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The interictal dysphoric disorder in patients with epilepsy: A doubtful disorder lacking diagnostic tools

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ABSTRACT

Purpose: To examine adult epilepsy outpatients for the existence of the interictal dysphoric disorder (IDD) using the interictal dysphoric disorder inventory (IDDI), the overlap between IDD, depression, and anxiety, and the reproducibility of IDDI.
Methods: Epilepsy outpatients were assessed with the Danish IDDI and self-report inventories for depression and anxiety. Patients with abnormal scores were further assessed with the Mini International Neuropsychiatric Interview (MINI). Patients with IDD were asked to repeat IDDI for evaluating the reproducibility. Quality of life, well-being and adverse effects to antiepileptic drugs were determined.
Results: We included 169 patients, and 32 (19%) were diagnosed with IDD. Thirty patients were further assessed with MINI, and 17 (57%) were diagnosed with additional psychiatric disorders, mainly depression, dysthymia, and anxiety. Patients with IDD and additional psychiatric comorbidity had significantly higher seizure frequency, higher level of side effects to the antiepileptic treatment, and lower quality of life, both when compared to patients with normal screening and patients with IDD as the only comorbidity. The reproducibility of the Danish IDDI was only 50%.
Conclusion: With a prevalence of 19%, IDD appeared to be the commonest neuropsychiatric syndrome. The majority of the patients with IDD also had depressive and/or anxiety disorders. Quality of life, seizure control, and side effects to antiepileptic drugs were affected much more by depression or anxiety, than by IDD. The Danish version of IDDI has a poor reproducibility. The existence of IDD as a diagnostic entity is doubtful.

1. Introduction

Since the time of Hippocrates, associations between epilepsy and depression have been described.[1] In German psychiatric literature, a depressive condition with special characteristics in epilepsy patients has been described by Kraepelin[2] and Bleuler.[3] This condition was characterized by affective symptoms including irritability and euphoria as specific symptoms. Others have confirmed that a considerable fraction of epilepsy patients have this long lasting condition, and Blumer described this *Interictal Dysphoric Disorder* (IDD) as a condition characterized by labile depressive symptoms, labile affective symptoms, and the specific symptoms euphoria and paroxysmal irritability.[4,5]

In the literature on the psychiatric aspects of epilepsy, there is disagreement as to the existence of IDD. Mula et al. have investigated the features of IDD, and they argue that such a syndrome exists as a homogenous construct with specific clinical features.[1,6,7] However, IDD does not seem to be specific for epilepsy, as it is also diagnosed in patients with migraine.[6]

It is now possible to diagnose IDD with the self-report inventory, the *Interictal Dysphoric Disorder Inventory* (*IDDI*).[1] According to the published criteria, the diagnosis IDD requires that at least three of the following symptoms of moderate/severe severity leading to moderate/severe limitation have been present in the previous 12 months: *anergia, pain*, *sleeplessness*, *fear/panic*, *anxiety*, *depression*, *euphoria*, and *irritability*. Using the IDDI, it was the purpose of the present study to examine the existence of IDD in a population of epilepsy outpatients. Consequently, we translated IDDI from English to Danish.[8] The reliability of the IDDI was assessed by repeating the use of the IDDI in the same epilepsy patients. Since the time frame of the IDDI is 12 months, a high degree of reproducibility was expected. To further investigate the existence of IDD as a nosological entity we assessed the occurrence of the specific IDD symptoms euphoria and paroxysmal irritability in patients with and without IDD.

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2. Methods

2.1. Subjects

Adult patients with epilepsy treated at the epilepsy outpatient clinic, Department of Neurology, University Hospital of North Zealand were included from January 1 to December 31, 2013. The inclusion criteria were as follows: age 18 years or above, diagnosis of epilepsy according to criteria by the International League Against Epilepsy, MRI or CT scan of the brain, EEG, treatment with at least one AED in a constant dose in the previous month, and the ability to read and speak Danish. Exclusion criteria were severe medical or psychiatric comorbidity and inability to read and speak Danish.

