Chapter 2

It has been well established in the last chapter that both medical and psychological factors have an important impact upon the psychosocial functioning of people with epilepsy. In the present chapter all such past references and studies would be reviewed chronologically with reference with identified factors that significantly distinguish people with epilepsy who function well from those who do not.

Aghihotri, Teja, Prabhu and Virmani (1972) conducted a study on psychiatric, psychological and social disturbances in epilepsy. They were using a sample of 59 epileptic patients. They considered the history of patients and their parents and obtained information regarding psychiatric manifestations and social adjustment by using a specially designed performa. They applied psychological tests to assess cognitive functions and Rorschach for studying personality structure. They observed that 83% of 59 epileptic patients have psychiatric disturbances i.e. irritability, anxiety, somatic concern and deteriorated intellectual functioning. Social adjustment in these patients was satisfactory before the onset of illness, but only 5% patients were able to maintain this level afterwards.

Bagadia, Jeste, Charegaonkar, Pradhan and Shah (1973) also did the same study by using a sample of 180 epileptic patients. They interviewed each patient and their parents. They included detailed central nervous system check up and physical examination, fundoscopy was also done. They calculated all percentages and reported that the causes of epilepsy were the factors like age, educational performance, occupational stress, economic status, family, emotional states, mental deficiency of various degrees, epileptic personality traits, organic brain damage, epileptic discharges and arteriosclerosis. They also found that males and females were equally affected by epilepsy.

Vaidyalingam (1979) conducted a study to assess the intellectual deterioration in epileptic psychosis because it is necessary to treat the disease as it leads to many problems. The sample of 106 epileptic adults male was used. The measure was using Case history, WAIS, Binet-Kamath Test. Frequency and percentages was also calculated. Results showed that 2.4 to 4.2% of 106 epileptics had some or the other mental
symptoms. Various symptoms mentioned by them were mental retardation (39%), mood
disorder (41%), schizophrenia (18%), paranoid (5%) and dementias (3%). They found
that intellectual functioning also deteriorated with the passage of time in the epileptic
patients.

Devillis, Devellis, Wallston and Wallston (1980) examining the relationship
between epilepsy and learned helplessness can increase our understanding of both
phenomena. They used a sample of 289 individuals with epilepsy was surveyed via a
questionnaire assessing several parameters of their seizure disorders, general and health-
specific locus of control, and depression. Depression and locus-of-control variables are
conceptualized as indexes of learned helplessness. Regression analyses indicate that
theoretically relevant dimensions of seizure disorders (including the perceived
controllability/predictability of seizures, severity of seizures, and extent of exposure to
having seizures) account for significant proportions of the variance in the helplessness
indexes. They concluded that, despite the modest proportions of variance explained, the
general pattern of statistically significant and theoretically compatible findings of the
present study justify further research into the epilepsy-helplessness parallel. The close
parallel between the natural history of seizure disorders and laboratory procedures for
inducing learned helplessness is noted.

George (1981) compared adjustment in epileptics and non-epileptics controls.
Thirty epileptics and thirty non-epileptics were assigned with mean ages of 17.63 and
17.90, and average years of schooling 13.23 and 13.77. Bell’s Adjustment Inventory was
used. The results showed that the epileptics as a group obtained significantly low scores
on health and social adjustment. They were also found to be low on global adjustment,
compared to non-epileptics. But both of groups however, did not differ significantly on
home and emotional adjustments.

Banerjee (1985) reviewed the studies related to psychosocial causes. The study
was aimed to resolution on the epileptic personality: A psycho diagnostic approach. They
used a sample of 50 epileptic patients. The measure was Rorschach Ink Blot Test and
EEG. Results showed that the cause of epilepsy were a typical personality pattern which
were extratensive, not methodical, lack abstract thinking and good commonsense have a
tendency to escape from reality, emotional immaturity ever possibility of emotional
outburst, presence of hostile, inner force and anxiety, intellectually deficient and not susceptible to the environmental influence. They had a highly disbalanced and disintegrated personality.

Seidenberg, Beck, Geisser, Giordani and Chris (1986) examined the academic achievement scores of 122 children with epilepsy in relation to demographic and clinical seizure variables. As a group, these children were making less academic progress than expected for their age and IQ level. Academic deficiencies were greatest in arithmetic, followed by spelling, reading, comprehension, and word recognition. The multiple regression were employed, which indicated a modest combined predictive significance of the demographic and clinical seizure variables for academic performance. In addition, the magnitude of these relationships varied by academic area. Among the individual variables examined the strongest correlates of academic performance were age of the child, age of seizure onset, lifetime total seizure frequency, and presence of multiple seizures (absence and tonic-clonic).

Maj, Del, Tata, Guizzaro, Bravaccio and Kemali. (1987) assessed memories of parental rearing behaviour by the EMBU in 61 epileptics and 151 healthy controls. The occurrence of the first crisis during the childhood was an inclusion criterion for patients. Epileptics, as compared with controls, rated their fathers and mothers as less stimulating, their fathers as less performance oriented and affectionate, and their mothers as more tolerant. Moreover, the score on the subscale 'favouring subject' for both fathers and mothers was higher in epileptics. As patients with and without interictal psychopathological features were compared, the scores on the subscales 'overprotective' and 'favouring subject' for mothers and 'abusive' and 'depriving' for fathers were higher in the former subgroup, whereas that on the subscale 'performance oriented' for fathers was higher in the latter. No significant difference was observed among patients suffering from the various subtypes of epilepsy. These results are consistent with the idea that parents of epileptics tend to encourage passivity in their children, have low expectations as regards their ability to operate effectively, and treat them in a more indulgent way because of their disability. Furthermore, they are in line with the reported association between maternal overprotectiveness and problem behaviour in epileptics.
Levin, Banks and Berg (1988) reviewed the literature on psychosocial dimensions of epilepsy utilizing the framework developed by Dodrill et al. (Epilepsia 1980; 21:123-35). They considered the factors like family background, emotional adjustment, interpersonal adjustment, vocational adjustment, financial status, adjustment to seizures, and medicine and medical management. They indicated that persons with epilepsy experience lower rates of marriage and more sexual difficulties than do non epileptic persons. They also reported greater unemployment and underemployment in epileptic persons than in the population at large. They suggested that some persons with epilepsy manifest an attitude of non acceptance of self. Some are reluctant to disclose their disability to others. They also indicated the presence of a discriminatory attitude by some non epileptic persons toward epileptic persons. They found that several factors are associated with successful medical management of epilepsy.

Olsson and Compenhausen (1990) performed a long-term follow-up of 58 young adults, aged 18–27 years, with persisting absence epilepsies since childhood or early adolescence, to assess psychosocial outcome and the patients' own concept of their epilepsy. They were well adjusted in the areas of family status and employment, but had more unqualified jobs as compared with a reference group. They were also inclined to lead very regular lives in a way that led to social isolation. They found 74% of the group to have been affected by their epilepsy, schooling, occupation, routines of daily life, relations with friends, leisure time activities and housing. This was independent of whether or not they had achieved seizure control. In treating absence epilepsies, it is important that one considers psychosocial aspects, even if a medically satisfying result with seizure control is obtained.

Hoare and Kerley (1991) a cross sectional study was undertaken of psychosocial morbidity among a sample of 108 children with a chronic epilepsy and their families. They found that approximately half the children showed significant psychological, emotional, neurotic, behavioral disturbances strongly associated with epileptic variables, family factors, individual characteristics of the child and the maternal anxiety about epilepsy. They found that several factors are responsible for this increase, and further study is needed to elucidate these and to reduce the incidence of psychosocial morbidity among these children.
Mattson (1991) surveyed 177 patients with epilepsy. They identified that 58% of epileptic patients have seizures occurred more frequently when they were stressed, with seizures occurring sometimes days or weeks later.

Konishi, Naganuma, Hongo et al. (1992) found that 51.5% of 264 children with epilepsy had some inducing factors. Various inducing factors mentioned by them are fatigue after exercise (15.2%), sleep disturbance (9.1%), psychic stress (8.3%), emotional change (6.8%). They observed that inducing factors were more common with partial epilepsies (64.3%). Those whose epilepsy was difficult to control showed a higher incidence and variable kinds of inducing factors than those with well controlled seizures.

Chaplin, Lasso, Shorvon and Floyd (1992) determined the nature and extent of psychosocial problems in epilepsy and their associations. A postal survey was used drawing data from prospective consecutive cases. Data on demographic, medical, and social backgrounds were collected. A specially designed, validated attitude questionnaire examined 14 areas of psychosocial adjustment to epilepsy. 124 primary care general practices were setted. They used 216 adults (aged over 17) with a recent diagnosis of epilepsy (within previous 36 months). 192 subjects returned their questionnaires. Results showed that problems in at least one area were experienced by 175 (91%) of the 192 subjects. Problems were generally mild, which contrasted strongly with findings in chronic cases. The areas of greatest concern were fear of seizures (80% of cases; 72% moderate or severe) and fear of stigma in employment (69% of cases; 40% moderate or severe). A highly significant relation was found between psychosocial effects and the frequency and recency of seizures. They concluded that in the early stages of epilepsy psychosocial effects are closely related to the severity of the medical condition, suggesting that the argument for the stigmatizing effect of the diagnosis by itself is less important than previously thought. The findings also suggest that problems may evolve as the condition becomes chronic.

