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DEPRESSION IN PATIENTS WITH EPILEPSY

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Abstract

Depression is the most common psychiatric co-morbidity in people with epilepsy, but often remains unrecognized. The aims of the study were to investigate differences in level and severity of depression between patients with epilepsy and healthy control group. The study explores understanding on specific socio economic factors that might contribute to depression and compare differences among patients with epilepsy and control group. The sample consisted of 100 adult patients with epilepsy from University Clinical Centre Tuzla, Bosnia and Herzegovina and 100 adult volunteers without any diagnosis. Level of depression was measured by Beck Depression Inventory (BDI). The questionnaire about demographic and specific socio economic data (gender, employment, education, marital status) was used.Patients with epilepsy showed significantly higher Beck's depression inventory than controls. The minimal depression was less frequent, but mild, moderate and severe depression was more frequent in subjects with epilepsy.In both group females and males showed similar distribution of BDI. Females and males with epilepsy showed significantly higher BDI than in control group. Patients with epilepsy showed similar distribution among subject regarding education. Employed and unemployed subjects among patients with epilepsy showed similar distribution of BDI. In control group, unemployed subjects showed significantly higher BDI. Beck Depression Inventory had similar distribution regarding marital status in both groups. The subjects that are married, in relationship or without relationship showed significantly lower BDI. There are statistically significant differences in level and severity of depression between epileptic patients and healthy subjects in control group. Hypothesis that there are statistically significant differences in specific socioeconomic factors that are related to depression among patients with epilepsy and control group is partially confirmed.

Keywords: Epilepsy, depression, BDI, employment, gender

EPİLEPSİ HASTALARINDA DEPRESYON

Özet

Depresyon, epilepsi hastalarında en sık görülen psikiyatrik komorbiditedir, ancak çoğu zaman tanınamayan bir durumdur. Bu çalışmanın amacı, epilepsi hastaları ile sağlıklı kontrok grubu arasında depresyonunun düzey ve şiddetindeki farklılıkları araştırmaktır. Çalışma, depresyona katkıda bulunabilecek sosyoekonomik faktörler hakkında ilişkiyi ve epilepsi hastaları ile kontrol grubu arasındaki farklılıkları karşılaştırır. Katılımcılar, Bosna Hersek'teki Tuzla Üniversitesi klinik merkezindeki epilepsili 100 yetişkin hasta ile herhangi bir tanı koyulmamış 100 yetişkin gönüllüden oluşmaktadır. Depresyon düzeyi Beck Depresyonu Envanteri (BDI) ile ölçülmüştür. Demografik ve özel sosyoekonomik veriler (cinsiyet, istihdan, eğitim, medeni durum) ile ilgili anket kullanılmıştır. Beck Envanteri'ne göre epilepsi hastalarının depresyon düzeyinin kontrol grubu hastalarına göre önemli ölçüde yüksek olduğu görülmüştür. Epilepsi hastalarında minimal depresyon daha az sıklıkta iken hafif, orta ve şiddetli depresyon daha sık olarak görülmüştür. Her iki gruptaki kadın ve erkeklerde BDI benzer dağılım göstermektedir. Epilepsili kadın ve erkeklerde BDI kontrol grubuna göre önemli ölçüde yüksek bulunmuştur. Epilepsi hastalarının eğitime ilişkin düzeyleri benzer dağılıma sahiptir. Epilepsi hastalarında işi olan ve işsiz deneklerdeki BDI düzeyi benzerlik göstermektedir. Kontrol grubunda ise BDI düzeyi işsizlerde önemli derecede yüksek olarak tespit edilmiştir. BDI her iki grupta da medeni durum bakımından benzer dağılımın bulunduğunu göstermiştir. Evli, ilişkisi olan ya da ilişkisi olmayan deneklerde BDI anlamlı olarak düşüktür. Kontrol grubunda epileptik hastalar ile sağlıklı bireyler arasında depresyonun düzeyi ve şiddedi açısından istatistiksel olarak anlamlı fark vardır. Epilepsi hastalarında ve kontrol grubunda depresyona bağlı spesifik sosyoekonomik faktörlerde istatistiksel olarak anlamlı farklılıklar olduğu varsayımı kısmen doğrulanmıştır.

Anahtar Kelimeler:: Epilepsi, depresyon, Beck Depresyon Envanteri (BDI), istihdam, cinsiyet

Özgün Araştırma/ Original Article

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Introduction

Epilepsy is one of the most common neurological disorders, affecting into fifty million people worldwide. It has significant effects on everyday life of the affected persons, their mood and behavior, but also has an impact on the family and on the community.
Many studies (e.g., Kanner, 2003b; Kanner, 2002), during last several decades, suggested a bidirectional relation between epilepsy and co morbid psychiatric disorders and behavioral changes. Epileptic seizure could be manifested as a brief change or interruption in behavior, but evidence also suggests that epilepsy can affect behaviour when seizures are not occurring. Psychiatric disorders in patients with epilepsy have been neglected for a long time, but it is clear that this relation is complex, especially relation between different type of mood disorders and also different type of epilepsy (Kanner, 2003 B; Kanner, 2002). Depression is the most common mood disorder in patients with epilepsy. It is a chronic disorder that affects their quality of life, even if they are well controlled on treatment and seizure-free.

