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**SPECIFICS AND DYNAMICS OF THE PAIN SYMPTOMS AND EXPERIENCES IN  
PATIENTS WITH DEPRESSION**

**SUMMARY**

Of dissertation for conferment of scientific and educational degree of „Doctor“  
of scientific subject „Psychiatry“

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The dissertation contains 179 pages, includes 77 tables and 20 figures. The bibliography includes 370 titles, of which 16 are Bulgarian and 354 are English.

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The materials on the defense are available in the library of MU – Varna, as well as on the official website of the university.

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## **ABBREVIATIONS**

|                 |   |
|-----------------|---|
| <b>ICD – 10</b> | International Statistical Classification of Diseases, 10- th revision |
| <b>HAMD-17</b>  | Hamilton Depression Rating Scale                                      |
| <b>MMSE</b>     | Mini-Mental State Examination   |
| <b>STAI</b>     | State – Trait Anxiety Inventory                                       |
| <b>VAS</b>      | Visual analog scale   |

## INTRODUCTION

Pain is a complex, multilayered phenomenon. It is the subject of study of philosophers, theologians, psychologists, as well as various specialists in the field of medicine, such as physiologists, pathophysiologists, neurologists, rheumatologists, psychiatrists, pharmacologists etc. This is the reason for pain as a concept to be characterized by polysemy, depending on the context and the situations, in which it is being used. Pain can be a feeling, a symptom, a vital sign, a disease, suffering, a stressor, behavior, motivation, a memory, a proficiency or an experience.

Pain is an experience, familiar to all people, except for the ones with a congenital lack of sensitivity to pain. Acute pain has a precautionary function. By signaling for danger, it plays a decisive part for the survival of the human as an individual. Unlike acute pain, chronic pain is destructive in its nature and can manifest in the absence of a harmful stimulus. Chronic pain can have a deep negative impact on all spheres of a person's life by changing one's way of life, and sometimes even the meaning of one's life.

Chronic pain is one of the leading causes of disability on a worldwide scale and is identified as a health problem with a global priority. The clarification of the factors provoking and supporting chronic pain is still at the center of the research interest not only in general theoretical terms, but in clinical terms as well. This is why the issues, related to chronic pain management, which aims to improve the overall functioning, remain a priority in clinical practice.

Pain is a phenomenon formed as a result of complex integration by sensory-discriminatory, affective-motivational and cognitive-evaluating processes. There is a lot of evidence supporting the leading role of psychosocial factors in the processes of manifestation and maintaining of chronic pain. These are the factors that are subject to change and can be managed in order to improve the prognosis and quality of life of patients.

Depressive experiences are among the factors accompanying chronic pain, which in norm or pathology refer to the affective component of pain. Depressive experiences manifested in pathology are among the main psychological factors involved in the maintaining and persistence of chronic pain. For this reason, the combination of chronic pain with a depressive episode is a common psychiatric comorbidity. Regardless of this fact, there is still a lack of sufficient systematicity in the studies proving the common neurobiological, psychological and phenomenological connections between pain and depression. It is precisely these prerequisites that demonstrate the serious importance of research highlighting the need for the two phenomena to be studied in their entirety. In practical terms, this would significantly reduce cases of clinically unrecognized depression among patients with chronic pain. This common medical problem provokes the need to use a battery of tools for the clinical evaluation of pain and affective symptoms in patients with chronic pain.

Quite a few of the studies related to chronic pain are dedicated to the search for the factors that give the clearest idea of the prognosis of patients. Most of them support the notion that anxiety is a factor whose appearance and intensity predetermine not only the persistence of pain during its acute and subacute period, but also the manifestation of depression during its chronic period. Depression in chronic pain negatively affects the overall functioning of patients

and predicts their future disability. Data on the influence of pain symptoms (intensity and localization) and affective symptoms (anxiety and depression) on the patient's prognosis and experiences are still sought. The present dissertation underlines the necessity of the application of the phenomenological approaches for holistic and individualized assessment of patients with chronic pain. Thus, the specific experiences of chronic pain with a prognostic role are to be examined.

The development of this thesis is an attempt to answer topical questions related to the clarification of causal relationships between affective and sensory pain variables, as well as their influence on the specifics and the dynamics (transformation) of experiences associated with pain and how the situation is perceived when experiencing pain. For the purposes of this thesis, quantitative and qualitative approaches to pain assessment as a phenomenon are combined, allowing for a more in-depth study of causal relationships between the studied variables, predicting connections between them and studying the nature of pain as an experience. Quantitative methods give an objective assessment of the phenomenon of pain and reveal its multi-aspectual nature. Qualitative approaches make it possible to reveal the subjective (invisible) side of pain, which is an expression of its uniqueness as an experience. The combination of these two approaches can contribute not only to a better and deeper study of the pain phenomenon in patients with depression, but also to identifying at-risk individuals in order to apply individualized therapeutic approaches aimed at restoring functioning in spite of pain.

## I. METHODOLOGY

### 1. Purpose and tasks of the study

The purpose of this thesis is to study the impact of the severity of depression and anxiety (trait and state) on the strength of pain and their influence on the specifics and dynamics of pain symptoms and experiences in comorbid patients with chronic pain and depression. The identified relationships and causal relationships between the key indicators and experiences will outline a model for research with potential practical application in clinical work.

The execution of the stated objective provokes the resolution of the following research tasks:

1. To study the degree of influence of the severity of depression and anxiety (trait and state) on the intensity of pain, by seeking correlations and causal relations between the main groups of indicators.
2. To analyze and summarize the specific experiences associated with pain in patients with chronic pain and depression.
3. To study the dynamics of experiences associated with pain and their influence on the severity of depression.
4. To study the influence of depression on how the situation is perceived during pain and the characteristics of pain (frequency and description of the sensation of pain).
5. To conceptualize a model for the study of comorbid patients with chronic pain and depression.

### 2. Hypotheses

- 2.1. Correlations between the severity of depression, state anxiety, trait anxiety and the strength of pain sensation are assumed.
- 2.2. It is assumed that the severity of depression, state anxiety and personal anxiety have varying degrees of influence on the strength of pain.
- 2.3. It is assumed that depression affects the expression of specific experiences associated with pain and the way the situation is perceived during pain in patients with chronic pain.
- 2.4. It is assumed that the change in the severity of depression dynamically transforms the experiences associated with pain and the way the situation is perceived during pain.



### 3. Methods

The study was approved by the Committee on Ethics of Research at Medical University “Prof. Dr. Paraskev Stoyanov” – Varna by Protocol/Decision № 85/26.07.2019. All participants are familiar with the procedures and have signed an informed consent form.

The data necessary for the purposes of the study were collected following the described sequence of the provided components of the study.

#### 3.1. Data collection methods

##### 3.1.1. Work card

The work card encompasses the collection of information on:

- demographics: age, gender, marital status, education, ethnicity, employment, working capacity;
- localization, statute of limitation, diagnostic category of chronic pain and regularity of the conducted pain treatment;
- somatic comorbidity and conducted treatment;
- psychiatric comorbidity – diagnostic category, statute of limitation and ongoing treatment;
- risk factors – smoking, alcohol consumption and overweight.

##### 3.1.2. Hamilton Depression Rating Scale (HAM-D-17)

Hamilton Depression Rating Scale (HAM-D-17) is a widely used scale for determining the severity of the depressive symptoms. The study is conducted in the form of an interview with the patient. Nine of the symptoms (depressive mood, feelings of guilt, suicidality, retardation in daily activity and work activity, agitation, mental anxiety, somatic anxiety, hypochondriacs) are estimated from 0 to 4. Another eight symptoms /sleep disorders, sleep continuity disorders, early awakening, gastrointestinal somatic symptoms, genital symptoms, general somatic symptoms, weight loss, awareness of disease/ – from 0 to 2. The sum total ranges from 0 to 52 points. At a sum of 0 to 7, depression is absent; from 8 to 16 depression is considered as mild; from 17 to 23 – as moderate; and over 24 – as severe.

##### 3.1.3. Mini-Mental State Examination (MMSE)

Screening test for rapid quantitative evaluation of general cognitive functioning validated in Bulgarian by M. Raycheva and co-authors (2013). It contains 30 questions and tasks about: time and place orientation /10 points/; registration of 3 words /3 points/; attention and calculation /5 points/; reproduction of the three words / 3 points/; linguistic abilities / 8 points/ and copying /1 point/. The maximum sum is 30 points. A score of 25 to 20 points is defined as a slight cognitive decline; from 19 to 11 points – as moderate cognitive decline and below 10

points – as severe cognitive decline. It is significantly indicative in the initial stages of cognitive deficiency in patients with dementia.

#### 3.1.4. Spielberger's State – Trait Anxiety Inventory (STAI)

STAI (State – Trait Anxiety Inventory) is a self-assessment questionnaire with wide application. It is used in clinical practice and for research purposes. It was adapted for Bulgarian conditions by D. Shtetinski and I. Paspalanov. The questionnaire consists of two separate scales:

- Scale (S) for state anxiety (STAI – form Y1) – contains 20 statements and assesses how the respondent “feels at this point”. S – the scale assesses the emotional state and a certain set of emotional reactions that arise in the individual when perceiving a given situation as threatening, regardless of objective reality. They are characterized by bad presentiments, a sense of danger, tension, nervousness and anxiety. The researched evaluate the twenty statements, describing the intensity of their sensations in the following gradation:
  1. Not at all
  2. To some extent,
  3. To a significant extent,
  4. Completely

Ten of the statements are evaluated straight ahead and the rest are evaluated the opposite way, via recording. The raw sum total ranges from 20 to 80 points in the direction of increasing anxiety.

- Scale (T) for assessment of anxiety as a personal predisposition (STAI – form Y2) encompasses 20 statements that assess how the person surveyed “feels overall.” The instruction of the T-scale requires the studied person to describe how they feel overall by assessment of the frequency of their dominant states on a four-stage scale (likert type):
  1. Almost never
  2. Sometimes
  3. Often
  4. Almost always

On this scale, 11 allegations are evaluated straight ahead and the remaining nine are recorded. The raw sum total ranges from 20 to 80 points in the direction of increasing personal anxiety.

#### 3.1.5. Visual analog pain quantification scale (VAS)

The visually analog scale is a 10-centimeter horizontal line with an outline only at the beginning and at the end of the scale. At the beginning of the scale there is no pain, and at the

end – the strongest pain a person can imagine. The person studied marks his pain sensation and the examiner measures the distance from the beginning of the scale in centimeters or millimeters. This way, a digital expression of the intensity of pain is given during the examination.

### 3.1.6. Semi-structured interview to study pain symptoms and experiences

The interview contains open- and close-ended questions about pain symptoms and experiences:

- an open-ended question about the essence of pain as an experience;
- an open-ended question about the experiences during pain;
- an open-ended question related to the change of one's way of life as a consequence of chronic pain;
- an open-ended question related to the description of pain
- a close-ended question related to pain frequency;
- a multiple-choice question about the way the situation is being perceived during.

Open-ended questions are asked in order to stimulate the persons surveyed to freely describe experiences related to pain. The aim of the close-ended questions is to conceptually discern the types of pain and the situations in which the studied find themselves.

### 3.2. Methods of data analysis

- Descriptive statistics;
- Correlation analysis;
- Regression analysis;
- T – test (Student's T-Test) to determine differences in mean values between variables in different measurements;
- Assessment of the reliability and validity of self-assessment methodologies;
- Content analysis.

The statistical processing of the results is carried out with a statistical software package “SPSS-22 – form for expert science”.

## 4. Description of the sample

In the period of one year (from August 2019 to July 2020) a total of 120 subjects with chronic non-malignant pain of different origin were studied. Two groups of participants aged between 24 and 75 are studied. The first group includes 61 patients with chronic pain and depression, and the second group (control group) – 59 individuals with chronic pain and without clinical data on depression

The selection of the participants was carried out according to set criteria for inclusion and exclusion from the study.

#### 4.1. Criteria for inclusion in the study:

1. Patients with chronic non-malignant pain and depression with a duration of the pain symptomatology for more than three months and diagnosed with a depressive episode according to the ICD – 10 criteria;
2. Individuals with no clinical data on depression and with chronic non-malignant pain – control group;
3. Signed informed consent for participation in the study.

#### 4.2. Criteria for exclusion from the study:

1. Patients under 18 years of age;
2. Patients over 75 years of age;
3. Pregnant women;
4. Patients with chronic pain of malignant origin;
5. Patients between 65 and 75 years of age with data on cognitive deficit – an evaluation of below 25 points from the study with the MMSE screening scale.

Those who participated in the study were randomized. Some of them have received inpatient treatment in St. Marina's Hospital – Varna in the following clinics: psychiatric clinics, clinics of neurology, rheumatology clinic.

#### 5. Organization and conduct of the survey

The study goes through two stages for both groups of studied subjects.

In the first stage, the persons are examined using the following methodologies:

1. Filling out a work card with demographics, psychiatric and somatic comorbidity, conducted treatment, type and localization of chronic pain as well as risk factors. For the completion of the work card, both the information shared by the surveyed persons and the information contained in the medical documentation provided by them is used.
2. Determination of cognitive deficit via the MMSE screening scale for patients between 65 and 75 years of age. For this group of patients, the study continues at a sum total of above 25 points on the scale.
3. Assessment of the severity of the depressive symptoms via HAM-D-17.
4. Filling out the C. Spielberger questionnaire for anxiety assessment. Both questionnaire scales are filled out: Scale (S) for state anxiety (STAI – form Y1) and Scale (T) for assessing anxiety as a personality preposition (STAI – form Y2).
5. Quantification of the intensity of pain during the study via a visually analogue scale (VAS).
6. Conducting a semi-structured clinical interview to study pain symptoms and experiences. The surveyed participants were asked open-ended questions about the experiences of pain, feelings during pain, change in the way of life as a consequence pain, description and duration of pain, which are written down in detail by the

investigator. The answers to the close-ended questions, given by the participant, are noted.

The second stage of the study takes place three months after the first. Both groups of participants are studied. During this stage, the following methodologies are used:

1. Filling out a work card at the time of a change in some of the data set out therein.
2. Studying the severity of depressive symptoms using HAM-D-17.
3. Filling out Spielberg's anxiety assessment questionnaire (STAI – form Y1) i.e., only the scale for state anxiety. Anxiety as a personality trait (trait anxiety) is assumed to not change.
4. Quantification of the intensity of pain during the study via a visually analogue scale (VAS).
5. Conducting a semi-structured clinical interview to examine pain symptoms and experiences.
6. Limitations and frameworks of the study

The study has limitations with regards to the time period of its conduction and the characteristics of the sample studied.

The instrumental part of the study was carried out within a year. The total number of persons surveyed is 120. All participants are preliminarily familiar with the survey procedures and have signed informed consent to participate. The sample is obtained on the basis of randomization. The persons surveyed are from the city of Varna and the Varna region. In terms of ethnicity, the sample was not balanced against the main population. All these limitations are taken into account in the analysis of the results. The study does not claim epidemiology in the field of the sought problems and focuses on the search of the specific and the dominant as experiences in terms of chronic pain.

The study is conducted in two stages. The participants in the first stage are the same ones in the second stage. Its main goal is to construct a model for the studying and dynamic observation of patients with chronic pain and depression. It is of a conceptual nature and attempts to create a design for studying the problems.

The results do not relate beyond the specific moment (situation) during the both stages of the study.

The prospects for this kind of research could be oriented towards increasing the numbers of the participants and looking for the influence of other latent variables that would be relevant to the problem.

## II. RESULTS

### 1. Descriptive methods.

#### 1.1. Distribution of the persons surveyed by age

A total of 120 persons with chronic pain up of a minimal age of 24 years and a maximal of up to 76 years were examined. The median age of the participants was 51.9083 at a standard deviation of 11.94244. Table 1 shows the age distribution in the group with depression (n = 61). It is apparent that the median age of the group with depression (55,6066) was not significantly different from that of the general group (table 1).

**Table 1**

**Age distribution of the group with depression**

|                    |          |
|--------------------|----------|
| Number (N)         | 61       |
| Mean               | 55,6066  |
| Standard deviation | 10,90608 |

#### 1.2. Distribution of the persons surveyed by sex

The gender distribution of the overall group (n=120) was uneven. The number of the studied women was predominant – 98 (81,7%), compared to the number of men – 22 (18,3%). The results of the gender distribution of the group with chronic pain and depression are similar (n = 61) (table 2).

**Table 2**

**Gender distribution of the group with depression**

| <b>Paul</b> | <b>Frequency (N)</b> | <b>Percentage (%)</b> | <b>Valid percentage (%)</b> | <b>Cumulative percentage (%)</b> |
|-------------|----------------------|-----------------------|-----------------------------|----------------------------------|
| Men         | 5                    | 8,2                   | 8,2                         | 8,2                              |
| Women       | 56                   | 91,8                  | 91,8                        | 100,0                            |
| Total       | 61                   | 100,0                 | 100,0                       |                                  |

### 1.3. Distribution of the persons surveyed by marital status

Of the 120 people surveyed, 60 were married, 21 were single, 23 were widowed and 16 were divorced. This distribution allows for the separation of two relatively equivalent groups – people with a family (50%) and a group covering those who for some reason do not have a family (50%).

