BDI IN THE ASSESSMENT OF DEPRESSION IN DIFFERENT MEDICAL CONDITIONS

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ABSTRACT

As a common disorder, depression must be diagnosed not only in psychiatric but also in different medical settings, especially in patients with chronic diseases. Beck Depression Inventory is valuable and sensitive self-report inventory used worldwide for assessment depressive symptoms. In this research we present obtained scores of BDI in different group of disorders and we showed that BDI scores are related to the clinical condition, as well as with the age.

Key words: depression, self-report, BDI

INTRODUCTION

Depression is a common but very serious mood disorder. It causes severe symptoms that affect practically all daily activities, such as sleeping, eating, or working. To be diagnosed with depression, the symptoms must be present for at least two weeks.

The World Health Organization (WHO) has ranked depression the 4th leading cause of disability worldwide and projects that by 2020, it will be the second leading cause [1].

Direct information on the prevalence of major depression does not exist for most countries, so, there is wide variability in prevalence estimates. Moussavi et al. in Lancet (2007) published data for lifetime prevalence estimates which ranged from 1.0% (Czech Republic) to 16.9% (US), with midpoints at 8.3% (Canada) and 9.0% (Chile). The 12-month prevalence estimates ranged from 0.3% (Czech Republic) to 10% (US), with midpoints at 4.5% (Mexico) and 5.2% (West Germany). However, lifetime prevalence is two-three times higher that of 12-month prevalence suggesting that between one-third and one-half of lifetime cases have recurrent episodes in a given year. The ratio of 12-month to lifetime prevalence estimates in some reports was significantly lower on average in reports concerned to high income (37.7%) than low-middle income (53.3%) countries.

In the report about global World Health in 2008 it was pointed that depression has a greater effect on overall health than angina, arthritis, asthma or diabetes.

The wide variability in the prevalence estimates is presumably due to a combination of substantive, measurement, and study design factors. The WHO World Mental Health (WMH) Survey Initiative in order to study cross-national differences in prevalence, proposed a common protocol and instrument, the WHO Composite International Diagnostic Interview (CIDI) Version 3.0. The 12-month prevalence estimate in 18 WMH countries ranged from 2.2% (Japan) to 10.4% (Brazil) [2, 3].

A number of consistent socio-demographic correlates, as well as the evidence for a wide range of adverse effects of major depression have also been found across countries. Cross-national data document associations of depression with some factors such as low education, high teen child-bearing, marital disruption, unstable employment, low marital quality, low work performance, low earnings, a wide range of secondary disorders etc. [4, 5].

The criteria for depressive disorders have been explained in the Diagnostic and Statistical Manual of

Mental Disorders. There are several DSM editions, the newest one is DSM-V, edited by American Psychiatric Association in 2013. In this manual, unlike in DSM-IV, the chapter "Depressive Disorders" has been separated from the previous chapter "Bipolar and Related Disorders." The common feature of all of these disorders is the presence of sad, empty, or irritable mood, accompanied by somatic and cognitive changes that significantly affect the individual's capacity to function.

Since depression cannot be diagnosed with any laboratory testing the diagnose is mainly based upon symptomatology and medical history following criteria noted in DSM-V. However, because of possible comorbidity, some main laboratory must be done, such as: complete blood count, thyroid function check, creatinine and blood urea nitrogen, liver function check, fasting blood glucose, cholesterol, calcium and magnesium level and folic acid and vitamin B_{12} levels.

Untreated depression increases the chance of other risky behaviors such as drug or alcohol addiction. It also can ruin relationships, cause problems at work, and make it difficult to overcome serious illnesses. Additionally, depression carries a high risk of suicide. It is especially a possible outcome in males, opposite to suicide tentamens in female population.

In this context, depression must be diagnosed at time, and treated corresponding current medical knowledge.

Without proper treatment, including pharmacotherapy (antidepressants) and psychotherapy, untreated depression can last for weeks, months, or years. The other possible modalities for treatment are Transcranial Magnetic Resonance, Biofeedback or Cranial Electrotherapy Stimulation (CES).