Epilepsy

> *Epilepsy* is a disease characterized by an enduring predisposition to generate epileptic seizures and by the neurobiological, cognitive, psychological, and social consequences of this condition. A commonly used definition of epilepsy has been two unprovoked seizures more than 24 hours apart (Berg et al., 2010). It is a heterogeneous condition characterized by multiple possible seizure types and syndromes, diverse etiology, and variable prognoses. Seizure is an event and epilepsy is the disease involving recurrent unprovoked seizures. The official definition of a seizure is:
> A transient occurrence of signs and/or symptoms due to an abnormal excessive or synchronous neuronal activity in the brain. This means that during a seizure, large numbers of brain cells are activated abnormally at the same time. It is like an electrical storm in the brain. People with epilepsy have recurrent seizures that often occur spontaneously and without warning. (Berg et al., 2010, p. 676)

Epilepsy is among the most common serious neurological conditions with incidence rates, in high-income countries, ranging between 40 and 70 per 100 000 persons per year and generally higher in young children and in the elderly (Duncan, 2006; MacDonald, 2000).
In resource-poor countries, the incidence is usually much higher, often above 120/100 000/year, and in high-income countries, poor people also seem to have a higher incidence (Heaney 2008; Nogueira 2012). Prevalence studies have reported lifetime rates between 4 and 10/1000 in developed countries (Forsgren, 2005) but data from poor countries suggest prevalence rates of 23.2–32.1/1000 (Bell, 2014) up to 57/1000 in some rural areas (Sander, 1996).

Etiology of epilepsy is very complex and, according Daroff (2016) and Aminoff (2015), includes many factors such as: Genetic**,** structural brain abnormality, distinct metabolic abnormality, immune-mediated etiology, infectious, including: tuberculosis, HIV, cerebral malaria, etc.
From psychological point of view, the most important are side effects that are central nervous system related: behaviour changes, mood disorder, depression, hallucinations, and even psychotic reactions. (Fabris at all, 2016).

According to different authors, psychiatric disorders are relatively frequent co morbidities in epilepsy. The incidence of psychiatric disorders is higher in patient with epilepsy than in general population, especially depression, anxiety and psychoses. It is estimated that 20-30 percentages of patients with epilepsy have psychiatric disturbances and 58 percentages of these patients have a history of depressive episodes, 32 percentages have agoraphobia and 13 percentages have psychoses (Kobau, 2006).
A number of epidemiological studies have suggested that the relationship between epilepsy and psychiatric problems is bidirectional and some people may present with a psychiatric disorder before than epilepsy (Hesdorffer, 2012). Different factors could be responsible for development of psychoses, depression or behavioural disorders in patients with epilepsy (Kanner, 2009).

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Depression

The last definition of depression as a chronic mental disorder is:

> Depression is a mental state or chronic mental disorder characterized by feelings of sadness, loneliness, despair, low self-esteem, and self-reproach. Accompanying signs include psychomotor retardation (or, less frequently, agitation), withdrawal from social contact, and vegetative states, such as loss of appetite and insomnia.
>
> Depression could be described as:
>
> > Mood state, as indicated by feelings of sadness, despair, anxiety, emptiness, discouragement, or hopelessness; having no feelings; or appearing tearful.
> > Syndrome, which is a constellation of symptoms and signs that may include depressed mood. Depressive syndromes that are typically encountered include major depression, minor depression, or dysthymia (persistent depressive disorder).
> >
> > Mental disorder that identifies a distinct clinical condition. As an example, the syndrome of major depression can occur in several disorders, such as unipolar major depression (also called "major depressive disorder"), bipolar disorder, schizophrenia, substance/medication-induced depressive disorder, and depressive disorder due to another (general) medical condition.
> >
> > (DSM-5, 2013, p.162)

Diagnostic criteria for Major depressive disorder include:

> A. Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning:
>
> (1) depressed mood or (2) loss of interest or pleasure.
>
> 1. Depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad, empty, hopeless) or observation made by others
>
> 2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day
>
> 3. Significant weight loss when not dieting or weight gain (change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day.
>
> 4. Insomnia or hypersomnia nearly every day.
>
> 5. Psychomotor agitation or retardation nearly every day
>
> 6. Fatigue or loss of energy nearly every day.
>
> 7. Feelings of worthlessness or excessive or inappropriate guilt nearly every day
>
> 8. Diminished ability to think or concentrate, or indecisiveness, nearly every day
>
> 9. Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.

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B. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

C. The episode is not attributable to the physiological effects of a substance or to another medical condition.

Criteria A-C represents a major depressive episode.

D. The occurrence of the major depressive episode is not better explained by schizoaffective disorder, schizophrenia, schizophreniform disorder, delusional disorder, or other specified and unspecified schizophrenia spectrum and other psychotic disorders

E. There has never been a manic or a hypomanic episode. (DSM-5, 2013, p.162)

Most frequent psychiatric co morbidity seen in patients with epilepsy is depression. The suicide risk in patients with epilepsy has been estimated to be 10 times higher than in general population. Although it is clear that epilepsy is a risk factor for depression, recent studies shown also that depression history is associated with greater risk of developing epilepsy. Depression in general population ranges from 6 to 17% in comparison with reported rates from 8 - 48% among patients with epilepsy (Kanner, 2003A).

