Review of Literature

Epilepsy

Definitions of Epilepsy and Epileptic Seizures

Epilepsy is defined as "a chronic neurological disorder, characterized by recurrent unprovoked seizures originating in the brain" ***(Indian Epilepsy Society, 2008 and Shorvon, 2009).*** Epilepsy is also defined as a disorder of the brain characterized by an enduring predisposition to generate epileptic seizures; the definition of epilepsy requires the occurrence of at least one epileptic seizure ***(Kligman et al, 2012 and Shorvon et al, 2013).*** Epilepsy is also defined as an abnormal electrical disturbance in one or more areas of the brain, which characterized by recurrent epileptic seizures originating in the brain ***(Hockenberry & Wilson, 2013).***

The International League Against Epilepsy defined active epilepsy as two or more afebrile seizures, at least 24 hours apart, unrelated to acute infection, metabolic disturbance, neurologic disorders or drugs in the last 5 years ***(International League Against Epilepsy, 2009)***. Children who were on antiepileptic drugs were also considered as having active epilepsy, where it is the broad operational definition of epilepsy and remains the most widely accepted one ***(Burton et al., 2012).***

An epileptic seizure is a transient occurrence of signs and/or symptoms due to abnormal excessive or hyper-synchronized neuron discharges in the brain. These discharges can involve widespread areas of the brain simultaneously or be focused in one specific area and results in an alteration in motor activity, sensation, behaviour or consciousness ***(Kligman et al, 2012)***.

Etiology of Epilepsy

The International League Against Epilepsy classify etiology of epilepsy to a three broad categories, namely genetic, structural/metabolic and unknown causes. Genetic epilepsy must be a direct result of a known or presumed genetic defect and the seizure is the core symptom of the disorder. Classifying epilepsy as genetic does not exclude the possibility that environmental factors may contribute to expression of the disease. Structural / metabolic epilepsy has to be associated with a structural lesion or metabolic disease that has been shown to substantially increase the risk of developing

epilepsy. Examples of structural lesions include stroke, trauma, infection, tuberous sclerosis, and malformations of cortical development. The third etiological classification of epilepsy is the epilepsy of unknown cause i.e. idiopathic; it constitutes over one-third of all epilepsy causes ***(International League Against Epilepsy / International Bureau for Epilepsy / World Health Organization Global, (2010).***

Pathophysiology

The basic mechanism of the seizures is abnormal electrical discharges that may arise from the central areas in the brain that affect consciousness or may be restricted to one area of the cerebral cortex. The electrical discharge may also spread to other portions of the brain, which if sufficiently extensive, produce generalized seizure activity. The electrical discharge initiated by a group of hyper excitable cells referred to the epileptogenic focus, increased electric excitability, but normally these discharged are restrained from spreading beyond the focal area by normal inhibitory mechanism. In patients with epilepsy there is an imbalance between the excitatory and inhibitory mechanism in the brain, leading to convulsion ***(Hockenberry & Wilson, 2013).***

Classification of Epileptic Seizures

Classifying seizure type(s) which the children have experienced is important for future management and outcome of the children's epilepsy. The classification of epileptic seizures is still largely based on clinical observation and expert opinions ***(Indian Academy of Pediatrics, 2009).*** The classification scheme developed in 1981 still the one that is in broadest use; most recently the ILAE published the recent classifications of seizures and epilepsy in 2010 ***(Berg et al., 2010; Berg & Scheffer, 2011; and National Institute for Health and Clinical Excellence, 2013).***

The classification of epileptic seizures includes: Focal seizures (previously ''partial'') and generalized seizures. Focal seizures are subdivided between simple and complex partial seizures, which are distinguished by the presence or absence of impairment of consciousness. Simple partial seizures are defined as seizures without impairment of consciousness, while complex partial seizures are defined as seizures with impairment of consciousness. In generalised seizures, the whole brain is affected

by change in electrical activity and the children become unconscious of their surroundings ***(Rudzinski and Shih 2011).***

Generalised seizures are tonic-clonic seizures, absence seizures, atonic seizures, myoclonic seizures, tonic seizures, and clonic seizures. *Tonic-clonic seizures,* also known as grand mal seizures and consists of two distinct phases, tonic and clonic. *Absence seizures,* formerly called petit mal or lapses, are generalized seizures usually begin in childhood or adolescence and may occur many times a day and provoke a brief 'trance-like' state ***(Berg & Scheffer, 2011).***

Unclassified epileptic seizures are seizures that lack sufficient information to classify. In addition to the seizures classified by the International classification of Epileptic Seizures, several types of epileptic syndromes display a group of signs and symptoms that collectively characterize or indicate a particular condition ***(Rudzinski and Shih 2011).*** The classification of epileptic seizures are illustrated in **Table (I)**

Table (I). The Classification of Epileptic Seizures

International Classification of Epileptic Seizures

Focal Seizures

Simple Partial Seizure

No loss of consciousness or awareness

1. With motor signs limited to one side of the body, such as an isolated jerking of part of the body. Seizures may begin in a small part of the body, such as the corner of the mouth, a finger, or a toe, and then spread to other parts of the body.
2. With sensory symptoms:

   a) Sight b) Smell c) Sound d) Taste e) Touch f) Emotions

Complex Partial Seizures

Also called psychomotor or temporal lobe; loss of awareness of surrounding. The person may stop whatever he or she is doing and begin some purposeless behavior, such as lip smacking, picking at clothes, or wandering around a room; or the person may continue whatever he or she is doing but in an inappropriate manner. Confusion follows the seizures.

1. Simple partial onset (aura) followed by impairment of consciousness
2. With impairment of consciousness at onset
3. Partial seizures evolving to secondarily generalized seizures (may be generalized tonic-clonic, tonic, or clonic).

Generalized Seizures

Absence Seizures: Formerly called petit mal. Non-convulsive seizures with total loss of consciousness or awareness. Short periods of blinking, staring, or minor movements lasting a few seconds.

Tonic-Clonic Seizures: Formerly called grand mal. Total loss of consciousness with convulsions usually lasting 1 to 3 minutes.

Myoclonic Seizures: Myoclonic jerks (single or multiple); start or stop abruptly.

Clonic Seizures: Clonic muscle activity

Tonic Seizures: Stiffening of the body.

Atonic Seizures: Lack of muscle tone ("drop attacks")

Unclassified Epileptic Seizures

These include all seizures that can't be classified because of inadequate or incomplete data. They include some neonatal seizures (e.g. rhythmic eye movements, chewing, and swimming movements).

(Source: Berg, A.T.; Berkovic, S.F. and Brodie, M. et. al. (2010). Revised terminology and concepts for organization of seizures and epilepsies: Report of the ILAE Commission on Classification and Terminology, 2005-2009. *Epilepsia*, Vol. 51, No. 4, (April 2010), pp. 676-685, ISSN 1528-1167).

Status Epilepticus

The vast majority of seizures are self-limiting; however, on occasion a prolonged seizure may occur. Status epilepticus is defined as a seizure lasting for 30 minutes or longer without the person regaining consciousness or recurring seizures without full recovery between seizures ***(International League Against Epilepsy, 2010 and El-Biltagi et al., 2012).*** Status epilepticus (SE) is a medical emergency that requires rapid diagnosis and treatment. Although any type of seizure may develop into status epilepticus, generalized tonic-clonic seizures (convulsive) progressing into status epilepticus are the most serious ***(Scottish Intercollegiate Guidelines Network, 2005 and Hillman et al., 2013).***

Components of Epileptic Seizures

Engel., (2013) defined four components of a seizure which can be distinguished, namely; prodromal phase, aura, ictus and post ictus phase. But not all seizure types will have all these stages. The presence or absence and the nature of them are important for diagnosing the seizure type. The first phase is the *Prodromal phase,* begins a few hours or even days before the actual seizure and should not be confused with the aura. Prodromal symptoms are: headache, irritability, insomnia, bad temper, depression or increased activity.

Aura precedes the seizure by seconds or a few minutes. The term aura comes from the Latin word "breeze" and is synonymous with a simple partial sensory or psychic seizure. It is the beginning of the seizure and signals the focal onset of the seizure. The feelings of the aura are often vague and indescribable, leading to extreme fear, Strange epigastric sensations, dreamlike experiences, unpleasant smells,... etc. may occur. The epileptic children remember the aura very well, as it happens before consciousness is lost.

Ictus (Seizure) characteristics differ according to their classification. In most seizures, there is a loss of consciousness, and the epileptic children have no memory of the seizure. Therefore, the diagnosis depends on witnesses who have seen the actual seizure. *Post-ictal phase* may be absent or brief or may last several hours, and

sometimes even days. There is usually a deep sleep and waking up with headache, tiredness, irritability, vomiting, confusion, muscular aches or ataxia. Transient paralysis of a part of the body, known as Todd's paresis may occur for a few hours or days. Altered speech or aphasia may occur when the dominant hemisphere of the brain has been involved.

Clinical Manifestations of Epileptic Seizures

The clinical manifestations of epilepsy differ according to which type of seizure the children have ***(Berg & Scheffer, 2011)***. The different types of epilepsy and the clinical manifestations of every type are presented as follows: Focal, Generalized, and Unclassified Epileptic Seizures. Focal seizures manifest themselves in many different forms, depending on which area of the cortex is involved in the onset and spread of the ictal discharge. It is originated from a focal area of cerebral cortex and may spread to other cortical regions either unilaterally or bilaterally. Focal seizure may manifests with motor, sensory, autonomic and psycic symptoms ***(Rudzinski and Shih 2011).***

Motor seizures may be manifested as jerking of a limb, twitching of the face. Sensory seizures can be manifested by numbness, tingling or burning sensation in a region of the body. Autonomic seizures may include blushing, pallor, racing heart-rate and nausea. Psychic symptoms include feelings of familiarity ("deja-vu"), hallucinations (visual, sound, taste or smell), anxiety or panic ***(Rudzinski and Shih 2011).***

Simple partial seizures are often referred to as auras. Complex partial seizures involve regions of both hemispheres, thus explaining the impaired consciousness and the more complex and often bilateral motor symptoms. During complex partial seizures, the epileptic children may have a variety of repetitive semi-purposeful movements that are referred to as motor automatisms. These can include oral-buccal movements (chewing, swallowing, sucking), complex motor phenomena including bicycling and kicking movements, flailing of the arms, and even running, jumping, and spinning ***(Rudzinski and Shih 2011).***

The generalized seizures include, *Tonic-clonic seizures,* consist of two distinct phases: tonic and clonic. In the tonic phase the children roll the eyes upward and immediately loss consciousness. If standing, the children fall to the ground. The

musculature stiffens in a generalized and symmetric tonic contraction of the entire body. The mouth is forcefully closed which can result in a tongue bite. The thoracic and abdominal muscle contract and sometimes produce a "tonic cry" as air is forced over the vocal cords. Parents often misinterpret this as an expression of pain. The average tonic phase lasts 10 to 30 seconds, during which the children are apneic and may become cyanotic. Autonomic phenomena that may be observed include increased blood pressure, increased heart rate, flushing, and increased salivation ***(Berg and Berkovic 2010).***

In the clonic phase the tonic rigidity is replaced by intense jerking movements as the trunk and extremities undergo rhythmic contraction and relaxation. During this time the children cannot control oral secretions and may be incontinent of urine and faces. As the seizure ends, the movements become less intense and occur at less frequent intervals until they cease entirely. The average clonic phase lasts 30 to 50 seconds. In the post-ictal phase children may remain semiconscious and difficult to arouse. The average duration of the post-ictal phase is from 1 to 15 minutes. The affected children may remain confused or sleep for several hours. They have mild impairment of fine motor movements. Children may have visual and speech difficulties and may vomit or complain of headache. On awakening, they are fully conscious but usually fell tired and may complain of sore muscles and headache. They have no recollection of the event ***(Berg et al., 2010).***

In *Absence seizures,* the children will stare blankly and be unresponsive usually for five to ten seconds, with the children experiencing 20 or more events daily, recovery is immediate and these episodes may go unnoticed. The children's failure to respond when being spoken to during a seizure often results in the children being told off for not paying attention. Frequent episodes can result in slow intellectual processes and deterioration in schoolwork and behavior. This is often the first indication of the problem ***(Berg & Scheffer, 2011).***

Atonic seizures are manifested as a sudden, momentary loss of muscle tone. The onset is usually between 2 and 5 years of age. During a mild seizure the children may simply experience several sudden brief head drops. During a more severe episode the children suddenly fall to the ground (generally face down), briefly lose consciousness, and after a few seconds get up as if nothing happened. Because of the sudden loss of

tone, the children are unable to break the fall by putting out a hand, and so suffers injuries to the head, face, or shoulder. Therefore, if the children are known to have frequent atonic seizures, they should wear a helmet with a face guard to prevent injury to the face and teeth ***(Berg & Schetfer, 2011).***

Myoclonic seizures are characterized by sudden brief contractions of a muscle or a group of muscles. The seizures may involve only the face and trunk or one or more extremities. They may occur singly or repetitively. The seizures may or may not be a symmetric. Myoclonic seizures often occur in combination with other seizures types. Consciousness is not impaired and there is no post-ictal confusion with single myoclonic jerks. Myoclonic seizures can occur in clusters and evolve into clonic-tonic-clonic seizures, with resultant loss of consciousness and post-ictal confusion ***(Berg et al., 2010).***

Tonic seizures are characterized by a sudden onset of increased tone. The children will fall if standing. The children may cry out because of contraction of the respiratory and abdominal muscles. Tonic seizures are longer than myoclonic seizures, with an average duration of 10 seconds. Post-ictal confusion, tiredness, and headache are common. Tonic seizures are uncommon and typically begin between 1 and 7 years of age. *Clonic seizures* are characterized by loss of consciousness and decreased tone followed by jerking movements of the extremity. The duration is typically from 1 to several minutes and may be followed by a rapid recovery or may have a prolonged period of post-ictal confusion ***(Shinnar, 2010).***

Seizure Triggers

The most common factors that may trigger seizures in children include emotional stress, sleep deprivation, fatigue, failing to take medication, fever and illness. Other precipitating factors as every sensorial stimulus such as flashing light, visual patterns, water sounds may increase the chance of a seizure occurring. Seizure triggers can occur in all types of epilepsy, but are more of a feature in particular epilepsy syndromes ***(Granata, 2011).*** Certain factors as illustrated in **Table (II)** may precipitate the epileptic seizures in the children.

