 30                 |
| Difficulty coping with required tasks | r               | 0,163           | 0,605**                     | 0,219                  | 1                                     | 0,243              |
|                                       | Sig. (2-tailed) | 0,390           | 0,000                       | 0,245                  |                                       | 0,195              |
|                                       | N               | 30              | 30                          | 30                     | 30                                    | 30                 |
| Feeling of tension                    | r               | 0,770**         | 0,636**                     | 0,637**                | 0,243                                 | 1                  |
|                                       | Sig. (2-tailed) | 0,000           | 0,000                       | 0,001                  | 0,195                                 |                    |
|                                       | N               | 30              | 30                          | 30                     | 30                                    | 30                 |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The Spearman analysis (Table 5) for patients in the pre-dialysis stage of CKD reveals that stress, nervousness, and tension show a stronger positive correlation both with the lack of control over events in the surrounding environment and with each other. This highlights the interrelationship between perceived control, emotional strain, and overall stress levels in this patient group. The less control a patient feels over what is happening, the more intensely they experience anxiety, tension, and psychological burden.

By contrast, these factors show a weaker, statistically non-significant correlation with an inability or difficulty in handling specific tasks. This suggests that emotional stress in pre-dialysis patients is not directly associated with a perceived cognitive or physical deficit in performing daily activities, or that they still retain an adaptive capacity to manage tasks despite increased psycho-emotional load.

The sense of loss of control after diagnosis is strongly correlated with all tracked symptoms, underscoring its key role in the dynamics of mental state. A perceived loss of control often serves as a central mechanism in the development of distress, anxiety, and helplessness, which become significant barriers to effective adaptation to the illness. Difficulties in coping with daily tasks already show a statistically significant association with lack of control over life events in the pre-dialysis stage, suggesting future challenges in the adaptation process when transitioning to HD treatment.

### 5.3.2. Correlation analysis of the psychological factor-stress in CKD patients in the dialysis (G5) stage.

**Table 6. Correlation analysis between the stress factor and related symptoms in patients in the dialysis (G5) stage of CKD.**

|                                       |                 | Everyday stress | Lack of control over events | Feeling of nervousness | Difficulty coping with required tasks | Feeling of tension |
|---------------------------------------|-----------------|-----------------|-----------------------------|------------------------|---------------------------------------|--------------------|
| Everyday stress                       | r               | 1               | 0,508**                     | 0,796**                | 0,637**                               | 0,764**            |
|                                       | Sig. (2-tailed) |                 | 0,000                       | 0,000                  | 0,000                                 | 0,000              |
|                                       | N               | 60              | 60                          | 60                     | 60                                    | 60                 |
| Lack of control over events           | r               | 0,508**         | 1                           | 0,541**                | 0,646**                               | 0,567**            |
|                                       | Sig. (2-tailed) | 0,000           |                             | 0,000                  | 0,000                                 | 0,000              |
|                                       | N               | 60              | 60                          | 60                     | 60                                    | 60                 |
| Feeling of nervousness                | r               | 0,796**         | 0,541**                     | 1                      | 0,611**                               | 0,662**            |
|                                       | Sig. (2-tailed) | 0,000           | 0,000                       |                        | 0,000                                 | 0,000              |
|                                       | N               | 60              | 60                          | 60                     | 60                                    | 60                 |
| Difficulty coping with required tasks | r               | 0,637**         | 0,646**                     | 0,611**                | 1                                     | 0,652**            |
|                                       | Sig. (2-tailed) | 0,000           | 0,000                       | 0,000                  |                                       | 0,000              |
|                                       | N               | 60              | 60                          | 60                     | 60                                    | 60                 |

|                    |                 |         |         |         |         |    |
|--------------------|-----------------|---------|---------|---------|---------|----|
| Feeling of tension | r               | 0,764** | 0,567** | 0,662** | 0,652** | 1  |
|                    | Sig. (2-tailed) | 0,000   | 0,000   | 0,000   | 0,000   |    |
|                    | N               | 60      | 60      | 60      | 60      | 60 |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The Spearman correlation analysis (Table 6) in patients at end-stage CKD undergoing regular HD treatment found a statistically significant relationship among all listed manifestations of stress in the questionnaire, such as the feeling of stress, tension, nervousness, difficulty coping with tasks, and lack of control over events. The presence of a significant positive correlation among these indicators shows that the stronger the subjective sense of stress, the more pronounced the accompanying emotional and functional difficulties—including trouble handling everyday tasks and a feeling of lacking control over one’s own life.

Patients often face multiple constraints: limited time due to a fixed HD schedule; chronic fatigue after procedures; and reduced opportunities for social or work activity. The consequences can trigger a sense of lost control and persistent psycho-emotional strain. Stress represents an overall response of the organism to the diagnosis, loss of physical autonomy, restrictions imposed by treatment, and uncertainty about the future.

The manifestations of tension and nervousness are a direct result of increased stress and constitute its emotional expressions. The constant sense of pressure, worry, or irritability stems from the perceived lack of control, the unpredictability of the future, and the chronic feeling that things are “beyond the patient’s capabilities.” Nervousness is common when there is a mismatch between expectations and reality. The perception of having no control over the course of events (including the illness, treatment, personal schedule, or future) plays a central role in intensifying anxiety and tension, fostering feelings of helplessness and vulnerability, and reducing motivation to cope and engage in therapy.

Difficulties coping with tasks are associated with cognitive challenges—problems with concentration and decision-making—and with behavioral aspects such as activity avoidance, passivity, and physical fatigue.

### 5.3.3. Correlation analysis of the psychological factor—depressive experiences—in CKD patients in the pre-dialysis (G1–G4) stage.

**Table 7. Correlation analysis between the factor depressive experiences and related manifestations in patients in the pre-dialysis (G1–G4) stage of CKD.**