Fear is the most common emotion as a part of some seizure types, but depressed mood is second common emotion. These emotions are usually one of the symptoms during partial epileptic seizures, temporal or frontal origin, and also in patients with poorly controlled seizures (Lopez-Rodriguez, 1999).

Depression could be presented as a reaction of patient to disease, or could be presented as a symptom of different type of epilepsy. In patients with refractory epilepsy, depression has serious impact on quality of life. According to many studies, quality of life of patients with epilepsy is related to depression and to degree of seizure control (Barry, 2007).

Materials and Methods

This study takes a quantitative research approach that involves the use of survey questionnaires in collecting the data.

The Research aims of this study were to investigate differences in level and severity of depression between patients with epilepsy and healthy control group. The second aim was to explore knowledge about specific socioeconomic factors that contributes to depression among patients with epilepsy and healthy subjects in control group, representing general population.

Hypothesis

H1: There are statistically significant differences in level and severity of depression between epileptic patients and healthy control group
H2: There are statistically significant differences in specific socio economic factors (employment, married status, education, gender) among patients with epilepsy and healthy control group

Participants

Convenience sample consisted of 100 adult patients with epilepsy who are regularly followed up in Neurology Clinic in University Clinical Centre Tuzla, Bosnia and Herzegovina. The group consisted of 47 female and 53 male. Participants, average ages 38 years. The chronological age of patients were: from 18 - 30 years (23M and 22 F); from 31 -40 years (14M and 9 F); from 41- 50 years (5 M and 8 F); > 50 years (11M and 8 F). Exclusion criteria for examined group included patients who have any other neurological problems, or other chronically disease, except for epilepsy. The control group of healthy subjects representing general population was aligned with the examined group on the basis of gender and

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ages. Exclusion criteria for control group included any diagnosis; the participants had to be healthy volunteers representing general population.

Instruments

In order to investigate the level of depression among participants in both groups, we used Beck Depression Inventory (BDI IA).

> The BDI is a relevant psychometric instrument, showing high reliability, capacity to discriminate between depressed and non-depressed subjects, and improved concurrent, content, and structural validity. Based on available psychometric evidence, the BDI can be viewed as a cost-effective questionnaire for measuring the severity of depression, with broad applicability for research and clinical practice worldwide (Wang, 2013, p.429).

Beck Depression Inventory was revised in 1996, as a part of Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV) published by American Psychiatric Association- APA. In this revision diagnostic criteria for Major Depressive Disorder was changed; all except three items were differently presented, included sleep and appetite increase items, becoming the BDI-II. The BDI-II also as BDI I is scored on a scale from 0 to 3 and contains 21 questions (Beck, 1961; Beck, 1993; Beck 1996).

BDI is designed to measure depth of depression; it measures intensity of depression symptoms, and provides quantitative assessment of depression intensity. It reflects patients' depression depth in last two weeks and because of that can monitor changes over short period of time. Each question had a set of at least four possible responses, ranging in intensity from score 0 to score 3; the sum of all scores represents total score. The standard cut-off scores for depression severity by BDI are: minimal depression in range from 0 to 9; mild depression in range from 10 to 18; moderate depression from 19 to 29 and severe depression from 30 to 63.

Questionnaire for demographic (personal) information for participants included simple questions about: gander, age ranged, level of education, marital status, employed, occupation, duration of disease.

Model of Data Analysis

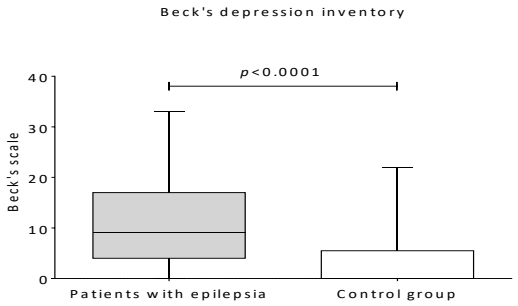
Accuracy and normality were determined using Kolmogorov-Smirnov and Shapiro-Wilk tests. Non-parametric and parametric methods were used to calculate statistical significance. Student's t-test, Mann-Whitney test, Fisher's test and $\chi 2$ test were used for calculating the difference between the groups. ANOVA test was used to calculate the relative difference distribution variance between variables.

The statistical hypotheses were tested at the level of $\alpha=0.05$, and the difference between the groups in the sample was considered significant when $p<0.05$ or less. Statistical significance was depicted as: $p<0.05$, $p<0.01$ and $p<0.001$.All data were analysed using GraphPad Prism version 7 (San Diego, California, USA).

Results

The sample of this study consist of 200 participants (mean age 35.6 ± 13.91; F/M=0.91) divided into 2 groups - patients with epilepsy (n=100) and healthy subjects (n=100), as a control group. The results of the study are presented for 2 groups for each variables.