2.2. Flow of patients

All patients received oral and written information. After informed consent to participate in the study, the patients were given the following self-report inventories:

- Anxiety Symptom Scale (ASS)
- Major Depression Inventory (MDI)
- Neurological Disorder Depression Inventory for Epilepsy (NDDI-E)
- Quality of Life in Patients with Epilepsy (QOLIE-31)
- World Health Organization Well-being Index (WHO-5)
- Liverpool Adverse Events Profile to antiepileptic drugs (LAEP)
- Interictal Dysphoric Disorder Inventory (IDDI)

If patients scored above threshold in ASS, MDI, or NDDI-E or fulfilled the criteria for IDD, a Mini International Neuropsychiatric Interview version 5.0.0 (MINI) was carried out.[9] Patients diagnosed with depression or anxiety were assessed with the Hamilton Depression Scale (HAM-D17)[10] and the Hamilton Anxiety Scale (HAM-A14),[10] respectively, to measure disease severity. Patients, who were diagnosed with a psychiatric disorder, were offered treatment according to local practice. To test the reproducibility of the Danish version of IDDI, all patients who underwent MINI, were asked to complete the IDDI again. This retest took place from 4 to 11 weeks after the first IDDI.

2.3. Translation of IDDI, NDDI-E and LAEP to Danish

IDDI, NDDI-E, and LAEP did not exist in Danish before this study. These three inventories were translated from English to Danish according to published methods.[8] First, a neurologist and a psychiatrist, both fluent in English and Danish, independently translated the three inventories. Consensus was found, and the three inventories were sent to a professional Danish–English translator who carried out a back-translation of the Danish versions to English. Finally, a Danish–English language specialist from the Research Unit at the Copenhagen University Psychiatric Centre of North Zealand carried out a debriefing of the results of the translation-back-translation procedures, and a few corrections were made. The adjusted translations were tested by the language specialist on three patients before use in the study to assure that the questions were clearly understood in the same way as they were written in the English versions. The Danish versions of these inventories are available as appendices.

2.4. The Major Depression Inventory (MDI)

The scale contains the items that cover the ICD-10 symptoms of depression. We used the MDI as a diagnostic tool requiring core symptoms of depression to be present most of the time for the past two weeks.[11]

2.5. The Anxiety Symptom Scale (ASS)

The ASS consists of 10 items. The presence of the items on levels 0–5 in the previous 14 days is assessed. The ASS was considered positive when Item 10, the impact on daily activities, had a score of three or more, and there was a score on the top three symptoms which are the actual anxiety symptoms.[10]

2.6. The Neurological Disorder Depression Inventory for Epilepsy (NDDI-E)

This screening tool for depression was developed for use specifically in patients with epilepsy. It consists of six statements about the past two weeks that are scored between 1 (never) and 4 (always/often), with a minimum score of 6 and maximum of 24. In the original version, a score above 15 has been shown to have high predictive value for major depression.[12]

2.7. The Interictal Dysphoric Disorder Inventory (IDDI)

This self-report questionnaire is specifically developed to diagnose IDD and to evaluate IDD symptoms in terms of presence, frequency, severity, and global impairment in the previous 12 months. Eight symptoms are examined. They are grouped into labile depressive symptoms (anergia, depressed mood, insomnia, and pain), labile affective symptoms (anxiety and fear), and specific symptoms (euphoric moods and paroxysmal irritability. The diagnosis of IDD is defined by the presence of at least three symptoms of "moderate" or "severe" severity and causing "moderate" or "severe" distress.[1]

The IDDI also includes an appendix with questions regarding the temporal relationship of the different IDD symptoms and their relations to seizures. In this study, we have chosen not to use the appendix, since it is not required for the diagnosis of IDD. Furthermore, many of our patients found the appendix too difficult to answer.

2.8. The Liverpool Adverse Events Profile (LAEP)

The LAEP is a 20-item self-report inventory for adverse events to antiepileptic drugs. These items are rated by the patient from one (the symptom is never a problem) to four (the symptom is always or often a problem).[13]

2.9. The World Health Organization Well-being Index (WHO-5)

The WHO-5 consists of five items. Each item is rated on a 6-point scale from 0 to 5. The score ranges from 0 to 25. The percentage value is calculated by multiplying the score by 4 and thus obtaining a scale from 0 (worst) to 100 (best). A percentage score below 50 is interpreted as indicating risk of depression and anxiety.[10]

2.10. The Quality of Life in Epilepsy Inventory (QOLIE-31)

The QOLIE-31 consists of seven multi-item scales. An overall score of 50 is the average for persons with epilepsy. The t-score ranges from 11 to 73.[14]

2.11. The Mini International Neuropsychiatric Interview version 5.0.0 (MINI)

The MINI-D is a Danish version of the Mini International Neuropsychiatric Interview version 5.0.0 (MINI), a previously validated interviewer-administered, structured, diagnostic psychiatric interview for DSM-IV and ICD-10.[9] In this study, the

MINI-D was used as the gold standard for current psychiatric diagnosis in the participants with abnormal scores on MDI, ASS, NDDI-E and IDDI.