Table (II). Possible Triggering Factors for Seizures

CONDITIONS	FACTORS
Physical	•Overexertion • Sleep deprivation • Alteration in bowel elimination • Fever • Recent head trauma • Concurrent illness/infections • Excesses in caffeine, sugar, and other foods
Psychosocial/emotional	•Stress or anger • Depression, anxiety
Metabolic and Electrolyte Imbalance	•Low blood glucose, low sodium •Low calcium, low magnesium • Dehydration • Hyperventilation
Medication or chemical	•Reduction or inadequate treatment of AEDs • Administration of drugs with pro-convulsant properties (e.g., central nervous system stimulants and anti-cholinergics). • Immune suppressants such as cyclosporine • Antibiotics such as Quinolones or Imipenem/Cilastatin • Toxins
Hormonal Variations	•Menstruation • Ovulation
Environmental	•Particular odors • Flashing lights • Certain types of music

(Source: Hickey, JV., 2011: The Clinical Practice of Neurological and Neurosurgical Nursing. 6th ed. Philadelphia: Lippincott Co.).

Diagnosis of Epilepsy

A clear history from eyewitness to the attack gives the most important diagnostic information, and should be the mainstay of diagnosis. Prospective recording of events, including video recording and written descriptions, can be very helpful in reaching a diagnosis ***(Indian Epilepsy Society, 2008; and National Institute for Health and Clinical Excellence, 2012).***Children who have had a suspected epileptic seizure require ready access to a range of investigations, particularly EEG, brain CT and MRI, when clinically indicated ***(Aminoff et al., 2013).***

When the clinical diagnosis of epilepsy is uncertain and if events are sufficiently frequent, video-EEG monitoring should be used to assist in the diagnosis of an epileptic or non-epileptic seizure ***(Indian Academy of Pediatrics, 2009 and National Clinical Guideline Center, 2012).*** Genetic studies may be helpful and constitute an important clinical indicator for genetic epilepsy that provide significant implications for treatment and genetic counseling ***(Gadgil & Udani, 2011).***

Management of Epilepsy

Management of epilepsy is complicated, and often requires a complex, rigid and expensive medication regimen in order to control seizure activity. The medical team will need to ascertain whether the event was an epileptic seizure, if it was, what type of seizure occurred and whether the children have an epilepsy syndrome identifiable on the basis of age of onset, seizure type and specific electroencephalogram (EEG) characteristics and other features. The observation of seizure patterns can help identify a target for medication and lifestyle interventions to improve seizure management ***(National Institute for Health and Clinical Excellence, 2012).*** The goal of treatment in epilepsy is to control seizures by eliminating or minimizing their frequency and intensity. Management of epilepsy has four treatment options namely drug therapy, the ketogenic diet, vagus nerve stimulation, and epilepsy surgery ***(Costolo., 2012).***

Drug Therapy

For more than 60 years, the mainstay in epilepsy treatment has been the use of antiepileptic drugs (AEDs). It is known that children with epilepsy have seizures when

their basal level of neural excitability exceeds a critical point; no event occurs if the excitability maintained below this threshold. The administration of AEDs serves to raise this threshold and prevent seizures. Today, with a wide array of such medications to choose from, approximately 75% of patients achieve satisfactory seizure control with AEDs ***(Garnett et al., 2009 and National Institute for Health and Clinical Excellence, 2012).***

Finding the right medication is sometimes a lengthy and frustrating process because the first drug to be tried may not prove to be the best option. The use of one antiepileptic drug at a time (monotherapy) is generally recommended, and adding more antiepileptic drugs (polytherapy or adjunctive anti-epileptic drugs) should only be considered when attempts at monotherapy have failed to result in freedom from seizures. The AEDs are often grouped into categories including 'first-generation' (i.e., Carbamazepine, Phenobarbital, Phenytoin, Primidone, Valproate) and 'second-generation' (Clobazam, Oxcarbazepine, Lamotrigine). Although second-generation AEDs offer some improvement over first-generation drugs, each can cause notable adverse effects ***(Patsalos et al., 2008 and Krasowski, 2013).***

The general rule for prescribing anti-epileptic drugs in children is to prescribe enough medication to stop seizures without causing side-effects. Dosing of anti-epileptic drugs is entirely dependent on each individual child. Although adverse effects can occur with all AEDs, and CNS effects are most prevalent, the failure of an AED regimen may be the result of unacceptable adverse effects (intolerance), inadequate seizure control (inefficacy) or a combination of both ***(Ravat, 2008).*** Different antiepileptic drugs can have different side-effects, some of which can be unpleasant. Only a small number of children experience side-effects and these may subside after the initial introduction of the medication. The potential for adverse events in children is greater than in adults because young children (less than 2 years) have immature detoxification mechanisms and a greater variability in dosing owing to a wider range of body size and weight ***(Cramer et al., 2010).***

In general, antiepileptic medications are continued until the children are seizure free for 5 years. The medication is then slowly tapered over a period of weeks to avoid the possibility of precipitating a seizure ***(Johston & smith, 2007).*** Sudden withdrawal of a drug is not recommended because it can cause an increase in the number and severity

of seizures, where up to 25% of children whose medications are discontinued will experience seizure recurrence. When seizures medications have to be discontinued, the dose is decreased gradually over several weeks ***(Sharpe et al., 2009).***

For status epilepticus; the longer a seizure has been going, the harder it is to stop. Therefore, it is usually a good idea to treat a generalized tonic-clonic seizure with emergency medication after five minutes ***(National Institute for Health and Clinical Excellence, 2012 and Brophy et al., 2013)***. Benzodiazepines have an anticonvulsant effect. While, Diazepam is given via the rectal route and Midazolam is given nasal or in the buccal cavity which is absorbed rapidly through blood vessels, and another person should call emergency ***(Chin et al., 2008 and Sidhu et al., 2013).*** For refractory SE, continuous intravenous Midazolam and Propofol, separately or in a combination, are rapidly effective, with Pentobarbital remaining the gold standard for prolonged cases ***(Arif and Hirsch 2008; Sidhu et al., 2013).***

The side-effects of continued use of AEDs are sometimes distressing to the children and their families. Most side-effects are transient and dose related, but drug reactions warrant immediate attention. Dose related side-effects, such as; dizziness, headache, and ataxia often disappear over time or when drug dosages are reduced. Drug reactions require clinical evaluation and may require monitoring of serum drug levels ***(Ben-Menachem, 2007).*** Severe, potentially life – threatening side-effects can occur with specific antiepileptic medications. For example, Valproic acid may cause hepatic toxicity in children ***(Zaccara et al., 2007).*** Topiramate and Zonisamide have been associated with nephrolithiasis, oligohydrosis, hyperthermia and metabolic acidosis ***(Johann-Liang et al., 2009).*** Phenytoin may cause hypersensitivity that often results in a macula-papular eruption on the chest, inner elbow and knee areas, which indicate that the drug should be stopped immediately ***(Cramer et al., 2010).***

Chronic treatment with Phenytoin may cause insidious adverse effects because of the slow, incremental increase in severity or impact over time, as mental slowing after months or years of treatment. It also may cause gingival hyperplasia that seen in patients of all ages, but occurs much more commonly in developmentally impaired patients and young children ***(Willmore et al., 2008 and Kligman et al., 2012).*** Vitamin D deficiency is a common side-effect in children treated for long duration with Phenytoin with an estimated prevalence of 9% in American children aged 1 to 21 years.

It is thought to be particularly relevant in childhood as this is the time of maximum bone mineralization ***(Harijan et al., 2013)***. In addition, ***Gude, (2011)*** showed in his study that treatment with Valproic acid or Lamotrigine for more than 2 years was associated with a short stature, low bone mass and reduced bone formation.

Anti-epileptic drugs have distinct effects on brain function, particularly for children with long-term uncontrolled seizures. Cognitive effects typically include diminished attention, intelligence, language skills, memory and processing speed ***(Cramer et al., 2010).*** **Hermann et al., (2010)** reported that there was an improvement in mental slowing when Phenobarbital was discontinued. Phenobarbital is also linked to hyperactivity in preschool-aged children ***(Willmore et al., 2008).*** Also, mood disorders, notably anxiety and depression are common co-morbidities in epilepsy that may be associated with AED therapy ***(Cramer et al., 2010).***

Ketogenic Diet

The ketogenic diet is a high-fat, low-carbohydrate and controlled-protein diet, which may be considered for children whose seizures are not being controlled by medication ***(Kang, 2004 and National Institute for Health and Clinical Excellence, 2012).*** This diet is not effective for everyone, but for some children it results in an improvement in seizure control. Although the exact way the diet works is not known, it causes metabolic changes and ketone bodies become the fuel for the brain energy demands ***(Hartman, 2008).*** Ketone bodies are chemicals that are produced by the liver as by-products when fatty acids, instead of sugar, are broken down for energy. These chemicals increase when fasting occurs; it is the production of ketone bodies that is thought to alleviate seizures. The choice of diet used will depend on the age of the children and their normal food intake ***(Kossoff & Lee, 2011).***

Vagus Nerve Stimulator

The vagus nerve stimulator may be used in children who are resistant to medication and who are not suitable for surgery. Although it is not known exactly how it works, impulses on the vagus nerve seem to de-synchronise seizure activity in the brain ***(Kutscher, 2006 and National Institute for Health and Clinical Excellence, 2013).*** The left vagus nerve is stimulated by a small programmable device, which

delivers intermittent stimulation at a pre-programmed rate that interrupts the onset of a seizure or reduces its severity ***(Kotagal, 2011).***

Surgery

Neurosurgery may be considered if antiepileptic drug treatment has been shown to be ineffective and the results of investigations show that seizures arise from a specific part of the brain which can be clearly defined and the removal of this area will not cause any further problems. There is evidence of medical, social and/or educational disability as a result of seizures; the children's quality of life will be likely to improve after surgery; and there is an acceptable risk-benefit ratio for undergoing surgery. The success of surgery varies depending on the type of surgery being performed but in many cases the earlier surgery is carried out and the result is better ***(Zupanc et al., 2010 and Ghofrani & Akhondian, 2010)***.

Prognosis

Most children who experience a second seizure will experience additional seizures where 72% of them having additional seizures within 5 years after the second seizure. Therefore, a history of two seizures is sufficient to diagnose epilepsy ***(Kandil et al., 2007 and Hockenberry & Wilson, 2013)***. Epidemological studies using population or community based cohorts shows that the underlying etiology of children's epilepsy is most important factor affecting prognosis with respect to family history, age at onset, and neuroimaging findings ***(Seneviratne et al., 2012)***.

In general most children with epilepsy (70%) enter remission (being seizure free for five years on or off treatment) but 30% develop chronic and intractable epilepsy. The number of seizures in the 6 months after first presentation is an important predictive factor for both early and long-term remission of seizures ***(National Clinical Guideline Center, 2012).***

Death is the most devastating outcome of epilepsy, mortality in children with epilepsy may be as much as 90 times more frequent than in children without epilepsy. Children with epilepsy and severe neurological disorders were 22 times more likely to die than children with epilepsy and a normal neurological status. Mortality is also

associated with the severity and frequency of the children seizures, mortality does not significantly increase in children who are free of seizure but can be as high as 46% in patients with status epilepticus ***(Nickels and Wirrell, 2010; Hockenberry & Wilson, 2013)***.