Differences in level and severity of depression between patients with epilepsy and healthy control group



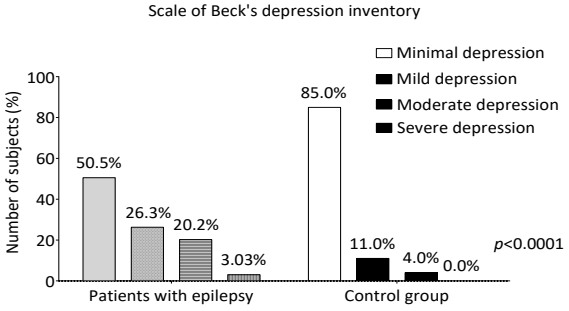


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Figure 1 (A and B) BDI and Scales of Beck Depression Inventory in patients with epilepsy and healthy control group

Patients with epilepsy showed significantly higher BDI than controls (11.24 ± 0.9 *vs* 3.64 ± 0.53; $p<0.0001$). In comparison to the controls, minimal depression was less frequent ($p<0.0001$), but mild, moderate and severe depression were more frequent in subjects with epilepsy ($p=0.0063$, $p=0.0004$ and $p=0.0397$ respectively) then in control group.

Depression in patients with epilepsy and healthy control group regarding to gender

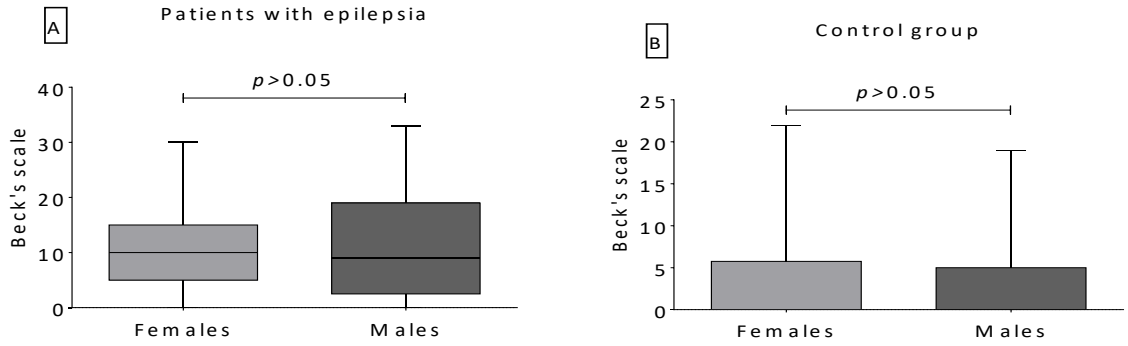

Figure 2(A and B**)** shows BDI in males and females in patients with epilepsy (A) and healthy subjects in control group (B).

In both groups, patients with epilepsy and controls, females and males showed similar distribution of Beck's depression inventory ($p>0.05$ for both measurements).

On the other side, both females and males with epilepsy showed significantly higher BDI than females or males in control group ($p<0.0001$ for all measurements).

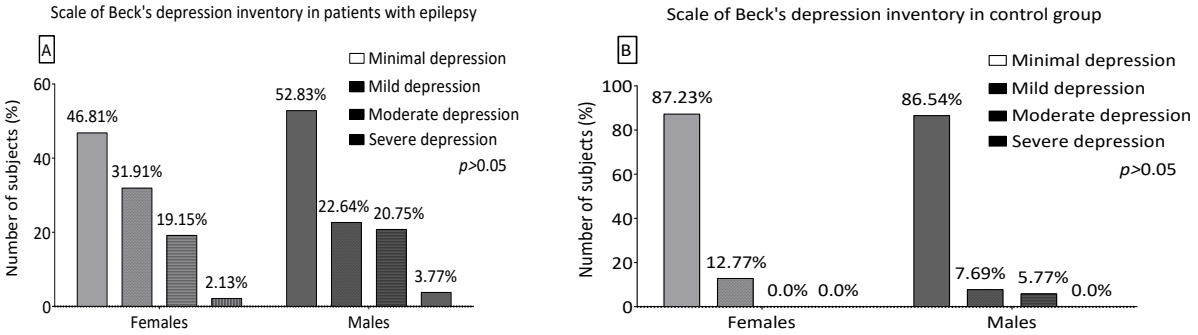

Figure 3 (A and B) shows scales of BDI in female and male patients with epilepsy (A) and in control group (B).

In both groups, patients with epilepsy and controls, females and males showed similar distribution of minimal, mild and moderate depression ($p>0.05$ for all measurements).

Depression in patients with epilepsy and healthy subjects in control group regarding to employment

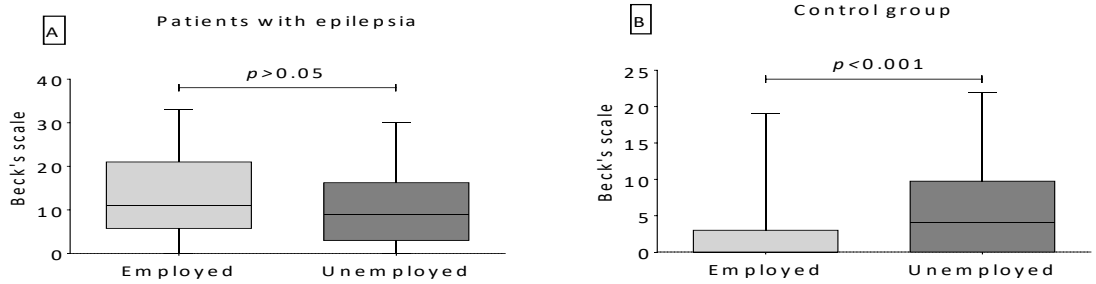

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Figure 4(A and B) shows BDI in employed and unemployed subjects in patients with epilepsy (A) and control group (B)
In patients with epilepsy, employed and unemployed subjects showed similar distribution of BDI ($p>0.05$).
On the other side, in control group, unemployed subjects showed significantly higher Beck's depression inventory then employed subjects ($p<0.001$).