2.12. Statistics

The results for epilepsy patients with psychiatric comorbidity were compared with the results for epilepsy patients without psychiatric comorbidity. We used SAS 9.3. Continuous data were compared using unpaired *t*-tests. The Chi-square test was used for categorical data, and Fisher's exact test if the cells had a frequency of five or less. $P < 0.05$ was considered statistically significant.

2.13. Ethics

The study was approved by the Ethical Committee of the Capital Region of Denmark (H-3-2012-086). All patients gave their written informed consent prior to inclusion in the study.

3. Results

3.1. Basic characteristics of patients with IDD

A total of 176 patients were included in the study, and 169 returned the self-report inventories. Forty-two patients had a score above threshold in at least one of the following inventories; IDDI, MDI, ASS, and NDDI-E. IDD was found in 32 patients (19%), and 19 of these also scored above threshold in at least one of the other self-report inventories screening for depression and anxiety (ASS, MDI and NDDI-E). Table 1 shows the basic data for included patients.

3.2. Depression, anxiety and IDD

Of the 42 patients with abnormal scores, 39 underwent MINI. Psychiatric disorder according to MINI was found in 23 patients (14%), the majority (19 patients) being depression, dysthymia, anxiety disorders, or a combination of these. The severity of depression as assessed with the HAM-D17 was mild or moderate (range 14–22), and the severity of anxiety as assessed by HAM-A14 was questionable to moderate (9–22). The distribution of patients with psychiatric disorders according to MINI is seen in Fig. 1.

Of the 32 patients with IDD, 30 underwent MINI. Fig. 2 shows the distribution of MINI verified psychiatric diagnosis in patients with IDD.

According to MINI 13 patients with IDD did not fulfill the diagnostic criteria for any psychiatric disorder. Depression was found in eight patients, five patients had dysthymia, four had anxiety, and four patients were diagnosed with other psychiatric comorbidities than the above mentioned. All patients with IDD and anxiety were also diagnosed with depression or dysthymia.

In total we found depression in 10 patients, of whom 8 also had IDD, and dysthymia was diagnosed in 7 patients of whom 5 had IDD. Thus, 13 (76%) of the patients with depressive disorders also fulfilled the criteria for IDD.

In Table 2 patients with IDD are separated into two subgroups; patients with IDD as the only neuropsychiatric disorder and patients with IDD and an additional MINI verified psychiatric diagnosis. The subgroups are compared to patients without IDD.

Patients with only IDD have more resemblance with patients without IDD than with patients with IDD and a MINI-based diagnosis. IDD patients with other psychiatric comorbidity were less likely to be seizure free compared to epilepsy patients with only IDD, and they were more likely to be treated with antidepressants. These differences were statistically significant.

3.3. Euphoria and irritability

Euphoria and paroxysmal irritability were considered to be present if they were indicated in IDDI as "moderate" or "severe" and causing "moderate" or "severe" distress. Euphoria was found in 1 out of the 13 patients with only IDD (7.7%) and 2 of 17 patients with IDD and additional MINI verified diagnosis (11.8%). In patients without any psychiatric comorbidity we found euphoria in 0.7%. Paroxysmal irritability was found in 7 out of 13 patients with only IDD (53.8%), 12 out of 17 patients with IDD and additional MINI verified psychiatric comorbidity (70.6%) and in only 1.5% of patients without any psychiatric comorbidity. The prevalence of euphoria and paroxysmal irritability was significantly higher in

Table 1
Basic characteristics of patients with normal score after screening, patients with abnormal scores, patients with IDD and patients with MINI verified psychiatric disorders.