|                                        |                 | Anxiety | Decreased interest in daily activities | Fatigue | Loss of appetite | Changes in body weight | Difficulty concentrating | Inner restlessness | Sleep disturbances | Feelings of worthlessness |
|----------------------------------------|-----------------|---------|----------------------------------------|---------|------------------|------------------------|--------------------------|--------------------|--------------------|---------------------------|
| Anxiety                                | r               | 1       | 0,676**                                | 0,622** | 0,281            | 0,552**                | 0,200                    | 0,506*             | 0,601**            | 0,369*                    |
|                                        | Sig. (2-tailed) |         | 0,000                                  | 0,002   | 0,133            | 0,002                  | 0,289                    | 0,004              | 0,000              | 0,045                     |
|                                        | N               | 30      | 30                                     | 30      | 30               | 30                     | 30                       | 30                 | 30                 | 30                        |
| Decreased interest in daily activities | r               | 0,676*  | 1                                      | 0,758** | 0,541**          | 0,427**                | 0,394*                   | 0,284              | 0,479**            | 0,652**                   |
|                                        | Sig. (2-tailed) | 0,000   |                                        | 0,000   | 0,002            | 0,019                  | 0,031                    | 0,128              | 0,007              | 0,000                     |
|                                        | N               | 30      | 30                                     | 30      | 30               | 30                     | 30                       | 30                 | 30                 | 30                        |
| Fatigue                                | r               | 0,622*  | 0,758**                                | 1       | 0,412**          | 0,585**                | 0,512**                  | 0,515*             | 0,676**            | 0,532**                   |
|                                        | Sig. (2-tailed) | 0,000   | 0,000                                  |         | 0,024            | 0,001                  | 0,004                    | 0,004              | 0,000              | 0,002                     |
|                                        | N               | 30      | 30                                     | 30      | 30               | 30                     | 30                       | 30                 | 30                 | 30                        |
| Loss of appetite                       | r               | 0,281   | 0,541**                                | 0,412** | 1                | 0,265                  | 0,404**                  | 0,150              | 0,228              | 0,688**                   |
|                                        | Sig. (2-tailed) | 0,133   | 0,002                                  | 0,0237  |                  | 0,157                  | 0,027                    | 0,428              | 0,2266             | 0,000                     |
|                                        | N               | 30      | 30                                     | 30      | 30               | 30                     | 30                       | 30                 | 30                 | 30                        |
| Changes in body weight                 | r               | 0,552*  | 0,427**                                | 0,585** | 0,265            | 1                      | 0,412**                  | 0,491*             | 0,559**            | 0,310                     |
|                                        | Sig. (2-tailed) | 0,001   | 0,018                                  | 0,000   | 0,157            |                        | 0,024                    | 0,006              | 0,001              | 0,095                     |
|                                        | N               | 30      | 30                                     | 30      | 30               | 30                     | 30                       | 30                 | 30                 | 30                        |
| Difficulty concentrating               | r               | 0,200   | 0,394*                                 | 0,512** | 0,404**          | 0,412*                 | 1                        | 0,345*             | 0,433**            | 0,503**                   |
|                                        | Sig. (2-tailed) | 0,289   | 0,031                                  | 0,003   | 0,027            | 0,024                  |                          | 0,062              | 0,016              | 0,005                     |
|                                        | N               | 30      | 30                                     | 30      | 30               | 30                     | 30                       | 30                 | 30                 | 30                        |
| Inner restlessness                     | r               | 0,506*  | 0,384*                                 | 0,515** | 0,150            | 0,491**                | 0,345*                   | 1                  | 0,735**            | 0,318*                    |
|                                        | Sig. (2-tailed) | 0,004   | 0,067                                  | 0,003   | 0,428            | 0,006                  | 0,062                    |                    | 0,000              | 0,086                     |
|                                        | N               | 30      | 30                                     | 30      | 30               | 30                     | 30                       | 30                 | 30                 | 30                        |

|                           |                 |        |         |         |         |         |         |        |        |        |
|---------------------------|-----------------|--------|---------|---------|---------|---------|---------|--------|--------|--------|
| Sleep disturbances        | r               | 0,601* | 0,479** | 0,676** | 0,228   | 0,559** | 0,433** | 0,735* | 1      | 0,311* |
|                           | Sig. (2-tailed) | 0,000  | 0,007   | 0,000   | 0,227   | 0,001   | 0,017   | 0,000  |        | 0,095  |
|                           | N               | 30     | 30      | 30      | 30      | 30      | 30      | 30     | 30     | 30     |
| Feelings of worthlessness | r               | 0,369* | 0,652** | 0,532** | 0,688** | 0,310*  | 0,503** | 0,318* | 0,311* | 1      |
|                           | Sig. (2-tailed) | 0,045  | 0,000   | 0,002   | 0,000   | 0,095   | 0,005   | 0,086  | 0,094  |        |
|                           | N               | 30     | 30      | 30      | 30      | 30      | 30      | 30     | 30     | 30     |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The analysis (Table 7) conducted among patients in the pre-dialysis (G1–G4) stage of CKD shows that anxiety exhibits a stronger, significant positive correlation with a number of other symptoms—reduced interest in performing daily tasks (likely due to the decreased motivation typical of this condition), fatigue (a key indicator of anxiety and mental overexertion), changes in body weight over the past year, a sense of inner restlessness (a direct emotional manifestation of anxiety), and sleep disturbances manifested as either insomnia or hypersomnia (consequences of anxiety), as well as feelings of worthlessness, which suggest the onset of depressive experiences. Anxiety shows an insignificant association with loss of appetite and with difficulties concentrating on specific tasks (likely because cognitive function is preserved in the pre-dialysis stage).

Other manifestations of depressive experiences, such as fatigue and feelings of worthlessness, display stronger interrelationships with all the variables examined. Therefore, these two symptoms can be considered central indicators of emotional and physical distress in pre-dialysis patients. The correlation between fatigue and reduced interest in performing tasks ( $r = 0.758$ ) indicates that loss of motivation and engagement in daily or professional activities predisposes to a substantial increase in perceived fatigue, affecting both cognitive functions (the ability to concentrate and complete tasks) and the socio-psychological state (feelings of worthlessness, restlessness, and sleep disturbances).

Restlessness and sleep disturbances emerge as two key, mutually reinforcing factors in the psycho-emotional profile of patients in the pre-dialysis stage of CKD, with a strong positive correlation between them ( $r = 0.735$ ,  $p < 0.001$ ). Restlessness is viewed as a direct expression of the affective component of anxiety—feelings of tension, inner unease, heightened irritability, and worries about disease progression. This persistent mental discomfort often predisposes to difficulty falling asleep and to experiencing nocturnal hyperactivation of

thoughts. Conversely, poor sleep quality or hypersomnia leads to increased fatigue, reduced concentration, impaired mood, and consequently worsened daytime functioning.

Reduced interest in carrying out daily tasks is more strongly associated with all the variables examined (anxiety, fatigue, loss of appetite, weight change, difficulty concentrating, sleep disturbances, and feelings of worthlessness), which suggests an early stage of symptomatology related to depressive experiences—with the exception of restlessness.

### 5.3.4. Correlation analysis of the psychological factor—depressive experiences—in CKD patients in the dialysis (G5) stage.

**Table 8. Correlation analysis between the factor depressive experiences and related manifestations in patients in the dialysis (G5) stage of CKD.**

|                                        |                 | Anxiety | Decreased interest in daily activities | Fatigue | Loss of appetite | Changes in body weight | Difficulty concentrating | Inner restlessness | Sleep disturbances | Feelings of worthlessness |
|----------------------------------------|-----------------|---------|----------------------------------------|---------|------------------|------------------------|--------------------------|--------------------|--------------------|---------------------------|
| Anxiety                                | r               | 1       | 0,664**                                | 0,625** | 0,611**          | 0,504**                | 0,581**                  | 0,861*             | 0,625**            | 0,668**                   |
|                                        | Sig. (2-tailed) |         | 0,000                                  | 0,000   | 0,000            | 0,000                  | 0,000                    | 0,000              | 0,000              | 0,000                     |
|                                        | N               | 60      | 60                                     | 60      | 60               | 60                     | 60                       | 60                 | 60                 | 60                        |
| Decreased interest in daily activities | r               | 0,664*  | 1                                      | 0,668** | 0,490**          | 0,555**                | 0,679**                  | 0,710*             | 0,587**            | 0,688**                   |
|                                        | Sig. (2-tailed) | 0,000   |                                        | 0,000   | 0,000            | 0,000                  | 0,000                    | 0,000              | 0,000              | 0,000                     |
|                                        | N               | 60      | 60                                     | 60      | 60               | 60                     | 60                       | 60                 | 60                 | 60                        |
| Fatigue                                | r               | 0,625*  | 0,668**                                | 1       | 0,461**          | 0,444**                | 0,581**                  | 0,682*             | 0,560**            | 0,595**                   |
|                                        | Sig. (2-tailed) | 0,000   | 0,000                                  |         | 0,000            | 0,000                  | 0,000                    | 0,000              | 0,000              | 0,000                     |
|                                        | N               | 60      | 60                                     | 60      | 60               | 60                     | 60                       | 60                 | 60                 | 60                        |
| Loss of appetite                       | r               | 0,611*  | 0,490**                                | 0,461** | 1                | 0,234                  | 0,483**                  | 0,587*             | 0,516**            | 0,583**                   |
|                                        | Sig. (2-tailed) | 0,000   | 0,000                                  | 0,000   |                  | 0,205                  | 0,000                    | 0,000              | 0,000              | 0,000                     |
|                                        | N               | 60      | 60                                     | 60      | 60               | 60                     | 60                       | 60                 | 60                 | 60                        |
| Changes in body weight                 | r               | 0,504*  | 0,555**                                | 0,444** | 0,234            | 1                      | 0,497**                  | 0,489*             | 0,448**            | 0,426**                   |
|                                        | Sig. (2-tailed) | 0,000   | 0,000                                  | 0,000   | 0,205            |                        | 0,000                    | 0,000              | 0,000              | 0,001                     |
|                                        | N               | 60      | 60                                     | 60      | 60               | 60                     | 60                       | 60                 | 60                 | 60                        |