Watten (1992) conducted a study on psychological profiles in patients with medically refractory epilepsy. The study was aimed to explore whether patients with epilepsy show characteristic psychological profiles which might be risk factors for epileptic seizures. They were using a sample of 15 medically refractory epileptic patients and 15 healthy controls matched on age and gender. The instruments used were the
Millon Behavioural Health Inventory (MBHI) and the Arnett Inventory of Sensation Seeking (AISS). Compared with healthy controls the patients with epilepsy showed significantly higher scores on the basis of coping styles MBHI Inhibition style and MBHI Sensitivity style, and the lower scores on the MBHI Sociability and the MBHI Confidence. The epilepsy group also exhibited elevated scores on the MBHI psychogenic attitude scales Chronic tension, Recent stress, Pre-morbid pessimism, Social alienation and Somatic anxiety. The patient group had lower sensation-seeking scores on the AISS Novelty scale, Intensity scale and in AISS Total scores. They found that patients with medically refractory show dysfunctional coping styles. These factors should be taken into consideration in treatment and rehabilitation planning. The findings point to psychological risk factors for eliciting epileptic seizures.

Jacoby (1992) examined psychosocial functioning in a group of people in whom epilepsy was well-controlled; the majority had been seizure-free for at least two years. In doing so, it drew upon a model of quality of life which incorporated physical, social and psychological domains. Among this group of people, psychosocial functioning and adjustment to epilepsy appeared high, with low reported levels of distress. This is an important finding, not least for people with epilepsy themselves.

Panjwani, Selvamurthy, Singh, Gupta, Mukhopadhyay and Thakur (1996) studied the effect of Sahaja yoga meditation on 32 patients with primary idiopathic epilepsy on regular and maintained antiepileptic medication. The patients were randomly divided into 3 groups: group I practiced Sahaja Yoga meditation twice daily for 6 months under proper guidance; group II practiced postural exercises mimicking the meditation for the same duration; and group III was the control group. Visual Contrast Sensitivity (VCS), Auditory Evoked Potentials (AEP), Brainstem Auditory Evoked Potentials (BAEP), and Mid Latency Responses (MLR) were recorded initially (0 month) and at 3 and 6 months for each group. There was a significant improvement in VCS following meditation practice in group I participants. Na, the first prominent negative peak of MLR and Pa, the positive peak following Na did not register changes in latency. The Na-Pa amplitude of MLR also showed a significant increase. There were no significant changes in the absolute and interpeak latencies of BAEP. The reduced level of stress following meditation practice may make patients more responsive to specific stimuli. Sahaja Yoga
meditation appears to bring about changes in some of the electrophysiological responses studied in epileptic patients. It is indicated that Sahaja yoga could prove to be beneficial in the management of patients of epilepsy.

Hermann, Trenerry and Colligan (1996) examining the relevance of the theory of learned helplessness in general, and attributional style in particular, to the understanding of depression among patients with epilepsy. The patients with lateralized temporal lobe epilepsy (TLE) (right = 73, left = 70) were administered two self-report depression inventories Beck Depression Inventory (BDI), Center for Epidemiological Studies-Depression scale (CES-D). Depression scores were examined in relation to a key component of the revised theory of learned helplessness (attributional style) using the Optimism/Pessimism Scale. They found that attributional style was significantly associated with increased self-reported depression and remained significant when the effects of several confounding variables were controlled age, age at onset, laterality of TLE, sex, and method variance. They concluded that the concept of learned helplessness in general, and attributional style in particular, are related to the genesis of depression in epilepsy. Because they are known to be related to depression in the general population, and because specific techniques for intervention and prevention are available, greater consideration of learned helplessness and attributional style in the genesis of depression in epilepsy may be worthwhile.

Kokkonen, Kokkonen, Saukkonen and Pennannen (1997) conducted a study on psychosocial outcome of young adults with epilepsy in childhood. The study was aimed to evaluate the social maturation and psychiatric morbidity in young adults treated for epilepsy during their childhood. They interviewed eighty one young adults with epilepsy. The results were compared with those from 211 randomly selected controls. Compared with the controls they found that the patients had more often not succeeded in passing the normal comprehensive school (20% v 2%) or had left school at the secondary level (53% v 46%) and remained without any vocational education (27% v 11%). There was no significant difference in the employment status of those with work between the patients and the controls. The patients were significantly more often labeled with poor social maturation and dependent lifestyle factors such as living with their parents. However, risk analysis showed that neither the disease itself nor antiepileptic medication were
significant predisposing factors for poor social adjustment but low or borderline mental
capacity or learning disabilities relating to epilepsy were. Psychiatric morbidity was
similar in both groups. They concluded that the social handicap found in a certain group
of young adults with epilepsy during childhood is largely associated with neurological
and cognitive impairments other than epilepsy itself. With the present mode of treatment
epilepsy itself does not seem to disturb adolescent social and psychological development.

Ettinger, Weisbrot, Nolan, Gadow et al. (1998) assessed the rates of
symptoms of anxiety and depression among pediatric patients with epilepsy. They
administered the Revised Child Manifest Anxiety Scale (RCMAS), and Child Depression
Inventory (CDI) to 44 epilepsy patients aged 7–18 years (mean age 12.4 years). They
examined demographic, socioeconomic, and epilepsy-related information in relation to
depression and anxiety scores. Results showed that no patients had been previously
identified to have depression or anxiety. However, 26% had significantly increased
depression scores and 16% met criteria for significant anxiety symptomatology. They
conclude that symptoms of depression and anxiety are common among pediatric patients
with epilepsy and appear to be overlooked by care providers.

O’Donoghue, Goodridge, Redhead, Sander and Duncan (1999) assessed the
prevalence of psychosocial problems associated with epilepsy, Using validated scales few
studies were measured about the psychosocial handicap of epilepsy in a general practice
setting. They surveyed on the sample of 309 subjects, with one or more non-febrile
epileptic seizures The measure used were the Subjective Handicap of Epilepsy Scale
(SHE), the SF-36, and the Hospital Anxiety and Depression scale (HAD). Results
showed that one-third of persons with active epilepsy were significantly handicapped by
their condition. The severity of subjective handicap was related to seizure frequency and
to the duration of remission of seizures. Between one-third and one-half of subjects
scored as 'cases' on the HAD scale and on the mental health subscale of the SF-36. Only
one-third of the psychiatric morbidity revealed by the questionnaires had been recognized
by the general practitioner (GP). Scores on the SF-36 indicated that people with active
seizures perceived themselves as significantly less healthy than those in remission, and
that, for persons in remission, drug treatment had a detrimental effect on certain aspects
of well-being. They conclude that the occurrence of seizures, even at low frequencies, is associated with psychosocial handicap, and this may remain covert in general practice.

Rodriguez, Altshuler et al. (1999) assessed the DSM-III-Revised personality disorder in a sample of 52 medically refractory epileptic patients. Twenty-one percent of patients met threshold criteria for an Axis II disorder. Dependent and avoidant personality disorders were the most common diagnoses. They found that epileptic aura was positively correlated with the presence of personality disorders. These results support previous studies that have demonstrated an increased rate of dependency and social isolation in epileptic patients. This increase may be related to disrupted psychosocial functioning as a consequence of having epilepsy, to disrupted neuronal function in central nervous system structures as a consequence of repeated epileptiform discharge or to some combination of the two.

DeRoss, Marrinan, Schattner and Gullone (1999) reported the relationship between perceived family environment and psychological wellbeing. They used a sample of 42 nonclinical adolescents and their two biological parents. Participants individually completed self-reported measures of self-esteem, depression, and family environment. The present results largely confirmed the link between adolescents' self-reported levels of wellbeing and family environment. The present findings also pointed to the father's wellbeing as a significant correlate of adolescent wellbeing, thereby highlighting a need to include information about fathers in any future related research. It was also reported that high family conflict and a lack of family cohesion were associated with adolescent depression.

Hoare, Mann and Dunn (2000) describes the evaluation of a newly designed questionnaire to assess the quality of life among children with epilepsy or diabetes. They were using a sample of 102 epileptic and 148 diabetic. Factor analysis identified one factor, the impact on the parents and the family, which was responsible for over a third of the variance in the two illness groups. Two other factors, impact on development and impact on health, were also found in the epilepsy group. The questionnaire discriminates well between children with epilepsy or diabetes, showing that the former is more affected than the latter. They found that children with epilepsy had a poorer health related quality
of life than children with diabetes. Children with more severe epilepsy are seen by parents to have a worse quality of life than children whose epilepsy is well controlled.

Anderson, Kim and Warner (2000) conducted a study on impact of taking antiepileptic drugs at school in a group of children and adolescents. The pilot study was aimed to determine if there is a measurable effect on peer relationships in children having to leave the classroom or recess time to take antiepileptic medications in a school setting. They were using a sample of 47 children, aged 6 to 18 years, by surveys mailed or distributed by a pharmacist. They found that children who reported poor seizure control were significantly more likely to have trouble making friends compared with those with seizures controlled (70% vs 27% ). Even though the majority reported good seizure control (7/8), the children who left the classroom to take medications reported that they had significantly more trouble making friends than those who did not leave the classroom (63% vs 21%). Therefore, the effect of taking medication at school may be associated with a significant decrease in social and peer relationships, even in children with self-reported good seizure control.