Variable	Study groups ($n_{total} = 169$)			
	Normal screening	Abnormal screening	IDD	Psychiatric comorbidity according to MINI
Subjects, *n*	127 (75%)	42 (25%)	32 (19%)	23 (14%)
Age, mean years (SD)	55 (17.2)	46 (15.9)*	44 (15.4)*	48 (16.3)*
Female, *n*	55 (43%)	27 (64%)*	22(68%)*	12 (52%)
Epilepsy diagnosis, *n*				
G40.1: epilepsy with simple focal seizures	8 (6%)	1 (2%)	1 (3%)	1 (4%)
G40.2: epilepsy with complex focal seizures and secondarily generalized seizures	86 (68%)	31 (74%)	23 (72%)	17 (74%)
G40.3: epilepsy with generalized seizures	15 (12%)	3 (7%)	3 (9%)	2 (9%)
Others (G40.4, G40.5, G40.6, G40.9, R56,8)	18 (14%)	7 (17%)	5 (16%)	3 (13%)
Seizure free in the previous year, *n*	68 (54%)	10 (24%)*	9 (28%)*	3 (13%)*
AED, *n*				
Lamotrigine	99 (79%)	23 (58%)*	17 (53%)*	11 (48%)*
Levetiracetam	24 (19%)	13 (33%)	10 (31%)	7 (30%)
Others	43 (34%)	19 (45%)	15 (47%)	11 (48%)
Treatment with two or more AEDs per Subject, *n*	21 (17%)	14 (33%)*	11 (34%)*	7 (30%)*
Presence of side effects according to the LAEP (score range 20–80)	28	49*	48*	52*
Treatment with antidepressant, *n*	7 (6%)	11 (28%)*	9 (28%)*	10 (43%)*

* Statistically significant difference ($P < 0.05$) when compared to patients with normal score in the inventories.

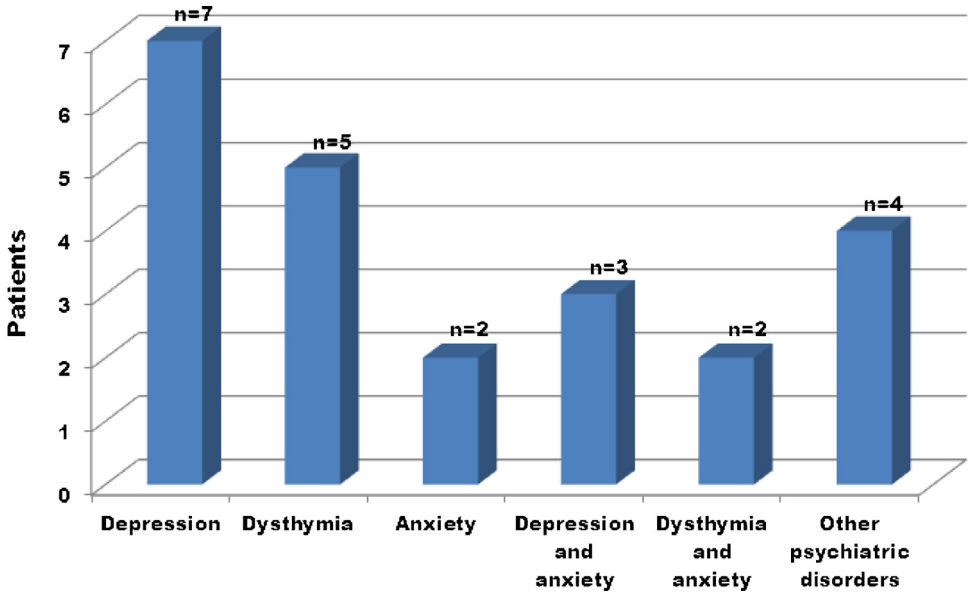

Fig. 1. Distribution of patients according to the Mini International Neuropsychiatric Interview (MINI).

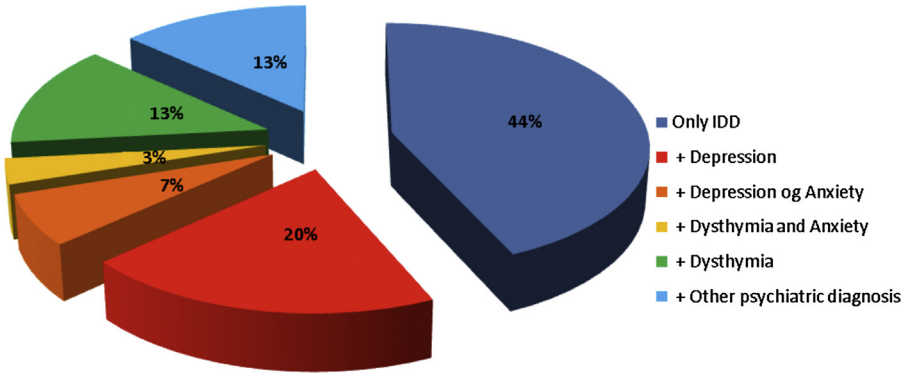

Fig. 2. Distribution of psychiatric diagnosis in patients with IDD according to the Mini International Neuropsychiatric Interview (MINI). [+]Presence of psychiatric diagnosis in addition to IDD.

patients with IDD and MINI verified diagnosis when compared to patients without any psychiatric comorbidity.

