

In press *Epilepsy & Behavior*

Acceptance and Commitment Therapy and Yoga for drug refractory Epilepsy:

A randomized controlled trial

*Tobias Lundgren, *JoAnne Dahl, **Nandan Yardi, *Lennart Melin

*Department of psychology, University of Uppsala Sweden

**Yardi Hospital, Pune India

Corresponding author: Tobias Lundgren, Tobias.Lundgren@psyk.uu.se Cell phone: +46 70 612 4555, Fax +46 18 471 21 23, Department of psychology, Uppsala University, Trädgårdsgatan 20, box 1225, 751 42 Uppsala Sweden

Abstract

Purpose: There is a need for controlled outcome studies on behavior treatment of epilepsy. The purpose of this study was to evaluate Acceptance and Commitment Therapy and Yoga in the treatment of epilepsy.

Methods: The design consisted of a RCT with repeated measures (N=18). All participants had an EEG verified epilepsy diagnosis with drug refractory seizures. Participants were randomized into one of two groups ACT or Yoga. Therapeutic effects were measured using seizure index (frequency x duration) and quality of life (SWLS, WHOQOL-Bref). The treatment protocols consisted of 12 hours of professional therapy distributed in two individual sessions, two group sessions during a five-week period and booster sessions at 6 month and 12-month post treatment. Seizure index was continuously assessed during the 3-month

baseline and 12-month follow up. Quality of life was measured after treatment and at 6 month and 1 year follow up.

Results: The results showed that both ACT and Yoga significantly reduced their seizure index and increased quality of life over time. The ACT group reduced seizure index significantly more as compared to the Yoga group. Participants in both the ACT and the Yoga group improved their quality of life significantly in one of two life quality instruments. The ACT group increased the quality of life significantly as compared to the Yoga group at the WHOQOL-Bref and the Yoga group increased their quality of life significantly as compared to the ACT group at the SWLS.

Conclusions: The results of this study suggest that complementary treatments, such as ACT and Yoga decrease seizure index and increase quality of life.

Key words: Epilepsy, Acceptance and Commitment Therapy, Yoga, India

1. Introduction

Research suggesting that behavior treatments can influence the seizure process is substantial (1-2). However, there are few signs that these low cost, non-invasive interventions are integrated in the everyday treatment for epilepsy. Antiepileptic drugs (AED) are normally the only treatment offered to those who suffer from epilepsy despite the fact that they do not function effectively for everyone, entail averse side effects and are not economically available to the majority of people (3-4). The actual seizures are only a small part of the overall problems associated with epilepsy. Persons suffering from seizures suffer more frequently from psychiatric disorders like depression, anxiety and low quality of life as compared to those with other chronic illnesses [5]. The stigmatization problems associated with epilepsy are well documented [6]. These conclusions suggest that persons suffering from epilepsy and related problems need to be treated with a broad behavior approach [7]. The present project evaluates the effect of two active treatments both, which address the larger context of epilepsy and quality of life: Acceptance and Commitment Therapy (ACT) and Yoga for a group of patients with drug refractory seizures.

An epileptic seizure is according to the behavior model defined as a complex involving a biological predisposition to 'seize' and internal and external contextual factors that increase or decrease the probability of seizure occurrence [8]. The epileptic seizure is seen as a chain of behavior and the analysis of that chain includes, eliciting, inhibiting and the seizure function [9]. A tailored made program is developed based on the behavior analysis and

includes preventive strategies, seizure management, and intervention dealing with the functions of the seizure behavior [10]. The aim of applied behavior analysis is to predict and affect behavior. The goal of the intervention is to decrease seizure activity and increase life quality.