|                           |                 |        |         |         |         |         |         |        |         |         |
|---------------------------|-----------------|--------|---------|---------|---------|---------|---------|--------|---------|---------|
| Difficulty concentrating  | r               | 0,581* | 0,679** | 0,581** | 0,483** | 0,497** | 1       | 0,654* | 0,650** | 0,733** |
|                           | Sig. (2-tailed) | 0,000  | 0,000   | 0,000   | 0,000   | 0,000   |         | 0,000  | 0,000   | 0,000   |
|                           | N               | 60     | 60      | 60      | 60      | 60      | 60      | 60     | 60      | 60      |
| Inner restlessness        | r               | 0,861* | 0,710** | 0,682** | 0,587** | 0,489** | 0,654** | 1      | 0,676** | 0,677** |
|                           | Sig. (2-tailed) | 0,000  | 0,000   | 0,000   | 0,000   | 0,000   | 0,000   |        | 0,000   | 0,000   |
|                           | N               | 60     | 60      | 60      | 60      | 60      | 60      | 60     | 60      | 60      |
| Sleep disturbances        | r               | 0,625* | 0,587** | 0,560** | 0,516** | 0,448** | 0,650** | 0,676* | 1       | 0,687** |
|                           | Sig. (2-tailed) | 0,000  | 0,000   | 0,000   | 0,000   | 0,054   | 0,000   | 0,000  |         | 0,000   |
|                           | N               | 60     | 60      | 60      | 60      | 60      | 60      | 60     | 60      | 60      |
| Feelings of worthlessness | r               | 0,668* | 0,688** | 0,595** | 0,583** | 0,426** | 0,733** | 0,677* | 0,687** | 1       |
|                           | Sig. (2-tailed) | 0,000  | 0,000   | 0,000   | 0,000   | 0,001   | 0,000   | 0,000  | 0,000   |         |
|                           | N               | 60     | 60      | 60      | 60      | 60      | 60      | 60     | 60      | 60      |

\*\*. Correlation is significant at the 0.01 level (2-tailed).

The study conducted among patients in the dialysis (G5) stage of CKD shows a clear trend toward stronger positive correlations among most of the assessed signs (anxiety, reduced interest in performing tasks, fatigue, difficulty concentrating, restlessness, and feelings of worthlessness) included in the questionnaire. These symptoms are closely interrelated and are presumed to mutually reinforce or accompany one another—characteristic of the terminal stage of the disease.

An exception to this pattern is the weaker correlation found between changes in body weight and the presence of loss of appetite, as well as between body weight and sleep disturbances. This result can be interpreted as an indication that these symptoms, although common, do not always occur simultaneously or directly influence each other in this patient group. Most often, they are due to fluid retention/loss or to the psychological impact of the treatment itself. Sleep disturbances and loss of appetite show stronger correlations with all of the examined signs, with the exception of the change in body weight after initiating HD treatment.

### 5.3.5. Correlation analysis of the psychological factor - social support in CKD patients in the pre-dialysis (G1–G4) stage.

**Table 9. Correlation analysis between the factor social support and its related indicators in patients in the pre-dialysis (G1–G4) stage of CKD.**

|                                              |                 | Finding activities | Finding leisure in daily life | Employment after diagnosis | Support of family | Support of friends | Lack of feeling of isolation after diagnosis |
|----------------------------------------------|-----------------|--------------------|-------------------------------|----------------------------|-------------------|--------------------|----------------------------------------------|
| Finding activities                           | r               | 1                  | 0,845**                       | 0,844**                    | 0,536**           | 0,857**            | 0,492**                                      |
|                                              | Sig. (2-tailed) |                    | 0,000                         | 0,000                      | 0,008             | 0,000              | 0,003                                        |
|                                              | N               | 30                 | 30                            | 30                         | 30                | 30                 | 30                                           |
| Finding leisure in daily life                | r               | 0,845**            | 1                             | 0,853**                    | 0,540**           | 0,830**            | 0,530**                                      |
|                                              | Sig. (2-tailed) | 0,000              |                               | 0,000                      | 0,008             | 0,000              | 0,006                                        |
|                                              | N               | 30                 | 30                            | 30                         | 30                | 30                 | 30                                           |
| Employment after diagnosis                   | r               | 0,844**            | 0,853**                       | 1                          | 0,517**           | 0,823**            | 0,582**                                      |
|                                              | Sig. (2-tailed) | 0,000              | 0,000                         |                            | 0,011             | 0,000              | 0,000                                        |
|                                              | N               | 30                 | 30                            | 30                         | 30                | 30                 | 30                                           |
| Support of family                            | r               | 0,536**            | 0,540**                       | 0,517**                    | 1                 | 0,495**            | 0,543**                                      |
|                                              | Sig. (2-tailed) | 0,008              | 0,008                         | 0,011                      |                   | 0,011              | 0,003                                        |
|                                              | N               | 30                 | 30                            | 30                         | 30                | 30                 | 30                                           |
| Support of friends                           | r               | 0,857**            | 0,830**                       | 0,823**                    | 0,495**           | 1                  | 0,587**                                      |
|                                              | Sig. (2-tailed) | 0,000              | 0,000                         | 0,000                      | 0,011             |                    | 0,001                                        |
|                                              | N               | 30                 | 30                            | 30                         | 30                | 30                 | 30                                           |
| Lack of feeling of isolation after diagnosis | r               | 0,492**            | 0,530**                       | 0,582**                    | 0,543**           | 0,587**            | 1                                            |
|                                              | Sig. (2-tailed) | 0,003              | 0,006                         | 0,000                      | 0,003             | 0,001              |                                              |
|                                              | N               | 30                 | 30                            | 30                         | 30                | 30                 | 30                                           |

\*\* . Correlation is significant at the 0.01 level (2-tailed).