Gramstad, Iversen, Bernt and Engelsen (2001) conducted a study on the impact of affectivity dispositions, self-efficacy and locus of control on psychosocial adjustment in patients with epilepsy. They hypothesised that negative and positive affectivity, self-efficacy and health-related locus of control are important for psychosocial adjustment in patients with epilepsy. These dimensions are rarely examined directly in relation to the psychosocial adjustment in these patients. They investigated correlations between measures of these constructs and measures of psychosocial adjustment in epilepsy by using a sample of one hundred and one patients. The measures used were the Washington psychosocial seizure inventory (WPSI), the positive and negative affect schedule (PANAS-X), the multidimensional health locus of control scales (MHLC), the generalized self-efficacy scale and a scale measuring self-efficacy in epilepsy. Reliability analyses, correlational analyses and multiple stepwise regression analyses were performed. Negative affectivity (NA), positive affectivity (PA) and generalized self-efficacy showed high correlations with the WPSI scales emotional adjustment, overall psychosocial adjustment and quality of life. The epilepsy self-efficacy measures showed high, but lower correlations with the same WPSI scales. The MHLC scales showed low
correlations with the WPSI scales. Multiple regression analyses showed that PA, NA and measures of self-efficacy explained more than 50% of the variances on emotional adjustment, overall psychosocial functioning and quality of life. They concluded that, positive and negative affectivity and self-efficacy are important predictors of perceived emotional adjustment, psychosocial adjustment and quality of life in patients with epilepsy. Negative affect is the best predictor, but Positive affect and self-efficacy measures give unique predictions independent of Negative affect.

Oguz (2002) evaluated the anxiety and depression in epileptic children to compare their results with that of a healthy control group and to determine the relationship of anxiety and depression scores to epilepsy-related factors. State Trait Anxiety Inventory (STAI) and Children's Depression Inventory (CDI) were applied to 35 patients with epilepsy aged 9 to 18 years and to 35 healthy children who served as the control group. Both study and control groups were divided into two age groups (9 to 11 and 12 to 18 years) to exclude the effect of puberty on anxiety and depression scores. Significant depression and suicidal ideation were determined in the study group. The mean trait anxiety score was significantly higher in the 9- to 11-year age group of epileptic patients than the corresponding control group. The mean state anxiety score, trait anxiety score, and depression score were significantly higher in the 12- to 18-year age group of epileptic children than in the control group. Among the epilepsy-related factors, whereas epilepsy duration, seizure frequency, and polytherapy were determined to increase anxiety and depression, age of seizure onset, seizure type, and electroencephalographic findings were not related to anxiety and depression. Symptoms of anxiety and depression are common among epileptic children, especially during puberty. The State Trait Anxiety Inventory and Children's Depression Inventory may be used as a tool to provide information to clinicians. They found cognitive and behavioral impairments are more often among epileptic children than among their peers.

Attarian_, Vahle, Carter, Hykes_, and Gilliam (2003) studied patients with epilepsy have a higher prevalence of depressive disorders than the general population, but the relationship between seizure rates and depression has not been adequately studied. The measure used was Beck Depression Inventory. They evaluated depressive symptoms in 143 consecutive epilepsy patients from outpatient clinics. Patients who were seizure
free more than 6 months were considered not intractable. Thirty-six percent were neither intractable nor depressed, 43% had intractable epilepsy and were not depressed, 10% had intractable epilepsy and were depressed, and 11% did not have intractable epilepsy and were depressed. They concluded that patients with epilepsy have a higher prevalence of depression than the general population, but the intractability of the seizure disorder does not seem to be an independent risk factor for the occurrence of depression. There is no relationship between the severity of depression and monthly seizure rate.

Swinkels, Duijsens and Spinhoven (2003) studied the association of PD traits with epilepsy-related variables as well as the association between PD traits and level of psychopathology. They used a sample of 203 patients with epilepsy and a control group of 332 subjects from the general population. The Questionnaire on Personality Traits (VKP: Vragenlijst voor Kenmerken van de Persoonlijkheid) was used to investigate personality disorder (PD) traits. The results showed that, compared with the control group, patients with epilepsy had higher dimensional VKP scores for several Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) and International Classification of Diseases (ICD-10) PDs. Associations were found between PD traits and age at onset of epilepsy, duration of epilepsy, seizure frequency and number of anti-epileptic drugs. Anxiety and depression were not associated with PD traits. They concluded that it is likely that suffering from epileptic seizures negatively influences personality development and can result in the development of maladaptive PD traits. The results also support the idea that PD traits are not (completely) covered by axis I psychopathology and therefore should be separately investigated.

Tait (2003) stated that 32% of people with epilepsy have experienced a major depressive episode, 25% have experienced long term, but less severe depression, and the most epileptic who are depressed are never treated for the depression. In other study he shows that 50% of children with intractable epilepsy as having serious psychosocial problems. They stated that overprotective parental behaviour is associated with slow maturation in children with epilepsy. Level of social support in epileptic patients have direct effect on mental health and well-being. Those who feel more supported are less likely to show the symptom of anxiety, depression or other mental health issues.
Raty et al. (2003) described the health-related quality of life (HRQOL) in adolescents and young adults with uncomplicated epilepsy and to compare it with a random sample of the general population. They were using a sample of (n = 158/193) on HRQOL together with 282 (n = 282/390) random controls. The instruments used were “I think I am,” “Youth Self Report,” “Sense of coherence,” and “Family APGAR.” Data were analyzed by using factorial analysis of variance. Results showed that Girls had a poorer HRQOL than boys. The epilepsy group reported lower competence (i.e., they were less active, had lower social competence and poorer school achievement). Both groups had an overall positive self-esteem. Differences between girls in the epilepsy and control groups were small, whereas differences among boys were more evident. Older age was related to poorer HRQOL in both groups. They pointed out the importance of being observant of signs of stigmatization in adolescents with epilepsy.

Haut, Vauyiouklis and Shinnar (2003) conducted a study to assess perceptions about stress, seizures, and stress reduction. A questionnaire was administered to patients in the Montefiore Medical Center outpatient epilepsy department. Eighty-nine patients completed the questionnaire. They reported that 64% of patients believed that stress increased the frequency of their seizures. This belief was not significantly associated with gender, age, location of care, epilepsy classification, or seizure control, but was significantly associated with a shorter duration of epilepsy. Thirty-two percent of subjects had tried stress reduction modalities for epilepsy. Of those who had not, 53% were willing to try, and this willingness was significantly associated with a greater number of seizures in the prior 2 months and the belief that stress was associated with seizures. Both major and minor stressors were reported with equal frequency. These findings indicate a need for a prospective study to evaluate the role of stress and stress reduction as an additional potential therapeutic modality for epilepsy.

Collen, Patricia, Richard, Thomas, Donald, Katherine and the Project EASE Study Group (2003) conducted a study on the association of stigma with self-management and perceptions of health care among adults with epilepsy. The study was aimed to examine the perception of stigma among adults with epilepsy including its association with epilepsy self-management and perceptions of health care. Participants for the study were recruited from two epilepsy centers and a neurology clinic. Individuals
agreeing to participate in the study were asked to complete three assessments each 3 months apart. Data were collected from 320 adult men and women with epilepsy; 314 provided responses on stigma and were included in this analysis. Results showed that participants ranged in age from 19 to 75 years (mean=43). Fifty percent of the sample was female, and 80% was white. The mean age of seizure onset was 22 years, and 76% of participants reported having had a seizure within the past year. Analysis suggests levels of perceived stigma are similar for men and women and across ethnic and age groups. However, participants who were not married or living with a partner, were not working for pay, and had limited income reported higher levels of stigma than did married participants, those working for pay, and those in higher income brackets. Participants reporting higher levels of stigma included those who had their first seizure before the age of 50 and a seizure in the last year. Participants whose seizures interfered more with activities, who rated their seizures as under less control, and who were not legally able to drive also reported higher levels of stigma. Tests of association between stigma and health-related variables revealed that participants reporting higher levels of perceived stigma also reported lower levels of self-efficacy to manage epilepsy; more negative outcome expectancies related to treatment and seizures; and lower levels of medication management, medication adherence, and patient satisfaction. However, they also reported greater management of information related to seizures. In regression analysis, income, age at first seizure, seizures during the past year, lower self-efficacy, negative outcome expectancies for seizures, and less patient satisfaction explained 54% of the variance in perceived stigma. They suggest that perceived stigma is significant for people with epilepsy and is associated with factors that are known to be important in the management of epilepsy. Understanding who is at greatest risk for feeling stigmatized could lead to the development of preventive measures.

Kobau and Dilorio (2003) conducted a study on epilepsy self-management: a comparison of self-efficacy and outcome expectancy for medication adherence and lifestyle behaviors among people with epilepsy. The study was aimed to describe self-efficacy beliefs and outcome expectancies toward medication, seizure, and lifestyle management behaviors among 108 adults with epilepsy. Epilepsy Self-Efficacy and Epilepsy Outcome Expectancy scales were used. They were identified modifiable
behavioral risk factors such as confidence for following medication dosing schedule, planning for medication refills, coping with adverse effects of medication, getting sufficient sleep, avoiding alcohol, and obtaining social support. A larger proportion of persons reported higher self-efficacy for medication management behaviors than for healthful lifestyle behaviors. Findings from this study extend previous research on chronic disease that showed that individuals may be adherent with medication therapy, but not with healthful lifestyle behaviors necessary for the prevention and treatment of chronic disease. Individuals with low self-efficacy would benefit from interventions that increase efficacy beliefs to enhance their ability to adopt and maintain good self-management practices.

Jane, Chris, Gregory et al. (2003) conducted a study on anxiety in children with epilepsy. The study was aimed to examine the occurrence of anxiety in children and adolescents with epilepsy and to determine factors associated with elevation of these symptoms. They were using a sample of 101 children and adolescents between the ages of 6 and 16 years. The tests were given the Revised Children's Manifest Anxiety Scale (RCMAS). They reported mild to moderate symptoms of anxiety in 23% of the patients. Based on regression analysis, factors significantly associated with increased anxiety included the presence of comorbid learning or behavioral difficulties, ethnicity, and polytherapy. Their results suggest the need to monitor children and adolescents with epilepsy for affective symptoms in order to provide appropriate interventions.