Applied behavior analysis and learning theory has in recent years taken important steps in the development of theoretical and clinical understanding of human functioning [11]. One recent developed model in behavior therapy is Acceptance and Commitment Therapy (ACT). ACT is based on behavior psychology and grounded on a new theory of language and cognition called Relational Frame Theory (RFT) [12]. The effect of ACT has been evaluated for chronic illnesses such as epilepsy [13], diabetes [14], and pain [15] showing promising results. ACT has also been evaluated for psychiatric disorders like depression, anxiety, stigmatization problems and social phobia with good effects [16]. The aim of ACT is to create psychological flexibility and stimulate activity in directions that persons consider meaningful and vital, so called valued directions. Psychological flexibility around difficult emotions and thoughts that function as a barrier to valued actions is created using acceptance and mindfulness processes. Acceptance refers to an active willingness to experience emotions, bodily sensations and thoughts without trying to control or manipulate them [17]. Mindfulness is a process through which emotions, thoughts and sensations are experienced here and now in a conscious flow [18]. Psychological flexibility developed through acceptance and mindfulness aim to help patients to act instead of re-acting on bodily sensations [19]. ACT for epilepsy is built on basic behavior processes and focus on both quality of life and the seizure pattern. The aim of an ACT treatment for epilepsy is to increase psychological flexibility around the chain of seizure development, decrease the epilepsy related experiential avoidance, broaden the behavior repertoire and motivate activity in chosen valued direction. Reducing experiential avoidance with behavior methods may decrease the triggering function of experiences related to epilepsy [20].

Yoga may have an effect on the probability of seizure occurrence in a similar way to biofeedback training and relaxation due to the effect yoga has on brain wave activity and arousal level [21-22]. Research shows that sudden changes in cortical activity and arousal level affect the probability of seizure occurrence [23-24]. Studies on biofeedback show that persons in a lab using a video EEG can be trained to generate brain waves that affect the probability of seizure occurrence [25]. Furthermore, Brown and Gerbarg [26] suggest that yoga training stimulates the vagus nerve, and stimulation of the vagus nerve has shown to decrease seizure frequency by 28-38% [27-28]. Yoga has shown to increase quality of life and

decrease psychiatric problems for those who suffer from epilepsy [29]. The aim of the yoga training in this study is to prevent and decrease seizure behavior and increase quality of life.

Between 25-40% of those who suffer from epilepsy have uncontrolled seizures, suffer from adverse side effects from medication, suffer from stigmatization and have a higher degree of psychiatric disorders as compared to those who suffer from other chronic illnesses. For those who suffer from epilepsy and related problems it is important to develop, evaluate and implement a complementary treatment model, in the everyday treatment of epilepsy [30-31]. Cochrane library has expressed the need for well-designed, controlled outcome studies evaluating the effect of behavioral treatment of epilepsy [32]. The aim of this study is to evaluate and compare the effects of two active treatments for epilepsy: ACT and Yoga.

2. Methods

2.1. Design

The design was a randomized controlled two-group study with repeated measures. Participants were assigned into either an ACT or Yoga treatment using a computerized randomization table [33]. The design involved 4 sessions entailing one individual, two group and one individual session. Booster sessions were given at 6 and 12 months. The individual sessions and booster sessions were 1.5 hour each and the group sessions were 3 hours, creating a total therapy time for both groups of 12 hours. The booster sessions were given after the 6 and 12-month follow-up.

2.2. Subjects

Eighteen adults ranging between the age of 18 and 55 years living in the South West of India participated in the study. All participants were recruited from an outpatient clinic. Inclusion criteria were: being able and willing to participate in the treatment program, having had a minimum of three seizures during the past three months, and having a verified diagnosis of epilepsy using EEG. One participant was excluded due to ongoing progressive illness.

Table 1 shows an overview of the demographic data among the participants in the ACT and Yoga condition. There were no noticeable differences between the groups in background variables.

Table 1

Demographic description of participants gender, need for interpreter, living situation, age, seizure type, educational level, social skills, marital status, use of AED, side effect of AED and seizure triggers in the two conditions, ACT and Yoga.