3.4. IDD and epilepsy diagnosis according to ICD-10

No statistically significant difference was found in the frequency of IDD when comparing patients with simple focal seizures (G40.1), secondarily generalized seizures (G40.2) and generalized seizures (G40.3).

3.5. IDD, seizure control, and antidepressants

Fig. 3 illustrates the level of seizure control in the different groups of patients according to psychiatric comorbidity and presence of IDD.

Patients with IDD without MINI-verified psychiatric disorders did not differ in seizure freedom when compared to patients with no psychiatric disorder. The percentage of seizure free patients was significantly lower in patients with a psychiatric diagnosis according to MINI, especially depression and anxiety. Treatment with antidepressants was significantly more common in the group with IDD and additional MINI diagnosis.

3.6. IDD and suicidality

Suicidality was found in 13 of the 169 patients (8%), and 11 of the epilepsy patients with suicidality fulfilled the criteria for IDD. Seven patients had low risk of suicidality; three had moderate risk and three high risk. All patients with moderate or high risk of suicidality were diagnosed with psychiatric comorbidities other than IDD. We did not find any association between specific antiepileptic drugs and the presence of suicidality.

3.7. Well-being, quality of life and adverse effects to AEDs

As shown in Fig. 4 patients without psychiatric comorbidity had the highest well-being and quality of life and the lowest level of adverse effects. Patients with a psychiatric diagnosis according to MINI had the lowest level of well-being and quality of life and the highest level of side effects. In patients with only IDD but without any MINI verified psychiatric comorbidity we found significantly higher level of well-being and quality of life and significantly lower level of adverse effects to AEDs when compared to patients with IDD and MINI verified psychiatric disorders. When comparing these patients to patients with normal screening, they had higher

Table 2
Patients without IDD, with IDD alone, and IDD in addition to MINI verified psychiatric disorders. *n* refers to the number of patients in each category with % in brackets.

	No IDD	Only IDD	IDD + additional psychiatric disorder
Subjects, *n*	137 (81%)	13 (43%)	17 (57%)
Gender, female, *n*	60 (44%)	10 (83%)†	10 (58%)*
Age, mean years (SD)	55 (17.2)	48 (16.6)	46 (14.3)*,†
Epilepsy diagnosis, *n*			
G40.2	94 (69%)	10 (77%)	12 (71%)
Other	43 (31%)	3 (23%)	5 (29%)
AEDs, *n*			
Lamotrigin	105 (77%)	7 (54%)	8 (44%)*,†
Levetiracetam	27 (20%)	4 (31%)	6 (33)
Others	46 (34%)	5 (38%)	10 (55%)
AED poly-therapy, *n*	24 (18%)	4 (31%)	5 (29%)
Seizure free in the previous year, *n*	69 (50%)	7 (54%)	3 (18%)*,†
Adverse effects to AED according to LAEP (score range 20–80)	30	43†	53†
Treatment with antidepressants, *n*	9 (7%)	1 (8%)	8 (47%)*,†

* Statistically significant difference ($P < 0.05$) between patients with IDD and additional psychiatric disorder compared with patients with only IDD.
† Statistically significant difference ($P < 0.05$) between the subgroup and patients without IDD.