Burden of Epilepsy

The management of epilepsy requires recognition of potential effects of epilepsy on all aspects of life ***(Aggarwal et al., 2011).*** The impact of epilepsy on the children is a combination of physical consequences of the seizures, the effect on the social position, and the psychological outcome of both of them. Furthermore, not only the children with epilepsy but also the families and indirectly the community are affected ***(World Health Organization / International League Against Epilepsy / International Bureau for Epilepsy, 2009; Stevanovic et al., 2011; Roberts & Whiting-MacKinnon, 2012).***

Social and economic impacts, epilepsy accounts for 0.5% of the global burden of disease, a time-based measure that combines years of life lost due to premature mortality and time lived in states of less than full health. Epilepsy has significant economic implications in terms of health-care needs, premature death and lost work productivity ***(World Health Organization, 2012).*** The health care costs of epilepsy increase dramatically in proportion to seizure frequency. While, the costs of seizure-free epilepsy patients are similar to the general population. The economic costs to the community for a patient with frequent seizures is four times that of a seizure free patient, and this number doubles again (four times) for patients having >1 seizure/month. The greatest direct medical costs are hospital admissions. For patients having >1 seizure per month, 1 in 10 requires admission at least once a year because of seizures ***(Solomon & McHale, 2012).***

Although the social effects vary from country to country, the discrimination and social stigma that surround epilepsy worldwide are often more difficult to overcome than the seizures themselves, people with epilepsy can be targets of prejudice. The stigma of the disorder can discourage people from seeking treatment for symptoms and becoming identified with the disorder. Children with epilepsy may be banned from school, adults may be barred from marriage, and employment is often denied, even when seizures would not render the work unsuitable or unsafe ***(World Health***

Organization / International League Against Epilepsy / International Bureau for Epilepsy, 2009). It has been estimated that 10% of the burden of brain and mental disorders in the world is caused by epilepsy, calculated in disability-adjusted life years (DALYs), which is very significant. This calculation includes premature deaths and the loss of healthy life due to disability ***(World Health Organization, 2010).***

Physically, children with epilepsy experience a number of problems that interfere with daily functioning. The most frequent physical complaint is excessive fatigue ***(Yong et al., 2006 and Moffat et al., 2009).*** Excessive fatigue can occur directly after a seizure or for many hours following. Side-effects of anti-epileptic medications can also enhance fatigue, causing a general lack of energy. Children's ability to participate in some physical and social activities is subsequently limited. In many cases, extra sleep is essential, making frequent naps and earlier bed times necessary ***(Elliot et al., 2005).***

Children and adolescents with epilepsy also express somatic complaints due to medication side-effects or seizure-related factors. Somatic complaints include headaches, hair loss, visual disturbances, clumsiness, increased appetite, weight gain and dizziness, Soreness of the mouth, uncontrolled urination and injuries from seizures are also experienced by some individuals ***(Moffat et al., 2009).*** Somatic complaints not only enhance children's feelings of abnormality, but also interfere with daily functioning ***(Elliot et al., 2005).***

Childhood epilepsy is of special significance because it occurs at a time of rapid brain development and can influence the child's development, personality, and achievement, as well as long-term intellectual outcome, physical and mental wellbeing. Epilepsy has a potentially deleterious effect on academic functioning that may be the result of central nervous system dysfunction, seizures, antiepileptic drugs, or child and family response to illness. An increased incidence of learning difficulties, under achievement, self esteem issues and difficulties with peer relationships have been identified in children with epilepsy who have normal intellect ***(Haneef et al., 2010-a; Mecarelli et al., 2011; and Rodenburg et al., 2011)***.

There are several reasons of presence of behavioural problems among children with epilepsy than those without ***(Kanner et al., 2010 and Taylor et al., 2011-a).***

Children may be fearful, stressed and anxious about having seizures, because they may have poor achievement at school in addition to the frustration result from their learning or language difficulties. There may be abnormal epileptic activity going on which inhibits normal brain function, resulting in verbal and physical aggression. Some antiepileptic drugs may alter the chemical balance in the brain that regulates behaviour. Sometimes some changes are observed in behaviour, personality and mood for minutes or days before seizures which is known as a prodrome ***(Austin et al., 2004; Chapieski et al., 2005 and Piyasil et al., 2008)***.

Concerning the emotional and psychological problems that may affect children and young people with epilepsy, these will vary considerably for each child according to the type and frequency of seizures, child age, stage of development and parent-child relationship ***(Tracy et al., 2007 and Clary et al., 2010).*** Studies related to psychiatric and psychological outcomes of epilepsy have shown a high prevalence of psychiatric morbidity in nearly one third of children with epilepsy. Anxiety and depression are the two most common manifestations of psychopathology reported by children with epilepsy. Social withdrawal and isolation are frequently the product of anxiety about the possible hostile reactions of others if a seizure should occur in a public place ***(Neurosciences & the Senses Health Network and Epilepsy Review Committee, 2008; Ekinci et al., 2009; and Otero, 2009).***

Increased anxiety levels and depression may be caused by a wide variety of issues, such as, fear of the seizures and fear of their body being 'out of control' during a seizure. Also, being dependent on adults for care when their friends are becoming increasingly independent and fear of being hospitalized are among the causes that increase anxiety. In addition to, lack of understanding from friends and coping with overprotective parents or carers often leads to increase children's anxiety ***(Li et al., 2008; Inoue & Matsuura, 2012).***

Nurses' Role in Caring for Epileptic Children

The primary goal of care is to minimize the impact of seizure disorders on the lives of children with epilepsy. The cooperation of all team members including the children and their families is required to establish optimal level of seizure control ***(Wagner et al., 2013 and Epilepsy Action, 2010).*** Most children with epilepsy live a

full life span, however there are potential factors associated with living with epilepsy and seizures that may increase the risk of injury or untimely death, children with epilepsy must take certain precautions to reduce the risk of injury during a seizure ***(Epilepsy Foundation, 2012-b).*** An important nursing role is to educate not only the children and families but also the community, including the children's teachers and caregivers on the reality and facts of the disorder ***(Scottish Intercollegiate Guidelines Network, 2005 and National Association of Epilepsy Centers, 2010).***

An important nursing responsibility is to observe the seizure episode and accurately document the events. Any alteration in behavior preceding the seizure and the characteristics of the episode, such as sensory hallucinatory phenomena (e.g., an aura), motor effects (e.g., eye movements and muscular contractions), alterations in consciousness and post ictal state must be noted and recorded. The nurse should describe only what is observed rather than trying to label a seizure with start and stop times ***(Painter et al., 2014).***

In the event of the seizure, the nurse has to place the epileptic children on side-lying position on a flat surface, such as, floor or bed to facilitate the drainage of secretion and to maintain a patent airway. If the children condition requires suctioning, the nurse should suction the oral cavity and posterior oropharynx. The nurse administers oxygen as necessary and monitors oxygenation status. For seizures that continued longer than 5 minutes, the nurse should administer the medications that intended to stop seizure (rectal Diazepam, IV Dilantin, IV Lorazepam). She should take the vital signs and the children are allowed to rest ***(Hockenberry & Wilson, 2013).*** Because seizures frequently occur during the absence of professional staff, therefore mothers of children who may have seizures must be trained in managing and protecting their children during a seizure. The basic first aid for seizures is illustrated in **Table (III).**

Table (III): Basic Seizures First Aid

Basic Seizure First Aid	
Do……	**Don't……**
• Stay calm & track time	• Restrain the child movement
• Keep child safe	• Put anything in the child`s mouth
• Protect head	•Give child anything to eat or drink
• Turn child on side	until they are fully recovered
• Stay with child until fully conscious	
• Record seizure in log	
A seizure is generally considered an emergency when:	
• Convulsive (tonic-clonic) seizure lasts longer than 5 minutes	
• Child has repeated seizures without regaining consciousness	
• Child is injured or has diabetes	
• Child has a first-time seizure	
• Child has breathing difficulties	
• Child has a seizure in water	

(Source: Epilepsy Action, (2013): First aid for seizure; Retrieved at 16 January 2014, from: https://www.epilepsy.org.uk/info/firstaid.

Care of epileptic children with a recurrent seizure disorder involves physical care and more significant, the care of the problems related to the emotional aspects of the disorder. Few diseases generates as much anxiety among relatives of epilepsy, fears and misconceptions about the disease and its treatment are common. Nursing care is directed toward educating the children and their families about epilepsy and helping them to develop strategies to cope with the psychologic and sociologic problems related to epilepsy ***(Hosking, 2004 and Costolo, 2011).***

The nurse should educate the children and their mothers about the importance of drug therapy and the possible adverse reactions to the medications used to treat seizures ***(DiIorio et al., 2009; and Lewis et al., 2010).*** Effects, such as, ataxia, nausea and vomiting are obvious, but slowed motor and cognitive capacity may be difficult to detect. Also, other adverse effects, such as diplopia or dizziness, may be difficult to detect in children and especially for nonverbal children who are unable to describe their

symptoms to caregivers. The nurse should assess the children to detect adverse effects ***(Willmore et al., 2008).***

The difficulty with late-appearing adverse effects is the lack of reporting by epileptic children / caregivers because they do not consider the problem to be related to their AEDs. Thus, the nurse should be aware of these subtle problems and ask about them during follow-up assessments ***(Cramer et al., 2010).*** Because the risk of cognitive impairment in children with epilepsy is high, the children should have special education resources, such as, speech, physical and occupational therapy. School nurse should be properly informed of the children's condition to monitor seizure frequency in order to help physicians on proper assessment and should be trained on basic seizure first aid ***(Sillanpaa, 2004; Pavlou & Gkampeta, 2010).***

The nurse should inform the parents of children with epilepsy about the risk of Sudden Unexpected Death in Epilepsy (SUDEP). The information should be tailored on an individual basis, allowing parents the opportunity to minimize risk factors, such as identifying undetected nocturnal seizures and highlighting an opportunity to optimize seizure control. The parents of children with absence seizures can be reassured about the low risk of SUDEP. Sudden unexpected death in epilepsy remains an emotional topic, and the nurse should properly inform parents about this condition ***(Jones and Naude, 2013).***

An important role of the nurse is to provide family support; change parental attitudes and self management of children with a seizure disorder. Weather the seizures result from illness, injury, or unknown etiology, the parents may feel guilt, anxiety, and even humiliation. The parents want to know if the seizures will affect their children's mental capacities. Many people erroneously associate epilepsy with mental deficiency, but children with seizures like any population of healthy children, display a wide range of intelligence. It is important for the nurse to encourage a healthy attitude toward the epileptic children and to help the parents feel competent in their ability to meet their responsibilities to their children. The nurse should instruct the mothers that epileptic children should be reared in the same manner as normal children, with natural concern tempered by understanding of the need not to overprotect ***(Ramaglia, 2007).***

Many parents refrain from correcting or punishing their children, especially if they have had the experience of their children having a seizure after disciplining. The nurse should instruct the parents that epileptic children must not be made to feel different in any way. The nurse must encourage parents to be honest and open about the disorder with their children and with others. Some parents are tempted to try to conceal the nature of their children's illness because of their belief that the disorder is shameful or a disgrace to the family. Educational programmes should be implemented continuously among epileptic children and their families. The children and their families need to be constantly-equipped with up-to-date knowledge via the most effective ways. Thus, the nurse could play a crucial role in improving the knowledge and management of epilepsy and implement epilepsy education programme utilizing all available resources ***(Farrace, et al., 2013).***

Mothers' Role in Management of their Epileptic Children

Epilepsy is a chronic disorder where parents especially the mothers, have to deal with their children all the day. So, mothers should have adequate knowledge about the condition of their children's disorder in order to provide satisfactory care ***(Holmes, 2009).***

Mothers should initiate seizures safety at home which includes bath room, kitchen and sport safety. They should consider bathroom safety precautions as encourage epileptic child to take shower instead of baths to prevent drowning and leave bathroom door unlocked. For kitchen safety they have to protect their children from the injury by sharp objects as well as protect them from burn. Sports safety includes wearing protective equipment, having others nearby, and avoiding vigorous activities ***(Epilepsy Foundation, 2011-a and Center of Disease control and Prevention, (2012).***

Mothers must protect their children from injury during the seizure. Their observations during the seizures provide valuable information for diagnosis and management of the disorder. It is impossible to halt a seizure after it has begun, and an attempt should not be made to do so. Mothers must remain calm, stay with their children, and protect their children from sustaining any harm during the seizure. If possible, the children should be isolated from the view of others by closing a door or

pulling screens. A seizure can be upsetting to the siblings and others; all who witness the seizure should be assured that everything is being done for the seized children. After the seizure, the mother can give the seized children a simple explanation about the event as needed ***(Center of Disease Control and Prevention, 2011; Epilepsy Foundation, 2012-a; and Epilepsy Action, 2013).***

Proper interventions should take place at the time of seizure activity. The mothers who observed the seizure activity should notify the nurse and provide an accurate description of the clinical presentation. Mothers should document the reported observations in notes and should refer their children immediately to hospital if the seizure continues for more than two consecutive minutes or the children experience two or more generalized seizures without full recovery of consciousness between seizures. Mothers must report any significant or unusual findings immediately to the physician ***(National Association of Epilepsy Centers, 2010; Solomon & McHale, 2012 and Hockenberry & Wilson, 2013)***.

Epileptic children adherence to medication regimens is important in the management of epilepsy. Failure to follow prescribed drug regimes will reduce the benefit that could be gained from the medication leading to uncontrolled epilepsy. The mothers should plan the administration of the medications at convenient times to avoid disruptions of family routines as much as possible. Mothers should understand the danger of skipping doses or omit them even if their children are free of seizures most of the time. The seizure threshold may be lowered during any illness but particularly with fever. Therefore, mothers should be aware that if their children have an illness, they are at increased risk of seizures, so mothers should contact their health professional if their children miss medications during the illness. The mothers' knowledge of potential side-effects of AEDs is important and must be encouraged to report their observations to their health-care provider ***(Mbuba, 2011 & Epilepsy Foundation, 2011b).***

Buccal Midazolam or rectal Diazepam is a useful and adjunctive home treatment for children at risk for prolonged seizures or clusters of seizures and can minimize the need for hospitalization while enhancing mothers' confidence. Rectal preparations of AEDs are highly effective when the epileptic children are unable to take oral medications because of repeated vomiting, gastrointestinal surgery, or status epilepticus. Therefore, mothers can learn how to administer rectal antiepileptic medications for

home treatment ***(National Institute for Health and Clinical Excellence, 2012 & National Institute of Neurological Disorders and Strokes, 2013).***

The mothers should be knowledgeable of drug-to-drug interactions, it is critical for them in caring for their children with epilepsy, including other medications, such as antibiotics, Barbiturates and Carbamazepine, combination therapy can potentiate drug level. The mothers should understand the importance of consulting the physician before using such medications to their children ***(DiIorio et al., 2009; and Lewis et al., 2010).***

Mothers should provide a well balanced diet at regular times to their epileptic children. Coffee and other caffeinated beverages should be limited to a moderate amount. Fluid intake should be between 1,000 to 1,500 ml / day depending on the weather ***(Hickey, 2011)***. Children with epilepsy are at increased risk for injury, mothers should place a few limitations on their children's activities. The degree to which activities are restricted is individualized for each child and depends on the type, frequency, and severity of the seizures the child has ***(Kyle, 2008).***

Mothers should consider in their daily care plan the general health measures as avoid constipation, excessive fatigue, hyperventilation and stress because they may trigger seizures. They must understand that fever may trigger seizures; therefore, the fever and underlying cause must be treated. The mothers should avoid or minimize the environmental and recreational risk factors as noisy environments, and bright flashing lights, poorly adjusted televisions or computer screens as these factors may precipitate the occurrence of seizures**.** Additionally, good oral hygiene and regular visits to the dentist are important to minimize effects of gingival hyperplasia that can occur from some AEDs ***(Center for Managing Chronic diseases, 2010 and Hickey, 2011)***.