	ACT (n=10)	Yoga (n=8)
Male	7	5
Female	3	3
Need for interpreter	6	5
Mean age group (year)	21.9	25.8
Social skills		
Adequate	6	5
Inadequate	4	3
Marital Status		
Married	1	2
Single	9	6
Seizure Type		
Generalized tonic clonic	6	6
Myclonic jerks	2	1
Partial complex seizures	3	2
Absences	0	1
Antiepileptic drugs (AED):		
Phenytoin	5	1
Carbamazepine	3	5
Valproid	2	1
Tegretol	3	1
Encorate	0	1
Clobazam	4	3
Side effects of AED:		
Drowsiness	4	3
Memory loss	3	2
Concentration problems	3	2
Nausea	3	1
Tiredness	4	3
Swollen gums	1	1
Weight gain	3	2
Seizure triggers:		
Drowsiness	2	2
Tension	4	2
Worry related to seizures	7	6
Flicker of light	1	1
Sudden changes in arousal level	8	6

2.3. Procedure

Assessments of seizure index were taken at a 3-month baseline and during the 12 months of follow up using seizure diary. Life quality was assessed prior to the treatment start, after treatment and at 6 and 12 months follow up. The treatments were given during a 5-week period at a clinic for epilepsy in the south west of India. Two clinical psychologists (first and second author) trained in ACT and behavioral treatment of epilepsy was responsible for the ACT part of the study. A Yoga teacher from the outpatient clinic was responsible for the

Yoga treatment. Physicians and a clinical psychologist, employed at the outpatient clinic assisted with translations during assessment of dependent variables, individual sessions and group sessions. Participating staff was given a half-day ACT workshop to ensure treatment integrity and the assessment and treatment sessions were video and audio recorded for the same purpose. The ACT protocol was adjusted to the Indian context after discussions with the participating staff to avoid unnecessary misunderstandings due to language problems and cultural differences. Prescriptions and dosages of antiepileptic drugs remained constant throughout the study. Changes in either prescriptions or dosages were exclusion criteria. In the case of exclusion the participants was offered full treatment.

2.4. Independent variable

The independent variable comprised of two active treatment conditions: ACT and Yoga. The ACT treatment protocol was designed using Acceptance and Commitment Therapy [34] and Clinical handbook in the treatment of epilepsy [35]. Both the ACT and the yoga treatment protocols were designed for this project and adjusted for the Indian context. The yoga treatment protocol was designed using Yardi [36] and Chopra and Simon [37]. A video summary of both the ACT and Yoga intervention is available for download at www.contextualpsychology.org.

2.4.1. Acceptance and Commitment Therapy

The aim of the ACT condition was to increase psychological flexibility around participant's life barriers including seizures, fear of seizures and improve activity in personally chosen valued directions. The therapists helped the participants to built broader behavior repertoires in valued directions using processes like values clarification, acceptance, defusion, mindfulness, commitment [38-40] functional analysis of seizure chains and countermeasures [42].

The aims of sessions one and two are described below. The ACT protocol [43] can be downloaded at www.contextualpsychology.org and www.ACT-Forum.se

Session 1: Individual session and the aims of the session were to:

- 1) Use the values compass and the Bulls-Eye to establish values as the context of therapy.
- 2) Examine discrepancies between how participants want to live and how they, in fact, are living their lives, currently.
- 3) Identify barriers and obstacles to participant's valued life.
- 4) Examine participant's reactions or ways of relating to described barriers and obstacles.

- 5) Examine the “function” of the participant’s strategies in reducing or controlling these obstacles, which in ACT is called creative hopelessness.
- 6) Commit to the personal valued directions described in the beginning of the session.

Session two: Group session (6-8 participants).

The aims of session two were to present, practically demonstrate and provide the opportunity for the participants to experience the following components of ACT:

- 1) Self as context versus self as content using mindfulness exercise “the observer self”
- 2) Living a valued life versus living a life in avoidance, Exercise: Discriminating your own values from rules of conduct.
- 3) Seeing thoughts as thoughts versus seeing thoughts as true obstacles to a valued life. Exercise: “Kick your butts” showing the functions of sentences like: I want to have an intimate relationship but I have epilepsy leads to: no intimate relationship.
- 4) Acceptance of what cannot be changed (thoughts and feelings) and changing what can be changed. To illustrate this a dramatization of the “Bus Metaphor” was used. Participants attempts to drive the bus of life in a valued direction and all the thought obstacles which come up are personified by bus passengers (members of the group) who argue and fight with the driver to bully him or her off course. The object is to relate to these obstacles in a manner of acceptance and at the same time keep on course.
- 5) Commitment of taking steps in valued directions even in the face of emotional difficulties related to epilepsy and life: Exercise: Participants take turns in standing up at the end of session and stating:
 - a) A valued direction,
 - b) The identified “thought” obstacles often related to epilepsy but also to life in general,
 - c) How he or she typically handled the obstacles
 - d) The experience of the workability of those coping strategies
 - e) A committed action of a step in valued direction that will be taken today

In addition, behavior technology of seizure control was presented in a simple ABC (antecedents, behavior and consequences) chain of events. Participants recorded seizure chains and typical patterns of high and low risk for seizures were investigated. Participants practiced interrupting seizures by the simplest countermeasure techniques to arrest an ongoing seizure.