Together with clinical symptomatology, the diagnosis is based more frequently on psychological testing but neuroimaging techniques and QEEG recordings are also available.

There are several tests for diagnostic of depression: Hamilton scale (HAM-D), Zung Self-Rating Depression Scale, Montgomery-Asberg Depression Rating Scale, Geriatric Depression Scale, Beck Depression Inventory etc. Except the HAM-D (used by professionals), which was developed as a measure of treatment outcome rather than a screening or diagnostic tool for depression, all others are based on self-reports.

The most frequently used self-report measures are Beck Depression Inventory I and II, Center for Epidemiologic Studies Depression Scale, Geriatric Depression Scale, Hospital Anxiety and Depression Scale, and Patient Health Questionnaire-9. Some of these measures have become integrated into routine clinical practice (as screening tools) in large managed-care organizations

The aim of this article is to present the results obtained with the original BDI for testing depressive symptoms in different groups of patients in the period over 10 years.

METHOD AND SAMPLES

In this research the original BDI was used for testing depressive symptoms in different groups of patients in the period over 10 years.

Beck Depression Inventory follows the criteria for depression listed in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders. The test consists of twenty-one questions that not only assess the presence of depression, but also the severity of depression as well. There are three versions of the BDI—the original BDI, created by Aaron T. Beck, first published in 1961 and later revised in 1978 as the BDI-1A, and finally the BDI-II, published in 1996. The BDI is widely used as an assessment tool by health care professionals and researchers in a variety of settings. Each question has a set of at least four possible responses, ranging in intensity. When the test is scored, a value of 0 to 3 is assigned for each answer and then the total score is compared to a key to determine the depression's severity. The standard cut-off scores are as follows: 0–9: indicates minimal depression; 10–18: indicates mild depression; 19–29: indicates moderate depression; 30–63: indicates severe depression [6].

For this research BDI is applied in 510 patients, comprising followed groups:

(1) For checking possible postpartum depression BDI was applied in 150 randomly selected women, examined within the first week after delivery. Mean age of women was 29.23 years (SD± 5.11). In the majority there was the first childbirth (mean 1.34).

(2) Patients treated with chronic maintenance dialysis comprised a sample of 230 patients; 110 females (mean age 55.5 ± 13.5 years), and 120 males (mean age 54.5± 14.3 years). The mean duration of maintenance dialysis was 8.3 ± 5.8 years (from 0.5 to 24 years). Patients were selected randomly from three dialysis centers in R. Macedonia.

(3) Patients with different ophthalmological problems (N=100); mean age 41.6 ± 15.9 years, both sexes included. Patients were divided in two groups: serious ophthalmological diagnoses, where we expected psychological problems (N=65) and simplest ones (N=35) as control.

(4) Group of adolescents (N= 20) with obsessive compulsive disorder (OCD); mean age 16, 33±1, 83 years, both genders.

(5) Adolescents with chronic diseases: a) cystic fibrosis (N = 25 mean age = 17.5±2.6 years); b) malignancies (N=20, mean age=19.5±1.3 years) c) juvenile rheumatoid arthritis (N=15, mean age 13.5 ± 0.56 years) and d) diabetes mellitus (N = 25, mean age = 13.5 ± 1.5 years, 18 girls and 7 boys).

(6) Adults females with moderate hypertension (N= 25) mean age 65.2 ± 7.5 years tested as voluntaries for evaluation the effects of cranial electrostimulation (CES) with Alpha Stim.
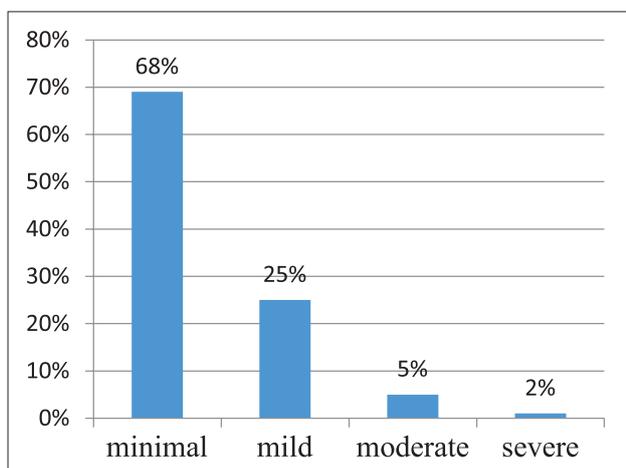
RESULTS

Table 1 presents some characteristics of all evaluated patients.