The analysis among patients in the pre-dialysis (G1–G4) stage of CKD found a stronger correlation between performing daily activities, engagement in leisure pursuits, and the absence of a sense of social isolation, on the one hand, and the perception of social support from family and friends and employment status, on the other—as well as among these factors themselves. This underscores the importance of social and functional engagement for the overall psycho-emotional state of patients at this stage of the disease. The presence of social activity and professional fulfillment are indicators of psychosocial stability. Patients who are socially active are less likely to feel isolated or psychologically burdened by their illness. Family support plays a key role in patients’ psychosocial functioning and shows a stronger association with carrying out daily activities, engagement in leisure, and the absence of perceived social isolation. The family is a primary source of support and contributes to patients’ emotional stability. It is not always directly related to other forms of social support or to professional realization after diagnosis.

### 5.3.6. Correlation analysis of the psychological factor - social support in CKD patients in the dialysis (G5) stage.

**Table 10. Correlation analysis between the factor “social support” and its related indicators in patients in the dialysis (G5) stage of CKD.**

|                               |                 | Finding activities | Finding leisure in daily life | Employment after diagnosis | Support of family | Support of friends | Lack of feeling of isolation after diagnosis |
|-------------------------------|-----------------|--------------------|-------------------------------|----------------------------|-------------------|--------------------|----------------------------------------------|
| Finding activities            | r               | 1                  | 0,680**                       | 0,598**                    | 0,402**           | 0,278              | 0,558**                                      |
|                               | Sig. (2-tailed) |                    | 0,000                         | 0,000                      | 0,019             | 0,034              | 0,000                                        |
|                               | N               | 60                 | 60                            | 60                         | 60                | 60                 | 60                                           |
| Finding leisure in daily life | r               | 0,680**            | 1                             | 0,548**                    | 0,429**           | 0,309              | 0,593**                                      |
|                               | Sig. (2-tailed) | 0,000              |                               | 0,000                      | 0,001             | 0,030              | 0,000                                        |
|                               | N               | 60                 | 60                            | 60                         | 60                | 60                 | 60                                           |
| Employment after diagnosis    | r               | 0,598**            | 0,548**                       | 1                          | 0,222             | 0,115              | 0,275                                        |
|                               | Sig. (2-tailed) | 0,000              | 0,000                         |                            | 0,089             | 0,397              | 0,038                                        |
|                               | N               | 60                 | 60                            | 60                         | 60                | 60                 | 60                                           |

|                                                     |                 |         |         |       |         |         |         |
|-----------------------------------------------------|-----------------|---------|---------|-------|---------|---------|---------|
| <b>Support of family</b>                            | r               | 0,402** | 0,429** | 0,222 | 1       | 0,290   | 0,391** |
|                                                     | Sig. (2-tailed) | 0,019   | 0,001   | 0,089 |         | 0,031   | 0,002   |
|                                                     | N               | 60      | 60      | 60    | 60      | 60      | 60      |
| <b>Support of friends</b>                           | r               | 0,278   | 0,309   | 0,115 | 0,290   | 1       | 0,628** |
|                                                     | Sig. (2-tailed) | 0,034   | 0,030   | 0,397 | 0,031   |         | 0,000   |
|                                                     | N               | 60      | 60      | 60    | 60      | 60      | 60      |
| <b>Lack of feeling of isolation after diagnosis</b> | r               | 0,558** | 0,593** | 0,275 | 0,391** | 0,628** | 1       |
|                                                     | Sig. (2-tailed) | 0,000   | 0,000   | 0,038 | 0,002   | 0,000   |         |
|                                                     | N               | 60      | 60      | 60    | 60      | 60      | 60      |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The study among patients in the dialysis (G5) stage of CKD shows that performing daily activities and finding leisure pursuits are more strongly correlated with the ability to start or continue working after diagnosis, as well as with the absence of isolation and with receiving support from the family. When patients are socially active and find ways to stay engaged in everyday activities, they are less likely to feel isolated. According to Cukor et al. (2022), family is considered the primary source of daily support for chronically ill patients, whereas friends play a secondary role or contact with them may be limited because of the illness—explaining the weaker association between friends’ support and the examined indicators of daily activities, leisure, employment, and family support.

A noteworthy subgroup comprises patients who started work after diagnosis. In them, a weaker association is observed with the absence of a sense of isolation. At the same time, a relatively insignificant correlation with social support from family and friends is recorded, which may mean that this group relies less on close others and tries to cope independently—or conversely, that they do not receive sufficient support. The presence of support from family correlates strongly with engagement in daily activities and leisure and with the absence of feelings of isolation, while it is more weakly related to support from friends, since close family members can provide emotional and practical help at home.

#### 5.4. Overall survival (OS) in patients undergoing hemodialysis treatment.

##### Survival proportions: Survival in dialysis-dependent patients

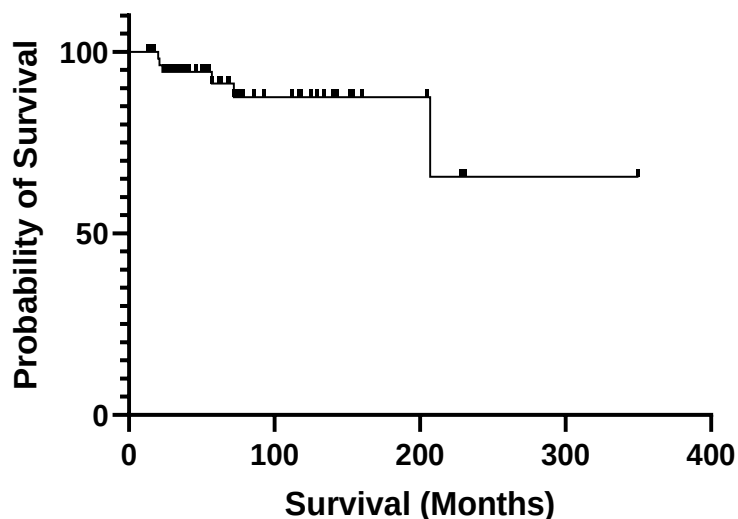


Figure 9. Graph depicting overall survival (OS) of patients on hemodialysis (HD).

| Mean survival |            |                         |           | Median survival |            |                         |           |
|---------------|------------|-------------------------|-----------|-----------------|------------|-------------------------|-----------|
| Estimate      | Std. Error | 95% Confidence Interval |           | Estimate        | Std. Error | 95% Confidence Interval |           |
|               |            | Low risk                | High risk |                 |            | Low risk                | High risk |
| 85,780        | ±9,950     | 66,279                  | 105,282   | 62,000          | ±9,468     | 43,444                  | 80,556    |

Table 11. Table showing the mean survival and median survival of patients on hemodialysis (HD).

The Kaplan–Meier analysis shows that, of the 60 patients undergoing HD treatment, 6 (10%) died during follow-up, while 54 (90%) were alive at the end of the study. These data suggest high overall survival in the study group, with the median survival not reached (i.e., more than 50% of patients remained alive throughout the period). Table 11 presents the mean survival of participants—approximately 85.78 days ( $\pm 9.95$ )—and the median of 62.00 days ( $\pm 9.47$ ). These results indicate that half of the patients survived at least two months from the start of follow-up.