Aguilar, Blanquez, Rubio and Rey (2004) examined the quality of life of a population sample of adolescents suffering from epilepsy. For this all people aged 10–19 years were diagnosed with epilepsy and without comorbid conditions in the Spanish province of Huesca were considered for the study. Quality of life was measured with the Spanish version of the Qolie-AD-48. Results showed that a total of 66 young people with a mean age of 15 years had active epilepsy and agreed to participate; 30.3% had experienced seizures during the previous year. There were some differences in quality of life according to gender and socio-economic status. Quality of life decreased with increasing severity of epilepsy. Medication neurotoxicity was associated with a lower quality of life over and above the effect of severity of the illness. Quality of life was negatively associated with the number of seizures per year, longer duration of the illness
and earlier age of onset. The results were concluded that quality of life of young people with epilepsy in community samples varies according to gender and socio-economic status, but severity of the epilepsy and side-effects of medication are the main influence. This highlights the importance of optimal control of the seizures with medications with few side-effects.

Dow, Seidenberg and Hermann (2004) examined the relationship between white matter volume and processing speed and performance efficiency on the Sternberg Memory Scanning Test (SMST). They included TLE subjects with white matter volume reduction (n = 13), TLE subjects with normal white matter volume (n = 14), and healthy controls (n = 18). The groups did not differ in total cerebral gray matter volume. Compared with the controls, the reduced white matter volume TLE group exhibited a significantly steeper slope on the SMST. This was characterized by a disproportionate increase in reaction time with increased processing demands (set size), particularly for negative probe trials. In contrast, no significant differences on the SMST were evident between controls and the normal white matter volume TLE group. These findings suggest the presence of information processing speed and efficiency impairment in TLE and its relationship with white matter volume integrity.

Devinsky and Tarulli (2004) stated psychosocial problems affect cognitive and behavioral treatment in epilepsy patients. They were using a sample of 131 children with epilepsy. Matched children with epilepsy to those with asthma were assessed with regard to physical, psychological, social and school functioning. They found that children with epilepsy showed greater impairments in the psychological, social and school categories, whereas asthmatics had a more compromised QOL in the physical domain.

EJisabete and Priscila (2005) studied anxiety and depression in patients with epilepsy and evaluated their relationship with neuroepilepsy and psychological variables. They were using a sample of 60 patients and 60 healthy subjects, using the Beck Depression Inventory and State-Trait Anxiety Inventory. They assessed that epilepsy was associated with disease 63.4%, mental problems 11.6%, feelings of shame, fear, worry and low self esteem 56.6% and perception of stigma 26.6%. The strategies were looking for social support, seeking medical treatment, withdrawal, denial and spiritual support. There was a significant association between psychological symptoms and perception of
seizures control, which reinforces the importance of subjective aspects involved in epilepsy.

Kaisa, Haken & Jari-Erik. (2005) investigated the extent to which adolescents achievement strategies are associated with the parenting styles they experience in their families. They used a sample of three hundred and fifty-four 14-year-old adolescents completed a Strategy and Attribution Questionnaire and a family parenting style inventory. Analogous questionnaires were also completed by the adolescents' parents. Based on adolescents' report of the parenting styles, four types of families were identified: those with Authoritative, Authoritarian, Permissive, and Neglectful parenting styles. The results showed that adolescents from authoritative families applied most adaptive achievement strategies characterized by low levels of failure expectations, task-irrelevant behaviour and passivity, and the use of self-enhancing attributions. Adolescents from neglectful families, in turn, applied maladaptive strategies characterized by high levels of task-irrelevant behaviour, passivity and a lack of self-enhancing attributions. The results provide a basis for understanding some of the processes by which parenting styles may influence adolescents' academic achievement and performance.

Spatt et al. (2005) assessed knowledge and attitudes toward epilepsy in the Austrian general public and to identify independent predictors of negative attitudes. They surveyed a representative sample of 2,128 Austrian adults. A questionnaire similar to the ones used in earlier studies in other countries was used. The independent influence of socioeconomic variables and of knowledge and concepts about epilepsy on attitudes were analyzed by using logistic stepwise regression procedure. Results showed that nearly 10% of respondents expressed negative attitudes toward people with epilepsy. These figures are similar to those of other studies performed in comparable societies. In addition to being male and of low socioeconomic background, having little theoretical knowledge about epilepsy, misconceptions of epilepsy as a form of insanity, and no personal acquaintance with someone with epilepsy independently predispose to unfavorable attitudes toward epilepsy. They concluded that information campaigns on epilepsy are likely to improve attitudes toward epilepsy when they target misconceptions about epilepsy and when they offer opportunities for personal acquaintance with people with epilepsy.
Karen, (2006) described on-going family interaction patterns in 15 epileptic-member and 15 control families with a view to isolating differences which may be responsible for behaviour disorders in epileptic children. Categorisation of the speeches of family tetrads in a problem-solving situation revealed that epileptic-member families tended towards an autocratic matriarchal structure which is more efficient in problem-solving. The epileptic child was found to withdraw from family interaction. That form of organisation would appear to equip the family with a more secure structure to meet the family crisis while simultaneously meeting the dependency needs of the "sick" child. However, the relationship between this type of functioning and disturbed behaviour leads to speculation as to the long-term effects of such coping strategies.

Cynthia, David, Blagovest, Kristen et al. (2007) evaluated the relationship between seizure severity and quality of life in epilepsy. They were using a sample of 118 women from the baseline phase of a clinical treatment trial. They found that two domains of the Quality of Life in Epilepsy-31 (QOLIE-31) correlated highly significantly with seizure severity: Seizure Worry and Social Functioning. Two additional domains were significantly correlated: Overall Quality of Life and Cognitive. When the potentially confounding effect of depression, measured by the Beck Depression Inventory, was controlled for, the regression of seizure severity with QOLIE-31 Seizure Worry remained significant, as did the regression with QOLIE-31 Social Functioning and the regression with QOLIE-31 Cognitive. These findings indicate that severe and potentially injurious seizure behaviors contribute to anxiety and socially avoidant behavior for persons with intractable epilepsy.

Funderburk, Bryan and Austin (2007) examined the extent to which children’s attitude toward epilepsy mediates the relationship between perceived stigma and the mental health outcomes of self-concept, behavioral problems, and social competence. They were using a sample of 173 youth aged 9–14 who had been diagnosed and treated for epilepsy for at least 6 months. A secondary data analysis from a larger study was completed to test if the children’s attitude mediated the relationship between stigma and mental health outcomes. Multiple regression was used. They found that Children’s attitude was to mediate the relationships between stigma and self-concept and
behavior problems, respectively. In contrast, attitude did not mediate the relationship between stigma and social competence.

Vivian, Brigitte, Jos et. al (2007) reviewed to increase understanding of the factors that affect the regular employment positions of people with epilepsy by means of the World Health Organization International Classification of Functioning, Disability, and Health (ICF) model. They were using a sample of thirty-four primary research articles describing factors associated with employment for people with epilepsy are reviewed. Results showed that people with epilepsy may face a number of complex and interacting problems in finding and maintaining employment. Stigma, seizure severity, and psychosocial variables such as low self-esteem, passive coping style, and low self-efficacy have been implicated as factors that play an important role in predicting employment. Findings demonstrate the need for specific employment training programs. They concluded that we recommend specific training interventions that focus on increasing the self-efficacy and coping skills of people with epilepsy so that these individuals will be able to accept their disorder and make personal and health-related choices that help them to achieve better employment positions in society.

Assadi-Pooya, Schilling, Glosser, Joseph, Michael (2007) determined the health locus of control in patients with epilepsy and its relationship to anxiety, depression, and seizure control. They used adults aged 18 and older who had had epilepsy for at least 1 year in either the inpatient epilepsy monitoring unit or the outpatient epilepsy clinic at Thomas Jefferson University in 2006. They filled out a questionnaire, which elicited data on age, sex, education, and seizure control. The Hospital Anxiety and Depression (HAD) scale was used to evaluate anxiety level and depression, and Form C of the Multidimensional Health Locus of Control (MHLC) scales was used to evaluate the health locus of control. Statistical analyses were performed using regression analyses to determine potentially significant associations. Results indicate that two hundred patients with a mean age of 40.3 ± 16 participated. Patients had low mean scores on the Internal, medium mean scores on the Chance, and high mean scores on the Powerful Others MHLC subscales. Patients with epilepsy with higher Internal MHLC scores more frequently had controlled seizures. Patients with higher Powerful Others MHLC scores had higher scores on the Anxiety subscale of the HAD scale.
Wagner, and Smith et al. (2008) tested the cognitive diathesis-stress and mediational components of the theory of learned hopelessness in youth with epilepsy. They were using a sample of seventy-seven participants ages 9–17 (35 girls, 42 boys) completed measures of depressive symptoms, hopelessness, self-efficacy for seizure management, and attitude toward epilepsy. Caregivers provided information on seizure activity. Diagnostic and treatment information was obtained via medical record review. Regression analyses revealed that hopelessness mediated the attitude towards epilepsy–depressive symptom relationship. While attitude toward epilepsy and self-efficacy were independent predictors of depressive symptoms, the relationship of attitudes toward epilepsy and depressive symptoms was not enhanced with low self-efficacy for seizure management. These findings support the mediation component of the learned hopelessness theory in youth with epilepsy, suggesting the importance of interventions that assist youth in identifying epilepsy-related aspects of functioning over which they can realistically exercise control and challenging negative thoughts about situations they cannot control.