The distribution by marital status of the group with depression is shown in Table 3. It is apparent that it is close to that of the overall sample and allows for comparisons between the two groups of persons – married (44.3%) and without family (55.7%).

**Table 3**

**Distribution by marital status in the group with depression**

| <b>Marital status</b> | <b>Frequency (N)</b> | <b>Percentage (%)</b> |
|-----------------------|----------------------|-----------------------|
| Family                | 27                   | 44,3                  |
| No family             | 34                   | 55,7                  |

### 1.4. Distribution of the persons surveyed by ethnicity

A total of 100 of the persons surveyed indicated that they belonged to the Bulgarian ethnicity and 17 – to the Turkish ethnicity. Only two identify as belonging to the Roma ethnicity and 1 – to the Russian ethnicity. The sample is not balanced by ethnicity. The main conclusions will apply to the Bulgarian ethnicity.

### 1.5. Distribution of surveyed persons by education

In the overall sample, 69 of those surveyed had completed higher education, 27 had secondary education and 20 had basic education. The persons with primary education and without education are respectively two of each. Once again, two relatively equivalent groups can be separated – persons with secondary education (51) and persons with higher education (69). Following the proposed dichotomic principle, the group with depression is divided into two groups with higher education (n=21) and without higher education (n=40) (table 4).

**Table 4**

**Distribution by education in the group with depression**

| <b>Education</b>      | <b>Frequency (N)</b> | <b>Percentage (%)</b> |
|-----------------------|----------------------|-----------------------|
| With higher education | 21                   | 34,4                  |
| No higher education   | 40                   | 65,6                  |

#### 1.6. Distribution of the persons studied according to the limitation period of chronic pain

The minimum duration of chronic pain in the overall sample (n= 120) is 3 months, and the maximum – 456 months. The average duration of chronic pain is 109.0417 and the standard deviation – 106,90736. Thus, the results are significantly dispersed from the average.

The distribution by limitation of chronic pain in the group with depression is presented in Table 5. The standard deviation (147.42299) is greater than the mean, indicating the greater dissipation of the data.

**Table 5**

**Distribution by limitation of chronic pain in the group with depression in months**

|                    |           |
|--------------------|-----------|
| Number (N)         | 61        |
| Mean               | 111,3770  |
| Standard deviation | 147,42299 |

#### 1.7. Distribution of the studied persons according to the number of diagnostic categories of chronic pain

During the study, seven diagnostic categories were covered: chronic headache, chronic neuropathic pain, chronic visceral pain, chronic musculoskeletal pain, chronic postoperative pain, chronic post-traumatic pain and other pain. All cases of chronic pain, in which no organic cause of pain is detected (dysfunctional pain), refer to the latter. In the general group (n=120) 80 of the subjects studied had chronic pain referring to one diagnostic category, 33 of them had pain associated with two diagnostic categories and 7 – with three diagnostic categories.

The distribution of the group with depression according to the number of diagnostic categories is presented in Table 6. It is apparent that 32 patients have chronic pain referring to one diagnostic category, and 29 patients – referring to more than one.

**Table 6**

**Distribution by number of diagnostic categories of chronic pain in the group with depression**

| Number of diagnostic categories | Frequency (N) | Percentage (%) |
|---------------------------------|---------------|----------------|
| 1                               | 32            | 52,5           |
| 2                               | 23            | 37,7           |
| 3                               | 6             | 9,8            |



### 1.8. Distribution of the sample studied according to the conduct of treatment for pain

Depending on whether the persons studied regularly conduct medical treatment of chronic pain, two groups are formed: individuals who regularly conduct treatment and persons who take medication only during pain. In the entire sample, 30% of the subjects surveyed conducted regular supportive pain treatment and 70% took medication only during pain. The results for the group with depression are similar – 63.93% took medication only during pain and 36.07% were on maintenance medication (table 7).

**Table 7**

**Distribution according to the regularity of the drug treatment of pain in the group with depression**

| <b>Medical treatment of pain</b>    | <b>Frequency (N)</b> | <b>Percentage (%)</b> |
|-------------------------------------|----------------------|-----------------------|
| Conducts regular treatment          | 22                   | 36,07                 |
| Conducts treatment only during pain | 39                   | 63,93                 |

### 1.9. Distribution of the sample studied according to the limitation period of depression

The assessment of the mental state was made according to the criteria for depressive episode of ICD – 10. A depressive episode is considered that with a duration of depressive symptoms of more than two weeks. Thus, the overall group is divided into two equivalent groups. Patients with depression were 61 or 50.8% of the total sample. Those without clinical data for depressive episodes were 59 or 49.2% of the sample. The distribution of the group with depression (n=61) by limitation period of depression is uneven.

### 1.10. Distribution of the sample studied according to maintenance treatment with antidepressants

The distribution of the overall group according to treatment with antidepressants is presented in Table 8. The persons with chronic pain who had not received antidepressant treatment at the time of the study and in the past were 64. The persons who had previously received treatment with antidepressants and have for some reason discontinued it were 11. The persons who received regular maintenance therapy with antidepressant were 45. Therefore, a significant proportion of the persons in the overall sample are treated with an antidepressant. The data also showed that there are persons with a depressive episode for which they do not conduct a treatment (table 8).

**Table 8**

**Distribution of the overall group according to the duration of treatment with antidepressants**

| <b>Treatment with antidepressants</b>       | <b>Frequency (N)</b> | <b>Percentage (%)</b> |
|---|----------------------|-----------------------|
| No treatment                                | 64                   | 53,3                  |
| Conduct treatment with antidepressants      | 45                   | 37,5                  |
| Discontinued treatment with antidepressants | 11                   | 9,2                   |

1.11. Distribution of the sample studied according to the severity of depressive symptoms assessed with the Hamilton scale (HAM-D-17)

The scale was successfully conducted in all persons with chronic pain during the first stage of the study. The summarized results showed that 59 of those with chronic pain assessed with HAM-D-17 had a total score of up to 7 points, i.e. no evidence of depression. The same distribution is maintained at the second stage of the study. The remaining 61 individuals had a total score of more than 8 points on the HAM-D-17 scale and the limitation period of depressive symptoms was more than two weeks.

The mean values of the HAM-D scale of 17 by group for the two stages of the study are shown in Table 9.

**Table 9**

**Severity of depression by group for both stages of the study**

| <b>Group</b>       | <b>Depression-free (n=59)</b> |                 | <b>With depression (n=61)</b> |                 |
|--------------------|-------------------------------|-----------------|-------------------------------|-----------------|
|                    | <b>Stage I</b>                | <b>Stage II</b> | <b>Stage I</b>                | <b>Stage II</b> |
| Mean               | 3,5424                        | 3,8814          | 16,1475                       | 13,3607         |
| Standard deviation | 1,77455                       | 2,82894         | 5,86753                       | 6,95948         |

It is apparent that in the depression-free group there is a slight increase in the average score on the HAM-D – 17 scale, while in the group with depression it decreases significantly – from 16.1475 to 13,3607 (table 9).

The distribution of persons with depression according to the severity of depressive symptoms at both stages of the study is presented in Table 10. At the first stage, the persons with mild depression were 54.2%, while those with moderate and severe depression were 37.8% and 8%, respectively. At the second stage, the number of patients with mild depression (62.4%) increased and the number of patients with moderate (31.1%) and severe depression (6.5%) decreased (Table 10).

**Table 10**

**Distribution of individuals in the group with depression according to the severity of depression**

| Stage                         | Stage I | Stage II |
|-------------------------------|---------|----------|
| Mild depression (8 – 16)      | 54,2%   | 62,4%    |
| Moderate depression (17 – 23) | 37,8%   | 31,1%    |
| Severe depression (over 24)   | 8%      | 6,5%     |

1.12. Distribution of the sample studied according to the scale (S) for state anxiety (STAI – form Y1) and scale (T) for trait anxiety (STAI – form Y2) of the Spielberger's questionnaire

Spielberger's state anxiety scale (S) was successfully conducted during the first and second stages of the study. The mean values of state anxiety by group for both stages of the study are presented in Table 11. It can be seen that both groups showed a decrease in state anxiety at the second stage of the study.

**Table 11**

**State anxiety by group in both stages of the study**

| Group              | Depression-free (n=59) |          | With depression (n=61) |          |
|--------------------|------------------------|----------|------------------------|----------|
|                    | Stage I                | Stage II | Stage I                | Stage II |
| Mean               | 36,3559                | 35,4407  | 50,1475                | 49,2295  |
| Standard deviation | 8,88967                | 8,37334  | 13,89944               | 16,03475 |

Table 12 shows the distribution by groups according to the degree of state anxiety at both stages of the study.

**Table 12**

**Degree of state anxiety by group in both stages of the study**

| Group                  | Depression-free (n=59) |          | With depression (n=61) |          |
|------------------------|------------------------|----------|------------------------|----------|
|                        | Stage I                | Stage II | Stage I                | Stage II |
| Mild degree (up to 30) | 27,2%                  | 39%      | 8,2%                   | 6,4%     |
| Moderate (31– 44)      | 62,6%                  | 52,5%    | 27,8%                  | 31,1%    |
| High degree (over 45)  | 10,2%                  | 8,5%     | 64%                    | 62,5%    |

In the first stage, the depression-free group was dominated by those with moderate anxiety, compared to those with high and low levels of state anxiety. In the group with

depression, patients with high state anxiety, compared to those with moderate and low anxiety, were prevalent. This trend by group remains during the second stage of the study.

The Spielberger Trait anxiety Assessment Scale (STAI – Form Y2) was successfully performed in the first stage of the study. It is not applied in the second stage, since it is assumed that anxiety as a personality characteristic does not undergo change. The distribution by group according to the degree of trait anxiety is presented in Table 13.

**Table 13**

**Degree of trait anxiety (TA) by group**

| TA degree                 | Low TA<br>(up to 30)      |   | Moderate TA<br>(30–44) |        | High TA<br>(45–59) |        | High TA<br>(over 60) |        |
|---------------------------|---------------------------|---|------------------------|--------|--------------------|--------|----------------------|--------|
|                           | Depression-free<br>(n=59) | 7 | 11,87%                 | 35     | 59,32%             | 16     | 27,11%               | 1      |
| With depression<br>(n=61) | 0                         |   | 12                     | 19,67% | 28                 | 45,91% | 21                   | 34,42% |

It is apparent that individuals in both groups differ significantly in the degree of trait anxiety. In the depression-free group, a significant part of the persons had moderate trait anxiety of 59.32%, compared to those with low trait anxiety (11.87%). In the group with depression, subjects with high trait anxiety were 80.33% and the remaining 19.67% had moderate trait anxiety (table 13).

1.13. Distribution of the studied individuals according to pain intensity assessed by VAS

Table 14 presents the results of mean pain intensity values by group in both phases of the study. It is apparent that in both groups the average value of pain strength decreased at the second stage of the study. For the persons without depression, it decreases from 3,8475 to 3,1695 in three months and for the group with depression – from 5,7705 – to 5,2623 (table 14).

**Table 14**

**Intensity of pain by group in both stages of the study**

| Group              | Depression-free (n=59) |          | With depression (n=61) |          |
|--------------------|------------------------|----------|------------------------|----------|
|                    | Stage I                | Stage II | Stage I                | Stage II |
| Mean               | 3,8475                 | 3,1695   | 5,7705                 | 5,2623   |
| Standard deviation | 1,95478                | 2,16678  | 2,73492                | 2,58135  |

Table 15 shows the distribution of the persons examined by groups according to the intensity of pain.

**Table 15****Distribution of the subjects studied by pain intensity**

| Group | No depression |          |                |          | With depression |          |                |          |
|-------|---------------|----------|----------------|----------|-----------------|----------|----------------|----------|
|       | Frequency (N) |          | Percentage (%) |          | Frequency (N)   |          | Percentage (%) |          |
| Stage | Stage I       | Stage II | Stage I        | Stage II | Stage I         | Stage II | Stage I        | Stage II |
| ,00   | 6             | 12       | 10,2           | 20,3     | 3               | 2        | 4,9            | 3,3      |
| 1,00  | 2             | 4        | 3,4            | 6,8      | 2               | 0        | 3,3            | 0        |
| 2,00  | 2             | 7        | 3,4            | 11,9     | 2               | 2        | 3,3            | 3,3      |
| 3,00  | 11            | 15       | 18,6           | 25,4     | 2               | 7        | 3,3            | 11,5     |
| 4,00  | 19            | 7        | 32,2           | 11,9     | 9               | 13       | 14,8           | 21,3     |
| 5,00  | 12            | 8        | 20,3           | 13,6     | 15              | 10       | 24,6           | 16,4     |
| 6,00  | 3             | 4        | 5,1            | 6,8      | 2               | 6        | 3,3            | 9,8      |
| 7,00  | 1             | 0        | 1,7            | 0        | 6               | 3        | 9,8            | 4,9      |
| 8,00  | 3             | 0        | 5,1            | 0        | 9               | 14       | 14,8           | 23,0     |
| 9,00  |               | 1        |                | 1,7      | 4               | 2        | 6,6            | 3,3      |
| 10,00 |               | 1        |                | 1,7      | 7               | 2        | 11,5           | 3,3      |
| Total | 59            | 59       | 100,0          | 100,0    | 61              | 61       | 100,0          | 100,0    |

It is apparent that at the second stage of the study in the depression-free group the proportion of persons who assessed pain by 4 and 5 is significantly reduced, and the number of persons who assessed their pain by 2 and 3 increased. In the group with depression, patients who rated pain strength by 5, 7, 9 and 10 decreased, and those with 3, 4, 6, 8 increased (table 15).

## 2. Reliability of the scales used in the study

The reliability factor of the used Cronbach's alpha methodologies was calculated (Cronbach's alpha). The coefficient was not calculated for HAM-D-17 as it does not imply a normal distribution. It is clear from Table 16 that the scales used during the two stages of the study have a high reliability coefficient.

**Table 16**  
**Cronbach's alpha value of the scales used for evaluation during the first and second stages of the study**

| Cronbach's Alpha (Cronbach's alpha)      | Scales |
|--|--------|
| Scale (S) for state anxiety first stage  | 0,845  |
| Scale (S) for state anxiety second stage | 0,833  |
| Scale (T) for trait anxiety              | 0,839  |
| VAS first stage                          | 0,807  |
| VAS second stage                         | 0,802  |

### 3. Correlation analysis

In order to search for correlations between the main groups of indicators examined in the framework of the study, namely the results of the VAS, HAM-D-17, STAI – Y1 and STAI – Y2 scales, a correlation analysis of Pearson was carried out.

#### 3.1. Correlation analysis in the general group

Table 17 shows the correlations between the scales in the general group of the first stage of the study. There are significant correlations between all values:

- between severity of depression and trait anxiety;
- between severity of depression and state anxiety;
- between trait and state anxiety;
- between the pain intensity and state anxiety (table 17).

**Table 17**

**Correlation analysis of the scales in the general group – first stage**

| <b>Correlations</b>           | <b>Intensity of pain</b> | <b>Severity of depression</b> | <b>State anxiety</b> | <b>Trait anxiety</b> |
|-------------------------------|--------------------------|-------------------------------|----------------------|----------------------|
| <b>Intensity of pain</b>      | 1                        | ,528**                        | ,542**               | ,364**               |
| <b>Severity of depression</b> | ,528**                   | 1                             | ,594**               | ,648**               |
| <b>State anxiety</b>          | ,542**                   | ,594**                        | 1                    | ,592**               |
| <b>Trait anxiety</b>          | ,364**                   | ,648**                        | ,592**               | 1                    |

Note: Significant correlations are shown:

\*\* - significant at  $p < 0.01$ ; \* - significant at  $p < 0.05$ .

At the second stage of the study, trait anxiety is removed from the correlation analysis because it is a time-sustaining characteristic and manifests itself as a constant. The results of the analysis are presented in Table 18. It is apparent that the connection between the scales is much higher compared to the connection in the first stage of the study. There are significant correlations between:

- between severity of depression and state anxiety;
- between severity of depression and intensity of pain;
- between pain intensity and state anxiety (table 18).

**Table 18**

**Correlation analysis of the scales in the general group – second stage**

| <b>Correlations</b>           | <b>Intensity of pain</b> | <b>Severity of depression</b> | <b>State anxiety</b> |
|-------------------------------|--------------------------|-------------------------------|----------------------|
| <b>Intensity of pain</b>      | 1                        | ,609**                        | ,543**               |
| <b>Severity of depression</b> | ,609**                   | 1                             | ,782**               |
| <b>State anxiety</b>          | ,543**                   | ,782**                        | 1                    |

Note: Significant correlations are shown:  
 \*\* - significant at  $p < 0.01$ ; \* - significant at  $p < 0.05$ .