2.4.2 Yoga

The aim of the Yoga condition was to teach participants to respond to internal stimuli in a conscious way, decrease seizure activity and increase quality of life. The training aimed at helping participants decrease behaviors that were under discriminative control of fears, thoughts, and emotions associated with epilepsy. The Yoga training for epilepsy had two main features: stimulating activity in directions that the participants considered meaningful and to use yoga techniques to decrease the risk of epileptic seizures. The Yoga program focused on three different physical dimensions and two psychological dimensions to unite the

mind, body and soul. The physical dimensions are called 'Pranayama' (controlled deep breathing), 'Asanas', (physical postures) and 'Dhyana' (meditation) [44]. The psychological dimensions are called 'Yama' (harmony with others) and 'Niyama' (harmony with yourself). The Yoga teacher integrated the teaching of 'Pranayama', 'Asanas' 'Dhyana' and the teaching of the 'Yama' and 'Niyama' into a four-session protocol to fulfill the aim of the study. Furthermore, the Yoga teacher included significant others during the sessions for two purposes: 1) increase the likelihood that the yoga training is maintained without the trainer being present and 2) increase the likelihood that significant others would be supportive. The Yoga focused on general well-being and reduction in seizure index. The Yoga teacher and the participants discussed barriers towards living a life considered important. Accepting private events, and living meaningful lives were essential parts of the treatment. The teacher used metaphors, direct instructions and encouragement to help the participants to be active in areas considered important. Examples of such domains are: relationships, work, health and leisure time. The sessions were video and audio recorded to ensure treatment integrity.

2.5. *Dependent variables*

The dependent variables in the study were seizure index (seizure frequency x seizure duration) and quality of life. The instruments that measured the dependent variables in the study were seizure diary, SWLS and WHOQOL-bref. Seizure frequency and duration were continuously reported in a seizure diary three-month prior to the intervention (baseline) and prospectively during the 15-month project period. The participants filled out the quality of life instruments SWLS and WHOQOL-Bref prior to the intervention start, after treatment and at 6 and 12 months follow up.

The Satisfaction With Life Scale (SWLS) consists of 5 statements that the client can either strongly agree or strongly disagree with on a 1-7 scale. According to Diener and colleagues [45], SWLS has shown a strong internal consistency (Cronbach's alpha .87) and moderate temporal stability (test re-test .82). SWLS has shown to correlate with 10 other measurements of subjective wellbeing, $r \sim .50$ [46].

The World Health Organization Quality Of Life (WHOQOL-BREF) has a reported Cronbach's Alpha at 0.81-0.90. The instrument consists of 4 domains of life quality, psychological health, physiological health, social relationships and environmental health. The discriminant validity was satisfactory and the instrument did not show any ceiling or floor effects. [47].

2.6. Statistical analyses

The analysis of variance was done using Statistica 6.0 [48]. The seizure index was analyzed using independent and dependent t-test on pre to post change score. Change scores focus on the improvements from pre to posttest and were used due to significant pretreatment differences. To detect differences between groups over time with regard to SWLS and WHOQOL-bref mixed ANOVA'S (2 groups * 4 time periods) and one-way ANOVA's were conducted. Cohen's d effect sizes were calculated using Excel.

2.7. Ethical considerations

Written informed consent was obtained from each of the participants in the study. Participants were provided with written and verbal information that participation in the study was voluntary and could be terminated at any time and that all information gathered in the study was treated as confidential. Participants signed separate informed consent-form giving therapists permission to video and audio record during the sessions.

3. Results

A description and comparison of effects of the two treatment conditions with respect to each of the dependent variables before and after treatment is presented.