Because epileptic children are encouraged to attend school, camp, and other normal activities, the mothers must inform the school nurses, teachers, care providers, camp counselors, youth organization leaders, coaches, and other adults who assume responsibility for children about the care of their children during a seizure. Therefore, they can act in a calm manner for the children's welfare and influence the attitude of the children's peers. They can help ensure regularity of medication administration and provision of any special care the children might need. Furthermore, the mothers should consider the presence of the medical bracelet with their children all the times especially

out home to make the others alert to the children's condition in the event of sudden seizures. Mothers should understand that their children need periodic follow-up and regular physical assessment and laboratory studies ***(Spangenberg and Lalkhen, 2006 and Neni et al., 2010).***

Materials and Method

Materials and Method

Materials

Research Design

A descriptive design was used to accomplish this study.

Setting

The study was conducted at the Epileptic Clinic of Mansoura University Children Hospital.

Subjects

A convenient sample of 100 mothers of epileptic children with the following criteria constituted the subjects:

- Both sexes.
- Diagnosed with epilepsy for at least 6 months.
- Free from other chronic diseases.

Tool of the Study

Mothers' Knowledge and Management of Epileptic Children Interview Schedule

It was developed by the researcher after thorough review of literature to assess the mothers' knowledge and management of their children with epilepsy. It included three parts:

Part I: Characteristics of mothers and their children:

A. Characteristics of mothers as mother's age, level of education, marital status, occupation, family income, residence and family medical history.
B. Characteristics of children, such as, age, sex, birth order, number of siblings, level of education, previous academic failure or success, last year achievement and absenteeism rate, children's hobbies. It also included the children's medical history

as onset of epilepsy, duration, frequency of seizures, seizures triggers factors, and history of hospital admission.

Part II: Mothers' knowledge about epilepsy: as definition, etiology, manifestations, triggers factors, aura symptoms, its treatment and side-effects, dangers of epileptic seizures on children and the emergency situations that require immediate child referral to the nearest emergency service.

Part III: Mothers' management of their epileptic children:

A. Mothers' management before the epileptic attack includes two parts:
   1. Seizures safety precautions
   2. Management of drugs

B. Mothers' management during the epileptic attack

C. Mothers' management after the epileptic attack **(See Appendix II)**

Method

- An official permission was obtained by submission of an official letter issued from the Dean of Faculty of Nursing, Mansoura University, to the director of Pediatric Neurological unit (inpatient) and head of the outpatient clinic to conduct the study after explaining the aim of the study.
- The tool was developed by the researcher, after reviewing of the related literature.
- The developed tool was submitted to a jury of five experts in the pediatric nursing field for its content validity. Based on their comments; necessary modifications were done.
- The reliability of the tool was done by measuring the internal consistency of its items using the Cronbach's alpha coefficient. The tool was reliable as r = 0.79.
- A pilot study was carried out on 10 mothers (10% of sample), to ascertain the feasibility, applicability and clarity of the tool and some modifications were made consequently. These mothers were excluded from the final study sample.
- Every mother was interviewed individually by the researcher to collect the necessary data. The researcher was available one day per week, where the children were available for follow-up in the outpatient clinic or referred to the inpatient department. The duration of each interview lasted from 20-25 minutes.

Ethical Considerations

- Ethical approval was obtained from Research Ethics Committee at the Faculty of Nursing - Mansoura University.
- Informed written consent was obtained from every mother after explaining the aim of the study.
- Confidentiality of data and anonymity as well as mothers' right to withdraw from the study at any time was ascertained.

❖ Data collection of this study was carried out over six months in the period from the beginning of June 2013 to the end of November 2013.

Data Analysis

The collected data were coded and entered in a data based file using the excel program for windows. Frequency analysis and manual revision were used to detect any error. After complete entry, data were transformed to the statistical package of social sciences (SPSS) version 16.0 by which the analysis was conducted applying frequency tables with percentages. Data were revised, coded and analyzed. Data was presented as number and percent. The Chi-Square test was used to find the relations between variables. All tests were performed at a level of significance of 5% ($P \leq 0.05$).

Scoring System for Maternal Knowledge and Management

A scoring system was used regarding maternal knowledge and management of their children with epilepsy. Total score of knowledge and management was obtained, and then the obtained score is converted to a percent score.

I – Knowledge Score

Scores were used to evaluate mothers' knowledge where each true answer of knowledge was given one mark and zero mark if not known or wrong answer.

Total knowledge scores of mothers about epilepsy were 85 marks, distributed as follows:

a.	Definition of epilepsy	1	Marks
b.	Causes of epilepsy	12	Marks
c.	Manifestations of epilepsy	11	Marks
d.	Trigger factors of epilepsy	13	Marks
e.	Symptoms of aura	18	Marks
f.	Treatment of epilepsy	3	Marks
g.	Side effects of anti-epileptic drugs	19	Marks
h.	Dangers of epileptic seizures	4	Marks
i.	The epileptic seizures that require child referral to the nearest emergency service	4	Marks

Mothers' knowledge was classified as follows:

- Good for score 65% and more
- Fair for score 40- less than 65%
- Poor for score less than 40%

II- Management Scores

Scores were used to evaluate mothers' management where each step of practice was given one mark and zero mark if not done.

Total Management scores of mothers about epilepsy was 60 marks, distributed as follows:

a) Mothers' management before epileptic seizures 36 Marks

- Seizures safety precautions (19 Marks)
- Drug management (17 Marks)

b) Mothers' management during epileptic seizures 11 Marks

c) Mothers' management after epileptic seizures 13 Marks

Total score of Mothers' Management was classified as follows:

- Good for score 65% and more
- Satisfactory for score 40- less than 65%
- Unsatisfactory for score less than 40%

Results

RESULTS

The results of the current study will be presented in four parts as follows:

Part I: Characteristics of Mothers and their Children

Part II: Mothers' Knowledge about Epilepsy

Part III: Mothers' Management of Epilepsy

A. Before Epileptic Seizures
B. During Epileptic Seizures
C. After Epileptic Seizures

Part IV: Scores of Mothers' Knowledge and Management of their Epileptic Children

Part V: Mothers' Management Scores of their Epileptic Children According to Mothers' and Children's Characteristics

Part I: Characteristics of Mothers and their Children

Characteristics of mothers are presented in **Table (IV)** and **Figure (I)**. It is revealed from the table that more than half of the studied mothers were in the age 30 to less than 40 years (53.0%), while 32.0% were in the age 20 to less than 30 years with a mean age 33.29 ± 6.47 years. Slightly more than half of the mothers had completed secondary / diploma education (52.0%), while 12.0% of them were illiterate. Eighty three percent of mothers were housewives. Sixty five percent of mothers stated that their income was insufficient, and 88.0% of them were married. The majority of mothers were residing in rural area (83.0%), while the rest were living in urban area (17.0%).

Table (V) and **Figure (II & III)** illustrated characteristics of children with epilepsy. It is revealed from the table and the figures that more than half of the studied children were in the age 6 to less than 12 years (55.0%), while 28.0% of them were less than 6 years of age with a mean age of 8.71 ± 3.38 years. More than two third of the studied children were males (62.0%). Slightly more than half of the children were in primary schools (51.0%) and 18.0% were in preparatory schools, and 15.0% didn't attend school. Forty three percent of the children were the first child, while 35.0% were the second. More than two third of the studied children had either one or two siblings (26.0% and 44.0 respectively). The hobbies of the majority of children in their leisure time was watching T.V and computer related activities (80.0% and 67.0% respectively), while less than one third of them mentioned social and physical activities as a types of child hobbies or leisure time activities (22.0% and 10.0% respectively).

Table (IV): Characteristics of Mothers

Characteristics	Mothers (n=100)	
	No	%
Age / years		
▪ <20	2	2.0
▪ 20-	32	32.0
▪ 30-	53	53.0
▪ 40 & more	13	13.0
Range	19.0 – 48.0	
Mean ± SD	33.29 ± 6.47	
Education		
▪ Illiterate	12	12.0
▪ Read and write	3	3.0
▪ Primary	9	9.0
▪ Preparatory	16	16.0
▪ Secondary / Diploma	52	52.0
▪ Bachelor Degree	8	8.0
Work		
▪ Working	17	17.0
▪ Housewife	83	83.0
Family income		
▪ Sufficient	35	35.0
▪ Insufficient	65	65.0
Marital status		
▪ Married	88	88.0
▪ Divorced	10	10.0
▪ Widow	2	2.0
Residence		
▪ Rural	83	83.0
▪ Urban	17	17.0

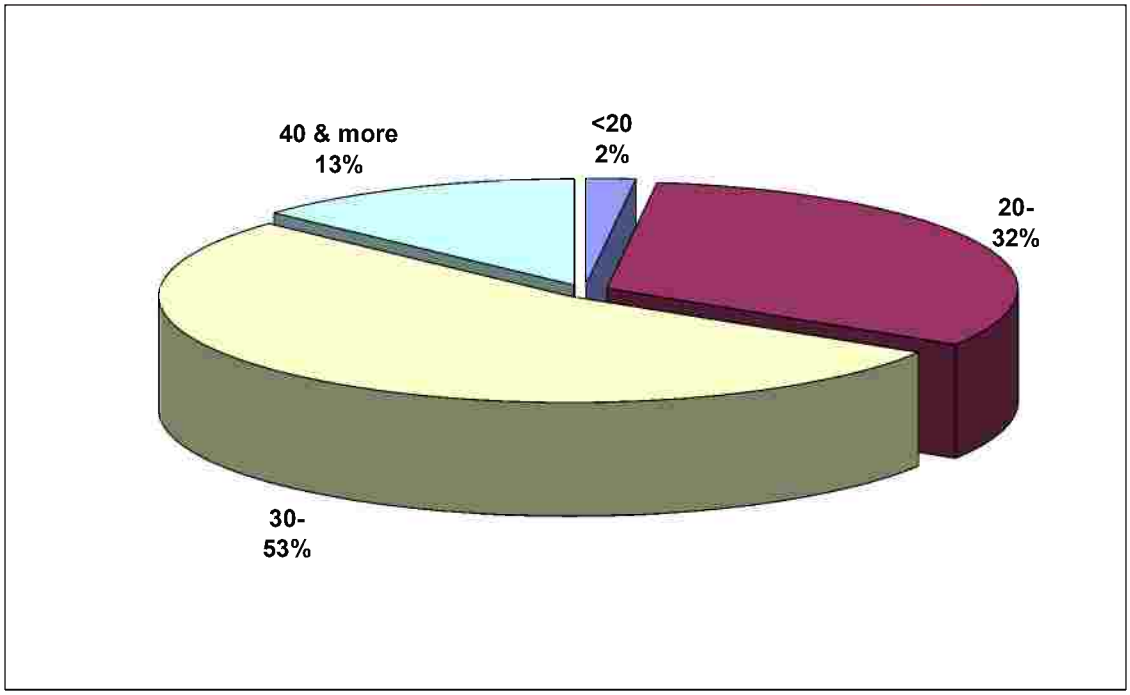

Figure (I): Age of Mothers

Table (V): Characteristics of Children with Epilepsy

Characteristics	No (n=100)	%
Child age / years		
▪ <6	28	28.0
▪ 6-	55	55.0
▪ 12 & more	17	17.0
Range Mean ± SD	2.0 – 17.0 8.71 ± 3.38	
Gender		
▪ Male	62	62.0
▪ Female	38	38.0
Education		
▪ Nursery	13	13.0
▪ Primary	51	51.0
▪ Preparatory	18	18.0
▪ Secondary	3	3.0
▪ Did not attend school	15	15.0
Birth order		
▪ 1st	43	43.0
▪ 2nd	35	35.0
▪ 3rd and more	22	22.0
Number of siblings		
▪ Only child	9	9.0
▪ 1	26	26.0
▪ 2	44	44.0
▪ 3 and more	21	21.0
Child hobbies #		
▪ Watching T.V	80	80
▪ Computer related activities	67	67
▪ Physical activities	22	22
▪ Social activities	10	10
▪ No hobbies	10	10