In the same time, control subjects that were employed or unemployed had significantly lower Beck's depression inventory compared to corresponding patients with epilepsy ($p<0.0001$ for employed subjects and $p<0.01$ for unemployed subjects).

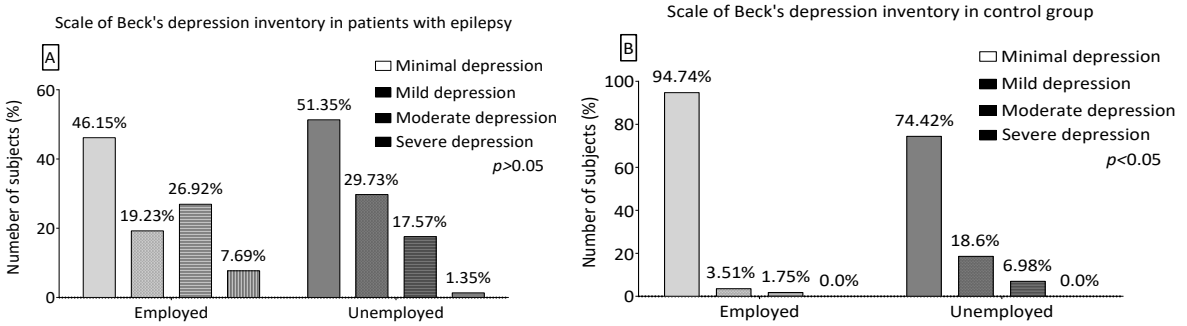

Figure 5 (A and B) shows scales of BDI in employed and unemployed patients with epilepsy (A) and in control group (B).
Minimal, mild, moderate and severe depression had similar distribution among employed and unemployed patients with epilepsy ($p>0.05$ for all measurements).
In control group, unemployed subjects showed significantly lower frequency of minimal depression ($p<0.01$), but higher frequency of mild depression ($p<0.05$) in comparison to employed subjects. However, in this group unemployed and employed subjects had similar frequency of moderate depression ($p>0.05$).
No case of severe depression was observed in unemployed or employed subjects in control group.
Depression in patients with epilepsy and healthy subjects in control group regarding to level of education

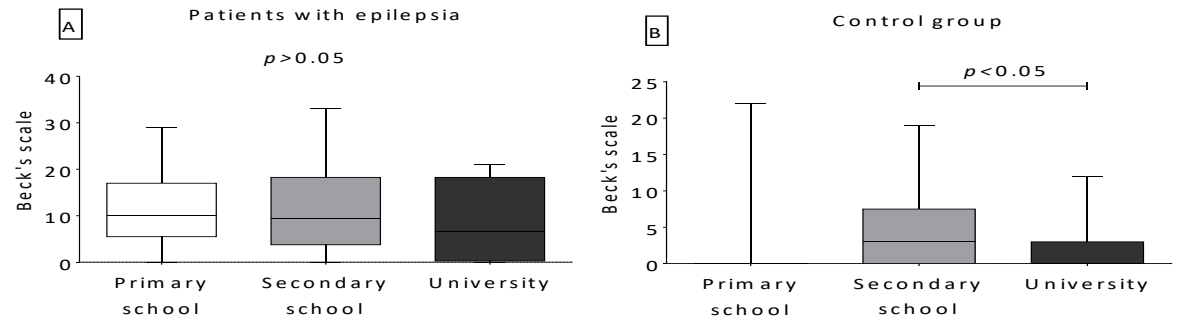

Figure 6(A and B) shows BDI in regard to level of education in patients with epilepsy (A) and control group (B).
In patients with epilepsy BDI showed similar distribution among subject with finished primary school, secondary school and university ($p>0.05$ for all measurements).
In controls, subjects with finished university had significantly lower BDI then subjects with secondary school ($p<0.05$), while similar to subjects with primary school ($p>0.05$). In the same time, BDI was similar between subjects with finished primary and secondary school ($p>0.05$ for all measurements). On the other side, comparing control group to patients with epilepsy, subjects with finished primary school, secondary school or university had significantly lower BDI ($p<0.05$, $p<0.0001$ and $p<0.001$, respectively).