3.1 Seizure frequency

Table 2 shows an overview of participants epilepsy diagnose as well as the seizure frequency.

Table 2 Description of each participant's epilepsy diagnose, mean seizure frequency and duration (in seconds) at pre and post treatment. GTC=Generalized Tonic Clonic, PC=Partial Complex, MJ=Myclonic Jerk P=Participant, A=Absences.

Participant, Group & Diagnose	Mean frequency Pre	Mean frequency Post	Mean duration Pre	Mean duration Post
P1 Yoga GTC	8	0	4	0
P 2 Yoga GTC	1	0.2	10	7
P 3 Yoga PC	1	0.7	90	50
P 4 Yoga GTC	1	0.5	150	100
P 5 Yoga GTC + A	2	0	4	0
P 6 Yoga GTC	1	0.4	120	80
P 7 Yoga	1	0	120	0
P 7 Yoga PC	1	0	120	0

P 8 Yoga GTC + MJ	18	0	4	0
P 9 ACT GTC	1	0.5	90	60
P 10 ACT GTC	1.7	0.3	150	80
P 11 ACT GTC + MJ	120	0	3	0
P 12 ACT GTC	7	6.1	60	45
P 13 ACT PC	1.3	0	240	0
P 14 ACT PC	3	1	60	17
P 15 ACT MJ	187	60	6	4
P 16 ACT GTC	1	0	10	0
P 17 ACT PC	2	0	150	0
P 18 ACT GTC	90	0	10	0

Table 2 shows that all participants in the study decreased their seizure frequency and duration at follow up and also that 5 out of 10 participants were seizure free in the ACT group and 4 out of 8 in the Yoga group.

3.2 Seizure index

Table 3 shows an overview of the result for the ACT and Yoga condition at the seizure index before and after treatment.

Table 3

Descriptions of the seizure index as to mean, standard deviation, degrees of freedom, t-value and p-value.

Dependent Variable	Group	Pre M (Sd)	Post M (Sd)	Pre treatment comparison	Pre - Post	Change score Between groups	Cohen's d Pre to post
Seizure index	ACT	395 (351)	62 (104)	$t_{(16)} = 2.5^*$	$t_{(9)} = 3.3^{**}$	$t_{(16)} = 2.4^*$	ACT = 1.3
	Yoga	75 (54)	15 (23)		$t_{(7)} = 3.8^{**}$		Yoga = 1.4

*= $p < .05$, **= $p < .01$

Table 3 shows a significant reduction in seizure index in both groups over time. Due to significant pre-treatment group differences, change scores were used and the results showed that the ACT group changed significantly more as compared to Yoga.

3.3 Quality of life

Table 4 shows an overview of the results for the quality of life instruments SWLS and WHOQOL-Bref at baseline, after treatment, at 6 and 12 months follow up. No significant interaction effect was found in SWLS ($F(3,48) = .49$ NS) and WHOQOL-Bref ($F(3,48) = 2.77$ NS). The effect sizes are calculated using a mean of all post measure points.

Table 4: Description of the quality of life measures SWLS and WHOQOL-Bref as to mean, standard deviation, Degrees of freedom, p-value, F-value and effect size of pre and mean post.

Dependent Variable	Group	M (Sd)	ANOVA Simple main effects	Cohen's d Pre & Post
SWLS	ACT pre post 6 month 12 month	19.4 (5.4) 21.8 (6.3) 21.4 (7.2) 24.4 (6.6)	F (3,27)= 1.75 NS	ACT=0.55
	Yoga pre post 6 month 12 month	18.5 (8.9) 21 (7.1) 23.6 (7.5) 24.3 (5.2)	F (3,21)= 4.49*	Yoga=0.58
WHOQOL-Bref	ACT pre post 6 month 12 month	51.3 (7.9) 57.2 (7.2) 56.4 (6.7) 58.4 (6.5)	F (3,27)= 5.50**	ACT= 0.81
	Yoga pre post 6 month 12 month	59.7 (9.6) 60.2 (8.6) 58 (6.5) 61.5 (3.9)	F (3,21)= 1.59 NS	Yoga=0.02

*= $p < .05$, **= $p < .01$, NS=Not Significant

Table 4 shows that the participants in the ACT group increased their quality of life significantly using the WHOQOL-Bref. The ACT group show a strong effect pre to post at SWLS but the changes in the group over time are not significant. The participants in the Yoga group increased their quality of life significantly using the SWLS but did not show any significant changes or strong effects using the WHOQOL-Bref.