Wendy and Janice (2008) conducted a study on hybrid concept analysis of self-management in adults newly diagnosed with epilepsy. The study was aimed to analyze and define the concept of self-management for adults diagnosed with epilepsy in the previous 12 months. Using the hybrid concept analysis method, they analyzed the concept of self-management as used in literature and as described by patients. The three phases of a hybrid concept analysis are theory, fieldwork, and analysis. Patient perceptions of the concept were elicited in the fieldwork phase via semistructured interviews. Qualitative content analysis was used to analyze both theoretical and fieldwork phase data. The analysis yielded 12 themes regarding the participants' self-management experiences that were organized under three main, interactive themes: emotional and physical comfort, functional ability, and self-management actions and behaviors. A conceptual framework and definition of self-management also emerged. They concluded that the patients in this population have unique self-management experiences, and an understanding of those needs allows health care providers to devise and utilize interventions to assist those patients in self-managing their epilepsy. Additional research is needed to investigate self-management further in this population.
Lu, Wu, Jin, Lu, Wang (2009) assessed the impact of childhood epilepsy on parental quality of life (QOL) and psychological health, and to investigate possible correlations between parental QOL and background variables as well as parental anxiety and depression. They were using a sample of parents having an epileptic child (n = 263) and parents having a healthy child (n = 270) were enrolled. Groups were in balance for background variables. Short-Form Health Survey (SF-36) Questionnaire, Zung Depression Scale (ZDS) and Zung Anxiety Scale (ZAS) were applied to all parents. Patients were divided into the first visit group (newly diagnosed epilepsy) and follow-up visit group. Results showed that the parents of children with epilepsy had significantly lower QOL scores in SF-36 for all subscales and higher levels of depression and anxiety by using ZDS and ZAS. The factors correlated with parental QOL were seizure control, visit status, anxiety, depression, employment, cost of epilepsy, status epilepticus, drug side effect and age of parents. They concluded that childhood epilepsy has a severe impact on parental QOL and psychological health, and recognition of possible correlations between parental QOL and background variable will be helpful to improve parental QOL.

Ekaterina and Zahari (2009) determined the impact of depressivity and anxiety on some aspects of the quality of life of patients with refractory epilepsy. The present open prospective study included 94 patients (67 women) with refractory epilepsy (mean age 42 years) who were categorized according to their medical history, individual clinical parameters and results of paraclinical studies. The patients completed the questionnaires for depression (BDI-II), anxiety (HAS) and quality of life (QOLIE-89). Results showed that we found different degrees of depressivity in 59 patients (63.44%). Only three of the participants (3.19%) were found to have no depressivity or anxiety. In the remaining 91 patients (96.81%) anxiety was diagnosed in a different degree. The QOLIE-89 showed a low overall assessment of the quality of life in 54 patients (57.45%). We found: 1. A strong correlation between depressivity and the low overall assessment of quality of life as well as the assessment in the subscales for limitations due to physical problems, emotional wellbeing, attention/concentration, and memory. 2. A strong correlation between the increase of severity of depressivity and decrease of the overall assessment of quality of life. 3. A weak correlation between anxiety and the low overall assessment of
QOL as well as the assessment in all subscales. They concluded that depressivity is a factor which worsens significantly all aspects of quality of life of patients with refractory epilepsy. This makes the timely diagnosis and treatment of the disease absolute necessity.

SECTION-2

Behavioural treatment in epilepsy is based on the early observation that seizures can be precipitated in susceptible people by particular stimulus or states. This phenomenon was understood long before modern concepts of epilepsy were evolved.

Dunsmure (1874) reported the case of a boy 5 years of age who suffered attacks described as "temporary loss of voluntary power" whenever anything touched his head without his foreknowledge. The details of this case suggest that the spells were mainly akinetic or inhibitory.

Jackson (1887) reported the case of a 7-year-old boy who had similar attacks whenever his face or head was touched. They reported patient’s fits were a ways precipitated if his face was touched abruptly. If he thought that his face would be touched, the stimulus would not evoke a fit.

Mostofsky and Balaschak (1977) reviewed behavioral treatment approaches to controlling epileptic seizures. The various procedures may be classified into 3 major categories: (a) reward and punishment programs, (b) self-control and psychotherapy, and (c) psychophysiological techniques. This review examines the relevant studies and proposes guidelines to eliminate ambiguities and insufficiencies in future studies. It is suggested that behavioral therapies offer substantial promise for the clinical management of seizure problems and that continued activity in this area of behavioral medicine is important for a better understanding of epilepsy and for theory development in both the behavioral and neurological sciences.

These studies in the last century suggested the possibility of a potent management strategy other than drugs for the patients of epilepsy.

Efron (1957) it was possible to condition the patient to a visual stimulus i.e. a bracelet so that seizures could be aborted by looking at the bracelet alone. There were two significant subjective differences in the response to the specific stimulus (essence of jasmine) and the non-specific conditioned stimulus (bracelet). The dissolving of the seizure began later after exposure to the bracelet compared with exposure to the essence
of jasmine. The lysis itself was described as more abrupt when terminated by the essence. But the measurements of the latency and the duration of the lysis were impossible to obtain with any accuracy. With continuous practice the patient became more socially adapted at controlling her fits. Similar effect occurred, if the patient thought about the bracelet instead of looking at it.

Pritchard et al. (1985) reported that 7 of 71 patients with complex partial seizures claimed they were able to abate their seizures, while none of 18 with simple partial seizures were able to do so. They compared the Minnesota Multiphasic Personality Inventory (MMPI) profiles of the self-abatement groups with epileptic controls matched for seizure types. Self-abatement exercises included highly stereotyped cognitive and physical components unique to the individual. Those who could abate their seizures had attained higher educational status, better social and vocational adjustment, and better psychological adjustment than did the control group of patients with epilepsy. The self-abatement group was also more likely to have right hemispheric electroencephalographic abnormalities. Characterization of the self-abatement group may be relevant to the selection of candidates for behavioral therapy for epilepsy.

Austin, Risinger and Beckett (1991) report results from the first part of an ongoing longitudinal study aimed at identifying the relative contributions of demographic, seizure, and family variables in the prediction of behavior problems in children with epilepsy. They studied 127 children with epilepsy aged 8-12 years and their mothers. Self-report questionnaires, interviews, and medical records were used. Backward and forward stepwise elimination procedures using multiple regression indicated five variables that contributed significantly to prediction of behavior problems: female gender, family stress, family mastery, extended family social support, and seizure frequency. These factors accounted for 29% of the variation in behavioral problems. Their findings suggest that family variables are important correlates of behavior problems and should be considered in clinical management of children with epilepsy.

Roth, Goode, Williams and Faught (1994) using a self-report measure to complete the exercise participation, barriers to exercise, stressful life experience, depression, and general psycho-social adjustment on 133 adult patients with epilepsy. Descriptive statistics was used. They showed lower levels of depression among patients
who exercised regularly. Structural equation analyses confirmed the fit of a path model that included significant direct effects of exercise and stressful life experience on depression. These effects were independent of each other, and independent of the influence of other predictor variables, such as seizure frequency, age, and gender. Stressful life experience also had a direct unique effect on seizure frequency in the multivariate models. These results suggest that problems with depression, which are common in adults with epilepsy, are significantly lower among those who exercise regularly and avoid stressful life change.

Panjwani, Selvamurthy et al. (1996) studied the effect of Sahaja yoga meditation on 32 patients with primary idiopathic epilepsy on regular and maintained antiepileptic medication. The patients were randomly divided into 3 groups: group I practiced Sahaja Yoga meditation twice daily for 6 months under proper guidance; group II practiced postural exercises mimicking the meditation for the same duration; and group III was the control group. Visual Contrast Sensitivity (VCS), Auditory Evoked Potentials (AEP), Brainstem Auditory Evoked Potentials (BAEP), and Mid Latency Responses (MLR) were recorded initially (0 month) and at 3 and 6 months for each group. There was a significant improvement in VCS following meditation practice in group I participants. Na, the first prominent negative peak of MLR and Pa, the positive peak following Na did not register changes in latency. The Na-Pa amplitude of MLR also showed a significant increase. There were no significant changes in the absolute and interpeak latencies of BAEP. The reduced level of stress following meditation practice may make patients more responsive to specific stimuli. Sahaja Yoga meditation appears to bring about changes in some of the electrophysiological responses studied in epileptic patients. It is indicated that Sahaja yoga could prove to be beneficial in the management of patients of epilepsy.

Amir, Roziner, Knoll and Newfeld (1999) examined the influence of two psychosocial variables mediating between disease severity and quality of life (QoL) in epilepsy; social support and mastery (measured by locus of control and self-efficacy). A model placing these two variables as mediators between disease severity and QoL was tested with structural equation modeling. They were using a sample of eighty-nine patients with epilepsy (58% men, age 36 +/- 12 years) were given the following
instruments: Liverpool Seizure Severity Scale, Interpersonal Support Evaluation List, Epileptic Self-Efficacy Scale, Locus of Control scale, and the World Health Organization's Quality of Life Questionnaire, the WHOQOL. Results showed that structural equation modeling showed good fit between the research model and the data (Bentler-Bonett Normalized Index of fit, 0.96; LISREL GFI, 0.95). Ninety percent of the variance of the WHOQOL was explained by a combination of disease severity, self-efficacy in epilepsy, social support, and locus of control. Mastery was found to mediate the correlation between disease severity and QoL, and social support was found to act as a mediator between disease severity and mastery. It is concluded that the study findings emphasize the possibility of improving QoL among patients with epilepsy by counseling and treatment aimed at reinforcing their self-efficacy and locus of control, as well as by improving their social support.