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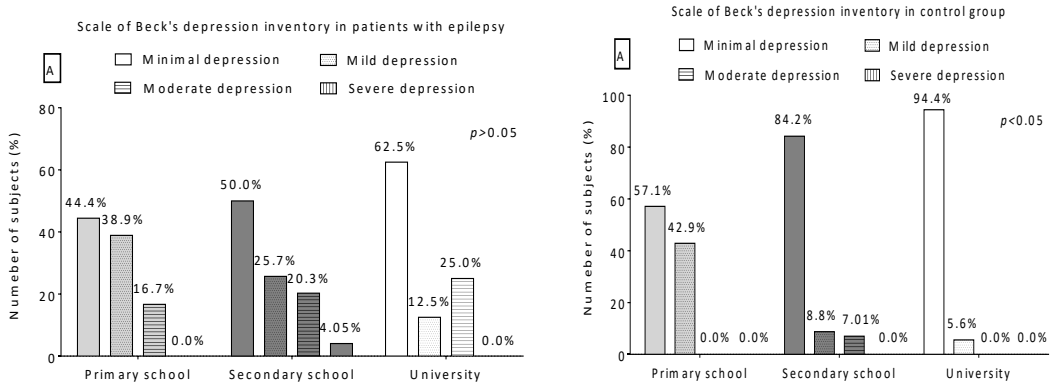

Figure 7(A and B**)** shows scales of BDI in regard to level of education in patients with epilepsy (A) and in control group (B).

In patients with epilepsy, minimal, mild, moderate and severe depression showed similar distribution among subjects with finished primary school, secondary school and university ($p>0.05$).

In controls, subjects with finished primary school showed similar frequency of minimal depression compared to subjects with secondary school ($p>0.05$), but lower than subjects with university ($p<0.05$).

Also in controls, subjects with finished primary school showed significantly higher frequency of mild depression comparing to subjects with secondary school and university ($p<0.05$ for both measurements), while subjects with finished secondary school and university had similar distribution of mild depression ($p>0.05$).

In the same time, moderate and severe depression had similar frequency among control subjects with finished primary school, secondary school and university ($p>0.05$ for all measurements).

Depression in patients with epilepsy and healthy control group regarding to marital status

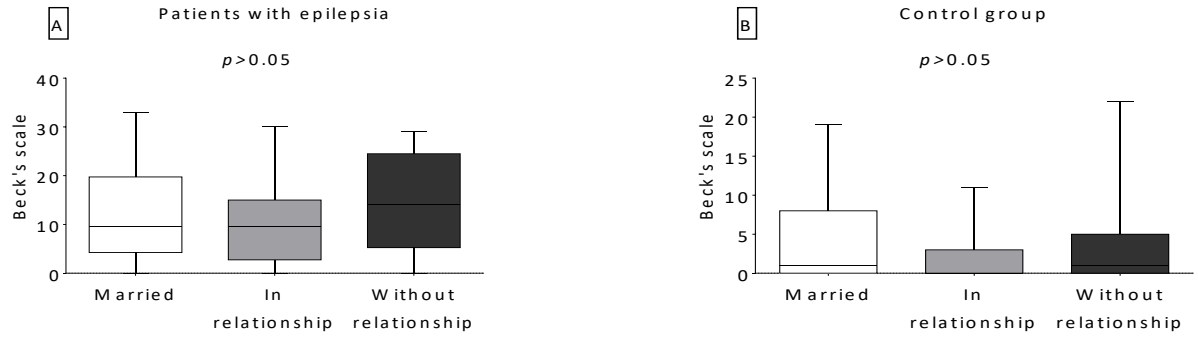

Figure 8(A and B) shows BDI in regard to marital status in patients with epilepsy (A) and control group (B).

BDI had similar distribution regarding marital status in both patients with epilepsy and controls ($p>0.05$ for all measurements).However, comparing control group to patients with epilepsy, subjects that are married, in relationship or without relationship showed significantly lower BDI ($p<0.0001$ for all three measurements).

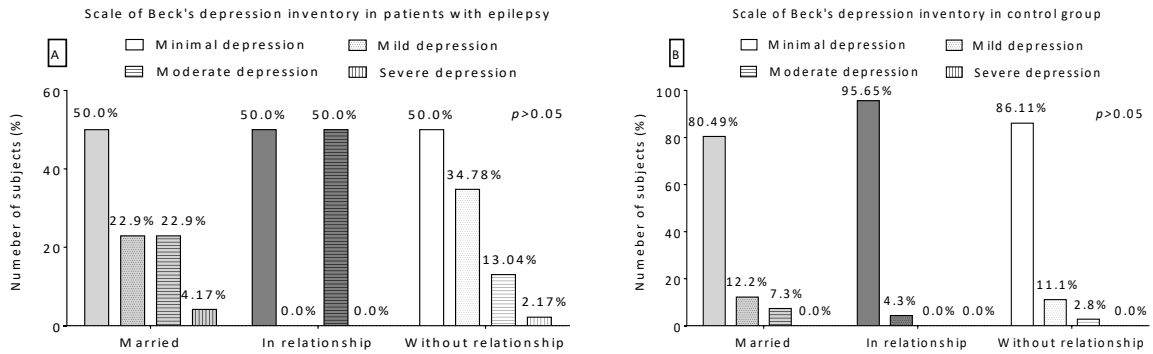

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Figure 9(A and B) shows scales of BDI regarding marital status in patients with epilepsy (A) and in control group (B).
In both groups, patients with epilepsy and controls, minimal, mild, moderate and severe depression showed similar distribution among married subjects, subjects in relationships and subject without relationship (p>0.05 for all measurements).