Table 1. Some characteristics of evaluated groups

Diagnosis	*Number*		*Mean age (years)*
Postpartum depression (PPD)	150	females	29.23 ± 5.11
Dialyzed patients	230	110 females 120 males	55.5 ± 13.5 54.5 ± 14.3
OCD	20	both sexes	16.33 ± 1.83
Cystic fibrosis (CF)	25	both sexes	17.5 ± 2.6
Malignancies	20	both sexes	19.5 ± 1.3
Juvenile rheumatoid arthritis (JRA)	15	both sexes	13.5 ± 0.56
Diabetes mellitus T1 (T1DM)	25	18 girls 7 boys	13.5 ± 1.5
Adults with moderate hypertension	25	females	65.2 ± 7.5

Postpartum depression (PPD) is a complex combination of physical, emotional, and behavioral changes that happen in a woman after giving birth [7]. According to DSM IV there are three types of mood changes in this period: "baby blues", PPD and postpartum psychosis.

The diagnosis of postpartum depression is based not only on the length of time between delivery and onset, but also on the severity of the depression. Generally, the incidence worldwide is supposed to be 10-20% [8]. In Hispanic women the prevalence of significant symptoms of PPD was found to be much higher (54.2%) [9].

A number of factors can increase the risk of postpartum depression, including: a history of depression during or before pregnancy, age at time of pregnancy (the younger the women is, the higher the risk), ambivalence about the pregnancy, number of children, having a history of premenstrual dysphoric disorder, limited social support, living alone, marital conflict, especially domestic violence [10-12].

The level of depression in this group of women obtained with BDI is presented on Figure 1. It is obvious that the most frequent is the state of minimal postpartum depression.

Correlation between the age and depression scores is presented on Figure 2. The calculated Pearson's coefficient was r= - 0.15 which means minimal negative correlation. This result confirms that younger women are more susceptible for depressive

Figure 1: Level of postpartum depression obtained with BDI
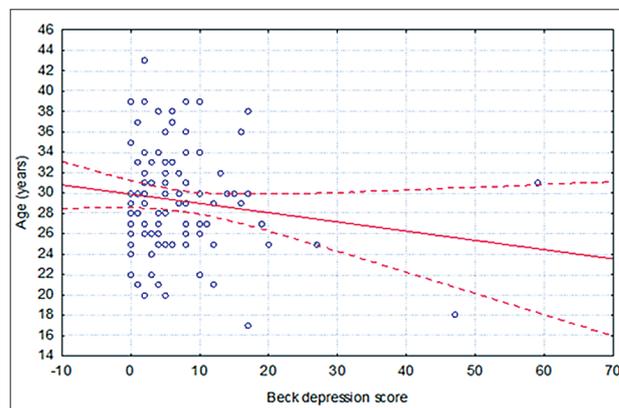

Figure 2: Correlation between age of women and Beck depression scores
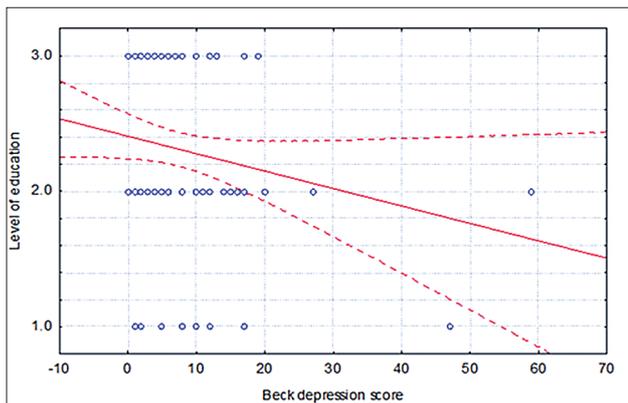
Figure 3: Correlation between level of education
(1- primary school; 2- high school; 3- university degree)
and Beck depression scores

reaction. Concerning education (Figure 3) minimal negative correlation between depression and education is obtained. It means that higher education influence as beneficial factor for PPD.