Oosterhuis (1994) investigated the efficacy of a group intervention combining a range of psychological approaches and techniques for seizure management in adults with poorly controlled epilepsy. An uncontrolled AB group design was employed. Seven adults with intractable seizures took part in 8, weekly group sessions which included providing information, employed cognitive-behavioural techniques and addressed emotional difficulties. Weekly seizure logs were kept by participants during the intervention and the following 3 months. Five questionnaires were administered before and after the intervention and at 2-months follow-up to provide an indication of psychosocial well-being. Seizure frequency and scores on the questionnaires were used as outcome measures. There was a significant reduction in seizure frequency in the group, which persisted at follow-up. There were no significant changes on any of the questionnaires. The results suggest that a group-based intervention incorporating a range of psychological techniques may be effective for improving seizure control. The link between seizure reduction and psychological and psychosocial well-being needs further investigation.

Studies using operant techniques

Gardner (1967) reported a case of a ten years old girl whose seizures were abolished when her parents were instructed to ignore their daughters seizures. But it is not entirely clear whether these were epileptic seizures or pseudo-seizures.
Cautela and Flannery (1973) taught the basic principles of operant conditioning and stimulus control to the staff of the community school, where their patient was studying. The patient had complex partial seizures as well as grand tonic clonic seizures. A drop of 56% was observed in his seizure frequency as a result of the treatment program. Use of the teachers as therapists in a natural community setting is a unique characteristic of this study. As seizures were always increasing during school vacations and seizure frequency was reducing after an uncontrollable summer vacation, it can be concluded that the specific contingencies were controlling the seizure behaviour.

Balaschak (1976) achieved significant reduction of seizures in an 11-yr-old epileptic girl through a contingency management program implemented by her classroom teacher which shifted the focus from her actual seizures to seizure-free time periods. A chart of "good times" was kept by the teacher, and rewards given at the completion of a totally seizure-free week at school. They found that seizures diminished from an average of 3/wk to 1/wk over the treatment period. The program was discontinued due to the teacher's unwillingness to reinstate it following the child's lengthy absenteeism and changes in her medication. Seizures then returned to the baseline rate. Lack of adequate controls made it impossible to attribute success entirely to the behavioral intervention. According to them it was unlikely, however, that such dramatic change could be the result of chance, the continuation of her medication, or her continued traditional psychotherapy. Their results suggest the need for more heuristic case studies of seizure disorders treated as an operant chain and the need for subsequent tightly controlled research.

Cataldo et al. (1979) stated that epilepsy represents a serious medical and social problem. In the majority of cases, seizures are successfully managed by a variety of anticonvulsant medications, even though these drugs may potentiate significant physical and developmental side effects. A small group of studies offered evidence that behavioral procedures can successfully manage some seizure disorders and are particularly desirable treatment choices when seizure disorders are intractable to drug management or when drug side effects are to be avoided. The present case adds to this small but growing group of studies in that it demonstrates the use of behavioral procedures in the analysis and treatment of high-rate myoclonic seizures. Seizures were evaluated on a hospital ward.
and in a controlled experimental setting. The data indicated a variable rate of seizures across days and activities and a reduction of seizure frequency in the controlled setting when time-out was made contingent on seizures. A program of contingent rest was then applied on the hospital ward that demonstrated a reduction in myoclonic seizure frequency and the apparent prevention of several grand mal episodes. An observer calibration procedure showed high correspondence between behaviorally and physiologically recorded seizures.

Connel (1979) epileptic seizures and resulting incontinence of urine were effectively reduced by reinforcement of incompatible behaviour with individual programming within a general token economy system. Two treatment phases, including token and social reinforcement, during an 11 week period resulted in significant seizure reduction. Therapeutic gains were maintained in a 6 month follow-up.

Cinciripine et al. (1980) evaluated the effects of a behavioral treatment package and anti-convulsant medication for reducing self-stimulation and seizure activity, and for improving attention in a 7-yr-old white male. During baseline (A), no direct contingencies for the target behaviors were applied. In the B phase, hand overcorrection for self-stimulation and differential reinforcement of attentional responses and behaviors incompatible with self-stimulation were arranged. Carbamazepine (tegretol) was added to the behavioral program in the BC phase. Medication was later withdrawn while behavioral strategies remained in effect. The results showed rapid and significant improvements in all target symptoms during all phases of behavioral treatment, while introduction and withdrawal of medication did not result in any significant changes. Effects were maintained at 8 months' follow-up.

Dahl et al. (1985) divided eighteen children with refractory epileptic seizures into three groups: behaviour modification, attention control and control groups. A combination of seizure frequency and seizure duration, termed as seizure index, was used as a dependent measure. There was a significant reduction in seizure index only for those children receiving behaviour modification at both the follow ups. Though it is shown that behaviour modification may be of substantial help to children with epilepsy, it is not yet clear whether this program will be of use to patients who respond to anticonvulsants.
Thus all the studies using operant techniques are case studies without adequate control, except for one i.e. Dahl et al. (1985).

**Studies using self control strategies:**

**Countermeasures:**

A countermeasure is a behavioural strategy employed at the onset of a focal seizure to abolish seizure or to reduce seizure spread.

Jung (1962) studied the blocking effect of sensory arousal and of active attention on epileptic seizures in 200 cases of petit-mal and 20 cases of grand mal with focal onset. The mechanisms of the seizure block may be similar to desynchronization and reciprocal inhibition of neuronal activity in the cortex during arousal. They may arise from the non-specific thalamo-reticular system which is activated by sensory afferents or attention. Results showed that seizure frequency declined in a patient with absence epilepsy when he was kept interested.

Ounsted et al. (1966) reported a case of intractable petit mal epilepsy in a 9-year-old girl. An attempt was made by them to effect an alteration in the child's bioelectric activity by repeated application of a visual stimulus (intermittent bursts of photic stimulation) whenever spike and wave paroxysms were present in the EEG. This procedure was carried out for a 0.5 h period on 16 days. EEG alterations were observed, in the form of a redistribution of spike and wave activity during the recording period, but the absolute number of spike and wave complexes in successive EEGs was not significantly affected. The EEG changes were accompanied by a marked behavioural change, the paroxysmal spike and wave complexes being accompanied gradually less often by any clinical manifestation. This was paralleled by a general clinical improvement in all other hospital situations. Their examination of background activity showed that alpha and beta rhythms remained relatively constant during the 16 day period: the amount of activity in the theta and delta bands progressively fell; variability in theta and delta voltage was also reduced. In follow-up, the child's clinical condition has showed a number of fluctuations but in general she had maintained excellent progress. Both of these studies point out that deliberate alerting in boring situations can reduce the frequency of seizures.
Penn and Wada (1986) described if patients with primary epileptogenic focus in the right temporal lobe could suppress seizures, humming a tune, napevanie only the melodies are not blocked the attack, indicating the important role of active interhemispheric functional interaction in the suppression of epileptic activity. This is probably due to the predominantly inhibitory kallozalnyh influences interhemispheric connections. They described a case of a woman with right temporal lesion and an aura of dejavu, leading to complex partial seizure: with sodium amytal test, it was obvious that she had left cerebral dominance for speech and right cerebral dominance for music. Her seizures were inhibited by singing but not by humming. But it is not known whether verbal activity on its own would be as effective as singing.

Betts et al. (1995) have developed an Olfactory treatment package. They have reported results of an opentrial of this method in 30 patients. Several of them now use this technique to control their seizures completely and have discontinued medication.

Betts et al. (1999) have compared olfactory countermeasure and massage in a group of 50 patients. They have reported complete seizure control in three patients. Important aspect is that though some patients have not achieved control, they feel better and more in control. There seems a slight advantage in using massage although this does not reach statistical significance.

Reeve and Lincoln (2002) investigated the effects on both psychological adjustment and coping behaviour in epilepsy. They were using a sample of 36, 16–21 year olds with epilepsy and a control group of 31 of their peers. Participants completed a postal questionnaire containing measures of psychological adjustment (self-esteem, affect, self-efficacy) and an adolescent coping questionnaire. Comparison of the two groups showed that the patient group exhibited significantly more non-productive coping than the control group. The control group exhibited significantly more problem solving coping and displayed significantly more problem solving bias than the patient group. No significant differences were found between the patient and control group on measures of psychological adjustment. They found that psychological adjustment associated with coping response in the patient but not the control group.
Studies using psychophysiological techniques:

Seizures can also be precipitated by physical stimuli.

Biofeedback:

Tansey (1985) performed SMR (sensori motor rhythm) training in an undermedicated 14 year old girl with absence epilepsy. There was 30% increase in her SMR rhythm that was accompanied by reduction in seizures, reduction in emotional problem and discontinuation of medication, marked improvement in quality of life. There was no control period in the report, and the case could simply reflect nonspecific changes.

Kuhlman (1977) evaluated the clinical efficacy and mechanisms underlying EEG feedback training of epileptic patients, 5 adult patients with poorly controlled seizures were studied for 4--10 months during which quantitative analysis of seizures, the EEG, and serum anticonvulsant levels was conducted. Sustained seizure reduction did not occur during the first 4-5 weeks in which feedback signals were presented randomly in relation to the EEG. When feedback was then made contingent upon central 9-14 c/sec activity, seizures declined by 60% in 3 patients. Power spectral analysis showed upward shifts in EEG frequency, decreases in abnormal slow activity, and enhancement of alpha rhythm activity as a function of contingent training, but no specific EEG change was associated with seizure reduction in all patients. No evidence was obtained for the hypothesized involvement of a 'sensorimotor rhythm' or motor inhibition in the training effects. The lack of effect in two patients could not be attributed to insufficient training, lack of motivation, or to differences in seizure classification. A second phase of research showed that continued laboratory training was both sufficient and necessary for maintaining clinical and EEG effects. Results indicate that: (1) significant seizure reductions can occur with EEG feedback training which are not related to placebo effects, non-specific factors or to changes in medication; (2) EEG changes associated with such training can best be described as 'normalization'; (3) continued clinical investigation of EEG feedback training as a non-pharmacological adjunct to conventional therapy appears justified.