 # More than one answer

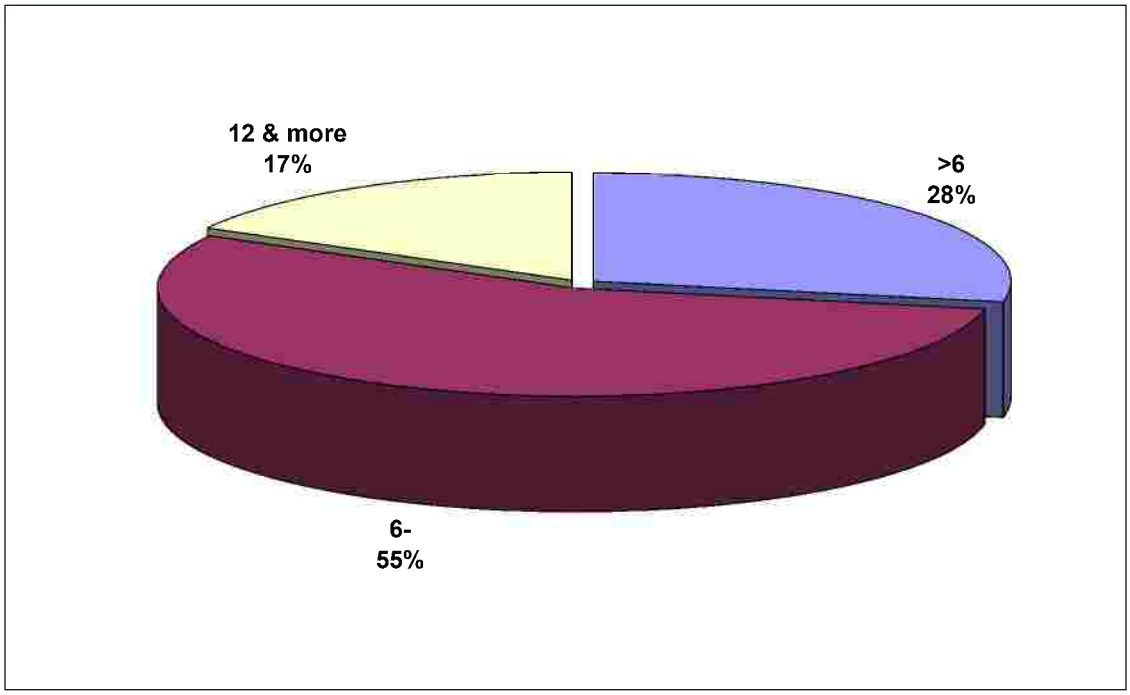

Figure (II): Children's Age

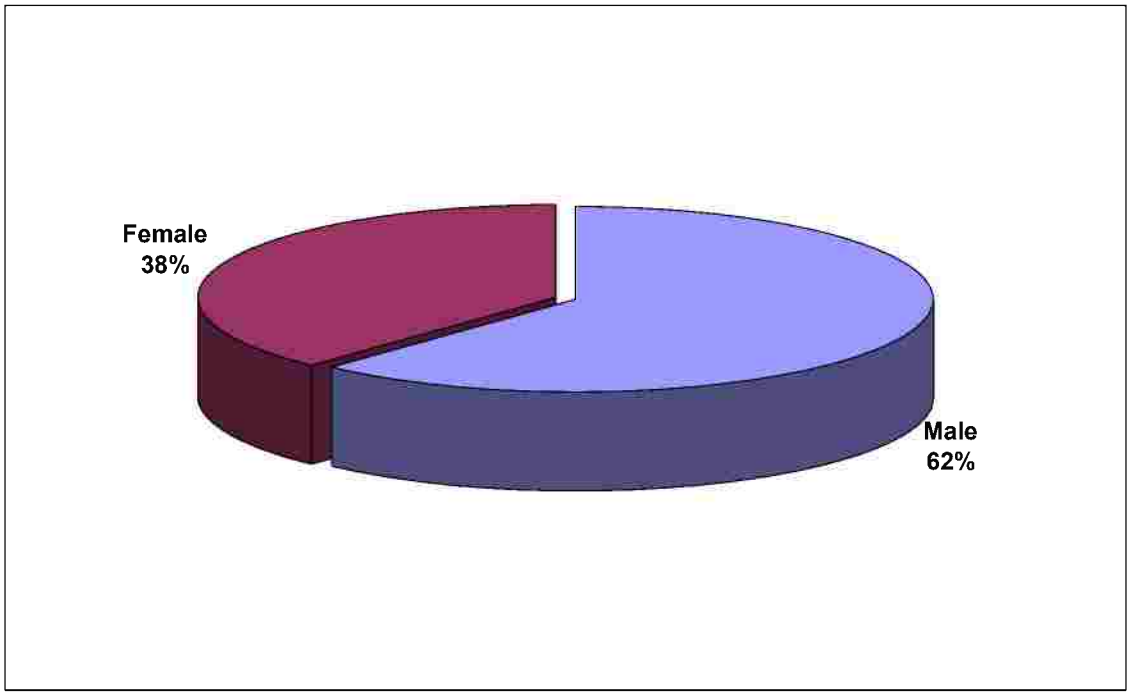

Figure (III): Children's Gender

Table (VI) represents children's school history. It was found that the majority of the studied children were absent for either one or two days /week (40.6% for each). The academic achievement of more than two third of the children in the past year was normal (66.6%), with previous academic failure for 18.2% of the studied children.

Table (VI): Children's School History

School History	No (n=85)	%
School absenteeism #		
▪ Yes	64	75.3
▪ No	21	24.7
Frequency of absence days / week	**n=64**	
▪ 1	26	40.6
▪ 2	26	40.6
▪ 3 and more	12	18.8
Academic achievement level in past year # #	**n=66**	
▪ Normal	44	66.6
▪ Under achievement	18	27.3
▪ Superior	4	6.1
Previous academic failure # #		
▪ Yes	12	18.2
▪ No	54	81.8
Frequency of failure / year	**n=12**	
▪ 1	10	83.3
▪ 2	2	16.7

 # included children in nursery, primary, preparatory and secondary school.

 # #1st year primary school, who didn't attend school and nursery were excluded.

Medical history of children with epilepsy is presented in **Table (VII).** It is revealed from the table that 43.0% of the children had their first epileptic attack at the age from 1 to 5 years, while 34.0% of them had it at more than 5 years of the age. The duration of illness ranged from 1 –15 years with a mean of 4.23 ± 2.91 years. The majority of the children asked for the medical consultation at the first epileptic seizures (97.0%).

It is revealed from the same table that excessive salivation was reported by all the mothers as a symptom of epileptic seizures (100.0%), rapid eye movement was

mentioned by 97.0%, body stiffness (99.0%) and jerking motion of arms and legs were stated by 91.0% of the mothers. Loss of consciousness was stated by 88.0% and cyanosis by 82.0% and uncontrolled urination by 65.0% of the mothers. Concerning the frequency of epileptic seizures, it had recurrent once or more / day in 20% of the children, once or more / week in 38% of them and once or more / month in 42% of the children.

Forty two percent of the mothers stated that their children's epileptic seizures continued for 5 minutes and less compared to only 9.0% where epileptic seizures continued for more than 5 minutes and about half of the mothers didn't count the duration of fits (49.0%). The majority of the studied children had a negative family history for epilepsy (82.0%), father assumed 44.4% of those who had a positive family history.

Table (VII): Medical History of Children with Epilepsy

Medical history	No (n=100)	%
Age at first epileptic attack		
▪ <1 year	23	23.0
▪ 1-5	43	43.0
▪ >5	34	34.0
Duration of illness / years		
▪ Range	1 – 15	
▪ Mean ± SD	4.23 ± 2.91	
First time of medical consultation		
▪ After first seizure	97	97.0
▪ After second seizure	2	2.0
▪ After third seizure	1	1.0
Symptoms of attack #		
▪ Excessive salivation	100	100.0
▪ Body stiffness	99	99.0
▪ Rapid eye movements	97	97.0
▪ Jerking motion of arms and legs	91	91.0
▪ Loss of consciousness	88	88.0
▪ Cyanosis	82	82.0
▪ Uncontrolled urination	65	65.0
▪ Motor signs	12	12.0
▪ Lip smacking	8	8.0
Fit duration \ min		
▪ ≤ 5 min	42	42.0
▪ > 5 min	9	9.0
▪ Mother don't count the duration	49	49.0
Frequency of fits		
▪ Once or more /month	42	42.0
▪ Once or more /week	38	38.0
▪ Once or more /day	20	20.0
Family member suffering from epilepsy		
▪ Yes	18	18.0
▪ No	82	82.0
Type of relation	**n=18**	
▪ Father	8	44.4
▪ Uncle	6	33.3
▪ Grand father / grand mother	3	16.7

 # More than one answer

Table (VIII) represents hospitalization and follow-up of the epileptic children. It was found that 80.0% of the epileptic children had a previous hospitalization due to epileptic seizures. Forty six point three percent were hospitalized for one time compared to 26.3% who were hospitalized for three times. Ninety seven percent of the epileptic children were following-up regularly. Hospital was the place of follow-up for all the children who had a regular follow-up (100.0%), about one third of them went to a private clinic beside the hospital (30.9%). It was found that the place of follow-up was not near to home for 88.0% of the studied children.

Table (VIII): Hospitalization and Follow-up of Epileptic Children

Hospitalization & follow-up data	No (n=100)	%
Previous hospitalization in last year due to seizures		
▪ Yes	80	80.0
▪ No	20	20.0
Number of previous hospitalization in last year	**n=80**	
▪ Once	37	46.3
▪ Twice	19	23.7
▪ Three	21	26.3
▪ Others	3	3.7
Regular follow-up	**n=100**	
▪ Yes	97	97.0
▪ No	3	3.0
Place of follow-up #	**n=97**	
▪ Hospital only	97	100.0
▪ Hospital & private clinic	30	30.9
Nearness of follow-up place to home	**n=100**	
▪ Yes	12	12.0
▪ No	88	88.0

 # More than one answer

Mothers' knowledge about trigger factors of their children's epileptic seizures was shown in **Table (IX).** Seventy six percent of mothers knew the trigger factors of their children. Psychological and physical stress was mentioned by more than half of the mothers as a trigger factor (57.9%), followed by fever (46.0%), then sitting in front of computer for long periods (22.4%). While, hearing loud sounds or noise and missing medications were reported by 15.8 and 10.5% of mothers respectively.

Table (IX): Mothers' Knowledge about Trigger Factors of their Children's Epileptic Attacks

Trigger Factors	No (n=100)	%
Presence of trigger factors		
▪ Yes	76	76.0
▪ No	24	24.0
Trigger Factors #	**n=76**	
▪ Psychological and physical stress	44	57.9
▪ Fever	35	46.0
▪ Sitting in front of a computer for long periods	17	22.4
▪ Watching TV for long periods, especially at night	13	17.1
▪ Hearing loud sounds or noise	12	15.8
▪ Missing medications	8	10.5
▪ Bright light	8	10.5
▪ Eating certain types of foods	5	6.6
▪ Insufficient sleep or interrupted sleep	1	1.3
▪ Exposure to Acute disease	1	1.3

More than one answer

Part II: Mothers' Knowledge about Epilepsy

Table (X) illustrates mothers' knowledge about definition and causes of epilepsy. As clarified from the table, more than half of the mothers correctly defined epilepsy (53.0%), while 45.0% of them didn't know the definition.

Regarding the causes of epilepsy, slightly more than half of the mothers didn't know the causes of epilepsy (52.0%). Twenty two percent of the mothers considered febrile convulsion is the cause of epilepsy, while 12.0% returned the cause to the peri-natal complications. Only 9.0% mentioned hereditary factors as a cause of epilepsy.

Table (X): Mothers' Knowledge about Definition and Causes of Epilepsy

	No (n=100)	%
a. Definition		
▪ Correct definition	53	53.0
▪ Wrong definition	2	2.0
▪ Didn't know	45	45.0
b. Causes #		
▪ Febrile convulsion	22	22.0
▪ Peri-natal complications	12	12.0
▪ Hereditary	9	9.0
▪ Peri-natal asphyxia	8	8.0
▪ Congenital anomalies in the brain	3	3.0
▪ Head injuries	0	0.0
▪ Follow meningitis or inflammation of brain tissue	0	0.0
▪ Poisoning some toxic elements such as lead	0	0.0
▪ Diseases and brain malformations	0	0.0
▪ Bruises of head at birth	0	0.0
▪ Brain tumors	0	0.0
▪ Irrelevant answer	1	1.0
▪ Didn't know	52	52.0

 # More than one answer

Mothers' knowledge about manifestations of epilepsy is presented in **Table (XI).** It is revealed from the table that all mothers mentioned drooling or excessive saliva as a symptom of epilepsy (100%). Also, the most common mentioned manifestations of epilepsy were rapid eye movement (97.0%), body stiffness and jerking motion of the arms and legs (91.0%) and loss of consciousness (88.0%). Cyanosis and loss of bladder or bowel control were stated by 82.0% and 65.0% of mothers respectively as manifestations of epilepsy.