### 3.2. Correlation analysis in the group with chronic pain without depression

The correlation analysis of the scales in the depression-free group from the first and second stages of the study are shown in Table 19 and Table 20 respectively.

**Table 19**

**Correlation analysis of the scales in the depression-free group – first stage**

| <b>Correlations</b>           | <b>Intensity of pain</b> | <b>Severity of depression</b> | <b>State anxiety</b> | <b>Trait anxiety</b> |
|-------------------------------|--------------------------|-------------------------------|----------------------|----------------------|
| <b>Intensity of pain</b>      | 1                        | -,050                         | ,322*                | -,153                |
| <b>Severity of depression</b> | -,050                    | 1                             | ,182                 | ,264*                |
| <b>State anxiety</b>          | ,322*                    | ,182                          | 1                    | ,204                 |
| <b>Trait anxiety</b>          | -,153                    | ,264*                         | ,204                 | 1                    |

Note: Significant correlations are shown:  
 \*\* - significant at  $p < 0.01$ ; \* - significant at  $p < 0.05$ .

For the first stage of the study in the depression-free group, the scales were insignificantly related to each other (table 19). This trend persisted for the second stage of the study, with the exception of the identified connection between the HAM-D depression scale and the state anxiety scale, but due to an unconfirmed connection at the beginning we attributed this factor to randomness (table 20).

**Table 20****Correlation analysis of the scales in the depression-free group – second stage**

| <b>Correlations</b>           | <b>Intensity of pain</b> | <b>Severity of depression</b> | <b>State anxiety</b> |
|-------------------------------|--------------------------|-------------------------------|----------------------|
| <b>Intensity of pain</b>      | 1                        | ,256*                         | ,114                 |
| <b>Severity of depression</b> | ,256*                    | 1                             | ,587**               |
| <b>State anxiety</b>          | ,114                     | ,587**                        | 1                    |

Note: Significant correlations are shown:

\*\* - significant at  $p < 0.01$ ; \* - significant at  $p < 0.05$ .

### 3.3. Correlation analysis in the group with chronic pain and depression

The correlation analysis of the scales in the group with depression differed significantly from that of the depression-free group. For the first stage of the study there were significant correlations between all values in the group with depression:

- between severity of depression and intensity of pain;
- between state and trait anxiety;
- between pain intensity and state anxiety;
- between severity of depression and trait anxiety;
- between severity of depression and state anxiety (table 21).

**Table 21****Correlation analysis of the scales in the group with depression – first stage**

| <b>Correlations</b>           | <b>Intensity of pain</b> | <b>Severity of depression</b> | <b>State anxiety</b> | <b>Trait anxiety</b> |
|-------------------------------|--------------------------|-------------------------------|----------------------|----------------------|
| <b>Intensity of pain</b>      | 1                        | ,538**                        | ,491**               | ,356**               |
| <b>Severity of depression</b> | ,538**                   | 1                             | ,405**               | ,416**               |
| <b>State anxiety</b>          | ,491**                   | ,405**                        | 1                    | ,516**               |
| <b>Trait anxiety</b>          | ,356**                   | ,416**                        | ,516**               | 1                    |

Note: Significant correlations are shown:

\*\* - significant at  $p < 0.01$ ; \* - significant at  $p < 0.05$ .



For the second stage of the study in the group with depression, there were again significant correlations of all values:

- between severity of depression and state anxiety;
- between severity of depression and intensity of pain;
- between pain intensity and state anxiety (table 22).

**Table 22**

**Correlation analysis of the scales in the group with depression – second stage**

| <b>Correlations</b>           | <b>Intensity of pain</b> | <b>Severity of depression</b> | <b>State anxiety</b> |
|-------------------------------|--------------------------|-------------------------------|----------------------|
| <b>Intensity of pain</b>      | 1                        | ,612**                        | ,588**               |
| <b>Severity of depression</b> | ,612**                   | 1                             | ,738**               |
| <b>State anxiety</b>          | ,588**                   | ,738**                        | 1                    |

Note: Significant correlations are shown:  
 \*\* - significant at  $p < 0.01$ ; \* - significant at  $p < 0.05$ .

#### 4. T – test for comparison of mean values in groups

In order to look for a degree of difference between the main indicators (the results of the VAS, HAM-D-17, STAI - Y1 and STAI – Y 2 scales were used), a T – test was performed. The trait anxiety is evaluated only in the first stage of the study and is not included in the T – test.

##### 4.1. T – test of indicators in the general group

When conducting the T – test, the mean values of the results of the scales used in the general group with chronic pain (n=120) revealed significant differences between the severity values of depression assessed by HAM-D-17 during the two stages of the study (HAM-D1 and HAM-D2) and between the pain intensity values assessed by VAS, also during the two stages of the study (VAS1 and VAS2). A similar trend was not observed for state anxiety measured by STAI – Y1 in the first and second phases of the study (table 23).

**Table 23**

**Descriptive statistics when conducting the T-test for the general group**

|        | Mean    | Number (N) | Standard deviation | Standard Error Mean |
|--------|---------|------------|--------------------|---------------------|
| HAM-D1 | 9,9500  | 120        | 7,67715            | ,70082              |
| HAM-D2 | 8,7000  | 120        | 7,13919            | ,65172              |
| ST1    | 43,3667 | 120        | 13,55966           | 1,23782             |
| ST2    | 42,4500 | 120        | 14,55090           | 1,32831             |
| VAS1   | 4,8250  | 120        | 2,56237            | ,23391              |
| VAS2   | 4,2333  | 120        | 2,59843            | ,23720              |

Legend: HAM-D1 – severity of depression assessed through HAM-D-17 during stage I; HAM-D2 – severity of depression assessed through HAM-D-17 during stage II; ST1 – state anxiety assessed through STAI – Y1 during stage I; ST1 – state anxiety assessed through STAI – Y1 during stage II; VAS1 – intensity of pain assessed through VAS during stage I; VAS2 – intensity of pain assessed through VAS during stage II.

Correlations showing the degree of the connection of the values for the two stages of the sample (n=120) are presented in Table 24. All pairs of indicators have a correlation of a high degree.

**Table 24**

**Interrelation between the scales in the T-test for the general group**

|                 | Number (N) | Coeff. correlation (r) | Sig. (p) |
|-----------------|------------|------------------------|----------|
| HAM-D1 & HAM-D2 | 120        | ,764                   | ,000     |
| ST1 & ST2       | 120        | ,715                   | ,000     |
| VAS1 & VAS2     | 120        | ,585                   | ,000     |

Legend: HAM-D1 – severity of depression assessed through HAM-D-17 during stage I; HAM-D2 – severity of depression assessed through HAM-D-17 during stage II; ST1 – state anxiety assessed through STAI – Y1 during stage I; ST1 – state anxiety assessed through STAI – Y1 during stage II; VAS1 – intensity of pain assessed through VAS during stage I; VAS2 – intensity of pain assessed through VAS during stage II.

The results of the T – the test for severity and significance of the differences between the indicators in the general group are presented in Table 25. Statistically significant differences in the results of indicators severity of depression and intensity of pain were observed. When comparing the two indicators, the difference in pain intensity indicator (t=2,758, p=.007) (table 25) was more significant.

**Table 25****T – test: degree of severity and significance of the differences of the scales in the general group**

|                 | Paired Differences |                |                 |   |         | t     | df  | Sig. (2-tailed) |
|-----------------|--------------------|----------------|-----------------|---|---------|-------|-----|-----------------|
|                 | Mean               | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference |         |       |     |                 |
|                 |                    |                |                 | Lower                                     | Upper   |       |     |                 |
| HAM-D1 – HAM-D2 | 1,25000            | 5,11260        | ,46671          | ,32586                                    | 2,17414 | 2,678 | 119 | ,008            |
| ST1 – ST2       | ,91667             | 10,64838       | ,97206          | -1,00811                                  | 2,84144 | ,943  | 119 | ,348            |
| VAS1 – VAS2     | ,59167             | 2,34967        | ,21449          | ,16695                                    | 1,01639 | 2,758 | 119 | ,007            |

Legend: HAM-D1 – severity of depression assessed through HAM-D-17 during stage I; HAM-D2 – severity of depression assessed through HAM-D-17 during stage II; ST1 – state anxiety assessed through STAI – Y1 during stage I; ST1 – state anxiety assessed through STAI – Y1 during stage II; VAS1 – intensity of pain assessed through VAS during stage I; VAS2 – intensity of pain assessed through VAS during stage II.

**4.2. T – test of indicators in the group with chronic pain without depression**

The values included in the T- test for the depression-free group are presented in Table 26. It is apparent that a degree of difference can be expected only in the intensity of pain indicator.

**Table 26****Descriptive statistics when conducting the T-test in the depression-free group**

|        | Mean    | Number (N) | Standard deviation | Standard Error Mean |
|--------|---------|------------|--------------------|---------------------|
| HAM-D1 | 3,5424  | 59         | 1,77455            | ,23103              |
| HAM-D2 | 3,8814  | 59         | 2,82894            | ,36830              |
| ST1    | 36,3559 | 59         | 8,88967            | 1,15734             |
| ST2    | 35,4407 | 59         | 8,37334            | 1,09012             |
| VAS1   | 3,8475  | 59         | 1,95478            | ,25449              |
| VAS2   | 3,1695  | 59         | 2,16678            | ,28209              |

Legend: HAM-D1 – severity of depression assessed through HAM-D-17 during stage I; HAM-D2 – severity of depression assessed through HAM-D-17 during stage II; ST1 – state anxiety assessed through STAI – Y1 during stage I; ST1 – state anxiety assessed through STAI – Y1 during stage II; VAS1 – intensity of pain assessed through VAS during stage I; VAS2 – intensity of pain assessed through VAS during stage II.

The correlations showing the degree of connectivity between values in the depression-free group (n=59) are shown in Table 27. The degrees of connection between the pairs of indicators for the group without depression (table 27) do not differ different from those calculated for the whole sample (table 24).

**Table 27****Interrelation between the scales in the T-test for the depression-free group**

|               | Number (N) | Coeff. correlation (r) | Sig. (p) |
|---------------|------------|------------------------|----------|
| HAM-D1&HAM-D2 | 59         | ,693                   | ,000     |
| ST1 & ST2     | 59         | ,541                   | ,000     |
| VAS1 & VAS2   | 59         | ,328                   | ,011     |

Legend: HAM-D1 – severity of depression assessed through HAM-D-17 during stage I; HAM-D2 – severity of depression assessed through HAM-D-17 during stage II; ST1 – state anxiety assessed through STAI – Y1 during stage I; ST1 – state anxiety assessed through STAI – Y1 during stage II; VAS1 – intensity of pain assessed through VAS during stage I; VAS2 – intensity of pain assessed through VAS during stage II.

The results of the T – the test for the degree of severity and significance of the differences between the values in the depression-free group are presented in Table 28. It is apparent that the most significant decrease was reported in the pain intensity indicator during the second stage of the study, compared to the first stage. In this regard, the degree of difference (t) was highest for the pain intensity indicator, or  $t = 2,174$  compared to that of other indicators (table 28).

**Table 28****T – test: degree of severity and significance of the differences of the scales in the depression-free group**

|                 | Paired Differences |                |                 |   |         | t      | df | Sig. (2-tailed) |
|-----------------|--------------------|----------------|-----------------|---|---------|--------|----|-----------------|
|                 | Mean               | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference |         |        |    |                 |
|                 |                    |                |                 | Lower                                     | Upper   |        |    |                 |
| HAM-D1 – HAM-D2 | -,33898            | 2,04779        | ,26660          | -,87264                                   | ,19467  | -1,272 | 58 | ,209            |
| ST1 – ST2       | ,91525             | 8,28020        | 1,07799         | -1,24258                                  | 3,07309 | ,849   | 58 | ,399            |
| VAS1 – VAS2     | ,67797             | 2,39569        | ,31189          | ,05365                                    | 1,30229 | 2,174  | 58 | ,034            |

Legend: HAM-D1 – severity of depression assessed through HAM-D-17 during stage I; HAM-D2 – severity of depression assessed through HAM-D-17 during stage II; ST1 – state anxiety assessed through STAI – Y1 during stage I; ST1 – state anxiety assessed through STAI – Y1 during stage II; VAS1 – intensity of pain assessed through VAS during stage I; VAS2 – intensity of pain assessed through VAS during stage II.

**4.3.T – test of indicators in the group with chronic pain and depression**

The descriptive statistics of the indicators included in the T – test are shown in Table 29. It is apparent that the absolute value of the severity of depression indicator for the first stage of the study (HAM-D1) is significantly higher than that for the second stage (HAM-D2) (table 29).

**Table 29****Descriptive statistics of the T-test in the group with depression**

|        | Mean    | Number (N) | Standard deviation | Standard Error Mean |
|--------|---------|------------|--------------------|---------------------|
| HAM-D1 | 16,1475 | 61         | 5,86753            | ,75126              |
| HAM-D2 | 13,3607 | 61         | 6,95948            | ,89107              |
| ST1    | 50,1475 | 61         | 13,89944           | 1,77964             |
| ST2    | 49,2295 | 61         | 16,03475           | 2,05304             |
| VAS1   | 5,7705  | 61         | 2,73492            | ,35017              |
| VAS2   | 5,2623  | 61         | 2,58135            | ,33051              |

Legend: HAM-D1 – severity of depression assessed through HAM-D-17 during stage I; HAM-D2 – severity of depression assessed through HAM-D-17 during stage II; ST1 – state anxiety assessed through STAI – Y1 during stage I; ST2 – state anxiety assessed through STAI – Y1 during stage II; VAS1 – intensity of pain assessed through VAS during stage I; VAS2 – intensity of pain assessed through VAS during stage II.

The correlations showing the degree of connection between the values during the two stages of the group with depression study (n=61) are shown in Table 30. Again, all indicators (scales) have a high degree of connectivity.

**Table 30****Interrelation between the scales in the T-test for the group with depression**

|                 | Number (N) | Coeff. correlation (r) | Degree of significance (p) |
|-----------------|------------|------------------------|----------------------------|
| HAM-D1 & HAM-D2 | 61         | ,489                   | ,000                       |
| ST1 & ST2       | 61         | ,654                   | ,000                       |
| VAS1 & VAS2     | 61         | ,620                   | ,000                       |

Legend: HAM-D1 – severity of depression assessed through HAM-D-17 during stage I; HAM-D2 – severity of depression assessed through HAM-D-17 during stage II; ST1 – state anxiety assessed through STAI – Y1 during stage I; ST2 – state anxiety assessed through STAI – Y1 during stage II; VAS1 – intensity of pain assessed through VAS during stage I; VAS2 – intensity of pain assessed through VAS during stage II.

The results of the T - the test for severity and significance of the differences between values in the group with depression are presented in Table 31. It is apparent that the degree of difference between the severity of depression indicator is highest ( $t = 3,323$ ), compared to the severity of difference for state anxiety ( $t = ,569$ ) and to pain intensity ( $t = 1,710$ ).

**Table 31****T – test: degree of severity and significance of the differences of the scales in the group with depression**

|               | Paired Differences |                |                 |   |         | t     | df | Sig. (2-tailed) |
|---------------|--------------------|----------------|-----------------|---|---------|-------|----|-----------------|
|               | Mean               | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference |         |       |    |                 |
|               |                    |                |                 | Lower                                     | Upper   |       |    |                 |
| HAM-D1-HAM-D2 | 2,78689            | 6,55010        | ,83865          | 1,10933                                   | 4,46444 | 3,323 | 60 | ,002            |
| ST1 – ST2     | ,91803             | 12,59404       | 1,61250         | -2,30745                                  | 4,14352 | ,569  | 60 | ,571            |
| VAS1 – VAS2   | ,50820             | 2,32108        | ,29718          | -,08626                                   | 1,10265 | 1,710 | 60 | ,092            |

Legend: HAM-D1 – severity of depression assessed through HAM-D-17 during stage I; HAM-D2 – severity of depression assessed through HAM-D-17 during stage II; ST1 – state anxiety assessed through STAI – Y1 during stage I; ST2 – state anxiety assessed through STAI – Y1 during stage II; VAS1 – intensity of pain assessed through VAS during stage I; VAS2 – intensity of pain assessed through VAS during stage II.

## 5. Regression analysis

In order to look for causal relationships between the studied values of trait and state anxiety, severity of depressive symptoms and intensity of pain, a regression analysis was applied. The analysis was done only for the group with chronic pain and depression due to the nature of the goals and tasks set in the methodology of the study.

### 5.1. Studying the influence of independent variables on the dependent variable in the first stage of the study

One dependent and three independent variables are involved in the analysis. A dependent variable is the indicator intensity of pain. The independent variables are: trait anxiety (TA), state anxiety (SA) and severity of depression (D) (table 32).

The model and the results of the analysis are presented in tables 33 and 34.