4. Discussion

The results of the current study showed that short-term ACT and Yoga treatments for epilepsy increased decreased seizure index and quality of life. The ACT treatment showed a significantly larger decrease in seizure index as compared to the Yoga treatment. The results from the quality of life measure showed that the participants in both groups increased quality of life significantly over the one year follow up period in one out of two instruments. The present study contributes to the research base on treatment of epilepsy in at least three ways: 1) Complementary treatments help those who suffer from epilepsy, both to enhance life quality and decrease seizure activity; 2) Interventions can be integrated in an out patient

clinic, even across cultures with good results; 3) Treatment of epilepsy can be non-invasive, at a low cost and conducted even when language barriers and cultural differences are present.

The ACT and Yoga protocols contained similarities, which raise questions about the processes through which the two treatments work. Both protocols include mindfulness training, acceptance of private events, discussions about losses of meaningful life directions, commitment towards important life directions and inclusion of significant others during both individual and group sessions. Acceptance, mindfulness and life fulfillment processes are of well-known utility as coping strategies in the treatment of epilepsy [49]. Practicing mindfulness may help participants not to react to bodily sensations but instead become aware of emotions, thoughts and sensations and consciously chose actions moment by moment. Mindfully choosing actions instead of experiencing oneself as being under control of bodily sensations, thoughts and memories associated with epilepsy may create a sense of self-efficacy and decrease epileptogenic activity. Mindfulness, biofeedback and relaxation contain similarities in the focus of effecting cortical activity. Biofeedback and relaxation has in previous research shown to decrease seizure activity [50-51] and it might be similar when practicing mindfulness.

Acceptance of private events, together with mindfulness may have helped the participants to persist in reclaiming a valued life even in the face of epilepsy and related problems. Persistence in the face of emotional difficulties and acceptance of private events has in previous research shown to correlate positively with higher quality of life and lower psychiatric problems [52]. Sensations, thoughts and emotions that previously have functioned as triggers for seizures may not necessarily lead to a full-blown seizure following an acceptance and mindfulness intervention. Acceptance and mindfulness skills may increase the seizure threshold in a similar way as biofeedback [53] and lead to a decrease in epileptogenic activity.

The therapists in both groups helped participants to investigate valued life directions and stimulate consistent activities. Increasing activity in valued directions has been shown to increase quality of life [54] and has been an important part of psychotherapy for persons suffering of epilepsy. Fenwick [55] writes that a sense of fulfillment and better life adjustment are powerful anticonvulsants. Furthermore, activation in valued direction may help the participants to contact natural positive reinforcement, which may help maintain behavior change [56].

The inclusion of significant others in treatment programs for epilepsy is recommended but rarely carried out [57-58]. In this study family members seizure related fears are targeted

and treated. The support from significant others in this study may be similar to other programs for epilepsy (Hufford et al 1999) help participants to take action towards meaningful life directions, help participants to maintain behavior change in valued direction and manage epileptic seizures.

All these four processes may have contributed to the increase in quality of life and the decrease in seizure activity for the participants in the present study. Further research on the effect of these processes in the treatment of epilepsy are important for two reasons: 1) To better understand the psychological mechanism involved in the development of epilepsy and related psychiatric problems and, 2) enhance the treatments for those who suffer from epilepsy and related problems.

The Yoga group increased their life quality in one (SWLS) of the two life quality measures and the ACT group increased in the other (WHOQOL-Bref). The WHOQOL-Bref is an instrument with both specific questions about barriers and problems in life and general questions about life quality. SWLS is a brief instrument with general questions about life quality. The ACT group worked more specifically with situations and barriers towards a good life quality and that may explain the significant changes in WHOQOL-Bref. In the Yoga group, a general approach towards life quality was used, which may explain the changes in SWLS. The quality of life instruments were not used for comparison with various norm-groups but only for comparison of the two treatment groups.