Table (XI): Mothers' Knowledge about Manifestations of Epilepsy

Manifestations #	No (n=100)	%
▪ Excessive saliva and drooling	100	100.0
▪ Rapid eye movement	97	97.0
▪ Body stiffens	91	91.0
▪ Jerking motion of the arms and legs (convulsion)	91	91.0
▪ Loss of consciousness	88	88.0
▪ Cyanosis	82	82.0
▪ Loss of bladder or bowel control	65	65.0
▪ Motor signs	12	12.0
▪ Heart rate change	12	12.0
▪ Lip smacking	8	8.0
▪ Sensory symptoms	0	0.0

More than one answer

Table (XII) shows mothers' knowledge about triggering factors of epilepsy. It is revealed from the table that more than two third of mothers stated that fever is a trigger factor of epilepsy (70.0%). Psychological and physical stress accounts for more than half of the stated trigger factors (57.0%). Twenty two percent of mothers considered sudden loud sounds and noise as trigger factors. Sitting in front of computer and watching TV for long periods especially at night were stated by 19.0% and 16.0% of mothers as the trigger factors respectively. Small percentage of the studied mothers reported that missing medications may trigger the epileptic seizures (17.0%). While, 13.0% of the mothers didn't know the trigger factors.

Table (XII): Mothers' Knowledge about Triggering Factors of Epilepsy

Trigger factors #	No (n=100)	%
▪ Fever	70	70.0
▪ Psychological and physical stress	57	57.0
▪ Sudden loud sounds or noise	22	22.0
▪ Sitting in front of a computer for long periods	19	19.0
▪ Missed medications	17	17.0
▪ Watching TV for long periods, especially at night	16	16.0
▪ Flashing light	10	10.0
▪ Eating certain types of foods	5	5.0
▪ Insufficient or interrupted sleep	4	4.0
▪ Exposure to an acute illness	3	3.0
▪ Medication interactions	2	2.0
▪ Hunger	0	0.0
▪ Long periods of reading	0	0.0
▪ Didn't know	13	13.0

More than one answer

Mothers' knowledge about symptoms of aura is presented in **Table (XIII).** It is shown from the table that 40.0% of the mothers didn't know about aura of epileptic seizures. While, headache was considered as an aura symptom by 23.0% of mothers. Twelve percent of mothers stated that irritability is the symptom of aura and 10.0% observed saliva collection in mouth or drooling of their children before the occurrence of the epileptic seizures and consider it as an aura symptom.

Table (XIII): Mothers' Knowledge about Symptoms of Aura

Aura Symptoms #	No (n=100)	%
▪ Headache	23	23.0
▪ Irritability (as pulling dresses)	12	12.0
▪ Saliva collecting in mouth or drooling	10	10.0
▪ Feeling nauseated	9	9.0
▪ Feeling palpitation	8	8.0
▪ Vertigo	5	5.0
▪ Feeling numbness and tingling in the hand or the legs	5	5.0
▪ Speaking problems	4	4.0
▪ Involuntary jerking movements in limbs	4	4.0
▪ Lip smacking	2	2.0
▪ See lights or certain views, such as patches in front of the eye	1	1.0
▪ Hear certain sounds such as ringing in the ear	1	1.0
▪ Chewing	1	1.0
▪ Swallowing	1	1.0
▪ Certain smell	0	0.0
▪ Feeling a strange taste in the mouth	0	0.0
▪ Sweating	0	0.0
▪ Desire to urinate	0	0.0
▪ Didn't know	40	40.0

 # More than one answer

Mothers' Knowledge about treatment of epilepsy and side-effects of anti-epileptic drugs are presented in **Table (XIV)**. It was found that more than two third of the mothers mentioned anti-epileptic drugs as a treatment of epilepsy (79.0%). While, diet and surgical therapy were stated by only 9.0% and 8.0% of the mothers respectively. On the other hand, 20.0% of the mothers didn't know the treatment of epilepsy.

It is clear from the same table that two thirds of the mothers didn't know the side-effects of anti-epileptic drugs (63.0%). While, 26.0% of them mentioned the hepatic affection as a side-effect of anti-epileptic drugs, followed by fatigue and dizziness (15.0%

of each), then gingival hyperplasia (11.0%). Also, 10.0% of the mothers stated that lack of attention and concentration are side-effects of anti-epileptic drugs.

Table (XIV): Mothers' Knowledge about Treatment of Epilepsy and Side-Effects of Anti-Epileptic Drugs

Treatment of Epilepsy and Side-Effects of Anti-Epileptic Drugs	No (n=100)	%
a. Treatment of Epilepsy #		
▪ Anti-epileptic drugs	79	79.0
▪ Diet	9	9.0
▪ Surgical therapy	8	8.0
▪ Didn't know	20	20.0
b. Side-Effects of Anti-Epileptic Drugs #		
▪ Hepatic affection	26	26.0
▪ Weakness in bones prone to fractures	15	15.0
▪ Fatigue	15	15.0
▪ Dizziness	14	14.0
▪ Gingival hyperplasia	11	11.0
▪ Lack of attention and concentration	10	10.0
▪ Weight loss	7	7.0
▪ Hair loss heavily	6	6.0
▪ Anorexia	6	6.0
▪ Increase in weight	3	3.0
▪ Speech problems	3	3.0
▪ Sleep a lot	3	3.0
▪ Unbalance in walking	2	2.0
▪ Nausea	1	1.0
▪ Increase movement	1	1.0
▪ Redness and irritation of skin	1	1.0
▪ Menstrual disorders in girls	1	1.0
▪ Memory problems as forgetfulness	1	1.0
▪ Depression	1	1.0
▪ Didn't know	63	63.0

 # More than one answer

Table (XV) shows mothers' knowledge about dangers of epileptic seizures and seizures that require children referral to the nearest emergency services. It is clear from the table that less than two third of mothers reported that tongue or a lip biting is a danger of epileptic seizures (60.0%). Injuries and fractures in various body places were mentioned by 49.0% and 23.0% respectively of mothers as dangers of epileptic seizures. On the other hand, 26.0% of the mothers were not aware of the dangers of epileptic seizures on their children.

It is revealed from the same table that the majority of the mothers will refer their children to the nearest emergency services when their children have a recurrent episode without regaining awareness in between seizures (75.0%). One third of the mothers stated that they can refer their children if they have difficulty in breathing during the epileptic seizures (32.0%). While, 21.0% of them reported that they will refer their children if seizures continued for more than five minutes. At the same time 21.0% of the mothers didn't know the epileptic seizures that require immediate referral.

Table (XV): Mothers' Knowledge about Dangers of Epileptic Seizures and Seizures that Require Children Referral to the Nearest Emergency Services

Dangers and children's referral	No (n=100)	%
a. Dangers: #		
▪ Tongue or lips biting	60	60.0
▪ Injuries	49	49.0
▪ Fractures in various body places	23	23.0
▪ Choking	9	9.0
▪ Didn't know	26	26.0
b. Seizures require referral: #		
▪ Recurrent episodes without regaining awareness in between episodes	75	75.0
▪ Difficulty in breathing during a seizure	32	32.0
▪ Continued seizures more than 5 min.	21	21.0
▪ Occurrence of seizures during bathing / swimming	1	1.0
▪ Didn't know	21	21.0

 # More than one answer

Part (III). Mothers' Management of Epilepsy

A. Mothers' Management before Epileptic Seizures

Table (XVI) represents mothers' safety precautions for their children's epileptic seizures and aura. It is revealed from the table that 63.0% of the mothers notified the school about their children illness. Less than half of them avoided leaving their children in a bath tub full of water alone (42.0%). More than one third of the mothers reported that they prevented their children from getting in a contact with sharp objects (39.0%) and 36.0% didn't leave their children to ride bicycle alone. Also, about one third of mothers didn't leave their children showering and swim alone (31.0% and 30.0% respectively) and 28.0% prevented their children from closing bath room from inside.

It is also clear from the same table that 27.0% of mothers protected their children from being in a high place alone and 25.0% of mothers stated that they avoid exposing their children to high voices. While, only 15.0% of mothers' mentioned that they keep a note to record the seizures. None of the studied mothers' their children carried a medical alarm (0.0%).

Concerning mothers' management of aura symptoms, it was clear from the same table that less than two third of mothers stay with their children when feel the aura symptoms (60%). More than half of the mothers stated that they keep things that may cause injury away from their children and prevent children from leaving home (56.0% for each). While, 26.0% of mothers roll their children on their side on the ground.

Table (XVI): Mothers' Safety Precautions for their Children's Epileptic Seizures and Aura

Safety Precautions	No=100	%
Safety Precautions of Epileptic Seizures		
▪ Notify school about child illness	63	63.0
▪ Avoid leaving child in a bathtub full of water	42	42.0
▪ Prevent child from a contact with sharp objects	39	39.0
▪ Avoid child riding of bicycle alone	36	36.0
▪ Avoid leaving child showering alone	31	31.0
▪ Avoid leaving child swim alone	30	30.0
▪ Prevent child from closing bath room from inside	28	28.0
▪ Avoid exposing child to sun	28	28.0
▪ Avoid leaving child in a high place alone	27	27.0
▪ Prevent child from using computer for long periods	26	26.0
▪ Avoid exposing child for high voices	25	25.0
▪ Prevent child from sitting close to watch TV	19	19.0
▪ Keep a note to record seizures	15	15.0
▪ Protect child from practicing mental activities for long periods	12	12.0
▪ Carry a medical alarm	0	0.0
Safety Precautions when Child Feel Aura		
▪ Stay with child	60	60.0
▪ Keep things that may cause injury away	56	56.0
▪ Prevent child from leaving home	56	56.0
▪ Roll child on his side on ground	26	26.0

Mothers' drug management is illustrated in **Table (XVII)**. It was found that more than two third of the mothers gave the AEDs on times (68.0%) and 51.0% didn't use the alternatives drugs without medical consultation. When the epileptic seizures decreased in its frequency, 31.0% of mothers continue to give the treatment and consult the doctor to reduce the drug dose, while 26.0% decrease the dose from themselves without medical consultation and 19.0% stop the drugs.

Concerning mothers' management for prevention of dosing forgetfulness, 47.0% of the mothers mentioned that they link the drug with a daily routine and 23.0% set the

alarm clock. One fifth of the mothers said that they don't do anything to remember the time of the drugs (20.0%). On the other hand, 79.0% of the mothers used the known medications without medical consultation when their children infected with an acute illness.

Regarding the management of side-effects of AEDs, more than half of the mothers didn't give attention to these side-effects as they do not relate the side-effects to AEDs (58.0%) and 33.0% ask the doctor. Only 9.0% of the mothers mentioned that they continue to give drugs in the same dose, while 7.0% of them said that they decrease the dose.

Table (XVII): Mothers' Drugs Management

Management	No (n=100)	%
Drugs Management		
▪ Giving drugs on times	68	68.0
▪ Don't give alternative drugs without doctor consultation	51	51.0
Management when epileptic seizures decreased #		
▪ Continue to give treatment	31	31.0
▪ Consult doctor to reduce dose	31	31.0
▪ Decrease dose by herself	26	26.0
▪ Stop drugs	19	19.0
Management for prevention of dose forgetfulness #		
▪ Link drug with a daily routine, e.g., with meal	47	47.0
▪ Set alarm clock	23	23.0
▪ Family remind her	19	19.0
▪ Did nothing	20	20.0
Management when child infected with acute illness		
▪ Use common known medications	79	79.0
▪ Consult doctor	21	21.0
Management of drugs side effects #		
▪ Ask Doctor	33	33.0
▪ Continue to give same dose	9	9.0
▪ Decrease the dose	7	7.0
▪ Stop drug	1	1.0
▪ Didn't gave attention to side effects	58	58.0

 # More than one answer

B. Mothers' Management during Epileptic Seizures

Table (XVIII) represents mothers' management during epileptic seizures. It is revealed from the table that all mothers stated that they stay with the child until seizure ends and restore his consciousness (100%). Eighty four percent of the mothers mentioned that they remove hard objects that cause injury (84.0%) and 61.0% loosen tight clothes around neck& chest. About one third of the mothers time the duration of the seizures (36.0%). Twenty four percent of the mothers reported that they place the child on side and 18.0% place something soft under child's head.

It is clear from the same table that some of the harmful unnecessary procedures followed by mothers like bribing face with water which was reported by 62.0% of mothers, restraining the child was followed by 39.0% of mothers and 36.0% put solid objects like a spoon in the child's mouth.

Table (XVIII). Mothers' Management during Epileptic Seizures

Management	No (n=100)	%
Mothers' Management		
▪ Stay with child until seizure ends and restore his consciousness	100	100.0
▪ Remove hard objects that cause injury	84	84.0
▪ Loosen tight clothes around neck and chest	61	61.0
▪ Time seizure duration	36	36.0
▪ Place child on his side	24	24.0
▪ Place something soft under head	18	18.0
▪ Keep calm	4	4.0
Harmful Unnecessary Procedures		
▪ Bribe face with water	62	62.0
▪ Restrain child	39	39.0
▪ Put solid objects like a spoon in mouth	36	36.0
▪ Give any treatment in mouth	30	30.0

C. Mothers' Management after Epileptic Seizures

Mothers' management after the epileptic seizures is clarified in **Table (XIX).** It was found that the majority of mothers clean children's mouth from saliva (99.0%) and 94.0% usually observe the children's level of awareness. Three quarters of the mothers stated that they observe children's breathing and general condition (75.0%) and 72.0% examine the children for involuntary urination or defecation during the epileptic seizures. More than half of mothers observe the children's ability to move limbs and his ability in general (54.0%) and 42.0% check the children for any wounds or injuries. While, 36.0% of them delay introducing food or drink until the children fully regain their consciousness, and 21.0% usually keep the children on their side or in back and the head turned to one side.

Concerning the recording of epileptic seizures, it is revealed from the same table that the minority of the mothers record the time and duration of seizures (12.0% and 13.0% respectively). Only 5.0% of mothers had record the signs of epileptic seizures and 4.0% record the children's activities before the seizures or general condition after it.