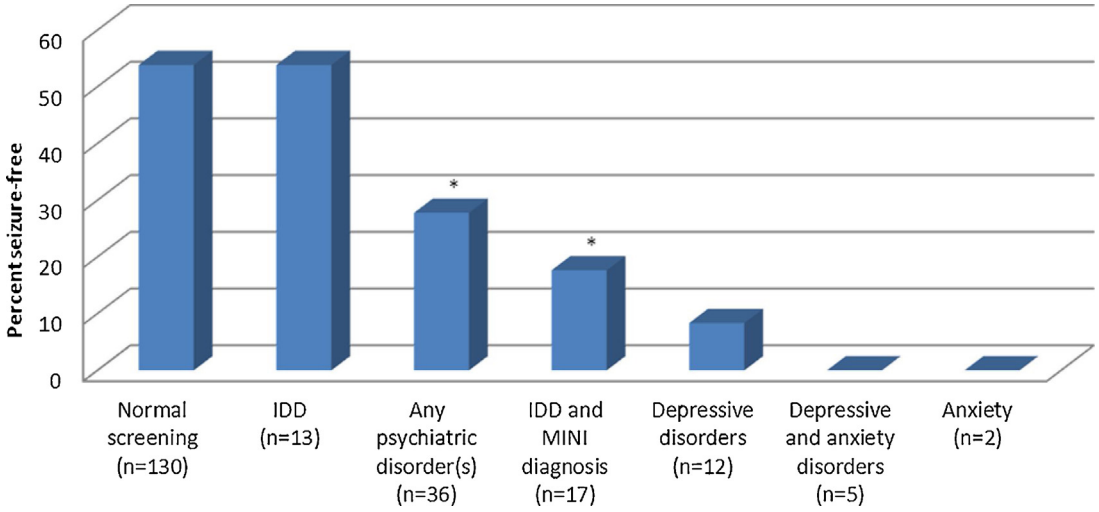

Fig. 3. Proportion of patients that were seizure-free in the previous year in various groups: n indicates the total number of patients in each group. *Statistically significant difference ($P < 0.05$) when compared with patients with normal screening.

level of adverse effects to AEDs and lower level of well-being and quality of life.

3.8. Reproducibility of IDDI

To assess the reproducibility of IDDI, patients with IDD were asked to repeat the IDDI. Twenty-two patients with IDD repeated the self-report inventory. The time interval between the first and the second IDDI varied from 4 to 11 weeks. Only 11 of 22 patients (50%) fulfilled the diagnostic criteria for IDD the second time. Seven of the 13 patients with IDD as the only psychiatric disorder repeated the IDDI, and only 2 fulfilled the diagnostic criteria for IDD the second time, making the reproducibility of IDDI even lower (29%) in this group.

4. Discussion

In this study, we find that IDD is diagnosed with IDDI in 19% of epilepsy outpatients. The main finding is that the reproducibility of IDDI is only 50%. Thus, IDD seems to be the most prevalent neuropsychiatric syndrome in epilepsy but it cannot be diagnosed in a reproducible way.

Our finding that IDD occurs with the same frequency in focal and generalized epilepsy is in line with recent publications.[15,16] With the Portuguese version of IDDI, 51% of the patients in tertiary epilepsy centers had IDD, and as in our study two thirds of the patients with IDD were females.[17] Our finding of 19% of patients with IDD using IDDI matched the finding by Mula et al.[6] (17%). The distinction between interictal dysphoric disorder and periictal dysphoric symptoms has been emphasized,[18] and we therefore chose to study epilepsy outpatients to eliminate too much influence of periictal symptoms in patients admitted due to seizures.

Given the large variation in frequency of IDD and its considerable overlap with other psychiatric disorders in epilepsy patients it is tempting to speculate whether IDD exists as a nosological entity. IDDI identifies epilepsy patients with a remarkable female preponderance, and the group of IDD patients have increased occurrence of antiepileptic side effects, reduced quality of life, and reduced well-being compared to epilepsy patients without psychiatric comorbidity.