Discussion and Conclusion

Differences in level and severity of depression between patients with epilepsy and healthy control group

Oliveira (2014) published large study searching and checking for depression signs in people with epilepsy. Authors compared psychometric properties of the Neurological Disorders Depression Inventory for Epilepsy (NDDI-E), Hospital Anxiety and Depression Scale Depression Subscale (HADS-D), and Beck Depression Inventory (BDI) as screening instruments for depression and suicidal risk in people with epilepsy. The sensitivity and specificity of BDI for the diagnosis of depression was around 90%; HADS-D and NDDI-E have sensitivity higher than 80%, and specificity was greater than 75%.
In study from Nigeria (Onwuekwe, 2012), depression was present in 85,5%, but wasn't significantly associated with age, gender, or educational level. Some studies found that the overall suicide rate is five-times higher in patients with epilepsy, who also suffer from depression compared to patients who have depression alone. Compared with general population, whose lifetime average suicide rate is 1.1-1.2%, average suicide rate in people with epilepsy is 12% (Harris, 1997; Jones 2003).
In a study by Ettinger (2006), patients with epilepsy were significantly more likely to score in the depressed range on the Centre for Epidemiological Studies Depression Scale (37%), than those with asthma (28%) or healthy subjects (12%).
Studies assessing factors influencing quality of life in patients with epilepsy consistently found depression and anxiety to be far more important than direct epilepsy-related items such as seizure frequency or antiepileptic drug (AED) adverse effects (Nogueira, 2012). Even though different tests and procedures have been used in many of these studies, depression is consistently found to be prevalent in association with epilepsy than in the general population. In the study from Croatia (Hecimovic, 2009) assessment with the BDI showed that 33.3% of patients had recent depressive symptoms: 6.3% had mild depressive symptoms, 8.4% moderate and 18.6% had severe depressive symptoms; three (6.4%) patients attempted suicide in the past, and all three were with severe symptoms of depression.
In our study, like in the previously mentioned studies, patients with epilepsy showed significantly higher BDI score than controls (p<0.0001).In comparison to the controls, minimal depression was less frequent but mild, moderate and severe depression were more frequent in subjects with epilepsy (p=0.0063, p=0.0004 and p=0.0397 respectively) than in control group. So our assumption that level and severity of depression in patients with epilepsy is statistically significant higher in compare to level of depression among healthy subjects in control group is confirmed.
People in our society, unfortunately, have very low level of knowledge about epilepsy as a neurological disease. Many of our citizens believe that epilepsy must have some psychiatric consequences, that patients could be danger, or that this is mandatory hereditary illness. Also, by our low, people with epilepsy have many limitations and restrictions: for a driving licence they have to be seizure free more than two years, on medications, with special doctor's permission. Stigmatization of patients is still very high, present in rural, but also in urban areas (Bagic, Bagic and Zivkovic, 2009).

Differences in depression in patients with epilepsy and healthy control group regarding specific socio economic factors (gender, employment, education and marital status)

Gender
In study of Salgado (2012), women had significant higher scores in the BDI than men in the total BDI score. Elmassry (2015) published the same results in his study. Results indicate that women with epilepsy report more depressive symptoms than men. According to Yildrim (2018) women had significantly higher BDI scores compared to men. In a study from Nigeria gender did not have statistically significant influence (Onwuekwe, 2012).
In our study, patients with epilepsy, females and males showed similar distribution of BDI without differences according gender. Both females and males with epilepsy showed significantly higher BDI

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than females or males in control group. In both groups, patients with epilepsy and controls, females and males showed similar distribution of minimal, mild and moderate depression ($p>0.05$ for all measurements). In our study, gender did not have statistically significant influence on depression among patients with epilepsy. Our assumption that there are statistically significant gender differences in level of depression among patients with epilepsy, also as there are statistically significant gender differences in level of depression among health subjects in control group are rejected.
This study cannot conclude that female patients are less depressed compared with female patients in other studies from the other countries. Even more this study found that gender did not have statistically significant influence on depression among patients with epilepsy.

Employment
Employment is very important for a quality of life every adult person, regardless of whether the person is healthy or have some disease. According to the study by Selgado (2012) the BDI scores among patients with epilepsy was significantly associated with status of employment (p=0.012).
In our study, patients with epilepsy, employed and unemployed subjects showed similar distribution of BDI ($p>0.05$). On the other side, in control group, unemployed subjects showed significantly higher BDI then employed subjects ($p<0.001$). So assumption that patients with epilepsy who are unemployed will have higher scores of depression and health subjects in control group that are unemployed will have higher scores of depression is partially correct. Employment did not show influence on depression among patients with epilepsy. Employed and unemployed patients showed similar distribution on BDI. In healthy control group, representing general population, unemployed showed statistically significant higher BDI result than employed. Explanation of these results could be that mean age of our subjects in both groups was 35.6 ± 13.91.