## 5.5. Cox regression analysis

### 5.5.1. Cox regression analysis of the stress factor and its impact on survival in HD patients.

|                                       | $\beta$ coefficient | CI $\beta$ coeff. | Hazard Ratio | CI HR         |
|---------------------------------------|---------------------|-------------------|--------------|---------------|
| Everyday stress                       | - 0.8166            | - 3.073 до 1.328  | 0.4419       | 0.04 до 3.77  |
| Lack of control over events           | 0.4966              | - 1.221 до 2.214  | 1.643        | 0.29 до 9.15  |
| Feeling of nervousness                | 0.5680              | - 0.8454 до 2.120 | 1.765        | 0.42 до 8.33  |
| Difficulty coping with required tasks | - 0.7835            | - 2.170 до 0.5306 | 0.4568       | 0.11 до 1.7   |
| Feeling of tension                    | 1.190               | - 0.6355 до 3.520 | 3.286        | 0.52 до 33.78 |

A Cox regression analysis was performed to assess the effect of subjectively perceived stress on survival among patients undergoing HD treatment. The study included five independent variables related to stress dimensions. The results did not show statistical significance; accordingly, no substantial impact of the examined stress factors on survival time was identified in these patients. These findings may be due to the limited number of events (deaths), the high number of patients who remained alive during the follow-up period, and individual differences in how HD patients perceive and report stress. Nevertheless, the role of stress should not be underestimated with respect to psycho-emotional well-being and long-term adaptation to life-sustaining therapy.

### 5.5.2. Cox regression analysis of depressive experiences and their impact on survival in HD patients.

|                                        | $\beta$ coefficient | CI $\beta$ coeff. | Hazard Ratio | CI HR          |
|----------------------------------------|---------------------|-------------------|--------------|----------------|
| Anxiety                                | 0.1401              | - 4.011 до 3.853  | 1.150        | 0.018 до 47.13 |
| Decreased interest in daily activities | 0.1438              | -2.690 до 3.223   | 1.155        | 0.067 до 25.09 |
| Fatigue                                | -2.799              | -7.621 до 0.3582  | 0.060        | 0,00 до 1.43   |
| Loss of appetite                       | -0.8902             | -3.825 до 1.219   | 0.4106       | 0.02 до 3.38   |
| Changes in body weight                 | -1.669              | -4.087 до 0.3928  | 0.1884       | 0.016 до 1.48  |
| Inner restlessness                     | 2.087               | 0.3777 до 4.672   | 8.062        | 1.45 до 106.9  |
| Difficulty concentrating               | 1.983               | -1.524 до 7.038   | 7.263        | 0.21 до 1139   |
| Sleep disturbances                     | 1.787               | -0.3029 до 4.757  | 5.970        | 0.73 до 116.4  |
| Feeling of worthlessness               | -1.662              | -4.360 до 0.3282  | 0.1898       | 0.01 до 1.38   |

The Cox regression analysis assessing the impact of subjectively perceived depressive experiences on survival among dialysis-dependent patients likewise did not show a statistically significant overall result. It was found that only higher levels of **restlessness/anxiety** ( $\beta = 2.087$ ; HR = 8.06) were associated with reduced survival. This symptom is viewed as a form of chronic psychological stress that affects patients' psycho-emotional state. The finding may be explained by an increased risk of mental state instability, persistent anxiety, heightened stress responses, or incorrect and/or poor adherence to medical instructions regarding the hygienic–dietary regimen. The presence of restlessness is linked to impaired attention and concentration, which hinders understanding and implementation of therapeutic guidance, thereby reducing treatment effectiveness and increasing the risk of complications. The remaining variables examined showed no statistically significant association with survival.

### 5.5.3. Cox regression analysis of social support and its impact on survival in HD patients.

|                                              | $\beta$ coefficient | CI $\beta$ coeff. | Hazard Ratio | CI HR         |
|----------------------------------------------|---------------------|-------------------|--------------|---------------|
| Finding activities                           | -0.2814             | -1.54 до 1.01     | 0.7548       | 0.21 до 2.76  |
| Finding leisure in daily life                | -0.3715             | -1.93 до 1.25     | 0.6897       | 0.14 до 3.50  |
| Support of family                            | -0.4487             | -3.38 до 1.24     | 0.6384       | 0.03 до 3.45  |
| Support of friends                           | 0.3823              | -0.65 до 1.59     | 1.466        | 0.52 до 4.92  |
| Employment after diagnosis                   | -0.8719             | -2.58 до 0.43     | 0.4181       | 0.07 до 1.54  |
| Lack of feeling of isolation after diagnosis | 1.281               | -0.76 до 3.37     | 3.60         | 0.46 до 29.33 |

A Cox regression analysis was performed to evaluate the effect of subjectively perceived social support on survival among patients undergoing HD treatment. The study included various aspects of the social environment—participation in daily activities and leisure, support from family and friends, employment after initiation of treatment, and the feeling of isolation. Based on the current data, no statistical significance was found, indicating that these social factors do not influence survival time in dialysis-dependent patients. The results may have been affected by the limited number of observations or by high variability within the study group.

## 6. Discussion

The incidence of CKD is rising worldwide, mainly due to the prevalence of underlying conditions such as diabetes mellitus (DM) and arterial hypertension (AH). Despite preventive efforts, the frequency of CKD diagnoses remains high, and the number of end-stage renal disease (ESRD) cases continues to increase. If this trend persists, the global consequences could be substantial, as treatment and care for ESRD patients (e.g., hemodialysis or kidney transplantation) entail significant social and economic costs. In addition to physical challenges, patients with advanced kidney disease often face emotional and social difficulties—such as changes in mental state, relationships with loved ones, and financial circumstances. All these factors can further influence the course of the chronic illness and the patient's quality of life (QoL).

In our study, several analyses were conducted to assess the impact of key psychological factors—stress, depressive experiences, and the presence of social support—on the psycho-emotional state of individuals diagnosed with CKD and of those receiving regular HD treatment. The comparative analysis (Table 3) between the two groups showed that HD patients (stage G5) reported significantly higher stress levels than patients in the pre-dialysis stage (G1–G4) of CKD. These findings align with results reported by Choi et al., 2019; Kimmel, 2001; and Sharma et al., 2022, which also demonstrate greater psychological distress among patients undergoing HD. All questionnaire items related to the subjective perception of stress—such as feelings of everyday tension, frequent irritability, lack of control over events, and difficulties coping with tasks—were significantly higher among dialysis patients. The data underscore that patients undergoing HD experience more intense and prolonged stress. Major reasons include physical limitations and the frequent, lengthy HD procedures that reduce physical activity and lead to chronic fatigue and weakness; dietary and fluid restrictions, which further heighten daily tension (Sharma et al., 2022; Choi et al., 2019; Kimmel, 2001). Another contributing factor is the need to adhere to a strict treatment regimen and plan each day around the HD schedule, making spontaneous activities and personal commitments difficult (Mug et al., 2001; Gorji et al., 2013; Logan et al., 2006). The impossibility of skipping or rescheduling HD sessions without health risks creates constant psychological strain. Many patients feel that decisions regarding their health and daily life are no longer in their hands; dependence on the medical team and equipment amplifies feelings of helplessness (Brimele et al., 2012). Unpredictable changes in health status or dialysis timing render the future uncertain (Muscat et al., 2021). Anxiety about potential complications—such as catheter-associated infections,

intradialytic hypotension, etc.—especially among those who frequently experience such issues, is ever-present, predisposing to distress (Theodoritsi et al., 2016; Davaridolatabadi E et al.). The study findings suggest a need for psychological and social support—particularly for patients in the dialysis stage—and for interdisciplinary care involving psychologists, social workers, and nephrologists (Bahmani et al., 2025).