The hemodialysis as a treatment of choice for the end-stage renal diseases disrupt a normal lifestyle and require considerable psychological and social adaptation. The mean duration of maintenance dialysis in the evaluated sample was 8.3 ± 5.8 years (from 0.5 to 24 years). It was expected that chronic stress related to the process of dialysis increases the level of depression. Obtained scores for BDI in dialyzed patients is shown on Figure 4.
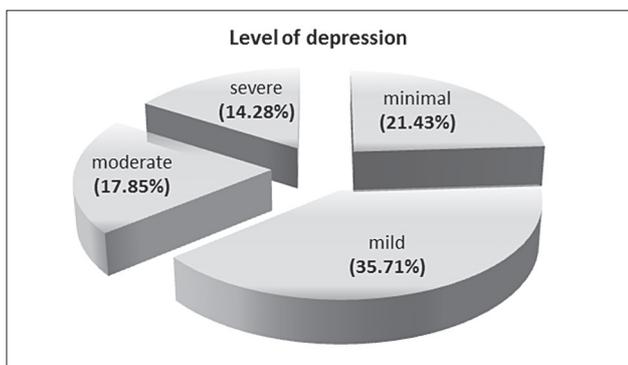
Figure 4: Level of depression in dialyzed patients graduated by scores obtained with BDI

Depression can be described as being composed of two components: an affective (mood) one and a physical (somatic) one (e.g., loss of appetite, fatigue). In participants with concomitant physical illness like chronic renal failure, the BDI's reliance on physical symptoms such as fatigue, may artificially inflate scores due to symptoms of illness, rather than those of depression. For this reason, there are several precautions that must be taken when interpreting the results. However, the BDI has been shown to be valid and reliable with results corresponding to a clinician rating of depression in more than 90% of all cases.

Regarding the duration of dialysis (in years) and depression, minimal negative correlation was obtained (r= -016) which is not statistically significant (Figure 5).
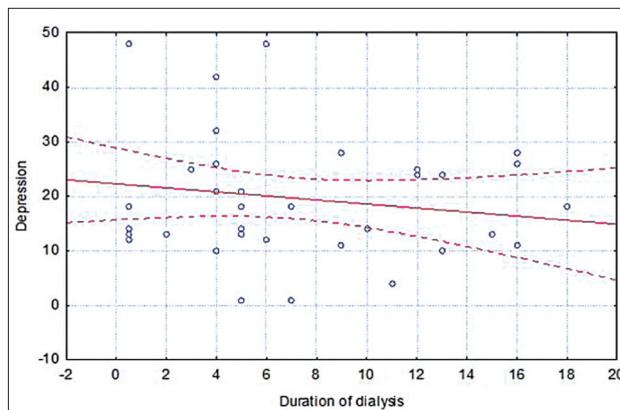
[Correlation r = -0.16; p = 0.32 (p>0.05)]

Figure 5: Correlation between duration of dialysis and depression score.

Eyes, being the organs of vision, detect light and convert it into electro-chemical impulses in neurons. Having this characteristics, vision is the most important sensorial part of the information system. Visual loss leads to reduced ability to perform routine activities of daily living. It is obvious that any kind of visual problems can be the risk for stable mental health. Patients with binocular disease have severe difficulties performing fine visual tests such as reading, and are often faced with serious lifestyle issues such as impending loss of driver's license, work, and independence [13].

It was described in many studies that depressive symptoms and anxiety are two common, practically normal responses to a glaucoma diagnosis [14]. It is similar with other ophthalmological diseases, but in the everyday practice mental health stays not so important. In addition, medical school doesn't usually discuss the soft skill of how to talk to patients. On the patient's part, the Internet will often give inaccurate disease information or take facts out of context. Still, depressed, anxious, or cognitively impaired patients are less likely to adhere to their medication regimen, putting themselves at an even greater risk for complications. On the other side, new researches show that even minimal depression can affect visual function in age-related macular degeneration (AMD) patients [15]. Table 1 presents serious ophthalmological patients (N=65) included in this study.