Cabral and Scott (1976) used two techniques of desensitization, biofeedback of alpha rhythm and relaxation, in a crossover design for the treatment of three young female patients suffering from drug resistant epilepsy associated with anxiety and phobic
symptoms. The patients were followed up for 15 months after the six months of treatment. Their results indicated that both the treatments improved the patients' control of seizures and effects were maintained during the follow-up periods. The mechanism by which amelioration came about is uncertain. The interpretation saying that non-specific or placebo factors might be playing a role can't be ruled out with this design of study and small sample size.

Whyler et al. (1976) reported the results of 23 severely epileptic patients who were given EEG feedback training. The paradigm reinforced the patients' 18 Hz activity over the scalp approximation of their focus while suppressing temporalis EMG and low frequency EEG activity. In contrast to other studies using EEG feedback, only 43% of patients showed significant changes in seizure occurrence and a lesser number were felt to have benefited clinically. They conclude that none of neuropsychological test parameters were helpful in identifying (prospectively or retrospectively) patients most likely to respond to this treatment.

**Psychotherapy**

Individual and group psychotherapy has been used to allow the patient to gain an understanding of self and of the relationship of seizures to difficulties in life.

Feldman and Paul (1976) describes a technique of stimulated recall and video replay which has reduced the frequency of seizures in five epileptic patients. Each of the patients had long standing partial epilepsy with complex symptomatology of the psychomotor type. It was generally acknowledged that emotional factors played an important role in their poor seizure control. Previous psychotherapeutic efforts had been without benefit because ictal amnesia had erased the memory of the stressful antecedent message-input which had triggered the seizures. Creation of empathetically stressful responses to presentation of audio and video tape recordings of specific problematic social interactions was sufficient to induce seizures in these patients. Video tape recording of the seizure and the antecedent events provided a means by which the patients could acquire otherwise unrecognized or forgotten information. Once equipped with the identity of the specific emotional trigger, the patient could avoid the kinds of events which might be expected to induce a seizure and be better able to cope with threatening environmental cues when encountered in the future.
Rosenbaum and Palman (1984) divided his patients into high resourceful and low resourceful groups. It was found that if seizure frequency was medium or low, high resourceful subjects were significantly less depressed and less anxious. If the seizure frequency was high, two groups did not differ on levels of emotional adjustment. The data suggest that patients with less severe epilepsy were influenced by their ability to cope with personal and social circumstances.

Correa (1987) tried to change the locus of control of 13 children with epilepsy. Despite an education program, no significant changes in the locus of control measures or in seizure frequency were found.

Collings (1990) examined the self-esteem, life fulfillments, social and interpersonal difficulties, general physical health, worries, and happiness of 392 adults with epilepsy using various psychometric instruments. A questionnaire method was used, and the sample was drawn from urban and rural epilepsy support groups in several regions of Great Britain and Ireland and a hospital outpatient population. The findings indicated general low well-being among the epilepsy sample when compared with a nonepilepsy sample matched for age and sex. Factors associated with high and low well-being within the epilepsy sample were also investigated. People's perceptions of themselves and of their epilepsy were strongly related to overall well-being, and seizure frequency, ratings of certainty of diagnosis, time since diagnosis, and a diagnosis of absence seizures also seemed of some significance. From a range of background factors, only employment status showed any significant association with well-being. The research findings have implications for the management of people with epilepsy and suggest that ratings of subjective experience could be usefully incorporated into future research into the quality of life of people with epilepsy.

Mathers (1992) reported that group therapy was beneficial for the patients attending epilepsy clinic. The greatest benefit was meeting others with epilepsy and sharing experiences in an environment that was neither over protective nor over anxious in contrast to the usual surroundings.

Cramer (1994) has stated that due to the diversity and impact of problems related to epilepsy, each patient has to think of his own priority issues and address them accordingly.
Ogata and Amano (1997) using a sample of 174 epileptic patients giving psychoeducational approach. They pointed out the importance of group psychotherapy and self-help groups in addition to educational programs in order to enhance the QOL of epileptic patients and their families.

Schmid-Schonbein (1998) examined the problem of intractability in psychological way. They found 68% obtained (80-100%) and 12% obtained (60-70%) reduction of seizures using a sample of 16 patients with intractable epilepsies. They were trained in technique of self control in addition to ongoing pharmacological treatment. The self control training consisted of detailed observation which aimed at identifying warning signals of a beginning seizure and seizure-provoking factors and the development of 'counter measures' (behavioural measures to interrupt a beginning seizure and to neutralize provoking factors). After self control training, all those patients who successfully managed to deal with their identified problems (strong psychic stress and/or poor intuitive self control abilities) achieved a significant improvement of seizure control: 68% obtained 80-100% reduction and 12% obtained 60-70% reduction of seizures. None changed for the worse. They suggested that psychological methods of seizure control can contribute to improving long standing intractable epilepsies. They may even help to prevent the development of intractability. A new kind of psychotherapy is proposed, consisting of a combination of pharmacological and self-control therapy.

Gidal et al. (1999) studied 465 epileptic patients and found that 31% had used complementary and alternative therapies in the previous 12 months, commonly to ameliorate difficulties with mood, cognition and fatigue and for general health promotion. 13% cited seizures as the specific reason for using complementary and specific reason for using complementary and alternative therapies, with relaxation, vitamins, herbs and homeopathy and 67% had not discussed their use of complementary and alternative therapies with their doctor.

Ogata and Amano (2000) taken a psychoeducational approach using a sample of 174 epileptic patients. Using this approach, no family problems were recognized among patients with idiopathic generalized epilepsy (IGE) or among those with symptomatic generalized epilepsy (SGE). However, 11 patients with temporal lobe epilepsy (TLE) and 1 patient with non-temporal lobe epilepsy (non-TLE) did exhibit family problems
indicating that such problems involving IGE or SGE cases can be prevented through educational programs using a psychoeducational approach. This fails, however, to prevent such problems for TLE or non-TLE cases. Furthermore, small group psychotherapy was given to 10 patients with intractable TLE. They were directed to make self-evaluations regarding therapeutic factors originally introduced by Yalom but specially modified for these particular patients. Relatively high evaluations were given on every factor when compared with the results of individual psychotherapy. These results showed that the importance of providing such psychotherapeutic approaches as group psychotherapy and self-help groups in addition to educational programs in order to enhance the quality of life (QOL) of epileptic patients and their families.

Mimics (2003) investigated interrelationships between problems in psychosocial adjustment, coping and epilepsy variables. They were using a sample of 310 outpatients with epilepsy. The measures used was Washington Psychosocial Seizure Inventory, Ways of Coping Scale, Modified Version, as well as scale measuring depression and anxiety. When the scores of patients with high Lie score were eliminated, the WPSI profiles were found to be similar to former studies, with some score elevations in emotional adjustment and interpersonal adjustment. When relationship between adjustment variable and coping were modeled, coping was found to be a mediator between the effects of interpersonal and emotional adjustment and integration to the broader social context (vocational adjustment). Family background was found to be a significant predictor of the emotional well-being and interpersonal adjustment scores of the patients. Results showed that the central role of coping and emotional well-being and emphasized the importance of family factors in adjustment to epilepsy. Psychotherapy and psychological interventions could support coping with illness, primarily through elimination of negative family and social effects and treatment of emotional problems.

Austin, MacLeod, et al. (2004) described the psychometric properties of two scales measuring perceived stigma in children with epilepsy and their parents. The data were collected for the parent scale in two samples: parents of 173 children with epilepsy and of 224 children with new-onset seizures. They were tested child scale, content validity, internal consistency reliability, and construct validity in the chronic sampled. The results showed that both scales had strong internal consistency reliability and
construct validity. Higher scores were associated with greater seizure severity scores. In the parent scale, lower scores were associated with more positive mood, less worry, and more family leisure activities. In the child scale, higher scores were correlated with more negative attitude, greater worry, poorer self-concept, and more depression symptoms. They concluded that both scales were found to have strong psychometric properties. They are short, and items are easy to understand. These scales have potential for use in research and in the clinical setting to measure stigma.

Caitlin (2009) reviewed that complementary and alternative medicine is a diverse group of health care practices and products that fall outside the realm of traditional Western medical theory and practice and that are used to complement or replace conventional medical therapies. The use of complementary and alternative medicine has increased over the past two decades, and surveys have shown that 44% of patients with epilepsy are using some form of complementary and alternative medicine treatment. They reviewed the complementary and alternative medicine modalities of meditation, yoga, relaxation techniques, biofeedback, nutritional and herbal supplements, dietary measures, chiropractic care, acupuncture, Reiki and homeopathy and what is known about their potential efficacy in patients with epilepsy.

**Relaxation and Epilepsy**

Relaxation technique is used as a countermeasure, wherein the patient is taught relaxation and asked to induce it at seizure ones. Mostovsky and Vicks (1973) reported a case of 28 years old retarded woman with grand mal and absence seizures. The treatment took place in 1 hour training session in her home for 3 week with progressive muscle relaxation. After that time, seizure frequency was reduced by about half. After a year’s follow up, the patient remained improved although seizures still occurred. The short term of treatment in that patient, and the fact that a rate of seizures at 1 year follow up was not reported, They suggest that, in absence of other confirmation, this may be a spurious effect. Results showed that progressive muscle relaxation reduce the seizure frequency in epileptic patients.

Wells et al. (1978) used relaxation as a countermeasure in group of patients with complex partial seizure where in the patient is taught relaxation and asked to induce it at
seizure ones. The training generalized well from the hospital to a home situation. The authors reported reduction of seizure frequency.