**Table 32****Types of variables included in the regression analysis of the first stage of the study**

| Independent variables | Dependent variable |
|-----------------------|--------------------|
| Trait anxiety (TA)    | Pain               |
| State anxiety (SA)    |                    |
| Depression (D)        |                    |

The influence of independent variables on the dependent variable (pain intensity) for the first stage of the study was studied. The results show:

- The multiple correlation coefficient between independent variables and dependent (pain) is  $R = ,616$  i.e. nearly 60% of variations in pain intensity in the first stage of the study could be explained by the influence of these three variables: trait anxiety, state anxiety and severity of depression.
- The proportion of variation in the dependent variable that is explained by independent variables is  $R^2 = ,379$ , which is a good result.

**Table 33**

**Regression analysis: model for the first stage of the study**

| Model | R                 | R <sup>2</sup> | Corrected R <sup>2</sup> | Standard Error |
|-------|-------------------|----------------|--------------------------|----------------|
| 1     | ,616 <sup>a</sup> | ,379           | ,347                     | 2,21073        |

a. Independent variables: TA, SA, D.

b. Dependent variable: intensity of pain.

**Table 34**

**Force of action of independent variables on the dependent variable during the first stage of the study**

| <b>R<sup>2</sup>=,379</b> | <b>B<br/>/Standardised<br/>Beta/</b> | <b>t</b> | <b>p</b> |
|---------------------------|--------------------------------------|----------|----------|
| <b>TA</b>                 | 0                                    | -,484    | ,630     |
| <b>SA</b>                 | ,316                                 | 2,513    | ,015     |
| <b>D</b>                  | ,399                                 | 3,372    | ,001     |

Table 34 presents the results for severity and degree of influence of independent variables on the dependent.

With regard to the severity of influence (t) of independent variables on the dependent (pain), the results showed:

- Depression has the greatest impact on pain (t = 3,372)
- State anxiety is next in severity of pain (t = 2,513)
- Trait anxiety has an insignificant severity of pain influence (t = -,484).

The results for the degree of significance (p) of the independent variables for the dependent are similar:

- Depression has the greatest degree of significance (p = ,001)
- State anxiety is the next variable in degree of importance (p = .015)
- Trait anxiety has a negligible degree of significance (p= ,630).

## 5.2. Studying the influence of independent variables on the dependent variable in the second stage of the study

For the purposes of the analysis, trait anxiety as an independent variable is removed due to its resistance over time. The influence of state anxiety and severity of depression on the intensity of pain are included in the analysis (table 35).

**Table 35**

### Types of variables included in the regression analysis of the second stage of the study

| Independent variables | Dependent variable |
|-----------------------|--------------------|
| State anxiety (SA)    | Pain               |
| Depression (D)        |                    |

The model and the results are presented in tables 36 and 37.

The results reveal:

- The multiple correlation coefficient between the independent variables and the dependent (pain) for the second stage of the study was  $R = ,644$  and, compared to the one calculated for the first stage ( $R = ,616$ ), has a better result.
- The proportion of variation in the dependent variable which is explained by the independent variables is  $R^2 = ,415$ , is also a good result (table 36).

**Table 36**

### Regression analysis: model for the second stage of the study

| Model | R                 | R <sup>2</sup> | Corrected R <sup>2</sup> | Standard Error |
|-------|-------------------|----------------|--------------------------|----------------|
| 1     | ,644 <sup>a</sup> | ,415           | ,395                     | 2,00834        |

a. Independent variables: SA, D.

b. Dependent variable: intensity of pain.



Table 37 presents the results of the analysis of the strength of effect of independent variables (severity of depression and state anxiety) on the independent variable (pain intensity) for the second stage of the study. The results show:

- Depression is a major variable that affects variations of pain intensity. The influence of depression on pain intensity is  $t = 2,626$ , and the degree of significance is satisfactory ( $p = ,011$ ).
- The influence of state anxiety on variations of pain intensity is weaker ( $t = 2,012$ ), and the degree of significance is low ( $p = ,049$ ) (table 37).

**Table 37**

**Force of action of independent variables on the dependent variable**

| <b>R<sup>2</sup>= .415</b> | <b>β<br/>/Standardised<br/>Beta/</b> | <b>t</b> | <b>p</b> |
|----------------------------|--------------------------------------|----------|----------|
| <b>SA</b>                  | ,299                                 | 2,012    | ,049     |
| <b>D</b>                   | ,391                                 | 2,626    | ,011     |

a. Independent variables: SA, D.

b. Dependent variable: intensity of pain.

5.3. Studying the influence of the independent variable depression and the dependent variable state anxiety

To clarify these specific relationships, it was necessary to re-use the regression analysis method in the independent variable depression (D) and the dependent variable state anxiety (SA) for the second stage of the study.

Tables 38 and 39 show the model and results of the regression analysis.

**Table 38**

**Regression analysis: model**

| <b>Model</b> | <b>R</b>          | <b>R<sup>2</sup></b> | <b>Corrected R<sup>2</sup></b> | <b>Standard Error</b> |
|--------------|-------------------|----------------------|--------------------------------|-----------------------|
| 1            | ,782 <sup>a</sup> | ,612                 | ,608                           | 9,10734               |

a. Independent variables: D.

b. Dependent variable: SA.

**Table 39****Strength of effect of the independent variable on the dependent variable**

| <b>R<sup>2</sup> = ,612</b> | <b>B<br/>/Non-<br/>standardized<br/>Beta/</b> | <b>I'm not<br/>going to be a<br/>Error</b> | <b>B<br/>/Standard<br/>Beta/</b> | <b>T</b> | <b>P</b> |
|-----------------------------|---|--|----------------------------------|----------|----------|
| E                           | 1,594   | ,117                                       | ,782                             | 13,630   | ,000     |

a. Dependent variable: SA.

b. Independent variable: D.

The results showed that the proportion of variation of the dependent variable, which is explained by independent variables ( $R^2 = ,612$ ) is a good result. Therefore, there is a large degree of conditioning of state anxiety by depression (table 39).

## 6. Content analysis

A content analysis was used for researching the specifics and dynamics of experiences associated with chronic pain in patients with depression. It refers to the qualitative research methods for analyzing information. The essence of this research methodology is the study of the content of documents (texts, audio recordings, video recordings, works of art, etc.) by systematically fixating on certain units and categories of analysis. On this basis, conclusions are drawn not only about their apparent content, but about the underlying mental conditions that determinize them as well. The subject of the analysis is the frequency of occurrence of a particular unit in the text (quantitative content-analysis) and its meaning associated with the text (qualitative content analysis). Meaningful units are distinct words or combinations of words from the text.

In this study, a content analysis of the content of the answers from the open-ended questions from the semi-structured interview during the first and second stages of the study was carried out. The analysis includes four levels: 1) the nature of pain as an experience; 2) experiences during pain; 3) experiences associated with lifestyle change due to chronic pain; 4) description of pain.

What is common to the whole group is the presence of chronic pain, and what is different is depression. This way, a comparative analysis of experiences between the two groups – with and without depression – allows for the determination of the specific experiences of pain in patients with depression. The dynamics of experiences are studied by comparing the frequency and specificity of experiences recorded during the first and second stages of the study.

For the purposes of the content analysis, it is necessary to distinguish the specific from the dominant experiences. The experiences that are distinctive and inherent in the study group are specific. Their specificity is determined by their meaning and by the frequency with which they occur in the responses of the persons surveyed. A specific category of experiences is considered to include units close in meaning (words or phrases) that occur significantly more frequently

in the responses of the study group than the control group where they are recorded at single frequencies. The dominant category of experiences is defined as the one that covers the highest number of thought units compared to the other categories of experiences in the study and control group.

#### 6.1. Content analysis of the answers to the question "What does pain mean to you?"

The results are analyzed on the basis of the frequency and specificity of the fixated thought units. After the initial processing of the data and their subsequent arranging, several categories of pain experiences were separated during the first stage of the study. The results are presented in Table 40.

- The experience of pain as a limitation is dominant in both groups, but in the depression-free group it has a greater frequency and a greater range of specific experiences.
- The experience of pain as suffering is second in frequency for both groups. In the group with depression, there is a greater frequency and with more specific experiences.
- The experience of pain as punishment ranks third in the group with depression. In the depression-free group it was registered only once.
- The experience of pain as discomfort and unpleasant sensation has a comparable frequency in the two groups studied.
- The experience of pain as anxiety is with close for both groups quantitative accumulations. Groups differ in specificity of experiences. Identical experiences for both groups of patients are the experience of fear and terror.
- The experience of pain as part of life has the lowest frequency in the group with depression.

The results of the content analysis of the answers to the question "What does pain mean to you?" in the second stage of the study are presented in Table 41.

- The most common experience in the group with depression is pain as a limitation. This category has more experiences that are more specific than the ones in the depression-free group.
- The next most frequent experience is pain as suffering, but the number of specific experiences was greater in the depression-free group.
- The experience of pain as anxiety was the third most frequent experience in the group with depression, but the number of specific experiences was greater in the depression-free group.
- The experience of pain as discomfort ranks fourth in the group with depression in terms of frequency and prevails in the depression-free group.
- The experience of pain as part of life has the same frequency for both groups, but in the depression-free group there are more specific experiences.
- The experience of pain as punishment occurs most rarely in both groups.

**Table 40**

**Content analysis of the answers to the question “What does pain mean to you?”–  
first stage of the study**

| <b>Group with chronic pain and depression</b>   | <b>Group with chronic pain without depression</b>  |
|---|--|
| <p>1. <b>Pain as a limitation:</b> 20</p> <ul style="list-style-type: none"> <li>• Obstacle: 6</li> <li>• Hurdle: 1</li> <li>• Limit: 9</li> <li>• Trap: 2</li> <li>• Prison: 1</li> <li>• Stalemate: 1</li> </ul>  | <p>1. <b>Pain as a limitation:</b> 27</p> <ul style="list-style-type: none"> <li>• Obstacle: 10</li> <li>• Hurdle: 4</li> <li>• Limit: 8</li> <li>• Trap: 1</li> <li>• Dependency: 1</li> <li>• Control: 1</li> <li>• Inevitability: 1</li> <li>• Insuperability: 1</li> </ul> |
| <p>2. <b>Pain as suffering:</b>17</p> <ul style="list-style-type: none"> <li>• Suffering: 6</li> <li>• Desperation: 3</li> <li>• Humiliation: 1</li> <li>• Difficulty: 1</li> <li>• Load: 1</li> <li>• Weight: 4</li> <li>• Burden: 1</li> </ul>                  | <p>2. <b>Pain as suffering:</b>15</p> <ul style="list-style-type: none"> <li>• Suffering: 5</li> <li>• Burden: 2</li> <li>• Weight: 1</li> <li>• Severity: 6</li> <li>• Load: 1</li> </ul>   |
| <p>3. <b>Pain as punishment :</b>13</p> <ul style="list-style-type: none"> <li>• Punishment: 8</li> <li>• Cruelty: 1</li> <li>• Test: 1</li> <li>• Torture: 1</li> <li>• Harassment: 1</li> <li>• Death: 1</li> </ul>   | <p>3. <b>Pain as punishment :</b>1</p> <ul style="list-style-type: none"> <li>• Torture:1</li> </ul>   |
| <p>4. <b>Pain as discomfort:</b> 12</p> <ul style="list-style-type: none"> <li>• Discomfort: 10</li> <li>• Unpleasant feeling: 1</li> <li>• Tormenting sensation: 1</li> </ul>  | <p>4. <b>Pain as discomfort:</b> 13</p> <ul style="list-style-type: none"> <li>• Discomfort: 10</li> <li>• Unpleasant feeling: 3</li> </ul>  |
| <p>5. <b>Pain as anxiety:</b>10</p> <ul style="list-style-type: none"> <li>• Stress: 1</li> <li>• Voltage: 1</li> <li>• Fear: 3</li> <li>• Horror: 1</li> <li>• Concern: 1</li> <li>• Uncertainty: 1</li> <li>• Restlessness: 1</li> <li>• Nightmare:1</li> </ul> | <p>5. <b>Pain as anxiety:</b>9</p> <ul style="list-style-type: none"> <li>• Aggression: 2</li> <li>• Worry: 1</li> <li>• Fear: 2</li> <li>• Horror: 1</li> <li>• Irritant: 1</li> <li>• Fixes consciousness:1</li> <li>• Distracted: 1</li> </ul>                              |
| <p>6. <b>Pain as part of life:</b>8</p> <ul style="list-style-type: none"> <li>• Part of life: 5</li> <li>• Lifestyle: 1</li> <li>• Something normal: 1</li> <li>• Given: 1</li> </ul>  | <p>6. <b>Pain as part of life:</b>12</p> <ul style="list-style-type: none"> <li>• Part of life: 9</li> <li>• Daily life: 1</li> <li>• Friend: 1</li> <li>• Temporary phenomenon: 1</li> </ul>  |

**Table 41**

**Content analysis of the answers to the question " What does pain mean to you?" –  
second stage of the study**

| <b>Group with chronic pain and depression</b>   | <b>Group with chronic pain without depression</b>  |
|---|--|
| <p>1. <b>Pain as a limitation:</b> 25</p> <ul style="list-style-type: none"> <li>• Obstacle: 7</li> <li>• Limit: 7</li> <li>• Trap: 1</li> <li>• Prison: 1</li> <li>• Stalemate: 3</li> <li>• Insuperability: 5</li> <li>• Silence:1</li> </ul>                       | <p>1. <b>Pain as a limitation:</b> 15</p> <ul style="list-style-type: none"> <li>• Obstacle: 4</li> <li>• Limit: 10</li> <li>• Control: 1</li> </ul>   |
| <p>2. <b>Pain as suffering:</b>19</p> <ul style="list-style-type: none"> <li>• Suffering: 3</li> <li>• Intolerance: 1</li> <li>• Destruction: 1</li> <li>• Difficulty: 1</li> <li>• Load: 3</li> <li>• Weight: 2</li> <li>• Weight: 7</li> <li>• Burden: 1</li> </ul> | <p>2. <b>Pain as suffering:</b>17</p> <ul style="list-style-type: none"> <li>• Suffering: 4</li> <li>• Inferiority: 1</li> <li>• Incompatibility: 1</li> <li>• Difficulty: 3</li> <li>• Weight: 1</li> <li>• Weight: 2</li> <li>• Load: 1</li> <li>• Burden: 3</li> <li>• Effort: 1</li> </ul> |
| <p>3. <b>Pain as an alarm:</b>12</p> <ul style="list-style-type: none"> <li>• Voltage: 2</li> <li>• Worry: 1</li> <li>• Fear/scare: 7</li> <li>• Uncertainty: 1</li> <li>• Nightmare:1</li> </ul>   | <p>3. <b>Pain as an alarm:</b>9</p> <ul style="list-style-type: none"> <li>• Signal: 1</li> <li>• Worry: 1</li> <li>• Fear/scare: 3</li> <li>• Irritant: 1</li> <li>• Unexpected experience:1</li> <li>• Threat: 1</li> <li>• Obscurity: 1</li> </ul>  |
| <p>4. <b>Pain as discomfort:</b> 9</p> <ul style="list-style-type: none"> <li>• Discomfort: 8</li> <li>• Unpleasant feeling: 1</li> </ul>   | <p>4. <b>Pain as discomfort:</b> 18</p> <ul style="list-style-type: none"> <li>• Discomfort: 6</li> <li>• Uncomfortable feeling: 10</li> <li>• Malaise: 1</li> <li>• Inconvenience: 1</li> </ul>   |
| <p>5. <b>Pain as part of life:</b>8</p> <ul style="list-style-type: none"> <li>• Part of life: 2</li> <li>• Part of everyday life: 2</li> <li>• Normal for age: 2</li> <li>• Daily life:2</li> <li>• Given: 2</li> </ul>  | <p>5. <b>Pain as part of life:</b>8</p> <ul style="list-style-type: none"> <li>• Part of life: 2</li> <li>• Daily life: 6</li> </ul>   |
| <p>6. <b>Pain as punishment :</b>4</p> <ul style="list-style-type: none"> <li>• Punishment: 1</li> <li>• Test: 1</li> <li>• Torture: 1</li> <li>• Hell: 1</li> </ul>  | <p>6. <b>Pain as punishment:</b>3</p> <ul style="list-style-type: none"> <li>• Torture: 2</li> <li>• Harassment: 1</li> </ul>  |

## 6.2. Content analysis of the answers to the question "How do you feel during pain?"

Words and phrases were grouped according to their meaning in the content of the answers to the question "How do you feel in times of pain?" from the semi structured interview. The following results are derived from the analysis for the first stage of the study:

- Experiences associated with depressed mood during pain were most often shared by patients in the group with depression. The experience of despair is specific to this group. The shared experiences of sadness, oppression, oppression are much less.
- Experiences associated with anxiety, fear and anger were second in frequency, but in the depression-free group they were more in number and more specific. "Aggressive", "angry", "irate", "scared", "nervous", "worried" prevailed in the responses of patients without depression.
- Experiences of loneliness and isolation were third most common in the group with depression. The experience of helplessness dominated, compared to the depression-free group. Experiences of isolation, imprisonment, loneliness are less frequent.
- In fourth place in the group with depression are experiences related to guilt and decreased self-esteem, which are specific to the group.
- The next experiences in terms of frequency in the group with depression were those associated with tiredness, decline in activity and impaired attention. In patients without depression the experience of lack of concentration dominates.
- Experiences associated with a pessimistic future were the sixth most frequent in the group with depression, but in the depression-free group they were more common.
- The lack of change in experiences during pain ("tolerate", "no change", "manage to cope") has a much greater frequency and specificity in the group without depression.
- In the group with depression, experiences related to suicidal ideas are recorded. Although they are less frequent, these experiences are defined as specific as they are not reported in the depression-free group.
- Experiences of discomfort during pain are reported only in the depression-free group (table 42).