The rest of 35 patients are diagnosed as chronic conjunctivitis, emmetropia, astigmatisms, and simple hypermetropia, and this group is comprised as control.

Table 2: Patients with serious ophthalmological problems

| *Diagnosis*	*Number of patients*
Diabetic Retinopathy	5
Glaucoma	10
Age-related Macular Degeneration (AMD)	10
Cataract	10
High Myopia (Myopia Alta)	5
Presbyopia	25
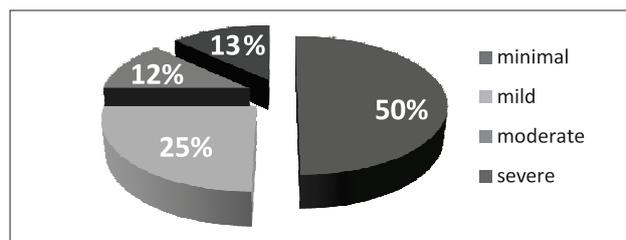
Figure 6: Level of depression in ophthalmological patients

BDI scores obtained in all group are presented on Figure 6.

Results obtained by BDI for all patients show that 50% of evaluated patients manifested minimal, 25% mild, 12% moderate, but even 13% severe depression (see Figure 6). This finding is very important because the moderate and severe depressions were unrecognized and untreated. It also raises the importance for deeper communication and support for all patients with vision's problems.

The highest scores for depression indicating moderate and severe depression are obtained from patients with age-related macular degeneration, proliferative diabetic retinopathy, as well as with glaucoma and cataract. Obtained results for the 35 patients with minimal eyes problems showed practically normal BDI scores (scores 0-9).

The correlation between BDI scores and age in this group of patients is presented on Figure 7. It
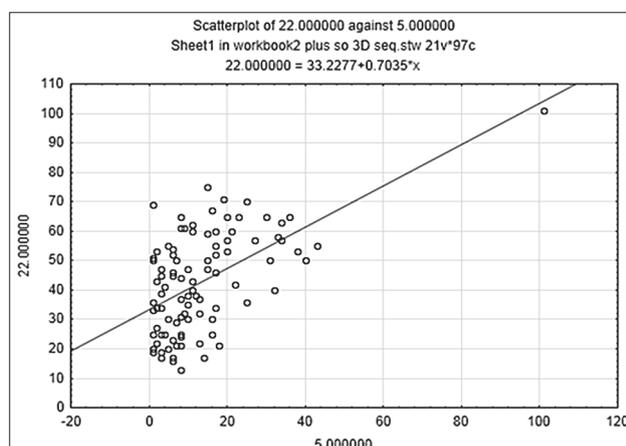
Figure 7: Correlation between obtained scores for depression and age

is very important to point out that all patients with moderate and severe depression are over 50 years old.

Obsessive–compulsive disorder (OCD) is a mental disorder where people feel the need to check things repeatedly, have certain thoughts repeatedly, or feel they need to perform certain routines repeatedly. People with this disorder are unable to control either the thoughts or the activities. Common activities include hand washing, counting of things, and checking to see if a door is locked. Often they take up more than an hour a day. The condition could be associated with tics, anxiety disorder, and an increased risk of suicide. In general, such behavior can disturb the normal functioning of the person. It is estimated that OCD affects 1–3% of the general population. The National Comorbidity Survey Replication found a median age of onset in OCD of 19 years, with 21% of cases having onset by age 10 [16].

The BDI results are showing that among this group of adolescents N=20 mean age 16.33 ± 1, 83 with OCD we did not find scores for clinical depression (mean BDI=7 ± 0.5).

The group of chronic patients comprised adolescents with cystic fibrosis, JRA, T1DM and different forms of malignancies.

The group with Cystic fibrosis comprised 25 adolescents with mean age 17.5 ± 2.6 years. Obtained BDI scores in majority of patients was 8.5 ± 0.8 which correspond to the state of no depression. Only in two patients BDI was 15 and 16 respectively, which means moderate depression. These results corresponded with the clinical presentation of depressive mood, fatigue and sleep problems, especially manifested in a girl, 19 years old who had family problems, but not related to the diagnosis. A few weeks later, she overcame this depressive reaction. The other patient was a boy aged 17.5 years and the depressive reaction was related to the disruption of the emotional relation with his girlfriend.