Table (XIX). Mothers' Management after Epileptic Seizures

Management	No (n=100)	%
Mothers' Management		
▪ Clean child's mouth	99	99.0
▪ Observe child's level of consciousness	94	94.0
▪ Observe breathing and general condition	75	75.0
▪ Examine for involuntary urination or defecation	72	72.0
▪ Observe child mobility and ability to move limbs	54	54.0
▪ Check child for any wounds or injuries	42	42.0
▪ Delay introducing food or drink until child fully regain his consciousness	36	36.0
▪ Keep child on his side or on back and head turned to one side	21	21.0
Record after seizures #		
▪ Duration in minutes	13	13.0
▪ Time of seizure (date / day / time)	12	12.0
▪ Symptoms	5	5.0
▪ Child's activities before seizure	4	4.0
▪ Child's general condition	4	4.0

 # More than one answer

Table (XX) and **Figure (IV)** present mothers' source of information regarding management of epilepsy. It is revealed from the table that the majority of the mothers reported that their own experience was the source of their information (87.0%). Twenty one percent of the mothers gained their information from the doctor. While, 13.0% of them get the information from their relatives and neighbors. The nurse was the source of information for 11.0% only of the mothers.

Table (XX): Mothers' Source of Information Regarding Management of Epilepsy

Source of Information #	No (n=100)	%
▪ Own experience	87	87.0
▪ Doctor	21	21.0
▪ Relatives and neighbors	13	13.0
▪ Nurse	11	11.0
▪ Media	11	11.0
▪ Other patients	4	4.0

 # More than one answer

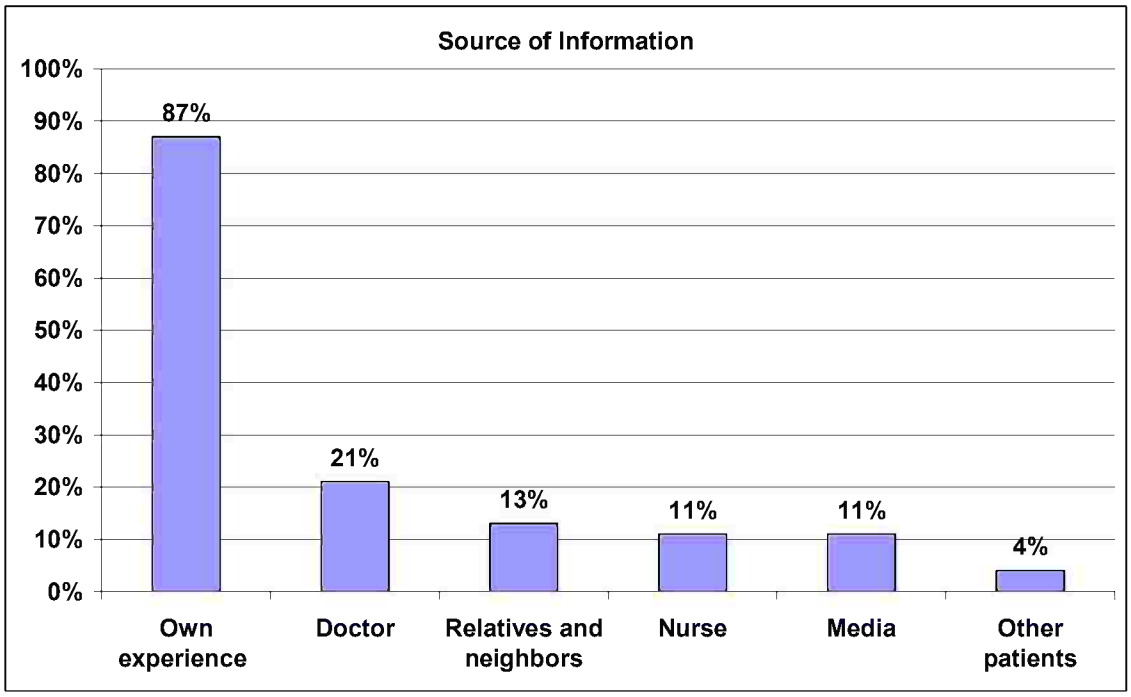

Figure (IV): Mothers' Source of Information Regarding Management of Epilepsy

Part IV: Scores of Mothers' Knowledge and Management of their Epileptic Children

Regarding mothers' total knowledge scores about epilepsy; it was found that all the studied mothers had "poor" scores of knowledge about epilepsy (100%).

Mothers' management scores before, during, after and total management of their epileptic children were presented in **Table (XXI)** and **Figure (V).** It is revealed from the table that almost half of the mothers had "unsatisfactory" scores of their total management of their children epileptic seizures (49.0%), 36.0% had "satisfactory" scores and 15.0% had "good" scores for their total management of their children epileptic seizures.

Regarding mothers' scores for their management before the epileptic seizures, **Table (XXI)** and **Figure (VI)** illustrated that 20.0% of the mothers had "good" and 24.0% had "satisfactory" scores of management before the epileptic seizures. Also, more than half of them had "unsatisfactory" scores of management (56.0%). In relation to mothers' score for their management during the epileptic seizures, 22.0% and 43.0% of mothers had "good" and "satisfactory" scores respectively and 35.0% of them had "unsatisfactory" scores. Only 10.0% of the mothers had "good" scores regarding management after the epileptic seizures and 35.0% had "satisfactory" scores and slightly more than half of them had "unsatisfactory" scores regarding their total management of their children after epileptic seizures (55.0%).

Table (XXI): Mothers' Total Management Scores of their Epileptic Children.

Management score	Good	Satisfactory	Unsatisfactory	Total
	%	%	%	%
Total Score	15	36	49	100.0
Before	20	24	56	100.0
During	22	43	35	100.0
After	10	35	55	100.0

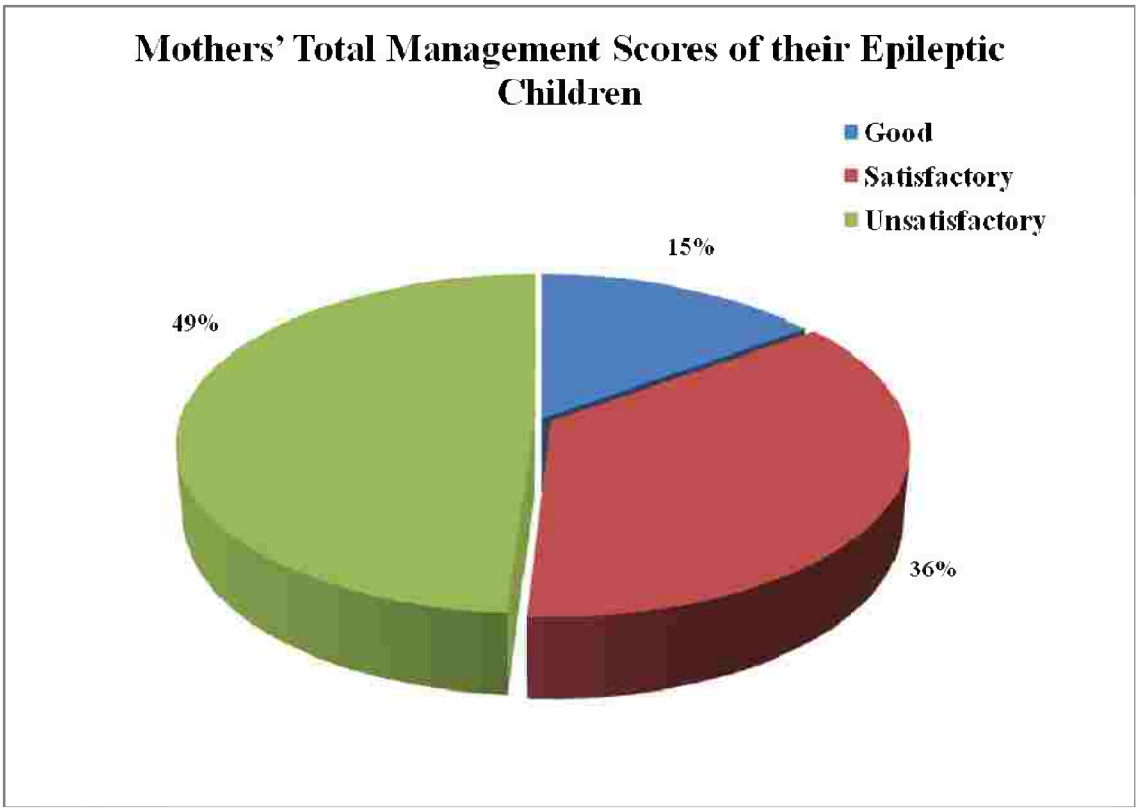

Figure (V): Mothers' Total Management Scores of their Epileptic Children

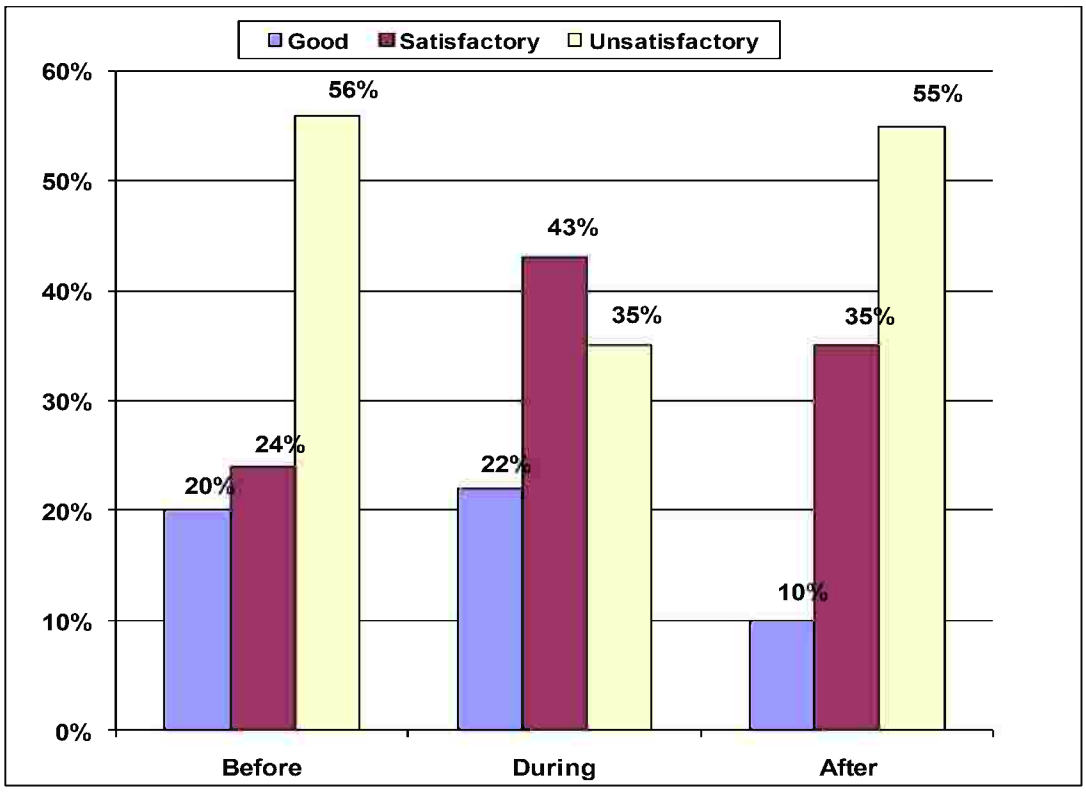

Figure (VI): Mothers' Management Scores of their Children before, during and after the Epileptic Seizures.

Part V: Mothers' Management Scores of their Epileptic Children According to their Characteristics

Table (XXII) clarified mothers' total management scores of their epileptic children according to their characteristics. It is clear from the table that 73.3% and 72.2% of mother their age 30 years & more had "good" and "satisfactory" scores respectively regarding their total management of their children epileptic seizures.

The same table showed that 60.0% and 75.0% of mothers who completed their secondary / diploma and university education had "good" and "satisfactory" scores respectively in their total management and the difference was statistically significant (P= 0.000). It was also noticed from this table that 85.7% of mothers who had "unsatisfactory" scores of management were from rural residence and the difference was statistically significant (P= 0.003).

Table (XXII): Total Mothers' Management Scores of their Epileptic Children According to their Characteristics

Characteristics	Mothers' Management Scores						χ^2	P
	Good		Satisfactory		Unsatisfactory			
	No	%	No	%	No	%		
Age								
▪ <30	4	26.7	10	27.8	13	26.5	0.017	0.991
▪ 30 & more	11	73.3	26	72.2	36	73.5		
Total	**15**	**100**	**36**	**100**	**49**	**100**		
Education								
▪ Illiterate and Read& Write	0	0	2	5.6	13	26.5	49.928	0.000*
▪ Primary	0	5	5	13.8	20	40.8		
▪ Secondary/ Diploma	9	60	27	75	16	32.7		
▪ University	6	40	2	5.6	0	0		
Total	**15**	**100**	**36**	**100**	**49**	**100**		
Residence								
▪ Rural	8	53.3	33	91.7	42	85.7	11.528	0.003*
▪ Urban	7	46.7	3	8.3	7	14.3		
Total	**15**	**100**	**36**	**100**	**49**	**100**		

(*) Statistically Significant at $p \leq 0.05$

Mothers' management scores of their epileptic children before the epileptic seizures according to their characteristics were presented in **Table (XXIII);** it is clear from the table that 65.0% and 75.0% of mother their age 30 years & more had "good" and "satisfactory" scores respectively regarding their management before the epileptic seizures.