Regarding depressive experiences, their subjective perception was assessed among respondents. Our results show that HD patients reported significantly higher levels of depressive feelings compared with those in G1–G4 CKD. Notably, participants more frequently reported heightened anxiety, chronic fatigue, and inner tension—symptoms commonly linked to the unpredictability of the disease itself (Mug et al., 2001; Gorji et al., 2013; Logan et al., 2006). ESRD is characterized not only by physiological loss of key renal functions (secretory, excretory, and regulatory) but also by the need for regular HD therapy accompanied by lifestyle restrictions. Consequently, dialysis-dependent patients often experience loss of autonomy, social isolation, and abrupt changes in daily roles (e.g., leaving employment, dependence on medical schedules) (Mathew N et al., 2023; Shafi ST et al., 2017; Lee et al., 2013). In contrast, patients in the pre-dialysis stage retain partial autonomy and are not yet burdened by the physical and social consequences of dialysis, which explains their lower levels of depressive experiences (Shafi ST et al., 2017; Lee et al., 2013). Anxiety, restlessness, and tension are characteristic of patients in a precarious, treatment-dependent situation such as HD; likely causes include fear of complications, the condition’s unpredictability, and the emotional load of constant dependence on medical staff at HD centers (Kim et al., 2019; Ok et al., 2019; Schouten et al., 2019). Fatigue (physical and mental) is common in CKD, but when accompanied by emotional exhaustion and reduced interest in activities, it is considered a precursor of depressive symptomatology (Artom et al., 2014). Continuous physical and mental strain leads to feelings of exhaustion and reduced self-esteem (Jablonski, 2007; Chilcot et al., 2008).

Other characteristic manifestations of depressive experiences include difficulty concentrating, feelings of worthlessness, and restlessness (Kang et al., 2019; Cukor et al., 2007), which reflect impaired self-assessment and cognitive functioning and hinder effective coping with daily tasks. They often stem from chronic stress, social isolation, and the inability to fulfill life roles (work, family responsibilities).

In our study, many participants reported sleep disturbances—manifesting as insomnia or hypersomnia (Ezzat & Mohab, 2015; Iliescu et al., 2003)—after starting or during HD treatment. These disturbances impair concentration, mood, and the sense of control over life



events and may predispose to or cause an increased risk of depressive states during treatment. Weight changes are also frequently observed after initiating HD. Fluctuations (gain or loss) are viewed as indicators of psycho-emotional imbalance and are associated with altered appetite, medication use, or diminished interest in eating due to depressive experiences or anxiety (Kalantar-Zadeh et al., 2005; Loosman et al., 2015). Notably, our results show no statistically significant difference between the two groups for the symptom “loss of appetite” (Bossola et al., 2011). This may be because appetite disturbances are relatively common among patients with chronic illnesses regardless of stage and are influenced more by physiological and emotional factors (Carrero et al., 2007). Loss of appetite is a frequent somatic symptom in both early and advanced CKD and may be due to uremia, gastrointestinal complaints, and medication (Kalantar-Zadeh et al., 2005). Moreover, HD therapy is considered a catabolic process. According to Elezi et al., 2023, renal replacement therapy delivered by the HD machine can significantly alter body image, leading patients to perceive themselves as unattractive, which can also affect self-esteem (Zyga et al., 2011; Pagels et al., 2008; Mouelhi et al., 2021). Patients do not always view lack of appetite as a problem or perceive it as a normal part of their condition, which can influence self-report (Kalantar-Zadeh et al., 2005; Carrero et al., 2007). This combination of physical and psychological complaints indicates that chronic treatment not only burdens the body but also affects the patient’s emotional and cognitive state (Cukor et al., 2007, *Seminars in Dialysis*; Kang et al., 2019).

In the present study, the importance of social support as a factor influencing the psycho-emotional status of participants was also evaluated. Analysis results (Table 5) show that patients in the pre-dialysis CKD stage (G1–G4) report significantly higher levels of social support than those undergoing regular HD procedures (stage G5). The indicators examined covered various aspects of social support—assistance from family and friends, participation in daily activities and/or leisure, the possibility of employment after diagnosis, and the subjective perception of social isolation. The likely explanation for the pre-dialysis group’s results is their better preserved physical and functional condition, which allows greater social activity, engagement in various pursuits, and closer contact with family and friends (Lopes et al., 2004). By contrast, patients receiving regular HD report lower levels of social support (Theodoritsi et al., 2016), possibly due to a stronger sense of social isolation and treatment dependence that negatively affects their psycho-emotional well-being. The strict therapeutic regimen, the need for regular visits to HD centers (Cohen et al., 2007), frequent absences from work and family or social events, and post-dialysis fatigue limit social contacts and make it harder to maintain an active social life (Theodoritsi et al., 2016; Tong et al., 2013). Reduced desire to participate

in previous activities and weight fluctuations are also signs of emotional exhaustion due to ongoing medical dependence and lack of motivation (Bohlke et al., 2008; Kalantar-Zadeh et al., 2005).

A Spearman correlation analysis was conducted among the psychological factors—stress, depressive experiences, and social support—and their associated symptoms. Regarding the stress factor, the analysis among patients in the pre-dialysis stage of CKD shows that perceived feelings of stress, nervousness, and tension are more strongly and positively correlated both with a lack of control over events in the surrounding environment and with one another. These data underscore the relationship between the subjective sense of control (Christensen & Ehlers, 2002; Lopes et al., 2004), emotional tension (Wu et al., 2014), and overall stress level in this patient group. The less a patient feels they control what is happening, the more pronounced the anxiety, tension, and psychological burden. At the same time, these factors have a weaker and statistically non-significant association with difficulties handling specific tasks, which may suggest that emotional stress in pre-dialysis patients is not directly linked to perceived cognitive or physical limitations in daily activities, or that they retain the ability to adapt and cope with challenges despite increased psycho-emotional strain. After diagnosis, the feeling of lack of control shows a stronger relationship with all tracked symptoms, highlighting its primary role in shaping mental state. This feeling often becomes a leading mechanism for the development of distress, anxiety, and helplessness, which hinder effective adaptation to the illness. Even in the pre-dialysis stage, one stress manifestation—difficulty performing daily tasks—shows a statistically significant association only with lack of control over life circumstances, which may indicate potential adaptation difficulties when starting HD (Griva et al., 2010).

The results among patients receiving maintenance hemodialysis differ from those in the pre-dialysis stage. The Spearman correlation analysis in dialysis-dependent patients revealed statistically significant associations among all tracked manifestations of stress, including feelings of tension, nervousness, difficulties coping with specific tasks, and lack of control over life events. The positive relationships among these indicators show that as the subjective sense of stress increases, both emotional and functional difficulties intensify—from feelings of helplessness to problems performing daily activities. Patients face multiple constraints—fixed dialysis schedules, chronic post-procedure fatigue, and reduced opportunities for social and work activities—factors that further heighten the sense of lost control and maintain high levels of psycho-emotional tension (Christensen & Ehlers, 2002). Tension and nervousness are a direct consequence of increased stress and can be viewed as its

core emotional manifestations (Griva et al., 2010; Kouidi et al., 2010). A persistent sense of pressure, worry, or irritability often stems from lack of control, uncertainty about the future, and the chronic perception that circumstances are “beyond the patient’s capabilities.” Nervousness is particularly pronounced when there is a mismatch between expectations and reality. The sense of having no influence over the course of events—including the disease, treatment, personal schedule, and future prospects—plays a key role in heightening anxiety, tension, helplessness, and vulnerability, as well as in reducing motivation for active coping and treatment engagement (Buchanan et al., 2011; Cukor et al., 2007). Difficulties coping with daily tasks are linked to cognitive problems (poorer concentration and decision-making) and to behavioral and physical aspects—activity avoidance, passivity, and fatigue (Theodoritsi et al., 2016).