**Table 42**

**Content analysis of the answers to the question "How do you feel during pain?" – first stage of the study**

| <b>Patients with chronic pain and depression</b>   | <b>Persons with chronic pain without depression</b>  |
|--|--|
| <b>Experiences of depressed mood 38</b><br>Suppressed 2    Sad 3<br>Desperate 31    Weeping 1    Oppressed 1   | <b>Mood swing experiences 10</b><br>Suppressed 6<br>Desperate 4  |
| <b>Experiences of anxiety, fear, anger 44</b><br>Irritable 12            Anxious 6<br>Nervous 4              Angry 1<br>Restless 3              Scare/Fear 8<br>Tense 10   | <b>Experiences of anxiety, fear, anger 65</b><br>Irritable 19              Aggressive 2<br>Tense 12                Angry 2<br>Worrying 10            Worried 3<br>Nervous 5               Scared 5<br>Irate 5                    Impatient 2 |
| <b>Experiences of loneliness 22</b><br>Isolated 3            Helpless 14<br>Lonely 1              Unnecessary 1<br>Closed 2              Misunderstood 1   | <b>Experiences of loneliness 10</b><br>Misunderstood 1      Helpless 6<br>No support 1<br>Disappointed 2   |
| <b>Experiences of decreased self-esteem and guilt 11</b><br>Guilty 2                Humiliated 1<br>Incapacitated 4        No Self-Esteem 2<br>Nothingness 1        Weak 1   | <b>Experiences of decreased self-esteem and guilt 1</b><br>Guilty 1  |
| <b>Experiences of tiredness, decrease in activity and impaired attention 10</b><br>Inactive 1              Tired 1<br>Disinterested 1        Weak 1<br>Dropped 3              Exhausted 1<br>Low 1                    No concentration 1 | <b>Experiences of tiredness, decrease in activity and impaired attention 7</b><br>Powerless 1<br>No concentration 5<br>Outdated 1  |
| <b>Experiences of a pessimistic future 7</b><br>Without perspective 1      Missing 1<br>Hopeless 1                Insecure 1<br>"Tied to a chain" 1        Dependent 2   | <b>Experiences of a pessimistic future 10</b><br>Useless 5<br>Uncertain 1<br>Dependent 4   |
| <b>No change 6</b><br>Tolerate 3<br>No Change 1<br>I manage to do 2  | <b>No change 16</b><br>I tolerate 5                    I control myself 1<br>I'm doing 4                    I'm not despairing 1<br>Ignore 5   |
| <b>Experiences associated with suicidal ideas 3</b><br>No Desire to Live 3   |  |
|  | <b>Experiences of discomfort 9</b><br>Discomfort 4                    Unpleasant 5   |

**Table 43**

**Content analysis of the answers to the question “How do you feel during pain?” –  
second stage of the study**

| <b>Patients with chronic pain and depression</b>   | <b>Persons with chronic pain without depression</b>   |
|--|---|
| <b>Experiences of anxiety, fear, anger 44</b><br>Irritable 13                      Anxious 8<br>Nervous 6                        Angry 4<br>Restless 4                        Scare/Fear 8<br>Tense 10                         Angry 3   | <b>Experiences of anxiety, fear, anger 57</b><br>Irritable 13                      Aggressive 2<br>Tense 11                         Angry 1<br>Alarming 11                      Concerned 1<br>Nervous 4                        Scared 1<br>Irrate 5                          Worried 4<br>Restless 3                        Unsettling 1 |
| <b>Experiences of depressed mood 36</b><br>Desperate 23                    Washed-out 1<br>Sad 2                              Suppressed 6   | <b>Experiences of depressed mood 7</b><br>Desperate 5                      Sad 1<br>Outdated 1  |
| <b>Experiences of tiredness, decrease in activity and impaired attention 16</b><br>Tired 1                            Powerless 5<br>Dropped 1                        Exhausted 1<br>Dizzy 1                            Tortured 1<br>Confused 1                        Inadequate 1<br>Concentrated on pain 1<br>No concentration 1<br>No desire for anything 1 | <b>Experiences of tiredness, decrease in activity and impaired attention 13</b><br>Veal 1<br>Tired 4<br>Dropped 3<br>Bored 1<br>No concentration 3<br>Obsessed 1  |
| <b>Experiences of loneliness 15</b><br>Isolated 3 Helpless 8<br>Lonely 3 Asocial 1   | <b>Experiences of loneliness 10</b><br>Misunderstood 1                      Helpless 6<br>No support 1                            Disappointed 2  |
| <b>Experiences of a pessimistic future 15</b><br>Incapacitated 1                      In stalemate 1<br>Hopeless 2                            Dependent 6<br>Insecure 2                            Stuck 1<br>I think pessimistic 1                    Punished 1  | <b>Experiences of a pessimistic future 2</b><br>Uncertain 1<br>Trapped 1  |
| <b>Experiences of discomfort 7</b><br>Discomfort 6                        Heavy 1  | <b>Experiences of discomfort 2</b><br>Discomfort 2  |
| <b>Experiences of decreased self-esteem and guilt 5</b><br>Guilty 1                            Incomplete 1<br>Incapable 2                        Clumsy 1   | <b>Experiences of decreased self-esteem and guilt 5</b><br>Guilty 1                            Incomplete 2<br>Useless 2  |
| <b>No Change 2</b><br>I tolerate 1<br>Ignore 1   | <b>No change 7</b><br>I tolerate 1                            Mobilized 1<br>I'm trying to cope 3<br>I got used to the pain 2   |
| <b>Experiences associated with suicidal ideas 1</b><br>I'm thinking about death 1  |   |



The results of the analysis of experiences during pain in the second stage of the study are presented in Table 43:

- In the group with depression experiences associated with anxiety, fear and anger were the most frequent. Fright and fear are specific to patients with depression, and aggression is specific to patients without depression.
- Experiences associated with depressed mood were second in terms of frequency, of which the experience of despair dominated, compared to the depression-free group.
- Next in terms of frequency were experiences associated with tiredness, decline in activity and impaired attention, the frequency of which was comparable to the depression-free group.
- Experiences of loneliness were next in terms of frequency in the group with depression. Experiences of loneliness and isolation are shared by the group with depression.
- Experiences associated with a pessimistic future in the group with depression are recorded with the same frequency as the experiences of loneliness. Compared to the depression-free group, they are specific.
- In the group with depression, experiences associated with physical discomfort from pain were recorded and prevailed when compared to the depression-free group.
- Experiences of guilt were next in terms of frequency, with the frequency being the same in both groups of patients.
- The lack of change in experiences during pain prevailed in the depression-free group.
- Experiences associated with suicidal ideas that are missing in the depression-free group were last in terms of frequency.

### 6.3. Content analysis of the answers to the question "Has the pain changed your lifestyle?"

The recorded experiences associated with lifestyle change in the group with depression during the first stage of the study are ranked according to their frequency as follows:

- With the greatest frequency are the responses related to the cessation of daily activities (work, daily tasks and actual activities).
- Next in frequency are the experiences associated with cessation of social contacts.
- Experiences associated with limitations in everyday life were third most frequent in the group with depression (limitations in activities, movements and difficulties in coping), but in the depression-free group they had a greater frequency and specificity.
- Subsequent experiences in frequency are those related to pain's control on life or life's dependency on pain (dependence, fear and control). This group of experiences are predominant.
- Lifestyle change in terms of a healthier way of life is last and is comparable in frequency in both groups of patients.
- A proportion of patients without depression report a lack of lifestyle change (table 44)

**Table 44**

**Content analysis of the answers to the question "Did your pain change your lifestyle?" – first stage of the study**

| <b>Patients with chronic pain and depression</b>   | <b>Persons with chronic pain without depression</b>  |
|--|--|
| <p><b>Stop daily activities 39</b></p> <p>I don't work 13<br/>           I'm not moving/lying 6<br/>           I don't go out 6<br/>           I stopped homework 1<br/>           I don't do it in everyday life 6<br/>           I can't take care of my child 2<br/>           Sedentary lifestyle 1<br/>           I have no desire to work 1<br/>           I have no desire for anything 1<br/>           I became lazy 1<br/>           I'm useless 2</p> | <p><b>Stop daily activities 10</b></p> <p>I don't work 3<br/>           I stopped sports 2<br/>           I don't physically burden myself 1<br/>           I'm not active 2<br/>           Sedentary lifestyle 1<br/>           I don't do it in everyday life 1</p>  |
| <p><b>Stop social contacts 28</b></p> <p>Isolate myself 23            I don't have friends 3<br/>           I don't communicate 1    I don't share 1<br/>           I'm lonely 1</p>   | <p><b>Stop social contacts 2</b></p> <p>Isolate myself 1<br/>           I'm closing 1</p>  |
| <p><b>Limitations in everyday life 19</b></p> <p>I've restricted/slowed down movements 7<br/>           I restricted actions 2<br/>           I often rest 3<br/>           Hard to deal with in everyday life 6</p>   | <p><b>Limitations in everyday life 27</b></p> <p>I limited my daily routine 5<br/>           I restricted my movements 11<br/>           I've reduced my activity 2<br/>           I've reduced the work 2<br/>           I'm guarding myself 3<br/>           I am cautious in everyday life 2<br/>           Rest more often 2</p> |
| <p><b>Life depending and control 14</b></p> <p>Dependent on pain 2<br/>           Depend on my loved ones 3<br/>           I take into account the pain 5<br/>           I live in fear of pain 3<br/>           I live under the control of pain 1</p>  | <p><b>Life depending and control 4</b></p> <p>I take into account pain 1<br/>           Depend on my relatives 3<br/>           My whole life has changed 1</p>  |
| <p><b>Healthy lifestyle 1</b></p> <p>I changed my diet 1</p>   | <p><b>Healthy lifestyle 1</b></p> <p>Healthy lifestyle 1</p>   |
|  | <p><b>No change in the lifestyle 14</b></p> <p>No change 14</p>  |

**Table 45**

**Content analysis of the answers to the question "Did your pain change your lifestyle?" – second stage of the study**

| <b>Patients with chronic pain and depression</b>   | <b>Persons with chronic pain without depression</b>   |
|--|---|
| <p><b>Stop daily activities 22</b><br/>           I don't go out 5<br/>           I don't do hard work 1<br/>           I don't work 4<br/>           Quit my job 1<br/>           I'm not climbing stairs 1<br/>           Don't drive a car 1<br/>           I don't play sports 2<br/>           I'm crazy 1<br/>           No incentive to work 1<br/>           I can't work 1 I'm not doing anything 4</p> | <p><b>Stop daily activities 13</b><br/>           I don't work 3<br/>           I stopped active lifestyle and sports 7<br/>           I'm not physically active 3</p>  |
| <p><b>Stop social contacts 19</b><br/>           Isolate myself 15<br/>           I stand alone 1 I do not meet friends 1<br/>           Soling 1 I do not communicate 1<br/>           I stopped my contacts 1</p>  | <p><b>Stop social contacts 5</b><br/>           Isolating myself 3<br/>           I'm closing 1<br/>           I'm alone 1</p>  |
| <p><b>Limitations in everyday life 20</b><br/>           I restricted activities 2<br/>           I restricted actions/activities 2<br/>           Limited daily life 2<br/>           Impaired daily life 1<br/>           Rest often 3<br/>           I'm guarding myself 1<br/>           I'm tired 1<br/>           I'm working slowly 1<br/>           Hard to deal with in everyday life 7</p>             | <p><b>Limitations in everyday life 25</b><br/>           I limited my daily routine 4<br/>           I decreased my physical activity 6<br/>           I'm guarding myself 3<br/>           Rest more often 8<br/>           Hard to deal with in everyday life 2<br/>           Hard to move 2</p> |
| <p><b>Life dependent and control 16</b><br/>           I'm dependent on everyday life 7<br/>           I don't do it alone in everyday life 3<br/>           I take into account pain 3<br/>           I need help 2<br/>           I'm not single 1</p>   | <p><b>Life depending and control 10</b><br/>           I take into account the pain 10</p>  |
| <p><b>No change in the lifestyle 5</b><br/>           No change 3<br/>           I manage to do 2</p>  | <p><b>No change in the lifestyle 17</b><br/>           No change 15<br/>           I do everything like I did 1<br/>           I keep going despite the pain 1</p>  |
| <p><b>Healthy lifestyle 2</b><br/>           I lead a healthy lifestyle 2</p>  | <p><b>Healthy lifestyle 2</b><br/>           I lead a healthy lifestyle 1<br/>           I spend more time on my health 1</p>   |

At the second stage of the study, the experiences related to lifestyle change in the group with depression are ranked by frequency as follows:

- Experiences associated with stopping daily activities were dominant, compared to the depression-free group.
- Next in terms of frequency are experiences related to limitations in everyday life due to pain, but their number is greater in the group without depression.
- Experiences associated with stopping social contacts occur with the same frequency. They are dominant, compared to the depression-free group.
- In third place come the experiences related to addiction and pain control, which are of greater number and specificity, compared to the depression-free group.
- Fourthly, responses to a lack of lifestyle change were reported, which were prevalent in the depression-free group.
- The fewest answers are about a healthy lifestyle. Their frequency is comparable to the one in the depression-free group (table 45).

#### 6.4. Content analysis of the answer to the question "How would you describe your pain?"

The results of the analysis for the first and second stages of the study are presented in Tables 46 and 47, respectively.

**Table 46**

#### **Description of pain at the first stage of the study**

| <b>Patients with chronic pain and depression</b>   | <b>Persons with chronic pain without depression</b>   |
|--|---|
| <p style="text-align: center;"><b>Acute pain 38</b></p> Acute episodic pain 10<br>Acute persistent pain 17<br>Acute tolerable pain 3<br>Acute pain 8 | <p style="text-align: center;"><b>Acute pain 32</b></p> Acute episodic pain 18<br>Acute persistent pain 2<br>Acute pain 11      |
| <p style="text-align: center;"><b>Dull pain 17</b></p> Dull persistent pain 8<br>Dull tolerable/tolerable pain 6<br>Dull pain 3                      | <p style="text-align: center;"><b>Dull pain 24</b></p> Dull persistent pain 14<br>Dull tolerable pain 3<br>Dull episodic pain 7 |
| <b>Persistent tolerable pain 2</b>   | <b>Persistent tolerable pain 1</b>  |
| <b>Force-variable pain 3</b>   | <b>Chronic neuropathic pain 1</b>   |
| <b>Continuous discomfort 1</b>   | <b>Persistent discomfort 1</b>  |

**Table 47**

**Description of pain at the second stage of the study**

| <b>Patients with chronic pain and depression</b>   | <b>Persons with chronic pain without depression</b>   |
|--|---|
| <p style="text-align: center;"><b>Acute pain 31</b></p> <p>Acute episodic pain 9<br/>Acute persistent pain 7<br/>Acute tolerable pain 2<br/>Acute pain 13</p>      | <p style="text-align: center;"><b>Acute pain 18</b></p> <p>Acute episodic pain 8<br/>Acute pain 10</p>  |
| <p style="text-align: center;"><b>Dull pain 25</b></p> <p>Dull persistent pain 8<br/>Dull tolerable/tolerable pain 10<br/>Dull episodic pain 4<br/>Dull pain 3</p> | <p style="text-align: center;"><b>Dull pain 39</b></p> <p>Dull persistent pain 14<br/>Dull tolerable pain 15<br/>Dull episodic pain 5<br/>Dull pain 5</p> |
| <b>Persistent tolerable pain 2</b>   | <b>Persistent tolerable pain 1</b>  |
| <b>Variable pain by force 2</b>  | <b>Chronic neuropathic pain 1</b>   |
| <b>Discomfort 1</b>  |   |

For the first stage of the study, the results show that:

- In the group with depression acute pain is the most shared about. The description of acute and constant pain predominates in the answers, compared to that of acute and episodic pain. Next in terms of frequency in the group with depression is the description of dull and persistent pain.
- In the depression-free group, a description of acute and episodic pain, dull and episodic pain and dull and persistent pain is more often shared (table 46).