In patients with T1 diabetes mellitus BDI showed normal scores related to no depressive signs (mean scores 9.02 ± 1.3). Practically the same results are obtained in a group of JRA patients which was unexpected because the frequency of pain sensations in the last group.

The Beck depression inventory (BDI) was also applied in adolescents with malignant diseases. The group's results showed total scores of 14.66, which are under the cutoff for depression. However, in 8 patients the score on BDI was over 19 which corresponds to manifest depression.

In all depressed adolescents the psychological treatment was organized.

For testing the effects of cranial electrostimulation with Alpha Stim^R (CES) we evaluated a group of adult women recruited as voluntaries with moderate hypertension (N= 25), mean age 65.2 ± 7.5 years. The obtained mean BDI scores before the treatment were 25 ± 2.45 (confirming moderate depression) and were reduced to 14 ± 1.33 (mild depression) after the treatment. The obtained statistical significance is on the level p<0.05 and confirmed the effectiveness of this therapeutic modality for both, depression and hypertension.

Concerning all obtained BDI results in this study, it was obvious that the depressive mood is higher in older patients with any medical condition. In this context, BDI was higher in dialyzed patients, people with ophthalmological problems as well as women with moderate hypertension.

DISCUSSION

It is known that historically, depression was described in psychodynamic terms as "inverted hostility against the self". By contrast, the BDI was developed in a way by collating patients' descriptions of their symptoms and then using these to structure a scale which could reflect the intensity or severity of a given symptom. In this context, Aron Beck developed a triad of negative cognitions about the world, the future, and the self, which play a major role in depression.

Structured as self-report for 21 statement, scored with answers 0-3, the obtained higher total scores for BDI indicate more severe depressive symptoms.

In this article we showed that the use of BDI in practice is very useful for confirmation of the depression not only in psychiatric patients, but in a larger population. As it can been illustrated, BDI differentiated women in postpartum period in groups with minimal (68%), mild (25%), moderate (5%) and severe depression (2%). This finding is important especially for selection of non-diagnosed patients in obstetric practice [17].

In a group of dialyzed patients, it was expected that depression will be frequent mental problem. BDI showed the presence of minimal depression in 21.43%, mild in 35.71%, moderate in 17.85% and severe in 14.28%. This finding is very important for the medical staff included in the treatment of the end-stage renal diseases for organizing prevention/treatment of psychological comorbid problems in these patients [18].

Unexpectedly, the population treated in ophthalmological setting tested with BDI showed scores for severe depression in 13%, mild in 12%, moderate in 25%, and minimal in 50%. We concluded that depression appeared as an important mental problem in ophthalmological practice. It is usually unrecognized and untreated. Depression could be the risk factor for treatment and prognosis of the eyes diseases. Generally, all more severe eyes problems have a high impact on patients' daily life and causes restrictions of their psychological well-being, autonomy and mobility. For this reason, the role of doctors and nurses involved in the treatment of ophthalmological disorders is very subtle. In this context we proposed some measures for mitigation of psychological problems [19].

We also showed that adult women with moderate hypertension manifested moderate depression as well, which was underdiagnosed. Additionally, we showed that cranial electrostimulation is good non-pharmaceutical modality for treatment of moderate depression [20].

The used BDI was nonsignificant in adolescent patients with CF, T1DM, and JRA as well as in the patients with different forms of malignancies [21, 22, 23].

Our findings suggest that depression is highly correlated with age. In the adolescent period coping mechanisms are very strong and powerful and they help to overcome depressive reactions in majority of patients.

However, non-psychiatric clinicians have difficulty recognizing depression in their patients. One meta-analysis found that non-psychiatric clinicians accurately diagnosed depression in only 36% of depressed patients; another meta-analysis found a rate of 47% [24, 25].

As a general comment regarding any assessment of depression is that users of self-report instruments without psychological background/experience in the management of clinical issues related to depression may need supervision.