The small number of participants and the pre-treatment differences are limitations in the study. A placebo control group might have been preferable but due to the available number of patients, a three-group design was not possible.

Further research is of the up-most importance to help those who suffer from epilepsy and associated problems. A large, well-controlled, multi center study that implements complementary treatments at an outpatient clinic and evaluates the effect would be an important step for the field. Furthermore, research on the psychological mechanisms in the treatment of epilepsy is important to better understand eliciting, maintaining and inhibiting factors in epilepsy.

References

- [1,13,20,40] Lundgren T, Dahl J, Melin L, Kies B. Evaluation of Acceptance and Commitment Therapy for Drug Refractory Epilepsy: A Randomized Controlled Trial in South Africa—A Pilot Study. *Epilepsia* 2006;47:2173-2179.
- [2,32] Ramaratnam S, Baker GA, Goldstein LH. Psychological treatments for epilepsy. (Cochran Review). The Cochran Library, Issue 1, 2004; Chichester, UK: John Wiley & Sons, Ltd.
- [3] Kwan P, Brodie MJ. Early identification of refractory epilepsy. *N Engl J Med* 2000;58:2-8.
- [4] Platt M, Sperling MR. A comparison of surgical and medical costs for refractory epilepsy. *Epilepsia* 2000;43:25-31
- [5] Wallace SJ, Farrell, K. Epilepsy in children. 2nd edition. Arnold, London; 2004.
- [6] Jacoby A. Stigma, Epilepsy, and quality of life. *Epilepsy & Behavior* 2002;3:10-20.
- [7,31] Wolf P. From precipitation inhibition of seizures: rationale of a therapeutic paradigm. *Epilepsia* 2005;46:15-6.
- [8,10] Dahl J, Lundgren T. Behavior Analysis of Epilepsy: Conditioning mechanisms, behavior technology and the contribution of ACT. *The Behavior analyst today* 2005;6:191-202.
- [9] Wolf P. From precipitation to inhibition of seizures: rationale of a therapeutic paradigm. *Epilepsia* 1992;46:15-6.
- [11,16] Hayes SC. Acceptance and Commitment Therapy, Relational Frame Theory, and the third wave of behavior therapy. *Behavior Therapy* 2001;35:639-665.
- [12] Hayes SC, Barnes-Holmes D, Roche B (Eds) *Relational Frame Theory: A Post-Skinnerian account of human language and cognition*. New York: Plenum Press; 2001.
- [14] Gregg JA, Callaghan GM, Hayes SC, Glenn-Lawson JL. Improving Diabetes Self Management Through Acceptance, Mindfulness, and Values: A Randomized Controlled Trial. *Journal of Consulting and Clinical Psychology* 2007;75:336-343.
- [15] Dahl J, Wilson KG, Nilsson A. Acceptance and commitment Therapy and the Treatment of Persons at Risk for Long-Term Disability Resulting from Stress and Pain Symptoms: A preliminary Randomized Trail. *Behavior therapy* 2004;35:785-802.
- [17,19,34,38,56] Hayes SC, Stroschal K, Wilson KG. *Acceptance and commitment Therapy: an experiential approach to behavior change*. New York: Guilford Press; 1999.
- [18,39] Hayes SC, Stroschal K (Eds) *A practitioners guide to acceptance and commitment therapy*. New York: Springer-Verlag; 2005.
- [21,29,36,44] Yardi N. Yoga for epilepsy. *Seizure* 2000;0:1-6.
- [22] Stancak AJr, Kuna M, Srinivasan Dostalek C, and Vishnedeivananda S, Kapalabhati Yogic cleansing exercise. II. EEG topograhly analysis. *Homeostasis in Health and Disease* 1991;33:182-189.
- [23] Sterman M Sensorimotor EEG feedback training in the study and treatment of epilepsy. In D.I. Mostofsky & Y. Loyning, (Eds), *The Neurobehavioral Treatment of Epilepsy*. New Jersey: Lawrence Erlbaum; 1993.
- [24,51] Dahl J, Melin L, Lund L. Effects of a contingent relaxation treatment program on adults with refractory epileptic seizures, *Epilepsia* 1987;29:125-132.
- [25,50,53] Rockstroh B, Birbaumer N, Elbert T, Lutsenberger W. Operant control of EEG, event related and slow potentials. *Biofeedback & Self-regulation* 1984;9:139-160.
- [26] Brown RP, Gerbarg PL. *The Journal of Alternative and Complementary Medicine* 2005;11:189-201.
- [27] Handforth A, DeGiorgio CM, Schachter SC, Uthman BM, Naritoku DK,