For the second stage of the study, the results show that:

- Again, the group with depression most frequently shared a description of acute pain that predominated, compared to the depression-free group.
- The description of dull pain prevails in the depression-free group (table 47).

**7. Studying the frequency of pain**

The study of the frequency of pain is done through the question "How often do you have pain?" from the half-structured interview, with a possible choice of one answer.

The results of the distribution of the depression-free group according to the frequency of pain in both stages of the study are presented in Table 48. The highest proportion were the persons with daily pain at both stages of the study. At the second stage, some dynamics are reported – the number of persons with daily pain decreases, and the number of persons with pain experienced several times a week increases. There is no change in the results in terms of pain experienced several times a month.

The results of the distribution of the group with depression according to the frequency of pain are presented in Table 49. Again, patients with daily pain were the highest proportion, followed by those with pain experienced several times a week. The patients with pain several times a month make up the smallest proportion. At the second stage of the study, the number of patients with pain experienced several times a month increase, and the number of those with daily pain decreases (table 49). In the group with depression, the proportion of patients with daily pain was higher compared to the depression-free group (tables 48 and 49).

**Table 48**

**Distribution of pain frequency in the depression-free group for both stages of the study**

| Group                 | Chronic pain without depression |          |                |          |
|-----------------------|---------------------------------|----------|----------------|----------|
|                       | Frequency (N)                   |          | Percentage (%) |          |
| Stage                 | Stage I                         | Stage II | Stage I        | Stage II |
| Daily                 | 27                              | 25       | 45,80          | 41,4     |
| Several times a week  | 19                              | 22       | 32,20          | 36,6     |
| Several times a month | 13                              | 14       | 22             | 22       |
| Total                 | 59                              | 59       | 100,0          | 100,0    |

**Table 49**

**Distribution of pain frequency in the group with depression for both stages of the study**

| Group                 | Chronic pain and depression |          |                |          |
|-----------------------|-----------------------------|----------|----------------|----------|
|                       | Frequency (N)               |          | Percentage (%) |          |
| Stage                 | Stage I                     | Stage II | Stage I        | Stage II |
| Daily                 | 42                          | 39       | 68,9           | 63,9     |
| Several times a week  | 17                          | 17       | 27,9           | 27,9     |
| Several times a month | 2                           | 5        | 3,20           | 8,20     |
| Total                 | 61                          | 61       | 100,0          | 100,0    |

8. Assessment of the situation during pain

For the assessment of the situation during pain, a model proposed by I. Aleksandrov (2015) was used to study the conditions of the environment and the situations in a hospital setting resulting from them. There are four types of situations set in the semi structured interview with a possible multiple answer to the question "When you are in pain, in what situation are you in?". The following situations in times of pain are proposed: a risk situation, an uncertainty situation, a unique situation and a routine situation.

The results of the assessment of the situation during pain in the depression-free group at both stages of the study are presented in Table 51. It is apparent that more than half of the individuals perceive the situation during pain as routine (Stage I – 62.70% and Stage II – 68.80%).

**Table 51**

**Results of the assessment of the situation during pain in the depression-free group**

| Group                  | Chronic pain without depression |          |                |          |
|------------------------|---------------------------------|----------|----------------|----------|
|                        | Frequency (N)                   |          | Percentage (%) |          |
| Stage                  | Stage I                         | Stage II | Stage I        | Stage II |
| Risk                   | 5                               | 3        | 8,50           | 5,10     |
| Risk and routine       | 8                               | 4        | 13,60          | 6,80     |
| Uncertainty            | 4                               | 4        | 6,80           | 6,80     |
| Uncertainty, routine   | 2                               | 6        | 3,40           | 9,10     |
| Unique                 | 3                               | 1        | 5,00           | 1,70     |
| Routine                | 37                              | 40       | 62,70          | 68,80    |
| Uncertainty and unique |                                 | 1        |                | 1,7      |
| Total                  | 59                              | 59       | 100,0          | 100,0    |

The results of the assessment of the situation in the group with depression at both stages of the study are presented in Table 52.

**Table 52**

**Results of the assessment of the situation during pain in the group with depression**

| Group                | Chronic pain with depression |          |                |          |
|----------------------|------------------------------|----------|----------------|----------|
|                      | Frequency (N)                |          | Percentage (%) |          |
| Stage                | Stage I                      | Stage II | Stage I        | Stage II |
| Risk                 | 16                           | 10       | 26,70          | 16,40    |
| Risk, uncertainty    | 5                            | 9        | 8,20           | 14,80    |
| Risky, routine       | 2                            | 3        | 3,30           | 4,90     |
| Uncertainty          | 8                            | 4        | 13,50          | 7,00     |
| Uncertainty, unique  | 1                            | 1        | 1,60           | 1,80     |
| Uncertainty, routine | 12                           | 11       | 18,40          | 18       |
| Routine              | 16                           | 23       | 26,70          | 37,10    |
| Unique               | 1                            |          | 1,60           |          |
| Total                | 61                           | 61       | 100,0          | 100,0    |

At the first stage of the study, an equal proportion of individuals with chronic pain and depression perceived the situation during pain as routine (26.70%) and as a risk (26.70%). The proportion of persons who identified it as a situation of uncertainty is 13.50%, and the proportion of those who defined it as a combination of uncertainty and routine – 18.40%. The lowest proportion is made up of the persons who rate it as a unique situation (1.60%) and as a combination of unique and uncertainty situation (1.60%) (table 52).

In the second stage of the study 37.10% of people with depression defined the situation during pain as routine, followed by those who defined it as a combination of a situation of uncertainty and a routine situation (18%). The proportion of persons who perceive the situation during pain as a risk is 16.40%, and the number of persons who assess it as a combination of risk and uncertainty situation is 14.80% (table 52).

Each situation contains specific and precisely arranged material, psychological and social components at a certain point in time. For this reason, the situations, respectively the assessment of the situation during pain, change dynamically in each moment. The results presented do not relate beyond the specific moment of the situation assessment, which outlines a certain framework of the study.



## IV. DISCUSSION

### 1. Demographic analysis

Those who participated in the study were a total of 120 at an average age of 51,9083. The minimum and maximum age of the participants is 24 and 76 years respectively. The highest number of persons is of those aged between 40 and 64. The standard deviation 11,94244 indicates that the age distribution of the sample surveyed is close to normal. This way, the analyses and trends relating to the sample examined would be relevant to the population but with a degree of conditionality proportional to the sample. These results confirm data from the literature on the widespread prevalence of chronic pain among the adult population above 40 years of age.

The age distribution in the group with depression (n = 61) did not differ significantly from that of the overall sample. The average age is 55,6066 and the standard deviation is 10.90608, from which can be deduced that the majority of people with chronic pain and depression are between the ages of 45 and 66. Age is a risk factor not only for the manifestation of chronic pain, but also for its combination with depression. The data from the literature reveal that as the age increases, the prevalence of chronic pain among the population increases. With an increase in age by a year, the risk of the manifestation of pain in patients with depression increases by 2%. Therefore, age is a risk factor not only for the manifestation of chronic pain, but also for its combination with depression.

The gender distribution of the persons in the overall sample was uneven. In the general group, the number of women is prevalent – 98, compared to that of men – 22, which, expressed in percentage terms, is 81.7% women, compared to 18.3% men. These results support the data revealing a higher frequency of chronic pain among women, especially after the age of 40. One of the reasons associated with the gender differences in terms of the distribution of chronic pain, is the higher sensitivity to pain, respectively the lower pain threshold in women. Another reason discussed could also be the probability that men are less likely to seek medical help in the event of pain.

In the group of patients with depression and chronic pain, the proportion of women was again higher than that of men – 91.8% and 8.2%, respectively. Given that depressive disorder and chronic pain isolated from each other are more common among women, it could be assumed that women are more vulnerable to their manifestation as a comorbidity. These data are also confirmed by other authors, according to which symptoms of depression and anxiety are more common among women with chronic pain.

The analysis of the distribution by marital status of the sample surveyed showed an even presence of the family persons compared to those who for some reason did not have a family. Family persons are 60 or 50% of the sample. The remaining 50% encompass widowers (19.2%), single (17.5%) and divorced (13.3%).

The distribution by marital status in the group with chronic pain and depression is close to that of the overall sample. The proportion of family persons with depression was 44.3%, compared to that of those without a family – 55.7%. Such a distribution allows for comparisons between the two groups of persons – married and without family.

The sample surveyed is unevenly distributed by ethnicity. The persons who indicated that they belonged to the Bulgarian ethnicity were 83.3%. Persons belonging to the Turkish ethnicity were 14.2%, and to the Roma and Russian ethnicities 1.7% and 0.8%, respectively. For this reason, the main conclusions related to this study will apply to the Bulgarian ethnicity. The cultural and the ethnic factors are relevant to how pain is perceived as a health issue that affects experiences and pain-related behavior. A comparative analysis relating to individual ethnic groups and discussion of their cultural differences is not provided for in the study.

Data from the education distribution in the general group show that the share of persons with higher education is 57.5% and the share of persons without higher education was 43.5%. The group of persons without higher education included persons with secondary education (22.5%), with primary education (16.7%), with primary education (1.7%) and with no education (1.7%).

The distribution of the surveyed patients with chronic pain and depression by education according to the proposed dichotomic model shows that the share of patients with higher education is 34.4% and of those without higher education – 65.6%. Therefore, in the group with depression, persons without higher education prevail.

The data from the literature offer an explanation for the links between chronic pain, depression and a low degree of education. Those with chronic pain and a lower degree of education tend to use passive and deformative strategies to deal with pain and think catastrophically, which turn out to be the main mediators for future disability. It is proven that the level of education is not related to the intensity of pain and severity of depressive symptoms, but it has a counter-proportional dependence on disability.

## 2. Analysis of data related to chronic pain: limitation period, number of diagnostic categories and conducted treatment

The results for the distribution of the sample by the limitation period of chronic pain, calculated in months, are dispersed from the average. The minimum duration of chronic pain in the overall sample is 3 months and the maximum – 456 months.

The results of the distribution of the persons with chronic pain and depression by the limitation period of chronic pain in months shows that the average (111,3770) is lower than the standard deviation (147,42299).

The distribution of the sample by the number of diagnostic categories of pain shows that persons with chronic pain associated with one diagnostic category were 66.7%, 27.5% had chronic pain associated with two diagnostic categories and 5.8% – with three.

The distribution of the group with chronic pain and depression by the number of diagnostic categories of pain shows that 52.5% have chronic pain, referring to one, 37.7% – to two and 9.8% – to three diagnostic categories. Therefore, in the group with depression, the proportion of individuals with more than one diagnostic category of chronic pain was higher (47.5%), compared to the general group (33.3%).

The presence of more than one diagnostic category is associated with more than one localization of pain. The data from the literature show that acute pain with more than one localization predicted future manifestation of chronic with a severe degree of manifestation,

and with an increase in the number of localizations of chronic pain, the risk of onset of depression increases.

With regard to the regular conduct of pain treatment, the majority of the surveyed subjects (70%) do not receive supportive medication. They take analgetic drugs only during the exacerbation of pain. The remaining 30% of the sample take a supportive analgetic medication. The need for a supportive drug treatment of chronic pain is determined by the diagnostic category of pain and its severity and duration.

### 3. Analysis of data related to depression: assessing the severity of depression with HAM-D-17 and antidepressant treatment

The mental status of the studied subjects was assessed according to the criteria for a depressive episode of ICD – 10. The severity of depression was assessed with the HAM-D-17 scale. The results of the first stage of the study showed that 59 individuals in the sample had no symptoms of depression and the remaining 61 had depression. Thus, the total group is divided into two equivalent samples, respectively groups:

1) 50,8% of the total sample includes patients with depressive symptoms of more than two weeks and with a total score of HAM-D – 17 over 8 points;

2) 49.2% of the sample includes persons without symptoms of depression according to the criteria for depressive episode of ICD – 10 and with a total score of HAM-D – 17 under 7 points.

The distribution of the group with depression by the limitation period of the depressive disorder is uneven and without the possibility of separation of individual subgroups for assessment and analysis.

More than half of the total sample did not receive antidepressant treatment (53.3%). These were 64 individuals studied, three of whom were assessed for a depressive episode and did not receive antidepressant treatment during the study. The individuals who regularly took antidepressant treatment before and after inclusion in the study were 45, respectively 37.5% of the sample. The individuals who resumed their interrupted antidepressant treatment during the study were 11 or 9.2% of the sample. The supportive antidepressants treatment would lead to an improvement in the mental state associated with reducing the severity of the depressive episode or achieving remission and, respectively, affecting the pain symptoms and improvement of functioning.

The mean depression severity values of the two groups of persons studied showed different dynamics in the results between the two stages of the study. In the depression-free group, a slight increase in the average severity of depression was reported, while in the group with depression the average severity of depression decreased significantly, from 16,1475 to 13,3607. Therefore, in the group with depression, an improvement in depressive symptoms is reported, resulting from the regular supportive antidepressant treatment.

This dynamics of results in the group with depression was also demonstrated in the distribution of patients according to the severity of depression. At the first stage of the study, the highest proportion was that of people with mild depression – 54.2%. The next largest proportion was the that of people with moderate depression – 37.8%, and the lowest was of those with severe depression – 8%. At the second stage of the study, an improvement of the

severity of depression was reported. The number of patients with mild depression increased (62.4%), the number of patients with moderate (31.1%) and severe depression (6.5%) decreased.

The presented results provoke discussion in three directions. Firstly, the regular supportive antidepressant treatment in the group with depression for the period of three months led to an improvement in the depressive symptoms. Secondly, a slight increase in the average severity of depression in the depression-free group could predict future clinical manifestations of depression. Thirdly, both patients with chronic pain and depression who interrupted their antidepressant treatment and patients with newly diagnosed depression were registered.

The data from the literature on the prevalence of symptoms of depression among patients with chronic pain show different trends that depend on the size and the characteristics of the studied samples. The results of some studies also indicate the presence of unrecognized symptoms of depression among patients with chronic pain. The data from the literature and the current study reveal the need for systematic monitoring of the mental state of the chronic pain patients, in order to actively seek symptoms of depression.

#### 4. Analysis of data related to state anxiety

The assessment of state anxiety was done using the S scale (STAI – form Y1) according to Spielberger's methodology at both stages of the study. At the first stage of the study, the minimum and maximum scores of state anxiety assessed in the overall sample were 20 and 80, respectively, and the average was 43,3667. The standard deviation is 13.55966, which indicates that the majority of individuals have state anxiety distributed between 29 and 56 i.e. between moderate and high values. A very small proportion of individuals in the general group were assessed with a mild degree of state anxiety – below 29.

At the second stage of the study, the maximum S-scale score in the overall sample was 79 and the minimum score was 20. A lower mean value (42.4500) and a higher standard deviation (14.55090) were measured. This way, the majority of individuals are divided between 27 and 57, encompassing mild and high degrees of state anxiety. Therefore, at the second stage of the study, a decrease in indicators of severity of depression and state anxiety was reported for the entire sample.

This trend was also observed when examining the average values of state anxiety by group. In both groups, a decrease in state anxiety was reported in the second stage of the study. A significant proportion of individuals in the depression-free group had mild and moderate state anxiety, while in the group with depression the number of patients with moderate and severe state anxiety is predominant. This trend is also maintained in the second stage of the study. Therefore, symptoms of anxiety accompany the depressive episode in the studied sample with chronic pain. They manifest with tension, anxiety and bad presentiments of impending danger.

The presented results related to the presence of symptoms of anxiety in the clinical picture of depression in the sample studied are also confirmed by the data in the literature. According to some authors, the symptoms of anxiety are more common in patients with chronic pain and depression than in those without depression. Even slightly manifested symptoms of anxiety affect the course of the depressive episode and determine its more severe course. It is proven

that the combination of symptoms of anxiety and depression worsens the condition of patients with chronic pain more than they would when manifested independently.

#### 5. Analysis of data related to trait anxiety

Trait anxiety was investigated using a scale T (STAI – form Y2) according to Spielberger's methodology only during the first stage of the study, as it is a personality characteristic and does not tolerate change. The minimum and maximum assessments of trait anxiety in the sample studied were 27 and 76, respectively. The average value of the trait anxiety for the sample was 47.5500 at a standard deviation of 12.35188. Therefore, the majority of the sample studied was divided in the range between 35 and 59 i.e. the average and high levels of trait anxiety were encompassed.

The distribution of the subjects surveyed in both groups in terms of the degree of trait anxiety showed that individuals with high trait anxiety were concentrated primarily in the group with depression – 80.33%, compared to the depression-free group, where they were 28.81%. The proportion of people with moderate trait anxiety was higher in the depression-free group (59.32%), compared to those in the group with depression (19.67%). Individuals with low trait anxiety comprised a very small proportion in the depression-free group (11.87%), and in the depression group there were none registered.