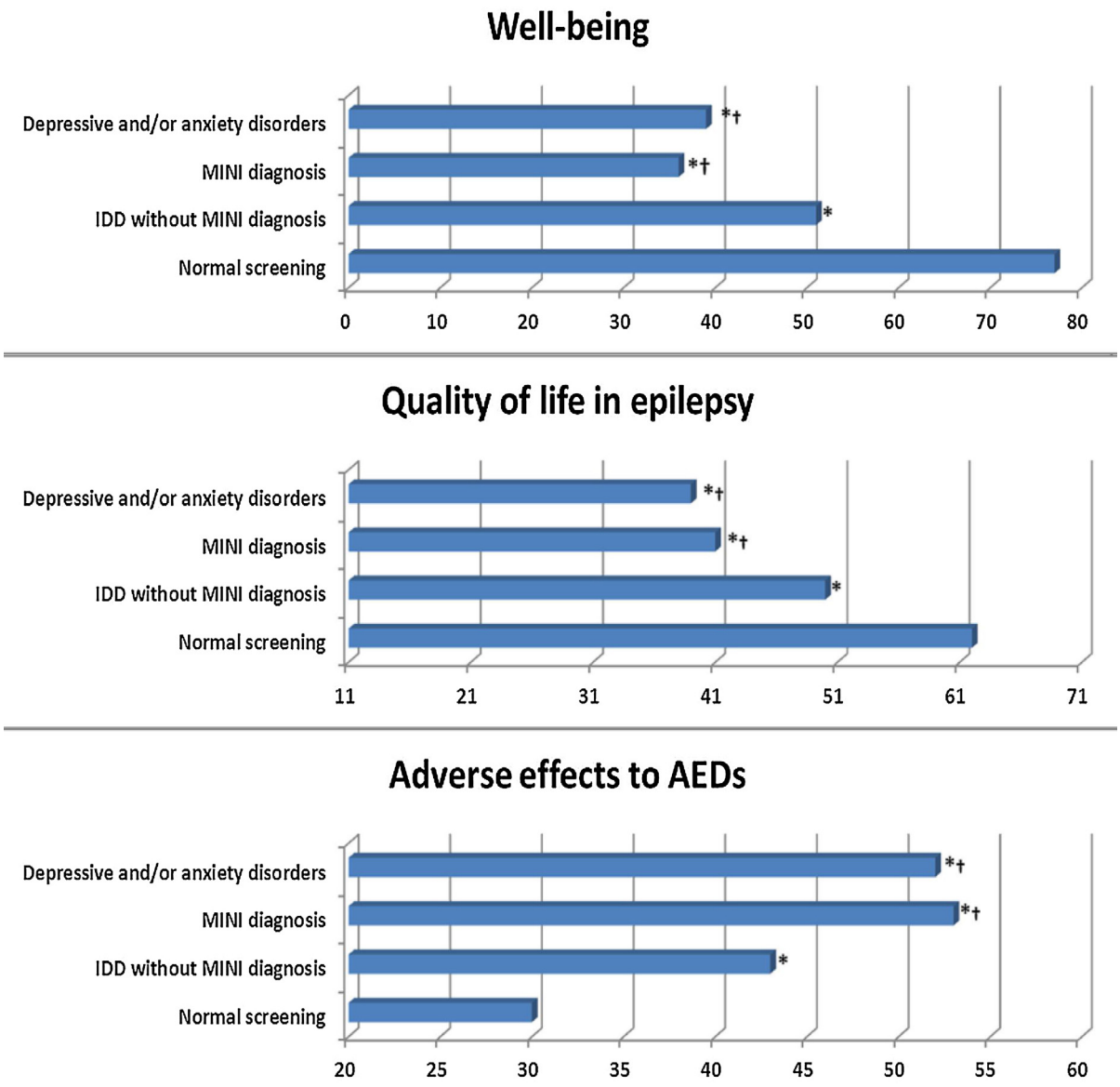

Fig. 4. Well-being (WHO-5 range 0–100), quality of life (QOLIE-31 range 11–73), and adverse effects to AEDs (LAEP range 20–80) in patients with epilepsy. *Statistically significant difference ($P < 0.05$) when compared to patients with normal screening. †Statistically significant ($P < 0.05$) difference when compared to patients with IDD without MINI verified psychiatric diagnosis.

However, less than half of the patients with IDD had IDD as the sole psychiatric comorbidity. Depression was the commonest companion, occurring in 27% of our IDD patients, whereas Mula et al.[6] found more than 40% of the IDD patients to have a current depression. They found depression to be the commonest psychiatric comorbidity in epilepsy. We found dysthymia and anxiety disorders coupled to IDD in frequencies matching those published by Mula et al.[6] As epilepsy patients with depression and IDD have many symptoms in common it could be speculated whether IDD is a specific disorder. Mula et al. argue that IDD is qualitatively different from depression. Especially the so called specific IDD symptoms paroxysmal irritability and euphoric moods are assumed to be characteristic for IDD and not for depression.[6] Consequently, we would expect paroxysmal irritability and euphoria to occur more frequently in patient with isolated IDD. However, only 10% of the patients in the current study with IDD had euphoria. Paroxysmal irritability was found in a higher frequency with IDD and additional psychiatric disorders compared to IDD alone. The data indicate that paroxysmal irritability and to a smaller extent euphoria is connected with psychiatric comorbidity more generally, and not IDD specifically.