Melin and Dahl (1981) used contingent relaxation successfully in four single subjects with different seizure types. They showed significant decline in seizure in all their patients. They also showed that simple and complex partial seizures respond more to behavioural treatment and that relaxation is necessary. But non-specific controls were not used in this study.

Snyder (1983) studied the effect of relaxation on psychosocial functioning in persons with epilepsy. They found that three of four adults trained in relaxation and who practiced it for at least 15 days per month experienced an average reduction in seizure frequency.

Rousseau et al. (1985) studied the effects of progressive relaxation therapy on the frequency of seizures in 8 patients aged 19–32 yr old with partial epilepsy. All 8 subjects experienced at least 6 seizures in a 3-wk baseline period. They were then randomly placed into either Group 1, which underwent relaxation therapy during the next 3-wk interval, or Group 2, which underwent a 3-wk sham treatment and then a 3-wk relaxation therapy. All Ss showed decreases from baseline to treatment, indicating a significant beneficial effect of relaxation therapy for reducing seizures. All subjects also gave subjective reports of improved feelings of well-being beyond decreases in the frequency of their seizures.

Dahl et al. (1987) studied a group of eighteen adults with refractory epileptic seizures to give psychological treatment in a two-phase experimental group study. In phase one, the experimental phase, the patients were divided into three groups—contingent relaxation (CR), attention control (ATC) treatment, and a no-treatment (NT) control group with the purpose of investigating the effects of a learning-based contingent relaxation program compared with the effects of professional attention alone when superimposed on a regular medical treatment program. Their design of the experimental phase was comprised of a 10-week baseline, 6-week intervention, and 10-week follow-up. Results of this phase at the end of follow-up showed a significant reduction only for those patients receiving the CR treatment. In the nonexperimental phase, the two control groups also received the CR treatment for a 6-week period, and subsequent
seizure frequency measures for all three groups were analyzed after 10-week and 30-week follow-up periods. Results of this phase showed a significant reduction in seizure frequency for all three groups after receiving the CR treatment. Effects of the CR treatment were maintained at a 30-week follow-up. Their results indicate that the CR treatment program may be of substantial help to adults whose seizures are resistant to conventional drug therapy.

Dahl et al. (1988) conducted a study on behavior therapy in the treatment of epilepsy. The study was aimed to provide controlled data on the usefulness of behavioral interventions in reducing epileptic seizures and to provide a theoretical explanation of the psychological mechanisms at work. In Study 1, a single subject replication series, patient recognition of early cues and application of a contingent relaxation technique was found to be useful in reducing seizures. Study 2, a controlled group study, confirmed the seizure reducing effects of the relaxation skill used in high risk seizure situations. In Study 3, a broad spectrum behavioral intervention strategy was used, allowing for individual variation in seizure patterns and arousal levels. It was found that teaching the person with epilepsy to recognize his/her particular pattern of early seizure cues and arousal level, and to react with an appropriate counter measure was relatively more successful in reducing seizures than teaching the standard technique of relaxation. Study 4 investigated, under laboratory conditions, using EEG-video measures, the behavioral treatment components: symptom discrimination, counter measures, contingent relaxation and positive reinforcement of correct responses. It was found that the element of counter measures i.e. appropriate manipulation upwards or downwards of arousal level contingent upon preseizure signals may be the most effective agent in the psychological treatment of epilepsy presented in these studies.

Fenwick and Brown (1989) suggests Lockhart's monkey model of focal epilepsy a theoretical approach to behavioural seizure inhibition. They suggest that by changing the pattern of excitation and inhibition surrounding a focus, behaviour is able to inhibit seizure activity. They describe five single case studies in which the behavioural methods of cued arousal, covert desensitization and relaxation have brought about a decrease in seizure frequency.
Puskarich et al. (1992) determined the efficacy of progressive muscle relaxation in reducing seizure frequency. They were using a sample of 24 people with epilepsy attending an urban neurology clinic. The experimental design consisted of an 8-week baseline period, a treatment period of six sessions of progressive relaxation training (PRT, n = 13) or quiet sitting (QS, n = 11) and an 8-week follow up. In the PRT group, 11 subjects reported a decrease in seizure frequency (p < 0.01), and in the QS group, 7 reported a decrease (p > 0.05). The mean decrease in seizure frequency was 29% for the PRT group (p < 0.01) but only 3% for the QS group (p > 0.05). This is the fifth recent report of a controlled study documenting the success of progressive relaxation therapy in seizure reduction. PRT is inexpensive and noninvasive and facilitates patient participation. Such a technique should be incorporated into clinical practice.

Pitkanen, Laakso, Kalviainen, Pertanen, Vainio, Lehtovirta, Rickkinen, Soininen (1996) analyzed hippocampal volumes and T2 relaxation times by MRI from 78 control subjects, 24 patients with temporal lobe epilepsy, and 55 patients with Alzheimer's disease (AD). In the epilepsy group, the hippocampal volumes were 27% smaller than in control subjects (p < 0.001). The T2 relaxation times were prolonged (8 to 20 ms compared with control subjects) in the head, body, and tail portions of the hippocampus on the focal side (p < 0.01) and also on the contralateral side (p < 0.05) compared with control subjects. In the epilepsy group, the prolongation of T2 relaxation time correlated inversely with the hippocampal volume (p < 0.05). In the AD group, the hippocampal volumes were 35% smaller than in control subjects (p < 0.01). The T2 relaxation times were slightly prolonged (5 to 6 ms) in the head and tail portions of the right hippocampus (p < 0.01), but the T2 relaxation times did not correlate with the hippocampal volumes. These data show that the degree of prolongation of T2 relaxation time is associated with severity of hippocampal atrophy in temporal lobe epilepsy but not in AD.

Namer, Waydelich, Arpspach, Hirsch, Marescauz, Grucker (1998) compared the results of visual analysis of MR imaging with T2 relaxation time mapping of the mesial structures in a group of 97 patients with cryptogenic temporal lobe epilepsy. All patients underwent a clinical neurological examination, neuropsychological investigation, prolonged video-EEG monitoring, SPECT imaging, MR imaging, and T2 relaxation time
mapping. T2 relaxation times were estimated with a Carr-Purcell-Meiboom-Gill pulse sequence with 48 echoes (15 to 720 ms). The mean T2 relaxation time value was 118.5 +/- 2 ms in the hippocampus and 120.3 +/- 1.9 ms in the amygdala of 21 healthy subjects used as controls. T2 relaxation mapping revealed mesial temporal sclerosis in 91.8% of the patients (often involving both the hippocampus and the amygdala) and evidenced bilateral involvement in 44.6% of the patients against 72.2 and 6.2%, respectively, for MR imaging. The ipsilateral and contralateral hippocampal T2 relaxation time values did significantly correlate with seizure frequency and the contralateral hippocampal T2 relaxation time value with the duration of epilepsy. They concluded that quantitative method is highly sensitive for the detection of mesial temporal sclerosis and permits a better evaluation of the apparently normal contralateral mesial structures.

Briellmann, Jackson, Pell, Mitchell, Abbott (2004) determined the extent and severity of mesial temporal and subcortical signal abnormalities in patients with partial epilepsy. T2 relaxation time maps were acquired in 50 consecutive patients and 55 control subjects on a 3 T MRI scanner. Twenty-two patients had hippocampal sclerosis (HS), 16 had malformations of cortical development (MCD), and 12 had no obvious MR abnormalities (normal MR). The following eight regions were measured bilaterally: hippocampus, anterior temporal lobe (ATL) white matter, amygdala, frontal lobe white matter, caudate, putamen, pallidum, and thalamus. Results showed that in patients with HS, increased T2 relaxation times were found in the ipsilateral hippocampus and ATL but not in subcortical nuclei. In patients with MCD, increased T2 relaxation times were found in the temporal lobe (hippocampus, ATL) and in subcortical areas (caudate, putamen, and pallidum); in patients with normal MR, increased T2 relaxation times were found in the hippocampus and putamen. The degree of abnormality did not correlate with the duration of epilepsy or the estimated seizure load. They concluded that mesial temporal structures show increased T2 relaxation times not only in patients with hippocampal sclerosis but also in patients with a seizure focus remote from the hippocampus. Patients with normal MR and focal malformations of cortical development have increased T2 relaxation times in subcortical structures. Therefore, abnormalities in T2 relaxation time can be found remote from the seizure focus. They cannot be simply attributed to secondary seizure effects.
Gupta and Naorem (2003) stated that epilepsy is the commonest neurological disorder, so there is a need to establish more effective remedial programmes for the deficits in cognitive functioning associated with epilepsy. They studied the relative change in the targeted skill areas as a consequence of cognitive retraining. For this purpose, a pre- and post-multiple baseline design was adopted with the intention of treating specific deficient skill. The measures of neuropsychological functioning adopted were a composite of tests/tasks, with specific emphasis on attention, memory and emotional status. The subject was targeted to a special neuro-rehabilitation programme comprised of cognitive retraining, supportive therapy and a deep breathing relaxation exercise. A regular home intervention programme was conducted simultaneously. Cognitive retraining included both paper and pencil tasks and real life activities. The training programme covered a 6-week period and each weekly session lasted 1 hour. The results showed an overall improvement in cognitive performance across sessions, and the regular home intervention sessions were found to have enhanced the subject's performance. They concluded that by identifying cognitive deficits, effective training programmes can be devised that will be of substantial benefit to patients with epilepsy.

Batra (2004) found that self administration of JPMR by a subject, who was not even undergoing any drug therapy, helped her overcome the epileptic attacks with in 15 days of the learning of relaxation.