- Tecoma ES, Henry TR, Collins SD, Vaughn BV, Gilmartin RC, Labar DR, Morris GL 3rd, Salinsky MC, Osorio I, Ristanovic RK, Labiner DM, Jones JC, Murphy JV, Ney GC, Wheless JW. Vagus nerve stimulation therapy for partial-onset seizures: a randomized active-control trial. *Neurology* 1998;51:48-55.
- [28] Ben-Menachem E, Mañon-Espaillet R, Ristanovic R, Wilder BJ, Stefan H, Mirza W, Tarver WB, Wernicke JF. Vagus Nerve Stimulation for Treatment of Partial Seizures: 1. A Controlled Study of Effect on Seizures. *Epilepsia* 1994;35:616-626
- [30] Gruman J, VonKorff M, Reynolds J, Wagner EH. Organizing Health Care for People with Seizures and Epilepsy. *Journal of Ambulatory Care Management* 1998;21:1-17.
- [33] Fisher RA, Yates F. *Statistical Tables for Biological, Agricultural and medical research*. Oliver & Boyd Ltd, Edinburgh, Scotland; 1963.
- [35,42] Dahl J. *Epilepsy: A Behavior Medicine Approach To Assessment and Treatment in Children*. Gottingen, Seattle: Hogrefe & Huber publisher; 1992.
- [37] Chopra D, Simon D () *The Seven spiritual laws of Yoga: A practical guide to healing body mind, and spirit*. New Jersey: John Wiley & Sons; 2004
- [43] Lundgren T. A development and evaluation of an integrative health model in the treatment of epilepsy. Masters thesis: University of Uppsala, Sweden; 2004.
- [45,46] Diener E, Emmons RA, Larsen RJ, Griffin S. The Satisfaction With Life Scale. *Journal of Personality and Social Psychology* 1985;49:71-75.
- [47] Amir M, Marcelo F, Herrman H, Lomachenkov A, Lucas R, Patrick D. Reliability, Validity and Reproducibility of the WHOQOL.BREF in six Countries; October 2003
http://www.hrainc.net/pdf/ISOQOL_2000_Vancouver_BREF.pdf
- [48] *Statistica 6.0*. StatSoft Inc. Tulsa, USA; 2002.
- [49] Buelow JM, Johnson J. Self-management of epilepsy - A review of the concept and its outcomes. *Disease Management & Health Outcomes* 2000;8:327-336.
- [52] Hayes SC, Luoma J, Bond F, Masuda A, Lillis J. Acceptance and Commitment Therapy: Model, processes, and outcomes. *Behavior Research and Therapy* 2006;44:1-25.
- [54] Dimidjian S, Hollon SD, Dobson KS, Schmaling KB, Kohlenberg R, Addis M, Gallop R, McGlinchey J, Markley D, Gollan JK, Atkins DC, Dunner DL, & Jacobson NS. Randomized trial of behavioral activation, cognitive therapy, and antidepressant medication in the acute treatment of adults with major depression. *Journal of Consulting and Clinical Psychology* 2006;74:658-670.
- [55] Fenwick P. The basis of behavioral treatments in seizure control. *Epilepsia* 1995;36:46-50.
- [57] Wagner JL, Smith G. Psychosocial intervention in pediatric epilepsy: A critique of the literature. *Epilepsy and Behavior* 2006;8:39-49.
- [58] Austin JK, McNelis AM, Shore CP, Dunn DW, Musick B. A feasibility study of a family seizure management program: be seizure smart. *J Neuroscience Nurs* 2002;34:30-7.
- [59] Hufford BJ, Glueckauf RL, Webber MP. Home-Based, interactive videoconferencing for adolescents with epilepsy and their families. *Rehabilitation Psychology* 1999;44:176-93.