We found that quality of life was significantly lower in patients with IDD and other psychiatric comorbidity both when compared to IDD patients without other psychiatric comorbidity and patients without IDD. A significantly poorer seizure control in the group of patients with IDD in addition to other psychiatric comorbidity could be of importance. Likewise, almost half of the patients in the latter group were in treatment with antidepressants when entering the study compared to only 8% of the patients who had IDD as the only psychiatric comorbidity. Thus, the health status for the epilepsy patients with IDD seems to depend on other psychiatric comorbidity more than on IDD.

It is remarkable that 37% of the epilepsy patients with IDD have suicidality as assessed by the MINI, whereas 8% of all participating epilepsy patients displayed suicidality. The severity of suicidality is more dependent on the presence of depression or other psychiatric comorbidity according to MINI than IDD. Epilepsy patients have an increased risk of committing suicide even in the absence of

psychiatric comorbidity, but the highest risk has been found in patients with epilepsy and comorbid psychiatric disease.[19] Recently, Hesdorffer et al.[20] found that epilepsy is associated with an increased risk of psychiatric disorders and suicide even before the epilepsy diagnosis disorders. The explanation could be common underlying pathophysiological mechanisms.

IDD is not limited to epilepsy. Migraine patients fulfill the criteria for IDD to the same extent as epilepsy patients.[6] At present, we do not know whether patients with chronic diseases affecting other organ systems could have IDD.

If we assumed that IDD exists as a nosological entity in epilepsy, how could we diagnose it? In this study we have used IDDI as published in English[1] and translated it into Danish according to published methods.[8] We found a frequency of IDD (19%) very comparable with the frequency published for the English version of IDDI.[6] However, only 11 of 22 patients (50%) fulfilled the criteria for the diagnosis IDD the second time. Since the time frame for IDD symptoms is 12 months, a change in condition over a few weeks cannot be the explanation for the low degree of reproducibility. Language problems, cognitive problems or lack of compliance are unlikely explanations. In our opinion, the most likely explanation is that the inventory testing for IDD is complicated and difficult to fill out in a reproducible way. We also base this opinion on our own work with the translation of IDD from English to Danish. For each of the 8 symptoms of IDD there are four levels of questions. The first level regards presence or absence of a symptom, the second level the occurrence of the symptom in time with four possible answers; the third level the severity of the symptom with four possible answers and finally the impairment due to the symptom with four possible answers. We imagine that many epilepsy patients would have difficulties filling out the inventory, especially when considering the long time frame of 12 months. In the hands of our epilepsy patients IDDI does not have the necessary reliability. Consequently there seems to be a need for prospective studies to clarify if IDD exists, and if so, to devise a reliable diagnostic tool.

The major limitation in our study is that patients with normal screening did not undergo MINI. Consequently, we cannot exclude a present psychiatric comorbidity in these patients. However IDDI cannot be validated by the MINI, since it is not a DSM-IV diagnosis and therefore this limitation does not change our conclusion. Furthermore, our study is limited by the number of patients included, which results in problems with subgroup analysis, for example when assessing the presence of psychiatric comorbidity in different groups of epilepsy patients. A large number of patients (see patient flowchart in supplementary information) were excluded from our study because of severe mental retardation of cognitive dysfunction. This introduces a selection bias, since many of these patients are probably in higher risk of suffering from psychiatric comorbidities.

5. Conclusion

IDDI identifies 19% of the epilepsy outpatients as having IDD. Two thirds are female, and they are more likely to have reduced quality of life and well-being and increased risk of AED side effects and suicidality. However, more than half of these patients fulfill the DSM-IV criteria for depression, dysthymia, or an anxiety disorder. Furthermore, the seizure control and the use of antidepressants is the same among IDD patients as in patients without psychiatric comorbidity. The supposed IDD specific symptom euphoria was only found in 10% of the IDD patients. Paroxysmal irritability seemed more prominent in patients with IDD and additional psychiatric comorbidities as opposed to patients with only IDD. Other studies show that IDD is not specific for epilepsy. IDDI in the Danish version had a reproducibility of only 50%. Based on these results the existence of IDD as a nosological entity is doubtful, and reliable tools for its identification are lacking.

Disclosures

We confirm that we have read the journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.seizure.2014.08.009.

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