The correlation analysis of depressive experiences conducted among patients in the pre-dialysis (G1–G4) stage shows that anxiety is significantly and positively correlated with several manifestations: reduced interest in daily activities (likely due to the decreased motivation characteristic of this condition), pronounced fatigue (a key indicator of mental overexertion), changes in body weight over the past year, feelings of inner tension, and sleep disturbances manifested as insomnia or hypersomnia (common consequences of anxiety), as well as feelings of worthlessness (a precursor to early depressive symptomatology). A weaker correlation is noted between anxiety and loss of appetite, as well as difficulty concentrating on specific tasks, suggesting preserved cognitive function at this stage.

Fatigue and feelings of worthlessness show the strongest interrelationships with all variables examined, identifying them as key indicators of emotional and physical distress in pre-dialysis patients, consistent with Tsay et al. (2004). Fatigue may be both a result of anxiety and apathy and a factor that exacerbates them, while feelings of worthlessness contribute to reduced daytime functioning, diminished motivation, and intensified helplessness (Palmer et al., 2013). The strong correlation between fatigue and decreased interest in task performance ( $r = 0.758$ ) indicates that lack of motivation and reduced everyday activity are directly linked to increased exhaustion. This affects not only cognitive processes (concentration and work efficiency) but also patients’ psycho-emotional status, manifested as restlessness, feelings of worthlessness, and sleep disturbances. Restlessness and sleep disturbances show a stronger positive association ( $r = 0.735$ ,  $p < 0.001$ ) and emerge as two key, mutually reinforcing components in the psycho-emotional profile of pre-dialysis CKD patients. Restlessness can be viewed as an expression of anxiety, characterized by tension, inner unease, irritability, and fears related to disease progression (Loosman et al., 2015; Chen et al., 2017). Persistent inner

discomfort often causes difficulty falling asleep, while poor sleep quality or excessive daytime sleepiness intensifies fatigue, worsens concentration and mood, and thus limits optimal daily functioning. Reduced interest in everyday activities is more strongly associated with anxiety, fatigue, loss of appetite, changes in body weight, difficulty concentrating, sleep disturbances, and feelings of worthlessness, suggesting an early presentation of symptoms typical of depressive experiences (Griva et al., 2010).

Loss of appetite shows a stronger correlation with reduced interest in daily activities and with fatigue, suggesting a shared mechanism related to decreased motivation (Carrero et al., 2018). A strong correlation is also seen with difficulty concentrating and feelings of worthlessness, indicating that loss of appetite often co-occurs with cognitive difficulties and anxiety, which can, in turn, impair the ability to cope with daily challenges (Kimmel, 2002). The correlation with difficulties concentrating on tasks and with feelings of worthlessness suggests an early predisposition to the development of depressive experiences, as these symptoms often appear within the depressive spectrum (Palmer et al., 2013). The observed insignificant association with changes in body weight suggests that at this stage, loss of appetite does not always lead to alterations in physical condition, which may be due to compensatory mechanisms or the short duration of the symptom.

The change in body weight shows a stronger correlation with a number of other symptoms such as anxiety, reduced interest in performing tasks, fatigue, difficulty concentrating, restlessness, and sleep disturbances. These results indicate that weight changes in pre-dialysis patients are not an isolated physiological phenomenon but are closely linked to the psycho-emotional state (Chilcot et al., 2010). On the one hand, anxiety and restlessness can affect eating behavior—both by reducing appetite and by increasing the tendency to overeat—leading to weight fluctuations. On the other hand, fatigue, concentration difficulties, and sleep disturbances reflect general exhaustion and emotional distress, which can also influence eating habits (Kalantar-Zadeh & Kopple, 2011). Weight change is therefore considered an indirect indicator of accumulated psychological strain and diminishing adaptive resources of the body.

The correlation analysis among participants in the dialysis (G5) stage of CKD shows a clear trend toward stronger positive correlations among most of the symptoms assessed in the questionnaire—anxiety, reduced interest in daily activities, fatigue, difficulty concentrating, inner restlessness, and feelings of worthlessness. These manifestations are closely related and likely reinforce or accompany one another, which is characteristic of the terminal phase of the disease and reflects the complex psycho-emotional burden in this patient group (Tsay, S. L. et al., 2004). It should be noted that maintenance hemodialysis imposes substantial lifestyle

constraints (fixed procedures several times per week, physical exhaustion after sessions, limited social and work activity), which themselves are sources of chronic stress and psycho-emotional tension (Cukor, D. et al., 2004). An exception to this pattern is the weaker correlation between changes in body weight and loss of appetite, as well as between body weight and sleep disturbances, suggesting that these symptoms, although common, are not necessarily linked to psycho-emotional state and more often reflect physiological processes—for example, fluid retention, catabolic changes, or effects of HD itself (Kuhlmann, M. K. et al., 2006). Conversely, sleep disturbances and loss of appetite (Unruh, M. L. et al., 2007) show stronger positive relationships with almost all indicators examined (except for change in body weight). This correlation underscores their role as central indicators of distress in patients for whom HD treatment not only physically exhausts the body but also alters quality of life and psychological adaptation. Sleep disturbances lead to poorer daytime functioning, reduced motivation, and heightened feelings of helplessness, while loss of appetite (Bossola, M. et al., 2015) may result from physical symptoms (taste changes, nausea, fatigue) as well as emotional factors (anxiety, depressive experiences).

In the correlation analysis conducted among patients in the pre-dialysis (G1–G4) stage of CKD, a stronger association was found between performing daily activities, engagement in leisure, and the absence of a sense of social isolation, on the one hand, and perceived social support from family, friends, and employment, on the other—as well as among these factors themselves. The data show that patients who manage to maintain an active social life and functional engagement (through daily tasks or work) are less likely to experience feelings of isolation and psychological strain related to the illness (Theodoritsi et al., 2016; Griva et al., 2010; Cukor et al., 2007). Social and professional activity function as psychological protective factors that support adaptation to the chronic condition and preserve emotional stability. Family support is considered important for proper psychosocial functioning and shows a stronger correlation with the ability to carry out daily tasks, participation in leisure and social activities, and the absence of perceived social isolation (Theodoritsi et al., 2016). These results highlight the importance of close relatives as a primary source of emotional and practical assistance in the patient's daily life. Support from friends and opportunities for employment, however, show a weaker correlation with family support, most likely due to external factors such as physical condition limiting work ability and social contacts outside the family, which are sometimes constrained by time limitations or changes in the patient's social role after diagnosis.

The correlation analysis among patients in the dialysis (G5) stage of CKD demonstrates that performing daily activities (shopping, housekeeping, personal care) and finding leisure pursuits (hobbies, social gatherings, cultural activities) are more strongly correlated with the ability to start or continue working after diagnosis, as well as with the absence of isolation and with receiving support from family (Kara et al., 2016). This finding indicates that functional activity and social inclusion are interrelated and jointly facilitate adaptation to chronic illness (Curtin et al., 2002; Theodoritsi et al., 2016). The absence of social isolation correlates strongly with daily activities and leisure, especially in patients who receive family support. Family is the leading source of emotional and practical assistance, providing stability amid the physical constraints imposed by treatment (e.g., fixed HD schedules, chronic fatigue), which means that social and functional activity are interconnected with family support as a foundation for successful adaptation (Curtin et al., 2002; Theodoritsi et al., 2016).