Similar results are found in other studies that report a high average of trait anxiety for the entire group with chronic pain. Perhaps the high and the moderate degrees of trait anxiety are a factor contributing to the vulnerability of the person to the manifestation of chronic pain. These views are supported by authors who consider neuroticism to be one of the personality traits that predispose the manifestation of chronic pain. Neuroticism is associated with time-long states of uneasiness, tension, anxiety and a tendency to catastrophic thinking. It is considered that the tendency to catastrophic thinking during pain affects the manifestation of state anxiety and lowers the tolerance to pain.

Therefore, a significant proportion of patients with chronic pain and depression have high trait anxiety and high state anxiety, with the latter remaining high at the second stage of the study. In general, people with high trait anxiety are more likely to interpret a wide range of situations as dangerous and threatening. State anxiety can vary over time and fluctuate as a function of the amount of stress affecting the person at the specific time, or, respectively, situation. The greatest influence on the value of state anxiety does not belong so much to the real danger associated with the situation, but to the way a person perceives the situation. Individuals with high trait anxiety have been proven to report more symptoms of anxiety and more intense pain compared to those with low trait anxiety. The degrees of trait and state anxiety have a cumulative effect on the subjective perception of pain. Some authors define state anxiety as a prognostic factor for the manifestation of pain related disability.

#### 6. Analysis of data related to pain intensity

The intensity of pain was studied by using VAS. A tendency of decreasing the mean value of pain intensity in the second stage of the study in the both groups was observed. At the first stage, the average value of pain intensity in the group with depression was 5.7705, and in the

depression-free group it was 3.8475. At the second stage, the average value of pain intensity decreases in both groups, respectively in the group with depression it becomes 5.2623, and in depression-free group - 3.1695.

Therefore, in the group with chronic pain and depression, a decrease in the average values of the studied indicators – severity of depression, state anxiety and pain intensity – is recorded. Other authors who found a correlation between pain relief and improvement in anxiety and depressed mood present similar dynamics of the studied indicators. It is clear that the affective component (depression and anxiety) has a significant positive correlation to the severity of pain, which emphasizes the need to study these indicators jointly when assessing the condition of patients with chronic pain.

## 7. Correlation analysis

The correlation analysis of the studied values was done to show the connectivity between them. The presence of a correlation between variables is an essential factor without which the data would be attributed to chance. In the framework of this study, correlations between all variables are observed, allowing for logically justified statements about the relationship between them to be made.

At the first stage of the study, significant correlations in the general group between all values were found. Correlations between the results of the VAS, HAM-D-17, STAI-Y1 and STAI-Y2 scales are arranged by degree of significance as follows: 1) between severity of depression and trait anxiety; 2) between severity of depression and state anxiety; 3) between trait and state anxiety; 4) between pain intensity and state anxiety.

At the second stage of the study, the connection between the studied values, respectively the scales in the general group, is much higher, compared to the first stage. The correlations of the second stage arranged by degree of importance are: 1) between the severity of depression and state anxiety; 2) between severity of depression and pain intensity and 3) between pain intensity and state anxiety. In the correlation analysis of the second stage of the study, trait anxiety is removed because it is a time-resilient (constant) characteristic.

These results prove that the selected scales are not isolated from the general concept. They are connected, exhibiting test battery qualities for assessment of the affective and sensory components of pain. These claims were set as a hypothesis in the theoretical model, but their empirical verification categorically confirmed the initial assumptions.

The correlation analysis of the values in the depression-free group showed an insignificant connection between the scales at both stages of the study. There is a correlation between the severity of depression and the state anxiety that is attributed to randomness due to unidentified connectivity in the first stage. The applied methodologies for assessing the sensory and affective component (depression and anxiety) are suggested for the study of comorbid patients with chronic pain and depression, which explains the insignificant connection of the scales in the depression-free group.

The correlation analysis of the studied values for the group with depression differs significantly from the one for the depression-free group. Significant correlations were found between all values during the two stages of the study. For the first stage, the arrangement of correlations by degree of importance is the following: 1) between the severity of depression

and the intensity of pain; 2) between state and trait anxiety; 3) between pain intensity and state anxiety; 4) between severity of depression and trait anxiety and 5) between severity of depression and state anxiety. For the second stage of the study, the arrangement of correlations by degree of significance is as follows: 1) between severity of depression and state anxiety; 2) between severity of depression and pain intensity and 3) pain intensity and state anxiety. Trait anxiety is removed from the analysis in the second stage.

The existence of correlations between variables does not prove the existence of causal links between them. The correlation only shows that variations in one variable are accompanied by variations in the other variable. The causal links between the variables in this study will be demonstrated by regression analysis. The connectivity between the three variables – depression, anxiety and pain intensity – has been proven by other authors, regardless of the scales used for evaluation.

The results of the correlation analyses suggest formulating conclusions in three directions. Firstly, the selected and theoretically justified scales correspond to a common pattern when examining patients with chronic pain and depressive symptoms. Secondly, the selected scales exhibit the nature of a battery of tests for studying patients with chronic pain and clinically manifested depression. Thirdly, the scales exhibit sensitivity and can be used to examine the dynamics in the symptoms of treated patients with depression.

#### 8. T – test for comparison of mean values in groups

In order to differentiate between the main values, studied using the scales set in this study (VAS, HAM-D-17, STAI – Y1 and STAI – Y2), a T – test was performed. The indicator trait anxiety is not involved in the analysis, since it is not studied in the second stage.

The data from the mean values of the values studied in the general group T – test, revealed significant differences between the values of severity of depression assessed by HAM-D-17 during the first (HAM-D1) and the second (HAM-D2) stage of the study. A similar trend is revealed for the pain intensity values assessed by VAS also during the two stages of the study (VAS1 and VAS2), but not in terms of the values of state anxiety measured by STI – Y1 in the first (ST1) and the second stage (ST2) of the study. In the study of the degrees of severity and the difference levels between the values in the general group, statistically significant differences in the results of the indicators severity of depression and pain intensity are observed, with the difference in the indicator pain intensity being more significant ( $t = 2,758$ ,  $sig. = ,007$ ).

Data from T – the test for the depression-free group show that a degree of difference can only be expected in terms of pain intensity. The degree of difference between the pairs of indicators HAM-D1 and HAM-D2, ST1 and ST2 and VAS1 and VAS2 does not differ from those calculated for the general group. Thus, the battery of scales is proposed to assess the condition of patients with chronic pain and depression.

The data from the T – test for the group with depression indicate that the absolute value of the indicator severity of depression for the first stage of the study (HAM-D1) is significantly higher than the value for the second stage (HAM-D2). The trend for the indicators state anxiety and intensity of pain is similar, but not with such a degree of difference as in the indicator severity of depression. The severity of the difference between HAM-D1 and HAM-D2 is the

highest. Therefore, it can be assumed that pain, besides direct, may also be a latent variable in the equation in relation to the clinical manifestation of depressive experiences. The verification of these hypotheses would be of interest to further studies.

The results of the T test allow for conclusions in two directions. Firstly, the degree of difference between the pairs of indicators HAM-D1 and HAM-D2, ST1 and ST2 and VAS1 and VAS2 is high in both the general group and in the groups with and without depression, indicating the possibility of applying the proposed scales to study patients with chronic pain and depression. Secondly, there is a prospect for future research to prove the probability that the intensity of pain could be a latent variable in relation to the degree of manifestation of the depressive symptomatology.

## 9. Regression analysis

The regression analysis was done in order to find causal relationships between the studied values in the group with chronic pain and depression. The influence of three independent variables was assessed: trait anxiety, state anxiety and severity of depression on the dependent variable – pain intensity.

For the first stage of the study, nearly 60% of the variations in pain intensity can be explained by the combined influence of the three variables: trait anxiety, state anxiety and severity of depression. The severity of depression has the greatest influence on the intensity of pain, followed by that of state anxiety. Trait anxiety has a negligible impact.

This trend remains for the second stage of the study. The indicator of trait anxiety is not involved in the analysis. The multiple correlation coefficient between the independent variables and the dependent variable for the second stage of the study has a better result than the one calculated for the first stage. Therefore, the combined influence of the severity of depression and state anxiety explains to a great degree the variations in the intensity of pain. The severity of depression is the main variable influencing variations in pain intensity. State anxiety has a negligible impact.

At the second stage of the study, there was a decrease in the average severity of depression, as well as a decrease in the mean value of state anxiety in the group with depression. To clarify these relationships, a further regression analysis was applied with an independent variable severity of depression and dependent variable state anxiety. The analysis shows that the degree of state anxiety is determined by the severity of depression. Therefore, the improvement of severity of depression determines the decrease in state anxiety, thus reducing its degree of influence on the intensity of pain.

Several causal relationships are derived from the regression analyses. The severity of depression has the greatest influence on the intensity of pain, compared to state anxiety, which has less of an influence. Trait anxiety has a negligible effect on the intensity of pain. The combination of these three variables – severity of depression, state anxiety and trait anxiety explain nearly 60% of the variations in pain intensity. The degree of influence of state anxiety on the intensity of pain is determined by the severity of depression. Therefore, the severity of depression is a major variable that affects the intensity of pain.

Other evidence of the influence of the depression on pain intensity is also found in the literature. The combination of depression with chronic pain is associated with a greater



intensity of pain or the severity of depression is a strong predictor of the severity of pain. Some authors prove the opposite dependence established by us, namely that the degrees of state and trait anxiety affect the severity of depression. Therefore, the causal relationships between pain and depression could be defined as bidirectional.

In the current study, depression is a major factor influencing pain intensity in comorbid patients with chronic pain and depression. On one hand, the isolated influence of state anxiety on the intensity of pain is weaker, but in combination with the depression has a significant influence. On the other hand, depression affects the state anxiety. Therefore, the treatment of depression in patients with chronic pain and the improvement in the depressive symptoms would lead to a decrease in the degree of state anxiety and the intensity of pain. The results support the evidence that the improvement of affective symptoms in chronic pain will affect the sensory component of pain. The symptoms of depression and anxiety in patients with chronic pain should not be considered separately, because they are a part of a general condition influencing the pain perceptions.

## 10. Content analysis

In order to study the specifics and dynamics of chronic pain experiences in comorbid patients with chronic pain and depression, a content analysis of the answers given by the surveyed persons to the open-ended questions from the semi-structured interview was done:

1. "What does pain mean to you?";
2. "How do you feel during pain?";
3. "Has pain changed your lifestyle?";
4. "How would you describe your pain?"

Thus, a qualitative analysis on four levels was done:

1. The essence of chronic pain experience;
2. Experiences during pain;
3. Experiences related to the lifestyle changes due to chronic pain (qualitative assessment of functioning);
4. Description of the perception of pain.

For the execution of the assigned tasks related to this study, the analysis of experiences is done on two levels:

1) For the determination of the specificity of pain experiences in patients with depression, a comparative analysis between the experiences of those with chronic pain without depression and those with chronic pain and depression was made.

2) For the determination of the dynamics of pain experiences in patients with depression, a comparative analysis of both the specifics and frequency of experiences during the first stage of the study compared to those during the second stage of the study in the group with depression was made.

The definition of the concepts – specific and dominant experiences – complies with the following points in this study:

1. Specific are those experiences that are distinctive and inherent in the study group. Their specificity is determined by their meaning and by the frequency of occurrence in the responses of the surveyed persons. A specific category of experiences is considered the one that includes units (words or phrases) with a similar semantic meaning that occur significantly more frequently in the answers of the study group than in the control group where they are recorded at single frequencies.
2. The dominant category of experiences encompasses the highest number of semantic units, compared to the other categories of experiences in the studied and in the control group.

#### 10.1. Analysis of the answers to the question “What does pain mean to you?”

The essence of an experience is determined by the personal concept of the answer to the question "What does the experience mean to me?". The meaning of the pain experience is based on the individual responses to pain in a particular situation.

The most qualitative studies related to chronic pain experiences are done via an interpretive phenomenological analysis. Less often, a content analysis is used, in which certain units and categories are fixated onto in the description of the experiences. On the basis of these, conclusions are drawn about both their meaning and the underlying mental phenomena. For the content analysis, both the determining the meaning of the units, fixated in the text, and the frequency with which they are registered are relevant. These distinctive characteristics of the analysis highlight its advantages in determining specific and dominant experiences.

In analyzing the answers to the question “What does pain mean to you?”, several categories of experiences were formed, which occur in both groups of studied individuals, but with different frequency and specificity.

During the first stage of the study, pain is most often experienced as a limitation by both groups of individuals studied. In the depression-free group it occurs much more often and with more specific experiences ("obstacle", "trap", "dependency", "control", "inevitability", "insuperability"). Pain limits the movements, actions, activity of patients and becomes an obstacle to performing one or another task in their daily lives. Thus, chronic pain makes a person dependent on the help of others. Restriction and dependence are associated with a loss of autonomy and the ability to control life.

The limitations due to chronic pain could be considered in several aspects: time, physical and psychological. The time aspects are the result of the limitations associated with setting future life goals, which necessitates a change of priorities. The physical aspects of the chronic pain limitations refer to the physical inability to cope with everyday life, which puts the individual in a limited framework of functioning. The psychological aspects of the chronic pain limitations stem from psychological factors supporting the constant pain, such as the fear of pain exacerbation and the use of ineffective managing strategies.

Next in terms of frequency is the experience of pain as suffering, which is more common for the group with depression and occurs with a greater number of specific experiences such as: "suffering", "despair", "humiliation", "difficulty", "burden". Some authors define suffering as a harrowing experience, that has a profound impact on a psychophysiological and existential

level. The experience of chronic pain as suffering predetermines significant changes in the perceptions of oneself and of the world.

Qualitative studies of pain as suffering and of the factors that define it are presented in the literature. The main determinants for the suffering of chronic pain are the experiences of loneliness, the fear of an uncertain future and disparaging treatment by healthcare workers.

The experience of pain as discomfort occurs with the same frequency and specificity for both groups of the studied subjects. It is a manifestation of the sensory aspects of pain as an unpleasant sensation.

The experience of pain as anxiety has a comparable frequency for both groups. Experiences such as "fear" and "horror" occur in both groups of individuals. Experiences of "stress", "tension", "restlessness" and "nightmare" are characteristic of the group with depression, and "irritant", "worry", "aggression", "distracted" or "fixates the consciousness" are characteristic of the group without depression.

There is an explanation for the experience of pain as anxiety in the literature. A number of studies have shown that people experiencing pain often estimate it as a threat. The experience of pain as a threat interrupts most of the current tasks, provoking anxiety and fear of future negative consequences.

Pain as punishment is a specific experience for the group with depression. In the depression-free group, it was found in only one of the studied participants. The punishment is defined as retribution for a crime or guilt. The concept of pain as punishment is set semantically in the Ancient Greek word "poiné" (from which the English word "pain" originates) which means not only pain, but also sanction, punishment, redemption. Pain could be experienced as suffering, which may not be the result of a rightfully-deserved punishment. In some patients with chronic pain and depression, the physical pain is perceived as punishment, resulting from feeling of guilt, associated with depression. Patients with chronic pain and depression perceive the physical pain as a punishment for the past mistakes and sins in life. When patients suffer from depression, they fixate on insignificant and minor mistakes, overestimating them, and giving them the form of thoughts of guilt. Specific experiences in this category are: "punishment", "cruelty", "torture", "harassment", "trial", "death", "punishment from God".

The links between guilt, the experience of punishment and pain are found in the literature. According to George Engel (1959), pain plays an important role in the psychological development of the individual, taking a key position in regulating the overall mental activity. Pain is involved in the formation of objective relationships and in the building of the concepts of good and evil, reward and punishment, right and wrong. It becomes an effective means of relieving guilt and thus affects objective relationships. According to Engel, pain serves as a means of redemption for conscious and unconscious guilt. Some authors consider that unconscious guilt has an extremely vast power in human development and behavior and plays an important role in psychopathology, manifesting in unexpected and varied forms. Unconscious guilt is linked to unconscious irrational beliefs about the punishment deserved in response to the causing of significant harm.

Pain as an experience, that is part of life, occurs in both groups studied. In the depression-free group, people more often experience pain as a "daily routine," a "temporary phenomenon" or "as a friend that reminds you to pay attention to health". These are the persons who have

accepted the pain in their lives, which predicts an adaptive coping with it and demonstrates an optimistic outlook on life.

At the second stage of the study, the following dynamics in the essence of the pain experience are registered:

- In the group with depression the frequency of the experience of pain as punishment decreases significantly, and the frequency of the experience of pain as a limitation increased. The frequency of pain as suffering and discomfort and the experience of pain as anxiety increases insignificantly.
- In the depression-free group, a significant increase in the frequency of the experience of pain as discomfort, and to a lesser extent of pain as suffering and punishment, is registered. The frequency of the experience of pain as a limitation and to a lesser extent as a way of life decreases significantly.