It is clear from the same table that 65.0% and 30.0% of mothers who had completed their secondary/ diploma and university education had "good" scores of management compared to 33.9% for those having "unsatisfactory" scores and the difference was statistically significant (P=0.000). It was also noticed from this table that 85.7% of mothers who had "unsatisfactory" scores of management were from rural residence, where there was statistical significant difference between mothers' management and their residence (P=0.005).

Table (XXIII): Mothers' Management Scores of their Epileptic Children Before Seizures According to their Characteristics

Characteristics	Mothers' Management Scores						χ^2	P
	Good		Satisfactory		Unsatisfactory			
	No	%	No	%	No	%		
Age								
▪ <30	7	35	6	25	14	25	0.812	0.666
▪ 30 & more	13	65	18	75	42	75		
Total	**20**	**100**	**24**	**100**	**56**	**100**		
Education								
▪ Illiterate and Read& Write	0	0	0	0	15	26.8	47.505	0.000*
▪ Primary	1	5	2	8.3	22	39.3		
▪ Secondary/ Diploma	13	65	20	83.4	19	33.9		
▪ University	6	30	2	8.3	0	0		
Total	**20**	**100**	**24**	**100**	**56**	**100**		
Residence								
▪ Rural	12	60	23	95.8	48	85.7	10.592	0.005*
▪ Urban	8	40	1	4.2	8	14.3		
Total	**20**	**100**	**24**	**100**	**56**	**100**		

(*) Statistically significant at p ≤ 0.05

Table (XXIV) shows mothers' management scores of their epileptic children during the epileptic seizures according to their characteristics. It is revealed from the table that 81.8% and 67.4% of mothers who were in the age 30 years & more had "good" and "satisfactory" scores of management respectively than mothers younger than 30 years. In relation to mothers' education, it is clarified from the table that, 68.2% and 58.1% of mothers completed their secondary / diploma and university education had "good" and "satisfactory" scores of management respectively in managing their children during the epileptic seizures compared to 34.3% of mothers who had "unsatisfactory" scores and the difference was statistically significant (P= 0.000).

Table (XXIV): Mothers' Management Scores of their Epileptic Children During Seizures According to their Characteristics

Characteristics	Mothers' Management Scores						χ^2	P
	Good		Satisfactory		Unsatisfactory			
	No	%	No	%	No	%		
Age								
▪ <30	4	18.2	14	32.6	9	25.7	1.571	0.456
▪ 30 & more	18	81.8	29	67.4	26	74.3		
Total	**22**	**100**	**43**	**100**	**35**	**100**		
Education								
▪ Illiterate and Read& Write	0	0	9	20.9	6	17.1	34.333	0.000*
▪ Primary	1	4.5	7	16.3	17	48.6		
▪ Secondary/ Diploma	15	68.2	25	58.1	12	34.3		
▪ University	6	27.3	2	4.7	0	0		
Total	**22**	**100**	**43**	**100**	**35**	**100**		
Residence								
▪ Rural	16	72.7	35	81.4	32	91.4	3.486	0.175
▪ Urban	6	27.3	8	18.6	3	8.6		
Total	**22**	**100**	**43**	**100**	**35**	**100**		

(*) Statistically significant at $p \leq 0.05$

Mothers' management scores of their epileptic children after the epileptic seizures according to their characteristics were illustrated in **Table (XXV).** The table showed that 40.0% and 77.1% of mothers in managing their children after the epileptic seizures had "good" and "satisfactory" scores of management respectively compared to 38.2% of mothers who had "unsatisfactory" scores and the difference was statistically significant (P= 0.000).

Table (XXV): Mothers' Management Scores of their Epileptic Children After Seizures According to their Characteristics

Characteristics	Mothers' Management Scores						χ^2	P
	Good		Satisfactory		Unsatisfactory			
	No	%	No	%	No	%		
Age							3.925	0.140
▪ <30	1	10	7	20	19	34.5		
▪ 30 & more	9	90	28	80	36	65.5		
Total	**10**	**100**	**35**	**100**	**55**	**100**		
Education							60.377	0.000*
▪ Illiterate and Read& Write	0	0	3	8.6	12	21.8		
▪ Primary	0	5	3	8.6	22	40		
▪ Secondary/ Diploma	4	40	27	77.1	21	38.2		
▪ University	6	60	2	5.7	0	0		
Total	**10**	**100**	**35**	**100**	**55**	**100**		
Residence							4.167	0.125
▪ Rural	6	60	30	85.7	47	85.5		
▪ Urban	4	40	5	14.3	8	14.5		
Total	**10**	**100**	**35**	**100**	**55**	**100**		

(*) Statistically significant at $p \leq 0.05$

Mothers' total management scores of their epileptic children according to their children characteristics were presented in **Table (XXVI).** It is revealed from the table that there were no statistical significant differences (P ranged from 0.063 to 0.629) between mother's total management scores of epileptic seizures and their children characteristics as age, gender, education, birth order and number of siblings.

Table (XXVI): Total Mothers' Management Scores of their Epileptic Children According to their Children Characteristics

Characteristics	Mothers' Management Scores						χ^2	P
	Good		Satisfactory		Unsatisfactory			
	No	%	No	%	No	%		
Age								
▪ <6	5	33.3	13	36.1	10	20.4		
▪ 6-	9	60	17	47.2	29	59.2	3.9.6	0.419
▪ 12 & more	1	6.7	6	16.7	10	20.4		
Total	**15**	**100**	**36**	**100**	**49**	**100**		
Gender								
▪ Male	7	46.7	19	52.8	36	73.5	5.532	0.063
▪ Female	8	53.3	17	47.2	13	26.5		
Total	**15**	**100**	**36**	**100**	**49**	**100**		
Education								
▪ Nursery	1	6.7	6	16.7	6	12.2		
▪ Primary	9	60	19	52.8	23	47		
▪ Preparatory	3	19.9	7	19.5	8	16.3	11.592	0.170
▪ Secondary	1	6.7	1	2.7	1	2.1		
▪ Didn't attend school	1	6.7	3	8.3	11	22.4		
Total	**15**	**100**	**36**	**100**	**49**	**100**		
Birth order								
▪ 1st	8	53.3	13	36.1	22	44.9		
▪ 2nd	5	33.4	16	44.4	14	28.6	6.165	0.629
▪ 3rd and more	2	13.3	7	19.5	13	26.5		
Total	**15**	**100**	**36**	**100**	**49**	**100**		
Number of siblings								
▪ Only child	2	13.3	5	13.9	2	4.1		
▪ 1	7	46.7	8	22.2	11	22.4	14.298	0.074
▪ 2	4	26.7	20	55.6	20	40.8		
▪ 3 and more	2	13.3	3	8.3	16	32.7		
Total	**15**	**100**	**36**	**100**	**49**	**100**		

(*) Statistically Significant at $p \leq 0.05$

Mothers' management scores of their epileptic children before the epileptic seizures according to their children characteristics were illustrated in **Table (XXVII).** The table showed that 65.0% of mothers having female child had "good" scores of management compared to those having males children (35.0%) and the difference was statistically significant (P= 0.016). Regarding to children number of siblings the table illustrated that 44.6% and 30.4% of mothers had "unsatisfactory" scores of management have more than two and three siblings compared to 3.6% where the sick children were the only child and the difference was statistically significant (P= 0.029).

Table (XXVII): Mothers' Management Scores of their Epileptic Children Before Seizures According to Children Characteristics

Characteristics	Mothers' Management Scores						χ^2	P
	Good		Satisfactory		Unsatisfactory			
	No	%	No	%	No	%		
Age								
▪ <6	9	45	7	29.2	12	21.4		
▪ 6-	10	50	14	58.3	31	55.4	6.332	0.176
▪ 12 & more	1	5	3	12.5	13	23.2		
Total	**20**	**100**	**24**	**100**	**56**	**100**		
Gender								
▪ Male	7	35	15	62.5	40	71.4	8.304	0.016*
▪ Female	13	65	9	37.5	16	28.6		
Total	**20**	**100**	**24**	**100**	**56**	**100**		
Education								
▪ Nursery	2	10	4	16.6	7	12.5		
▪ Primary	12	60	13	54.2	26	46.5		
▪ Preparatory	2	10	6	15	10	17.8	10.426	0.236
▪ Secondary	1	5	0	0	2	3.6		
▪ Didn't attend school	3	15	1	4.2	11	19.6		
Total	**20**	**100**	**24**	**100**	**56**	**100**		
Birth order								
▪ 1st	11	55	8	33.3	24	42.9		
▪ 2nd	7	35	11	45.9	17	30.4	5.210	0.735
▪ 3rd and more	2	10	5	20.8	15	26.7		
Total	**20**	**100**	**24**	**100**	**56**	**100**		
Number of siblings								
▪ Only child	3	15	4	16.7	2	3.6		
▪ 1	10	50	4	16.6	12	21.4	17.114	0.029*
▪ 2	6	30	13	54.2	25	44.6		
▪ 3 and more	1	5	3	12.5	17	30.4		
Total	**20**	**100**	**24**	**100**	**56**	**100**		

(*) Statistically Significant at $p \leq 0.05$

Mothers' management scores of their epileptic children during the epileptic seizures according to their children characteristics were presented in **Table (XXVIII).** It is revealed from table that there were no statistical significant differences between mother's management scores during epileptic seizures and their children age, gender, education, birth order and number of siblings (P ranged from 0.066 to 0.772).

Table (XXVIII): Mothers' Management Scores of their Epileptic Children During Seizures According to Children Characteristics

Characteristics	Mothers' Management Scores						χ^2	P
	Good		Satisfactory		Unsatisfactory			
	No	%	No	%	No	%		
Age								
▪ <6	7	31.8	15	34.8	6	17.1		
▪ 6-	12	54.6	22	51.2	21	60	3.678	0.451
▪ 12 & more	3	13.6	6	14	8	22.9		
Total	**22**	**100**	**43**	**100**	**35**	**100**		
Gender								
▪ Male	11	50	24	55.8	27	77.1	5.450	0.066
▪ Female	11	50	19	44.2	8	22.9		
Total	**22**	**100**	**43**	**100**	**35**	**100**		
Education								
▪ Nursery	2	9	6	14	5	14.3		
▪ Primary	11	50	22	51.4	18	51.4		
▪ Preparatory	6	27	6	14	6	17.1	8.543	0.382
▪ Secondary	2	9.5	0	0	1	2.9		
▪ Didn't attend school	1	4.5	9	20.6	5	14.3		
Total	**22**	**100**	**43**	**100**	**35**	**100**		
Birth order								
▪ 1st	9	40.9	18	41.9	16	45.7		
▪ 2nd	8	36.4	17	39.5	10	28.6	4.863	0.772
▪ 3rd and more	5	22.7	8	18.6	9	25.7		
Total	**22**	**100**	**43**	**100**	**35**	**100**		
Number of siblings								
▪ Only child	3	13.6	5	11.6	1	2.9		
▪ 1	7	31.8	12	27.9	7	20	10.168	0.253
▪ 2	10	45.5	19	44.2	15	42.8		
▪ 3 and more	2	9.1	7	16.3	12	34.3		
Total	**22**	**100**	**43**	**100**	**35**	**100**		

(*) Statistically Significant at $p \leq 0.05$

Mothers' management scores of their epileptic children after the epileptic seizures according to their children characteristics were illustrated in **Table (XXIX).** The table showed that there were no statistical significant differences between mother's management scores after epileptic seizures and their children age, gender, education, birth order and number of siblings (P ranged from 0.062 to 0.981).

Table (XXIX): Mothers' Management Scores of their Epileptic Children After Seizures According to Children Characteristics

Characteristics	Mothers' Management Scores						χ^2	P
	Good		Satisfactory		Unsatisfactory			
	No	%	No	%	No	%		
Age								
▪ <6	3	30	10	28.6	15	27.3		
▪ 6-	6	60	19	54.3	30	54.5	0.413	0.981
▪ 12 & more	1	10	6	17.1	10	18.2		
Total	**10**	**100**	**35**	**100**	**55**	**100**		
Gender								
▪ Male	5	50	17	48.5	35	63.6	6.643	0.066
▪ Female	5	50	18	51.5	20	36.4		
Total	**10**	**100**	**35**	**100**	**55**	**100**		
Education								
▪ Nursery	0	0	6	17.1	7	12.7		
▪ Primary	8	80	16	45.8	27	49		
▪ Preparatory	1	10	9	25.7	8	14.6	11.290	0.186
▪ Secondary	1	10	1	2.8	1	1.9		
▪ Did not attend school	0	0	3	8.6	12	21.8		
Total	**10**	**100**	**35**	**100**	**55**	**100**		
Birth order								
▪ 1st	7	70	8	22.9	28	50.9		
▪ 2nd	2	20	19	54.3	14	25.5	14.858	0.062
▪ 3rd and more	1	10	8	22.8	13	23.6		
Total	**10**	**100**	**35**	**100**	**55**	**100**		
Number of siblings								
▪ Only child	1	10	2	5.7	6	10.9		
▪ 1	5	50	9	25.7	12	21.8	9.541	0.299
▪ 2	3	30	20	57.1	21	38.2		
▪ 3 and more	1	10	4	11.5	16	29.1		
Total	**10**	**100**	**35**	**100**	**55**	**100**		

(*) Statistically Significant at $p \leq 0.05$