Support from friends shows a weaker relationship with daily activities and leisure, most likely due to limited opportunities for meetings and maintaining friendships because of HD schedules and physical exhaustion (Palmer et al., 2013); psychological factors such as isolation due to feeling ill or changing social roles; and the fact that in chronic illness the family assumes the primary role in daily help and emotional support, while friendships become secondary. Among the subgroup who continue to work after initiating HD (Ng et al., 2015), a weaker association with the absence of a sense of isolation is observed. This may indicate that HD patients can feel isolated despite being employed, likely due to fatigue, time constraints, or a lack of understanding in the workplace. A relatively weak correlation with social support from family and friends was also found, which may mean that dialysis-dependent patients consciously rely less on close others and try to be independent (Tong et al., 2013), or that they do not receive sufficient support. Support from family correlates strongly with engagement in daily activities and leisure and with the absence of feelings of isolation, while it is more weakly associated with support from friends (Theodoritsi et al., 2016). Family provides day-to-day emotional and practical assistance, whereas friendship contacts are often limited by patients' health and social circumstances (Theodoritsi et al., 2016).

Using Cox regression analysis, we evaluated the impact of subjectively perceived levels of stress, depressive experiences, and social support on survival among patients undergoing HD treatment. The variables related to stress (presence of everyday stress, lack of control over events, difficulty handling specific tasks, feelings of tension and nervousness) showed no statistically significant relationship with survival time. The results indicate that

stress, measured through subjective indicators, does not substantially influence long-term survival in the study group.

In assessing depressive experiences, no statistical significance was observed except for the indicator “feeling of restlessness/anxiety,” for which an eightfold higher risk of reduced survival was found in association with its perception ( $\beta = 2.087$ ; HR = 8.06). The presence of restlessness can be interpreted as a form of psycho-emotional strain and an indicator of chronic psychological stress, which predisposes to heightened anxiety and difficulties with concentration and attention when it comes to adhering to recommendations for the hygienic–dietary regimen and treatment. Many HD patients feel uncertain about the future and the disease outcome; the manifestation of restlessness, in turn, increases the likelihood of complications and hospitalizations.

Regarding the psychological factor of social support—including daily activities, leisure, support from family and friends, employment, and the feeling of isolation—no statistically significant effect on survival was observed among dialysis-dependent patients. These results may be influenced by the limited number of events (deaths), the high number of patients who remained alive during the follow-up period, and individual differences in how HD patients perceive and report psycho-emotional and social factors.

## **6.1. Conclusion**

Patients diagnosed with CKD and undergoing HD face challenges related to physical health, psychological stability, and social integration. The disease and its treatment limit physical abilities, change lifestyle, and often lead to loss of work capacity, which affects economic status and social relationships. Hemodialysis is considered an invasive procedure, and its frequency (three times per week) creates a sense of dependence and reduced autonomy, which is regarded as a precondition for psychological distress (Palmer et al., 2013; Chilcot et al., 2014).

In this study, key psychosocial factors—stress, depressive experiences, and social support—were analyzed and their importance in the adaptation process to treatment was evaluated. The results highlight the important role of family support as a protective factor in pre-dialysis patients. CKD patients who receive adequate support from their families show higher self-esteem, greater confidence and motivation to adhere to treatment, and better emotional resilience (Lopes et al., 2014; Griva et al., 2016). Family support facilitates better adherence to medical instructions and improved quality of life (Kugler et al., 2011). Although HD is a life-sustaining therapy, it cannot prevent the psychological and social consequences arising from the burden of the disease. Therefore, patients need comprehensive support that includes not only medical care but also psychological assistance and active social support to aid their adaptation and improve their overall well-being.

## **6.2. Conclusions of the study**

1. Higher stress levels are observed among HD patients (stage G5) compared with patients in the pre-dialysis stage (G1–G4) of CKD.
2. Dialysis-dependent patients show significantly higher levels of depressive experiences than those diagnosed with CKD.
3. Patients in the pre-dialysis stage of CKD (G1–G4) report significantly higher levels on social-support indicators compared with the HD group.



4. In CKD-diagnosed patients, correlation analysis revealed that stress, nervousness, and tension are more strongly and positively related both to a lack of control over life events and to one another.
5. In end-stage CKD patients, there is a statistically significant association among all listed stress manifestations (feeling stressed, tension, irritability, difficulty coping with specific tasks, and lack of control over events) included in the questionnaire.
6. Among HD patients, stronger positive correlations are found among the signs included in the questionnaire—anxiety, reduced interest in tasks, fatigue, poor concentration, restlessness, and feelings of worthlessness.
7. A stronger direct (positive) relationship is observed among all manifestations of social support (performing daily activities, leisure, family and friend support, absence of perceived social isolation, and employment) in CKD-diagnosed patients.
8. Cox regression analysis did not find statistically significant effects of subjectively perceived stress, social support, or depressive experiences on survival among dialysis-dependent patients; only higher levels of restlessness were associated with reduced survival.

## **7. Contributions**

### **7.1. Original contributions**

1. For the first time, psychological factors—stress, depressive experiences, and social support—are compared between patients in the pre-dialysis (G1–G4) and dialysis (G5) stages of CKD.
2. For the first time, the relationships among signs related to the subjective perception of stress, depressive experiences, and social support are examined in patients diagnosed in the pre-dialysis stage (G1–G4) of CKD and in patients undergoing regular HD treatment.
3. For the first time in Bulgaria, the significance of patients' perceptions of stress, depressive experiences, and social support—and their impact on survival—has been evaluated among those receiving regular HD.

### **7.2. Contributions of scientific and practical value**

1. The findings can be used to develop an algorithm for prevention, treatment, and follow-up of patients diagnosed with CKD and those receiving maintenance hemodialysis.
2. Implementation of activities and comprehensive educational programs aimed at preventing the development of psychological conditions that affect the psycho-emotional status of patients during CKD staging and at the initiation of HD treatment.
3. Implementation of programs and establishment of psycho-emotional screening for HD patients and their families, especially in the initial months after treatment initiation, to reduce the risk of psychological conditions/psychiatric disorders—requiring a multidisciplinary approach.

## **8. Scientific publications on the topic**

1. Stavreva A., Atanasova S., Staikova S. Stress, depression, and social support in patients on maintenance hemodialysis. *Current Nephrology*, no. 1, vol. 17, 2023, pp. 35–39.
2. Stavreva A., Atanasova S., Staikova S. Psycho-emotional status in patients in the pre-dialysis stage of CKD. *Nephrology, Dialysis and Transplantation*, no. 2, year 30, 2024, pp. 40–45.
3. Stavreva A., Staikova S. Quality of life in patients in the pre-dialysis stage of CKD. *Current Nephrology*, no. 1, vol. 18, 2024, pp. 23–28.
4. Stavreva A., Staikova S. Analysis and impact of stress and social support in CKD patients in the pre-dialysis and dialysis stages. *Current Nephrology*, no. 1, vol. 19, 2025.