Concerning the age related depressive signs, Sharp and Lipsky (2002) reported that psychometric data on the BDI are mixed, so the BDI may not be the best screening measure for elderly patients [26]. Based on the research that used different depression rating scales in the elderly population, it was shown that the GDS is the best validated instrument in various geriatric populations. For example, in cognitively intact elders, the GDS appears to be a well-validated instrument in various treatment settings.

The BDI was revised in 1996 and as result the BDI-II appeared. It is developed in response to the American Psychiatric Association's publication of the DSM-IV, which changed many of the diagnostic criteria for Major Depressive Disorder [27].

Items involving changes in body image, hypochondriasis, and difficulty working were replaced. Also, sleep loss and appetite loss items were revised to assess both increases and decreases in sleep and appetite. All but three of the items were reworded; only the items dealing with feelings of being punished, thoughts about suicide, and interest in sex remained the same. Finally, participants were asked to rate how they have been feeling for the past two weeks, as opposed to the past week as in the original BDI. Since the publication of the BDI-II, a sparse literature exists regarding its reliability, validity, and utility specifically among older adults.

Like the BDI, the BDI-II also contains 21 questions, each answer being scored on a scale value of 0 to 3. Higher total scores indicate more severe depressive symptoms. Steer, Rissmiller, and Beck (2000) reported that the BDI-II had good internal consistency ($\alpha = .90$) and that the total score was not significantly correlated with gender, age, or ethnicity of the patients.

In our country, we mainly used the older BDI for assessment depressive signs, and we are pretty satisfied with obtained results [28].

The results of the study of Sangmee Ahn Jo et al. 2016 showed that the Korean version of the BDI is appropriate for screening for depression and 16 is the optimal cut-off score for the Korean elderly [29].

The BDI has the same problems as other self-report inventories, in manner that scores can be easily exaggerated or minimized by the person completing them. Additionally, the way the instrument is administered can have an effect on the final score. If a patient is asked to fill out the form in front of the examiner in a clinical environment, social expectations have been shown to elicit a different response compared to administration via a postal survey.

However, BDI was used widely in the selection of depressive symptoms in different groups of patients such as: psoriatic patients [30], multiple sclerosis [31, 32], adolescents from dysfunctional families [33], high school adolescents [34], patients with dry eyes disease [35], in medical students [36], patients with coronary disease [37], patients with rheumatoid arthritis [38] etc.

Application of BDI in participants with concomitant physical illness may artificially inflate scores due to symptoms of the illness, rather than of depression. In an effort to deal with this concern Beck and his colleagues developed the "Beck Depression Inventory for Primary Care" (BDI-PC), a short screening scale consisting of seven items from the BDI-II considered to be independent of physical function. Unlike the standard BDI, the BDI-PC produces only a binary outcome of "not depressed" or "depressed" for patients above a cutoff score of 4.

Although designed as a screening device rather than a diagnostic tool, the BDI is sometimes used by health care providers to reach a quick diagnosis.

Some important remarks
- Depression as a commonly occurring disorder worldwide could be successfully assessed with BDI as a self- report inventory
- Lifetime prevalence estimates of major depression vary across countries, with prevalence generally higher in high income versus low-middle income countries
- Depression and it's severity confirmed with scores obtained with BDI is age-related
- Depression is comorbid with many other diseases, especially with chronic ones.

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Резиме

БДИ ВО ПРОЦЕНКАТА НА ДЕПРЕСИЈА ВО РАЗЛИЧНИ МЕДИЦИНСКИ СОСТОЈБИ

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Апстракт

Како многу често заболување, депресијата треба да биде дијагностицирана не само во психијатриските туку и во други медицински установи, особено оние што се занимаваат со хронично болни пациенти. Бековиот инвентор за депресија е валиден и сензитивен саморапортирачки инструмент, кој се користи насекаде во светот за проценка на депресивните симптоми. Во ова истражување се презентирани добиените скорови од БДИ кај разни групи растројства и покажано е дека тие се зависни од клиничката состојба, како и од возраста.

Клучни зборови: депресија, саморапортирање, БДИ