Therefore, the experience of pain as a punishment associated with feelings of guilt and retribution for past mistakes is specific for patients with chronic pain and depression. With the improvement of depressive symptoms, the experiences change dynamically in the direction of the experience of pain as a limitation. The latter is more typical of the studied persons without depression. At the second stage of the study, a certain increase of the frequency of the experiences of discomfort, suffering and punishment was registered in the depression-free group, which could predict the future manifestation of depression.

## 10.2. Analysis of the answers to the question "How do you feel during pain?"

The analysis of experiences during pain lead to the formulation of several categories, which occur in both groups of studied participants, again with different frequency and specificity.

At the first stage of the study, the most commonly shared experiences during pain for the group with depression were anxiety, anger and fear. These responses are more common in the depression-free group. Answers such as: "anxious," "tense," "restless," "nervous," "irritable," "scared," were found in both groups of surveyed individuals. In the depression-free group, specific experiences are: "angry," "aggressive," "angry," "impatient."

Research has shown that the experience of pain as fear and anxiety is associated with uncertainty of the future and with a change in the sense of identity. Some authors assume that anger is a significant emotional correlate in chronic pain. In other studies, the display of anger and irritability is the result of experiencing pain as social injustice.

In the group with depression, the next most frequently occurring experiences were those of depressed mood, of which the experience of despair was specific. Less common are "sad", "oppressed", "weeping". The data from the literature show that the fluctuations between the experiences of despair and hope depend on the experiences of anxiety and fear of the future, on the uncertainty and on the social living conditions.

Next in terms of frequency are the experiences of loneliness, from which the helplessness predominates. The experiences of guilt, anger and helplessness are among the factors associated with suicidal risk in patients with chronic pain and depression. Other experiences of this group include the experience of isolation, imprisonment, loneliness, misunderstanding and unnecessary. It is proven that the negative daily events resulting from the stress of pain and

the worsened interpersonal relationships are the cause of chronic and transient periods of loneliness in patients with chronic pain.

Experiences associated with decreased self-esteem and guilt occur mainly in the group with depression ("guilty", "incapacitated", "humiliated", "nothingness", "without self-esteem") and can be defined as specific.

The data from the literature also reveal other qualitative studies of patients with chronic pain, the main topics of study of which are: doubt in their own coping abilities, experiences of shame and frustration, difficulties in maintaining self-esteem and dignity. It has been found that the experience of guilt in patients with chronic pain is a result of the lack of ability to control pain and perform their social roles, and a lack of an organic pain cause. The acceptance of pain is an important mediator variable between pain and the experience of guilt.

The experiences of tiredness, decrease in activity and impaired attention occur in both groups, but in the group with depression they are more in number and of greater specificity: "tired", "weak", "exhausted", "disinterested", "deranged", "debilitating", "without concentration". In the depression-free group the experiences of loss of ability to concentrate during pain prevail.

The data from the literature show that with the increase of the severity of chronic pain, the probability of manifestation of depressed mood and chronic fatigue increases. The studied indicators pain and depressed mood could contribute independently of each other to the manifestation of chronic fatigue. Therefore, fatigue and lack of energy appear much more in patients with chronic pain and depression, than in those without depression.

Another group of experiences are those associated with a pessimistic future, which are more common among the answers of those without depression, but in patients with depression they are of greater specificity ("dependent", "unknown", "unpromising", "insecure", "tied in a chain"). This category of experiences affects the future perspectives that, along with the experiences of helplessness and hopelessness, can grow into ideas and plans of suicide. The group with depression also shared experiences related to suicidal ideas ("I feel no desire to live"), that were lacking in the depression-free group.

Typical for the depression-free group are the experiences of discomfort ("I feel uncomfortable, unpleasant"), which are not common in the group with depression. There are also responses related to the lack of changes in the experiences for both groups, but these are prevalent in the depression-free group with more specific units ("I tolerate", "without change", "I manage to cope", "I am in control", "I do not despair", "I do not pay attention"). The literature data show that patients with high levels of optimism function better in their daily lives, have a positive daily mood, experience fewer pain-related limitations, and are satisfied with their lives.

Therefore, the specific experiences during pain for patients with depression are those associated with despair, decreased self-esteem, guilt and suicidal ideas, the frequency of which decreases with an improvement in the severity of depression. Predominant in times of pain are the experiences of loneliness, of which the experience of helplessness is the most often shared about.

At the second stage of the study, with a decrease in the severity of depression, the following dynamics of the experiences during pain in the group with depression were reported: 1) there was no change in the frequency of the experiences of anxiety, fear, anger; 2) the frequency of experiences of despair decreases; 3) the frequency of the experiences of: loneliness, decreased

self-esteem, guilt and suicidal idea experiences decreases; 4) the answers concerning a lack of change in experience are without dynamics; 5) the frequency of the experiences of a pessimistic future, and of those associated with tiredness, decline in activity and impaired attention increases; and 6) the experience of discomfort occurs in the group with depression.

At the second stage of the study, the following dynamics in experiences during pain are reported in the depression-free group: 1) the frequency of the experiences of decreased self-esteem and guilt, and of those for tiredness, decrease in activity and impaired attention increases; 2) the frequency of the answers related to a lack of change in terms of the experiences of discomfort and a pessimistic future decreases. The dynamics for the other categories of experiences are negligible. Such dynamics of the experiences during pain could predict future clinical manifestations of depression.

### 10.3. Analysis of the answers to the question "Has pain change your way of life?"

In analyzing the responses related to change of one's way of life (daily functioning) as a result of chronic pain, several categories were defined – with different frequency and specificity for the two studied groups.

The group with depression the responses related to stopping performing daily activities predominated: "I do not work", "I can't take care of my child", "I am not going out", "I can't cope with my daily life". The answers "I have no desire for anything", "I am useless", deduced from depression related to the lack of desire and initiative (hypobulia), the experiences of inferiority and anhedonia are more notable. The answers associated with interrupting social contacts were specific to the group with depression. The answer "I isolate myself" is prevalent. Answers such as "I don't communicate", "I don't have friends", "I'm lonely" and "I don't share" are registered more rarely.

The literature data point to other qualitative studies investigating themes of social isolation, loss of social contacts and loneliness. The two-way link between chronic pain and social isolation is also described – social isolation and loneliness can increase pain and vice versa – chronic pain provokes their manifestation. Age, depression, professional employment and physical activity are factors associated with social isolation and loneliness.

The experiences related to dependence on pain and its control over life: "dependent on pain", "complied with pain", "living in fear of pain" are predominant in the group with depression. These experiences are associated with a worsening of the quality of life.

The answers revealing limitations in daily functioning due to chronic pain are more common in persons without depression and are more specific. The limiting role of pain in everyday life is also described in other qualitative studies that take into account the impact of the psychological factors like depression and fear of pain on the experiences

Answers related to the lack of change of one's way of life were reported only in the depression-free group.

In the second stage of the study, the group with depression reported a decrease in answers related to stopping daily activities and social contacts, while in the depression-free group the number of those answers increased. In the group with depression, the answers related to limited functioning increased and answers about coping with everyday life were reported.

Two conclusions are drawn from the analysis of the answers to the question "Has pain change your way of life?". The predominant experiences in the group with depression are associated with stopping daily activities and living under the control of pain. Specific experiences are those related to interrupting social contacts. The dynamics of the experiences, deduced from the decrease of the severity of depression, are towards the increase of the number of the experiences of limited functioning and the reduction of those experiences associated with the stopping of daily activities and interrupting social contacts, i.e. an improvement in daily functioning is reported.

#### 10.4. Analysis of the answers to the question "How would you describe your pain?"

Several groups of responses describing pain were formed in the executed content analysis. During the first stage of the study, the description of acute pain was predominant for both groups. Consistent acute pain is more often reported in the group with depression and acute episodic pain – in the depression-free group.

The next description of pain for both groups in terms of frequency is the feeling of dull pain. It was predominant in the depression-free group, which most often reported an experience of dull persistent pain, compared to the group with depression. During the second stage of the study, both groups report a decrease in answers about feeling acute pain, at the expense of feeling dull pain. In the group with depression, the answers about "dull and tolerable" and "dull and bearable" pain increased.

In the literature data proof of connection between severe and persistent pain and depression is found. It is established that the patients with persistent and severe pain have more severely manifested symptoms of depression.

Therefore, answers about acute pain predominate, in the group with depression. The answers about experiencing dull pain increase when an improvement of the severity of depression is registered. This dynamic correlates to the decrease in the average value of pain intensity during the second stage of the study, as well as to data from the regression analysis, that depression is a major variable that influences the intensity of pain.

#### 11. Analysis of the results on the frequency of pain

During the first stage of the study, the presence of daily pain stands out with the greatest frequency. In the group with depression, this frequency reached 68.9%. Nearly 1/3 of the persons in the studied groups reported experiencing pain several times a week. The largest proportion of patients reporting about pain several times a month was in the depression-free group (22%), compared to the group with depression (3.20%). In the second stage of the study, a decrease in the daily pain rate in both groups was reported.

Therefore, daily pain is typical for both studied groups, but prevails among comorbid patients with depression. Improving the severity of depression may be associated with some reduction in the frequency of daily pain.

## 12. Analysis of the results about the assessment of the situation during pain

Pain as a source of experiences manifests in a particular situation. The assessment of the situation is an essential component in determining the value (significance) of the personality experience. It constitutes a part of the cognitive aspects of the experience and determines the individual responses to pain.

In this study, a model proposed by I. Aleksandrov (2015) for the assessment of the situation during pain to study the environment conditions and the situations in a hospital setting resulting from them was used. Four types of situations with a possible multiple answer to the question "When you are in pain, what situation do you put yourself in?" are set in the semi-constructed interview.

During the first stage of the study in the general group, 44.40% of the persons surveyed perceived the situation during pain as routine. The routine is associated with built experience, habits and template of the situation<sup>1</sup> i.e. a situation that the person is accustomed to and has accepted. 17.50% of the persons assess the situation as a risk i.e. a situation involving a real threat to health and life or potential harm. The word "risk" is derived from the Italian verb "rischiare" – "be in danger" or "being threatened"<sup>(1)</sup>. In this case, the risk is associated with the occurrence of a specific, potential threat. The persons who define the situation during pain as uncertainty constitute 9,20 % of the sample. The uncertainty is associated with a risk of an adverse outcome. The threat and uncertainty are associated with anxiety, which is associated with experiences of insecurity, helplessness and a tendency to catastrophizing, overvigilance and fear of pain. Only 1.7% of the sample identified the situation during pain as unique, happening for the first time, which is explained by the fact that chronic pain persists over time and would less often be perceived as a temporary phenomenon.

In the depression-free group, 62.70% of the persons surveyed perceived the situation during pain as routine, 8.50% as a risk, 6.80% as an uncertainty, 5.00% as a unique situation, 13.60% as both routine and risky, and 3.40% as routine and uncertainty. Therefore, individuals with chronic pain and without depression perceive the situation during pain more as routine.

In the group with depression, 26.70% of patients perceived the situation during pain as a risk, 8.20% as risk and uncertainty, 3.20% as a risk and routine, 13.50% as a situation of uncertainty, 26.70% – as routine and 18.40% – as routine and uncertainty. It is apparent that more than 1/4 of patients with depression perceive the situation during pain as a risk or as a threat to health and life.

At the second stage of the study, the proportion of persons in the survey groups who perceived the situation during pain as routine increased. This dynamic is the most pronounced in the group with depression, in which the number of patients who rate the situation as routine increases by nearly 10%, and the number of those who assess it as a risk decreases. No significant dynamics in the perception of the situation during pain as uncertainty in the groups studied were identified.

The analysis of the results of the assessment of the situation during pain makes it possible to conclude that patients with depression and chronic pain are more likely to rate the situation during pain as a risk, compared to those without depression. This correlates to the data that patients with depression have high trait anxiety (80.33%), which predetermines their tendency to interpret a wider range of situations as dangerous and threatening, respectively manifestation



of state anxiety. The real danger of the situation does not have that much of an impact on this dependence, as much its perception as a threat by the individual does. The primary cognitive mediators of anxiety in chronic pain are the tendency to catastrophic thinking and the assessment of the situations as fear-inducing, which lower the tolerance to pain.

According to the regression analysis from the second stage of the study, the improvement in the severity of depression determines the decrease in state anxiety. With this dependence, it can be explained why, with the improvement in the severity of depression, the perception of the situation during pain is more as a routine than as a risk.

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The presented study combines quantitative and qualitative methods aimed at an in-depth study of the sensory, affective and phenomenological aspects of chronic pain in patients with depression. The causal relationships and correlations between the variables studied – pain intensity, severity of depression, situational and trait anxiety– were studied via quantitative, respectively statistical methods. The results prove the presence of significant correlations between the variables studied and determine the severity of depression as the main affective factor influencing the variations of perception of pain. The scales used to assess the variables exhibit the character of a test battery for studying patients with chronic pain and depression. The quantitative measurements of the variables and their dynamics contribute to the interpretation and the analysis of the results of the qualitative methods, i.e. how the change in the severity of the variables affects the pain related experiences.

A content analysis, as a qualitative method of analysis, was used to examine the meaning and frequency of the experiences. These advantages of the method enable the formulation of the specific and predominant experiences and their dynamics in the studied group with chronic pain and depression. The pain-related experiences were studied in several aspects, which determined the performed analysis to be a multidimensional one. The questions set in the semi-structured interview aim to study the experience of pain in several dimensions: 1) sensory dimension (description and frequency of pain); 2) dimension of experiences during pain; 3) situational dimension (assessment of the situation during pain) and 4) dimension associated with change of one's way of life (level of functioning). The essence of pain as an experience is influenced by the four dimensions studied. It occupies the central place in the presented model. Thereby, a model for the study of experiences associated with chronic pain is conceptualized in the direction of their deconstruction to a lower hierarchical level for description and analysis. The summarized analyses of the individual experiences made it possible to find the specific and predominant experiences characteristic of the general group of patients with chronic pain and depression. The data from the quantitative methods support and explain the trends (dynamics) of the experiences in the general group. Thus, the complex use of qualitative and quantitative methods enabled an in-depth examination of the essence of pain as an experience in patients with depression.

## V. CONCLUSIONS

On the basis of the analysis of the results obtained from the selected quantitative and qualitative methods of examination of patients with chronic pain and depression, the following conclusions relevant to the objectives and tasks of this study may be drawn:

1. The test methodologies included in the suggested battery - HAM- D -17, Spielberger's State – Trait Anxiety Inventory (STAI – form Y1 and STAI – form Y2 and VAS) are interconnected, highly sensitive and can be used for studying and dynamic monitoring of the pain and affective symptoms in patients with chronic pain and depression.
2. The results of the study determined the severity of depression as a key variable that influences pain intensity in comorbid patients with chronic pain and depression.
3. Situational anxiety has a lesser impact on the intensity of pain since its degree of manifestation depends on the severity of depression.
4. Personality anxiety has a negligible effect on pain intensity, but it plays a part in the manifestation of a depressive episode in patients with chronic pain.
5. The combined influence of the three variables – severity of depression, situational anxiety and personality anxiety explain to a large extent the variations in pain intensity in patients with chronic pain and depression.
6. Pain as punishment is a specific experience for patients with depression.
7. During pain, experiences of despair, decreased self-esteem, guilt and suicidal ideas are specific to patients with depression. The experience of helplessness is predominant.
8. A specific lifestyle experience is the interruption of social contacts. The experiences of "life of dependency and control" from pain and stopping everyday activities are predominant.
9. Depression affects how the situation is perceived during pain. Patients with depression and chronic pain are more likely to assess the situation during pain as a risk or as a situation of uncertainty, compared to those without depression. These data correlate with the reported high levels of personality and situational anxiety.
10. Acute, persistent and daily pain is typical of comorbid patients with chronic pain and depression.
11. The dynamics of experiences are influenced by the severity of depression. The improvement of depression changes the specific and predominant experiences by adopting a frequency and content typical of the depression-free group:
  - Pain is experienced more as a limitation, along with an increase in the frequency of experiences of limited functioning.
  - A decrease in the frequency of experiences of loneliness, decreased self-esteem, guilt and suicidal ideation during pain is recorded is reported.
  - Dynamics in terms of how the situation is perceived during pain is also reported, as the tendency to assess it as routine increases.
  - Daily pain remains prevalent, but its combination with dull pain increases.

## **VI. CONTRIBUTIONS**

1. Conceptualization and building a model for the study of patients with chronic pain and depression, combining qualitative and quantitative methods.
2. Offering a set of test methods for assessment and dynamic monitoring of pain and affective symptoms in patients with chronic pain and depression.
3. Conceptualization and operationalization of pain experiences in patients with chronic pain and depression in the direction of their deconstruction to a lower hierarchical level for description and analysis.

## PUBLICATIONS RELATED TO THE DISSERTATION

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2. Telbizova T, Aleksandrov I, Arnaoudova M. Common physiological aspects and interconnections between stress and pain. *Varna Medical Forum*. 2020; 9 (2): 130-138.
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