According to Agency for Statistics of Bosnia and Herzegovina (2018) unemployment rate in country is the highest in the Europe. In December 2017 the number of registered unemployed in BIH amounted to 475.084. Our healthy subjects in control group with mean age 35.6 ± 13.91 showed higher score of depression. Our patients with epilepsy have many limitations for different job positions, and they are aware of their health issues.
According to Agency for Statistics of Bosnia and Herzegovina (2018), in register of unemployment by qualification structure the largest number of unemployed is highly skilled and skilled by 157.390, followed by those with high school diploma by 134.000. In our study patients with epilepsy have lower educational level. Their illness, lack of education and statistic data known could be reasons for them not to develop higher depression if not employed. Healthy subjects have higher education, do not have any health issues, and economic status that depends of employment might have influence on their depression level. In our society, we still have a strong family relationship toward a sick unemployed member of family, but rare toward a healthy unemployed member of family.

Education
In the study about predictors of depression among patients with epilepsy patients with lower educational level showed significantly higher BDI score in comparison with patients with high level of education (Yildirim, 2018).
As the level of education decreased, BDI scores increased for each stratum. The highest BDI score had patients without education or with only primary school compared with higher educated patients. In study from Nigeria, most subjects had at least secondary school education. In this study, depression was not significantly associated to level of education (Onwuekwe, 2012). In our study, patients with epilepsy BDI showed similar distribution among subject regarding education: with finished primary school, secondary school and university ($p>0.05$ for all measurements). In controls, subjects with finished university had significantly lower Beck's depression inventory than subjects with secondary school ($p<0.05$), while similar to subjects with primary school ($p>0.05$). In the same time, Beck's depression inventory was similar between subjects with finished primary and secondary school ($p>0.05$ for all measurements).

On the other side, comparing control group to patients with epilepsy, subjects with finished primary school, secondary school or university had significantly lower BDI ($p<0.05$, $p<0.0001$ and $p<0.001$, respectively). In controls, subjects with finished primary school showed similar frequency of minimal

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depression compared to subjects with secondary school (p>0.05), but lower than subjects with university (p<0.05).

Marital status

In almost all societies, marital status is very important factor for everyday life, feeling of happiness, and security, sharing activities and obligations, raising children, but also, in some countries for social norms. According to Kessler (1982), married people have low rate of depression among healthy participants, because they had less stressful life than people who are not married. According to study from China unmarried adult patients with epilepsy are more anxious and depressed than married adult patients (Ding, 2017). In a study by Lee (2009) marital status of patients with epilepsy, didn't show significant influence of depression. Also in study from Nigeria depression was not significantly associated with marital status (Onwuekwe, 2012). According to results from a recent study marital status of participants didn't have significant influence of depression (Yildrim, 2018).

The similar results we got in our study. In comparing groups, marital status didn't have significant influence on severity of depression. BDI had similar distribution regarding marital status in both patients with epilepsy and controls. However, comparing control group to patients with epilepsy, subjects that are married, in relationship or without relationship showed significantly lower BDI. So our assumption that patients with epilepsy that are unmarried will have higher scores of depression and also in control group is rejected.

Explanation for these results could be that many young people live together and tend to tend to get married in their thirties. According to Agency for statistics of Bosnia and Herzegovina (2018), in our country average age for a first marriage is 28. Bad socio economic status and unemployment rate have influence on control group, people are depressed if they are unemployed and in marriage, but also if they are unemployed and not married. According to Hewit and Bexter (2005), socioeconomic status can have influence on young people decision when to start their married life. Also, people with epilepsy are more depressed than healthy subjects firstly because of their health issues, so it could be the reason that they have bigger scores on BDI in all three groups.

Patients with epilepsy showed significantly higher BDI than healthy persons. In comparison to the controls, minimal depression was less frequent but mild, moderate and severe depression were more frequent in subjects with epilepsy then in control group.

Gender didn't have any influence on presence or level of depression. Both female and male participants with epilepsy showed significantly higher BDI than females or males in control group. Also, BDI had similar distribution regarding marital status in both: patients with epilepsy and controls. In patients with epilepsy, employed and unemployed subjects showed similar distribution of BDI. On the other side, in control group, unemployed subjects showed significantly higher BDI then employed subjects. Most probably because they expect to be employed and do not have any health problems.

In patients with epilepsy BDI showed similar distribution among subject regarding education: with finished primary school, secondary school and university. In controls, subjects with finished university had significantly lower Beck's depression inventory then subjects with secondary school (p<0.05), while similar to subjects with primary school (p>0.05).

The hypothesis: There are statistically significant differences in level and severity of depression between epileptic patients and healthy subjects in control group is confirmed, but the hypothesis: There are statistically significant differences in specific socio economic factors that are related to depression among patients with epilepsy and healthy subjects in control group are partially confirmed.

As a recommendation, this type of study can be applied to patients with different chronic and acute disease. Our results can be a good basis for aligning with future results. This is an important topic that should be further investigated. Also, by finding better ways to detect depression in patients with epilepsy we would increase likelihood of treatment for depression in this population.

As a limitation of study, epilepsy patients had to fill in questionnaires in present of researcher and doctor so some of them may have minimized their problems. Some of them had difficulties with reading of questions so researcher had to fill in questionnaires with them. However, participants in control group had possibility to do questionnaires online and anonymously, what might effect on final results of this study. Study was conducted with only patients from Tuzla canton, so for reflecting general population

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there should be similar study with patients from other populations. Study had been done in particular period of time and measured level of depression in last two weeks, we did not have information about severity of depression before or after that could be different.

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